9.2 Preliminary Phase 2 Ground Condition Assessment

Riverside & Woodbank Estate, Balloch

Preliminary Phase 2 Ground Condition Assessment

On behalf of: Flamingo Land Ltd

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Issue	Date	Description	Prepared	Reviewed	Approved
001	21/06/17	DRAFT Preliminary site investigation report. Final gas and groundwater data to be incorporated into later edition	GS	DMcD	DMcD
002	18/09/17	Preliminary site investigation report. Final gas and groundwater data incorporated	GS	DMcD	DMcD

Contents

Figures

Tables

Appendices

Summary

This report presents the findings of a Preliminary Phase 2 Ground Condition Assessment for the proposed development of the site at Riverside and Woodbank, Balloch.

Site Description

The Site, which measures approximately 18 hectares, is situated at the southern end of Loch Lomond. The Site can be split into two distinct areas, Riverside in the east and Woodbank in the west.

The larger eastern area (Riverside) is an irregular shape and is bounded to the north by the Lomond Shores centre and the bank of the Loch itself. To the east is the River Leven (the Maid of the Loch Slipway, including pontoons) and to the south is primarily housing. The majority of the Riverside area is occupied by woodland and walking paths. Two INEOS oil pipelines run through the site from west to east and two fenced valve compounds are present.

The smaller western area (Woodbank) is accessed via a track from Old Luss Road. The majority of the site area comprises two relatively flat lying open fields, however, in the west is an area dominated by woodland and the ruins of an old hotel and outbuildings. The western part of Woodbank features some steep slopes.

The Riverside Site has a varied history. There is no record of heavy industrial land uses within the Riverside site, however, multiple small quarries were active, particularly in the northern and western areas. The eastern area (beside the slipway) was dominated by railway infrastructure from Balloch Station in the south to Balloch Pier in the north. A dye works was located immediately offsite to the south, however, this area is currently occupied by housing.

The majority of the Woodbank site remained undeveloped from 1864 until present. The exception to this being the hotel and outbuildings present within the sloping woodland area in the west of the Woodbank site. On later mapping the hotel was labelled as Hamilton House. The hotel building was destroyed in a fire in 1995. The majority of the building was ruined, however, the façade remains standing. The various outbuildings are in a state of severe disrepair.

Ground Investigation

A preliminary ground investigation which comprised the drilling of shallow boreholes at 57 locations has been undertaken. Samples of soil were collected for geotechnical and environmental analysis and monitoring standpipes were installed for gas and groundwater analysis.

The objectives of the investigation were to record the shallow ground conditions including gas and groundwater. Where ground conditions are likely to present constraints to certain types of development, these will be described. The report will discuss where further investigations will be required in order to enable foundation design and remediation (if required).

Results of the Ground Investigation

Geotechnical Ground Conditions

Ground conditions across the undeveloped areas of the site comprised natural drift deposits with alluvium (soft, sandy, clayey peat) primarily to the east of Pier Road, glaciofluvial deposits (sands and gravels with silt and clay) and till (gravelly sandy clay). Made ground of >1.0m thickness was almost entirely restricted to the eastern part of the site where former railway lines ran. Made ground varied from cohesive to granular with common inclusions such as ash, glass, pottery and brick. Soft ground conditions associated with Peat / Alluvium were also typically restricted to the eastern part of the site.

Due to the depth of poor ground (Made Ground, Alluvium and Peat), the area to the east of Pier Road will not be suitable for traditional pad or strip foundations and will therefore require some form of ground treatment such as localised excavation and replacement, the use of vibro columns or piled foundations. The exceptions to this would be very lightly loaded (i.e. timber or timber and canvas) structures which would cause very little compression of the ground and are relatively tolerant of a degree of settlement in the event of ground movement.

Any proposed road construction will need to take cognisance of the peat deposits and may require either the excavation of peat or the use of a piled load transfer blanket.

Across the majority of the site, where Till deposits and Glaciofluvial deposits are present, it may be possible to adopt shallow spread foundations for relatively lightly loaded structures where the underlying material is proved to be at least medium dense or medium strength.

However, depending on the nature of the specific structures, consideration may need to be given to ground improvement such as vibro concrete columns, and for heavier and/or more sensitive structures, or where the strata is low strength or relative density is very loose or loose, then a piled foundation solution is likely to be required. This is likely to apply to structures such as the swimming pool complex and hotels.

Contamination

A detailed risk assessment of contamination in soils cannot be carried out until the nature of the proposed uses have been confirmed. However, for this preliminary assessment, contaminants have been highlighted as 'elevated' if they exceeded guideline values for soils in residential gardens.

Soils containing elevated contaminants were primarily restricted to the area to the east of Pier Road and to the North of Ben Lomond Way. The primary contaminant of concern was lead, however, elevated arsenic and hexavalent chromium were also encountered. More detailed assessment of the potential risks posed by contaminants will be undertaken when the development plan has been refined. However, it is likely that some remedial measures will be required in the eastern area. These may be limited to the delineation and removal of 'hotspots' and / the placement of capping material above the contaminated soils to generate a barrier and thus limiting exposure.

Gas

The dataset indicates that the area east of Pier Road and north of Ben Lomond Way will be classified as CS2 as a result of concentrations of carbon dioxide and methane in exceedance of trigger values. The design of buildings in these areas may require the inclusion of gas protection measures. The results for the remainder of the site indicate that it would be classified as CS1 and no gas protection measures will be required.

Groundwater

The results of the analysis of groundwater samples have confirmed the presence of slightly elevated concentrations of heavy metals in some of the boreholes. The concentrations encountered are considered unlikely to have significant negative impact on the sensitive receptors (Loch Lomond and River Leven), however, a further round of borehole sampling and the collection of surface water samples with testing is recommended to strengthen this conclusion.

The summary contains an overview of the key findings and conclusions. However, no reliance should be placed on any part of the summary until the whole of the report has been read.

1 Introduction

1.1 Preamble

1.1.1 Peter Brett Associates LLP (PBA) has been commissioned by Flamingo Land (the Client) to prepare a Preliminary Phase 2 Ground Condition Assessment for the proposed tourist park development at Riverside and Woodbank, Balloch.

1.1.2 Previous investigations have been undertaken at the site, and PBA has reviewed complete or partial copies of the following salient reports:

- Engineering Review, West Riverside, Balloch, Aecom, 2015;
- West Riverside, Loch Lomond Shores, Phase 1 Geo-Environmental Desk Study, Aecom 2015;
- Lomond Shores, Stage 2 Site Investigation Report, URS Report Fer 44762681/GLRP0533 Issue 2.

1.1.3 It should be noted that none of the above listed reports included the Woodbank site, however, Woodbank was visible on historical mapping included within the Phase 1 Report.

1.1.4 Whilst PBA has taken cognisance of the contents of the reports listed above, the content of previous work will not be repeated here.

1.1.5 The reports listed above concern investigations undertaken when the site was being promoted for a different end use and with a different site boundary. Furthermore, since the previous investigations and assessments were carried out, there have been considerable developments in relevant guidance and best practice of assessing ground conditions, together with revisions to the assessment methodology and criteria for assessing the risks from land contamination and hazardous ground gases.

1.1.6 The objective of this study is to present an assessment of ground conditions based on a review of previous assessments and the results of a preliminary intrusive site investigation carried out in February 2017.

1.1.7 This study has been undertaken to assess the ground conditions at the Site, and thereby to identify potential geoenvironmental and geotechnical hazards and constraints with respect to the proposed end use.

1.1.8 At the time of writing this report, the proposed layout of the site (Masterplan) has yet to be finalised. It is anticipated that the findings of this investigation will be used to inform the next phase of master planning.

1.1.9 The development will include some very distinct structures and building types ranging from the demanding (such as an indoor leisure complex with a swimming pool and an outdoor monorail) to the simple (such as woodland paths, glamping accommodation and lodges). Clearly the different structures proposed will have very different foundation requirements. The various different land uses will also require different environmental risk assessments (more detailed description in **Section 2**, below).

1.1.10 Once a revised masterplan has been drawn up, additional phases of investigations will be required to establish ground conditions in more detail around the areas where the requirement is more complex (i.e. at large / heavily loaded buildings or monorail column footings). Likewise, additional intrusive investigation may be required at any areas where potentially significant contamination is encountered.

1.1.11 The assessment has been carried out in general accordance with "established procedures" using current UK best practice and guidance as given in British Standard 10175 (BS 10175, 2013), Contaminated Land Report 11 (EA, 2004) and NHBC Standards Chapter 4.1 (NHBC, 2016a) with regard to land contamination, and DCLG (2014) with regard to land stability.

1.2 Scope of Work

1.2.1 In summary the scope of work undertaken for this study comprised:

- A review of the previous investigations and assessments, together with readily available geological, hydrogeological and aquifer vulnerability maps, and historical Ordnance Survey maps.
- A preliminary intrusive investigation, designed to achieve site wide coverage. The investigation comprised:
    - Fifty-Seven (57) shallow boreholes were advanced across the site at the locations shown on **Figure 1** (N.B. the actual total number of boreholes advanced was 73, as the presence of obstructions in the shallow soils meant that A, B and C were required at certain locations),
    - Boreholes were logged and in situ testing, primarily in the form of SPTs was undertaken at all locations,
    - Samples were recovered from all boreholes for geotechnical and environmental analysis,
    - Environmental monitoring standpipes were installed in 36 no of the boreholes to enable gas and groundwater monitoring,
    - Ground gas concentrations and flow rates were measured in the boreholes on 6 occasions over at least 12 weeks.
    - Samples of groundwater were recovered from boreholes and sent to an accredited laboratory for environmental analysis.
- A preliminary assessment of geological hazards and ground stability risks was undertaken to identify potential risks arising from loose or weak soils, cavities and other potentially adverse foundation conditions constraints.
- A preliminary quantitative contamination risk assessment has been carried out utilising a Conceptual Site Model to identify 'source-pathway-receptor' linkages and data obtained from the site investigation to assess the potential risks and hazards, if any, associated with existing contamination in the ground.

1.2.2 Following the preliminary assessment, this report will recommend areas of the site where additional investigation would be beneficial.

1.2.3 It is anticipated that aspects of the masterplan will be revised or confirmed, partially based on the outcomes of the present study. Detailed foundation assessments will then be undertaken at the locations of the proposed structures that require them. I.e. the more detailed investigations and revisions of layout / design will be undertaken as concurrent, iterative processes.

1.3 Limitations

1.3.1 Unless stated otherwise, information from the previous ground investigation and assessment has not been included in this report and, where referenced, the report presenting this information should be read in conjunction with this report. PBA has not been involved in the supervision and technical direction of the previous investigations undertaken at the Site and accepts no responsible for the accuracy and completeness of the data.

1.3.2 Guidance on the context of this report and any general limitations or constraints on its content and usage are given in a separate guidance note included after the text of this report.

1.3.3 Additional investigations including flood risk, ecology and archaeology are being undertaken at the site and will not be covered in detail in this report.

2 The Site

2.1 Site Location

2.1.1 The Site is located at the northern extent of the town of Balloch, at the southern end of Loch Lomond approximately centred at Ordnance Survey Grid Reference 238666, 682128. The boundary of the Site is shown on a Plan presented as **Figure 1**.

2.1.2 The Site which measures approximately 18 hectares can be split into two distinct areas, Riverside in the east and Woodbank in the west.

2.1.3 The larger eastern area (Riverside) is an irregular shape and is bounded to the north by the Lomond Shores centre and the bank of the Loch itself. To the east is the River Leven (the Maid of the Loch Slipway, including pontoons) and to the south is primarily housing. The majority of the Riverside area is occupied by woodland and walking paths. Two INEOS oil pipelines run through the site from west to east and two fenced valve compounds are present.

2.1.4 The smaller western area (Woodbank) is accessed via a track from Old Luss Road. The majority of the site area comprises two relatively flat lying open fields, however, in the west is an area dominated by woodland and the ruins of an old hotel and outbuildings.

2.1.5 The Site in general is relatively flat lying. However, in the eastern area, ground levels fall away towards the River Leven. The Ineos oil pipelines run from west to east through the northern part of the site and for the most part are situated within a cutting. Woodland areas are hummocky, with level variations in the region of 2 – 3m. Other mounds and hollows at the site may be related to the superficial quarrying of sands and gravels. The western part of the Woodbank site includes some steeply sloping ground which is thought to be a natural feature, possibly due to the effects of glacial movement. The above features (with the exception of the Woodbank site) are shown on a topographical survey undertaken in 2017.

2.2 Summary of Site History

2.2.1 This summary is based on information from historical Ordnance Survey (OS) maps which were included within the 2015 Aecom Phase 1 report. An appraisal of the Site history was included within that report. A brief summary of the salient features is presented here.

2.2.2 The Riverside Site has a varied history. There is no record of heavy industrial land uses within the Riverside site, however, multiple small quarries were active, particularly in the northern and western areas. The eastern area (beside the slipway) was dominated by railway infrastructure from Balloch Station in the south to Balloch Pier in the north. A dye works was located immediately offsite to the south, however, this area is currently occupied by housing.

2.2.3 The majority of the Woodbank site remained undeveloped from 1864 until present. The exception to this being the hotel and outbuildings present within the sloping woodland area in the west of the Woodbank site. On later mapping the hotel was labelled as Hamilton House. The hotel building was destroyed in a fire in 1995. The majority of the building was ruined, however, the façade remains standing. The various outbuildings are in a state of severe disrepair.

2.3 Current Site Use

2.3.1 The eastern part of the Woodbank area is occupied by two relatively flat lying fields which have been used for grazing. The western part of the Woodbank area is more heavily vegetated with woodland and rhododendrons. The western area includes the various ruined buildings formerly

2.3.2 associated with the hotel. In the north west, is a small hill, possibly a drumlin (a hill moulded by glacial action).

2.3.3 The majority of the Riverside site is covered by woodland with paths, however, more open areas are also present throughout the site.

2.3.4 There is evidence of re-profiling throughout the Riverside site area. This is likely to have been associated with the small quarries in the area, the Lomond Shores development and the Ineos pipelines. Cuttings and embankments representing variations of between 2 and 5 metres in height are present and recorded on the topographical survey issued on 31/05/17 by L&M Survey Services for PBA.

2.3.5 Two fenced off compounds are present in the north of the site, along the route of the Ineos pipeline. These are assumed to be valve works.

2.3.6 The Aecom report from 2015 noted the presence of two stands of Japanese Knotweed within the Riverside site area. The Woodbank area was not included in that investigation. The presence of invasive / notifiable species will be covered during ecological survey works and are outside of the scope of this investigation.

2.3.7 The layout of the Site is shown on the plans included as **Figures 1 – 4**.

2.4 Proposed Development

2.4.1 A Masterplan for the proposed development is being developed. In general, the project relates to the erection and operation of a tourism and leisure led mixed use development with associated infrastructure on the two linked sites (Woodbank and Riverside) to the north west of Balloch.

2.4.2 The development will likely include new accommodation buildings, pods and glamping facilities, woodland paths, picnic areas, a central 'hub' including swimming pool, sports facilities and other attractions.

2.4.3 Development of the Woodbank House area will include proposals for the redevelopment of the remains of Woodbank House, (a listed building) and attendant structures, together with additional holiday lodge-style accommodation in the grounds.

2.4.4 Access to the proposed development will be from the existing road network including the A82, the A811 Stirling Road, the Old Luss Road, Ben Lomond Way, Pier Road and Balloch Road.

2.4.5 A Masterplan is currently being prepared with the layout evolving through an assessment of the site constraints (including the conclusions of this report). Early drafts of the Masterplan are still considered to provide a useful context for the findings of the present report as the draft shows the site split into zones and is indicative of the types of structures and density of development that is proposed.

2.4.6 Depending on the proposed structures, the foundation requirements will vary from robust and potentially complex (e.g. the swimming pool, elevated monorail footings) to very simple and undemanding (e.g. lodges and glamping pods, forest paths).

2.4.7 The assessments presented in **Sections 3, 4** and **5** of this report relate to the geotechnical properties (and implications for foundation design) for the various superficial geological.

2.4.8 Conditions encountered across the site as well as soil environmental and ground gassing assessments.

2.4.9 In order to make the assessments more useful to the masterplan revision phase, these constraints / ground conditions have been summarised on **Figures 1 - 4**.

3 Ground Conditions, Hydrogeology and Hydrology

3.1 Geology

Published Superficial Geology

3.1.1 The 1:50 000 scale geological map of the area, Sheet 30W and part of 29E (Scotland) - Drift "Greenock" (British Geological Survey, 1989) indicates the presence of some superficial deposits overlying the solid geology within the Site boundary. The superficial deposits comprise three main types:

- Raised Marine Deposits – Clay, silt, sand and gravel. Formed in shallow seas with mainly siliciclastic sediments. This is indicated to be present adjacent to and following the southern shoreline of the loch.
- Glaciofluvial Sand and Gravel – gravel, sand and silt formed in cold periods with Ice Age glaciers scouring the landscape and depositing moraines of till with outwash sand and gravel deposits. These deposits are indicated to be present across the greater part of the Woodbank and Riverside sites.
- Till (Diamicton) – these deposits were formed in cold periods with Ice Age glaciers scouring the landscape and depositing moraines of till with outwash sand and gravel deposits. These deposits are indicated to be potentially present along the western part of the Woodbank site.

3.1.2 In addition, the British Geological Survey (BGS) mapping also shows areas of man-made deposits (Made Ground) being present and these are annotated by the BGS as being "deposited on original ground surface". These occur in two locations, being; in a narrow strip along the banks of the River Leven (Slipway) to the east of Pier Road (along the alignment of the former railway line); and in an area of ground to the North of Balloch Road and extending beneath Clairnish.

3.1.3 Furthermore, infilled ground (annotated as being Man-made deposits - filling former opencast excavation) is marked as a parcel of land to the east of Old Luss Road and northwest of Ben Lomond Way, however this is believed to be outside of the Site boundary.

3.1.4 The Geology of Britain viewer on the BGS website indicates that there are also deposits of Alluvium present at the Site, described as clay, silt, sand and gravel, and shown as a ribbon extending from the shore of Loch Lomond, adjacent to the River Leven and along the alignment of the former railway line, predominantly to the east of Piers Road. These deposits may be present beneath any made ground.

Published Solid Geology

3.1.5 The 1:50 000 scale geological map of the area, Sheet 30W and part of 29E (Scotland) - Solid "Greenock" (BGS, 1990) indicates that the site is entirely underlain by the Teith Sandstone Formation of the Devonian Period.

Information on Solid Geology from the BGS and Previous Investigations

3.1.6 There are a number of BGS Borehole records available within the boundary of the Riverside site, and the deepest of these undertaken in 1998 for Balloch Footbridge (adjacent to the northern boundary of the Site) indicates that depth to bedrock is in excess of 35m at that location.

3.1.7 The Phase 1 Geo-Environmental Assessment (Aecom, May 2015) summarises the ground conditions indicated by previous ground investigations carried out at the Riverside site and identifies the presence of Made Ground and 'Organic Soils' overlying 'Fluvio/Upper Glacial Deposits', 'Glacial Till' with Bedrock (sandstone) encountered at depths of between 51m below ground level (m bgl) and 69m bgl. It is considered that the descriptor 'Organic Soils' could represent Alluvium.

3.1.8 There are no BGS borehole records from within the Woodbank site area. The closest BGS records relate to a string of shallow (generally <5m) boreholes drilled along the A82, to the west of the Woodbank site boundary. The boreholes typically reached depths of around 4.0mbgl and described 'Soft, friable or dense clayey SAND with cobbles' to around 1.5mbgl followed by 'Hard or Stiff sandy clay with boulders'

3.1.9 Two of the boreholes to the north / west of Woodbank (close to Stoneymollan Road / Roundabout) encountered sandstone bedrock at 5m – 6.5mbgl.

3.1.10 The historical boreholes indicate that the depth to bedrock may be highly variable within the area of the Riverside / Woodbank sites. Sandstone was encountered at a depth of 52.65m at Balloch Station (southern end of Riverside), whilst in close proximity to the roundabout at the southern tip of Woodbank site sandstone was recorded at 5.0m.

2017 Ground Investigation

3.1.11 The ground conditions on the Site were investigated by Phoenix Drilling Ltd in January 2017 to provide information for the proposed sale of the Site.

3.1.12 Phoenix Drilling were instructed to complete 57 window sample boreholes to depths of up to 5m below ground level (mbgl). However, as a result of frequent obstructions which prevented drilling progress, several attempts were made at achieving depth at many of the boreholes. The additional boreholes were given the suffixes A, B, C etc. As a result, the total number of boreholes attempted was 73. Borehole locations are shown on **Figure 1**. The borehole logs are presented in **Appendix A**.

3.1.13 Geotechnical testing comprised the following:

- Standard Penetration Test (SPTs) – testing undertaken in situ during the drilling of the boreholes and used to give an understanding of the bearing pressure of the strata.
- Particle Size Distributions (PSD) – laboratory test to determine the make-up of soils in terms of relative proportions of particle size which determines the classification (i.e. silt, clay, sand, gravel).
- Moisture Content – laboratory test, the results of which influence the understanding of soil mechanics, bearing capacity and settlement.
- Plasticity – laboratory test carried out on clays.
- pH and sulphate content – the results of these laboratory tests are used to determine whether ground conditions will be aggressive to concrete and produce recommendations for the concrete mix required.

3.1.14 The following section summarises the ground conditions encountered in the boreholes which are also summarised on **Figures 1 - 4**.

3.2 Made Ground

3.2.1 Made Ground was encountered in forty-six out of seventy-three window sample boreholes, either from the ground surface or below a relatively thin layer of topsoil, to depths of between 0.15m bgl

and 3.5m bgl. With the exception of WS07 on the Woodbank Site, Made Ground thicknesses in excess of 1m were encountered predominantly to the east of Pier Road (as shown on **Figures 2, 3 and 4**), where a former railway line used to cross the site on embankment (as shown on the historical maps presented in the 2015 Phase 1 report).

3.2.2 The borehole descriptions of the Made Ground indicate that it varies in composition from being a predominantly cohesive deposit comprising very soft gravelly sandy clay, to more typically a granular deposit, being a very loose to loose sand and gravel or organic silty gravelly sand. Each deposit contains varying quantities of cobbles, ash, glass fragments, pottery and brick fragments.

3.2.3 Uncorrected Standard Penetration Test (SPT) N values were recorded in a range of between 0 and 9, indicating that the granular Made Ground has a relative density of very loose and loose. Using an f1 factor (empirical correlation) of 4.5 (Stroud, 1989) would suggest an undrained shear strength for the cohesive Made Ground of between <5kPa and 40kPa. The SPT test results are included on the borehole logs included in **Appendix A**.

3.2.4 The laboratory testing indicates a variable moisture content range for the Made Ground of between 20% and 40%., with the higher moisture contents recorded within material described as Ash Fill.

3.2.5 A programme of geochemical laboratory testing was carried out on selected soil and groundwater samples to determine the concentrations of a range of commonly occurring potential contaminants as part of the investigation. In addition, monitoring wells installed in selected boreholes were monitored on a single occasion to provide a preliminary determination of concentrations of potentially hazardous ground gases. The results of the chemical analysis and gas monitoring are discussed in **Section 5**.

3.2.6 The results of the geotechnical laboratory analysis are included in **Appendix B**.

3.3 Alluvium

3.3.1 Material considered to represent Alluvium was encountered in fourteen of the seventy-three window sample boreholes, at depths between 0.2m bgl and 5.0m bgl. The Alluvium was only encountered in the eastern part of the Site, between Pier Road and the River Leven.

3.3.2 The Alluvium was typically described as very soft and soft peaty sandy Clay, but it is noted that beds (full thickness not proven but up to at least 2.85m) of very soft and soft sandy clayey Peat were encountered, as shown on **Figures 2 and 3** within the middle part of the site area east of Pier Road. The Alluvium is also occasionally encountered as a very loose and loose silty Sand.

3.3.3 An additional window sample borehole containing 2.5m thickness of peaty Sand overlying sandy Peat was encountered at WS16 located off site between Riverside and Woodbank.

3.3.4 Uncorrected SPT N values were recorded in a range of between 0 and 17. Using an f1 factor (empirical correlation) of 4.5 (Stroud, 1989) would suggest an undrained shear strength for the cohesive Alluvium of between <5kPa and 75kPa. The SPT N values indicate that the granular Alluvium has a typical relative density of very loose to loose.

3.3.5 The laboratory testing indicates moisture contents between 13% and 256% with measured values of liquid limit between 28% and 133% and plastic limit between 15% and 56%. Corresponding values of plasticity index range between 12% and 77% indicating the Alluvium to be variably of low to extremely high plasticity. The moisture contents above 100% and the extremely high plasticity relate to Peat samples encountered within the deposit.

3.4 Till (Diamicton)

3.4.1 Material considered to represent Till was encountered in five of the seventy-three window sample boreholes, all located in the western part of the Woodbank Site (see **Figure 3**). The Till was encountered at depths of between 0.1m bgl and 1.7m bgl, and was typically described as a firm

to stiff gravelly sandy Clay. The gravel was recorded as being flat to elongated subangular to rounded igneous rock and other lithologies. Some high value SPTs were recorded in the deposit which are considered to represent larger gravel /boulder elements present.

3.4.2 Uncorrected SPT N values recorded within the clay horizons were recorded in a range of between 26 and 47, which using an f1 factor (empirical correlation) of 4.5 (Stroud, 1989) would suggest an undrained shear strength for the Till of between about 100kPa and 200kPa. Measured values of undrained shear strength of clay samples within the Till, as determined by laboratory triaxial testing of two 71.49mm and 82.53mm diameter specimens are 57kPa and 113kPa indicating firm to stiff consistency. It is considered that these lower values may not be wholly representative of insitu conditions as they may have been subject to sample disturbance.

3.4.3 The laboratory testing indicates moisture contents between 11% and 26%, with measured values of liquid limit between 27% and 34% and plastic limit between 15% and 18%. Corresponding values of plasticity index range between 12% and 16% indicating the Till to be of low plasticity.

3.5 Glaciofluvial Deposits

3.5.1 Material considered to represent Glaciofluvial deposits was encountered in fifty-one out of seventy-three window sample boreholes, at depths from existing ground surface to 4.8m bgl. These deposits were typically encountered in the western part of the Riverside site and the eastern part of the Woodbank site (as shown on **Figure 3**). These deposits were typically described as medium dense Sand and Gravel, silty gravelly Sand and silty Sand, but also occasionally as gravelly sandy Clay. The gravel inclusions are described generally as elongated, sub angular to sub rounded, fine to coarse of quartz, sandstone, igneous rock and other lithologies.

3.5.2 Uncorrected SPT N values in the granular parts of this strata indicate a range between 0 and >50 indicating that the material has a highly variable relative density of between very loose to very dense, and it is considered that the higher values recorded may represent larger gravel/ boulder elements present within this deposit.

3.5.3 The laboratory testing indicates moisture contents for the glaciofluvial deposits of between 6% and 31%, with greater moisture contents encountered in the more cohesive parts of this deposit.

3.6 Groundwater

3.6.1 The 2015 Phase 1 report indicated that earlier ground investigations at the site identified groundwater strikes in the ‘majority of exploratory locations’ and that ‘groundwater at the site was in general hydraulic continuity with the River Leven at the level between 7.54m Above Ordnance Datum (AOD) and 8.89mAOD.

During this phase of investigation, groundwater was only encountered during drilling in fourteen of the seventy-three window sample boreholes, at variable depths of between 0.8mbgl and 3.7mbgl, predominantly located in the Made Ground, Alluvium and glaciofluvial deposits in the east of the Site. It is noted that the surface datum level of each of the boreholes was not recorded and as such the relative level of groundwater during this phase of investigation cannot be determined. In subsequent monitoring visits, around 13 of the 36 installed boreholes remained dry.

3.6.2 The groundwater encountered is considered to be perched water, existing in pockets of more permeable strata (such as sands and gravels), restricted by lower permeability deposits (such as clays), rather than a continuous shallow groundwater body.

3.7 Hydrogeology

3.7.1 The Phase 1 Report (Aecom 2015) states that groundwater in superficial deposits beneath the site is likely to be of moderate to high potential productivity.

3.7.2 The Phase 1 Report states that the Lower Devonian (Strathmore) bedrock aquifer is of High Productivity and has an overall classification of 'Good'.

3.7.3 The Phase 1 Report states that there are no known abstraction boreholes within 1km of the site.

3.8 Hydrology

3.8.1 The nearest surface water features to the site are Loch Lomond which is situated immediately to the north and the River Leven which is situated immediately to the east and enters the Loch adjacent to the north eastern point of the site.

3.8.2 The Phase 1 Report states that the River Leven has a SEPA status of Poor for ecology and Pass for chemistry. The pressures on the river resulting in these classifications include morphological modifications (water collection, dams, weird etc) and point source pollutants.

3.8.3 Likewise, the Phase 1 Report states that Loch Lomond has a SEPA status of Poor for ecology and Pass for chemistry. The status is a result of both diffuse and point sources of pollution, morphological alterations and recreational activities.

3.8.4 Information on discharge consents is summarised in the Phase 1 Report which includes a Landmark Envirocheck report.

3.8.5 A flood risk assessment is currently being undertaken.

3.9 Other Potential Geological Hazards / Constraints

3.9.1 **Radon** is a naturally occurring radioactive gas and emanates from geological formations to varying degrees, depending on the type, porosity and permeability. An assessment of potential for radon gas to be present is given in the Aecom Phase 1 report (2015) and indicates that the site is in the lowest category for potential radon risk. As such, no further assessment of radon or radon specific remedial measures will be required.

3.9.2 **Mining** based on the conclusions of the 2015 Phase 1 report and the Coal Authority website, the site is not considered to be in an area where coal mining has occurred.

4 Geotechnical Considerations and Ground Stability Assessment

4.1 Introduction

4.1.1 This section of the report presents comments on the ground conditions in relation to a conceptual Masterplan.

4.1.2 For the proposed development, the principal geotechnical considerations will be the strength and compressibility of the founding soils and hence, the foundation requirements for the proposed structures.

4.1.3 As the layout and design details of the proposed structures have yet to be finalised, this report will discuss the geotechnical properties at the site in general terms.

4.2 Site Preparation

4.2.1 It is assumed that the proposed development will largely be constructed at grade on the existing ground profile. It is anticipated however that local regrading of the existing ground levels and excavation of trenches and ditches will be required associated with the construction of the site infrastructure.

4.3 Excavations and Groundwater Control

4.3.1 Construction activities such as trenches for drainage and utilities, will require excavations. Due to the potential shallow depth below ground of the water table in the area (within 1.0m below ground level in places) excavations may encounter groundwater during development works. The expected permeability of the near surface soils on the Site is expected to vary depending on the presence of cohesive or granular materials. Allowance should therefore be made for controlling inflows of any groundwater. Should groundwater be encountered it will be required to be pumped out until the excavation is backfilled. Deep excavations that are required to be open for any length of time will need to consider the potential for groundwater entry and use appropriate techniques to ensure the excavations remain dry and stable for the required duration.

4.3.2 For any structures that are proposed to be below ground and the associated groundwater table, consideration will need to be given to appropriate design and construction measures to prevent and/or control groundwater ingress.

4.3.3 The predominantly granular nature of the ground conditions at the site mean that it is unlikely that trenches and areas of open cut will remain open unsupported for even short durations, and this is especially the case below the groundwater table. Where excavations are above the groundwater table, the sides may need to be battered back to a safe slope angle or restrained by full face support such as shoring or trench sheeting. Where excavations are below the groundwater table the sides will require full face support such as shoring or trench sheeting.

4.4 Slope Stability

4.4.1 The proposed development may require the reuse of near surface soils as an engineered fill, if site levels are required to be amended, and this may result in the development of both cut and filled slopes. Any slopes proposed for the development will need to be adequately designed based on the nature of the material likely to be present, to ensure the slopes remain stable during the term required (i.e. temporary or permanent). It is likely that slopes formed from the predominantly granular material present at the site will be at risk of surface erosion and local shallow surface failures of the side slopes and therefore it is likely that measures will be required to protect the surface of the slopes in the short, medium and long term.

4.5 Pavements

4.5.1 Pavements carried on a suitable depth of capping/sub-base should prove adequate provided the exposed deposits are compacted by a heavy smooth wheeled roller and any soft/loose or degradable materials removed and replaced with compacted granular fill. Similarly, any remains of walls, foundations or exposed pieces of demolition materials present within the made ground would need to be removed to prevent any development or concentrations of stress in the pavement.

4.5.2 Road construction on areas where Peat has been identified can however suffer from significant settlement and any roads proposed that cross areas underlain by Peat may need to consider either excavation of the Peat and replacement with engineered fill or the formation of a piled load transfer blanket with the road construction layers formed on top of the load transfer blanket.

4.5.3 Strengthening of peat may be carried out in discrete columns or by mass strengthening of a larger zone. Typically, the strengthening with discrete columns achieves more controlled mixing and containment of materials whilst mass strengthening may enable a greater production rate to be achieved. The strengthened peat should be surcharged immediately after mixing for a period of time to allow it to consolidate and improve the strength gain. Additional ground investigation, compaction testing with the addition of different binders and field trials would need to be carried out in order to verify if this option is viable for the Site.

4.5.4 Peat does not provide adequate lateral confinement for the use of vibro-stone columns to improve soil bearing properties, however it is possible that vibro-concrete columns (VCCs) could be used subject to confirmation of this by specialist contractors.

4.6 Below Ground Infrastructure

4.6.1 Where peat is present consideration will need to be given to all buried services that are sensitive to settlement and movement such as surface water drains or foul sewers. Typically, services sensitive to settlement will be placed in corridors where the Peat is excavated and replaced by engineered fill. Alternatively, consideration can be given to support of services on piled foundations. Ground improvement using soil mixing or VCCs could be considered.

4.7 Foundations

4.7.1 For the proposed development, the principal consideration will be the strength and compressibility of the founding soils, and hence, the foundation requirements for the proposed structures. The appropriate foundation solution will depend not only on ground conditions, but also on the building geometry, structural loading, load distribution and the limiting criteria for movement or settlement of the various structures.

4.7.2 It is unlikely that traditional shallow spread foundations will be suitable in the areas of the Site where deeper Made Ground (>1.5m – 2.0m thick) and Alluvium are present due to their variability, typically very low strength, and loose relative density resulting in unacceptably high magnitudes of total and differential settlements.

4.7.3 Where the Made Ground and Alluvium deposits are typically less than about 1.5m to 2.0m thick, and very lightly loaded structures that are relatively insensitive to settlement are proposed, deep strip or trench fill foundations could be taken through these deposits to found on more competent strata below (assuming competent strata is present). Alternatively, the Made Ground or Alluvium deposits could be excavated and replaced with engineered fill and a ground bearing raft used.

4.7.4 Where the Made Ground or Alluvium is greater than 1.5m to 2.0m thick, it may be uneconomical to adopt a traditional pad or deep strip foundation solution, and therefore consideration should be given to Vibrated Concrete Columns (VCC's) or a piled foundation solution.

4.7.5 Across the majority of the site, where Till deposits and Glaciofluvial deposits are present, it may be possible to adopt shallow spread foundations for relatively lightly loaded structures where the

underlying material is proved to be at least medium dense or medium strength. However, depending on the nature of the specific structures, consideration may need to be given to ground improvement such as vibro stone or vibro concrete columns, and for heavier and/or more sensitive structures, or where the strata is low strength or relative density is very loose or loose, then a piled foundation solution is likely to be required.

4.7.6 Careful consideration will need to be given to potential differential settlement developing between parts of the same building founded on different types of soil such as cohesive Till and granular Glaciofluvial deposits. The design of the proposed structures will need to consider both total and differential settlement, both beneath the whole structure and between individual foundations.

4.7.7 For any structures founded within areas of peat, there will be significant risk of differential movement between buildings and external pavement areas. Careful consideration will need to be given to mitigating the effects of differential movement, particularly at building thresholds or utility connections.

4.8 Piled Foundations

4.8.1 Piled foundations are likely to be required where strip or pad foundation depth becomes excessively deep, where the size of the foundation becomes excessively large, or where the magnitude of predicted settlements for pad or strip footings is unacceptable. It is therefore anticipated that medium and heavily loaded structures or structures that are sensitive to total and/or differential settlements such as the pool and leisure facility, hostel and hotel will require piled foundations.

4.9 Floor Slabs

4.9.1 The Made Ground and Alluvium, and other areas where the strata is identified as being of low strength or very loose/loose relative density, are unlikely to provide adequate support to floor slabs. As such, it is recommended that suspended ground floor slabs with suitable void are constructed in these areas.

4.9.2 It is anticipated that ground bearing floor slabs can be used on any engineered fill placed or on the Till and Glaciofluvial deposits (except where described as above), subject to loadings and serviceability requirements.

4.10 Design of Buried Concrete

4.10.1 The measured pH values and concentrations of water soluble sulphate measured on samples of soils recovered as part of the ground investigation are summarised in Table 4.1 below.

Table 4.1 Results of pH and Water Soluble Sulphate Analysis

No. of Results	pH Range	Water Soluble Sulphate (mg/l) Range
38	5.2 – 8.0	<12 - 108

4.10.2 The values provided above correspond to Design Sulphate Class DS1 conditions as defined by BRE (2017).

4.10.3 It is assumed that the groundwater conditions at the Site are mobile and therefore It is considered that the Aggressive Chemical Environment Concrete (ACEC) class for the site is AC2z.

Belowground Structures

4.10.4 Utilities including the INEOS High Pressure Oil Pipeline and other gas apparatus are known to be present below the surface of the site. Known utilities (and where available, standoff zones) are included on **Figures 1 - 4**.

4.10.5 A belowground void was encountered during hand digging at borehole WS 40. It was later suggested that this void relates to a redundant 18" culvert at approximately 2m depth. The direction and extent of this feature is not known and may require further investigation with an excavator. This feature is not included on service plans which have been reviewed (and are included on **Figures 1 – 4**) which suggests that it is not Scottish Water plant.

4.10.6 The eastern area of the site is known to have had extensive rail lines running north / south. The extent to which these rail lines have been removed or simply buried is not known.

5 Assessment of Soil and Groundwater Contamination and Ground Gases

5.1 Risk Assessment Strategy

5.1.1 The assessment of risks associated with contaminated land are based on the use of a Conceptual Site Model to identify 'source-pathway-receptor' linkages.

5.1.2 A significant risk can only exist if a Source (contamination capable of causing harm) is present together with a Receptor (sensitive to harm by the contaminant) and a Pathway (a mechanism through which the contaminant Source can reach and affect the sensitive Receptor).

5.1.3 The magnitude of the risk from a given source of contamination is determined by the sensitivity of the receptor and the likelihood of the receptor being exposed to the contaminant.

5.1.4 Potential receptors include humans (development workers and future site users), future buildings and structures and the water environment.

5.1.5 A quantitative risk assessment of the potential risks posed by contaminant sources requires an understanding of the nature of the proposed development. Since the Masterplan for the Riverside and Woodbank developments is being refined at the time of writing this preliminary investigation report, a generic quantitative risk assessment will be used. In this preliminary investigation report, soil contamination will be described as elevated when concentrations exceed the most conservative assessment criteria (which relate to residential garden soils).

5.1.6 Once the development layout has been refined, a more detailed assessment of the results can be undertaken. Further investigation may also be required in certain areas. The more detailed risk assessment will be carried out to determine whether any remedial measures are required.

5.2 Preliminary Conceptual Site Model

5.2.1 Although the layout and detailed development plans have yet to be finalised, a preliminary conceptual site model, setting out potential Sources, Pathways and Receptors is included here to assist with the assessment of potentially significant of contamination.

5.3 Potential Sources

5.3.1 The majority of the site has remained undeveloped. The main exceptions to this are the area of railway land in the east, the small superficial quarries (potentially backfilled with material of unknown origin) and the buildings associated with the hotel at the Woodbank area. These areas are considered the main potential sources of onsite contamination.

5.3.2 The offsite dye works represents a further potential source of contamination.

5.3.3 Made Ground and Peat can be a source of ground gases resulting from microbial decay.

5.3.4 Potential sources of contamination are presented Table 5.1 below.

Table 5.1 Summary of Potential Sources of Contamination

Source	Comment
On-Site	
Railway land	Railway land is often a source of contamination from the material used as ballast (including clinker and ashy material) as well as operational leaks and spills.
Made Ground	Made Ground or fill material of unknown origin can be a source of a range of contaminants including organic and inorganic compounds. Asbestos may be present within demolition rubble. If organic material is present, microbial decay can generate ground gases.
Peat / Organic Soils	Microbial decay can generate ground gases
Off-Site	
Dye-works	Potential for waste material from the adjacent historical dye works being deposited on site. The dye works may have affected groundwater, subsequently migrating below the Site.

5.4 Potential Receptors

5.4.1 Potential receptors will include development and maintenance workers, future users, surface and groundwater and proposed buildings and structures.

5.4.2 Table 5.2 below summarises the sensitivity of potential receptors assuming no mitigation measures are in place.

Table 5.2 Summary of Sensitivity of Potential Receptors

Receptor	Sensitivity	Comment
Site Workers	High	Ground workers and construction workers are likely to come into direct contact with soils, albeit for a short period of time. As the potential risk is to human health, the sensitivity is considered to be high.
Future Site Users	High	Future users include employees, day visitors and residential tourists who will have variable exposure scenarios to the potential contaminants. However, since the potential risks are to human health, the sensitivity is considered to be high.
Ground Water Resources	Moderate	Groundwater is currently considered to be of poor quality, albeit with a target of continuous improvement.
Surface Water Resources	Moderate	The site is immediately adjacent to the River Leven and Loch Lomond. The River Leven is considered to be of poor quality, albeit with a target of continuous improvement.
Built Environment	Moderate	Proposed buildings are potentially at risk from aggressive ground conditions caused by low pH or high sulphate and from the build-up of gases in confined spaces.

5.5 Potential Pathways

5.5.1 Table 5.3 below summarises potential pathways via which receptors could be affected by contamination and ground gases.

Table 5.3 Potential Exposure Pathways

Pathway	Comment
Direct contact with skin, ingestion or inhalation of soils or soil derived dust	Construction and maintenance work will take place in the presence of exposed, potentially contaminated surface soils. Workers may be exposed to direct contact with contaminated soils.
	Future site users may be exposed to potentially contaminated surface soils whilst working at or visiting the site.
Migration of gasses and accumulation in confined spaces	Ground gasses can migrate and accumulate in confined spaces with the potential to cause asphyxiation (CO_2 and CH_4) or explosion (CH_4)
Migration of mobile contamination to surface water receptors	Mobile soil contamination can migrate with shallow groundwater flow, potentially impacting surface water receptors.
Migration of mobile contamination to groundwater receptors	Mobile soil contamination can migrate vertically, potentially impacting surface water receptors.

5.6 Scope and Objectives of Contamination Investigation

5.6.1 One of the objectives of this preliminary investigation was to determine the presence of contamination sources within the soils and ground water and in the form of ground gasses.

5.6.2 Soil samples were recovered from 57 locations across the site. Analysis of soil samples was undertaken with the objective of quantifying the presence or absence of contamination in soil samples representative of conditions on site.

5.6.3 In summary, samples were tested for the following suite of potential contaminants (No. of samples shown in brackets):

- Metals: arsenic, cadmium chromium (III & VI), copper, lead, mercury, nickel, selenium, zinc, beryllium, boron and vanadium (63 samples),
- pH (63 samples),
- Petroleum hydrocarbons with carbon banding (63 samples)
- Polycyclic Aromatic Hydrocarbons (PAHs): USEPA 16 species (23 samples)
- Asbestos (63 samples)

5.6.4 Environmental monitoring wells were installed in 36 of the boreholes to enable gas monitoring, groundwater levels monitoring and groundwater sampling.

5.6.5 Gas monitoring has been undertaken on six occasions over 12 weeks.

5.6.6 Groundwater samples were recovered from 15 wells for the following laboratory analysis:

- Metals: arsenic, cadmium chromium (III & VI), copper, lead, mercury, nickel, selenium, zinc, beryllium, boron and vanadium (15 samples),
- pH and hardness (CaCO3) (15 samples),
- Petroleum hydrocarbons with carbon banding (6 samples), and
- Polycyclic Aromatic Hydrocarbons (PAHs): USEPA 16 species (13 samples).

5.7 Confirmed Soil Contamination – Woodbank

5.7.1 Despite the presence of Made Ground near the existing / ruined buildings, no potentially significant contamination has been encountered in soil samples recovered from the Woodbank site area.

5.7.2 It should be noted that no investigations have been undertaken from within the building footprints.

5.7.3 Given that the main hotel building was destroyed by fire, the potential exists for limited contamination to exist in soils within the building footprint. In particular, polycyclic aromatic hydrocarbons (PAHs) are often associated with combustion. If asbestos containing materials were present in any of the structures on site, the potential exists for asbestos to be present in structures or rubble that currently remain on site.

5.7.4 At the time of writing, it is unknown whether an attempt will be made to retain some or all of the existing buildings / remnants of buildings for inclusion within the proposed development. Depending on the outcome of these proposals, additional ground investigation locations are likely to be required within the existing / ruined building footprints.

5.8 Confirmed Soil Contamination – Riverside

5.8.1 No significant contamination was encountered within soil samples recovered from the natural soils to the west of Pier Road or South of Ben Lomond Way.

5.8.2 Elevated concentrations of heavy metals (lead and less frequently, arsenic and hexavalent chromium) were encountered within Made Ground soils to the east of Pier Road and North of Ben Lomond Way. These are likely to be associated with the former railway land and activities and potentially linked to the offsite dye works.

5.8.3 Concentrations of lead ranged from a maximum of 5,100mg/kg (in WS47) to a minimum of 5.1mg/kg. The average concentration of lead was 268mg/kg. The most conservative assessment criteria for lead is 200mg/kg which is the Category 4 Screening Value (C4SL) for soils in a residential garden scenario. Fourteen soil samples contained concentrations of lead above the C4SL of 200mg/kg. The 14 locations, together with the lead concentrations are included on **Figure 4**.

5.8.4 With the exception of WS46 (which is in close proximity to Pier Road), all of the potentially elevated concentrations of lead were located in Made Ground to the East of Pier Road and north of Ben Lomond Way.

5.8.5 A single soil sample contained a concentration of arsenic that was above the threshold for residential garden soil (65mg/kg arsenic in WS38). This location is indicated on **Figure 4**.

5.8.6 A single soil sample contained a concentration of hexavalent chromium that was above the threshold for residential garden soil (8mg/kg hexavalent chromium in WS49). This location is indicated on **Figure 4**. The elevated chromium concentrations correspond approximately with an area that driller noted some green colouration in soils during the site investigation.

5.8.7 No asbestos was encountered in any of the 63 samples analysed from Riverside and Woodbank.

5.8.8 A summary table including all chemical analysis results, with exceedances highlighted is included in **Appendix C**.

5.9 Assessment of Ground Gases

5.9.1 At the time of writing this preliminary report, ground gasses have been measured in 36 boreholes on 6 occasions. The results are included in **Appendix D**.

5.9.2 Using the approach recommended in CL:AIRE (2012) and endorsed in BS 8485 (2015), the Woodbank Site and the area of the Riverside site to the west of Pier Road and south of Ben Lomond Way may be classified as Characteristic Situation 1 as defined in BS 8485 (2015). This Situation is representative of ground with a very low potential for gas generation. For Characteristic Situation 1, BS 8485 (2015) advises that no special gas protection measures are required.

5.9.3 Within the areas to the east of Pier Road and the north of Ben Lomond Way the site is classified as CS2 for gas. This is due to the carbon dioxide (CO_2) and methane (CH_4) being recorded at concentrations above the trigger values of 5% and 1% respectively during the monitoring even though flow rates remained low.

5.9.4 As expected, the elevated concentrations of ground gases correspond with Made Ground and Peaty soils.

5.9.5 Depending on the nature of the structures proposed for this area, there may be a requirement to incorporate gas protection measures. The appropriate gas protection measures are dependent on the proposed building design and end use, however, typically gas protection measures comprise a combination of barrier (e.g. concrete slab, gas resistant membrane) and a ventilation layer (e.g. a void space).

5.10 Assessment of Groundwater

5.10.1 Samples of groundwater were collected from 15 boreholes and tested for the potential contaminants listed at 5.6.6, above. The results are included in **Appendix E**.

5.10.2 Concentrations of potential contaminants in the groundwater samples were assessed against appropriate threshold criteria.

5.10.3 The surface water quality of Loch Lomond and the River Leven are the primary receptors for consideration in this assessment due to the potential for groundwater below the site to migrate into the Loch. Therefore, the most appropriate assessment criteria selected were typically Environmental Quality Standards (EQS) for freshwater. EQS are designed to be used in assessing water quality within surface water bodies after dilution has occurred. As such, they are considered to be highly conservative thresholds for comparison with samples of shallow groundwater.

5.10.4 The potential risk to groundwater is considered a lower priority. This investigation has confirmed that shallow groundwater is not present consistently across the site. Rather, perched groundwater is present discontinuously across the site in natural superficial deposits and made ground. Given that there are no known groundwater abstractions within 1km of the site, and the fact that the depth to the bedrock aquifer is in the region of 50m (in the north / east of the site, perhaps shallower in the south / west) no specific assessment of the risk to groundwater as a resource has been undertaken.

5.10.5 The Tier 2 assessment reported in this preliminary site investigation report is based on a direct comparison of concentrations of potential contaminants measured in samples of groundwater recovered from within soil or made ground.

5.10.6 No exceedances were observed for the majority of the potential contaminants tested. The exceptions were: chromium, copper, lead, nickel, zinc, fluoranthene, and benzo(g,h,i)perylene. Each of these potential contaminants were recorded at concentrations above the most conservative surface water quality criteria and each of which will be discussed below.

Chromium

The groundwater sample from borehole WS40 contained a concentration of 6.1µg/l in exceedance of the long term mean EQS of 4.7µg/l, although well below the short term (95 percentile) of 32 µg/l. WS40 was advanced into made ground and soil samples were analysed for potential contaminants. Chromium was not found to be elevated with respect to the human health criteria in soil samples from this borehole.

Copper

Concentrations of copper exceeded the EQS of 1µg/l in ten out of the fifteen samples, including samples from boreholes within made ground and within natural soils. The maximum recorded concentration was 5.8µg/l. However, it should be noted that the EQS is based on the bioavailable fraction of the dissolved copper present within the surface water receptor following dilution and is therefore considered to be a conservative threshold for comparison.

Nickel

The maximum concentration of nickel recorded was 12 µg/l. Concentrations of nickel exceeded the annual average EQS of 4µg/l in ten out of the fifteen samples, including samples from boreholes within made ground and within natural soils. None of the concentrations were elevated compared to the Maximum Acceptable Concentration (MAC) of 34 µg/l. The MAC applies to dissolved nickel, whilst the EQS for annual average applies to bioavailable nickel.

Lead

The concentrations of lead exceeded the freshwater annual average EQS of 1.2µg/l in four samples. None of the samples exceeded the MAC of 14 µg/l.

Zinc

Concentrations of zinc exceeded the EQS of 11.9µg/l in nine out of the fifteen samples, including samples from boreholes within made ground and within natural soils. However, it should be noted that the EQS is based on the bioavailable fraction of the dissolved zinc and is therefore considered to be a conservative threshold for comparison.

PAHs

Benzo(a)pyrene (BaP) can be considered as a marker for the other PAHs. None of the samples tested contained concentrations of BaP that were above the laboratory limit of detection (LOD) of 0.01 µg/l. The EQS for the Annual Average is 0.00017µg/l (below the LOD used in this analysis) but the maximum allowable concentration is 0.27µg/l.

5.11 Summary of Groundwater Assessment

Samples of groundwater from across the site recorded concentrations of heavy metals that were, in some cases, elevated by comparison to the most conservative assessment criteria typically Annual Average (AA) EQS. However, with the exception of zinc and copper (which do not have a Maximum Allowable Concentration EQS), none of the samples were elevated by comparison to the less conservative Maximum Allowable Concentration (MAC) EQS.

The EQS for both copper and zinc are based on bioavailable concentrations, whereas the laboratory results are for the dissolved metals regardless of bioavailability. The actual bioavailable proportion would inevitably be lower than the total amount measured.

EQS thresholds are designed to be protective of the freshwater environment and are therefore intended to be applied at a compliance point within the surface water, after dilution has occurred, or to direct discharges. Therefore, it is highly conservative to compare these thresholds to samples of ground water recovered from boreholes within made ground or natural soils.

Both the River Leven and Loch Lomond are categorised as 'poor' for ecology and 'pass' for quality by SEPA due to physical modification and heavy recreational use. As such, despite their proximity, these receptors are considered to be of only moderate sensitivity.

It is considered highly unlikely that groundwater from the site is causing significant pollution of Loch Lomond or the River Leven as a result of the marginal concentrations of contamination encountered here. Contaminants have been recorded at relatively low concentrations and are likely to exhibit relatively low mobility through soil pores. The rate of flux of shallow perched groundwater from below the site into Loch Lomond is likely to be low. Furthermore, if contaminated groundwater from the site did reach the river or loch, the effect of dilution from such a large body of water would be highly effective.

6 Summary of Constraints and Recommendations

6.1 Summary

6.1.1 This investigation has established the characteristics of shallow soils at the site including geotechnical and contamination status.

6.1.2 It is anticipated that the constraints discussed below will be taken into consideration as the next iteration of masterplan for the site is produced.

6.1.3 As the Masterplan evolves, more detailed geotechnical investigations will be required in certain areas.

6.1.4 The contamination encountered will be assessed in more detail in the context of the proposed end use, with further assessment and delineation likely to be required.

6.1.5 Following the next phase of geotechnical investigation, recommendations for foundation solutions, soil remediation and gas protection measures for the various structures and areas of the site will be made.

6.2 Geotechnical Conclusions

6.2.1 Perched shallow groundwater may be encountered within excavations to form foundations or service trenches. An allowance should be made for pumping groundwater from excavations.

6.2.2 Road design will require to take cognisance of the presence of peat, made ground and soft ground conditions in the east. Localised excavation and replacement with competent material or the formation of a piled load transfer blanket may be required.

6.2.3 If buried services that are sensitive to settlement (e.g. sewers) are required within the eastern area, it may be necessary to avoid areas of peat, excavate and replace peat or, use ground improvement techniques.

6.3 Foundations

6.3.1 Shallow spread foundations are unlikely to be suitable within the eastern area where deeper Made Ground, Alluvium and Peat are present.

6.3.2 Where Made Ground, Alluvium and / or peat are greater than 1.5 – 2.0m thick, it may be most economical to consider vibrated concrete columns (VCC) or a piled foundation solution.

6.3.3 The Till and Glaciofluvial deposits present across the majority of the site may be suitable for shallow spread foundations for relatively lightly loaded structures. Heavier structures, or those with particularly low tolerance for settlement may require ground improvement (e.g. VCC) or piled foundations.

6.3.4 In summary, piled foundations are considered likely to be required for heavily loaded structures such as the swimming pool, leisure facility, hotel and hostel. For areas where strata have been identified as low strength, suspended floor slabs incorporating below slab voids are recommended.

6.3.5 Structures such as glamping (wood and canvas tents), pods, picnic areas and woodland paths may be suitable for the eastern area without ground improvement, as these are very lightweight and unlikely to be sensitive to a degree of settlement. Note that contamination and gas will need to be considered (see **Section 6.4**, below).

6.4 Contamination / Ground Gas Conclusions

6.4.1 No elevated contamination was encountered in soils at the Woodbank site, however, no investigations were undertaken within the footprints of the existing / ruined buildings. In particular, the footprint of the building destroyed by fire may represent a potential localised source of contamination.

6.4.2 Potentially elevated concentrations of lead were encountered in samples of Made Ground in the east of the Riverside site, as well as individual examples of elevated hexavalent chromium and arsenic.

6.4.3 No elevated ground gases have been detected to date across the majority of the site, which can be designated as CS1 (requires no special gas protection measures).

6.4.4 Methane and carbon dioxide were detected at concentrations slightly above the trigger concentrations to the east of Pier Road and north of Ben Lomond Way which will be designated as CS2. Depending on the nature of structures and / or buildings proposed it these areas, it will be necessary to consider the need to incorporate ground gas protection measures.

6.4.5 Concentrations of some heavy metals were recorded in borehole samples of groundwater were elevated compared to the most conservative EQS thresholds. However, the effect of the presence of marginally elevated contamination within perched groundwater below the site is considered unlikely to significantly impact surface water quality in Loch Lomond and no known groundwater abstractions exist within 1km of the site.

6.5 Contamination / Ground Gas Recommendations

6.5.1 Limited additional trial pitting and sampling is recommended around the areas of WS46, WS47 and WS49, in order to better understand and delineate the elevated concentrations of contamination encountered.

6.5.2 Depending on the development proposals for the areas where contamination was encountered, additional site investigation is likely to be required to delineate contamination and form a remedial strategy.

6.5.3 The remedial strategy is likely to comprise localised excavations of contaminated material and the replacement with clean fill / capping material or hardstanding. This will be confirmed after the proposed end use of these areas is known and a more thorough risk assessment has been carried out.

6.5.4 Depending on the proposals for the existing derelict buildings at Woodbank, additional investigation is likely to be required within these footprints for potential contaminants of concern including asbestos and PAHs.

6.5.5 Marginally elevated concentrations of heavy metals were encountered in samples of groundwater recovered from boreholes. The results of testing for PAHs were inconclusive. A further round of groundwater sampling and analysis is recommended, along with the collection and analysis of surface water samples from the Loch and the River Leven.

6.5.6 Construction and ground workers should take cognisance of the presence of contamination as reported here. Method statements, risk assessments and PPE will be required to mitigate potential risks.

6.5.7 Where new buried potable water pipes are proposed, UK Water Industry Research (UKWIR) compliant testing of soils will be required to determine the acceptable water pipe material.

6.6 Geotechnical / Foundation Recommendations

6.6.1 Heavy structures will need specific site investigations to determine the most effective and economical foundation solutions.

6.6.2 Where piled foundations are likely to be required, site investigation will focus on determining the depth to competent strata, noting that the depth to bedrock may vary considerably from reported depths of around 50m in the north and east, to reported depths of around 5m just off site to the south east.

6.6.3 Buried concrete structures should conform to Design Sulphate Class DS1 an Aggressive Chemical Environment Concrete Class (ACEC) AC2z.

Essential Guidance for Report Readers

This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints, they are described in the report text.

The opinions and recommendations expressed in this report are based on statute, guidance, and best practice current at the time of its publication. Peter Brett Associates LLP (PBA) does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and the report should be returned to us and reassessed if required for re-use after one year from date of publication. Following delivery of the report PBA has no obligation to advise the Client or any other party of such changes or their repercussions.

Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third party data used. Historical maps and aerial photographs provide a “snap shot” in time about conditions or activities at the site and cannot be relied upon as indicators of any events or activities that may have taken place at other times.

The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.

This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the express written authorisation of PBA. Any such party relies upon the report at its own risk.

The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc. unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Scottish Environment Protection Agency or Local Authority) have taken place only as part of this work where specifically stated.

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Figures

INEOS PIPELINE.

WEST RIVERSIDE SITE

WOODBANK SITE

WS01 MG TO 0.8m
WS02 MG TO 0.8m
WS03
WS04
WS05 MG TO 0.35m
WS06
WS07 MG TO 1.2m
WS08
WS09
WS10 MG TO 0.3m
WS11
WS12 MG TO 0.7m
WS13
WS14
WS15
WS16
WS17 MG TO 0.2m
WS18
WS19
WS20
WS21
WS22
WS23
WS24
WS25
WS26
WS27
WS28
WS29
WS30 MG TO 0.15m
WS31 MG TO 0.8m
WS32 MG TO 0.7m
WS33 MG TO 0.65m
WS34 MG TO 0.65m
WS35 MG TO 0.4m
WS36 MG TO 2.7m
WS37 MG TO 2.0m
WS38 MG TO 3.1m
WS39
WS40 VOID REDUNDANT 18" CULVERT @ ~2m DEEP FURTHER INVESTIGATION REQUIRED.
WS40C MG TO 3.2m
WS41 MG TO 2.7m
WS42
WS43 MG TO 3.5m
WS44 MG TO 0.6m
WS45 MG TO 2.8m
WS46
WS47 MG TO 0.6m
WS48
WS49 MG TO 2.8m
WS50 MG TO 2.2m
WS51 MG TO 1.3m
WS52 MG TO 2.8m
WS53 MG TO 0.6m
WS54 MG TO 0.4m
WS55 MG TO 0.8m
WS56
WS57

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- GAS - LOW PRESSURE
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- ELECTRICITY - 11kV x 3
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WS01 DENOTES WINDOW SAMPLER BOREHOLE LOCATION - JANUARY 2017

WS01 DENOTES MADE GROUND THICKNESS OF 0.0 - 1.0m

WS01 DENOTES MADE GROUND THICKNESS OF 1.0 - 2.0m

WS01 DENOTES MADE GROUND THICKNESS GREATER THAN 2.0m

WEST RIVERSIDE LOCH LOMOND SITE INVESTIGATION LOCATIONS WITH INDICATIONS OF PRESENCE AND DEPTH OF MADE GROUND

Client: LOMOND BANKS

Date of 1st Issue	Drawn by: K. EWING
A0 Scale: 1:1250	Checked by: G. SCOTT
Figure Number: 35854/3001-001	

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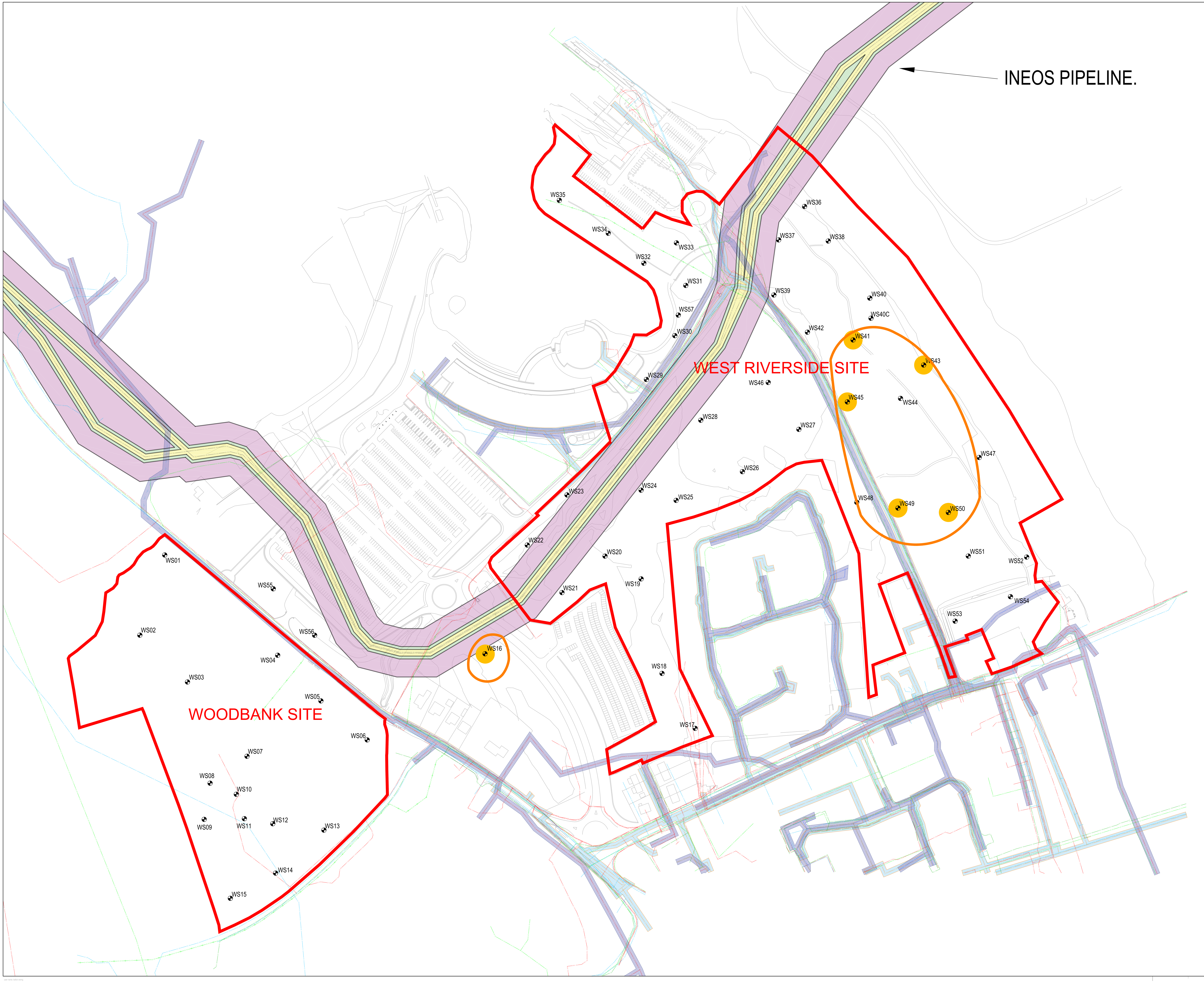

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KEY

Symbol	Description
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EX BT	BRITISH TELECOM
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EX 11kV	ELECTRICITY - 11kV
EX 11kVx3	ELECTRICITY - 11kV x 3
EX LV	ELECTRICITY - LV
EX FWS	FOUL SEWER
EX SWS	SURFACE WATER SEWER
EX CS	COMBINED SEWER
	RISING MAIN
EX W	WATER
EX SM	WATER - TRUNK MAIN
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WS01	DENOTES WINDOW SAMPLER BOREHOLE LOCATION - JANUARY 2017
WS01	DENOTES LOCATION WHERE PEAT WAS ENCOUNTERED

WEST RIVERSIDE LOCH LOMOND

SITE INVESTIGATION LOCATIONS WHERE PEAT WAS ENCOUNTERED

Client: LOMOND BANKS

Date of 1st Issue	Drawn by K. EWING
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INEOS PIPELINE.

WEST RIVERSIDE SITE

GLACIOFLUVIAL SANDS AND GRAVELS

PEAT

GLACIOFLUVIAL SANDS AND GRAVELS

WOODBANK SITE

TILL FIRM TO STIFF SANDY GRAVELLY CLAY

PEAT

ALLUVIUM AND MADE GROUND

WS01 WS02 WS03 WS04 WS05 WS06 WS07 WS08 WS09 WS10 WS11 WS12 WS13 WS14 WS15 WS16 WS17 WS18 WS19 WS20 WS21 WS22 WS23 WS24 WS25 WS26 WS27 WS28 WS29 WS30 WS31 WS32 WS33 WS34 WS35 WS36 WS37 WS38 WS39 WS40 WS40C WS41 WS42 WS43 WS44 WS45 WS46 WS47 WS48 WS49 WS50 WS51 WS52 WS53 WS54 WS55 WS56 WS57

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- DENOTES DISTRIBUTION OF PEAT
- DENOTES DISTRIBUTION OF GLACIOFLUVIAL SANDS AND GRAVELS
- DENOTES DISTRIBUTION OF TILL
- DENOTES DISTRIBUTION OF ALLUVIUM AND MADE GROUND
- WS01 DENOTES WINDOW SAMPLER BOREHOLE LOCATION - JANUARY 2017

WEST RIVERSIDE LOCH LOMOND

COMPOSITE PLAN OF SHALLOW GROUND CONDITIONS SHOWING APPROXIMATE DISTRIBUTION OF PEAT, ALLUVIUM, MADE GROUND, GLACIOFLUVIAL DEPOSITS (SANDS AND GRAVELS) AND TILL (GRAVELLY SANDY CLAYS)

Client: LOMOND BANKS

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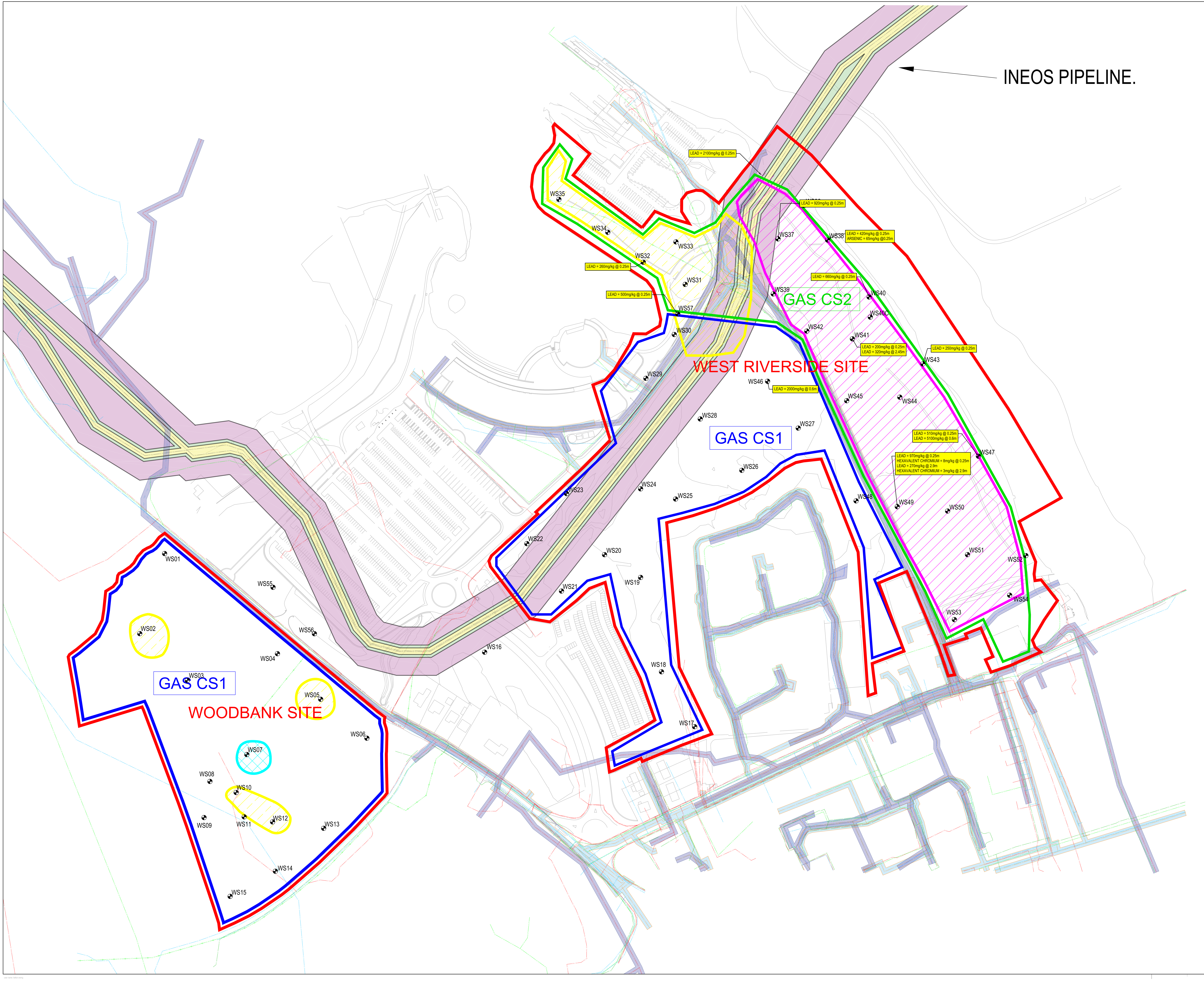

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- EX 11kVx3 — ELECTRICITY - 11kV x 3
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- EX CS — COMBINED SEWER
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WS01 — DENOTES WINDOW SAMPLER BOREHOLE LOCATION - JANUARY 2017

DENOTES DISTRIBUTION OF MADE GROUND WITH DEPTH OF LESS THAN 1.0m

DENOTES DISTRIBUTION OF MADE GROUND WITH DEPTH OF BETWEEN 1.0m AND 2.0m

DENOTES DISTRIBUTION OF MADE GROUND WITH DEPTH OF GREATER THAN 2.0m

WEST RIVERSIDE LOCH LOMOND

SITE INVESTIGATION LOCATIONS WHERE CONTAMINATION WAS ENCOUNTERED AND GROUND GAS CHARACTERISTIC SITUATIONS (CS1 + CS2)

Client: LOMOND BANKS	
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Figure Number 35854/3001-004	

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Appendix A Borehole Logs

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
7/2 2017						0.05	# Turf				0.20
	0.25	B, J, T, V				0.25	Soft brown organic slightly gravelly sandy clay. Gravel is flat to elongated subangular to subrounded fine to medium of quartz and other lithologies. (TOPSOIL)				0.50
							Medium dense brown silty clayey fine to coarse SAND and GRAVEL. Gravel is cubic to elongated subangular to subrounded of sandstone, igneous rock and other lithologies.				
	1.00	B									
	1.20	SPT=16 1.1/2.2.3.9 T									
	1.50	B				1.65					
						1.90	Firm to stiff brown silty gravelly sandy CLAY. Gravel is cubic to elongated subangular fine to medium of sandstone , igneous rock and other lithologies.				
	1.90	SPT= 50/				2.00	Very dense clayey sandy gravel. Recovered from SPT, likely a sandstone COBBLE.				2.00
	2.00	T B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.00	2.00

Location: E 238097.7 N 682022.2

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal 2.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.00m

Borehole No: WS01

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Printed: 13/06/2017 16:33:51 Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
6/2/2017	0.25	B, J, T, V				0.30	Brown organic slightly gravelly sandy clay with high cobble content. Gravel is flat to elongated subangular fine of various lithologies, cobbles are flat to elongated up to 12 cm of sandstone and igneous rock. (TOPSOIL)				
	0.50	J, T, V					Medium dense to very dense brown clayey to very clayey gravelly to very gravelly fine to medium SAND. Gravel is cubic to elongated subangular fine to coarse of sandstone, igneous rock and other lithologies.				
	1.00	B, J, T, V									
	1.20	SPT= 50/ T				1.30					1.30
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238071.5
N 681937.8

Level: -

Orientation: Vertical

Remarks:
SPT refusal 1.3 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.30m

Borehole No: WS02

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
6/2 2017							0.20	# TOPSOIL.				
								# Clay bound SAND and GRAVEL.				
							0.60					0.60
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.6 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.60m

Borehole No:
WS02A

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
6/2/2017						0.10	# TOPSOIL.				0.20
							# Clay fill, bricks. (MADE GROUND)				0.50
						0.80	# Clay bound SAND + GRAVEL.				
	1.20	SPT =29 4.5/7.7.8.7 T				1.20	Brown gravelly very sandy CLAY with low plasticity. Gravel is flat to elongated subangular to rounded of igneous rock and other lithologies.				
	2.00 2.00	SPT =31 2.3/4.4.11.12 B, T									
						2.60					2.60
	2.60	SPT = 50/					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.60	2.60

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal at 2.6 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.60m

Borehole No: WS02B

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
6/2/2017						0.10	# Turf				0.20
						0.20	# TOPSOIL.				
	0.25	B, J, T, V					Loose light brown very gravelly clayey fine to medium SAND with sandy clay lenses. Gravel is flat subangular fine to medium of sandstone and igneous rock.				
	0.50	J, T, V									1.00
	1.00	B, J, T, V									
	1.20	SPT=7 1.2/3.2.1.1 T									
						1.65					
						1.80	# Sandy SILT.				
	2.00	SPT=29 11.7/7.8.7.7					Medium dense light brown to brown silty clayey gravelly fine to medium SAND with sandy clay lenses. Gravel is cubic to elongated subangular fine to medium of various lithologies. Drillers recorded pushing boulder between 1.8 - 2.1 m depth.				
	2.00	B, T									
						3.00					
	3.00	SPT= 50/				3.15	Grey slightly weathered sandstone, likely a BOULDER or bedrock.				3.15
	3.00	B, T					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.15	3.15

Location: E 238121.6 N 681888.4

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal at 3.15 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.50m

Borehole No: WS03

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
6/2 2017						0.10	# Turf				0.20
	0.25	B, J, T, V				0.25	Brown organic silty clayey slightly gravelly sand with roots. Gravel is flat to elongated subangular fine of various lithologies. (TOPSOIL)				
	0.50	J, T, V					Medium dense greyish brown gravelly to very gravelly medium to coarse SAND. Gravel is flat to elongated subangular fine to medium of sandstone and igneous rock.				1.00
	1.00	B, J, T, V									
	1.20	SPT=12 T	2.3/3.3.3.3								
	2.00	SPT=12	2.2/3.2.3.4								
	2.00	B, T									
	3.00	SPT=14	3.3/3.3.3.5								
	3.00	B, T									
						3.50	Soft light brown gravelly sandy clayey SILT. Gravel is subangular fine of sandstone.				
	4.00	SPT=9	2.2/2.2.2.3			4.10					
	4.00	B, T					Soft light brown clayey sandy SILT.				
						5.00					5.00
	5.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	5.00	5.00

Location: E 238216.7 N 681916.6

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 5.00m

Borehole No: WS04

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
7/2 2017						0.10	# Turf				0.20
	0.25	B, J, T, V				0.25	Brown organic silty clayey slightly gravelly sand with rootlets. Gravel is flat to elongated subangular fine of various lithologies. (TOPSOIL)				
	0.50	J, T, V				0.35	# Black ash. (MADE GROUND)				0.50
							Light brown slightly gravelly very silty fine to medium SAND. Gravel is flat to elongated subangular to subrounded fine of sandstone and igneous rock.				
	1.00	B, J, T, V				1.00	# SAND.				
	1.20	SPT=6	1.1/1.1.2.2								
						1.65	Light brown silty gravelly medium SAND. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
	2.00	SPT=20	3.5/5.5.5.5			2.00	Medium dense greyish brown slightly silty medium to coarse SAND and GRAVEL. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
	2.00	B, T				2.45	Firm light brown gravelly very sandy silty CLAY with grey silt bands. Gravel is subangular fine of sandstone.				
	2.80	B				2.90					2.90
	2.90	SPT=	50/				END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.90	2.90

Location: E 238262.2 N 681868.5

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
No recovery for SPT at 1.2 and 2.9 m (refusal) depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.90m

Borehole No: WS05

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
3/2 2017						0.10	# TOPSOIL.				0.20
	0.25	B, J, T, V				0.40	Soft brown organic very sandy CLAY.				0.50
	0.50	J, T, V					Soft to firm light brown slightly gravelly sandy CLAY. Gravel is flat subangular fine of sandstone.				
	1.00	B, J, T, V				1.10					
	1.20	SPT	=10 2.2/2.3.3.2 T	1.20			Medium dense brown silty gravelly fine to medium SAND. Gravel is cubic to elongated subangular fine to medium of sandstone, igneous rock and other lithologies.				
	2.00	B, T				2.00					
	2.20	SPT	=14 4.4/4.3.4.3 T	2.20			Medium dense to dense light brown to brown silty gravelly fine SAND with fine silt lenses. Gravel is cubic to elongated subangular fine of various lithologies.				
	2.80	B									3.00
	3.00	SPT	= 7.15/15.50 T	3.00		3.30					3.30
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.30	3.00

Location: E 238311.0 N 681827.4

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal at 3.3 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.30m

Borehole No: WS06

Contract No: 2304

Driller: RB

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
2/2/2017						0.02	# Vegetation.				0.20
	0.25	B, J, T					Greyish brown slightly silty gravelly sand with medium cobble content. Gravel is flat to cubic subangular fine to medium of sandstone, tile fragments and other lithologies. Cobbles are up to 8 cm of angular elongated sandstone and igneous rock. (MADE GROUND)				0.50
	0.50	J, T									
	1.00	B, J, T									
	1.20	SPT T	=9 1.2/2.2.2.3	1.20		1.20					
							Loose to very dense greyish brown very sandy fine to medium GRAVEL. Gravel is flat to cubic angular to subangular of quartz, gneiss and other lithologies.				
	1.80	B									
	2.00	SPT T	= 15.20/50	2.00							2.00
						2.20	END OF BOREHOLE				2.20

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.20	2.00

Location: E 238184.4 N 681810.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal at 2.2 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.20m

Borehole No: WS07

Contract No: 2304

Driller: RB

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
7/2 2017						0.20	# TOPSOIL.				0.20
	0.25	B, J, T, V					Light brown slightly organic gravelly very silty clayey fine to medium SAND. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
	0.50	J, T, V				0.80					
	1.00	B, J, T, V					Soft to firm brown to greyish brown sandy gravelly CLAY with low plasticity and silty sand lenses. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				1.00
	1.20	U (22)		1.20		1.20					
							Stiff brown to greyish brown sandy gravelly CLAY with high strength and silty sand lenses. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
	2.00	SPT=33 4.6/8.7.8.10				1.70					
	2.00	B, T					Stiff brown sandy gravelly CLAY. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
						2.80					2.80
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.80	2.80

Location: E 238145.4 N 681781.8

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel refusal at 2.8 m depth.

Equipment:
DART

Method:
Inspection Pit to 1.20m
Window Sampler to 2.80m

Borehole No: WS08

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
7/2/2017						0.30	Dark brown organic very silty clayey slightly gravelly sand with rootlets. Gravel is flat to elongated subangular fine of various lithologies. (TOPSOIL)				
	0.25	B, J, T									
	0.50	J, T					Soft to firm light brown to brown sandy very gravelly CLAY with low plasticity and silty sand lenses. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
	1.00	B, J, T									
	1.20	SPT=26 2.4/4.8.8.6 T				1.20					
	2.00	SPT=47 6.8/15.11.9.12					Stiff to very stiff brown sandy gravelly CLAY. Gravel is flat to elongated subangular to subrounded fine to medium of sandstone and igneous rock.				
	2.00	B, T									
						2.40					
						2.45	# Obstruction (possible rock).				2.45
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.45	2.40

Location: E 238139.2 N 681743.7

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel refusal at 2.40 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.45m

Borehole No: WS09

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
2/2/2017						0.02	# Vegetation.				0.20
	0.25	B, J, T				0.30	Greyish brown silty gravelly medium sand with grey ash presence. Gravel is flat to cubic subangular fine to coarse of sandstone, shale and other lithologies. (MADE GROUND)				0.50
	0.50	J, T					Light brown silty fine to medium SAND with rootlets.				
	1.00	B, J, T				1.20					
	1.20	SPT=20 3.3/6.4.4.6		1.20			Medium dense brown silty gravelly fine to medium SAND. Gravel is elongated subangular medium to coarse of igneous rock.				
	1.20	B, T				1.80					1.80
	1.80	SPT= 11.7/20.26.50 T		1.80			Weak brown fine grained weathered sandstone BOULDER.				
						2.15	END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								1.60	1.60	20		125	2.15	1.80

Location: E 238173.1 N 681770.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal 2.15 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.15m

Borehole No: WS10

Contract No: 2304

Driller: RB

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
2/2 2017						0.02	# Vegetation.				0.20
	0.25	B, J, T					Light brown slightly gravelly silty fine to medium SAND with rootlets. Gravel is elongated subangular fine to coarse of sandstone and other lithologies.				
	0.50	J, T				0.80					0.50
	1.00	B, J, T					Firm light brown clayey very sandy very gravelly CLAY with low plasticity and medium strength after 2.2 m depth. Gravel is elongated subangular fine to coarse of igneous rock and other lithologies.				
	1.20	SPT=11 2.1/3.3.2.3	T								
	2.00	B									
	2.20	U (64)		2.20							
	2.65	B				2.60					
	2.80	SPT= 50/				2.80	Brown silty clayey gravelly fine to medium SAND. Gravel is elongated subangular medium to coarse of igneous rock.				2.80
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								1.50				125	2.80	2.80

Location: E 238181.6 N 681744.4

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 2.8 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.80m

Borehole No: WS11

Contract No: 2304

Driller: RB

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Printed: 13/06/2017 16:33:58

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
2/2 2017											0.20
	0.25	B, J, T					Greyish brown silty gravelly medium sand and gravel. Gravel is flat to cubic subangular fine to coarse of sandstone, shale, brick fragments and other lithologies. (MADE GROUND)				0.50
	0.50	J, T				0.70					
	1.00	B, J, T					Medium dense to dense light brown to brown slightly silty very gravelly medium SAND. Gravel is elongated subangular fine to medium of sandstone, igneous rock and other lithologies.				
	1.20	SPT=15 T	2.3/3.3.4.5	1.20							
	2.00	B									
	2.20	SPT=23 T	4.4/6.5.6.6	2.20							
	2.80	B				3.00					3.00
	3.00	SPT=	50/	3.00			END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.00	3.00

Location: E 238211.5 N 681739.1

Level: -

Orientation: Vertical

Remarks:

SPT refusal and no recovery at SPT at 3.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.00m

Borehole No: WS12

Contract No: 2304

Driller	Originator
RB	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
3/2 2017						0.10	# TOPSOIL.				0.20
	0.25	B, J, T, V				0.45	Soft brown organic gravelly sandy CLAY. Gravel is flat to elongated subangular medium of various lithologies.				0.50
	0.50	J, T, V					Soft to firm light brown to yellowish brown slightly gravelly sandy to very sand CLAY with intermediate plasticity. Gravel is flat subangular fine to medium of sandstone and other lithologies.				
	1.00	B, J, T, V									
	1.20	SPT=10 T	2.2/2.3.3.2	1.20							
	2.00	B, T				2.20					
	2.20	SPT=14 T	4.4/4.3.4.3	2.20			Medium dense brown silty gravelly fine to medium SAND. Gravel is cubic to elongated subangular fine to coarse of sandstone, igneous rock and other lithologies.				
	2.60	B				2.70					2.70
	2.70	SPT=	7.15/15.50	2.70			Obstruction, no recovery from SPT				
						3.00					3.00
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.00	2.70

Location: E 238265.4 N 681732.3

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 2.7 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.00m

Borehole No: WS13

Contract No: 2304

Driller	Originator
RB	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
3/2 2017						0.10	# TOPSOIL.				0.20
	0.25	B, J, T, V				0.45	Soft brown organic gravelly very sandy CLAY. Gravel is elongated subangular fine to coarse of sandstone, igneous rock and other lithologies.				0.50
	0.50	J, T, V					Dense brown silty gravelly medium SAND. Gravel is elongated subangular fine to medium of sandstone and igneous rock.				
	1.00	B, J, T, V									
	1.20	SPT=33 T	4.6/6.9.9.9	1.20		1.65					
							Dense greyish brown silty sandy fine to medium GRAVEL. Gravel is flat to elongated subangular to subrounded of sandstone, igneous rock and other lithologies.				
	2.00	B, T									
	2.20	SPT=41 T	10.10/9.10.11.11	2.20		2.70					
	2.80	B					Light brown to brown silty gravelly medum SAND. Gravel is flat to elongated subangular fine to coarse of igneous rock and other lithologies.				3.00
	3.00	SPT=	10.12/50	3.00		3.15	No recovery for SPT.				3.15
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								1.50	1.50	20		125	3.15	3.00

Location: E 238214.5 N 681687.0

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 3 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.15m

Borehole No: WS14

Contract No: 2304

Driller: RB

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
3/2/2017						0.10	# TOPSOIL.				0.20
	0.25	B, J, T, V					Soft brown organic slightly gravelly sandy CLAY with roots. Gravel is flat to elongated subangular medium of various lithologies.				0.50
	0.50	J, T, V				0.60					
							Firm to stiff brown gravelly slightly sandy silty CLAY with low plasticity. Gravel is flat subangular fine to coarse of sandstone, igneous rock and other lithologies.				
	1.00	B, J, T, V									
	1.20	SPT=29 2.4/6.7.7.9		1.20							
		T									
	1.50	B				1.70					1.70
	1.70	SPT = 50/		1.70			END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.70	1.70

Location: E 238166.8
N 681660.5

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at at 1.7 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.70m

Borehole No: WS15

Contract No: 2304

Driller: RB

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
8/2 2017						0.05	# Turf.				0.20
	0.25	B, J, T, V				0.30	Soft brown organic slightly gravelly sandy clay with rootlets. Gravel is flat to elongated subangular fine to coarse of various lithologies. (TOPSOIL).				0.50
	0.50	J, T, V					Loose greyish brown to dark grey peaty clayey gravelly medium SAND with black clayey peat lenses and coal traces. Gravel is flat subangular fine of sandstone, igneous rock, coal fragments and other lithologies.				
	1.00	B, T									
	1.20	SPT=4 2.2/1.1.1.1 T		1.20		1.50					
							Extremely soft grey to black clayey sandy PEAT with brown sandy clay lenses.				
	1.80	J, V									
	2.00	SPT=0 0.0/0.0.0.0		2.00							
	2.00	B, T									
						2.80					
							Medium dense light brown sligthly silty gravelly to very gravelly medium SAND with sandy silt lenses.				
	3.00	SPT=13 2.2/2.3.3.5		3.00							
	3.00	B, T									
						4.00					4.00
	4.00	SPT= 50/ B		4.00			END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	4.00	4.00

Location: E 238427.6 N 681938.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at at 4.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 4.00m

Borehole No: WS16

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
14/2 2017	0.25	B, J, T, V				0.05	# TOPSOIL.				
						0.20	# Ash fill (MADE GROUND)				
						0.50	Dark brown very organic silty gravelly medium to coarse SAND with low cobble content and rootlets. Gravel is elongated subangular to subrounded fine to medium of sandstone and other lithologies. Cobbles are elongated subangular of sandstone.				
	1.00	B					Light brown silty slightly gravelly medium SAND with low cobble content. Gravel is flat to elongated angular to subangular sandstone and other lithologies. Cobbles are elongated subangular of sandstone.				
	1.20	SPT=18 4.4/4.5.4.5 T		1.20		1.20					
						1.60	Medium dense light yellowish brown slightly silty medium SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to medium of quartz, igneous rock and other lithologies.				1.65
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.65	1.60

Location: E 238656.6
N 681839.6

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 1.6 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.65m

Borehole No: WS17

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
14/2 2017						0.20	# TOPSOIL.				0.20
	0.25	B, J, T, V					Dark brown organic silty gravelly medium to coarse SAND with medium cobble content. Gravel is elongated subangular to subrounded fine to medium of sandstone and other lithologies. Cobbles are flat subangular to subrounded of sandstone and igneous rock.				0.50
	1.00	B				1.20					
	1.20	SPT=14 2.3/3.3.4.4 T		1.20			Medium dense to dense light yellowish brown slightly silty medium SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of quartz, igneous rock and other lithologies.				
	2.00 2.00	SPT=22 3.4/5.5.6.6 B, T		2.00							
	3.00 3.00	SPT=43 11.11/12.14.8.9 B, T		3.00							3.10
						3.45					3.45
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.45	3.10

Location: E 238621.6 N 681897.5

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 3.1 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.45m

Borehole No: WS18

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
14/2 2017	0.25	B, J, T, V					0.30	Soft dark brown organic gravelly sandy clay with roots. Gravel is flat to elongated subangular fine of various lithologies. (TOPSOIL)				
							1.00	Brown to greyish brown silty fine to medium SAND and GRAVEL. Gravel is elongated subangular fine of quartz, sandstone and other lithologies.				1.00
	1.00	B						END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238599.6 N 681997.0

Level: -

Orientation: Vertical

Remarks:
Obstruction at 1.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.00m

Borehole No: WS19

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
14/2 2017							0.30	# TOPSOIL.				
							1.10	# SAND and GRAVEL.				
	1.20	SPT	=18 2.3/4.4.5.5 T	1.20				Medium dense brown to greyish brown silty fine to medium SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of quartz, sandstone and other lithologies.				
	2.00 2.00	SPT	=21 4.5/5.4.5.7 B, T	2.00								
							2.45	END OF BOREHOLE				2.45

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.00	2.00

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 2.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.00m

Borehole No: WS19A

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
13/2/2017											0.20
	0.25	B, J, T, V				0.45	Soft dark brown organic gravelly sandy clay with roots. Gravel is flat to elongated subangular fine of various lithologies. (TOPSOIL)				0.50
	1.00	B					Brown silty medium SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of quartz, igneous rock and other lithologies.				
	1.20	SPT=11 3.2/2.3.3.3 T		1.20		1.20					
	2.00	SPT=12 2.2/3.3.2.4		2.00			Medium dense light greyish brown slightly silty medium SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of quartz, igneous rock and other lithologies.				
	2.00	B, T									
						2.90					2.90
	2.90	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.90	2.90

Location: E 238561.6 N 682021.0

Level: -

Orientation: Vertical

Remarks:
Barrel obstruction at 2.9 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.90m

Borehole No: WS20

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
9/2 2017						0.20	# TOPSOIL.				0.20
	0.25	B, J, T, V					Brown slightly organic silty gravelly medium to coarse SAND with rootlets. Gravel is elongated subangular to subrounded fine of sandstone and other lithologies.				0.50
						1.00					
	1.00	B					Loose to medium dense light brown slightly silty gravelly to very gravelly medium to coarse SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone and other lithologies.				
	1.20	SPT=10 T	1.2/2.2.3.3								
	2.00	SPT=22	3.4/5.5.6.6	1.00							
	2.00	B, T									
	3.00	SPT=19	4.7/4.4.5.6	2.00							
	3.00	B, T									
						3.60					
							Firm light yellowish brown siglthly gravelly very sandy silty CLAY. Gravel is subangular fine of sandstone.				
	4.00	SPT=21	4.6/5.4.6.6	3.00		4.10					
	4.00	B, T					Medium dense light yellowish brown slightly silty gravelly medium SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone and other lithologies.				
						5.00					5.00
	5.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	5.00	5.00

Location: E 238508.4 N 681991.3

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 5.00m

Borehole No: WS21

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
9/2 2017						0.15	# TOPSOIL.				0.20
	0.25	B, J, T, V					Loose greyish brown organic silty gravelly fine to medium SAND. Gravel is cubic to elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				0.50
	1.00	B									
	1.20	SPT=6 1.1/1.2.1.2 T		1.20							
						2.00					
	2.00	SPT=15 3.3/4.3.4.4		2.00			Medium dense pale grey to grey gravelly medium to coarse SAND. Gravel is cubic to elongated subangular to subrounded fine of sandstone, quartz and other lithologies.				
	2.00	B, T									
						2.80					
	3.00	SPT=15 4.4/3.5.3.4		3.00			Medium dense slightly gravelly silty clayey fine to medium SAND. Gravel is subangular fine to medium of sandstone.				
	3.00	B, T									
	4.00	SPT=20 3.4/5.6.5.4		4.00							
	4.00	B, T				4.20					
							Light brown sandy SILT.				
						5.00					5.00
	5.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	5.00	5.00

Location: E 238485.4 N 682028.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 5.00m

Borehole No: WS22

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
9/2 2017						0.15	# TOPSOIL.				0.20
	0.25	B, J, T, V				0.80	Light brown silty fine to medium SAND.				0.50
	1.00	B				1.10	Greyish brown slightly gravelly silty fine to medium SAND. Gravel is flat subangular fine to medium of igneous rock.				
	1.20	SPT=10 2.2/2.2.3.3 T		1.20		2.10	Loose to medium dense light brown silty fine to medium SAND.				
	2.00	SPT=11 1.2/3.2.3.3 T		2.00		2.80	Medium dense greyish brown silty fine to medium SAND with some sandy silt lenses.				2.80
	2.80	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.80	2.80

Location: E 238537.8 N 682075.4

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 2.8 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.80m

Borehole No: WS23

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
10/2 2017						0.10	# TOPSOIL.				0.20
	0.25	B, J, T, V					Medium dense light brown slightly silty gravelly to very gravelly medium to coarse SAND. Gravel is elongated subangular to subrounded fine to coarse of sandstone and other lithologies.				0.50
	1.00	B									
	1.20	SPT=24 4.6/7.6.5.6 T				1.50					
							Medium dense light brown silty fine to medium SAND with brown silty bands.				
	2.00	SPT=15 2.3/3.3.4.5		1.00							
	2.00	B, T									
						3.00					
	3.00	SPT= 50/ B		2.00		3.10	# Obstruction.				3.10
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.10	3.00

Location: E 238595.6 N 682094.7

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 3.1 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.10m

Borehole No: WS24

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
15/2 2017	0.25	B, J, T, V				0.50	Soft dark brown organic gravelly clayey SAND with low cobble content and roots. Gravel is flat to elongated subangular fine of igneous rock and other lithologies. Cobbles are flat, subangular of igneous rock. (TOPSOIL)				0.20
											0.50
	1.00	B, T				1.15	Orangey brown silty clayey medium to coarse SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of sandstone, igneous rock and other lithologies.				
	1.20	SPT=15 4.4/4.4.3.4 T		1.20							
	2.00	SPT=11 2.2/2.3.3.3		2.00		2.10	Medium dense light brown to greyish brown slightly silty gravelly fine to medium SAND. Gravel is flat to elongated subangular to subrounded fine to medium of igneous rock, sandstone and other lithologies.				
	2.00	B, T									
	3.00	SPT=17 2.3/4.4.4.5		3.00			Medium dense to dense light brown to greyish brown slightly silty gravelly medium to coarse SAND. Gravel is flat to elongated subangular to subrounded fine to coarse of igneous rock, sandstone, quartz and other lithologies.				
	3.00	B, T									
	4.00	SPT=31 5.6/6.8.8.9		4.00							4.00
	4.00	B, T				4.45					4.45
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	4.45	4.00

Location:

Level: -

Orientation: Vertical

Remarks:
Barrel refusal at 4.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.45m

Borehole No: WS24A

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
15/2 2017	0.25	B, J, T, V				0.50	Soft dark brown organic gravelly clayey sand with low cobble content and roots. Gravel is flat to elongated subangular fine of igneous rock and other lithologies. Cobbles are flat, subangular of igneous rock. (TOPSOIL)				0.20 0.50
	1.00	B, T				1.50	Loose to medium dense orangey brown silty clayey medium to coarse SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of sandstone, igneous rock and other lithologies.				
	1.20	SPT=13 1.2/3.3.4.3 T		1.20		2.00	Medium dense light brown to greyish brown slightly silty gravelly fine to medium SAND. Gravel is flat to elongated subangular to subrounded fine to medium of igneous rock, sandstone and other lithologies.				
	2.00 2.00	SPT=22 5.5/5.6.5.6 B, T		2.00		4.45	Medium dense light brown to greyish brown slightly silty slightly gravelly to gravelly fine to medium SAND. Gravel is flat to elongated subangular to subrounded fine to medium of igneous rock, sandstone, quartz and other lithologies.				4.00
	3.00 3.00	SPT=15 3.4/3.4.3.5 B, T		3.00							
	4.00 4.00	SPT=26 2.3/4.5.7.10 B, T		4.00							4.45
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	4.45	4.00

Location: E 238636.5 N 682079.8

Level: -

Orientation: Vertical

Remarks:
Barrel refusal at 4.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 4.45m

Borehole No: WS25

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
16/2 2017							0.20	# TOPSOIL.				0.20
	0.25	B, J, T, V						Orangey brown to greyish brown silty clayey medium to coarse SAND and GRAVEL with brown sandy clay lenses. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				0.50
	1.00	B					1.20					
	1.20	SPT=24 3.4/5.7.6.6 T		1.20				Medium dense greyish brown silty clayey medium to coarse SAND and GRAVEL with brown sandy clay lenses. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				
							1.70					1.70
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.70	1.70

Location: E 238706.3
N 682110.0

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel refusal at 1.7 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.70m

Borehole No: WS26

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
14/2 2017						0.20	# TOPSOIL.				
	0.25	B, J, T, V					Dark brown slightly organic silty fine to medium SAND and GRAVEL with rootlets. Gravel is elongated subangular fine of quartz, sandstone and other lithologies.				
	1.00	B				1.00					
	1.20	SPT=22 3.4/5.5.5.7 T		1.20			Medium dense brown to greyish brown silty sandy fine to medium GRAVEL. Gravel is elongated subangular fine of quartz, sandstone and other lithologies.				
						1.75					1.75
	1.75	SPT= 50/		1.75			END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.75	1.75

Location: E 238765.8
N 682154.6

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 1.75 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.75m

Borehole No: WS27

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
16/2/2017	0.25	B, J, T, V					Soft dark brown organic gravelly very clayey sand with medium cobble content and roots. Gravel is flat to elongated subangular fine of igneous rock and other lithologies. Cobbles are flat subrounded up to 13 cm of igneous rock. (TOPSOIL)				
						0.70					
	1.00	B					Orangey brown to greyish brown silty clayey medium to coarse SAND and GRAVEL with yellowish brown sandy clay lenses. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				
	1.20	SPT=18 3,3/3,4,5,6 T		1.20		1.10					
							Medium dense greyish brown silty clayey medium to coarse gravelly SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				
						1.60					
						1.80	# Stiff boulder CLAY.				
	1.80	SPT= 50/		1.80			END OF BOREHOLE				1.80

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.80	1.80

Location: E 238662.5 N 682164.2

Level: -

Orientation: Vertical

Remarks:

SPT refusal and no recovery at 1.8 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.80m

Borehole No: WS28

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
16/2 2017							# Sandy TOPSOIL.				
						0.70	# Orange loose to medium SAND + GRAVEL.				
						1.10	# Grey loose to medium SAND + GRAVEL.				
						1.50	# Stiff boulder CLAY.				
	1.70	SPT = 50/		1.20		1.70	END OF BOREHOLE				1.70

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing
												125	1.70	1.70

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 1.70 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.70m

Borehole No: WS28A

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
10/2 2017						0.05	# TOPSOIL.				0.20
	0.25	B, J, T, V					Brown slightly silty very gravelly medium to coarse SAND. Gravel is elongated subangular to subrounded fine to coarse of sandstone and other lithologies.				0.50
						0.60	Light brown silty fine to medium SAND with pockets of organic matter.				
	1.00	B				1.00					
	1.20	SPT=12 2.2/3.3.3.3 T					Medium dense light brown slightly silty gravelly to very gravelly medium to coarse SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone and other lithologies.				
	2.00	SPT=14 2.2/3.3.3.5		1.00							
	2.00	B, T									
						3.00					
	3.00	SPT=22 3.3/3.5.6.8		2.00			Medium dense light brown slightly silty medium to coarse SAND and GRAVEL. Gravel is elongated subangular to subrounded fine of sandstone and other lithologies.				3.30
	3.00	B, T				3.60					3.60
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.60	3.60

Location: E 238622.4
N 682186.4

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 3.6 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.60m

Borehole No: WS29

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
10/2 2017						0.15	# Hardcore (MADE GROUND)				0.20
	0.25	B, J, T, V					Brown slighty organic silty very sandy GRAVEL with low cobble content. Gravel is elongated subangular to subrounded fine to coarse of sandstone and other lithologies. Cobbles are subangular elongated of sandstone.				0.50
	1.00	B									
	1.20	SPT=49 8,11/12,13,13,11		1.20		1.20					
	1.20	T					Stiff brown gravelly very sandy CLAY. Gravel is subangular to subrounded of quartz, igneous rock and other lithologies.				
						2.00					2.00
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	2.00	2.00

Location: E 238660.0
N 682237.8

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 2.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 2.00m

Borehole No: WS30

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
23/2 2017	0.25	B, J, T, V				0.05	# Turf.				
						0.15	# TOPSOIL.				
						0.60	Loose dark grey to brownish grey, slightly organic silty gravelly medium to coarse sand with low cobble content and rootlets, Gravel is elongated subangular fine to coarse of sandstone, other lithologies, brick and tile fragments. (MADE GROUND)				0.60
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238646.7 N 682306.2

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.6 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.60m

Borehole No: WS31

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
23/2 2017							0.05	# Turf.				
							0.15	# TOPSOIL.				
								# Dark brown clayfill, large cobbles. (MADE GROUND)				
							0.80					0.80
								END OF BOREHOLE				

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.8 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.80m

Borehole No:
WS31A

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
24/2 2017	0.25	B, J, T, V					0.05	# Turf.				
							0.20	# TOPSOIL.				
								Greyish brown, slightly organic silty clayey gravelly medium to coarse sand with rootlets. Gravel is elongated subangular fine of sandstone, other lithologies and brick fragments. (MADE GROUND)				
							0.70					
	0.90	B					0.90	Light brown silty gravelly to very gravelly fine to medium SAND. Gravel is elongated subangular fine of quartz, sandstone and other lithologies.				0.90
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238602.5 N 682329.6

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.9 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.90m

Borehole No: WS32

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
23/2 2017	0.25	B, J, T, V					0.05	# Turf.				
							0.40	Brown slighty organic slightly clayey gravelly medium to coarse sand. Gravel is elongated subangular to subrounded fine to coarse of sandstone and other lithologies. (TOPSOIL)				
							0.65	# Large hardcore obstruction. (MADE GROUND)				0.65
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238636.9
N 682351.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.65 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.65m

Borehole No:
WS33

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
24/2 2017	0.25	B, J, T, V					0.05	# Turf.				
							0.15	# TOPSOIL.				
								Greyish brown, slightly organic silty clayey gravelly medium to coarse sand with rootlets, Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick fragments. (MADE GROUND)				
							0.65	END OF BOREHOLE				0.65

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238565.0 N 682361.2

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.65 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.65m

Borehole No: WS34

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
24/2 2017	0.25	B, J, T, V				0.05	# Turf.				0.20
						0.15	# TOPSOIL.				
						0.40	Greyish brown, slightly organic silty clayey gravelly medium SAND with rootlets, Gravel is elongated subangular fine to medium of sandstone and other lithologies.				0.50
	0.80	B				0.80	Greyish brown silty fine to medium SAND and GRAVEL with medium cobble content. Gravel is elongated subangular fine to coarse of quartz, sandstone and other lithologies. Cobbles are subrounded up to 12 cm of igneous rock and sandstone.				
	1.00	B									1.20
	1.20	SPT= 13.14/17.19.23 T					Dense to very dense grey silty fine to medium SAND and GRAVEL. Gravel is elongated subangular fine to coarse of quartz, sandstone and other lithologies.				
						1.50					1.50
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								1.00	0.80	20		125	1.50	1.25

Location: E 238513.4 N 682395.9

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 1.25 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.50m

Borehole No: WS35

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
24/2 2017						0.05	# Turf.				
						0.15	# TOPSOIL.				
						0.40	# Clayfill. (MADE GROUND)				
							Large dark brown SAND and GRAVEL.				
	1.20	SPT= 50/				1.25	END OF BOREHOLE				1.25

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								0.90	0.80	10				

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 1.25 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.25m

Borehole No: WS35A

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
10/2 2017						0.05	# TOPSOIL.				0.20
	0.25	B, J, T, V					Loose dark grey to brownish grey, slightly organic silty gravelly medium to coarse sand with rootlets, glass fragments and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone and other lithologies. (MADE GROUND)				0.50
	1.00	B									
	1.20	SPT=6 1.2/2.1.1.2 T									
	2.00	SPT=7 2.2/1.1.2.3		1.00							
	2.00	B, T									
						2.70					
	2.80	J, T, V					Light brown silty fine to medium SAND and GRAVEL. Gravel is elongated subangular fine of quartz, sandstone and other lithologies.				
	3.00	SPT= 20/ B		2.00		3.20					3.20
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.20	3.00

Location: E 238727.0 N 682421.6

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 3.2 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.20m

Borehole No: WS36

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
20/2 2017						0.05	# TOPSOIL.				0.25
	0.25	B, J, T, V				0.50	Dark grey to black, silty gravelly medium to coarse sand and dark grey to black ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick fragments. (MADE GROUND)				0.50
	1.00	B					Loose brownish grey, slightly organic silty very sandy gravel with rootlets and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, slate, other lithologies and brick fragments. (MADE GROUND)				
	1.20	SPT=4 1.1/1.1.1.1 T				2.00					
	2.00	B, T					Loose light brown silty clayey fine to medium SAND. Gravel is elongated subangular fine of igneous rock and sandstone.				
	2.20	SPT=8 1.0/1.2.2.3				2.70					
						3.00	Light brown silty gravelly fine to medium SAND. Gravel is elongated subangular fine of quartz, sandstone and other lithologies.				3.00
	3.00	SPT= 50/ B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								2.90	2.75	20		125	3.00	3.00

Location: E 238744.6 N 682354.2

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.00m

Borehole No: WS37

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
21/2 2017						0.05	# TOPSOIL.				0.25
	0.25	B, J, T, V					Loose dark grey to brownish grey, slightly organic silty clayey gravelly medium to coarse sand and gravel with rootlets and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick fragments. (MADE GROUND)				0.50
	1.00	B									
	1.20	SPT=2 T	0.0/1.0.1.0								
	2.00	SPT=0	0.0/0.0.0.0								
	2.00	B, T									
	3.00	SPT=2	1.1/0.1.0.1			3.10					
	3.00	B, T					Very soft light brown organic silty sandy CLAY with rootlets.				
	3.30	J, T, V									
	4.00	SPT=0	0.0/0.0.0.0								
	4.00	B, T									4.50
						4.60	Very soft light brown silty fine to medium SAND and GRAVEL. Gravel is elongated subangular fine to coarse of quartz, sandstone and other lithologies.				
						5.00					5.00
	5.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								3.70	3.60	20		125	4.00	4.00

Location: E 238796.8 N 682353.0

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 5.00m

Borehole No: WS38

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
16/2 2017	0.25	B, J, T, V					0.50	Soft dark brown organic gravelly very clayey sand with roots. Gravel is flat to elongated subangular fine of igneous rock and other lithologies. (TOPSOIL)				
	1.00	B					1.20	Brown slightly organic clayey medium to coarse SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to coarse of sandstone, igneous rock and other lithologies.				
	1.20	SPT	=31 3.4/5.6.10.10	1.20			1.65	Medium dense to dense greyish brown to brown silty clayey medium to coarse very gravelly SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				1.65
		T						END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.65	1.50

Location: E 238739.5 N 682296.2

Level: -

Orientation: Vertical

Remarks:
Barrel refusal at 1.5 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.65m

Borehole No: WS39

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
16/2 2017								# Sandy TOPSOIL.				
							0.50	# Large dark brown SAND + GRAVEL.				
							1.40					1.40
	1.40	SPT = 50/		1.40				END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.40	1.40

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 1.40 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.40m

Borehole No:
WS39A

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
20/2 2017	0.25	B, J, T, V					0.05	# Turf.				
								Brownish grey, slightly organic silty gravelly medium to coarse sand with low cobble content, rootlets, grass fragments and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick and pottery fragments. Cobbles elongated subangular of sandstone. (MADE GROUND)				0.60
							0.60	END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238840.6
N 682292.9

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 0.60m

Borehole No:
WS40

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
20/2 2017							0.05	# Turf. Clayfill bricks pottery and large cobbles. (MADE GROUND)				
							0.65	END OF BOREHOLE				0.65

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing

Location:

Level: -

Orientation: Vertical

Remarks:
#Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 0.65m

Borehole No:
WS40A

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
20/2 2017							0.05	# Turf.				
								Clayfill bricks pottery and large cobbles. (MADE GROUND)				
							0.50					0.50
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 0.50m

Borehole No:
WS40B

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
23/2 2017						0.10	# TOPSOIL.				0.20
	0.25	B					# Sand and gravel fill. (MADE GROUND)				0.50
						0.60	Very loose dark grey to brownish grey, slightly organic silty gravelly medium to coarse sand with glass fragments and dark grey ash. Gravel is elongated subangular fine to medium of sandstone, other lithologies and tile fragments. (MADE GROUND)				
	1.00	B									
	1.20	SPT=0 T	0.1/0.0.0.0	1.20							
	2.00 2.00	SPT=1 B, T	1.1/0.0.1.0	2.00							
	3.00 3.00	SPT=2 B, T	1.1/1.0.0.1	3.00		3.20	Very soft to soft brown silty sandy CLAY.				
	4.00	SPT=5	1.1/2.1.1.1	4.00		4.40	Very loose grey silty slightly gravelly to gravelly medium to coarse SAND. Gravel is elongated to flat subangular fine to medium of quartz, sandstone and other lithologies.				5.60
	5.00	SPT=1 B	1.0/1.0.0.0	5.00		6.00	END OF BOREHOLE				6.00

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								2.50	2.40	10		125	6.00	6.00

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Liner sample between 3.0 and 4.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 6.00m

Borehole No: WS40C

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
17/2 2017						0.10	# TOPSOIL.				0.20
	0.25	B, J, T, V					Very loose dark grey to brownish grey, slightly organic silty gravelly medium to coarse sand with glass fragments and dark grey ash. Gravel is elongated subangular fine to medium of sandstone, other lithologies and tile fragments. (MADE GROUND)				0.50
	1.00	B									
	1.20	SPT=5 1.0/1.1.2.1 T		1.20							
	2.00	SPT=0 1.0/0.0.0.0		2.00							
	2.00	B, T									
						2.70					
	2.80	J, T, V					Very soft light brown sandy very clayey PEAT with rootlets.				
	3.00	SPT=2 1.1/0.1.0.1 B		3.00							
	4.00	SPT= 50/ B		4.00		4.10					4.10
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	4.10	4.10

Location: E 238822.9 N 682248.8

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 4.1 m depth.
No recovery for SPT at 3.0 and 4.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 4.10m

Borehole No: WS41

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
16/2 2017	0.25	B, J, T, V					0.35	Soft dark brown organic clayey very gravelly sand with roots. Gravel is flat to elongated subangular to subrounded fine to medium of igneous rock and other lithologies. (TOPSOIL)				
								Dense brown clayey sandy medium to coarse GRAVEL. Gravel is elongated and flat subangular to subrounded fine to coarse of sandstone, igneous rock and other lithologies.				
	1.00	B										
	1.20	SPT=42 11.12/10.11.9.12 T		1.20			1.65					1.65
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.65	1.40

Location: E 238774.9
N 682257.0

Level: -

Orientation: Vertical

Remarks:
Barrel refusal at 1.4 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.65m

Borehole No:
WS42

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
17/2 2017								# Sandy TOPSOIL.				
							0.50	# Large dark brown SAND and GRAVEL.				
							1.60					1.60
	1.60	SPT = 50/		1.60				END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.60	1.60

Location: E 238826.8
N 682077.8

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
SPT refusal and no recovery at 1.60 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.60m

Borehole No: WS42A

Contract No: 2304

Driller: KG
Originator: MM
Chk & App: SG
Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part
Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
21/2 2017						0.10	# TOPSOIL.				0.25
	0.25	B, J, T, V					Very loose dark grey to brownish grey, slightly organic silty gravelly to very gravelly medium to coarse sand with rootlets, glass fragments and dark grey ash. Gravel is elongated subangular fine to medium of sandstone, other lithologies and brick fragments. (MADE GROUND)				0.50
	1.00	B									
	1.20	SPT=1 0.0/1.0.0.0 T		1.20							
	2.00	SPT=1 1.0/0.1.0.0		2.00							
	2.00	B, T									
	3.00	SPT=2 0.0/1.0.1.0 B		3.00							
						3.50	Very soft dark brown to brown sandy clayey PEAT with rootlets.				
						4.00					4.00
	4.00	SPT= 50/ B		4.00			END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								2.60	2.60	20		125	4.00	4.00

Location: E 238897.3 N 682222.4

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
No recovery for SPT at 3.0 and 4.0 m depth.
SPT refusal at 4.0 m.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 4.00m

Borehole No: WS43

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
21/2 2017	0.25	B					0.10	# TOPSOIL.				
	0.50	J					0.60	Loose dark grey, slightly organic silty slightly gravelly to gravelly medium to coarse sand with rootlets and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick fragments. (MADE GROUND)				0.60
								END OF BOREHOLE				

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing

Location: E 238873.0
N 682187.2

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 0.60m

Borehole No:
WS44

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part
Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
17/2 2017	0.25	B, J, T, V					Brown organic silty clayey gravelly medium sand. Gravel is flat to elongated subangular fine to medium of sandstone, other lithologies and brick and tile fragments. (MADE GROUND)				0.20
	1.00	B									0.50
	1.20 1.30	SPT=1 J, T, V	1.1/1.0.0.0	1.20		1.20					
							Very loose to loose dark grey to grey, silty gravelly medium to coarse SAND with dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and tile fragments. (MADE GROUND)				
	2.00 2.00	SPT=1 B, T	1.1/0.0.1.0	2.00							
						2.90					
	3.00	SPT=2 B	2.1/0.1.0.1	3.00		3.15	Very loose light brown silty clayey fine to medium SAND and GRAVEL. Gravel is elongated angular to subangular fine of quartz, sandstone and other lithologies.				
							Very loose brown silty clayey gravelly fine to medium very sandy GRAVEL with peaty and sandy clay bands. Gravel is elongated subangular fine to medium of quartz, sandstone and other lithologies.				
	4.00 4.00	SPT=0 B, T	0.0/0.0.0.0	4.00							
						4.45					
							Soft to firm greyish brown peaty sandy CLAY.				
						5.00					
	5.00	SPT=0 B	0.0/0.0.0.0	5.00			Very soft to firm grey sandy clayey PEAT with shell fragments.				
						6.00					6.00
	6.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	6.00	6.00

Location: E 238816.9
N 682183.5

Level: -

Orientation: Vertical

Remarks:

No recovery for SPT at 1.2 , 3.0 and 5.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 6.00m

Borehole No:

WS45

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
16/2 2017	0.25	B, J, T, V					0.40	Soft dark brown organic clayey very gravelly sand with roots. Gravel is flat to elongated subangular to subrounded fine to medium of igneous rock and other lithologies. (TOPSOIL)				
	1.00	B					1.20	Brown clayey sandy medium to coarse GRAVEL. Gravel is elongated and flat subangular to subrounded fine to coarse of sandstone, igneous rock and other lithologies.				
	1.20	SPT	>50 6.8/10.14.17.21	1.20			1.65	Dense to very dense orangey brown to brown silty clayey gravelly medium SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				1.65
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.65	1.20

Location: E 238733.5 N 682204.0

Level: -

Orientation: Vertical

Remarks:
Barrel refusal at 1.35 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.65m

Borehole No: WS46

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
23/2 2017	0.25	B, J, T, V					0.10	# TOPSOIL.				
								Soft dark brown organic clayey very gravelly sand with roots and dark grey ash. Gravel is flat to elongated subangular to subrounded fine to medium of igneous rock, other lithologies and brick fragments. (MADE GROUND)				
	0.60	J					0.60	END OF BOREHOLE				0.60

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing

Location: E 238955.8
N 682125.0

Level: -

Orientation: Vertical

Remarks:
Stopped at 0.6 for potential chromium contamination.

Equipment:
Dart

Method:
Inspection Pit to 0.60m

Borehole No:
WS47

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part
Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
20/2 2017						0.10	# Turf.				0.25
						0.20	# TOPSOIL.				
	0.25	B, J, T, V					Very loose dark grey, slightly organic silty clayey gravelly medium to coarse sand with rootlets and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick fragments. (MADE GROUND)				0.50
	1.00	B									
	1.20	SPT=2 T	1.1/0.1.0.1								
						1.65					
							Very soft to soft dark grey to brownish grey, slightly organic slightly gravelly very sandy clay dark grey ash traces. Gravel is elongated subangular fine to coarse of sandstone and other lithologies. (MADE GROUND)				
	2.00	SPT=8 B	2.1/1.2.2.3								
						2.80					
	2.90	J, T, V					Soft dark brown to brown sandy clayey PEAT with rootlets.				
	3.00	SPT=10 B	3.2/2.2.3.3								
						3.60					
							Light greyish brown organic peaty silty sandy CLAY with rootlets.				
						4.00					4.00
	4.00	SPT= B	50/				END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.00	3.00

Location: E 238870.3 N 682071.7

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 4.00m

Borehole No: WS49

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
20/2 2017						0.05	# Turf.				0.25
						0.15	# TOPSOIL.				0.50
	0.25	B, J, T, V					Loose dark grey, slightly organic silty slightly gravelly to gravelly medium to coarse sand with rootlets and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick and pottery fragments. (MADE GROUND)				
	1.00	B									
	1.20	SPT=3 0.0/1.1.0.1 T									
	2.00	SPT=4 1.1/0.1.1.2									
	2.00	B, T				2.20					
							Very loose light brown to greyish brown peaty silty clayey to very clayey gravelly fine to medium SAND with some rootlets. Gravel is elongated subangular fine to coarse of quartz, sandstone and other lithologies.				3.00
	3.00	SPT= 50/ B				3.10	END OF BOREHOLE				3.10

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	3.00	3.00

Location: E 238923.4 N 682067.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.10m

Borehole No: WS50

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
21/2 2017	0.25	B, J, T, V					0.05	# TOPSOIL.				
							0.30	Loose dark grey to black, slightly organic silty slightly medium to coarse sand and gravel with dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies, brick fragments and slag. (MADE GROUND)				
							0.70	# Sand + gravel. (MADE GROUND)				0.70
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 238944.3
N 682021.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.

Equipment:
Dart

Method:
Inspection Pit to 0.70m

Borehole No: WS51

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
21/2 2017							0.05	# TOPSOIL.				
							0.30	# Slag. (MADE GROUD)				
								# Sand + gravel. (MADE GROUND)				
							0.75					0.75
								END OF BOREHOLE				

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records

Equipment:
Dart

Method:
Inspection Pit to 0.75m

Borehole No:
WS51A

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
22/2 2017						0.05	# TOPSOIL.				0.20
						0.30	Loose dark grey to black, slightly organic silty slightly medium to coarse sand and gravel with dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies, brick fragments and slag. (MADE GROUND)				0.50
							Light brown to brown slightly organic silty slightly medium to coarse sand and gravel. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick and tile fragments. (MADE GROUND)				
	1.00	B									
	1.20	SPT=9 2.2/2.2.2.3		1.20		1.30					
	1.20	T					Very soft brown silty sandy gravelly CLAY with low plasticity and sandy bands. Gravel is elongated subangular fine to coarse of sandstone, quartz and other lithologies.				
	2.00	SPT=5 0.0/1.3.0.1		2.00							
						3.00					3.00
	3.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								2.20	2.00	20		125	3.00	3.00

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 3.0 m depth.
Liner sample between 1.2 and 2.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.00m

Borehole No: WS51B

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
22/2 2017	0.25	B, J, T, V				0.05	# Turf.				
	0.50	J, T, V				0.35	Loose dark grey, slightly organic silty gravelly medium to coarse sand with rootlets and dark grey ash. Gravel is flat to elongated subangular fine to coarse of sandstone, other lithologies and brick and pottery fragments. (MADE GROUND)				
						0.50	Light brown silty gravelly fine to medium sand. Gravel is elongated subangular fine to medium of quartz, sandstone and other lithologies. (MADE GROUND)				
						0.75	# Black ash fill. (MADE GROUND)				0.75
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing

Location: E 239005.9
N 682020.1

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.75 m (driller records "metal").

Equipment:
Dart

Method:
Inspection Pit to 0.75m

Borehole No: WS52

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
22/2 2017						0.05	# Turf.				0.20
						0.35	# Light brown loose sand and gravel. (MADE GROUND)				0.50
							Very loose dark grey to black, slightly organic silty slightly gravelly to gravelly medium to coarse sand with rootlets and dark grey ash, some brown clayey sandy lenses. Gravel is flat to elongated subangular fine to coarse of sandstone, other lithologies and brick and pottery fragments. (MADE GROUND)				
	1.00	B									
	1.20	SPT=0 T	1.1/0.0.0.0	1.20							
	2.00	SPT=0 B, T	1.0/0.0.0.0	2.00							
	2.00					2.80					
							Very loose to medium dense light brown to brown silty clayey gravelly medium SAND. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				3.40
	3.00	SPT=3 B	0.0/1.0.1.1	3.00							
	4.00	SPT=9 B, T	1.1/2.2.2.3	4.00							
	4.00					4.45					4.45
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								2.70	2.90	10		125	4.45	4.00

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 4.0 m.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 4.45m

Borehole No: WS52A

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

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Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
22/2 2017	0.25	B, J, T, V					0.10	# Turf.				0.20
								Dark grey to brown, organic silty clayey gravelly medium to coarse sand with low cobble content, rootlets and dark grey ash. Gravel is elongated subangular fine to coarse of sandstone, other lithologies and brick fragments. Cobbles are flat to elongated subangular of igneous rock and brick fragments. (MADE GROUND)				0.50
							0.60	Medium dense brown silty gravelly to very gravelly fine to medium SAND. Gravel is elongated subangular fine to coarse of quartz, sandstone and other lithologies.				
	1.00	B										1.50
	1.20	SPT=29 6.6/7.7.7.8 T		1.20			1.65					1.65
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.65	1.50

Location: E 238930.5 N 681952.5

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obrstruction at 1.5 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.65m

Borehole No: WS53

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Printed: 13/06/2017 16:34:25

Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
22/2/2017							0.10	# Turf. # Topsoil fill bricks large cobbles. (MADE GROUND)				
							0.60	END OF BOREHOLE				0.65

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Obstruction at 0.65 m depth.

Equipment:
Dart

Method:
Inspection Pit to 0.65m

Borehole No:
WS53A

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Printed: 13/06/2017 16:34:26

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
22/2 2017							# Hardcore. (MADE GROUND)				0.20
						0.40					0.50
	0.50	J, T					Greyish brown silty clayey medium to coarse SAND and GRAVEL. Gravel is flat to elongated subangular fine to coarse of sandstone.				
						0.80					
	1.00	B					Soft to firm silty sandy gravelly CLAY with low plasticity and sandy bands. Gravel is elongated subangular fine to medium of sandstone, quartz, igneous rock and other lithologies.				
	1.20	SPT=7	4.3/2.2.1.2	1.20							
	1.20	T									
	2.00	SPT=6	1.2/1.1.1.3	2.00							
	2.00	B, T									
						2.40					3.00
							Medium dense light brown to brown very silty clayey medium SAND and GRAVEL. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				
	3.00	SPT=21	6.5/5.5.5.6	3.00							
		B									
						3.45					3.45
							END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								3.20				125	3.45	3.00

Location: E 238988.8 N 681978.3

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 3.0 m depth.
Liner sample between 1.2 to 2.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.45m

Borehole No: WS54

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Printed: 13/06/2017 16:34:26

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
8/2 2017	0.25	B, J, T, V					0.20	# TOPSOIL.				
								Soft dark brown organic gravelly sandy CLAY with roots. Gravel is flat to elongated subangular medium of various lithologies.				
							0.80					
	1.00	B						Light brown very silty fine SAND with silt lenses .				
	1.20	SPT=17 2.6/5.5.2.5 T					1.15					
								Firm dark brown organic gravelly very sandy CLAY. Gravel is flat to elongated subangular medium of igneous rock and other lithologies.				
							1.80					1.80
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.80	1.80

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 1.8 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.80m

Borehole No: WS55

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Printed: 13/06/2017 16:34:27

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
8/2 2017							0.20	# TOPSOIL.				0.20
							0.80	# Dark brown CLAY.				0.50
							1.15	# Silty SAND.				
							1.50	# Dark brown CLAY.				1.50
								END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
												125	1.50	1.50

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
Barrel obstruction at 1.5 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 1.50m

Borehole No: WS55A

Contract No: 2304

Driller: KG

Originator: MM

Chk & App: SG

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Printed: 13/06/2017 16:34:27 Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
8/2 2017						0.20	# TOPSOIL.				0.20
	0.25	B, J, T, V					Very loose light brown fine silty clayey slightly gravelly SAND with rootlets. Gravel is fine to medium of sandstone.				0.50
	1.00	B									
	1.20 1.20	SPT=0 T	1.1/0.0.0.0	1.20							
						1.60	Very soft to firm brown silty sandy laminated CLAY.				
	2.00 2.00	SPT=12 T	2.3/3.3.3.3	2.00							
						2.40	Loose brown silty clayey fine to medium SAND and GRAVEL. Gravel is subangular to subrounded fine to medium of quartz, igneous rock and other lithologies				
	3.00	SPT=7	2.4/2.1.2.2	3.00							
						3.80	Very loose dark greyish brown peaty silty clayey gravelly medium SAND. Gravel is subangular to subrounded fine to medium of quartz, igneous rock and other lithologies.				
	4.00 4.00	SPT=4 B, T	1.1/1.1.1.1	4.00							
						5.00					5.00
	5.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								3.00	2.90	20		125	5.00	5.00

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
No recovery for SPT at 3 m depth.
Liner sample between 1.2 and 2.0 m depth and between 2.0 and 3.0 m depth.

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 5.00m

Borehole No: WS56

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

Printed: 13/06/2017 16:34:28

Progress	Sample Depth	Samples and Tests Type	Samples and Tests Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
24/2 2017						0.05	# Turf.				0.20
	0.25	B, J, T, V				0.30	Dark brown organic very silty clayey slightly gravelly sand with rootlets. Gravel is flat to elongated subangular fine of various lithologies. (TOPSOIL)				0.50
							# Grey loose SAND + GRAVEL.		▼		
						0.80			▼		
	1.00	B					Soft to firm silty sandy gravelly CLAY with sandy bands. Gravel is elongated subangular fine of sandstone, quartz, igneous rock and other lithologies.				
	1.20	SPT=0	0.0/0.0.0.0	1.20		1.20					
							Very loose to loose brown to brown silty clayey gravelly medium SAND with sandy clay lenses. Gravel is elongated subangular to subrounded fine to medium of sandstone, igneous rock and other lithologies.				
						2.00					2.60
	2.00	SPT=1	1.0/0.1.0.0	2.00			Very loose greyish brown silty very sandy fine to coarse GRAVEL with low cobble content. Gravel is subangular to subrounded of quartz, igneous rock and other lithologies. Cobbles are rounded up to 8 cm of sandstone and igneous rock.				
	2.00	B, T									
						3.00					3.00
	3.00	B					END OF BOREHOLE				

Flush Returns	Flush Type	Flush To Depth	Chiselling From	Chiselling To	Chiselling Time(hr)	Water Added From	Water Added To	Ground-water Struck	Ground-water Rose To	Ground-water Time(mins)	Ground-water Cut Off	Diam	To Depth Boring	To Depth Casing
								0.80	0.50	20		125	3.00	2.60

Location:

Level: -

Orientation: Vertical

Remarks:
Description based on drillers records.
No recovery for SPT at 1.2 m depth.
Installed up to 2.6 m (sand and gravel blowing up casing)

Equipment:
Dart

Method:
Inspection Pit to 1.20m
Window Sampler to 3.00m

Borehole No: WS57

Contract No: 2304

Driller	Originator
KG	MM
Chk & App	Status
SG	**Final**

BOREHOLE RECORD

Scale 1:50

WEST RIVERSIDE, BALLOCH

Part

Fig. No.

Sheet 1 of 1

Phoenix Drilling Ltd, 2 Nairn Road, Deans Industrial Estate, Livingston, West Lothian, EH54 8AY E-mail: info@phoenixdrilling.co.uk Tel: 01506 411448

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Appendix B Geotechnical Test Results

LABORATORY TEST CERTIFICATE

MATtest Limited
materials testing & consultancy

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Tel: 0141 774 4032
Fax: 0141 774 3552

email: info@mattest.org
Website: www.mattest.org

Certificate No : **17/334 - 01**

To : **Stephen Glover**

Client : **Phoenix Drilling Limited**
2 Nairn Road
Deans Industrial Estate
Livingston
EH54 8AY

Dear Sirs,

LABORATORY TESTING OF SOIL

Introduction

We refer to samples taken from Riverside, Balloch and delivered to our laboratory on 20th March 2017.

Material & Source

Sample Reference	:	See Report Plates
Sampled By	:	Client
Sampling Certificate	:	Not Supplied
Location	:	See Report Plates
Description	:	See Page 2 to Page 5
Date Sampled	:	Not Supplied
Date Tested	:	20th March 2017 Onwards
Source	:	Riverside, Balloch

Test Results;

As Detailed On Page 2 to Page 34 inclusive

Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks;

Approved for Issue

Date 20/04/2017

T McLelland (Director)

UKAS TESTING
2643

BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
WS1	B	0.25	Brown gravelly sandy CLAY. Gravel is fine to coarse.
WS1	B	1.00	Brown clayey silty fine to coarse SAND and GRAVEL.
WS2	B	1.00	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
WS2B	B	2.00	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
WS3	B	1.00	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
WS4	B	1.00	Brown fine to coarse SAND and GRAVEL.
WS4	B	4.00	Brown gravelly very sandy CLAY. Gravel is fine to coarse.
WS5	B	1.00	Mottled brown gravelly sandy CLAY. Gravel is fine to coarse.
WS5	B	2.80	Mottled brown slightly gravelly very sandy CLAY. Gravel is fine to coarse.
WS6	B	1.00	Brown silty slightly sandy CLAY.
WS7	B	0.25	Brown fine to coarse SAND and GRAVEL.
WS8	B	1.00	Brown gravelly sandy CLAY. Gravel is fine to coarse.
WS8	U	1.20-1.65	Mottled brown gravelly very sandy CLAY. Gravel is fine to medium.
WS8	B	2.00	Mottled brown gravelly very sandy CLAY. Gravel is fine to medium.
WS9	B	1.00	Brown gravelly sandy CLAY. Gravel is fine to coarse.
WS10	B	1.00	Greyish brown slightly gravelly sandy CLAY with root fibres. Gravel is fine to medium.
WS11	B	0.25	Brown sandy CLAY.
WS11	B	2.00	Mottled brown very sandy very gravelly CLAY. Gravel is fine to coarse.
WS11	U	2.20-2.50	Brown gravelly sandy CLAY. Gravel is fine to coarse.
WS12	B	1.00	Brown fine to coarse SAND and GRAVEL.
WS13	B	0.25	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
WS13	B	1.00	Brown gravelly sandy CLAY with root fibres. Gravel is fine to coarse.
WS14	B	1.00	Brown slightly clayey fine to coarse SAND and GRAVEL.
WS15	B	1.00	Brown very gravelly sandy CLAY. Gravel is fine to coarse.

SUMMARY OF SAMPLE DESCRIPTIONS

BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
WS16	B	1.00	Dark brown PEAT (Von Post Classification - H4)
WS16	B	2.00	Dark brown PEAT (Von Post Classification - H2)
WS17	B	1.00	Brown gravelly fine to coarse SAND with cobbles. Gravel is fine to coarse.
WS18	B	1.00	Brown fine to coarse SAND and GRAVEL.
WS20	B	0.25	Dark brown fine to coarse SAND and GRAVEL with root fibres.
WS21	B	1.00	Brown fine to coarse SAND and GRAVEL with root fibres.
WS21	B	4.00	Light brown slightly gravelly very sandy silty CLAY. Gravel is fine to coarse.
WS22	B	4.00	Light brown very clayey very silty slightly gravelly fine to coarse SAND. Gravel is fine to medium.
WS23	B	1.00	Brown slightly gravelly fine to coarse SAND. Gravel is fine to medium.
WS24	B	1.00	Brown fine to coarse SAND and fine to medium GRAVEL.
WS24A	B	2.00	Brown fine to coarse SAND and fine to medium GRAVEL.
WS25	B	1.00	Brown fine to coarse SAND and GRAVEL with root fibres.
WS26	B	1.00	Brown fine to coarse SAND and GRAVEL.
WS29	B	1.00	Brown fine to coarse SAND with pockets of organic matter.
WS30	B	1.00	Brown clayey very sandy fine to coarse GRAVEL with cobbles.
WS32	B	0.90	Dark brown / grey fine to coarse SAND and GRAVEL.
WS35	B	1.00	Dark brown fine to coarse SAND and GRAVEL with pockets of sandy clay.
WS36	B	0.25	Dark brown fine to coarse SAND and GRAVEL with pockets of sandy clay.
WS36	B	2.00	Dark grey ASH FILL.
WS37	B	1.00	Brown fine to coarse SAND and GRAVEL.
WS37	B	2.00	Dark brown clayey silty fine to coarse SAND and GRAVEL.
WS38	B	0.25	Grey fine to coarse SAND and GRAVEL / ASH FILL.
WS38	B	3.00	Dark grey slightly clayey fine to coarse ASH FILL.
WS39	B	1.00	Brown fine to coarse SAND and GRAVEL.

SUMMARY OF SAMPLE DESCRIPTIONS

BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
WS40C	B	1.00	Black fine to coarse SAND and GRAVEL / ASH FILL.
WS40C	B	5.00	Dark grey slightly gravelly silty fine to coarse SAND. Gravel is fine to medium.
WS41	B	1.00	Black fine to coarse SAND / ASH FILL.
WS41	B	3.00	Black very clayey PEAT (Von Post Classification - H2)
WS43	B	1.00	Black ASH FILL.
WS43	B	4.00	Black PEAT (Von Post Classification - H3)
WS45	B	1.00	Dark brown slightly clayey fine to coarse SAND and GRAVEL.
WS45	B	4.00	Mottled brown very gravelly very sandy CLAY with black staining. Gravel is fine to coarse.
WS45	B	5.00	Dark brown / black ver clayey PEAT (Von Post Classification - H3)
WS47	B	0.25	Dark grey fine to coarse SAND and GRAVEL / ASH FILL.
WS49	B	1.00	Dark grey very clayey fine to coarse SAND and GRAVEL / ASH FILL.
WS49	B	2.00	Dark grey very clayey fine to coarse SAND and GRAVEL / ASH FILL.
WS49	B	3.00	Black PEAT (Von Post Classification - H2)
WS50	B	0.25	Black fine to coarse SAND and GRAVEL / ASH FILL.
WS50	B	3.00	Dark grey gravelly sandy CLAY. Gravel is fine to coarse.
WS51B	B	1.00	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
WS51B	B	3.00	Brown very sandy very gravelly CLAY. Gravel is fine to coarse.
WS52	B	0.25	Brown fine to coarse SAND and GRAVEL with cobbles.
WS53	B	0.25	Dark brown very gravelly very sandy CLAY with root fibres. Gravel is fine to coarse.
WS54	B	1.00	Brown gravelly sandy CLAY. Gravel is fine to coarse.
WS54	B	3.00	Greyish brown very gravelly very sandy CLAY. Gravel is fine to coarse.
WS55	B	0.25	Dark brown gravelly very sandy CLAY. Gravel is fine to coarse.
WS56	B	0.25	Brown sandy CLAY with root fibres.
WS56	B	1.00	Light brown slightly gravelly fine to coarse SAND with root fibres. Gravel is fine to medium.

SUMMARY OF SAMPLE DESCRIPTIONS

BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
WS57	B	1.00	Brown slightly gravelly sandy CLAY. Gravel is fine to coarse.

SUMMARY OF SAMPLE DESCRIPTIONS

BOREHOLE	SAMPLE	DEPTH (m)	MOISTURE CONTENT (%)
WS1	B	0.25	26
WS1	B	1.00	11
WS2	B	1.00	13
WS2B	B	2.00	26
WS3	B	1.00	24
WS4	B	1.00	6.8
WS4	B	4.00	21
WS5	B	1.00	30
WS6	B	1.00	25
WS8	B	1.00	16
WS8	U	1.20	11
WS8	B	2.00	12
WS9	B	1.00	13
WS10	B	1.00	30
WS11	B	0.25	30
WS11	B	2.00	15
WS12	B	1.00	9.2
WS13	B	0.25	32
WS13	B	1.00	28
WS15	B	1.00	14
WS16	B	1.00	35
WS16	B	2.00	211
WS17	B	1.00	9.9

Tested in accordance with BS 1377: Part 2: 1990: Clause 3

SUMMARY OF MOISTURE CONTENT TEST RESULTS

BOREHOLE	SAMPLE	DEPTH (m)	MOISTURE CONTENT (%)
WS18	B	1.00	6.8
WS20	B	0.25	23
WS21	B	1.00	9.0
WS22	B	4.00	9.2
WS23	B	1.00	18
WS24	B	1.00	7.0
WS24A	B	2.00	5.6
WS25	B	1.00	9.1
WS26	B	1.00	9.1
WS29	B	1.00	10
WS30	B	1.00	10
WS32	B	0.90	9.1
WS36	B	2.00	32
WS37	B	2.00	13
WS38	B	3.00	40
WS40C	B	5.00	22
WS41	B	3.00	195
WS43	B	4.00	125
WS45	B	4.00	31
WS45	B	5.00	102
WS49	B	1.00	22
WS49	B	2.00	20
WS49	B	3.00	256

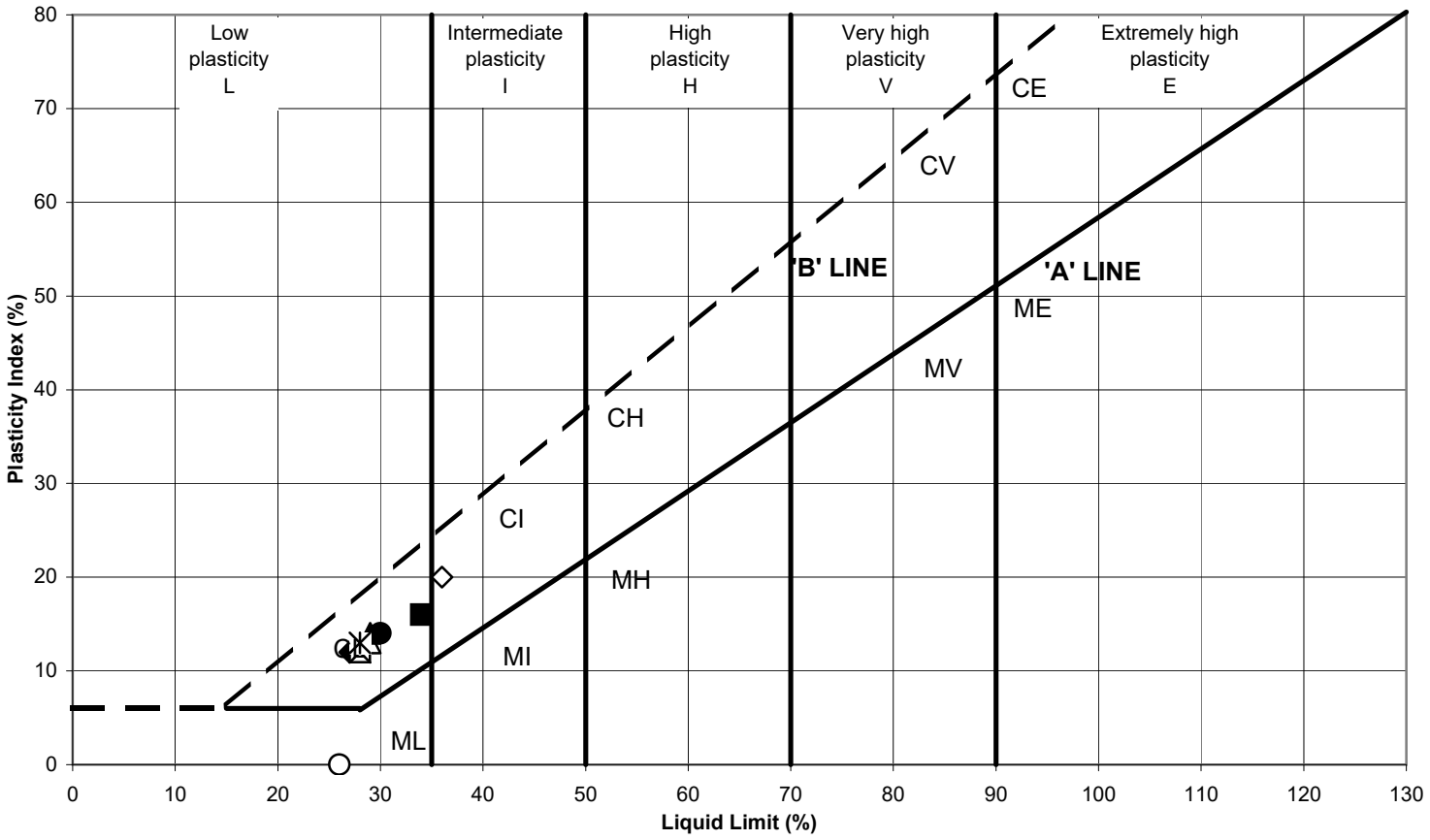
Tested in accordance with BS 1377: Part 2: 1990: Clause 3

SUMMARY OF MOISTURE CONTENT TEST RESULTS

BOREHOLE	SAMPLE	DEPTH (m)	MOISTURE CONTENT (%)
WS50	B	3.00	27
WS51B	B	3.00	17
WS54	B	1.00	13
WS54	B	3.00	14
WS55	B	0.25	25
WS56	B	1.00	18

Tested in accordance with BS 1377: Part 2: 1990: Clause 3

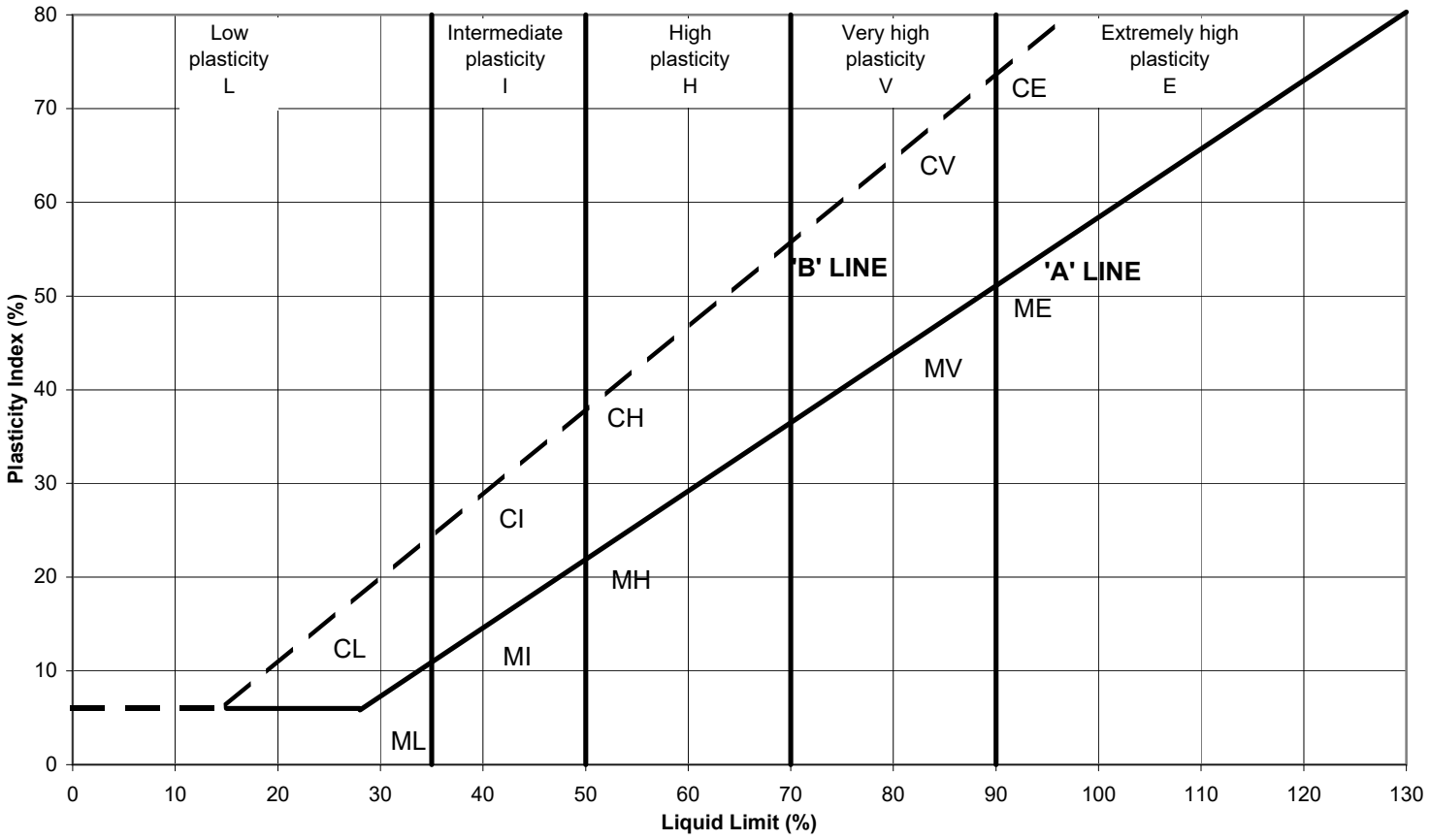
SUMMARY OF MOISTURE CONTENT TEST RESULTS



Symbol	Borehole	Sample	Depth	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 0.425mm Sieve	Remarks
■	WS2B	B	2.00	26	34	18	16	61	Clay with low plasticity
◆	WS8	U	1.30	11	27	15	12	66	Clay with low plasticity
▲	WS8	B	2.00	12	29	15	14	74	Clay with low plasticity
●	WS9	B	1.00	13	30	16	14	58	Clay with low plasticity
□	WS11	B	2.00	15	28	16	12	42	Clay with low plasticity
◇	WS13	B	1.00	28	36	16	20	91	Clay with intermediate plasticity
△	WS15	B	1.00	14	29	16	13	61	Clay with low plasticity
○	WS49	B	2.00	20	26	Non Plastic	Non Plastic	27	
×	WS51B	B	3.00	17	28	16	12	59	Clay with low plasticity
✳	WS54	B	1.00	13	28	15	13	62	Clay with low plasticity

All samples were tested in accordance with BS 1377 : Part 2 : 1990 Clause 4.3, 5.3 and 5.4.
All samples were washed on a 0.425mm test sieve prior to test.

SUMMARY OF ATTERBERG LIMITS TEST RESULTS



Symbol	Borehole	Sample	Depth	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 0.425mm Sieve	Remarks
■	WS45	B	5.00	102	133	56	77	-	Unable to plot on chart due to material type
◆									
▲									
●									
□									
◇									
△									
○									
×									
✳									

All samples were tested in accordance with BS 1377 : Part 2 : 1990 Clause 4.3, 5.3 and 5.4.
All samples were tested in their natural state.

SUMMARY OF ATTERBERG LIMITS TEST RESULTS

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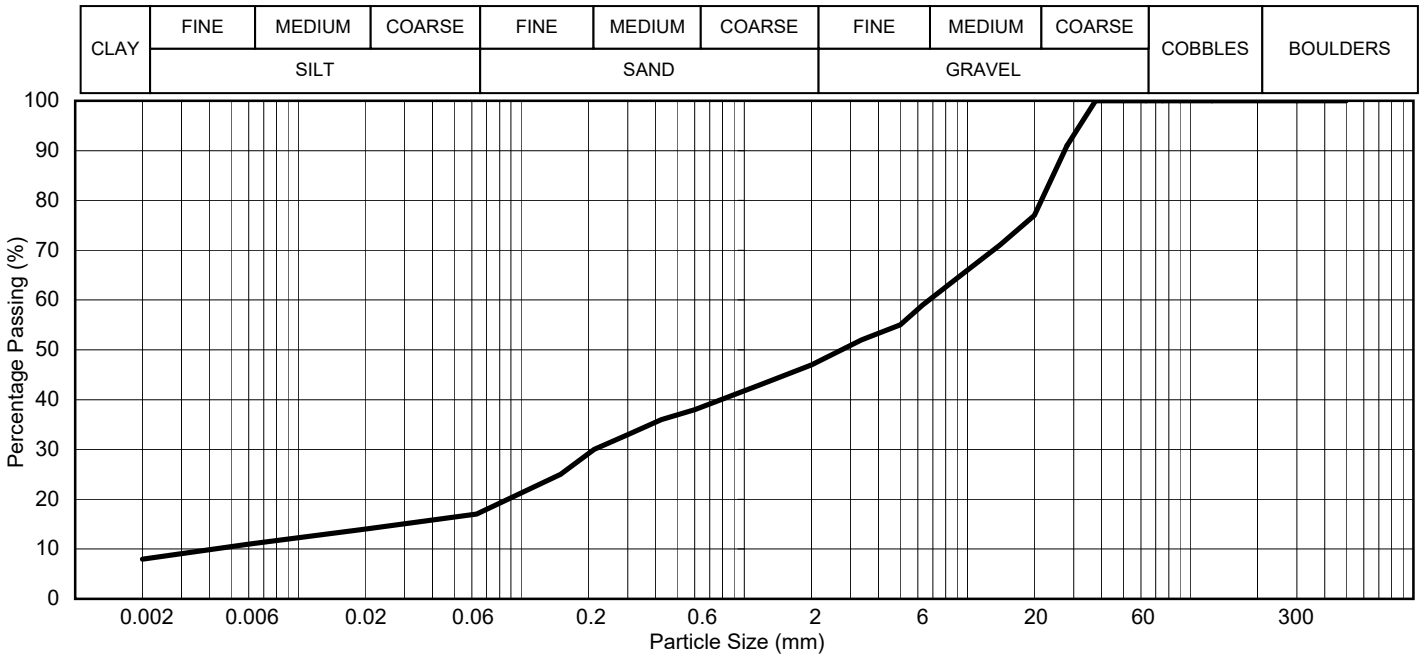
Borehole	WS1
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	14
300.0	100	-	-	0.006	11
125.0	100	-	-	0.002	8
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	91	-	-		
20.0	77	-	-		
14.0	71	-	-		
10.0	66	-	-	**PERCENTAGE SOIL TYPES**	
6.30	59	-	-		
5.00	55	-	-		
3.35	52	-	-		
2.00	47	-	-		
1.18	43	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	38	-	-		
0.425	36	-	-		
0.300	33	-	-		
0.212	30	-	-		
0.150	25	-	-		
0.063	17	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
8	9	30	53	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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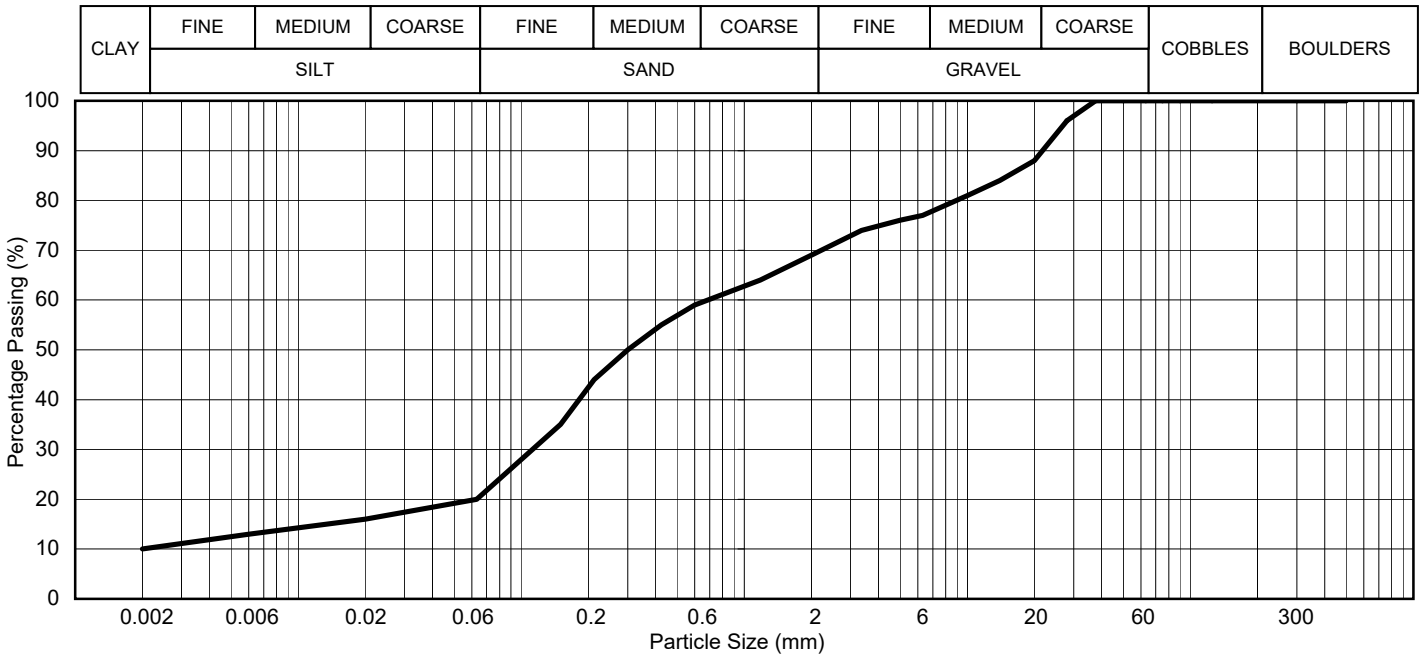
Borehole	WS3
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	16
300.0	100	-	-	0.006	13
125.0	100	-	-	0.002	10
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	96	-	-		
20.0	88	-	-		
14.0	84	-	-		
10.0	81	-	-	**PERCENTAGE SOIL TYPES**	
6.30	77	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.00	76	-	-		
3.35	74	-	-	10 / 10 / 49 / 31 / 0	
2.00	69	-	-		
1.18	64	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	59	-	-	**D10** / **D60** / **Specification**	
0.425	55	-	-		
0.300	50	-	-	- / -	
0.212	44	-	-	**UNIFORMITY COEFFICIENT** - / -	
0.150	35	-	-		
0.063	20	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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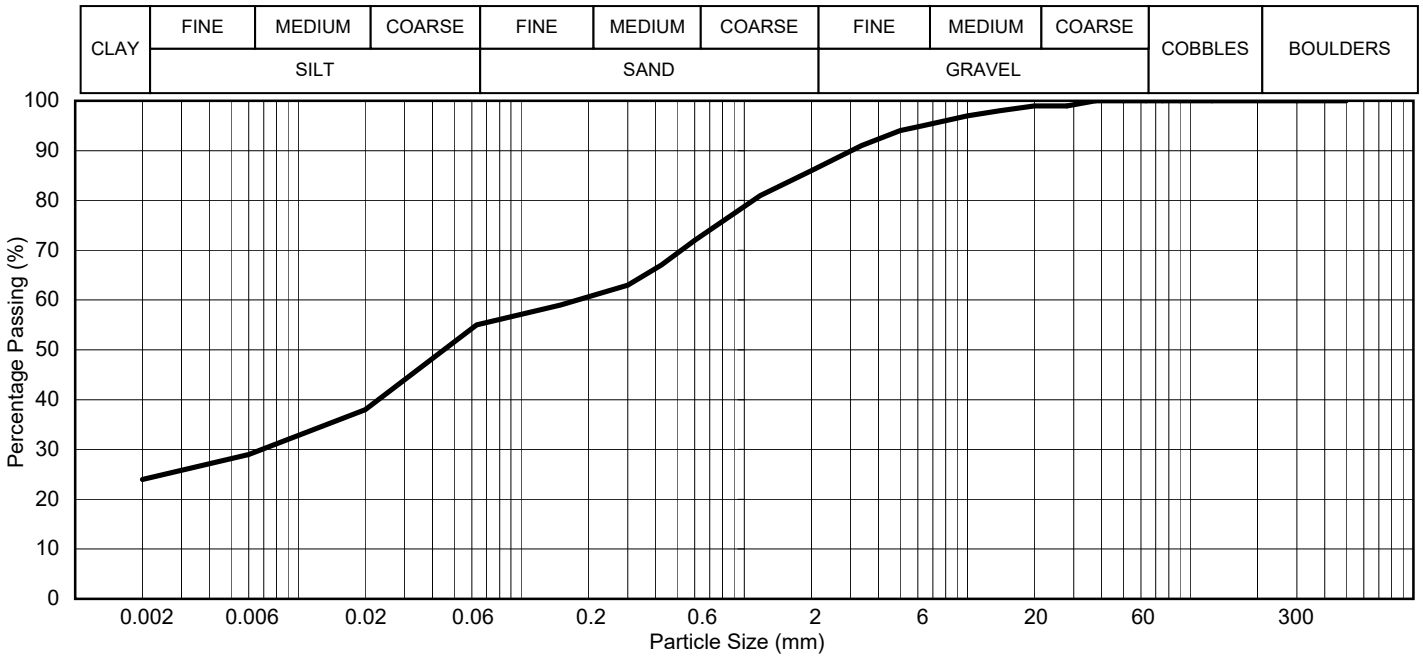
Borehole	WS4
Sample	B
Depth (m)	4.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	38
300.0	100	-	-	0.006	29
125.0	100	-	-	0.002	24
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	99	-	-		
20.0	99	-	-		
14.0	98	-	-		
10.0	97	-	-	**PERCENTAGE SOIL TYPES**	
6.30	95	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.00	94	-	-		
3.35	91	-	-	24 / 31 / 31 / 14 / 0	
2.00	86	-	-		
1.18	81	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	72	-	-	**D10** / **D60** / **Specification**	
0.425	67	-	-		
0.300	63	-	-	- / -	
0.212	61	-	-	**UNIFORMITY COEFFICIENT** - / -	
0.150	59	-	-		
0.063	55	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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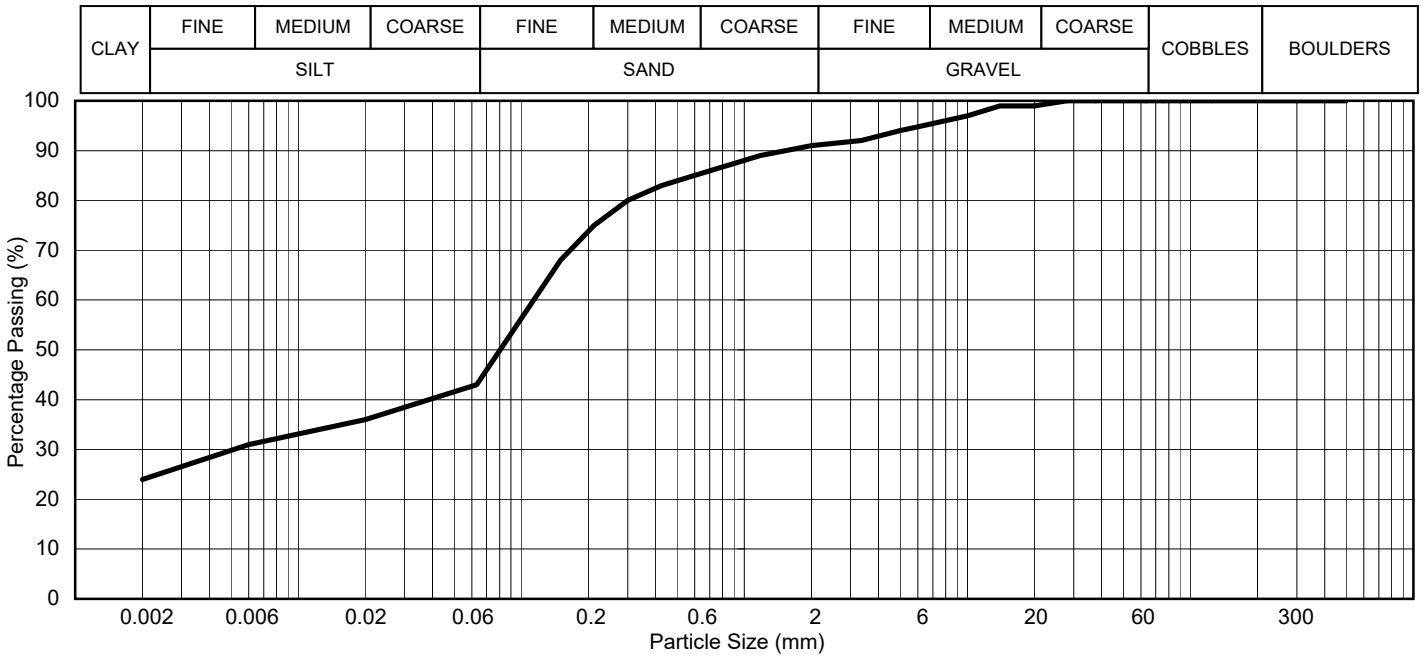
Borehole	WS5
Sample	B
Depth (m)	2.80



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	36
300.0	100	-	-	0.006	31
125.0	100	-	-	0.002	24
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	99	-	-		
14.0	99	-	-		
10.0	97	-	-	**PERCENTAGE SOIL TYPES**	
6.30	95	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.00	94	-	-		
3.35	92	-	-	24 / 19 / 48 / 9 / 0	
2.00	91	-	-		
1.18	89	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	85	-	-	**D10** / **D60** / **Specification**	
0.425	83	-	-		
0.300	80	-	-	- / -	
0.212	75	-	-	**UNIFORMITY COEFFICIENT** - / -	
0.150	68	-	-		
0.063	43	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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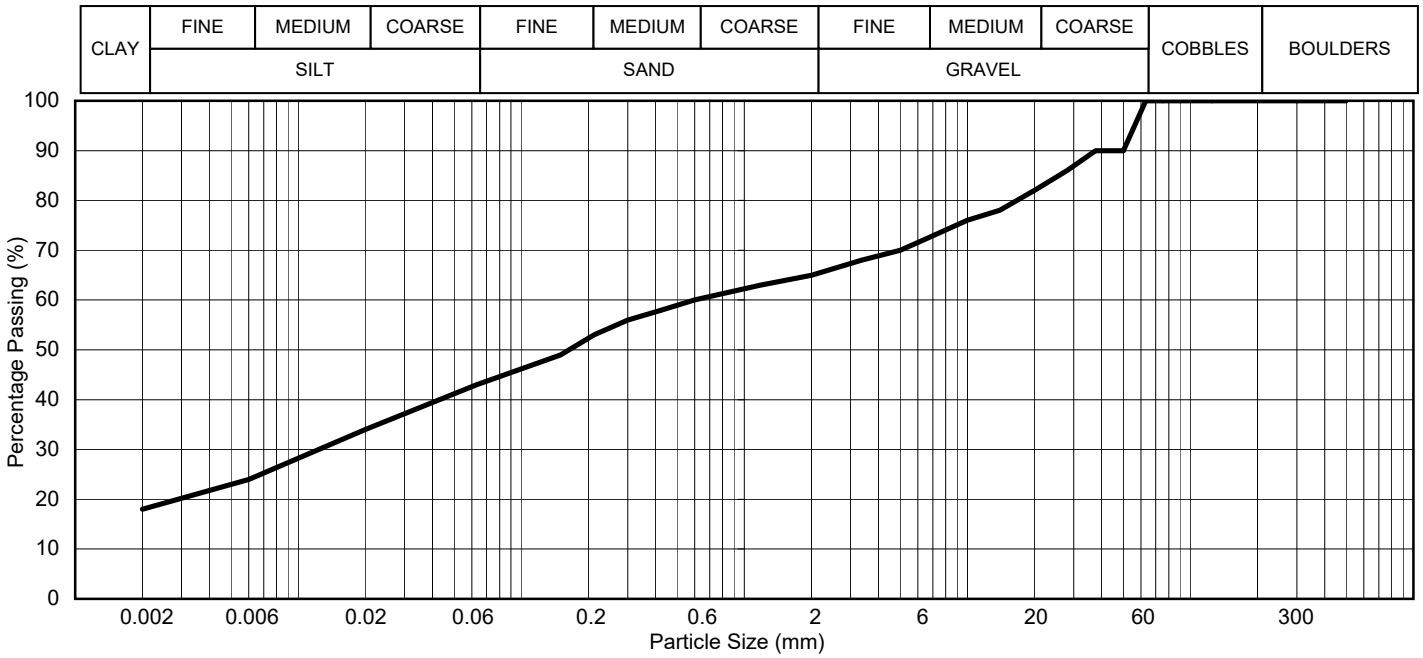
Borehole	WS9
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	34
300.0	100	-	-	0.006	24
125.0	100	-	-	0.002	18
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	90	-	-		
37.5	90	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	86	-	-		
20.0	82	-	-		
14.0	78	-	-		
10.0	76	-	-	**PERCENTAGE SOIL TYPES**	
6.30	72	-	-		
5.00	70	-	-		
3.35	68	-	-		
2.00	65	-	-		
1.18	63	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	60	-	-		
0.425	58	-	-		
0.300	56	-	-		
0.212	53	-	-		
0.150	49	-	-		
0.063	43	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
18	25	22	35	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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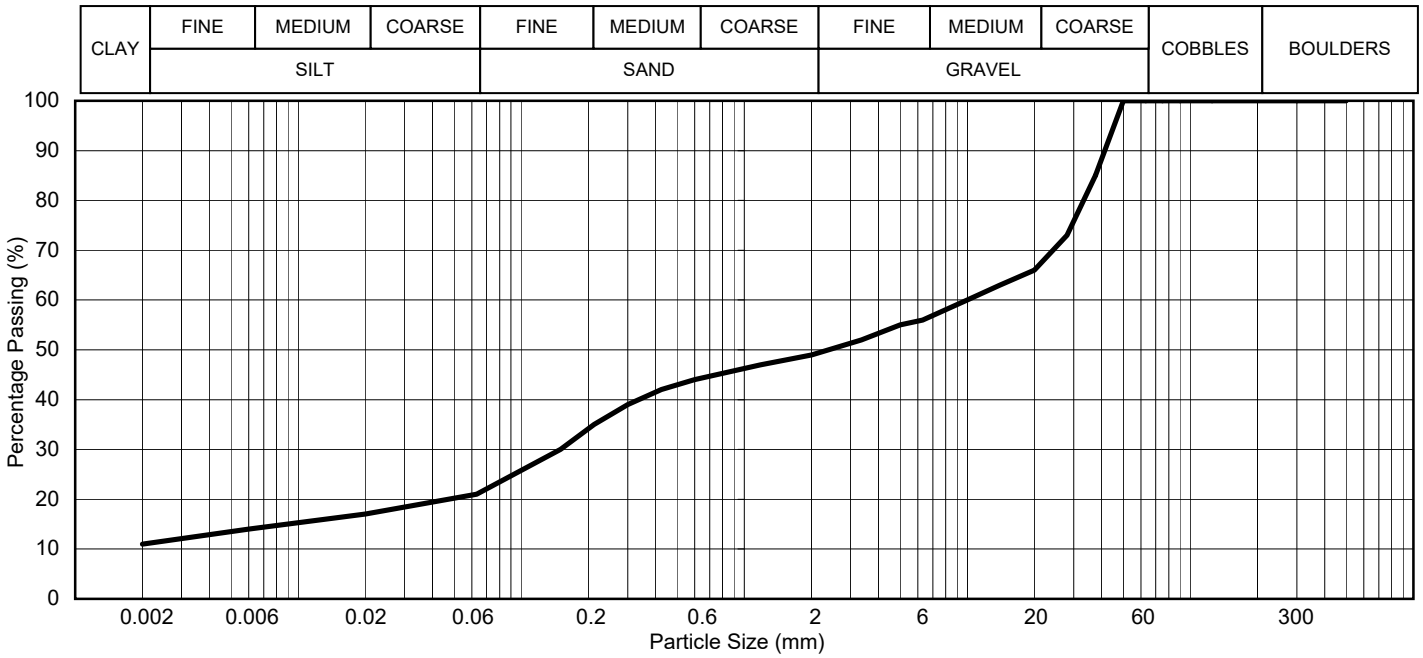
Borehole	WS11
Sample	B
Depth (m)	2.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	17
300.0	100	-	-	0.006	14
125.0	100	-	-	0.002	11
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	85	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	73	-	-		
20.0	66	-	-		
14.0	63	-	-		
10.0	60	-	-	**PERCENTAGE SOIL TYPES**	
6.30	56	-	-		
5.00	55	-	-		
3.35	52	-	-		
2.00	49	-	-		
1.18	47	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	44	-	-		
0.425	42	-	-		
0.300	39	-	-		
0.212	35	-	-		
0.150	30	-	-		
0.063	21	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
11	10	28	51	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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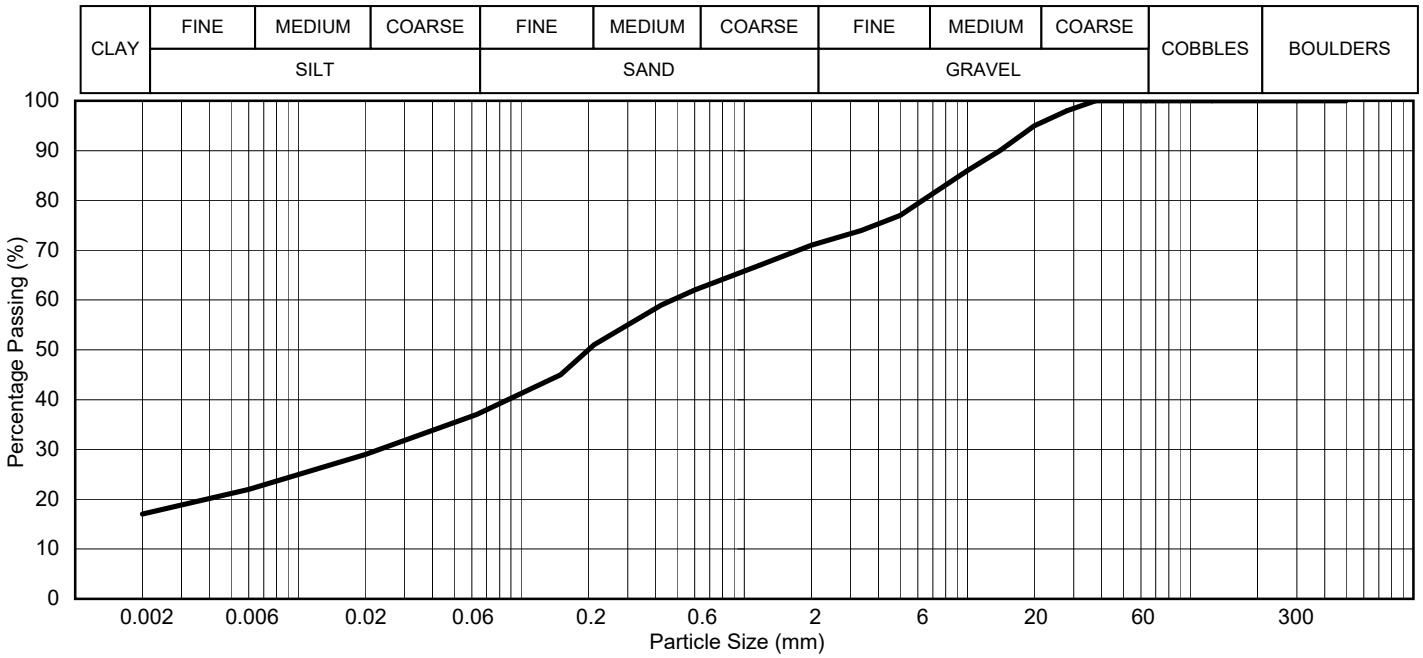
Borehole	WS13
Sample	B
Depth (m)	0.25



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	29
300.0	100	-	-	0.006	22
125.0	100	-	-	0.002	17
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	98	-	-		
20.0	95	-	-		
14.0	90	-	-		
10.0	86	-	-	**PERCENTAGE SOIL TYPES**	
6.30	80	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.00	77	-	-		
3.35	74	-	-	17 / 20 / 34 / 29 / 0	
2.00	71	-	-		
1.18	67	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	62	-	-	**D10** / **D60** / **Specification**	
0.425	59	-	-		
0.300	55	-	-	- / -	
0.212	51	-	-	**UNIFORMITY COEFFICIENT** - / -	
0.150	45	-	-		
0.063	37	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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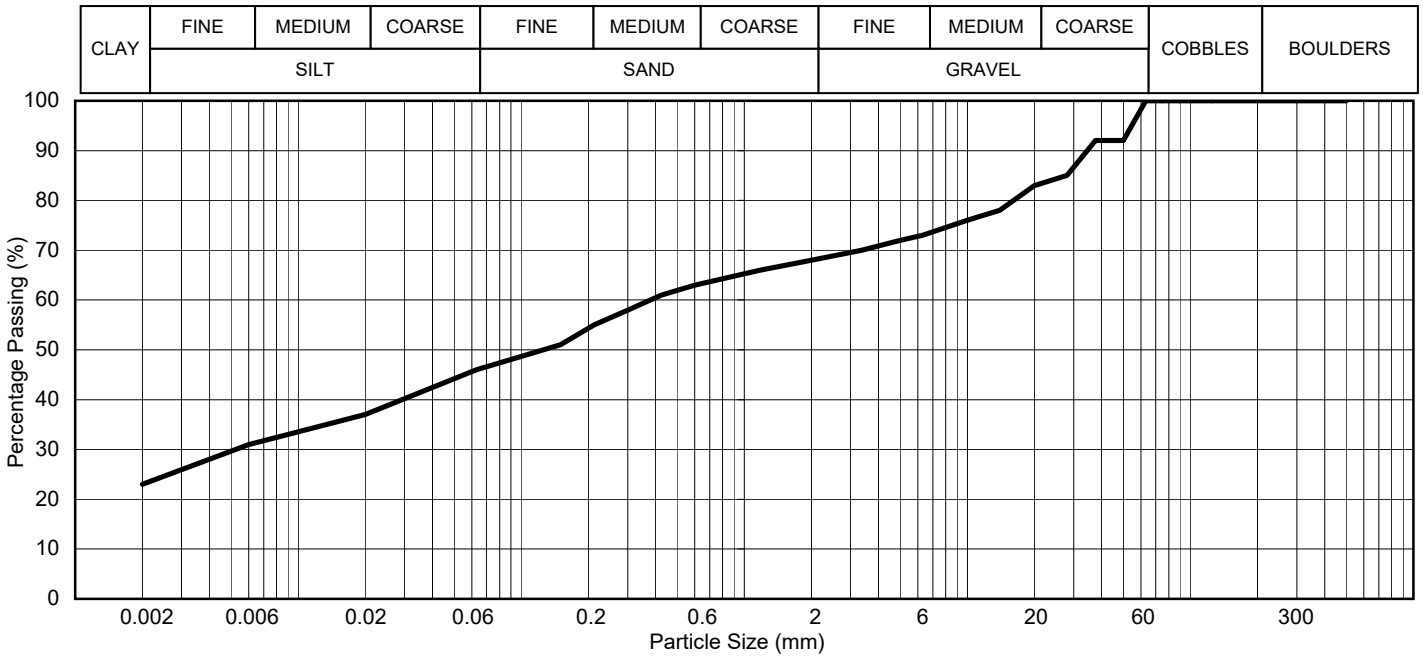
Borehole	WS15
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	37
300.0	100	-	-	0.006	31
125.0	100	-	-	0.002	23
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	92	-	-		
37.5	92	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	85	-	-		
20.0	83	-	-		
14.0	78	-	-		
10.0	76	-	-	**PERCENTAGE SOIL TYPES**	
6.30	73	-	-		
5.00	72	-	-		
3.35	70	-	-		
2.00	68	-	-		
1.18	66	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	63	-	-		
0.425	61	-	-		
0.300	58	-	-		
0.212	55	-	-		
0.150	51	-	-		
0.063	46	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
23	23	22	32	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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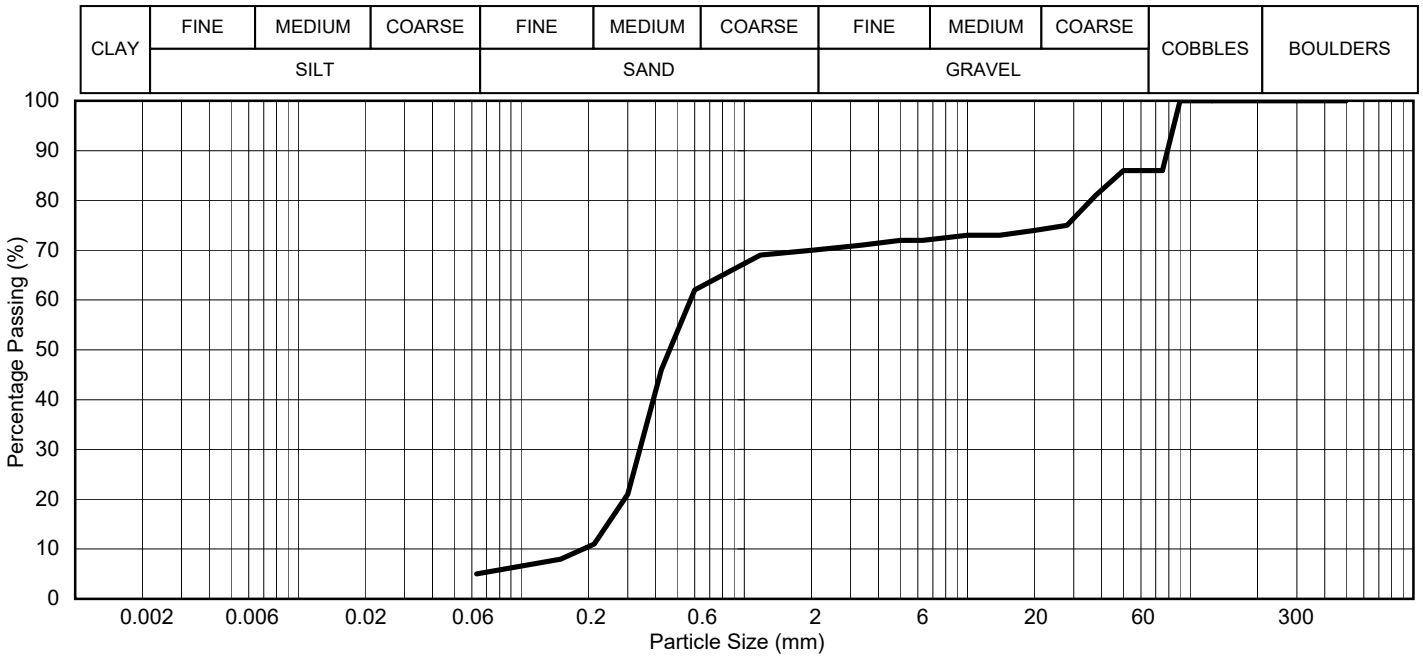
Borehole	WS17
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable Lower %	Specification Not Applicable Upper %	Particle Size (mm)	Percentage Passing (%)
500.0	100	-	-	0.020	
300.0	100	-	-	0.006	
125.0	100	-	-	0.002	
90.0	100	-	-		
75.0	86	-	-		
63.0	86	-	-		
50.0	86	-	-		
37.5	81	-	-		
28.0	75	-	-		
20.0	74	-	-		
14.0	73	-	-		
10.0	73	-	-		
6.30	72	-	-		
5.00	72	-	-		
3.35	71	-	-		
2.00	70	-	-		
1.18	69	-	-		
0.600	62	-	-		
0.425	46	-	-		
0.300	21	-	-		
0.212	11	-	-		
0.150	8	-	-		
0.063	5	-	-		

GRADING CLASSIFICATION (SHW TABLE 6/2)

-

Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.

PERCENTAGE SOIL TYPES

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	5	65	16	14

UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT -		-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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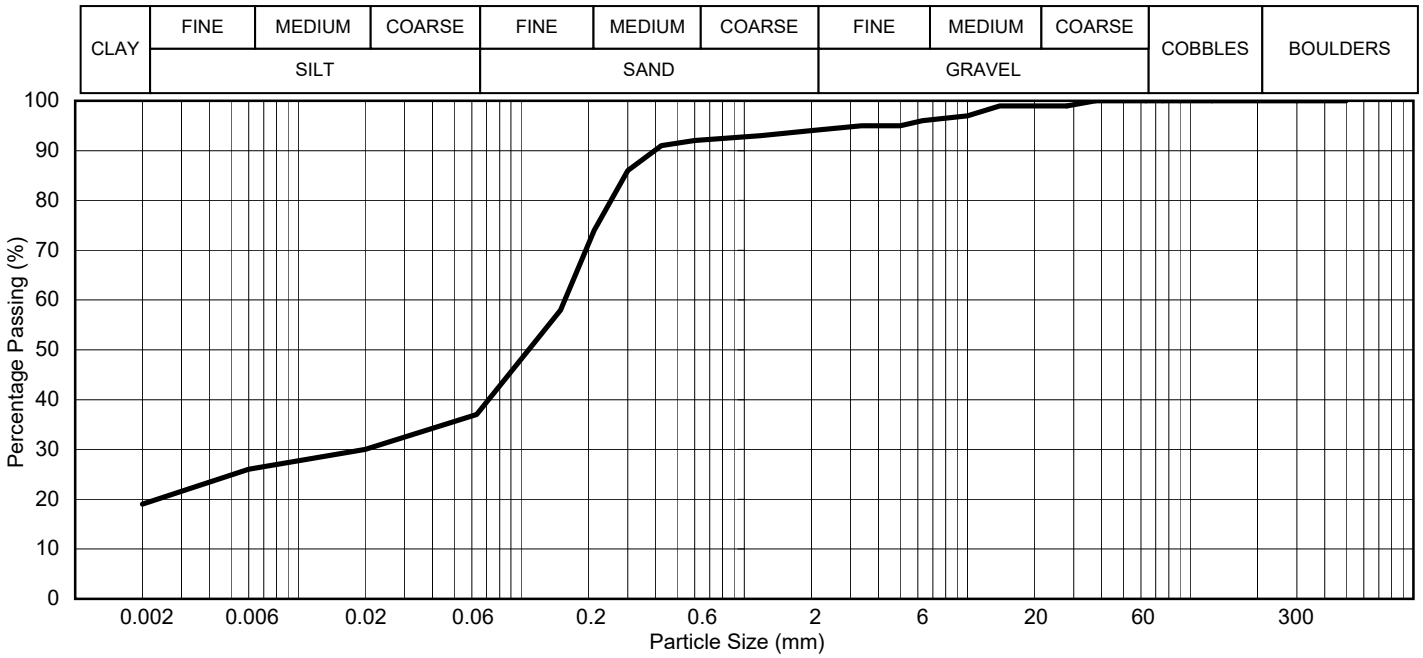
Borehole	WS21
Sample	B
Depth (m)	4.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	30
300.0	100	-	-	0.006	26
125.0	100	-	-	0.002	19
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	99	-	-		
20.0	99	-	-		
14.0	99	-	-		
10.0	97	-	-	**PERCENTAGE SOIL TYPES**	
6.30	96	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.00	95	-	-		
3.35	95	-	-	19 / 18 / 57 / 6 / 0	
2.00	94	-	-		
1.18	93	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	92	-	-	**D10** / **D60** / **Specification**	
0.425	91	-	-		
0.300	86	-	-	- / -	
0.212	74	-	-	**UNIFORMITY COEFFICIENT** - / -	
0.150	58	-	-		
0.063	37	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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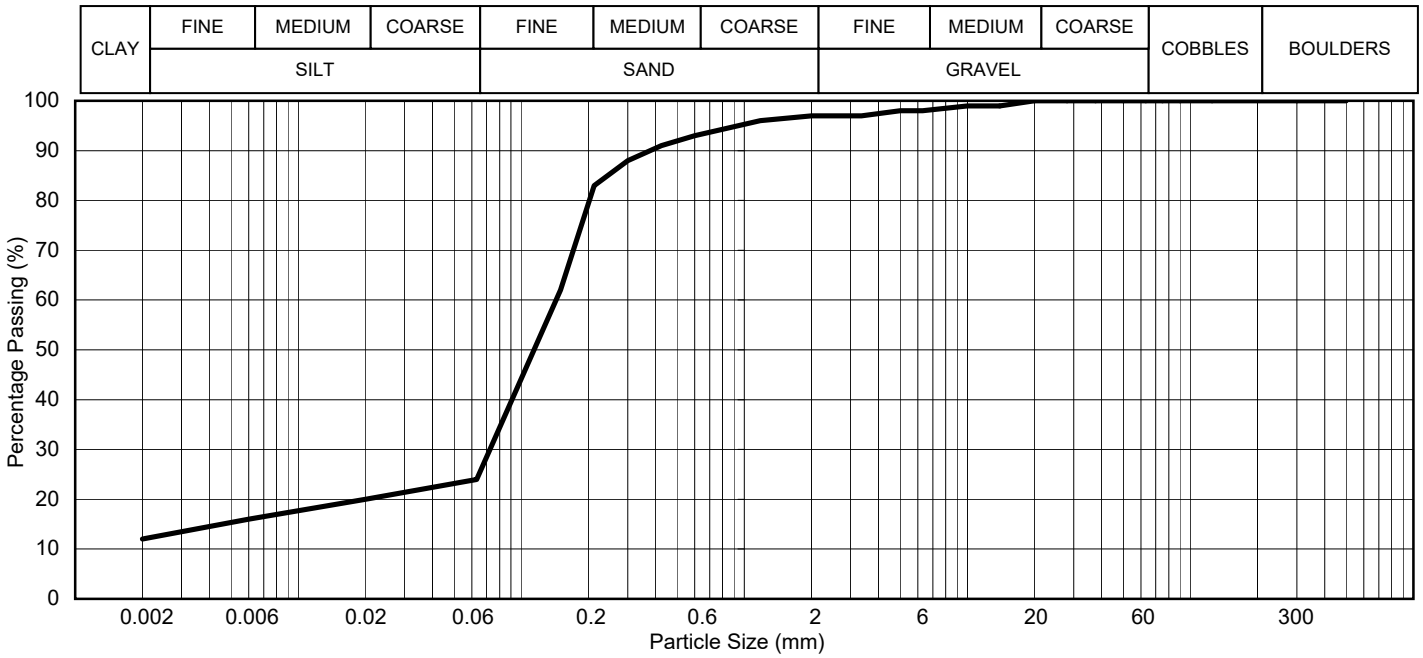
Borehole	WS22
Sample	B
Depth (m)	4.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	20
300.0	100	-	-	0.006	16
125.0	100	-	-	0.002	12
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	100	-	-		
14.0	99	-	-		
10.0	99	-	-	**PERCENTAGE SOIL TYPES**	
6.30	98	-	-		
5.00	98	-	-		
3.35	97	-	-		
2.00	97	-	-		
1.18	96	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	93	-	-		
0.425	91	-	-		
0.300	88	-	-		
0.212	83	-	-		
0.150	62	-	-		
0.063	24	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
12	12	73	3	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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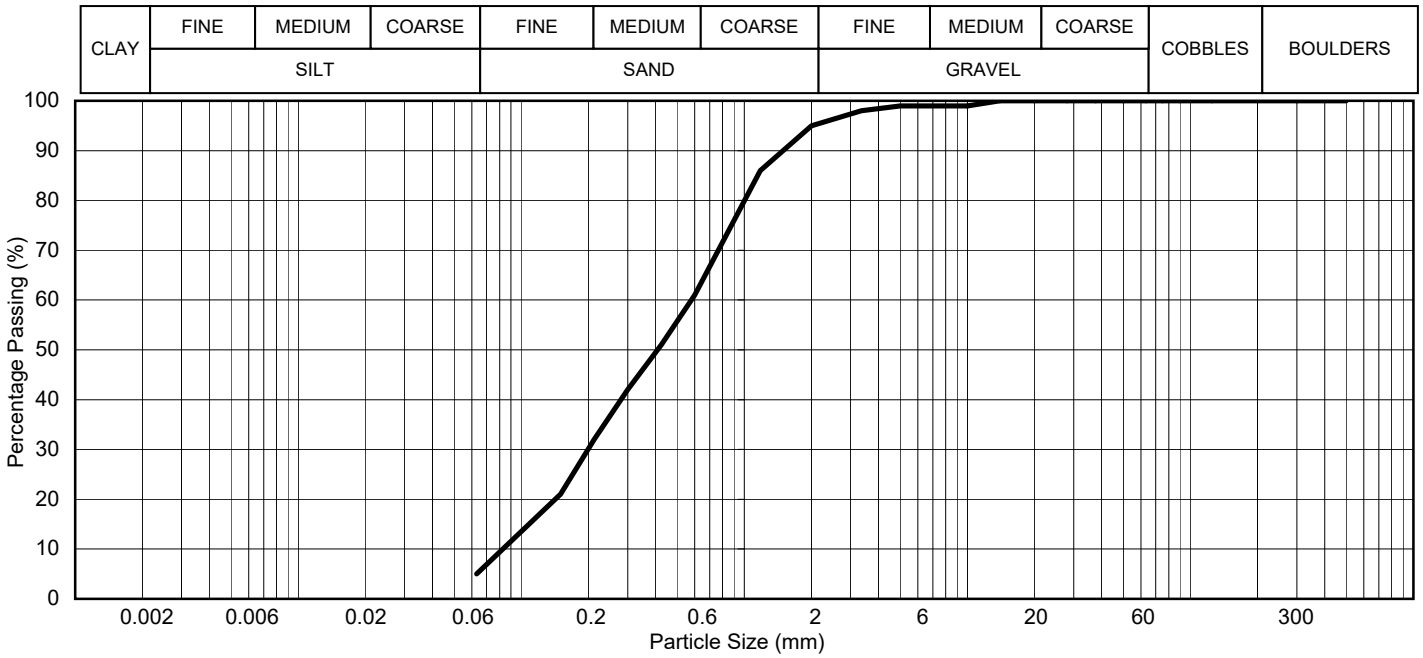
Borehole	WS23
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	
300.0	100	-	-	0.006	
125.0	100	-	-	0.002	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	100	-	-		
14.0	100	-	-		
10.0	99	-	-	**PERCENTAGE SOIL TYPES**	
6.30	99	-	-		
5.00	99	-	-		
3.35	98	-	-		
2.00	95	-	-		
1.18	86	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	61	-	-		
0.425	51	-	-		
0.300	42	-	-		
0.212	32	-	-		
0.150	21	-	-		
0.063	5	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	5	90	5	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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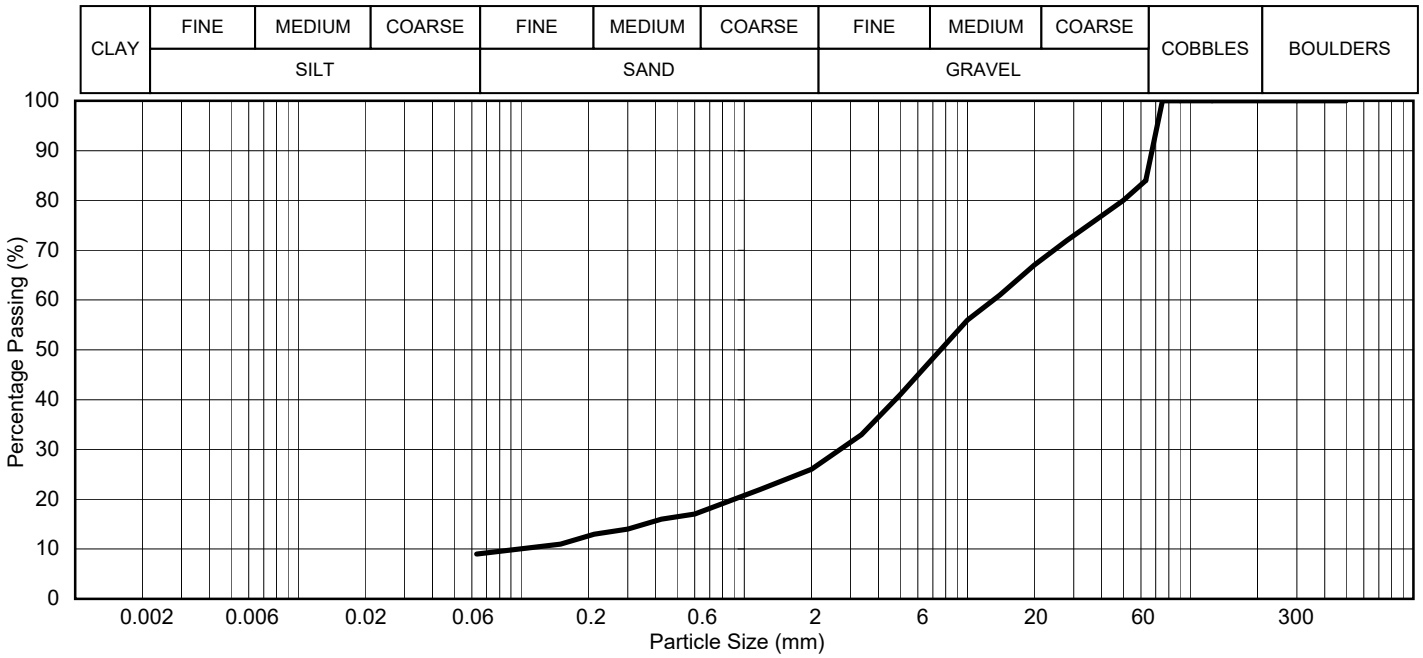
Borehole	WS30
Sample	B
Depth (m)	1.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	
300.0	100	-	-	0.006	
125.0	100	-	-	0.002	
90.0	100	-	-		
75.0	100	-	-		
63.0	84	-	-		
50.0	80	-	-		
37.5	76	-	-		
28.0	72	-	-		
20.0	67	-	-		
14.0	61	-	-		
10.0	56	-	-		
6.30	46	-	-		
5.00	41	-	-		
3.35	33	-	-		
2.00	26	-	-		
1.18	22	-	-		
0.600	17	-	-		
0.425	16	-	-		
0.300	14	-	-		
0.212	13	-	-		
0.150	11	-	-		
0.063	9	-	-		

GRADING CLASSIFICATION (SHW TABLE 6/2)

-

Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.

PERCENTAGE SOIL TYPES

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	9	17	58	16

UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT -		-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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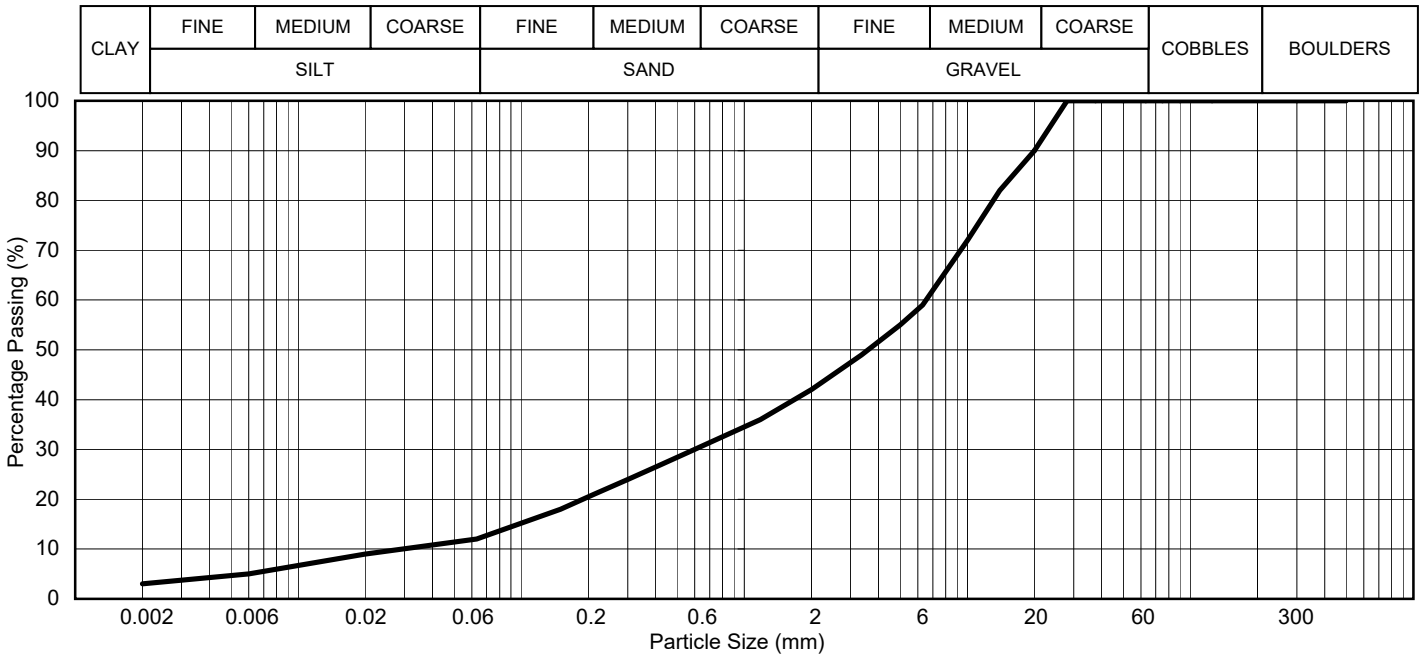
Borehole	WS37
Sample	B
Depth (m)	2.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	9
300.0	100	-	-	0.006	5
125.0	100	-	-	0.002	3
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	90	-	-		
14.0	82	-	-		
10.0	72	-	-	**PERCENTAGE SOIL TYPES**	
6.30	59	-	-		
5.00	55	-	-		
3.35	49	-	-		
2.00	42	-	-		
1.18	36	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	30	-	-		
0.425	27	-	-		
0.300	24	-	-		
0.212	21	-	-		
0.150	18	-	-		
0.063	12	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
3	9	30	58	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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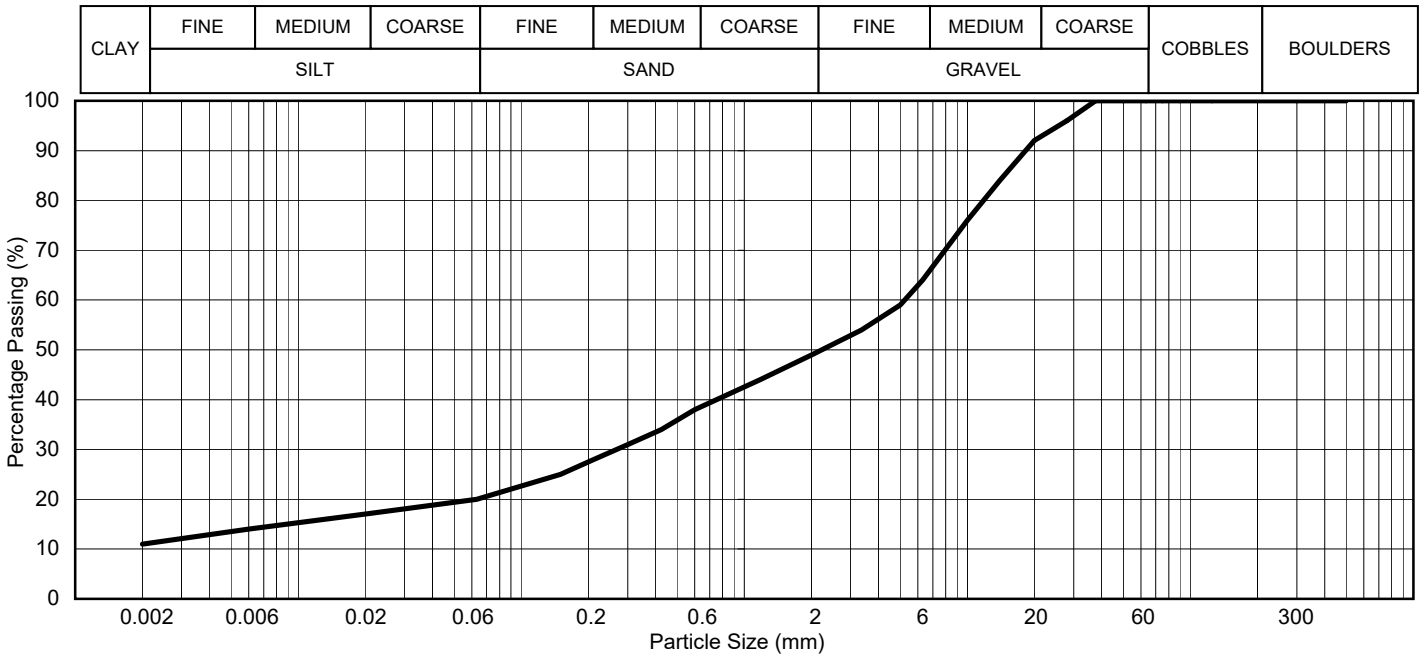
Borehole	WS38
Sample	B
Depth (m)	3.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	17
300.0	100	-	-	0.006	14
125.0	100	-	-	0.002	11
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	96	-	-		
20.0	92	-	-		
14.0	84	-	-		
10.0	76	-	-	**PERCENTAGE SOIL TYPES**	
6.30	64	-	-		
5.00	59	-	-		
3.35	54	-	-		
2.00	49	-	-		
1.18	44	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	38	-	-		
0.425	34	-	-		
0.300	31	-	-		
0.212	28	-	-		
0.150	25	-	-		
0.063	20	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
11	9	29	51	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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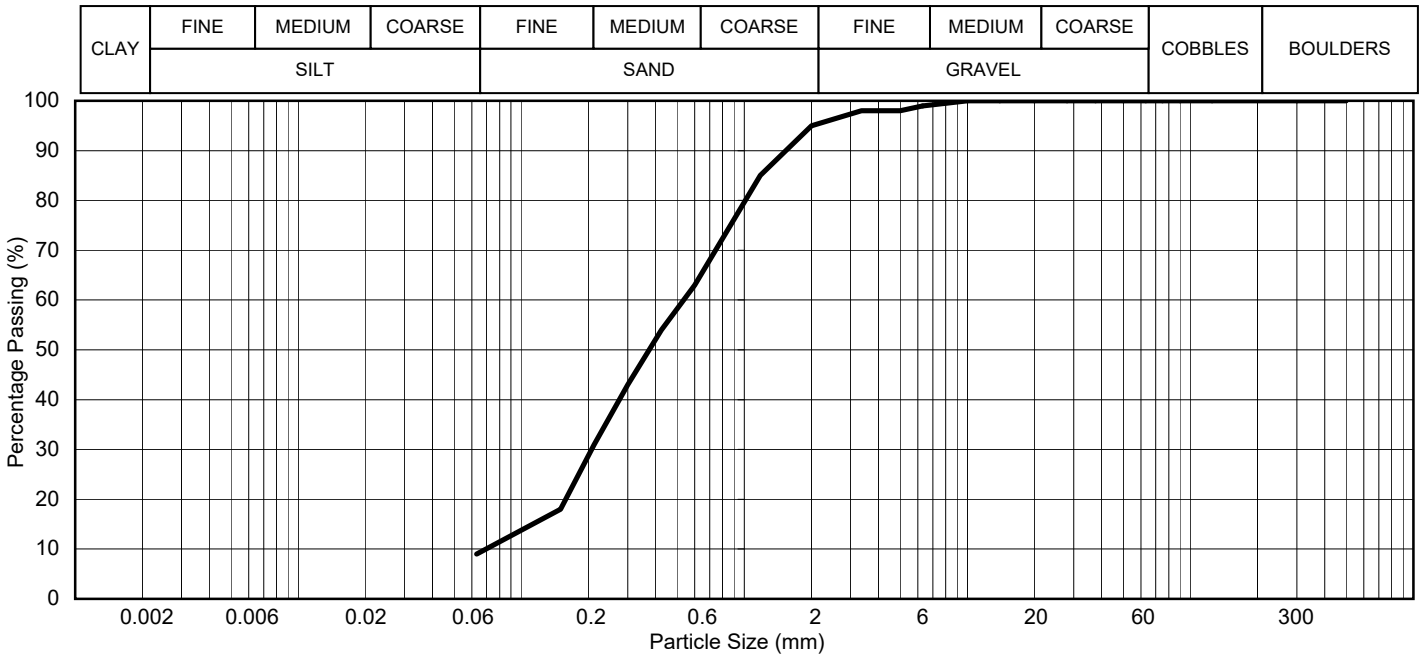
Borehole	WS40C
Sample	B
Depth (m)	5.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	
300.0	100	-	-	0.006	
125.0	100	-	-	0.002	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	100	-	-		
14.0	100	-	-		
10.0	100	-	-	**PERCENTAGE SOIL TYPES**	
6.30	99	-	-		
5.00	98	-	-		
3.35	98	-	-		
2.00	95	-	-		
1.18	85	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	63	-	-		
0.425	54	-	-		
0.300	43	-	-		
0.212	31	-	-		
0.150	18	-	-		
0.063	9	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	9	86	5	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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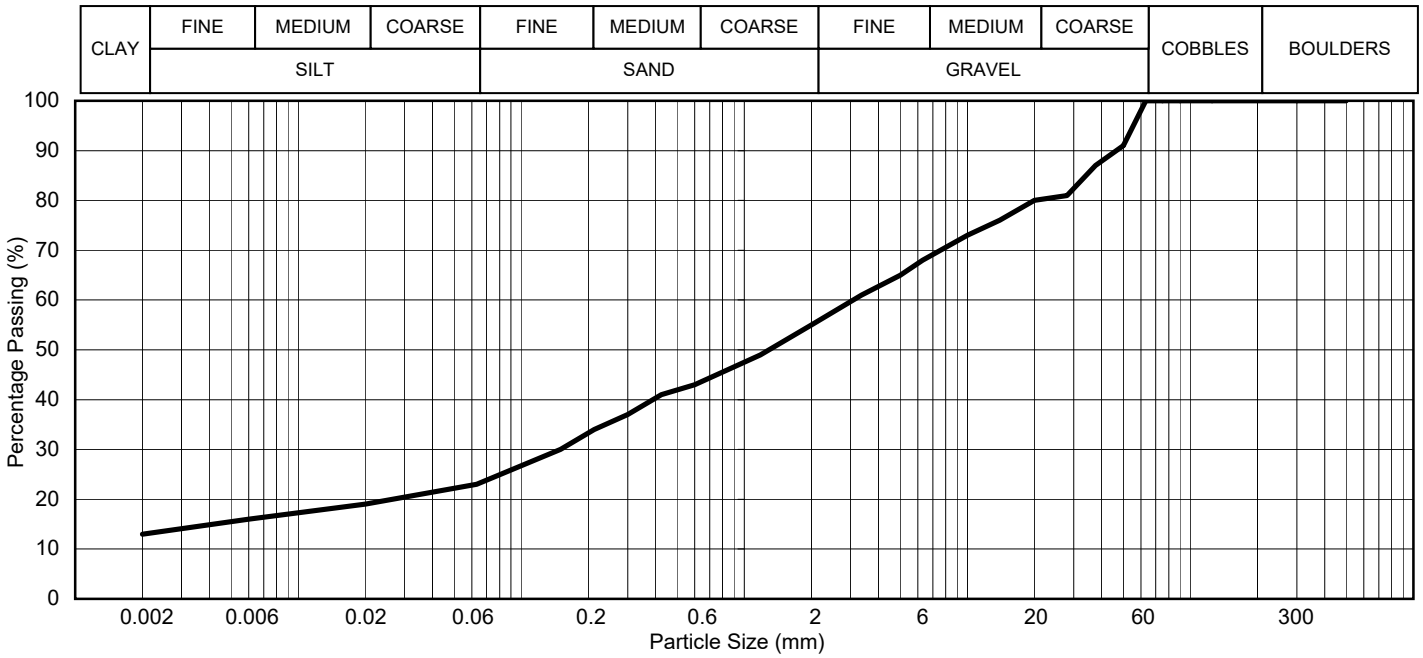
Borehole	WS45
Sample	B
Depth (m)	4.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	19
300.0	100	-	-	0.006	16
125.0	100	-	-	0.002	13
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	91	-	-		
37.5	87	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	81	-	-		
20.0	80	-	-		
14.0	76	-	-		
10.0	73	-	-	**PERCENTAGE SOIL TYPES**	
6.30	68	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.00	65	-	-		
3.35	61	-	-	13 / 10 / 32 / 45 / 0	
2.00	55	-	-		
1.18	49	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	43	-	-	**D10** / **D60** / **Specification**	
0.425	41	-	-		
0.300	37	-	-	- / -	
0.212	34	-	-	**UNIFORMITY COEFFICIENT** - / -	
0.150	30	-	-		
0.063	23	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

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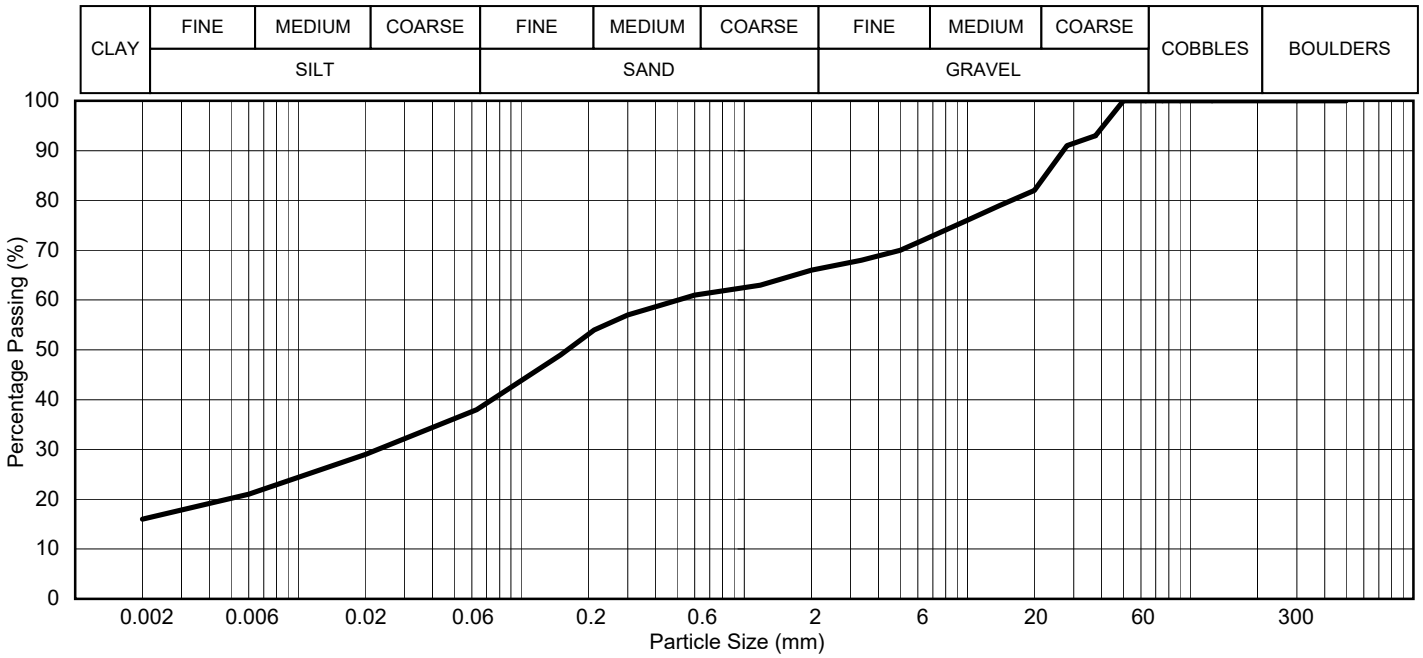
Borehole	WS51B
Sample	B
Depth (m)	3.00



SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	29
300.0	100	-	-	0.006	21
125.0	100	-	-	0.002	16
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	93	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	91	-	-		
20.0	82	-	-		
14.0	79	-	-		
10.0	76	-	-	**PERCENTAGE SOIL TYPES**	
6.30	72	-	-		
5.00	70	-	-		
3.35	68	-	-		
2.00	66	-	-		
1.18	63	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	61	-	-		
0.425	59	-	-		
0.300	57	-	-		
0.212	54	-	-		
0.150	49	-	-		
0.063	38	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
16	22	28	34	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

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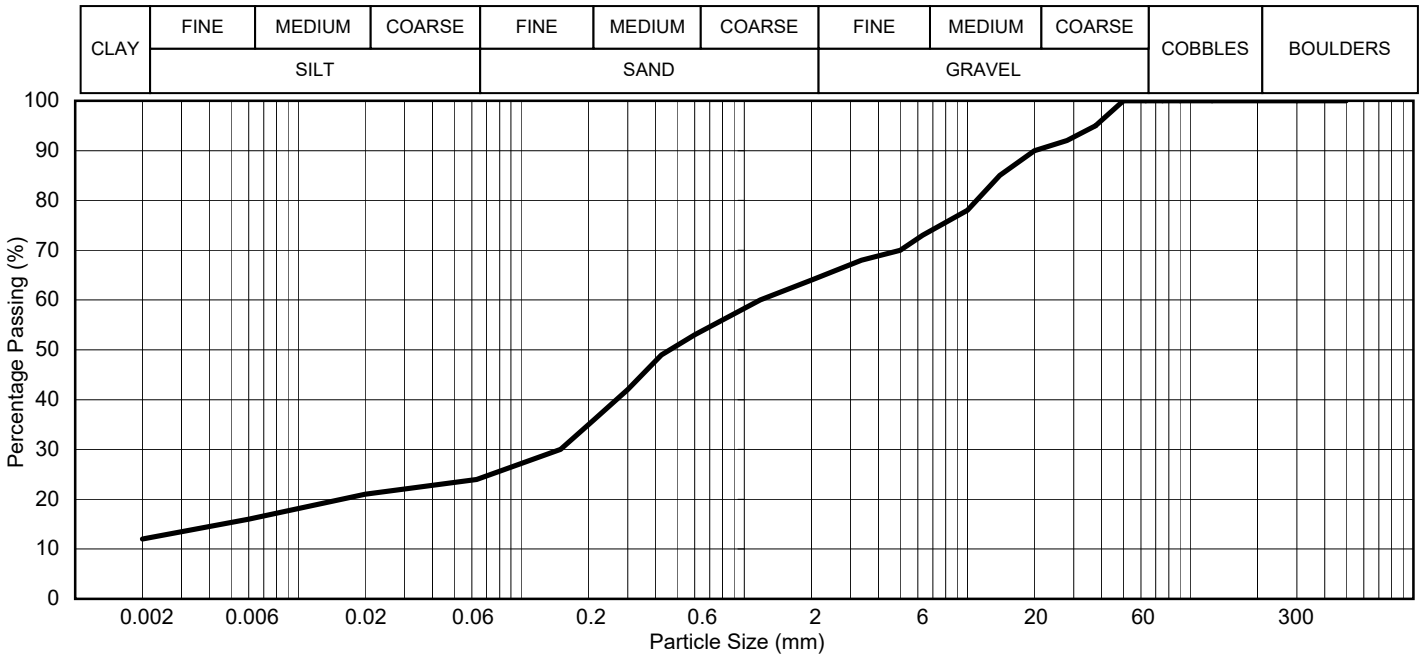
Borehole	WS54
Sample	B
Depth (m)	3.00



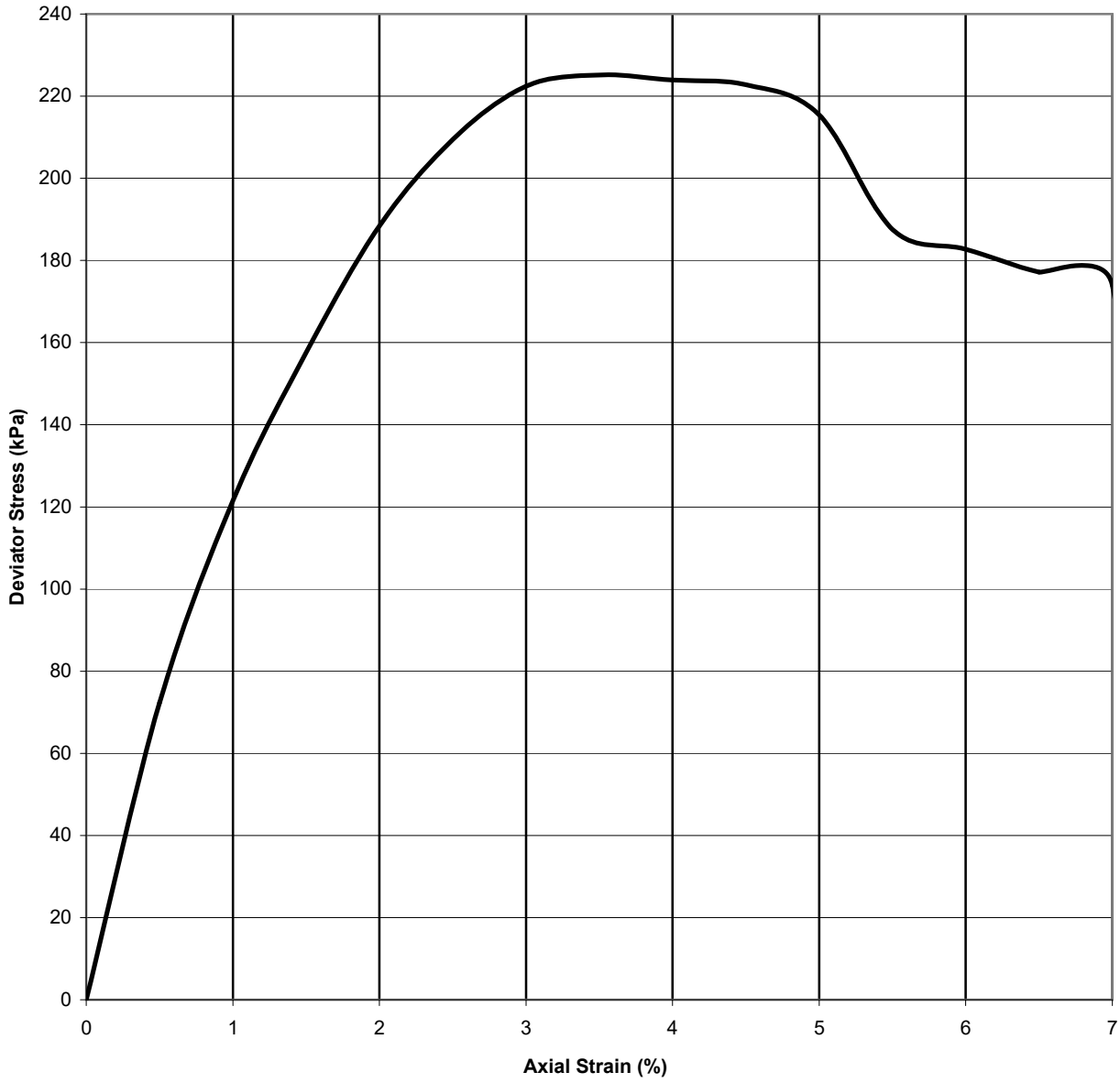
SIEVING				SEDIMENTATION	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.020	21
300.0	100	-	-	0.006	16
125.0	100	-	-	0.002	12
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	-	
50.0	100	-	-		
37.5	95	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	92	-	-		
20.0	90	-	-		
14.0	85	-	-		
10.0	78	-	-	**PERCENTAGE SOIL TYPES**	
6.30	73	-	-		
5.00	70	-	-		
3.35	68	-	-		
2.00	64	-	-		
1.18	60	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.600	53	-	-		
0.425	49	-	-		
0.300	42	-	-		
0.212	36	-	-		
0.150	30	-	-		
0.063	24	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
12	12	40	36	0

D10	D60	Specification
-	-	
UNIFORMITY COEFFICIENT	-	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns



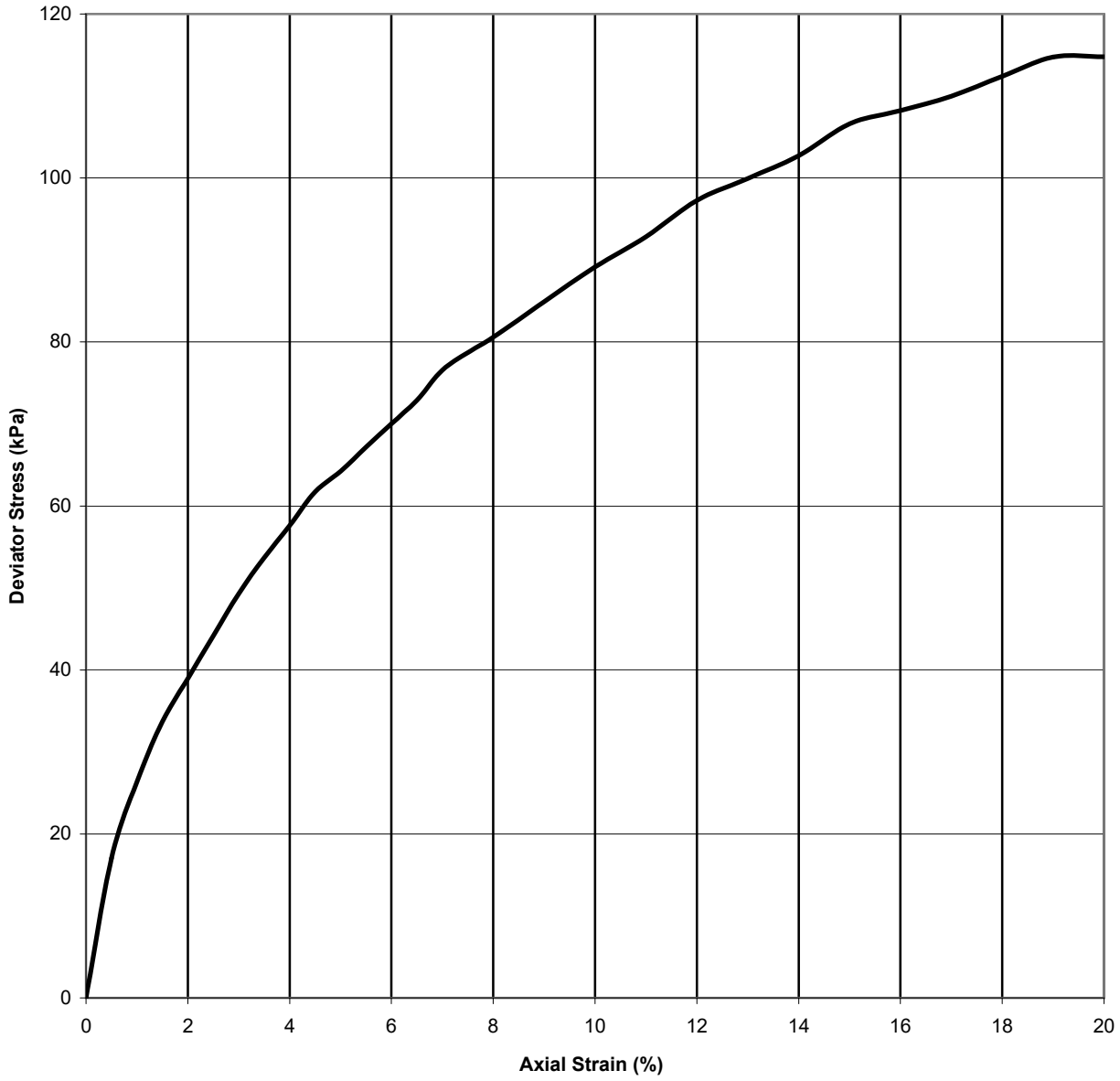
Undisturbed sample, taken directly from the sample tube and retaining axial orientation

Failure Conditions		
Cell pressure	(kPa)	25
Membrane correction	(kPa)	0.2
Strain at failure	(%)	3.5
Failure Type		Intermediate
Corrected deviator stress	(kPa)	225
Undrained shear strength	(kPa)	113

Initial Conditions						Borehole	WS8
Sample length	169.09	mm	Rate of strain	2.0	%/min		
Sample diameter	82.53	mm	Bulk Density	2.25	Mg/m^3	Sample	U
Membrane type	Latex		Dry Density	2.02	Mg/m^3		
Membrane thickness	0.2	mm	Moisture Content	12	%	Depth (m)	1.40

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377 : Part 7 : 8.0 : 1990



Undisturbed sample, taken directly from the sample tube and retaining axial orientation

Failure Conditions		
Cell pressure	(kPa)	50
Membrane correction	(kPa)	1.0
Strain at failure	(%)	20.0
Failure Type		Intermediate
Corrected deviator stress	(kPa)	115
Undrained shear strength	(kPa)	57

Initial Conditions							
Sample length	140.62	mm	Rate of strain	2.0	%/min	Borehole	WS11
Sample diameter	71.49	mm	Bulk Density	2.32	Mg/m^3	Sample	U
Membrane type	Latex		Dry Density	2.07	Mg/m^3	Depth (m)	2.20
Membrane thickness	0.2	mm	Moisture Content	12	%		

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377 : Part 7 : 8.0 : 1990

BOREHOLE	SAMPLE	DEPTH (m)	SPECIMEN § ORIENTATION	PREPARATION METHOD *	BS TEST METHODS *	SAMPLE PASSING 2mm SIEVE (%)	TOTAL SULPHATE (% SO3)	2:1 WATER SOLUBLE SULPHATE (g/l SO3)	pH VALUE
WS1	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	87	-	0.01	5.8
WS2	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	60	-	0.01	7.3
WS3	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	69	-	0.01	5.7
WS4	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	31	-	0.01	6.2
WS5	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	75	-	<0.01	6.4
WS6	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	97	-	0.01	6.0
WS7	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	31	-	<0.01	6.6
WS8	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	76	-	<0.01	8.0
WS10	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	85	-	<0.01	6.7
WS13	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	71	-	0.01	5.6
WS14	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	44	-	<0.01	6.3
WS15	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	68	-	0.01	6.3
WS16	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	57	-	0.04	6.8
WS20	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	65	-	<0.01	5.2
WS21	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	62	-	<0.01	6.7
WS23	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	95	-	<0.01	5.8
WS24	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	39	-	<0.01	6.0

All tests performed on fraction of sample passing 2mm sieve
NOTE: To convert sulphate results from SO_3 to SO_4 multiply by 1.2

§ Specimen orientation :

N/A	Not applicable due to preparation method and/or sample type
V	Cut vertically from undisturbed sample
H	Cut horizontally from undisturbed sample

* Tested in accordance with the following clauses of BS 1377: Part 3: 1990:

5.2	Acid extract method	9.4	Preparation of pH test specimen
5.3	Water extract method	9.5	Determination of the pH value
5.5	Gravimetric method of analysis		

SUMMARY OF SULPHATE & pH TEST RESULTS

BOREHOLE	SAMPLE	DEPTH (m)	SPECIMEN § ORIENTATION	PREPARATION METHOD *	BS TEST METHODS *	SAMPLE PASSING 2mm SIEVE (%)	TOTAL SULPHATE (% SO3)	2:1 WATER SOLUBLE SULPHATE (g/l SO3)	pH VALUE
WS25	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	20	-	<0.01	6.7
WS29	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	96	-	0.01	6.2
WS32	B	0.90	N/A	5.3 / 9.4	5.5 / 9.5	58	-	0.01	8.0
WS35	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	75	-	0.09	7.8
WS36	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	44	-	0.02	6.6
WS37	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	44	-	0.02	6.6
WS38	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	34	-	0.01	6.5
WS39	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	14	-	<0.01	6.6
WS40C	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	43	-	0.01	6.7
WS41	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	50	-	<0.01	6.5
WS43	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	31	-	0.02	6.6
WS45	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	33	-	0.01	7.0
WS47	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	38	-	<0.01	6.6
WS49	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	55	-	0.02	6.5
WS50	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	50	-	0.04	6.6
WS51B	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	54	-	0.01	7.1
WS52	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	75	-	<0.01	6.5

All tests performed on fraction of sample passing 2mm sieve
NOTE: To convert sulphate results from SO_3 to SO_4 multiply by 1.2

§ Specimen orientation :

N/A	Not applicable due to preparation method and/or sample type
V	Cut vertically from undisturbed sample
H	Cut horizontally from undisturbed sample

* Tested in accordance with the following clauses of BS 1377: Part 3: 1990:

5.2	Acid extract method	9.4	Preparation of pH test specimen
5.3	Water extract method	9.5	Determination of the pH value
5.5	Gravimetric method of analysis		

SUMMARY OF SULPHATE & pH TEST RESULTS

BOREHOLE	SAMPLE	DEPTH (m)	SPECIMEN § ORIENTATION	PREPARATION METHOD *	BS TEST METHODS *	SAMPLE PASSING 2mm SIEVE (%)	TOTAL SULPHATE (% SO3)	2:1 WATER SOLUBLE SULPHATE (g/l SO3)	pH VALUE
WS53	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	42	-	0.01	7.4
WS55	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	78	-	0.04	6.6
WS56	B	0.25	N/A	5.3 / 9.4	5.5 / 9.5	99	-	0.03	6.9
WS57	B	1.00	N/A	5.3 / 9.4	5.5 / 9.5	97	-	<0.01	6.5

All tests performed on fraction of sample passing 2mm sieve
NOTE: To convert sulphate results from SO_3 to SO_4 multiply by 1.2

§ Specimen orientation :

N/A	Not applicable due to preparation method and/or sample type
V	Cut vertically from undisturbed sample
H	Cut horizontally from undisturbed sample

* Tested in accordance with the following clauses of BS 1377: Part 3: 1990:

5.2	Acid extract method	9.4	Preparation of pH test specimen
5.3	Water extract method	9.5	Determination of the pH value
5.5	Gravimetric method of analysis		

SUMMARY OF SULPHATE & pH TEST RESULTS

Appendix C Environmental Laboratory Results

WEST RIVERSIDE AND WOODBANK
TABLE SUMMARISING SOIL RESULTS AND HIGHLIGHTING EXCEEDANCES ABOVE HUMAN HEALTH ASSESSMENT CRITERIA

SOM 2.5%		Assessment Criteria**			Strata																					
Analyte	**Units**	**RwHP**	**RwoHP**	**Commercial**	WS17	WS18	WS19	WS20	WS24	WS27	WS29	WS30	WS36	WS56	WS7	WS10	WS11	WS12	WS06	WS13	WS14	WS15	WS01	WS02	WS02	WS03	WS04	WS05
Stones BG 2.6/3.0	%	-	-	-																							
Moisture content at 30 C	%	-	-	-	17	6.5	13	15	12	8.4	7.2	8.1	18	9.1	7.4	15	18	7.8	29	25	21	20	30	20	16	18	11	29
Arsenic*	mg/kg	37	40	640	6.9	4.5	6.9	5.6	5.5	4.4	3.9	3.8	36	7.1	4	3.9	10	4	6.9	5.4	5.9	8.3	5.7	6.2	5.6	4.2	4	6.3
Cadmium	mg/kg	11	85	190	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium Trivalent	mg/kg	910	910	8600	14	31	16	15	13	17	14	19	74	22	22	18	21	13	25	21	20	23	29	24	36	17	21	26
Chromium Hexavalant*	mg/kg	6	6	33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper	mg/kg	2400	7100	68000	19	11	19	18	22	19	21	7.4	120	29	18	32	9.5	20	21	17	20	12	21	27	20	11	16	21
Lead*	mg/kg	200	310	2300	47	15	67	60	12	24	9.3	11	2100	21	31	83	37	60	39	34	94	38	53	84	100	26	21	36
Mercury	mg/kg	40	56	1100	0.12	0.05	0.78	0.1	0.05	0.05	0.05	0.05	0.12	0.05	0.18	0.06	0.05	0.16	0.11	0.11	0.24	0.13	0.11	0.11	0.2	0.05	0.07	0.1
Nickel	mg/kg	130	180	980	17	26	13	13	14	17	16	18	55	25	24	32	15	15	22	18	19	20	19	22	30	15	18	23
Selenium	mg/kg	250	430	12000	0.7	0.9	1	0.7	0.5	0.5	0.5	0.9	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Zinc	mg/kg	3700	40000	730000	39	71	47	44	28	47	33	40	100	45	41	70	32	74	60	51	64	48	60	91	77	36	46	57
Beryllium	mg/kg	1.7	1.7	12																								
Boron	mg/kg	290	11000	240000																								
Vanadium	mg/kg	410	1200	9000																								
Cyanide (Total)	mg/kg	-	-	-	0.4	0.2	0.5	0.4	0.2	0.3	0.1	0.3	3.6	0.3	0.2	0.3	0.3	0.2	0.5	0.5	0.4	0.3	0.6	0.3	0.2	0.3	0.3	0.4
Organic matter	%	-	-	-	3.8	0.8	4.7	3.7	1.1	2.2	0.5	1.1	6.7	0.6	0.8	5.9	1.1	0.8	3.9	3.3	3.1	2.2	4.9	2.5	2.1	1.5	1.7	3.7
Phenol, Total	mg/kg	200	690	690																								
Sulphate (Total) as SO4	%	-	-	-	38	59	10	11	12	11	11	35	23	12	19	12	12	10	10	10	10	10	10	10	10	10	10	10
pH	pH Units	-	-	-	5.9	7.4	5.4	5.5	6.3	6.2	6.6	6	7.9	6.8	7.8	7.3	6.9	7.5	5.4	5.6	5.6	5.7	6.7	5.6	5.7	5.9	6	5.9
>C10 to C12 Aromatic	mg/kg	180	590	28000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C12 to C16 Aromatic	mg/kg	330	2300	37000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C16 to C21 Aromatic	mg/kg	540	1900	28000	10	10	10	10	10	10	10	10	13	10	10	17	10	14	18	23	10	10	10	10	10	10	10	10
>C21 TO C35 Aromatic	mg/kg	1500	1900	28000																								
>C35 to C44 Aromatic	mg/kg	1500	1900	28000	10	10	15	14	10	10	13	10	18	10	10	18	10	14	24	37	10	10	10	10	10	10	10	10
Total Aromatic C5-C35	mg/kg	-	-	-																								
TPH Ali/Aro	mg/kg	-	-	-																								
EPH (C10-C40)	mg/kg	-	-	-	10	10	84	81	10	90	54	10	110	10	10	110	10	92	130	190	10	10	10	10	10	10	10	10
naphthalene	mg/kg	5.6	5.6	460	0.03						0.03	0.03	0.03															
acenaphthylene	mg/kg	420	4600	97000	0.03						0.03	0.03	0.03															
acenaphthene	mg/kg	510	4700	97000	0.03						0.03	0.03	0.03															
fluorene	mg/kg	400	3800	68000	0.03						0.03	0.03	0.03															
phenanthrene	mg/kg	220	1500	22000	0.03						0.03	0.03	0.07															
anthracene	mg/kg	5400	35000	540000	0.03						0.03	0.03	0.03															
fluoranthene	mg/kg	560	1600	23000	0.05						0.03	0.03	0.12															
pyrene	mg/kg	1200	3800	54000	0.04						0.03	0.03	0.14															
benzo(a)anthracene	mg/kg	11	14	170	0.03						0.03	0.03	0.06															
chrysene	mg/kg	22	31	350	0.03						0.03	0.03	0.07															
benzo(b)fluoranthene	mg/kg	3.3	4	44	0.03						0.03	0.03	0.07															
benzo(k)fluoranthene	mg/kg	93	110	1200	0.03						0.03	0.03	0.03															
benzo(a)pyrene*	mg/kg	2.7	3.2	35	0.03						0.03	0.03	0.05															
benzo(g,h,i)perylene	mg/kg	340	360	4000	0.03						0.03	0.03	0.05															
dibenzo(ah)anthracene	mg/kg	0.28	0.32	3.6	0.03						0.03	0.03	0.03															
indeno(1,2,3-c,d)pyrene	mg/kg	36	46	510	0.03						0.03	0.03	0.04															
Total PAH	mg/kg	-	-	-	0.1						0.1	0.1	0.69															
PCB (as Aroclors)	mg/kg	-	-	-																								
Asbestos	TEXT	-	-	-	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

* Category 4 Screening Value @ 6% SOM Version 5.1

** Land Use Scenarios: RwHP = residential with homegrown produce, RwoHP = Residential without homegrown produce

WEST RIVERSIDE AND WOODBANK
TABLE SUMMARISING SOIL RESULTS AND HIGHLIGHTING EXCEEDANCES ABOVE HUMAN HEALTH ASSESSMENT CRITERIA

SOM 2.5%		Assessment Criteria**			Strata																						
Analyte	Units	RwHP	RwoHP	Commercial	WS08	WS08	WS09	WS16	WS16	WS21	WS22	WS23	WS25	WS26	WS28	WS31	WS32	WS33	WS34	WS35	WS37	WS38	WS38	WS39	WS40	WS41	WS41	WS41
Stones BG 2.6/3.0	%	-	-	-																								
Moisture content at 30 C	%	-	-	-	24	13	19	23	72	5.6	8.2	14	21	13	17	15	11	24	12	19	19	26	24	10	18	24	63	55
Arsenic*	mg/kg	37	40	640	8.9	5.9	9.1	5.1	1.4	4	3.2	2.8	4.5	1.7	7	5.3	5.5	6.3	5.4	8.3	9.7	65	3.9	5.6	6.2	14	15	9.1
Cadmium	mg/kg	11	85	190	0.3	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.5	0.3	0.3	0.4
Chromium Trivalent	mg/kg	910	910	8600	25	30	27	16	3	16	15	11	18	13	19	20	25	21	22	45	17	34	22	18	26	21	28	34
Chromium Hexavalant*	mg/kg	6	6	33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper	mg/kg	2400	7100	68000	36	20	34	19	6.4	24	14	22	24	5.8	19	24	34	20	23	32	130	130	22	12	93	300	250	29
Lead*	mg/kg	200	310	2300	170	13	93	36	15	19	12	5.7	51	13	62	34	260	50	42	50	920	420	13	18	660	200	320	96
Mercury	mg/kg	40	56	1100	0.56	0.05	0.31	0.07	0.05	0.05	0.19	0.05	0.16	0.05	0.05	0.05	0.1	0.06	0.08	0.09	0.29	0.09	0.05	0.05	0.12	0.63	0.82	0.05
Nickel	mg/kg	130	180	980	31	29	29	15	3.4	18	14	13	19	10	17	19	23	17	22	49	50	77	22	15	30	52	61	27
Selenium	mg/kg	250	430	12000	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	1.7	1.1	1
Zinc	mg/kg	3700	40000	730000	110	55	100	49	16	48	34	29	64	31	39	53	72	55	60	81	98	87	40	39	340	89	92	100
Beryllium	mg/kg	1.7	1.7	12																								
Boron	mg/kg	290	11000	240000																								
Vanadium	mg/kg	410	1200	9000																								
Cyanide (Total)	mg/kg	-	-	-	0.4	0.1	0.3	0.3	0.3	0.1	0.2	0.1	0.2	0.2	0.4	0.2	0.2	0.4	0.2	0.3	3.2	2.3	0.1	0.3	0.6	1.5	0.9	0.9
Organic matter	%	-	-	-	4.9	0.5	3.3	3	25	0.7	3.5	0.4	6.6	1.4	3.8	2.8	1.9	3.5	1.2	3.6	6.9	11	0.3	1.5	3.6	9.9	8.2	7.4
Phenol, Total	mg/kg	200	690	690																								
Sulphate (Total) as SO4	%	-	-	-	12	10	10	10	37	12	17	10	25	15	10	73	11	13	14	18	16	25	10	10	17	19	27	88
pH	pH Units	-	-	-	5.8	6.4	6.4	6.2	5.8	6	6.2	6.3	6.4	5.7	5.4	7.5	7.5	6.5	7.5	6.2	7.4	6.4	6.3	5.2	7.4	7.8	7	5.4
>C10 to C12 Aromatic	mg/kg	180	590	28000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C12 to C16 Aromatic	mg/kg	330	2300	37000	10	10	10	10	24	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C16 to C21 Aromatic	mg/kg	540	1900	28000	10	10	10	10	47	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	15	25	14	10
>C21 TO C35 Aromatic	mg/kg	1500	1900	28000																								
>C35 to C44 Aromatic	mg/kg	1500	1900	28000	10	10	10	10	77	10	10	10	10	10	10	10	20	10	10	10	10	10	10	10	74	29	10	26
Total Aromatic C5-C35	mg/kg	-	-	-																								
TPH Ali/Aro	mg/kg	-	-	-																								
EPH (C10-C40)	mg/kg	-	-	-	10	10	10	10	530	10	10	10	10	10	10	10	75	10	10	10	10	10	10	10	270	210	54	150
naphthalene	mg/kg	5.6	5.6	460	0.03			0.03	0.03							0.03	0.19				0.03	0.03	0.03		0.03	0.03		
acenaphthylene	mg/kg	420	4600	97000	0.03			0.03	0.03							0.03	0.03				0.03	0.03	0.03		0.04	0.03		
acenaphthene	mg/kg	510	4700	97000	0.03			0.03	0.03							0.03	0.15				0.03	0.03	0.03		0.03	0.03		
fluorene	mg/kg	400	3800	68000	0.03			0.03	0.03							0.03	0.13				0.03	0.03	0.03		0.03	0.03		
phenanthrene	mg/kg	220	1500	22000	0.03			0.03	0.03							0.03	0.66				0.06	0.03	0.03		0.5	0.12		
anthracene	mg/kg	5400	35000	540000	0.03			0.03	0.03							0.03	0.14				0.03	0.03	0.03		0.13	0.09		
fluoranthene	mg/kg	560	1600	23000	0.03			0.03	0.03							0.03	0.51				0.09	0.03	0.03		1	0.14		
pyrene	mg/kg	1200	3800	54000	0.03			0.03	0.03							0.03	0.48				0.09	0.03	0.03		0.92	0.14		
benzo(a)anthracene	mg/kg	11	14	170	0.03			0.03	0.03							0.03	0.17				0.05	0.03	0.03		0.49	0.05		
chrysene	mg/kg	22	31	350	0.03			0.03	0.03							0.03	0.19				0.06	0.03	0.03		0.5	0.09		
benzo(b)fluoranthene	mg/kg	3.3	4	44	0.03			0.03	0.03							0.03	0.17				0.06	0.03	0.03		0.61	0.03		
benzo(k)fluoranthene	mg/kg	93	110	1200	0.03			0.03	0.03							0.03	0.07				0.03	0.03	0.03		0.23	0.03		
benzo(a)pyrene*	mg/kg	2.7	3.2	35	0.03			0.03	0.03							0.03	0.14				0.04	0.03	0.03		0.42	0.03		
benzo(g,h,i)perylene	mg/kg	340	360	4000	0.03			0.03	0.03							0.03	0.09				0.03	0.03	0.03		0.33	0.03		
dibenzo(ah)anthracene	mg/kg	0.28	0.32	3.6	0.03			0.03	0.03							0.03	0.03				0.03	0.03	0.03		0.08	0.03		
indeno(1,2,3-c,d)pyrene	mg/kg	36	46	510	0.03			0.03	0.03							0.03	0.08				0.03	0.03	0.03		0.3	0.03		
Total PAH	mg/kg	-	-	-	0.1			0.1	0.1							0.1	3.2				0.46	0.1	0.1		5.6	0.64		
PCB (as Aroclors)	mg/kg	-	-	-																								
Asbestos	TEXT	-	-	-	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

* Category 4 Screening Value @ 6% SOM

** Land Use Scenarios: RwHP = residential with homegrown produce, RwoHP = Residential without homeg

WEST RIVERSIDE AND WOODBANK
TABLE SUMMARISING SOIL RESULTS AND HIGHLIGHTING EXCEEDANCES ABOVE HUMAN HEALTH ASSESSMENT CRITERIA

SOM 2.5%		Assessment Criteria**			Strata														
Analyte	**Units**	**RwHP**	**RwoHP**	**Commercial**	WS43	WS44	WS45	WS45	WS46	WS47	WS47	WS49	WS49	WS50	WS51	WS52	WS53	WS54	WS57
Stones BG 2.6/3.0	%	-	-	-															
Moisture content at 30 C	%	-	-	-	32	23	28	24	14	26		17	73	19	11	9.2	13	9.2	16
Arsenic*	mg/kg	37	40	640	13	7.9	9.9	4.6	24	6.8	20	20	11	10	4.4	3.9	6.4	4.2	5.7
Cadmium	mg/kg	11	85	190	0.3	0.2	0.3	0.1	0.6	0.2	0.4	0.3	0.1	0.2	0.1	0.7	0.1	0.1	0.4
Chromium Trivalent	mg/kg	910	910	8600	14	10	21	17	41	15	820	150	19	32	21	16	20	20	23
Chromium Hexavalant*	mg/kg	6	6	33	1	1	1	1	1	1	1	8	3	1	1	1	1	1	1
Copper	mg/kg	2400	7100	68000	170	380	83	15	210	74	170	170	150	120	33	1600	48	30	48
Lead*	mg/kg	200	310	2300	250	66	120	32	2000	510	5100	970	270	140	27	130	88	10	500
Mercury	mg/kg	40	56	1100	0.22	0.08	0.11	0.05	0.25	0.13	0.14	0.14	0.05	0.13	0.05	0.15	0.09	0.05	0.2
Nickel	mg/kg	130	180	980	46	19	31	14	65	33	62	69	110	47	15	15	20	20	15
Selenium	mg/kg	250	430	12000	0.8	2.5	0.9	0.5	1.1	0.5	0.5	0.6	0.5	0.6	0.8	0.5	0.5	0.5	0.5
Zinc	mg/kg	3700	40000	730000	130	59	62	36	180	62	150	120	79	92	38	110	71	39	650
Beryllium	mg/kg	1.7	1.7	12															
Boron	mg/kg	290	11000	240000															
Vanadium	mg/kg	410	1200	9000															
Cyanide (Total)	mg/kg	-	-	-	0.4	0.5	0.8	0.4	3.5	12	120	18	4.3	0.9	0.3	0.1	0.2	0.1	0.6
Organic matter	%	-	-	-	12	9.4	7.9	3.1	8.7	> 25	8.9	9.1	4.3	5.5	2.6	0.4	2.3	0.2	2.3
Phenol, Total	mg/kg	200	690	690															
Sulphate (Total) as SO4	%	-	-	-	160	820	16	20	39	28	37	15	390	23	86	10	43	10	10
pH	pH Units	-	-	-	6.4	10.8	5.5	5.7	6.8	5.8	7	6.1	6.1	7.1	8.8	7.7	7.7	8.3	6.5
>C10 to C12 Aromatic	mg/kg	180	590	28000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C12 to C16 Aromatic	mg/kg	330	2300	37000	10	10	10	10	10	10	10	10	11	10	10	10	10	10	10
>C16 to C21 Aromatic	mg/kg	540	1900	28000	18	10	10	10	10	27	10	12	41	30	10	10	13	10	17
>C21 TO C35 Aromatic	mg/kg	1500	1900	28000															
>C35 to C44 Aromatic	mg/kg	1500	1900	28000	26	10	10	10	10	40	10	20	110	33	10	10	24	10	58
Total Aromatic C5-C35	mg/kg	-	-	-															
TPH Ali/Aro	mg/kg	-	-	-															
EPH (C10-C40)	mg/kg	-	-	-	170	10	10	10	10	270	10	94	1500	290	10	10	120	10	260
naphthalene	mg/kg	5.6	5.6	460	0.03	0.03		0.03		0.03		0.03		0.03	0.03	0.03	0.03		
acenaphthylene	mg/kg	420	4600	97000	0.03	0.03		0.03		0.03		0.03		0.03	0.03	0.03	0.03		
acenaphthene	mg/kg	510	4700	97000	0.03	0.03		0.03		0.03		0.03		0.03	0.03	0.03	0.03		
fluorene	mg/kg	400	3800	68000	0.03	0.03		0.03		0.03		0.03		0.03	0.03	0.03	0.03		
phenanthrene	mg/kg	220	1500	22000	0.09	0.04		0.03		0.2		0.05		0.14	0.08	0.03	0.26		
anthracene	mg/kg	5400	35000	540000	0.09	0.04		0.03		0.13		0.06		0.06	0.04	0.03	0.08		
fluoranthene	mg/kg	560	1600	23000	0.09	0.04		0.03		0.31		0.07		0.18	0.11	0.03	0.58		
pyrene	mg/kg	1200	3800	54000	0.07	0.04		0.03		0.29		0.06		0.17	0.11	0.03	0.56		
benzo(a)anthracene	mg/kg	11	14	170	0.03	0.03		0.03		0.13		0.03		0.08	0.06	0.03	0.28		
chrysene	mg/kg	22	31	350	0.03	0.03		0.03		0.15		0.03		0.09	0.06	0.03	0.29		
benzo(b)fluoranthene	mg/kg	3.3	4	44	0.03	0.03		0.03		0.15		0.06		0.09	0.07	0.03	0.43		
benzo(k)fluoranthene	mg/kg	93	110	1200	0.03	0.03		0.03		0.06		0.03		0.04	0.03	0.03	0.16		
benzo(a)pyrene*	mg/kg	2.7	3.2	35	0.03	0.03		0.03		0.1		0.03		0.06	0.05	0.03	0.34		
benzo(g,h,i)perylene	mg/kg	340	360	4000	0.03	0.03		0.03		0.08		0.03		0.05	0.05	0.03	0.26		
dibenzo(ah)anthracene	mg/kg	0.28	0.32	3.6	0.03	0.03		0.03		0.03		0.03		0.03	0.03	0.03	0.06		
indeno(1,2,3-c,d)pyrene	mg/kg	36	46	510	0.03	0.03		0.03		0.07		0.03		0.05	0.04	0.03	0.21		
Total PAH	mg/kg	-	-	-	0.34	0.16		0.1		1.7		0.3		1	0.64	0.1	3.5		
PCB (as Aroclors)	mg/kg	-	-	-															
Asbestos	TEXT	-	-	-	N	N	N	N	N	N		N	N	N	N	N	N	N	N

* Category 4 Screening Value @ 6% SOM

** Land Use Scenarios: RwHP = residential with homegrown produce, RwoHP = Residential without homeg

Appendix D Ground Gas Data (Pending)

Date	Borehole No.	Atmospheric Pressure (mBar)	Gas Composition CH4 (%vol)	CO2 (%vol)	O2 (%vol)	H2S (ppm)	Differential Pressure (Pa)	Flow (l/hr)	Depth of Water (m)	Remarks
19/04/17	WS1	1032	0.0	4.1	14.1	0.0	0.00	0.00	1.03	
19/04/17	WS2B	1031	0.0	0.6	19.9	0.1	0.00	0.00	1.74	
19/04/17	WS3	1031	0.0	0.2	20.4	0.0	0.00	0.00	1.31	
19/04/17	WS4	1033	0.0	2.1	17.8	0.1	0.00	0.00	3.79	
19/04/17	WS6	1037	0.0	3.1	16.1	0.0	0.00	0.00	2.02	
19/04/17	WS7	1031	0.0	0.7	19.7	0.0	0.00	0.00	Dry	
19/04/17	WS8	1026	0.1	1.4	20.2	0.0	0.00	0.00	1.67	
19/04/17	WS10	1029	0.2	3.1	16.8	0.0	0.00	0.00	1.68	
19/04/17	WS11	1030	0.0	2.7	17.1	0.1	0.00	0.00	Dry	
19/04/17	WS12	1029	0.1	0.5	20.1	0.1	0.00	0.00	Dry	
19/04/17	WS14	1030	0.0	4.4	14.3	0.0	0.00	0.00	2.04	
20/04/17	WS15	1029	0.0	0.5	20.5	0.0	0.00	0.00	2.32	
21/04/17	WS16	1028	0.1	4.2	14.7	0.0	0.00	0.00	Dry	
20/04/17	WS18	1029	0.1	0.4	20.1	0.0	0.00	0.00	Dry	
20/04/17	WS20	1028	0.0	0.6	19.7	0.0	0.00	0.00	Dry	
20/04/17	WS21	1028	0.0	0.0	20.3	0.0	0.00	0.00	Dry	
20/04/17	WS22	1029	0.1	1.1	19.0	0.0	0.00	0.00	0.84	
20/04/17	WS23	1029	0.0	0.4	20.1	0.0	0.00	0.00	Dry	
20/04/17	WS24	1031	0.0	0.8	19.9	0.0	0.00	0.00	Dry	
20/04/17	WS25	1031	0.0	1.1	19.4	0.1	0.00	0.00	Dry	
20/04/17	WS26	1029	0.0	0.6	19.7	0.0	0.00	0.00	Dry	
20/04/17	WS29	1032	0.0	0.2	20.4	0.0	0.00	0.00	1.96	
20/04/17	WS30	1033	0.0	0.8	19.7	0.0	0.00	0.00	2.29	
20/04/17	WS35	1032	1.1	2.4	15.6	0.0	0.00	0.30	0.79	
20/04/17	WS36	1031	0.0	1.3	19.0	0.0	0.00	0.00	2.10	
20/04/17	WS37	1032	0.0	1.2	18.9	0.0	0.00	0.00	2.15	
21/04/17	WS38	1033	0.00	0.60	20.30	0.00	0.00	0.00	3.01	
21/04/17	WS40C	1032	0.00	0.80	19.90	0.00	0.00	0.00	2.71	
21/04/17	WS41	1032	0.00	1.10	19.40	0.00	0.00	0.00	2.82	
21/04/17	WS43	1032	0.00	2.10	17.30	0.00	0.00	0.00	2.49	
21/04/17	WS49	1032	0.00	4.80	13.30	0.00	0.00	0.00	1.71	
21/04/17	WS50	1033	0.00	1.50	19.10	0.00	0.00	0.00	2.24	
21/04/17	WS51B	1034	0.00	1.30	17.40	0.00	0.00	0.10	2.03	
21/04/17	WS52A	1032	0.00	1.20	19.20	0.10	0.00	0.00	2.61	
21/04/17	WS53	1033	0.10	0.80	17.20	0.00	0.00	0.00	Dry	
21/04/17	WS54	1029	0.10	3.70	9.90	0.00	0.00	0.00	Dry	

Contract No.	RESULTS OF GAS AND WATER LEVEL MONITORING IN STANDPIPES		Fig. No.
2304	Riverside Balloch.		1

Date	Borehole No.	Atmospheric Pressure (mBar)	Gas Composition CH4 (%vol)	CO2 (%vol)	O2 (%vol)	H2S (ppm)	Differential Pressure (Pa)	Flow (l/hr)	Depth of Water (m)	Remarks
26/04/17	WS1	1014	0.0	3.7	14.8	0.0	0.00	0.00	0.98	
26/04/17	WS2B	1014	0.0	0.4	19.1	0.2	0.00	0.00	1.60	
26/04/17	WS3	1015	0.0	0.5	19.1	0.0	0.00	0.00	1.40	
26/04/17	WS4	1014	0.0	1.8	18.5	0.1	0.00	0.00	3.50	
26/04/17	WS6	1015	0.0	2.4	15.8	0.0	0.00	0.00	2.20	
26/04/17	WS7	1016	0.0	1.2	19.4	0.1	0.00	0.00	Dry	
26/04/17	WS8	1015	0.1	1.1	20.8	0.0	0.00	0.00	1.76	
26/04/17	WS10	1016	0.1	2.8	17.5	0.0	0.00	0.00	1.55	
26/04/17	WS11	1013	0.0	2.1	16.5	0.2	0.00	0.00	Dry	
26/04/17	WS12	1014	0.0	0.6	19.1	0.1	0.00	0.00	Dry	
26/04/17	WS14	1014	0.0	4.1	12.6	0.0	0.00	0.00	2.12	
27/04/17	WS15	998	0.0	0.3	19.1	0.1	0.00	0.00	2.44	
27/04/17	WS16	998	0.1	3.5	15.2	0.0	0.00	0.00	Dry	
27/04/17	WS18	996	0.1	0.6	20.9	0.0	0.00	0.00	Dry	
27/04/17	WS20	997	0.0	0.4	20.6	0.0	0.00	0.00	Dry	
27/04/17	WS21	995	0.0	0.0	19.5	0.0	0.00	0.00	Dry	
27/04/17	WS22	997	0.2	0.9	19.7	0.0	0.00	0.00	0.80	
27/04/17	WS23	997	0.0	0.6	19.2	0.0	0.00	0.00	Dry	
27/04/17	WS24	998	0.0	0.5	21.2	0.0	0.00	0.00	Dry	
27/04/17	WS25	996	0.0	0.8	19.1	0.1	0.00	0.00	Dry	
27/04/17	WS26	994	0.0	0.4	19.5	0.0	0.00	0.00	Dry	
27/04/17	WS29	996	0.0	0.3	20.0	0.0	0.00	0.00	1.86	
27/04/17	WS30	996	0.0	0.9	19.1	0.1	0.00	0.00	2.14	
27/04/17	WS35	998	0.8	2.1	15.1	0.0	0.00	0.30	0.89	
27/04/17	WS36	997	0.0	1.9	19.8	0.0	0.00	0.00	2.04	
27/04/17	WS37	994	0.0	1.4	18.5	0.0	0.00	0.00	2.00	
28/04/17	WS38	1004	0.00	0.80	21.00	0.00	0.00	0.00	2.91	
28/04/17	WS40C	1002	0.00	1.20	20.80	0.00	0.00	0.00	2.88	
28/04/17	WS41	1005	0.00	1.00	20.60	0.00	0.00	0.00	3.11	
28/04/17	WS43	1004	0.00	2.30	17.90	0.00	0.00	0.00	2.33	
28/04/17	WS49	1003	0.00	4.20	14.50	0.00	0.00	0.00	1.81	
28/04/17	WS50	1003	0.00	1.30	18.00	0.00	0.00	0.00	2.05	
28/04/17	WS51B	1002	0.00	1.80	16.20	0.00	0.00	0.10	1.89	
28/04/17	WS52A	1004	0.00	1.40	18.30	0.20	0.00	0.00	2.51	
28/04/17	WS53	1006	0.20	0.90	16.50	0.00	0.00	0.00	Dry	
28/04/17	WS54	1004	0.10	3.80	11.60	0.00	0.00	0.00	Dry	

Contract No.	RESULTS OF GAS AND WATER LEVEL MONITORING IN STANDPIPES		Fig. No.
2304	Riverside Balloch.		1

Date	Borehole No.	Atmospheric Pressure (mBar)	Gas Composition				Differential Pressure (Pa)	Flow (l/hr)	Depth of Water (m)	Remarks
			CH4 (%vol)	CO2 (%vol)	O2 (%vol)	H2S (ppm)				
17/05/17	WS1	1004	0.0	3.8	15.2	0.0	0.00	0.00	1.07	
17/05/17	WS2B	1007	0.0	0.6	20.1	0.0	0.00	0.00	1.30	
17/05/17	WS3	1006	0.0	0.7	20.1	0.0	0.00	0.00	1.80	No plastic
17/05/17	WS4	1004	0.0	1.8	19.1	0.0	0.00	0.00	3.20	
	WS5									Unable to locate
17/05/17	WS6	1006	0	2.8	18.5	0.0	0.00	0.00	2.10	
17/05/17	WS7	1007	0	1.2	15.8	0.0	0.00	0.00	Dry	
17/05/17	WS8	1008	0.10	1.1	19.4	0.0	0.00	0.00	1.65	
17/05/17	WS10	1004	0.10	2.9	17.4	0.0	0.00	0.00	1.70	
17/05/17	WS11	1006	0	3.0	16.6	0.0	0.00	0.00	Dry	
17/05/17	WS12	1006	0.10	0.6	20.4	0.0	0.00	0.00	Dry	
	WS13									Unable to locate
17/05/17	WS14	1006	0	4.0	13.2	0.0	0.00	0.00	1.90	
17/05/17	WS15	1007	0	0.6	19.4	0.0	0.00	0.00	1.30	
17/05/17	WS16	1006	0.10	3.6	15.2	0.0	0.00	0.00	Dry	
17/05/17	WS18	1019	0	0.8	20.3	0.0	0.00	0.00	Dry	
18/05/17	WS20	1021	0	0.6	20.6	0.0	0.00	0.00	Dry	
18/05/17	WS21	1020	0	0.1	20.6	0.0	0.00	0.00	Dry	
18/05/17	WS22	1020	0.10	0.9	19.4	0.0	0.00	0.00	1.10	
18/05/17	WS23	1019	0	0.6	20.3	0.0	0.00	0.00	Dry	
18/05/17	WS24	1021	0	0.5	21.1	0.0	0.00	0.00	Dry	
18/05/17	WS25	1020	0	0.8	19.4	0.0	0.00	0.00	Dry	
18/05/17	WS26	1014	0	0.7	15.6	0.0	0.00	0.00	Dry	
18/05/17	WS29	1008	0.10	0.9	20.0	0.0	0.00	0.00	1.80	
19/05/17	WS30	1016	0	1.1	19.5	0.0	0.00	0.00	1.76	
19/05/17	WS35	1017	0.20	2.6	16.2	0.0	0.00	0.00	0.80	
19/05/17	WS36	1009	0	1.6	19.6	0.0	0.00	0.00	Dry	
18/05/17	WS37	1010	0	1.2	18.0	0.0	0.00	0.00	2.35	
18/05/17	WS38	1019	0.20	0.90	20.10	0.0	0.00	0.00	2.05	
18/05/17	WS40C	1020	0.10	1.40	19.30	0.0	0.00	0.00	2.84	
18/05/17	WS41	1020	0.10	2.30	18.50	0.0	0.00	0.00	2.50	
19/05/17	WS43	1014	0.10	1.10	19.80	0.0	0.00	0.00	2.83	
19/05/17	WS45	1017	0	1.70	18.40	0.0	0.11	0.00	2.44	
18/05/17	WS49	1019	0	5.10	16.50	0.0	0.00	0.00	1.82	
18/05/17	WS50	1018	0	1.40	15.50	0.0	0.00	0.00	2.40	
19/05/17	WS51B	1015	0	1.30	17.90	0.0	0.00	0.10	2.15	
19/05/17	WS52A	1016	0	1.20	19.80	0.0	0.00	0.00	2.70	
19/05/17	WS53	1014	0.1	2.40	15.10	0.0	0.00	0.00	Dry	
19/05/17	WS54	1006	0.2	3.60	12.50	0.0	0.00	0.00	Dry	
18/05/17	WS56	1021	0.1	0.60	11.40	0.0	0.00	0.00	Dry	
	WS57									Unable to locate

Contract No.	RESULTS OF GAS AND WATER LEVEL MONITORING IN STANDPIPES		Fig. No.
2304	Riverside Balloch.		1

Date	Borehole No.	Atmospheric Pressure (mBar)	Gas Composition CH4 (%vol)	CO2 (%vol)	O2 (%vol)	H2S (ppm)	Differential Pressure (Pa)	Flow (l/hr)	Depth of Water (m)	Remarks
30/05/17	WS1	1007	0.0	3.9	16.5	0.0	0.00	0.00	1.09	
30/05/17	WS2B	1006	0.0	0.8	19.2	0.0	0.00	0.00	1.88	
30/05/17	WS3	1004	0.0	0.8	20.1	0.0	0.00	0.00	2.26	No plastic
30/05/17	WS4	1008	0.0	1.6	19.7	0.0	0.00	0.00	4.96	
	WS5									Unable to locate
30/05/17	WS6	1006	0.0	3.0	16.6	0.0	0.00	0.00	1.97	
30/05/17	WS7	1007	0.0	1.1	19.3	0.0	0.00	0.00	Dry	
30/05/17	WS8	1008	0.0	1.8	19.0	0.0	0.00	0.00	1.62	
30/05/17	WS10	1006	0.1	3.3	16.6	0.0	0.00	0.00	1.72	
30/05/17	WS11	1007	0.0	3.1	16.9	0.0	0.00	0.00	Dry	
30/05/17	WS12	1007	0.1	0.9	19.6	0.0	0.00	0.00	Dry	
	WS13									Unable to locate
30/05/17	WS14	1006	0.0	3.9	14.8	0.0	0.00	0.00	1.97	
30/05/17	WS15	1008	0.0	0.7	20.1	0.0	0.00	0.00	1.27	
30/05/17	WS16	1006	0.2	3.8	15.2	0.0	0.00	0.00	Dry	
31/05/17	WS18	1021	0.0	0.8	19.5	0.0	0.00	0.00	Dry	
31/05/17	WS20	1020	0.0	0.9	19.4	0.0	0.00	0.00	Dry	
31/05/17	WS21	1019	0.0	0.1	20.3	0.0	0.00	0.00	Dry	
31/05/17	WS22	1021	0.0	1.0	18.8	0.0	0.00	0.00	1.18	
31/05/17	WS23	1019	0.0	0.6	20.2	0.0	0.00	0.00	Dry	
31/05/17	WS24	1021	0.0	0.5	20.3	0.0	0.00	0.00	Dry	
31/05/17	WS25	1021	0.0	0.8	19.6	0.0	0.00	0.00	Dry	
31/05/17	WS26	1016	0.0	0.9	19.3	0.0	0.00	0.00	Dry	
30/05/17	WS29	1009	0.1	0.9	20.0	0.0	0.00	0.00	1.98	
01/06/17	WS30	1017	0.0	1.1	19.5	0.0	0.00	0.00	1.81	
01/06/17	WS35	1016	0.0	3.5	17.5	0.0	0.00	0.00	0.89	
31/05/17	WS36	1010	0.0	0.7	20.1	0.0	0.00	0.00	Dry	
30/05/17	WS37	1011	0.0	0.8	19.9	0.0	0.00	0.00	2.39	
31/05/17	WS38	1020	0.20	0.90	20.10	0.0	0.00	0.00	2.08	
31/05/17	WS40C	1019	0.10	1.60	19.30	0.0	0.00	0.00	2.89	
31/05/17	WS41	1020	0.10	4.50	13.50	0.0	0.00	0.00	2.51	
01/06/17	WS43	1015	0.10	1.10	19.80	0.0	0.00	0.00	2.98	
01/06/17	WS45	1016	0.00	1.70	19.40	0.0	0.11	0.00	2.59	
31/05/17	WS49	1020	0.00	5.10	14.70	0.0	0.00	0.00	1.83	
31/05/17	WS50	1018	0.00	1.40	14.50	0.0	0.00	0.00	2.43	
01/06/17	WS51B	1014	0.00	1.10	17.60	0.0	0.00	0.10	2.16	
01/06/17	WS52A	1014	0.00	0.90	19.50	0.0	0.00	0.00	2.73	
01/06/17	WS53	1014	0.10	2.40	15.70	0.0	0.00	0.00	Dry	
01/06/17	WS54	1004	0.00	3.30	10.20	0.0	0.00	0.00	Dry	
31/05/17	WS56	1022	0.10	0.70	20.50	0.0	0.00	0.00	Dry	
	WS57									Unable to locate

Contract No.	RESULTS OF GAS AND WATER LEVEL MONITORING IN STANDPIPES		Fig. No.
2304	Riverside Balloch.		1

Date	Borehole No.	Atmospheric Pressure (mBar)	Gas Composition CH4 (%vol)	CO2 (%vol)	O2 (%vol)	H2S (ppm)	Differential Pressure (Pa)	Flow (l/hr)	Depth of Water (m)	Remarks
07/06/17	WS1	1005	0.0	3.8	16.5	0.0	0.00	0.00	1.04	
07/06/17	WS2B	1004	0.0	0.8	19.2	0.0	0.00	0.00	1.82	
07/06/17	WS3	1003	0.0	0.8	20.1	0.0	0.00	0.00	2.22	No plastic
07/06/17	WS4	1007	0.0	1.6	19.7	0.0	0.00	0.00	4.92	
	WS5									Unable to locate
07/06/17	WS6	1007	0.0	3.2	16.4	0.0	0.00	0.00	1.95	
07/06/17	WS7	1007	0.0	1.1	19.2	0.0	0.00	0.00	Dry	
07/06/17	WS8	1006	0.0	1.7	18.8	0.0	0.00	0.00	1.57	
07/06/17	WS10	1005	0.1	3.4	16.4	0.0	0.00	0.00	1.69	
07/06/17	WS11	1006	0.0	3.0	16.9	0.0	0.00	0.00	Dry	
07/06/17	WS12	1006	0.1	0.8	19.4	0.0	0.00	0.00	Dry	
	WS13									Unable to locate
07/06/17	WS14	1005	0.0	3.9	14.7	0.0	0.00	0.00	1.94	
08/06/17	WS15	1007	0.0	0.8	20.1	0.0	0.00	0.00	1.24	
08/06/17	WS16	1005	0.2	3.8	15.2	0.0	0.00	0.00	Dry	
08/06/17	WS18	1021	0.0	0.8	19.5	0.0	0.00	0.00	Dry	
08/06/17	WS20	1020	0.0	0.9	19.3	0.0	0.00	0.00	Dry	
08/06/17	WS21	1020	0.0	0.1	20.3	0.0	0.00	0.00	Dry	
08/06/17	WS22	1019	0.0	0.9	18.7	0.0	0.00	0.00	1.16	
08/06/17	WS23	1019	0.0	0.6	20.1	0.0	0.00	0.00	Dry	
08/06/17	WS24	1020	0.0	0.5	20.2	0.0	0.00	0.00	Dry	
08/06/17	WS25	1020	0.0	0.9	19.5	0.0	0.00	0.00	Dry	
08/06/17	WS26	1014	0.0	0.8	19.3	0.0	0.00	0.00	Dry	
09/06/17	WS29	1007	0.1	0.9	20	0.0	0.00	0.00	1.92	
09/06/17	WS30	1015	0.0	1.1	19.5	0.0	0.00	0.00	1.78	
09/06/17	WS35	1014	0.0	3.4	17.4	0.0	0.00	0.00	0.86	
09/06/17	WS36	1009	0.0	0.7	20.1	0.0	0.00	0.00	Dry	
07/06/17	WS37	1009	0.0	0.8	19.9	0.0	0.00	0.00	2.35	
07/06/17	WS38	1019	0.20	0.90	20.1	0.0	0.00	0.00	2.06	
08/06/17	WS40C	1019	0.10	1.70	19.2	0.0	0.00	0.00	2.85	
08/06/17	WS41	1020	0.10	4.50	13.5	0.0	0.00	0.00	2.49	
08/06/17	WS43	1012	0.10	1.10	19.8	0.0	0.00	0.00	2.95	
08/06/17	WS45	1014	0.00	1.70	19.3	0.0	0.11	0.00	2.54	
08/06/17	WS49	1018	0.00	5.10	14.6	0.0	0.00	0.00	1.80	
08/06/17	WS50	1019	0.00	1.30	14.4	0.0	0.00	0.00	2.40	
09/06/17	WS51B	1019	0.00	0.90	17.2	0.0	0.00	0.10	2.14	
09/06/17	WS52A	1012	0.00	0.90	19.3	0.0	0.00	0.00	2.70	
09/06/17	WS53	1012	0.10	2.30	15.6	0.0	0.00	0.00	Dry	
08/06/17	WS54	1003	0.00	3.30	10.2	0.0	0.00	0.00	Dry	
09/06/17	WS56	1020	0.10	0.70	20.3	0.0	0.00	0.00	Dry	
	WS57									Unable to locate

Contract No.	RESULTS OF GAS AND WATER LEVEL MONITORING IN STANDPIPES		Fig. No.
2304	Riverside Balloch.		1

Date	Borehole No.	Atmospheric Pressure (mBar)	Gas Composition CH4 (%vol)	CO2 (%vol)	O2 (%vol)	H2S (ppm)	Differential Pressure (Pa)	Flow (l/hr)	Depth of Water (m)	Remarks
21/06/17	WS1	1003	0.0	3.7	16.4	0.0	0.00	0.00	1.02	
21/06/17	WS2B	1001	0.0	0.8	19.1	0.0	0.00	0.00	1.80	
21/06/17	WS3	1001	0.0	0.7	20.0	0.0	0.00	0.00	2.20	No plastic
21/06/17	WS4	1005	0.0	1.5	19.6	0.0	0.00	0.00	4.90	
	WS5									Unable to locate
21/06/17	WS6	1005	0.0	3.1	16.3	0.0	0.00	0.00	1.94	
21/06/17	WS7	1005	0.0	1.0	19.1	0.0	0.00	0.00	Dry	
21/06/17	WS8	1003	0.0	1.6	18.6	0.0	0.00	0.00	1.55	
21/06/17	WS10	1004	0.1	3.3	16.3	0.0	0.00	0.00	1.65	
21/06/17	WS11	1004	0.0	3.0	16.7	0.0	0.00	0.00	Dry	
21/06/17	WS12	1005	0.1	0.7	19.3	0.0	0.00	0.00	Dry	
	WS13									Unable to locate
21/06/17	WS14	1003	0.0	3.8	14.6	0.0	0.00	0.00	1.92	
22/06/17	WS15	1005	0.0	0.8	20.0	0.0	0.00	0.00	1.22	
22/06/17	WS16	1003	0.2	3.7	15.1	0.0	0.00	0.00	Dry	
22/06/17	WS18	1019	0.0	0.7	19.4	0.0	0.00	0.00	Dry	
22/06/17	WS20	1018	0.0	0.8	19.4	0.0	0.00	0.00	Dry	
22/06/17	WS21	1018	0.0	0.1	20.2	0.0	0.00	0.00	Dry	
22/06/17	WS22	1017	0.0	0.8	18.6	0.0	0.00	0.00	1.14	
22/06/17	WS23	1017	0.0	0.5	20.0	0.0	0.00	0.00	Dry	
22/06/17	WS24	1018	0.0	0.5	20.1	0.0	0.00	0.00	Dry	
22/06/17	WS25	1018	0.0	0.8	19.4	0.0	0.00	0.00	Dry	
22/06/17	WS26	1012	0.0	0.8	19.2	0.0	0.00	0.00	Dry	
23/06/17	WS29	1005	0.1	0.8	20	0.0	0.00	0.00	1.90	
23/06/17	WS30	1005	0.0	1.2	19.4	0.0	0.00	0.00	1.76	
23/06/17	WS35	1012	0.0	3.3	17.3	0.0	0.00	0.00	0.84	
23/06/17	WS36	1007	0.0	0.6	20.1	0.0	0.00	0.00	Dry	
22/06/17	WS37	10017	0.0	0.7	19.9	0.0	0.00	0.00	2.33	
22/06/17	WS38	1018	0.20	0.80	20.1	0.0	0.00	0.00	2.04	
21/06/17	WS40C	1018	0.10	1.60	19.1	0.0	0.00	0.00	2.80	
21/06/17	WS41	1018	0.10	4.30	13.4	0.0	0.00	0.00	2.45	
22/06/17	WS43	1018	0.10	1.10	19.8	0.0	0.00	0.00	2.93	
22/06/17	WS45	1013	0.00	1.60	19.2	0.0	0.11	0.00	2.50	
22/06/17	WS49	1016	0.00	5.10	14.3	0.0	0.00	0.00	1.78	
23/06/17	WS50	1017	0.00	1.20	14.3	0.0	0.00	0.00	2.38	
23/06/17	WS51B	1017	0.00	0.80	17.1	0.0	0.00	0.10	2.12	
23/06/17	WS52A	1010	0.00	0.80	19.2	0.0	0.00	0.00	2.68	
23/06/17	WS53	1010	0.10	2.20	15.5	0.0	0.00	0.00	Dry	
23/06/17	WS54	1002	0.00	3.10	10.1	0.0	0.00	0.00	Dry	
22/06/17	WS56	1018	0.10	0.60	20.2	0.0	0.00	0.00	Dry	
	WS57									Unable to locate

Contract No.	RESULTS OF GAS AND WATER LEVEL MONITORING IN STANDPIPES		Fig. No.
2304	Riverside Balloch.		1

Appendix E Groundwater Results

Certificate of Analysis

Certificate Number 17-09386

08-Sep-17

Client Peter Brett Associates LLP
Exchange Place
3 Semple Street
Edinburgh
EH3 8BL

Our Reference 17-09386

Client Reference (not supplied)

Order No (not supplied)

Contract Title Balloch

Description 15 Water samples.

Date Received 04-Sep-17

Date Started 04-Sep-17

Date Completed 08-Sep-17

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
Water Samples

Our Ref 17-09386
Client Ref
Contract Title Balloch

			Lab No	1225048	1225049	1225050	1225051	1225052	1225053
			Sample ID	WS1	WS2A	WS3	WS08	WS22	WS29
			Depth						
			Other ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sampling Date	30/05/17	30/05/17	30/05/17	30/05/17	31/05/17	30/05/17
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.42	0.56	0.42	0.60	0.22	0.21
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25	0.47	< 0.25	< 0.25	< 0.25
Chromium, Hexavalent	DETSC 2203	7	ug/l						
Copper, Dissolved	DETSC 2306	0.4	ug/l	0.5	1.4	0.7	0.9	5.8	2.1
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09	< 0.09	< 0.09	< 0.09	0.14	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.8	3.0	0.9	1.4	9.5	12
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	9.4	4.6	5.0	8.2	35	9.7
Inorganics									
pH	DETSC 2008			6.5	7.4	7.2	7.0	6.4	6.4
Hardness	DETSC 2303	0.1	mg/l	61.9	299	178	79.2	23.9	23.7
Petroleum Hydrocarbons									
EPH (C10-C12)	DETSC 3311	10	ug/l						
EPH (C12-C16)	DETSC 3311	10	ug/l						
EPH (C16-C21)	DETSC 3311	10	ug/l						
EPH (C21-C28)	DETSC 3311	10	ug/l						
EPH (C28-C35)	DETSC 3311	10	ug/l						
EPH (C35-C40)	DETSC 3311	10	ug/l						
EPH (C10-C40)	DETSC 3311	10	ug/l						
PAHs									
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	0.03		
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	0.06		
Pyrene	DETSC 3304	0.01	ug/l	0.06	0.03	0.07	0.28		
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01		
PAH Total	DETSC 3304	0.04	ug/l	0.06	< 0.04	0.07	0.38		

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 17-09386
Client Ref
Contract Title Balloch

			Lab No	1225054	1225055	1225056	1225057	1225058	1225059
			Sample ID	WS37	WS38	WS40	WS41	WS43	WS45
			Depth						
			Other ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sampling Date	30/05/17	31/05/17	31/05/17	31/05/17	01/06/17	01/06/17
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.39	0.37	1.6	1.1	4.5	0.61
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	0.04	0.11	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.42	0.45	6.1	0.31	0.57	0.32
Chromium, Hexavalent	DETSC 2203	7	ug/l					< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.6	2.5	4.5	1.8	1.3	0.8
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.23	0.42	4.8	1.9	32	4.0
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.9	6.1	6.1	11	8.9	7.6
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.75	< 0.25	0.78	< 0.25	< 0.25	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	17	37	32	230	62	20
Inorganics									
pH	DETSC 2008			6.8	6.8	6.7	6.4	7.0	6.9
Hardness	DETSC 2303	0.1	mg/l	185	112	136	124	172	183
Petroleum Hydrocarbons									
EPH (C10-C12)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
EPH (C12-C16)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
EPH (C16-C21)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
EPH (C21-C28)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
EPH (C28-C35)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
EPH (C35-C40)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10		< 10		< 10	< 10
PAHs									
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.01	0.02	< 0.01	< 0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.14	0.07	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.04	ug/l	< 0.04	0.15	0.08	< 0.04	< 0.04	< 0.04

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 17-09386
Client Ref
Contract Title Balloch

				Lab No	1225060	1225061	1225062
				Sample ID	WS49	WS51B	WS56
				Depth			
				Other ID			
				Sample Type	WATER	WATER	WATER
				Sampling Date	31/05/17	01/06/17	31/05/17
				Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.83	1.8	1.3
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.40	0.83	0.86
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.8	0.6	1.5
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.43	0.49	0.52
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	8.4	4.8	5.7
Selenium, Dissolved	DETSC 2306	0.25	ug/l	2.7	1.8	0.92
Zinc, Dissolved	DETSC 2306	1.3	ug/l	64	10	57
Inorganics						
pH	DETSC 2008			6.4	6.6	6.8
Hardness	DETSC 2303	0.1	mg/l	175	139	221
Petroleum Hydrocarbons						
EPH (C10-C12)	DETSC 3311	10	ug/l	< 10	< 10	
EPH (C12-C16)	DETSC 3311	10	ug/l	< 10	34	
EPH (C16-C21)	DETSC 3311	10	ug/l	< 10	80	
EPH (C21-C28)	DETSC 3311	10	ug/l	< 10	32	
EPH (C28-C35)	DETSC 3311	10	ug/l	< 10	< 10	
EPH (C35-C40)	DETSC 3311	10	ug/l	< 10	< 10	
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10	120	
PAHs						
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01	0.14	0.02
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.06
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.04
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.35
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	2.1
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	0.16
PAH Total	DETSC 3304	0.04	ug/l	< 0.04	0.14	2.8

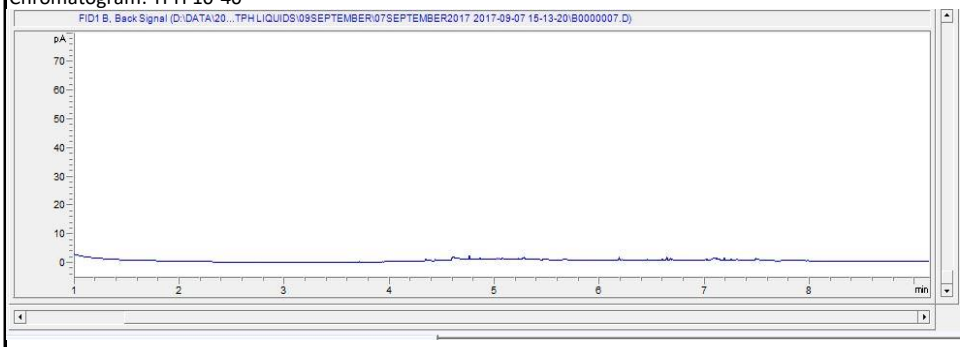
Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Chromatograms

Our Ref 17-09386
Client Ref
Contract Title Balloch

Lab No	1225054
Sample ID	WS37
Depth	
Other ID	
Sample Type	WATER
Sampling Date	30/05/2017
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

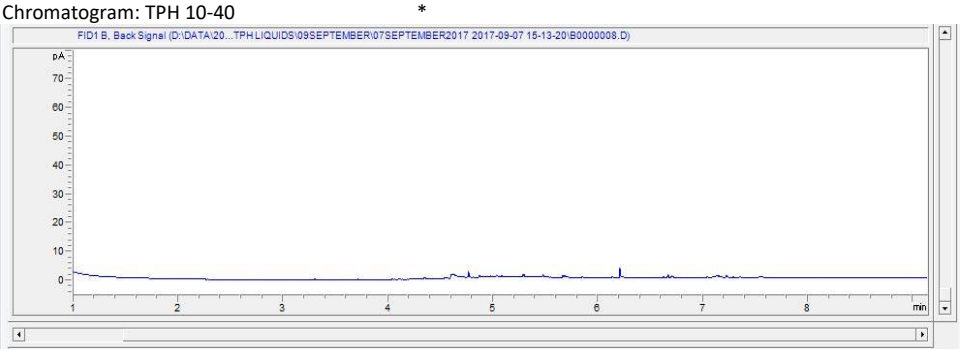


Summary of Chemical Analysis
Chromatograms

Our Ref 17-09386
Client Ref
Contract Title Balloch

Lab No	1225056
Sample ID	WS40
Depth	
Other ID	
Sample Type	WATER
Sampling Date	31/05/2017
Sampling Time	

Test	**Method**	**LOD**	**Units**
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

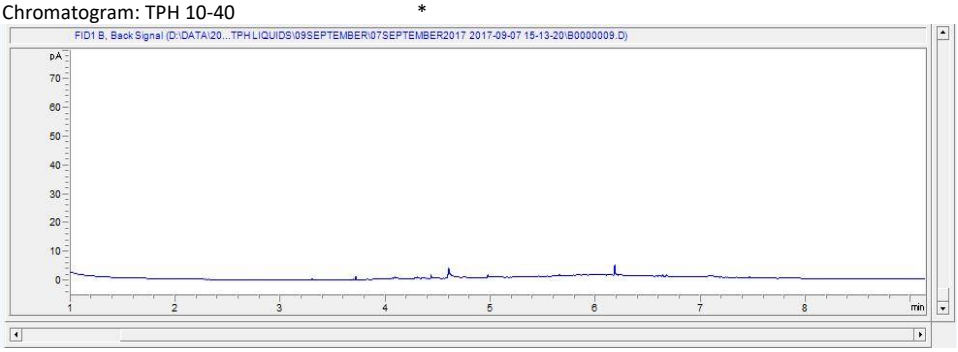


Summary of Chemical Analysis
Chromatograms

Our Ref 17-09386
Client Ref
Contract Title Balloch

Lab No	1225058
Sample ID	WS43
Depth	
Other ID	
Sample Type	WATER
Sampling Date	06/01/2017
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

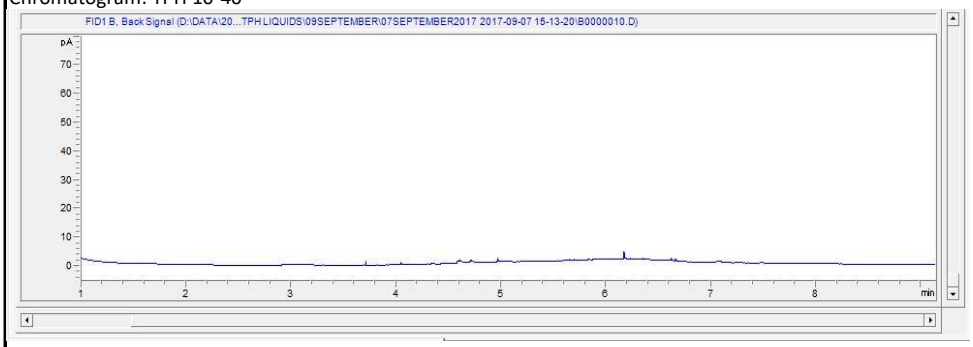


Summary of Chemical Analysis
Chromatograms

Our Ref 17-09386
Client Ref
Contract Title Balloch

Lab No	1225059
Sample ID	WS45
Depth	
Other ID	
Sample Type	WATER
Sampling Date	06/01/2017
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

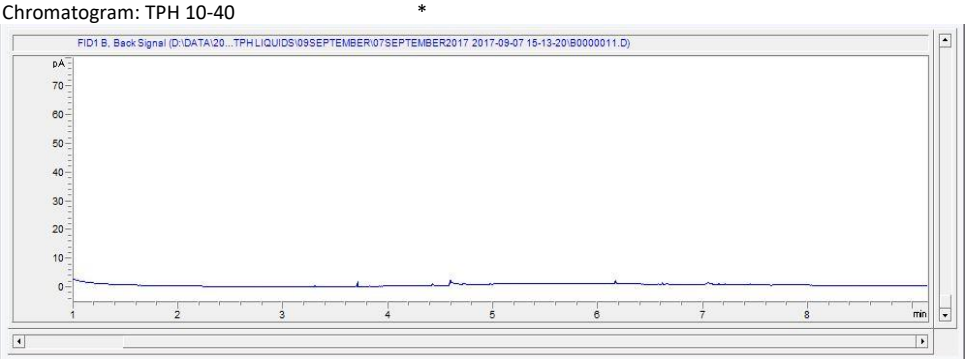


Summary of Chemical Analysis
Chromatograms

Our Ref 17-09386
Client Ref
Contract Title Balloch

Lab No	1225060
Sample ID	WS49
Depth	
Other ID	
Sample Type	WATER
Sampling Date	31/05/2017
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		

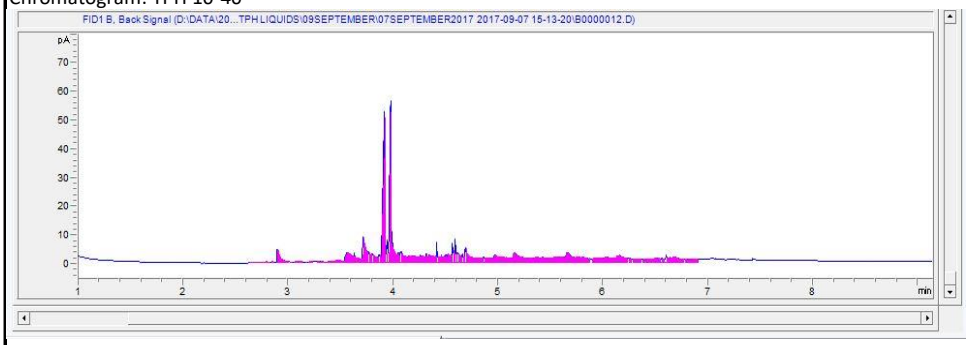


Summary of Chemical Analysis
Chromatograms

Our Ref 17-09386
Client Ref
Contract Title Balloch

Lab No	1225061
Sample ID	WS51B
Depth	
Other ID	
Sample Type	WATER
Sampling Date	06/01/2017
Sampling Time	

Test	Method	LOD	Units
Petroleum Hydrocarbons			
Chromatogram: TPH 10-40	*		



Information in Support of the Analytical Results

Our Ref 17-09386
Client Ref
Contract Balloch

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1225048	WS1 WATER	30/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	
1225049	WS2A WATER	30/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	
1225050	WS3 WATER	30/05/17	GB 1L, GV	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	
1225051	WS08 WATER	30/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	
1225052	WS22 WATER	31/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days)	
1225053	WS29 WATER	30/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days)	
1225054	WS37 WATER	30/05/17	GB 1L, GV, PB 1L	Chromium (14 days), Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days), EPH (14 days)	
1225055	WS38 WATER	31/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	
1225056	WS40 WATER	31/05/17	GB 1L, GV, PB 1L	Chromium (14 days), Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days), EPH (14 days)	
1225057	WS41 WATER	31/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	
1225058	WS43 WATER	01/06/17	GB 1L, GV, PB 1L	Chromium (14 days), Chromium, Hexavalent (4 days), Hardness (7 days), Kone (30 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days), EPH (14 days)	
1225059	WS45 WATER	01/06/17	GB 1L, GV, PB 1L	Chromium (14 days), Chromium, Hexavalent (4 days), Hardness (7 days), Kone (30 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days), EPH (14 days)	
1225060	WS49 WATER	31/05/17	GB 1L, GV, PB 1L	Chromium (14 days), Chromium, Hexavalent (4 days), Hardness (7 days), Kone (30 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days), EPH (14 days)	
1225061	WS51B WATER	01/06/17	GB 1L, GV, PB 1L	Chromium (14 days), Chromium, Hexavalent (4 days), Hardness (7 days), Kone (30 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days), EPH (14 days)	

Information in Support of the Analytical Results

Our Ref 17-09386
Client Ref
Contract Balloch

1225062	WS56 WATER	31/05/17	GB 1L, GV, PB 1L	Hardness (7 days), pH/Cond/TDS (7 days), Metals (Soluble) ICPMS (30 days), Naphthalene (14 days), PAH MS (14 days)	

Key: G-Glass P-Plastic B-Bottle V-Vial

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.

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

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