

A5036 Port of Liverpool Access

Preliminary Ground Investigation Interpretative Report

Highways England

March 2016

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1. Introduction

1.1. Scheme Description

The Port of Liverpool is an expanding port and continues to be an important transit point for freight for short distance sea, Transatlantic and Global trade. It is the busiest sea-port in the North West and the sixth largest nationally in terms of total freight tonnage. The port currently handles about 800,000 TEU (Twenty-Foot Equivalent Unit) a year and this is expected to increase to 3 million TEU by 2030 following the DfT's approval to provide a deep-sea container berth which is currently under construction.

Access to the port from the motorway network is via the existing A5036 which links the port with the Switch Island Interchange of the M57 and M58, which in turn links to the M62 and M6 respectively. The A5036 is urban in character and of dual carriageway standard. It already suffers from a high level of congestion and significant development pressures on the route for much needed regeneration.

The access to the port has been subject to a number of studies, with a Feasibility Study completed for the Port Access Steering Group by Atkins in 2014, which examined earlier work and developed the options for highway improvements further. This study concluded that there was a need for an increased highway capacity between the port and the motorway network.

A proposed highway improvement to improve access to the Port of Liverpool was included in the 2014 Autumn Statement, following which the scheme entered PCF Stage 1.

Currently there are two proposed routes for a new access road in the Litherland area of Liverpool:

- Online route: widening of the existing A5036, extending from the M57/M58 Switch Island Junction (approximate national grid reference (NGR) 336997, 400280) to the railway bridge beyond the junction roundabout with the A567 (approximate NGR 333318, 397167).
- Offline route: construction of a new road through Rimrose Valley Country Park, extending in a rough horseshoe shape, extending to the north west from the M57/M58 Switch Island Junction (NGR 336997, 400280) to the railway line beyond the junction roundabout with the A567 (approximate NGR 333318, 397167). An overview plan of the potential offline route through Rimrose Valley is provided in Appendix A.

1.2. Purpose of report

A historical landfill site is known to be present within the Rimrose Valley Park along the offline route, however very little information was available about the nature, quality and contamination state of the materials present within this landfill. This uncertainty was therefore deemed to represent a very high project risk and a specific ground investigation was undertaken in 2015 within accessible land covering the footprint of the landfill site to gain sufficient information to assess this risk.

This report presents the findings from the aforementioned ground investigation.

1.3. Site Description

The area investigated ("the site") lies within the Rimrose Valley Park approximately 7.5km north of Liverpool City Centre within Rimrose Valley Park, at approximate National Grid Reference SJ 330 985.

The boundaries to the site consist of the following:

- East the Leeds-Liverpool Canal, beyond which is suburban housing (Litherland)
- South the Liverpool to Southport Railway beyond which a mixture of suburban housing and industrial land (Waterloo & Seaforth)
- West the park is bounded by various types of fencing beyond which is suburban development (Crosby)

 North – the northern boundary is a tarmacadam road, beyond which lies open fields and some suburban development (Thornton)

The Rimrose Valley area is shown on maps dating from 1850 to be rural agricultural land with Rimrose Brook flowing through the site in north to west direction. The area is undeveloped with the exception of a number of farm houses and access roads, and is bounded to the east by the Leeds and Liverpool Canal. The eastern half of the route area remains predominantly unchanged to present day. The western half of the site is noted to have undergone land use changes over the period with maps dating from 1928 showing the area has been used as allotment gardens and recreation grounds. Some development is also apparent including a factory and some residential development. By 1965 the allotment gardens are no longer apparent and Whabbs Tip is apparent on the maps extending from the western boundary of the site. Review of the Environment Agency website historical landfill maps indicates that the Whabbs Tip received commercial and household waste between 1951 and 1975, extending over a wider area than shown on the historical maps. Whabbs Tip is not apparent on maps dating from 1989, with the area marked as Rimrose Valley Country Park on historical maps from 2006.

1.4. Report Scope

This report has been compiled for the following purposes:

- To better define the risk associated with contaminated land issues;
- To assess the variation in baseline geo-environmental conditions across the site with respect to contamination and the presence of landfilled domestic, commercial and industrial wastes;
- To assess and confirm the depth and extent of Whabbs Tip across the site; and
- To provide a qualitative geotechnical assessment of the ground and groundwater conditions on along the section of offline route investigated.

The current report is not intended to be a full Eurocode 7 or HD22/08 compliant Ground Investigation Report. As indicated above, it is anticipated that such a report would be produced at a later stage, further to a detailed design ground investigation for the route and option selected.

This report has been mainly based on the results of the recent ground investigation undertaken by Geotechnics Ltd and reported in a factual report.

2. Field and Laboratory Studies

2.1. Site Works

A ground investigation was designed to establish the depth and confirm the extent of the waste in Whabb's tip. Geotechnics were appointed by Atkins as the contractor for this ground investigation work. An Atkins engineer attended site throughout the investigation to oversee the site works. The ground investigation took place between 22 September 2015 and 8 October 2015, comprising:

- 7 No. exploratory boreholes advanced using two cable percussion rigs, from 22 September 2015 to 30 September 2015. Cable percussion boreholes were located along the centre of the park.
- 12 No. exploratory holes advanced using a dynamic window sampler rig, from 1 October 2015 to 8 October 2015 (excluding the first two attempts at the location of WS01: WS01A and WS01B). Window sample holes were located either side of the park, to confirm the lateral extents of the historical landfill and the lateral thickness, depth and nature variation of the landfill materials.
- 11 No. ground gas and groundwater monitoring installations were fitted, 6 No. in cable percussive holes and 5 No. in window sample holes.
- Soil samples were taken at regular intervals from the full depth of each hole for the purpose of soil and soil leachate chemical and geotechnical analysis.
- Bulk bags and UT100 samples were collected for geotechnical analysis.
- Three rounds of ground gas and groundwater monitoring were carried out in the six weeks post completion of the GI.
- One round of groundwater sampling was carried out on 3 November 2015.
- One round of surface water samples were collected from four locations around the site on 3 November 2015.

The results from the GI are summarised in Section 3 and the factual report issued by the contractor Geotechnics can be found in Appendix C.

2.2. In situ Testing

2.2.1. Geotechnical Testing

2.2.1.1. Standard Penetration Testing

SPT testing was carried out at approximately 1 m intervals for each of the nineteen exploratory holes (cable percussion and window sample). Testing is reported to have been undertaken in accordance with BS EN ISO 22476-3:2005+A1:2011 (Geotechnics, 2016).

2.2.1.2. Hand Shear Vane Testing

Three in situ hand shear tests were carried out in the window sample exploratory hole WS03.

2.2.2. Environmental Testing

With the exception of CP5 Photo Ionisation Detection (PID), screening was carried out on soil samples recovered every one metre from each all exploratory hole location. The results of this screening are presented in Table 4-2 in Section 4.

2.3. Laboratory Testing

Representative soil samples were collected by the on-site Geotechnics engineer and scheduled for analytical chemical and geotechnical testing by Atkins. Analytical testing was carried out by Jones Environmental. Jones Environmental carry both United Kingdom Accredited Service (UKAS) and Monitoring Certification Scheme (MCERTS) accreditation. All geotechnical testing was undertaken by Geotechnics Ltd's laboratories.

2.3.1. Geotechnical Testing

Geotechnical testing was scheduled in two batches, for cable percussion borehole samples on 11 November 2015 and for the window samples on 17 November 2015, based on the draft borehole logs issued to Atkins by Geotechnics. The scheduled testing is summarised in Table 2-1.

Testing type	Number specified for borehole samples	Number specified for window samples	Total number specified
Moisture Content	37	26	63
Atterberg Limits	7	7	14
Particle Size Distribution	29	8	37
Sedimentation	For all PSDs >10% fines	For all PSDs >10% fines	For all PSDs >10% fines
Bulk Density	21	-	21
BRE Suite A	4	-	4
BRE Suite C	18	13	31
Undrained triaxial	3	-	3

 Table 2-1
 Summary of geotechnical laboratory testing scheduled

2.3.2. Environmental Testing

2.3.2.1. Environmental Soil Analysis

Soil samples were scheduled for analysis of the following:

On all scheduled soil sample testing for the following determinands:

- Metals including: arsenic, cadmium, chromium (VI), chromium (total), copper, iron, lead, mercury, nickel, vanadium, selenium and zinc
- 16 Speciated Polycyclic Aromatic Hydrocarbons (PAHs) (US EPA priority list) including: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(bk)fluoranthene, benzo(a)pyrene, indeno(123cd)pyrene, dibenzo(ah)anthracene, benzo(ghi)perylene, benzo(b)fluoranthene, benzo(k)fluoranthene and PAH 16 total
- pH
- Soil Organic Matter (SOM)
- Cyanide (total)
- Cyanide (free)
- Asbestos (presence/absence screen) where present, asbestos quantification was carried out.

On selected scheduled soil samples: testing for the following determinands

- Speciated Total Petroleum Hydrocarbons (criteria working group) (TPH (CWG)) including: aliphatic/aromatic separation and carbon banding C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21 and C21-C35
- Sulphate (total)
- Polycyclic Biphenyls (PCBs) (WHO12)
- Volatile Organic Compounds (VOCs)
- BTEX including: benzene, toluene, ethylbenzene and xylene
- Asbestos (Quantification) where the presence of asbestos was detected.
- Ammoniacal Nitrogen (NH₄)
- Water Soluble Boron

2.3.2.2. Soil Leachate Analysis

Five soil samples were scheduled for soil leachate analysis of the following determinands:

- Dissolved metals including: arsenic, cadmium, chromium (VI), chromium (total) copper, iron, lead, mercury, nickel, selenium, vanadium and zinc.
- 16 Speciated PAHs (US EPA priority list)
- Sulphate (total)
- Cyanide (total)
- Cyanide (free)
- pH.

2.3.2.3. Groundwater and Surface Water Analysis

Six groundwater samples were taken and analysed for the following determinands:

- Dissolved metals including: arsenic, boron, cadmium, chromium (VI), chromium (total) copper, iron, lead, mercury, nickel, selenium, vanadium and zinc.
- Sulphate (total)
- Cyanide (total)
- Cyanide (free)
- pH
- Ammoniacal Nitrogen (NH₄)
- 16 Speciated PAHs (US EPA priority list)
- TPH (CWG) with aliphatic and aromatic split and BTEX
- VOCs
- SVOCs.

Four surface water samples were taken and analysed for the above suite with the addition of the following determinands:

- Hardness (CaCO₃)
- Alkalinity
- Chloride
- Orthophosphate as PO₄ (soluble reactive phosphorous)
- Suspended solids
- E. Coli and Intestinal Enterococci

3. Ground Summary and Material Properties

3.1. Published Geology

A review of both the published geology and the existing ground investigation data for the site was undertaken. The findings from this are summarised below.

3.1.1. Superficial Deposits

The approximately 500 m long section between the southern edge of the site near the Port Roundabout (chainage 0) and the anticipated southern edge of Whabb's Tip was anticipated to comprise Made Ground, Alluvium and Peat of generally poor quality and strength, underlain by more competent Glacial deposits.

Alluvial deposits are associated with watercourse and are likely variable in nature. Typically they comprise soft clay and silt but can also contain lenses of sand, peat and gravel. The BGS geology map suggests that Shirdley Hill Sand may also still be present under the Made Ground of the landfill. The BGS Lexicon describes the Shirdley Hill Sand Formation to also have "peat layers in the lower part" (British Geological Survey, 2015). The distinction between what may be Shirdley Hill Sand or granular Alluvium can be difficult.

3.1.2. Solid Geology

The offline route is shown to be underlain predominantly by the Helsby Sandstone Formation of the Sellafield Member (1 km²), with a short section in the southwest underlain instead by the Wilmslow Sandstone Formation (0.13 km²). Both are red-brown, fine to medium grained sandstones belonging to the Sherwood Sandstone Group. The Sidmouth Mudstone Formation underlies an area of the Sellafield Member (0.13km²) at or near the centre of the site.

3.2. Published Hydrogeology

The superficial deposits contain both Shirdley Hill Sand which is designated by the Environment Agency as a Secondary A aquifer (previously a minor aquifer), and Alluvium which is designated as a Secondary Undifferentiated aquifer (previously described as either a minor or non-aquifer depending on the rock porosity).

The Sherwood Sandstone Group bedrock is designated as a Principal Aquifer, meaning that it is likely to provide a high level of water storage which "may support water supply and/or river base flow on a strategic scale". (Envrionment Agency, 2015).

3.3. Geotechnics Ltd 2015 Ground Investigation

Generally, the nature of the strata encountered during the 2015 ground investigation (see Section 2) are consistent with anticipated ground conditions. Strata summaries are given in Section 3.4. However, the extent of each stratum was not always consistent with available geological records for the area, which is discussed further in Section 4.2 of this report.

Table 3.1 below summarises the strata encountered during the 2015 ground investigation.

Interpreted geological long-sections are provided in Appendix B.

Stratum	Shallowest elevation encountered from (m AOD)	Deepest elevation encountered to (m AOD)	Location of maximum thickness	Maximum thickness proven (m)
Topsoil	18.38	6.94	WS08	0.90
Made Ground	17.98	4.03	CP2	9.20
Alluvium	15.08	-2.16	CP1	4.50
Peat	6.87	2.34	CP1	2.90
Shirdley Hill Sand (possible) *	12.02	6.68	CP4	2.10
Glacial Deposits (granular & cohesive)	13.48	-2.61	CP2	3.90
Bedrock (mudstone, sandstone)	9.48	3.63	CP4	2.77

Table 3-1 2015 ground investigation strata summary

(*) interpretation to be reconsidered after "detailed design" ground investigation

3.4. Strata Description

3.4.1. Topsoil

Topsoil was noted in sixteen of the exploratory holes on-site. The depth of topsoil is typically 0.15 to 0.40 m across the site, with one location recording thicker topsoil (0.90 m in WS08). At four locations grass is recorded as directly above the Made Ground, and no topsoil was recorded in these locations.

Topsoil is generally thicker in the eastern half of the site, with window samples WS05 to WS12 recording at least 0.3 m of topsoil and CP6 and CP7 recording at least 0.4 m. Topsoil was generally described as soft, dark brown, sandy silt or silty sand, with some brick or natural gravel content noted at five locations. Natural gravels typically comprised angular to subrounded, fine to coarse sandstone and other mixed lithologies.

3.4.2. Made Ground

Made Ground was found in all exploratory holes on site with the exception of boreholes WS12, CP6 and CP7. WS12 and CP7 are situated beyond the previously anticipated landfill boundary and CP6 is located just within.

The thickness of Made Ground was found to be comprised between 0.4 m and 9.2 m. The Made Ground is predominantly granular in nature, with only WS06 recording clay. Material descriptions are typically of a silty sand or sandy silt, usually gravelly, with occasionally high cobble content. The gravel and cobbles are occasionally natural rock but the Made Ground more typically comprise fragments of anthropogenic materials, including: brick, concrete, ash clinker, ceramic, timber, glass, plastic, metal, pottery, masonry, paper, newspaper, rope and bone.

3.4.3. Natural Strata

Natural deposits consisting of superficial deposits and bedrock were noted beneath the Made Ground on site. These consisted of sands, gravels, clays, silts and peat. These deposits are described below.

3.4.3.1. Alluvium

Granular Alluvium was interpreted from the records of ten exploratory hole locations, and generally comprised very loose, brown or yellowish / orangish brown, silty, fine to medium sand with occasional dark brown organic or peaty material. Pockets of cohesive material were recorded in CP1. Nineteen SPTs were undertaken in granular Alluvium, see section 3.5 below.

Cohesive Alluvium was interpreted from the records of two exploratory hole locations, and generally comprised soft dark grey to brown, sandy silt or organic clay. No SPTs were undertaken in cohesive Alluvium.

3.4.3.2. Shirdley Hill Sand

Possible Shirdley Hill Sand has been interpreted from records in four cable percussion boreholes, CP2, CP4, CP6 and CP7, and generally comprised brown to grey, occasionally organic, fine to coarse sand. Density descriptions range from very loose to medium dense. Three SPTs were undertaken in the interpreted Shirdley Hill Sand, one of these penetrated into the underlying sandstone bedrock, see section 3.5 below.

As indicated above, the distinction between what may be Shirdley Hill Sand deposits and granular alluvium can be difficult to make, and these materials will require additional more detailed consideration if the offline route is selected. Should the offline route be selected, the proposed interpretation will need to be reviewed in light of the additional information that will be collected during a "detailed design" phase of ground investigation as part of a later stage in the project, in particular as part of the geotechnical risk management process.

3.4.3.3. Peat

A band of very soft, spongy, dark brown Peat was encountered in CP1 and WS02. The two records show a 0.7 m to 2.9 m thick peat stratum between the elevations of +2 mOD and +7 mOD (top of stratum 2.30m to 4.30m below existing ground level). Although these records of Peat are confined to the south-west of the site, three Granular Alluvium descriptions (WS08, WS10 and WS12) and one Shirdley Hill Sand description (CP7) record organic material or peat and these locations are located across the site area.

3.4.3.4. Glacial Deposits

Granular Glacial Till is interpreted to have been encountered in five exploratory hole locations, and generally comprised medium dense, greyish brown, gravelly, fine to coarse sand with an occasional low cobble content or clay bands. Gravel is angular to rounded, fine to coarse of various lithologies. Eight SPTs were undertaken in granular Glacial Till, see section 3.5 below.

Cohesive Glacial Till is interpreted to have been encountered in five exploratory holes, and generally comprised firm to stiff, reddish brown, slightly sandy, slightly gravelly clay. Gravel is described as angular to subrounded, fine to coarse of various lithologies. Six SPTs were undertaken in the Cohesive Glacial Till, see section 3.5 below.

3.4.3.5. Bedrock

Weathered Sandstone was encountered in two exploratory holes CP4 and CP5 at a level of +6.68 mOD and +6.35 mOD, respectively. The weathered Sandstone is recorded as extremely weak greyish brown or reddish grey, fine to coarse grained sandstone and in CP4 it was recovered as sand and gravel. In both cases the borehole terminated within the weathered Sandstone, proving at least a 3.15 m thickness and the deepest borehole reaching +3.5 mOD. Five SPTs were undertaken in the Sandstone, see section 3.5 below.

Weathered Mudstone was encountered in three exploratory holes CP3, CP6 and CP7 and intact Mudstone was recorded in one location, CP3, underlying the weathered Mudstone. Weathered Mudstone is recorded as a stiff brown bluish grey gravelly clay to an extremely weak bluish or reddish brown mudstone recovered as gravel and clay. Mudstone is recorded as weak brown mudstone. Five SPTs were undertaken in the weathered Mudstone and Mudstone, see section 3.5 below.

3.5. Soil Properties

3.5.1. Standard Penetration Testing

Standard Penetration Tests (SPTs) were carried out during the GI to provide an indication of in situ density for granular materials and in situ stiffness for cohesive materials. The data has been categorised by material type, as described above and the results have been treated as follows:

- The raw SPT N values have been extrapolated for results which did not achieve a test depth penetration of 300mm within 50 blow counts.
- For tests in the superficial deposits where the initial 150 mm seating depth has not been achieved or where the extrapolated SPT exceeds 200 blows, the result has been omitted as it is likely that the test has encountered an obstruction which has given an unrepresentative result.
- For tests in the sandstone and mudstone, the number of blow counts was not limit for the extrapolation purposes and where the penetration of 150 mm was not achieved during the seating blows, an extrapolated N has been calculated based on the penetration for the final 50 blows reported. This is acceptable for this preliminary report but may be reassessed for future applications of the data.

In addition, two SPT results have been omitted from the summary as they have been interpreted as outliers:

- CP4 10m SPT N=125 in Shirdley Hill Sand, this is close to the sandstone bedrock
- CP3 2m SPT N=67 in Made Ground, this is likely to be the result of the gravel of limestone and clinker, rather than being a representative value (next highest SPT N=47)

Plots of the extrapolated SPT N values are provided in the Figures section at the end of this report and a summary of the results is given in Table 3-2. Results have been interpreted in accordance the guidance in Table 13 of BS5930:1999 and BS EN ISO 14688.

Stratum	No. of SPT results summarised (total)*	Range of SPT N values	Mean SPT N value	Material description at SPT test depth
Made Ground	65 (68)	0-47	11	Predominantly very loose to medium dense. Some dense to very dense.
Shirdley Hill Sand	2 (3)	2-18	10	Very loose to medium dense
Alluvium (Granular)	19 (19)	0-26	13	Very loose to medium dense
Alluvium (Cohesive)	No testing	No testing	No testing	-
Peat	1 (1)	n/a	1	Very soft
Glacial Till (Granular)	8 (11)	0-44	20	Very loose to very dense
Glacial Till (Cohesive)	6 (6)	14-31	22	Stiff to very stiff
Weathered Mudstone	4 (4)	68-306	197	-
Mudstone	1 (1)	-	240	-
Sandstone	5 (5)	240-300	278	-

Table 3-2Summary of extrapolated SPT N results

* The total number of SPT results given in brackets includes test results which have been omitted from the plots for the reasons given above.

The SPT N values presented in this report are the 'raw' extrapolated test data and no corrections have been applied. Therefore, they may not be suitable for direct application to geotechnical design.

3.5.2. Hand Shear Vane testing

The three tests undertaken in WS03 are all within strata interpreted as cohesive Glacial Till. The results are reported as an average of the measurements made at each depth, and are 41 kPa and 95 kPa (intact), and 18 kPa (remoulded).

3.6. Discussion on Landfill Extent and Composition

A review of historical mapping for the proposed alternative route, identified the presence of a large landfill in the western section of the route, see Appendix F. A review of the Environment Agency (EA) website indicates that the site was known as Whabbs Tip and received commercial and household waste between 1951 and 1975. When compared to historical mapping the EA site indicates that Whabbs tip is shown to extend over a wider area than that shown on the historical maps.

The 2015 ground investigation indicates that the extent of Whabbs Tip is further to the south-west than originally indicated on the available mapping. The indicative extent of Made Ground likely to be associated with the landfill is confirmed in exploratory holes CP1, CP2, CP3, CP4, CP5, WS01, WS01A, WS01B, WS5, WS6, WS7, WS9 and WS10 and shown in Appendix F. Domestic refuse comprising a varying mixture of clinker, ash, glass, metal, plastic, timber, bone, cloth and paper was noted in CP3, CP5, WS6 and WS7 to a maximum depth of 8.7m (CP3). The remaining exploratory holes noted as containing landfill wastes comprised of ash, clinker, brick, concrete, glass, plastic, metal and ceramic. It was noted in the Envirocheck Report (Envirocheck Report, 2015) that there was industrial activity in the area around WS01 and WS01A, with which Made Ground in this area may be associated, rather than the landfill-related depositing activities. The greatest thickness of Made Ground was noted as 9.20 m in CP2.

Groundwater was noted in the Made Ground, and is further discussed in Section 3.7.

3.7. Groundwater

3.7.1. Groundwater Strikes During Investigation

Groundwater was noted during drilling in several exploratory holes throughout the GI. A summary of the groundwater strikes is shown in Table 3-3 below.

Table 3-3Summary of groundwater strikes during GI

Exploratory Hole	Groundwater strike depth (m bgl)	Strata encountered	Depth risen to after 20 mins (m bgl)
CP1	0.50	Made Ground	0.40
CP2	6.90 9.20	Made Ground Made Ground/ Shirdley Hill Sand boundary	DNR 8.75
CP3	8.70	Made Ground/ Alluvium boundary	7.20
CP4	7.90	Made Ground	7.10
CP5	4.75 7.60 8.75 9.00	Made Ground Glacial Till (cohesive) Glacial Till (cohesive) Glacial Till (cohesive)	4.50 7.45 DNR 8.70
CP6	2.80	Glacial Till (cohesive)/ Weathered Mudstone boundary	2.30

Exploratory Hole	Groundwater strike depth (m bgl)	Strata encountered	Depth risen to after 20 mins (m bgl)
CP7	1.20	Alluvium (granular)	1.15
WS01A	1.20	Made Ground	DNR
WS03	3.00	Glacial Till (cohesive) / Glacial Till (granular) boundary	WS
WS06	5.00	Made Ground	NR
WS08	3.00	Made Ground	NR
WS09	5.25	Made Ground/ Alluvium boundary	NR
WS10	2.10	Alluvium (granular)	2.05
WS11	1.85 3.30	Glacial Till (cohesive) Glacial Till (cohesive)	WS NR
WS12	2.00	Alluvium (granular)	NR

DNR= Did not rise WS= Wet stratum NR=Not reported

3.7.2. Groundwater Monitoring

Three rounds of groundwater level monitoring was carried out after completion of the GI site works. The groundwater levels in each installation are summarised in Table 3-4 for each round of monitoring.

Table 3-4 Summary of ground water monitoring

Exploratory borehole	Filter zone depth (m bgl)	Screened Strata	Round 1 20/10/15 m bgl (mAOD)	Round 2 3/11/15 m bgl (mAOD)	Round 3 19/11/15 m bgl (mAOD)
CP1	5.4-10.15	Alluvium (granular) & Glacial Till (granular)	0.17 (7.37)	Artesian (7.54+)	Artesian (7.54+)
CP2	5.85-8.00	Made Ground	8.00 (8.91)	DRY	8.00 (8.91)
CP4	6.10-8.30	Made Ground & Shirdley Hill Sand	6.51 (10.47)	6.48 (10.50)	6.54 (10.44)
CP5	6.75-8.90	Glacial Till (cohesive)	6.47 (9.13)	6.42 (9.18)	6.51 (9.09)
CP6	1.00-2.80	Alluvium (granular) & Glacial Till (cohesive)	1.80 (10.48)	1.73 (10.55)	1.28 (11.00)
CP7	4.90-7.20	Weathered Mudstone	1.26 (11.16)	1.08 (11.34)	0.98 (11.44)
WS02	1.00-3.00	Made Ground	3.00 (8.17)	3.00 (8.17)	3.00 (8.17)
WS05	3.00-5.00	Made Ground	5.00 (13.38)	5.00 (13.38)	4.99 (13.39)
WS06	2.70-5.70	Made Ground	5.26 (8.73)	5.30 (8.69)	5.28 (8.71)
WS09	0.80-3.80	Made Ground	3.50 (12.87)	DRY (n/a)	Flooded (16.37+)
WS10	0.90-2.00	Made Ground	1.78 (9.02)	1.70 (9.10)	1.51 (9.29)

4. Hazards and Risks

4.1. Geoenvironmental and Contaminated Land Discussion

4.1.1. Human Health

Detailed guidance on human health risk assessment is available in Science Report SR2 (Science Report 2), SR3 (Science Report 3, 2009) and the Contaminated Land Exposure Assessment (CLEA) Model v1.04 and v1.06 model. The Generic Quantitative Risk Assessment (GQRA) for identified human receptors has compared soil concentration data with Generic Assessment Criteria (GAC) to identify whether a potential risk is posed by the contaminant concentrations detected. The GAC are considered to include:

- Soil Guideline Values: The Environment Agency has published Soil Guideline Values (SGVs). SGVs are
 appropriate for screening out low risk areas of land contamination. They give an indication of
 representative average concentrations of chemicals in soil below which the long-term health risks are likely
 to be minimal. SGVs are available for arsenic, cadmium, mercury, nickel, selenium, benzene, toluene,
 ethylbenzene and xylenes (BTEX), phenols, and dioxins, furans and dioxin-like PCB substances for
 residential, allotments and commercial land-uses. The SGVs have been developed for a sandy loam soil
 with 6% soil organic matter (SOM) content;
- Atkins' Soil Screening Values: Atkins has derived a set of Soil-Screening Values (SSVs) to supplement the SGVs following the CLEA Model. Atkins'-derived SSVs are available for the CLEA standard land-uses listed above for a wider range of typical indicator contaminants. SSVs have also been derived for a sandy soil with 1% SOM and for parks, playing fields and open spaces; and
- Category 4 Screening Values (C4SLs) have recently been published for six contaminants (benzo (a) pyrene, benzene, lead, arsenic, cadmium and chromium) by DEFRA (DEFRA, 2014). The Statutory Guidance, 2012 includes four categories of contaminated land, ranging from Category 4 (low risk) to Category 1 (significant / high risk). C4SLs are low risk levels which are not representative of significant possibility of significant harm (SPoSH) and as such, if the C4SLs are not exceeded, land can be demonstrated as being in Category 4 and cannot be determined as contaminated land. To be suitably conservative only the C4SL for arsenic, hexavalent chromium and lead has been utilised in this assessment as all other values are higher than GAC used by Atkins.
- Suitable for Use Levels (S4ULs): In the absence of a SGV, SSV or C4SL for nickel the Land Quality Management Ltd (LQM) S4UL for nickel has been selected as a GAC. The S4UL is based on a sandy loam soil as defined in SR3 (Science Report 3, 2009) with 6 % SOM.

4.1.1.1. Soil Results

Representative soil samples were collected from each strata type and across a range of depths for environmental analysis. Atkins Soil Screening Values (SSVs) are used as GAC to screen the soil data and assess whether it poses a significant risk to human health.

The criteria values differ depending on the site situation and the soil organic matter (SOM) for a site. A total of 28 samples were analysed for SOM, with recorded values ranging from 0.2% to 68.4%. Of these samples 16 samples recorded SOM greater than 6%, with an average for all samples of 15.9%. Based on this information and given the low sensitivity of the end use it is not unreasonable to use SOM value of 6% for this site. Due to the general use of the site as an area of open park land, the land use was judged to be best represented by the term Open Space. Therefore the appropriate criteria would be 6% Open Spaces for analysing the soil data for this site.

Only six contaminants were found to exceed their GAC concentrations, these are summarised in Table 4-1 below.

Out of a total of 50 samples scheduled for analysis, elevated arsenic, lead and four PAHs were recorded. In all cases, exceedances were only marginally over their respective GAC concentrations. The majority of the recorded exceedances were from boreholes located within the central and southern areas of the landfill site area. Asbestos was recorded in nine of the 50 samples scheduled for asbestos identification. The exploratory holes where asbestos was recorded include WS01B (0.5m, 1.0m) to the extreme south of the site outside the

landfill area, WS2 (0.5m), on the southern boundary of the landfill, and WS09 (1.0m), CP2 (1.0m, 2.0m, 3.0m) and CP3 (2.8m, 8.7m) located within the landfill area itself.

Contaminant	SSV concentrati on (mg/kg) unless otherwise stated	No of Samples	No of Exceedances	Maximum exceedance (mg/kg)	Borehole name and depth of exceedance (m bgl) [maximum exceedance location highlighted bold]
Arsenic	C4SL value: 79	50	3	190	WS07 – 3.5-3.7, CP1 – 0.2 , CP1 – 0.5
Lead	C4SL value: 630	50	7	3055	WS01B - 1.0, WS02 - 1.0, WS04 - 4.0- 4.7, WS08 - 1.8-2.0, CP1 - 0.5, CP1 - 1.0, CP1 - 2.0
Benzo(a)anthracene	37.7	50	1	44.68	WS05 – 5.0-5.6
Benzo(a)pyrene	4.2	50	8	40.83	CP2 – 1.0, CP4 – 1.0 , CP4 – 4.0, CP4 – 6.0, WS02 – 1.0, WS05 – 2.3-2.5, WS08 – 1.8- 2.0, WS10 – 1.0
Dibenzo(ah)anthracene	4.48	50	1	7.83	CP4 – 1.0, WS05 – 2.3-2.5
Benzo(b)fluoranthene	40.7	50	2	55.53	WS05 - 2.3-2.5

Table 4-1	Soil Exceedances	of the Open \$	Space GAC

4.1.1.2. Photo Ionisation Screening (PID) Results

During the course of the ground investigation works PID readings were taken on all soil samples collected for analysis. Testing was undertaken to provide real time site data on the presence of volatile organic compounds (VOCs) and to assist in scheduling samples for analysis. All results that were greater than the detection limit of 0.1 ppm are summarised in Table 4-2 below.

The majority of PID results were minor (0.1 ppm or less), however there were some more elevated concentrations recorded (>5 ppm) in the Made Ground at boreholes CP1, CP2, CP3, CP4, and window samples WS01B and WS07. Elevated concentrations were also recorded in the superficial deposits of CP1, CP6 and CP7. The recorded PID results do not indicate that large quantities of waste containing volatiles were disposed within sampling locations. Elevated concentrations in the superficial deposits coincide mainly with granular Alluvium or cohesive Glacial Till and the possible Shirdley Hill Sands. Some organic material was recorded in the granular Alluvium of CP7.

Exploratory Hole No	PID Result (ppm)	Depth (m bgl)	Strata encountered	Visual / Olfactory Evidence
CP1	9.2	0.5	Made Ground	
CP1	18.2	1.0	Made Ground	Clinker, glass, ceramic and bone
CP1	12.2	2.0	Made Ground	50110

Table 4-2Summary of PID Results

Exploratory Hole No	y PID Result Depth (ppm) (m bgl) Strata encountered		Visual / Olfactory Evidence		
CP1	17.9	3.0	Peat	-	
CP2	12.7	3.0	Made Ground	Ash and clinker	
CP2	9.8	4.0	Made Ground	Brick, concrete, timber and	
CP2	6.0	5.0	Made Ground	plastic	
CP3	13.7	1.0	Made Ground	-	
CP3	18.4	2.5	Made Ground	Clinker	
CP3	18.0	3.5	Made Ground		
CP3	17.0	4.8	Made Ground		
CP3	16.3	6.0	Made Ground	Clinker, glass, metal, plastic, timber and domestic refuse	
CP3	14.2	7.0	Made Ground		
CP3	5.7	8.0	Made Ground		
CP4	18.2	3.0	Made Ground		
CP4	37.0	4.0	Made Ground	Ash, brick and concrete	
CP4	23.1	5.0	Made Ground		
CP4	34.0	6.0	Made Ground	Ash, plastic, metal and	
CP4	15.8	7.0	Made Ground	timber. Soft white paste at 7.3 – 7.9 m bgl	
CP4	15.8	8.0	Made Ground		
CP4	13.4	8.3	Shirdley Hill Sand	-	
CP6	18.3	0.2	Topsoil	-	
CP6	16.2	0.3	Topsoil	-	
CP6	20.1	1.0	Shirdley Hill Sand/ Alluvium (granular) boundary	-	
CP6	18.5	1.5	Alluvium (granular)/ Glacial Till (cohesive) boundary	-	
CP6	18.0	2.5	Glacial Till (cohesive)	-	
CP7	53.4	0.2	Topsoil	-	
CP7	64.4	0.5	Shirdley Hill Sand	-	
CP7	66.6	1.0	Alluvium (granular)	-	
WS01A	0.7	0.2	Made Ground	Brick	
WS01A	0.3	0.3	Made Ground	Brick and concrete	
WS01A	1	1.0	Made Ground	Creosote odour	
WS01B	3.1	0.2	Made Ground	Brick	
WS01B	47.2	0.5	Made Ground Brick, concrete, glass		
WS01B	205.0	1.0	Made Ground	plastic, metal and ceramic	
WS02	1.5	0.2	Topsoil/ Made Ground		
WS02	2.5	0.5	Made Ground		
WS02	2.7	1.0	Made Ground		
WS02	1.0	1.7 – 2.0	Made Ground	Ash, clinker and brick	
WS02	0.1	2.7 - 3.0	Made Ground	1	

Exploratory Hole No	ory PID Result Depth (ppm) (m bgl) Strata encountered		Visual / Olfactory Evidence	
WS02	0.9	3.7 - 4.0	Alluvium (granular)	-
WS02	1.1	4.7 - 5.0	Peat	-
WS03	0.3	0.2	Made Ground	Ash, concrete, brick and rope
WS03	0.3	1.0	Alluvium (granular)	-
WS03	0.3	1.4 - 1.7	Alluvium (granular)	-
WS03	0.9	4.2 - 4.7	Granular Till (cohesive)	-
WS04	0.3	1.0	Made Ground	-
WS04	0.4	1.5 – 1.8	Made Ground	Ash, clinker, brick and glass
WS04	1.6	2.4 - 2.7	Made Ground	Ash
WS04	0.4	4.0 - 4.7	Made Ground	
WS04	0.3	5.0 - 5.7	Made Ground	Ash, clinker, brick and glass
WS05	1.7	0.2	Topsoil	-
WS05	0.5	0.5	Made Ground	
WS05	0.6	1.3 – 1.5	Made Ground	Ash, clinker, brick, glass and pottery
WS05	0.6	2.3 – 2.5	Made Ground	pottery
WS05	1.6	3.3 – 3.5	Made Ground	-
WS05	0.6	4.0 - 4.3	Made Ground	Brick
WS05	0.5	5.0 - 5.6	Made Ground	Brick and clinker
WS06	0.5	0.2	Topsoil	Brick
WS06	0.4	0.5	Made Ground	Plastic, metal, brick and concrete
WS06	0.4	1.0	Made Ground	Brick and concrete
WS06	0.2	1.4 – 1.9	Made Ground Ash, clinker, brick an concrete	
WS06	0.8	1.9 – 2.5	Made Ground	Ash and 7 mm long fibres
WS06	0.5	3.0 - 3.7	Made Ground	Ash, brick, glass and
WS06	0.5	4.0 - 4.5	Made Ground	concrete
WS06	0.6	5.0 - 5.7	Made Ground	Ash, brick, glass and concrete
WS07	0.2	0.2	Topsoil	-
WS07	0.7	0.5	Made Ground	Brick and concrete
WS07	17.0	1.0	Made Ground	
WS07	8.4	1.5 – 1.7	Made Ground	Domestic refuse: ash, paper,
WS07	7.1	2.5 – 2.7 Made Ground		plastic, glass, ceramic, fabric
WS07	2.4	3.5 – 3.7	Made Ground	and timber
WS07	16.4	4.0 - 4.5	Made Ground	1
WS07	1.6	5.3 - 5.65	Made Ground	Timber
WS07	1.4	5.65 - 6.0	Alluvium (granular) and Glacial Till (cohesive)	-
WS10	2.5	1.8 - 1.95	Made Ground	Plastic and paper

4.1.2. Controlled Waters

The screening criteria selected for controlled waters assessment are dependent on the nature of the receptors. The underlying Shirdley Hill Sand is classified as a Secondary A aquifer and the bedrock is classified as a Principal Aquifer. They are therefore considered to be potential receptors to contamination derived from the site. There are two surface water features close to / on-site. The Leeds and Liverpool Canal runs along the western boundary of the site, and Rimrose Brook runs through the centre of the southern half of the site. The proximity and on-site status of these two water bodies therefore requires that these are considered as potential receptors. On this basis soil-derived leachate and groundwater samples have been screened against Environment Quality Standards (EQS), and/or UK Drinking Water Standards (DWS) (Water Quality Regulations, 2000) where no EQS are available. These standards are collectively termed 'Water Quality Standards' (WQS).

Certain metals toxicity varies with hardness concentration within a surface water body. Hardness as CaCO₃ was therefore analysed for to determine the correct screening values for these determinands.

The hardness value was analysed in four surface water samples and the geometric mean value of the four concentrations was calculated to give an overall hardness value of 260.77 mg/l. The results from this screening assessment are summarised in Table 4-3 below.

4.1.2.1. Soil Leachate

A total of five soil samples were scheduled by Atkins for soil leachate analysis from soil samples recovered from window samples WS01A, WS07, WS06 and two from WS04. Those results which exceeded the screening values are presented in Table 4.3 below.

Contaminant	EQS (µg/l unless stated otherwise)	No of Exceedances	Maximum exceedance (µg/l)	Borehole name [maximum exceedance location highlighted bold]
Arsenic	10*	1	10.1	WS07 – 1.00
Cadmium	0.15	5	0.78	WS07 - 1.00, WS04 - 3.30- 3.70, WS04 - 4.00-4.70, WS06 - 1.00, WS06 - 4.00- 4.50
Lead	7.2	1	8.7	WS07 – 1.00
Nickel	20	1	50.5	WS07 – 1.00
Zinc	75	1	514.4	WS07 – 1.00
Mercury	0.05	3	1.36	WS06 – 1.00, WS04 – 3.30 – 3.70, WS07 – 1.00
Fluoranthene	0.1	1	0.68	WS07 – 1.00
Benzo (a)pyrene	0.01*	4	0.24	WS06 - 1.00, WS04 - 3.30- 3.70, WS04 - 4.00-4.70, WS07 - 1.00
Sulphate	250 mg/l	1	308.78	WS04 - 4.00-4.70
Free Cyanide	1.00	1	10	WS07 -1.00

 Table 4-3
 Summary of Soil Leachate Screening Results

*DWS value used

Elevated concentrations of arsenic, cadmium, lead, nickel, zinc, mercury, fluoranthene, benzo (a)pyrene, sulphate and free cyanide were measured at locations across the whole site. For three of these contaminants (zinc, nickel and free cyanide) significant exceedances over the GACs were recorded. The remainder of the exceedances do not greatly exceeded their GAC concentrations. Such recorded concentrations are considered to be typical of a domestic landfill site.

4.1.2.2. Groundwater

Groundwater samples were retrieved from six exploratory holes. The results of the groundwater samples were screened against the EQSs and the results are summarised in the table below.

Contaminant	EQS (µg/I)	No of Exceedances	Maximum exceedance (µg/l)	Borehole name [maximum exceedance location highlighted bold]
Arsenic	10*	2	18.5	CP4 . CP5
Boron (Dissolved)	1000	1	2532	CP4
Cadmium (Dissolved)	0.15	4	0.9	CP1, CP4, CP5 , CP7
Copper (Dissolved)	10	1	13	WS10
Iron (Dissolved)	200*	4	41840	CP1, CP4, CP6, WS10
Nickel (Dissolved)	20	1	29	CP5
Anthracene	0.1	1	0.39	CP4
Fluoranthene	0.1	1	0.76	CP4
Benzo(a)pyrene	0.01	3	0.03	CP4, CP5, WS10
Phenol	0.5*	1	2	WS10
Sulphate	400 mg/l	1	503.45 mg/l	CP1
Ammoniacal Nitrogen as N	0.6 mg/l	3	240.7 mg/l	CP4, CP5, WS10
Sum of Benzo(b)fluoranthene & Benzo(k)Fluoranthene	0.03	2	0.04	CP5, WS10

	•		
Table 4-4	Summarv	of Controlled Water Screening Results (µg/I unless stated oth	erwise)

*DWS value used

The exceedances noted in general from both leachate and groundwater analysis do not indicate highly elevated toxic metal or metalloid contamination and there is no evidence currently of widespread contamination by PAHs, TPH or VOCs.

It is notable that highly elevated iron and ammoniacal nitrogen concentrations have been encountered within groundwater from boreholes impacted by the presence of domestic wastes. The elevated results for both of these determinands are therefore almost certainly as a result of the presence of domestic wastes and it would be assumed that these will be encountered across the site if a further more detailed investigation of soil and groundwater is undertaken.

4.1.2.3. Surface Water

Surface water samples were retrieved from four locations across the site. No results in the surface water screening exceeded the respective EQSs. However, SW1 exceeds the DWS threshold for iron (200 μ g/l), as it is recorded as 274 μ g/l. This result is in all likelihood due to the presence of leachate derived from domestic wastes leaching into surface waters in proximity to this location.

4.1.3. Ground Gas Regime

Three rounds of ground gas monitoring were undertaken over a period of six weeks. Full results are included in Appendix D. Elevated levels of methane (>0.1 %) were recorded in five of the 11 boreholes that were installed on-site. The maximum methane recorded was 37 %v/v in CP4 on 3 November 2015. Carbon dioxide (CO₂) was recorded above the level of detection (0.1 %v/v) at eight of the installed boreholes. The maximum value recorded was 35 %v/v in CP4 on 3 November 2015. The lowest barometric pressure recorded during the three monitoring visits was on 3 round of monitoring where it was recorded at 1001 mmbar and therefore as this level is above 1000 mmbar these results may not represent the worst case conditions.

The monitoring results were screened in accordance with guidance given within CIRIA report C665 (CIRIA 665, 2007) which categorises the risks associated with a site according to its overall gas screening value (GSV). The calculation for the GSV is shown in the equation below.

GSV(l/hr) = maximum borehole flow rate (l/hr)x maximum gas concentration (%)

This GSV is used to assess the risk posed by ground gas to the site and the need for potential protection measures for any infrastructure on a site. The results from this monitoring is summarised in Table 4-5.

Review of the ground levels recorded and the derivation of GSVs indicate that compared with the guidance contained within CIRIA 665, the GSVs based on the data set currently available at the site represent a 'low risk' or characteristic situation (CS) 2.

Elevated levels of CO_2 and CH_4 were recorded at CP4 and CP5. Elevated levels of CO_2 recorded at WS05, WS06, WS09 and WS10 and elevated levels of CH_4 at WS09.

Exploratory Hole	Minimum Oxygen (%)	Maximum Carbon Dioxide (%)	Maximum Methane (%)	Peak Flow (I/hr)	Individual GSV based on Borehole Readings	Overall Site GSV (worst case)
CP1		Art	esian Water	Level		
CP2	20.8	0.4	0	1.0	0.0040	CO ₂ GSV:
CP4	0.9	35.0	38.0	1.4	0.5320	0.49
CP5	17.9	9.4	5.5	1.1	0.1034	CH₄ GSV:
CP6	20.9	0	0	0	0.0001	0.53
CP7	21.4	0	0	0	0.0001	
WS02	18.3	3.5	0	0.6	0.0210	
WS05	12.2	8.3	0	0	0.0083	
WS06	1.9	25	0.4	0.3	0.0750	
WS09	0.8	30	34.5	1.4	0.4830	
WS10	3.3	18	4.3	0.3	0.0540	

 Table 4-5
 Ground Gas Screening Results

GSV	Risk Classification	Characteristic Situation
<0.07	Very low risk	1
<0.7	Low risk	2
<3.5	Moderate risk	3
<15	Moderate to high risk	4
<70	High risk	5
>70	Very high risk	6

The ground gas regime based on the current limited data set does not indicate an elevated risk with regard to the construction of a road and indicates a low level of risk to residential housing located close to the site. The ground gas regime is indicative of a domestic waste landfill where deposits have undergone significant breakdown. These conditions are not unexpected as it is understood that the site last accepted domestic waste over 30 years ago.

Although not considered a significant constraint to the proposed development, appropriate management will be required to ensure safe working conditions for construction staff and to prevent creation of preferential pathways, i.e. along service runs for the off-site migration of such gases.

4.1.4. CAT Waste

Site-won materials which are deemed unsuitable for reuse on engineering or environmental grounds are strictly classified as waste and should be disposed of in accordance with current guidance and regulations.

Atkins, in conjunction with McArdle, has developed the Waste Soils Characterisation Assessment Tool (CAT-WASTESOIL) (Atkins and McArdle, 2014) which follows current regulations / guidance and provides a preliminary indication of whether or not soils are likely to be considered hazardous waste (if removed from site for disposal).

Reported concentrations of contaminants from the 52 soil samples taken during the ground investigation were entered into the CAT-WASTESOIL tool to provide an initial indication of possible waste class. Full results are included in Appendix E.

The output of the CAT-WASTESOIL tool indicates that some of the material likely to be encountered on site would be classified as containing hazardous wastes. Ten samples taken from WS01B, WS05, WS06, and WS07 exhibited hazardous concentrations of zinc, copper, benzo(a)anthracene and lead. The CATWaste tool does not include an assessment of waste class due to the presence of asbestos, which was recorded in nine samples from CP2, CP3, WS09 and WS01B. Presence of asbestos above 0.1% of soil mass would result in waste material being classified as hazardous waste. Further advice should be sought from an asbestos specialist to ascertain risks and mitigation measures required in relation to the asbestos recorded.

Further testing and assessment of spoil generated during the excavation phase of the construction works, including waste acceptance criteria (WAC) tests, will be required to fully characterise the soils in accordance with waste management procedures and to determine the potential for reuse of soils excavated as a result of the potential construction of a road.

The results of the CAT-WASTESOIL assessment are provided in Appendix E.

4.2. Geotechnical Discussion

4.2.1. Ground Conditions

At the time of writing, borehole descriptions, SPT N data and a small number of in situ shear vane tests are available from the site specific ground investigation. Eurocode 7 recommends that the use of SPT data "should be restricted to a qualitative evaluation of the soil profile or to a qualitative estimate of the strength properties of the soil". (BS EN 1997-2, 2007)

Strength and density descriptions have been assigned to each strata according to the range of SPT results in Table 3-2.

4.2.1.1. Superficial Deposits

Three exploratory holes were terminated prematurely in the 500 m stretch between south-west of the Port Roundabout (chainage 0) and the southern edge of Whabb's Tip due to the presence of concrete and other obstructions. Moving north, CP1 and WS02 were drilled successfully and confirmed expected ground conditions of generally Made Ground overlying granular Alluvium and Peat. Granular Glacial Till was also encountered at the base of CP1.

The thickness of landfill materials within Whabb's Tip typically exceeds 5 m and is recorded to a maximum depth of 9.2m bgl in CP2. Shirdley Hill Sand was anticipated to underlie the Made Ground and some instances of possible Shirdley Hill Sand have been interpreted, approximately along the line of proposed offline route (CP2, CP4, CP6 and CP7). As indicated above, the distinction between what may be Shirdley Hill Sand deposits and granular alluvium can be difficult to make, and these materials will require additional more detailed consideration if the offline route is selected. Should the offline route be selected, the proposed interpretation will need to be reviewed in light of the additional information that will be collected during a

"detailed design" phase of ground investigation as part of a later stage in the project, in particular as part of the geotechnical risk management process.

Alluvium or Glacial Till have also been identified underlying the Made Ground.

The density of the Made Ground and the granular superficial deposits is highly variable, ranging from very loose to very dense. Loose or loose material has been noted to the maximum depth of the landfill.

Peat was encountered up to 3 m thick in the west of the site and available geology maps suggest that Peat may also be present both north and south of this. Where encountered, Peat was noted to be very soft.

The cohesive Glacial Till is indicated to be stiff to very stiff, which is consistent with the borehole descriptions. The Glacial Till does not form a coherent stratum across the site, suggesting previous erosion prior to deposition of the shallower superficial deposits.

4.2.1.2. Bedrock

Sandstone is noted to underlie the cohesive Glacial Till in the zone where Mudstone was anticipated to underlie the Sandstone form available geological mapping information. Neither of the boreholes recording Sandstone (CP4 and CP5) encountered Mudstone, with the deepest (CP4) penetrating approximately 3 m into the Sandstone.

Boreholes which have recorded Mudstone (CP3 and CP6) are on the boundary of where this stratum is shown on the geological map. However, CP7 records Mudstone approximately 0.6 km north-east of where it is indicated on the published map. Furthermore, Sandstone was not shown to overly the Mudstone in these three locations. Neither was there any evidence that the Sandstone had been previously removed, e.g. deep Made Ground.

From the data collected it is not possible to identify how the Sandstone and Mudstone layers interact, but it is expected that the observed Sandstone forms part of the Sellafield Member whilst the Mudstone is likely of the Sidmouth Mudstone Formation.

4.2.2. Groundwater Conditions

Groundwater strikes in the area of Whabb's Tip were common towards the base of the Made Ground, with strikes generally recorded at a depth of 7 to 8 m below ground level in boreholes (CP2, CP3, CP4 and CP5) and 3 to 5 m below ground level in window sample holes (WS03, WS08 and WS09). Outside of Whabb's Tip there were eight water strikes at much shallower depths, ranging from 0.50 to 3.30 m below ground level and averaging 1.90 m deep. These were encountered in a range of natural superficial deposits.

The Made Ground is predominantly granular, allowing run off to percolate through this strata, down to the level at which the strikes were recorded. The measurements taken twenty minutes after each strike suggest that, in general, the water in the Made Ground either remains static or dissipates after the surrounding ground has been disturbed.

Groundwater monitoring undertaken between 20 October 2015 and 19 November 2015 indicates relatively stable groundwater levels in each exploratory hole where a piezometer was installed. These levels are reflected on the geological cross-sections provided in Appendix B. The monitoring appears to indicate the presence of an established groundwater table located within an elevation range between 7.50mOD and 10.50mOD. Given the relative elevations of the various exploratory holes, particularly CP1 towards to the south of Whabbs Tip, this could explain the presence of high groundwater levels in the area to the south of Whabbs Tip. Groundwater monitoring ought to be continued in order to establish how influenced these levels are by seasonal variations.

5. Conclusions / Recommendations

5.1. Environmental Conclusions

A preliminary assessment for the offline route of the A5036 has been carried out in order to better characterise the environmental properties of the deposits present within the Rimrose Valley Park. Soil, leachate, groundwater, surface water and ground gas analysis and monitoring from the 21 exploratory holes advanced on-site have resulted in the following conclusions:

- The extent of the Whabbs Tip landfill site appears to extend further to the south west than originally thought and this will need to be borne in mind in order to determine the impact this will have on design of the road within this area.
- Based on the Atkins derived SGVs certain soil samples from the site failed due to heavy metal exceedances. These exceedance results are unlikely to pose a significant risk to human health for on-site users due to the minor nature of the exceedance.
- Analysis of leachate, surface water and groundwater samples indicates that the majority of contaminants are unlikely to pose a significant risk to surface waters or groundwater even where the results were elevated above the screening criteria. The exceptions are iron and ammoniacal nitrogen which are present within leachates and groundwater at levels and will have a detrimental impact. It would be expected that this impact would be most marked within surface water samples. Provision of impermeable liners may therefore be an option which should be considered for Rimrose Brook and ponds within the site if a road is to be constructed in this general area.
- Ground gas was monitored three times from the installed exploratory holes. Concentrations of CO₂ and CH₄ and the flow measurements were analysed using the ground gas screening sheet and the site given a CS2 value. Appropriate gas mitigation measures will be required for construction of drainage and service runs.
- CAT Waste analysis of the soil results show that any unsuitable material proposed for off -site disposal may contain hazardous substances and should therefore be disposed of accordingly. Overall the current limited data set does not indicate the site represents a serious risk to current users of the site with respect to human health or to surrounding residential areas from ground gas although further investigation will be necessary if the offline route is selected. It is also notable that in a large number of locations domestic waste was not present within Made Ground (more typically ash, clinker, brick and concrete with paper and wood or the domestic waste was encountered at deeper depths (3.0m below ground level or deeper). It may therefore be possible, subject to more detailed testing, to excavate and reuse near surface materials within the proposed construction scheme, for example to form noise bunds.

5.2. Geotechnical Conclusions

Extensive testing in the Made Ground and granular superficial deposits has demonstrated very significant variability in the density of these strata, suggesting that they would likely be unsuitable as a founding stratum unless treated. A thick band of peat in the southwest of the offline route will also represent an unsuitable founding stratum, the lateral extents and thickness of which will require further investigation.

Although the variable and potentially weak deposits are underlain by more competent strata (Glacial Till, Sandstone and/or Mudstone), these materials were proven to lie at depth in the area of Whabb's tip. A conventional 'dig and replace' approach could be uneconomical in this instance due to the large volumes of material that may require disposing of, and resulting subsequent material importing volumes.

Possible engineering solutions such as ground improvement (for example deep soil mixing or stone columns), or spanning the areas of weak ground using piles, may be feasible for the section of the road along this route. The chosen solution would also need to be compatible with the environmental findings (e.g. minipiles must resist potentially aggressive ground conditions and stone columns may not be suitable if creation of pathways is a concern).

The ground water regime would also present some technical challenges in the southern part of the site where groundwater levels were observed to be high during the ground investigation works and subsequent monitoring. The groundwater monitoring data collected so far indicates that groundwater levels in the southern part of the site are likely to remain high, due to the possible presence of an established groundwater table within the landfill, which is within a range of levels close to the existing ground level in the southern part of the site. Temporary and permanent site drainage measures in this part of the site would need to be considered very carefully. High groundwater levels could also affect temporary works significantly, particularly if excavations are considered. Significant dewatering measures may be required in order to form excavations and maintain their stability.

5.3. Recommendations

In the event that the offline route is to be progressed further it is recommended that the piezometers installed in the exploratory holes during the recent ground investigation works continue to be monitored over a period of a few months (at least one year), to establish a baseline for ground gas and groundwater data and gain an understanding into the possible effects of seasonal variations on the ground gas and groundwater regimes observed so far.

Should the offline route be selected, further ground investigation works will be necessary to better assess the potential risks currently posed by the site and to support a future optioneering process to determine a suitable engineering solution.

Further investigation should be designed in order to:

- further characterise the ground conditions, in particular
 - determine the extent of the Peat in the south-west of the site, and
 - refine the interpretation of the superficial strata, in particular the distinction between Shirdley Hill Sand and granular alluvium deposits, and
 - investigate the discrepancies between the bedrock proven in preliminary ground investigation and the bedrock shown geology maps, and
 - determine the boundaries of Whabb's tip more fully;
- gain a better understanding of the hydrogeological regime on-site and how it may be affected in the longterm;
- assess the potential risks to controlled water receptors;
- refine the depth and extent of made ground and in particular the spatial extent of domestic waste;
- assist in the development of an appropriate reuse and disposal strategy, and determine whether a
 proportion of materials excavated to allow construction of the road can be reused within the construction
 of wider infrastructure within the proposed scheme;
- provide a comprehensive assessment of potential health and safety issues associated with construction works.

Also, it is to be noted that the recent ground investigation works have only focussed on the area within and in proximity to the Whabbs Tip, due to land access restrictions and because the main objective of these works was to gain a better understanding of ground and groundwater conditions within and close to the footprint of this historical landfill. Further ground investigation works will be required to assess ground and groundwater conditions further north and north-west, in the section of the offline route between the northern boundary of the area which has been investigated and Switch Island.

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Figures

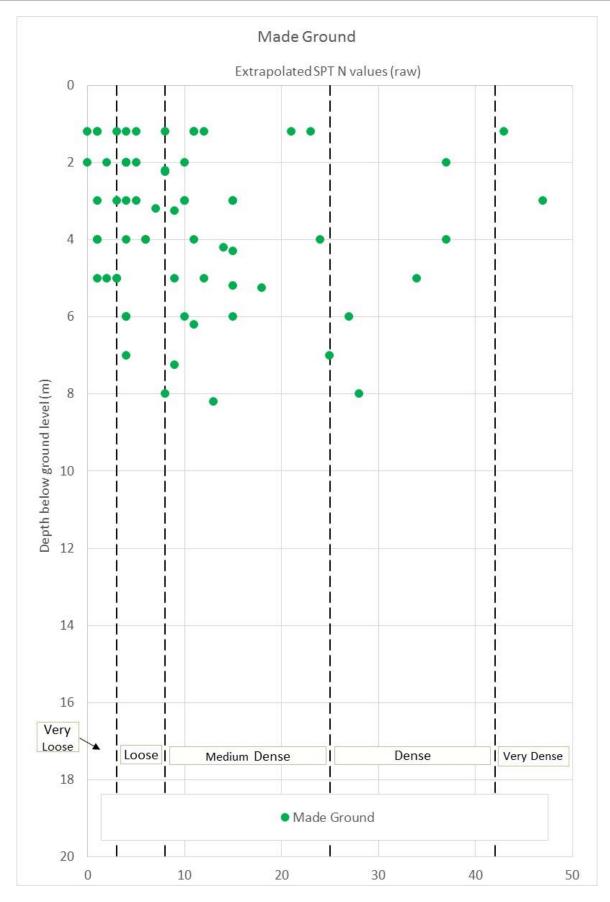


Figure 1 Extapolated SPT N values for made ground

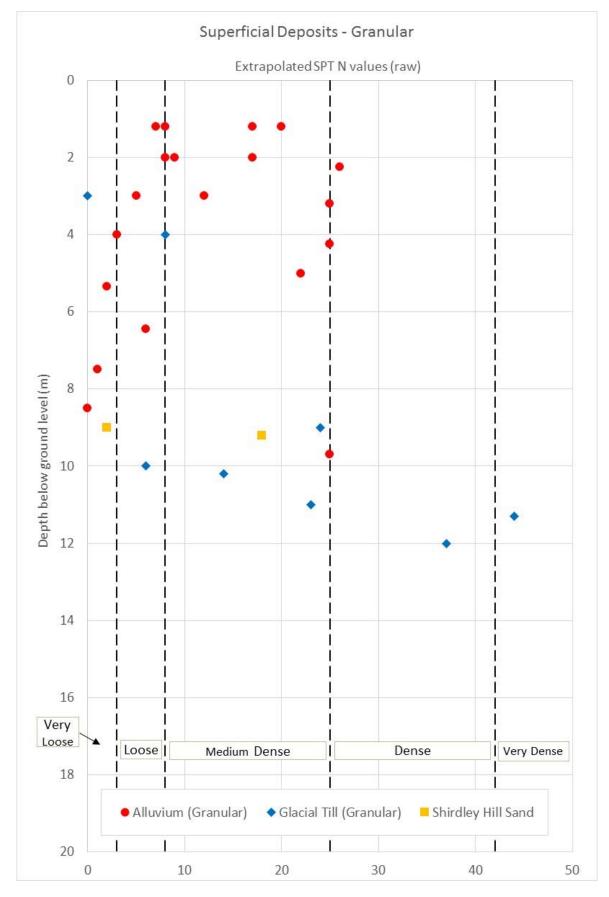


Figure 2 Extapolated SPT N values for granular strata

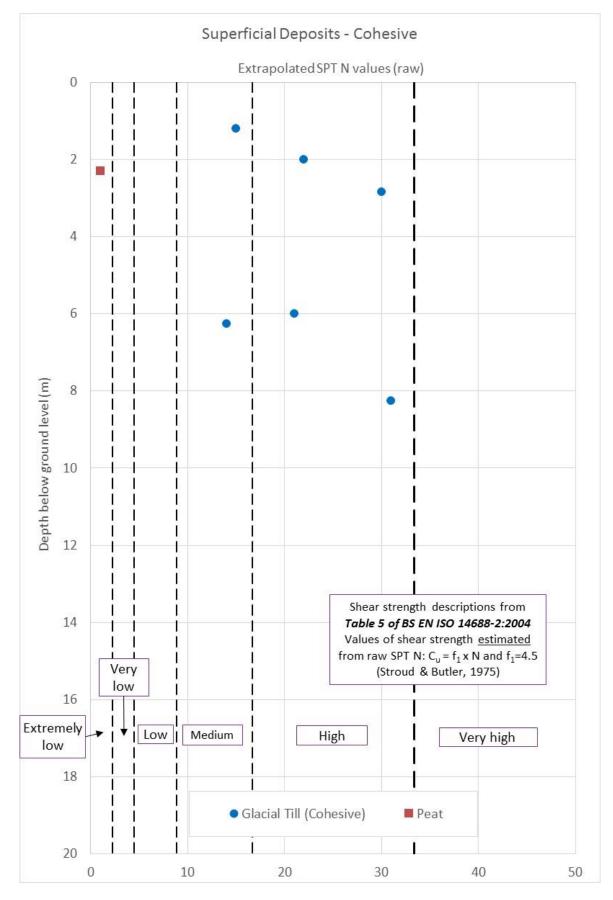


Figure 3 Extapolated SPT N values for cohesive strata

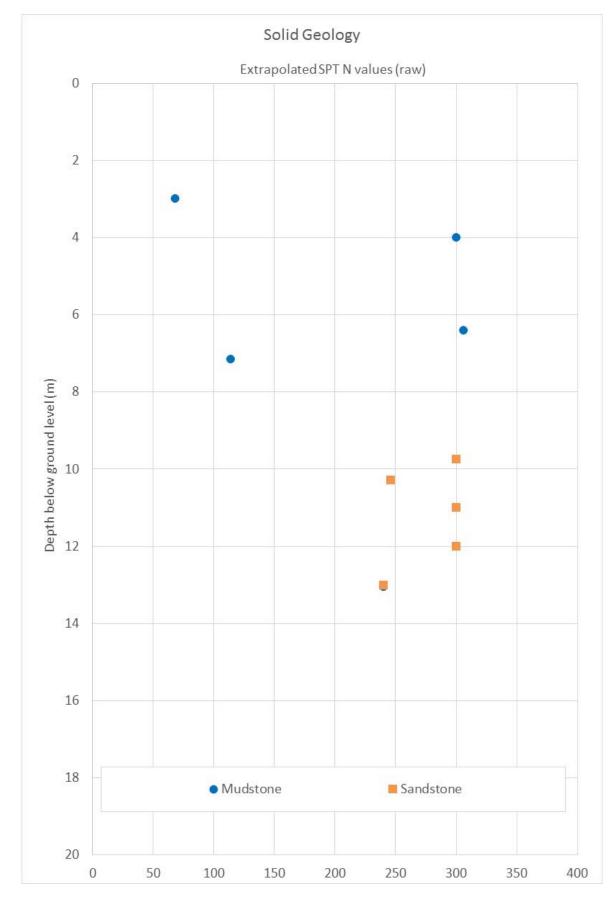
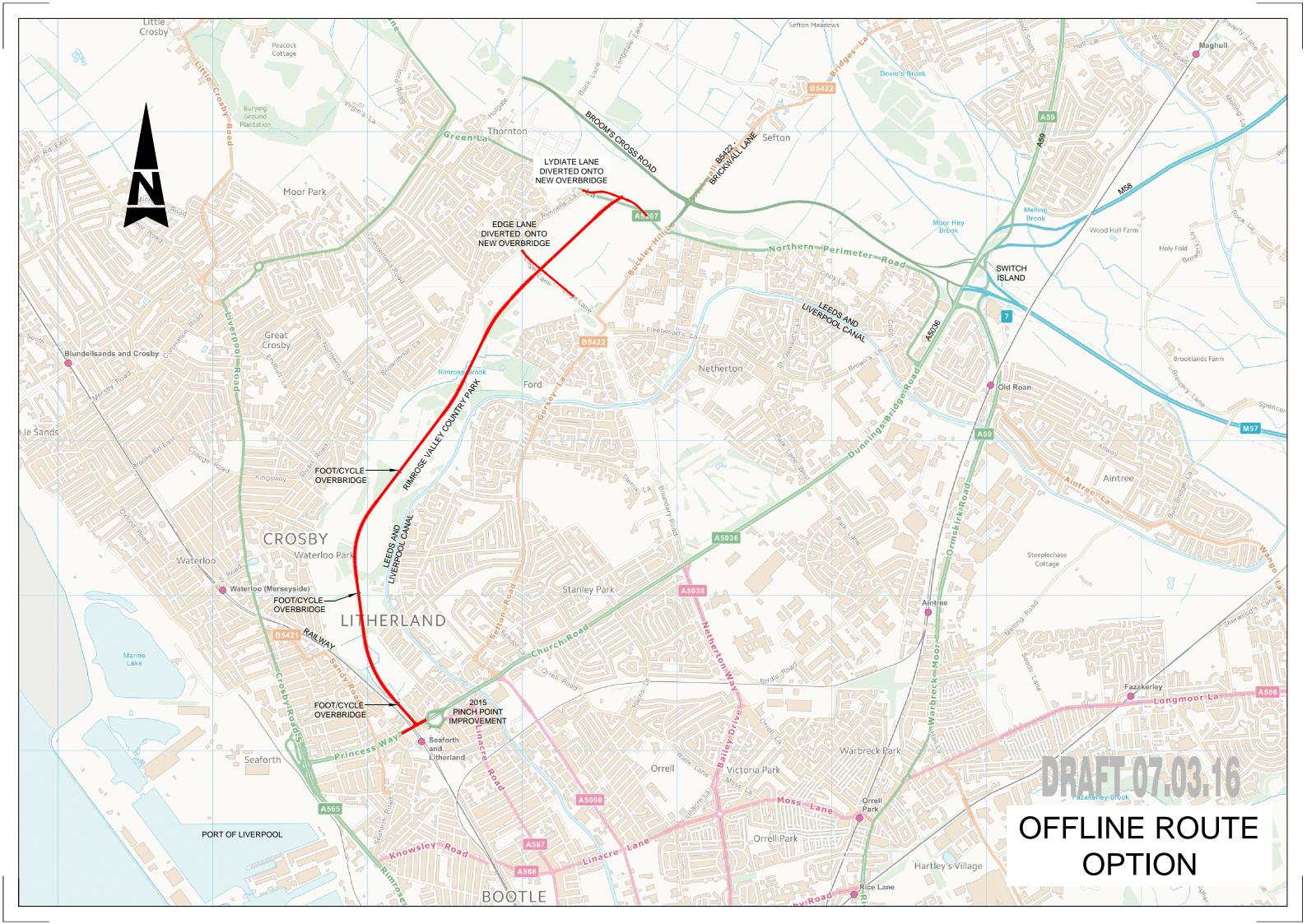


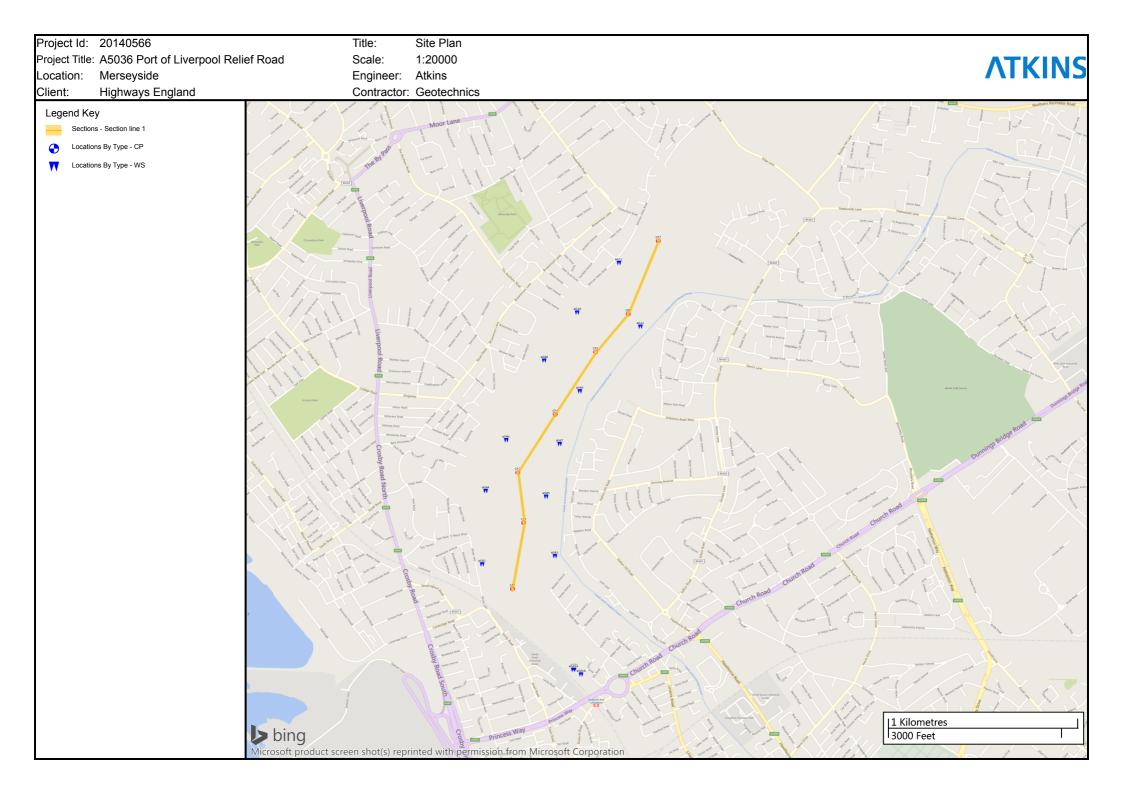
Figure 4 Extapolated SPT N values for mudstone and sandstone

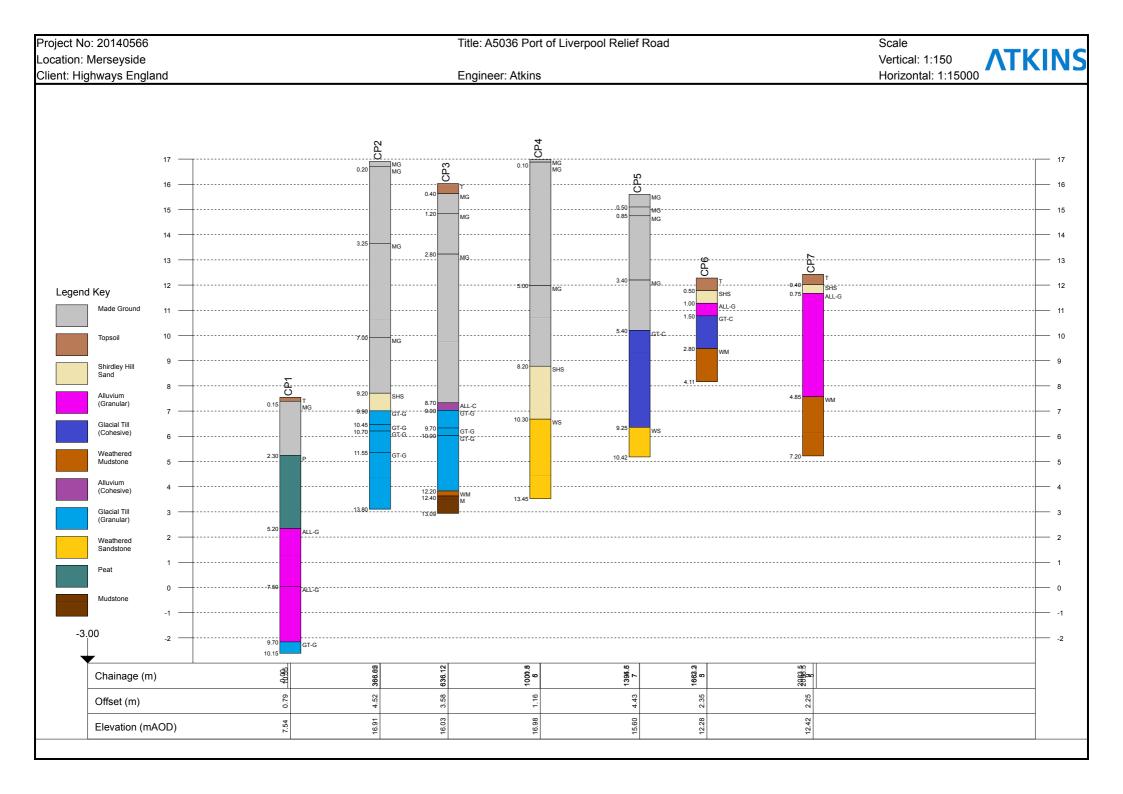
Appendices

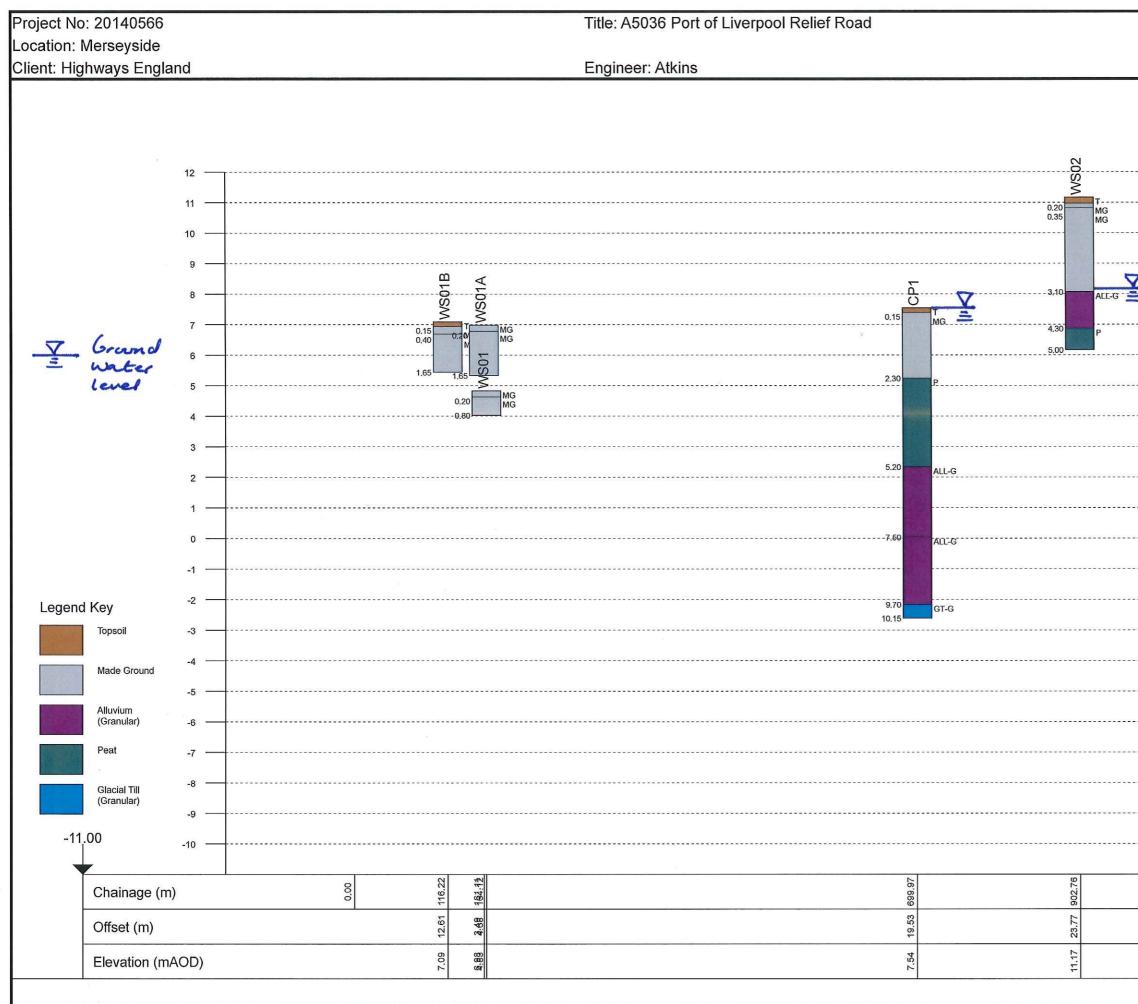
Appendix A. Outline Potential Route Through Rimrose Valley



Appendix B. Borehole Location Plan and Geological Cross-Sections







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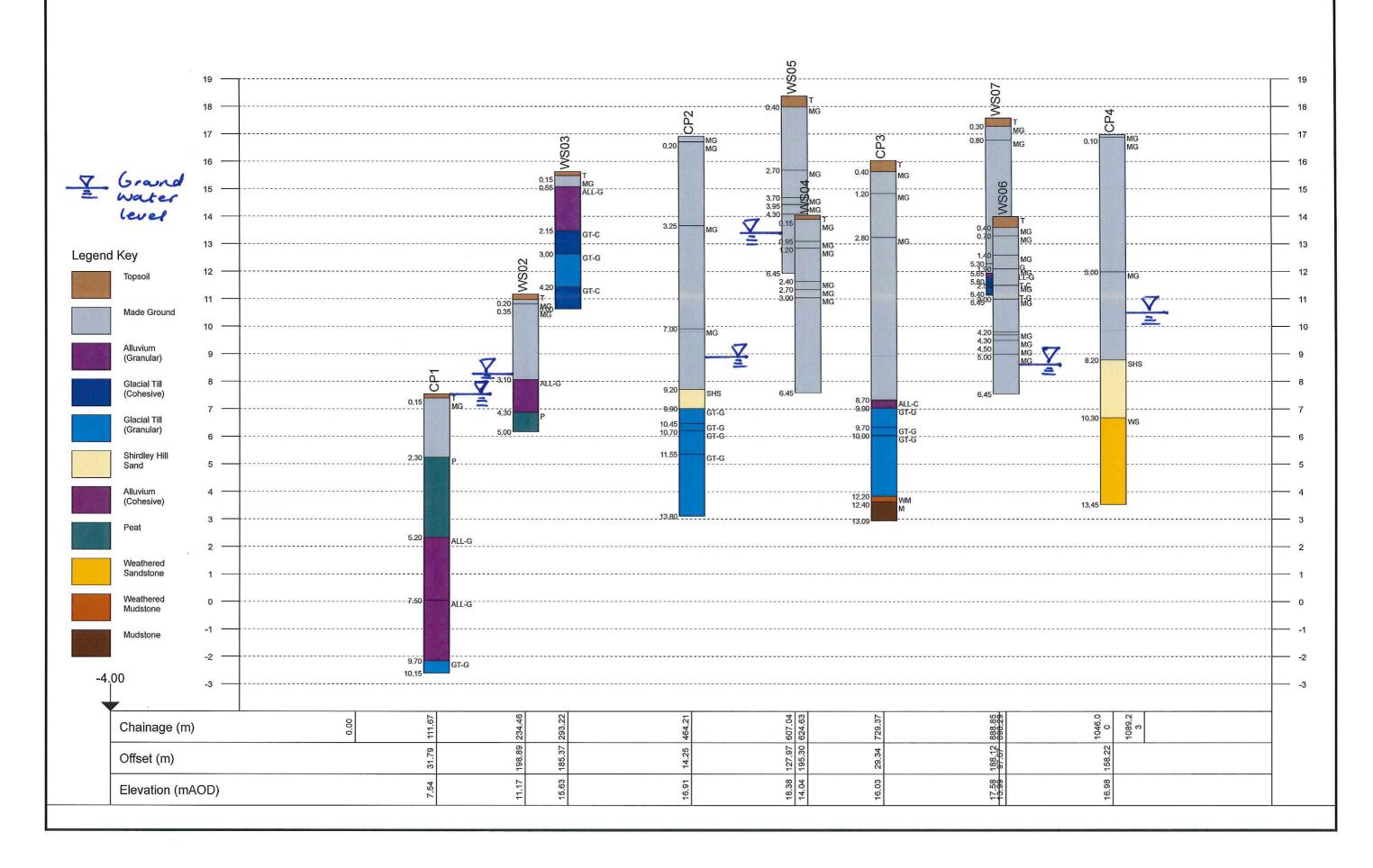


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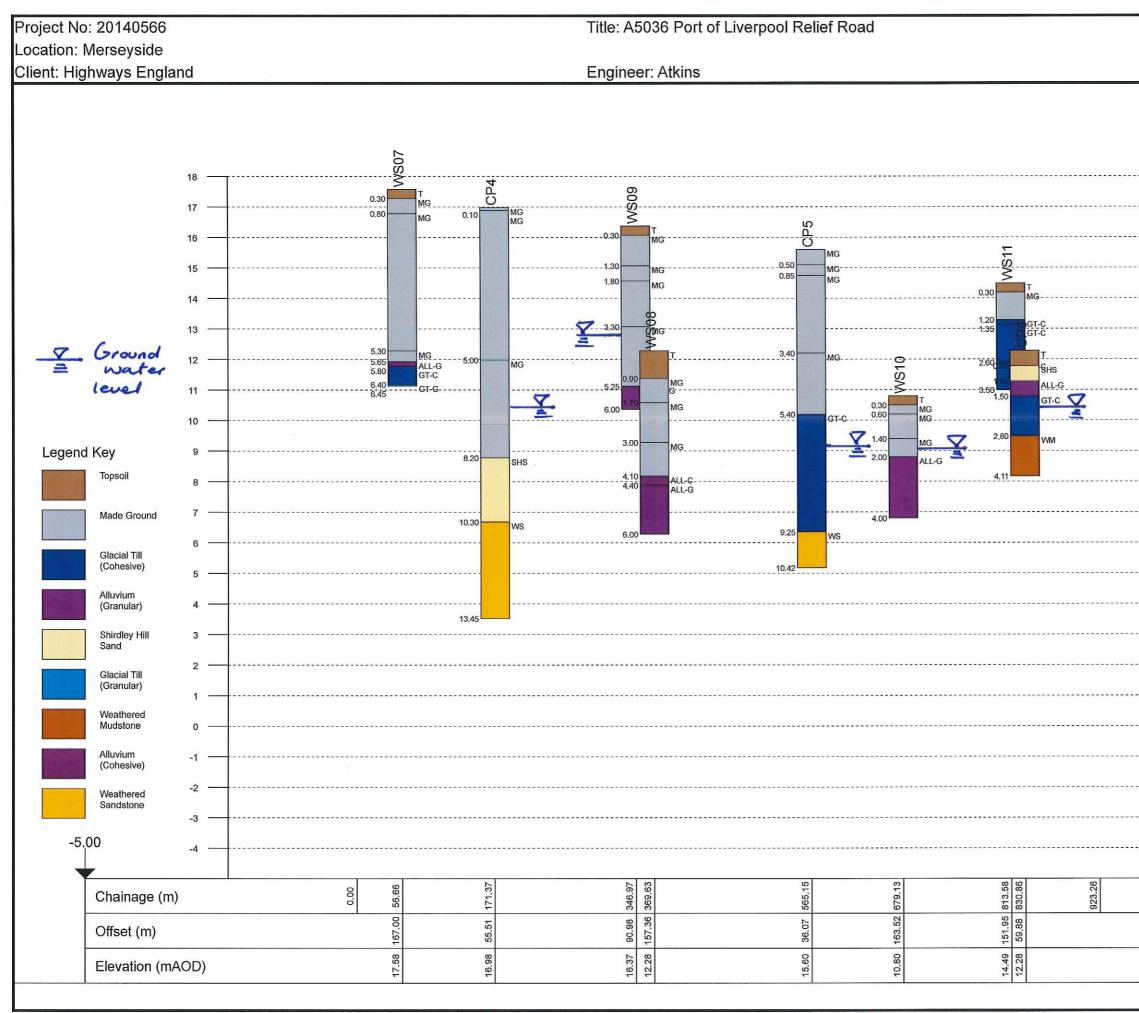
Title: A5036 Port of Liverpool Relief Road

Engineer: Atkins



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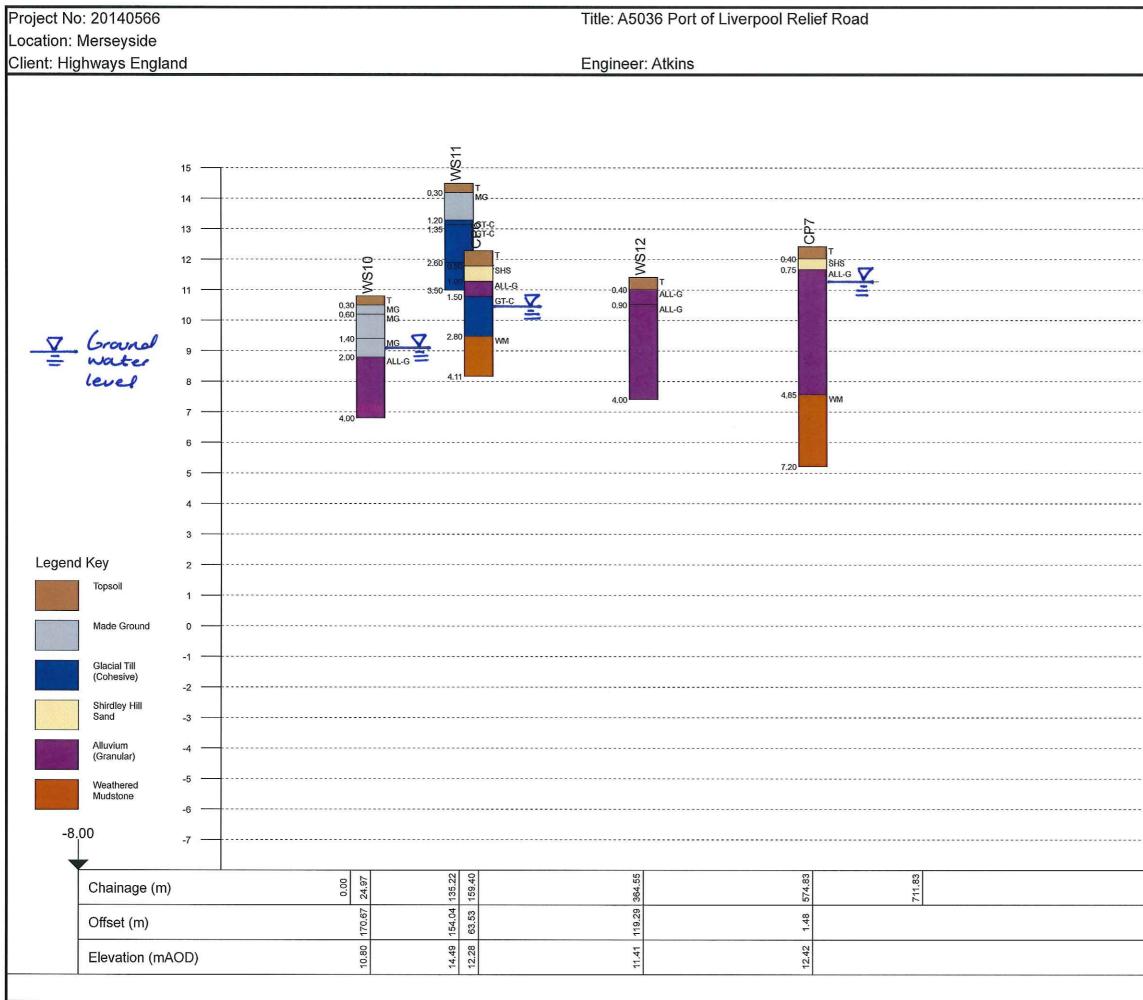
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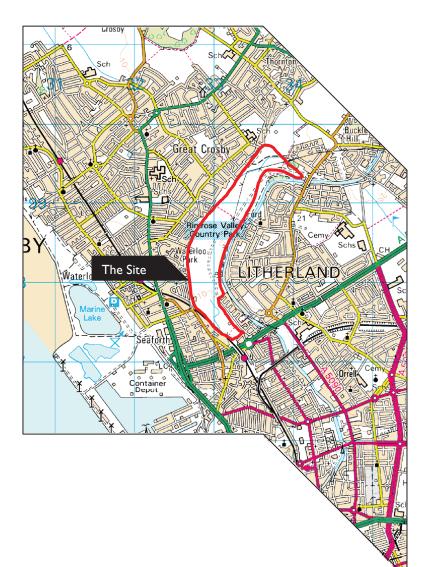
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Appendix C. Geotechnics Ltd Factual Report





Ground Investigation at

A5036 Port of Liverpool Access Study

Factual Report

For Atkins Limited

Engineer: Atkins Limited

Project Number: PNI53396

January 2016

Issuing Office:

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Factual Report

A5036 Port of Liverpool Access Study

for Atkins Limited

Engineer : Atkins Limited **Project No:** PN153396 January 2016

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Ground Investigation at A5036 PORT OF LIVERPOOL ACCESS STUDY

I.0 INTRODUCTION

A geotechnical and geo-environmental investigation was undertaken by Geotechnics Limited at Rimrose Valley Park, Liverpool as part of a feasibility study to determine the most suitable option for increased traffic flows from the Port of Liverpool to the motorway network. A new road through Rimrose Valley is one option being considered. The investigation was carried out to the instructions of Atkins Limited, acting in the role of both Engineer and Client. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of the investigation was to obtain information on the ground and groundwater conditions relating to the design of the proposed works within the limitations posed by trial hole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. The investigation comprised cable percussive and dynamic sample boreholes, in situ and laboratory testing and reporting. A Factual Report only was also commissioned.

3.0 **PRESENTATION**

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 2 to 8 of this report. Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 9 to aid an understanding of the procedures followed and the context in which the report should be read.

In addition, data in electronic format in accordance with "The Electronic Transfer of Geotechnical Data from Ground Investigations" (Third Edition) published by the AGS (the AGS Format) are presented separately on disk together with a copy of the report in electronic PDF format.

4.0 THE SITE

4.1 Location

The site is located within Rimrose Valley Park approximately 7.5km north of Liverpool City Centre. The approximate Ordnance Survey National Grid Reference for the centre of the site is SJ 330 985 and an extract from the relevant 1:50,000 Scale O.S. Map is included as Appendix 1.

4.2 Description

The investigation was undertaken within Rimrose Valley Park. The park is 'dog-legged' in shape, generally trending in a south-west to north-east orientation and is approximately 3km long by 0.5km wide. Various access points are located around the park from residential roads. The park is generally flat and comprises grassland, overgrown vegetation and areas of woodland, all interspersed with tarmac and grass footpaths.

The Leeds & Liverpool Canal bounds the site to the east. The Liverpool, Crosby & Southport railway line bounds the site to the south-west and residential properties to the west and north-west.

4.3 Site Geology

The 1:50,000 scale maps of Formby published by the British Geological Survey, Sheet 83 dated 1974 (Drift edition) and 1976 (Solid edition), show the site to be underlain by Blown Sand towards the boundary with the canal and Freshwater Alluvium over much of the remainder of the site. Glacial Till (Boulder Clay) is indicated to be present towards the northernmost tip of the site and to the south-east of the site. An area of Peat is also indicated below the southernmost part of the site.



January 2016

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The solid geology is indicated to primarily comprise rocks of Keuper Sandstone (now the Sellafield Member - part of the Sherwood Sandstone Group). A change to Bunter Sandstone (now the Wilmslow Sandstone Formation - also part of the Sherwood Sandstone Group) is shown below the southernmost part of the site. These rocks are of Triassic age.

The conjectured trace of the Crosby Fault is shown to pass through the northern end of the site, the fault trending roughly north-west to south-east. The strata to the south-west of the fault are shown to be downthrown. The conjectured trace of the Litherland Fault is shown to pass through the central part of the site and close to the eastern boundary of the southernmost part of the site. This fault trends roughly north-north-west to south-south-east and the strata to the east are shown to be downthrown. Between these two faults and close to/beyond the north-western site boundary, a change in solid strata to Keuper Marl (now the Sidmouth Mudstone Formation - part of the Mercia Mudstone Group) is indicated, this again being of Triassic age.

5.0 PROCEDURE

5.1 Commissioning

The work was awarded following submission of a tender for work designed by the Client for ground investigation of the site in accordance with their requirements.

5.2 General

The procedures followed in this site investigation are based on BS 5930:1999 + A2:2010 – Code of Practice for Site Investigations and BS 10175:2011 Investigation of Potentially Contaminated Sites. The soils and rocks encountered have been described in accordance with BS5930:1999+A2:2010 and BS EN ISO 14688-1:2002+A1:2013. The Cable Percussive Borehole and Dynamic Sample Borehole Records are included in Appendices 2 and 3 and their positions are shown on the Exploratory Hole Location Plan in Appendix 8.

The Exploratory Hole locations were specified by Atkins Limited. The co-ordinates and levels shown on the Exploratory Hole Records were measured using a Leica GPS survey device. The depths quoted on the exploratory hole records are in metres below ground level. At each exploratory hole location an inspection pit was excavated using hand tools to a depth of 1.20m below ground level to check for the presence of underground services. Prior to and on completion of the excavation, the location was scanned using a cable avoidance tool (CAT).

Aquifer protection measures were employed when drilling cable percussion boreholes CP1 to CP5 in order to preclude the creation of a pathway for contamination to migrate down towards the underlying aquifer. These protection measures comprised using 200mm diameter casing and tools to drill to the base of the Made Ground, then by installing a Im thick bentonite plug, prior to reducing to 150mm diameter casing and tools and re-commencing drilling.

5.3 Cable Percussion Boreholes

Seven (7 No.), 150mm diameter boreholes (numbered CPI to CP7) were sunk by Cable Percussion Tool techniques to depths varying between 4.11m and 13.80m below ground level. The work was carried out between 22nd and 30th September 2015.

Representative disturbed (D and B) and driven opentube thin-walled (UT) samples of the soils encountered were obtained at regular intervals. Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata. In addition, environmental soil samples (ES) were recovered at the depths indicated on the Borehole Records.

On encountering groundwater, boring operations were suspended for 20 minutes in order to record any rise in water level. Full details of groundwater observations during site work are included on the Borehole Records. It should be noted that the addition of water to the borehole as part of the drilling process may have masked the presence of groundwater in the borehole. Where water was added it has been noted on the Borehole Records.

On completion, standpipes were installed in Boreholes CPI, CP2 and CP4 to CP7 (see Section 5.5). Borehole CP3 was backfilled with bentonite.



5.4 Dynamic Sample Boreholes

Fourteen (14 No.) Dynamic Sample Boreholes (numbered WS01, WS01A, WS01B and WS02 to WS12) were undertaken at the site to depths varying between 0.80m and 6.45 below ground level. The work was carried out between I^{st} and 8^{th} October 2015.

The Dynamic Samples were taken using the superheavy apparatus which drives lined steel tubes into the ground in Im lengths. Samples are retrieved in the plastic liners. The hole is cased and progress depends on the nature of the strata penetrated. Full details of the casing used are included on the Borehole Records.

Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+AI:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater observations are included on the Borehole Records where appropriate and any rise in water level was recorded over 20 minutes whilst drilling operations were suspended.

On completion, standpipes were installed in Boreholes WS02, WS05, WS06, WS09 and WS10 (see Section 5.5). The other boreholes were backfilled with arisings and bentonite.

5.5 Instrumentation and Monitoring

Long-term monitoring of the gas and groundwater levels was made possible by the installation of standpipes as follows:

Exploratory	Standpipe
Hole	Slotted Pipe (Filter Zone)
	(m)
CPI	5.50m to 9.50m
	(5.40m to 10.15m)
CP2	6.00m to 8.00m
	(5.85m to 8.00m)
CP4	6.20m to 8.20m
	(6.10m to 8.30m)
CP5	6.90m to 8.90m
	(6.75m to 8.90m)
CP6	1.00m to 2.80m
	(1.00m to 2.80m)
CP7	5.00m to 7.00m
	(4.90m to 7.20m)

WS02	1.00m to 3.00m
	(1.00m to 3.00m)
WS05	3.00m to 5.00m
	(3.00m to 5.00m)
WS06	2.70m to 5.70m
	(2.70m to 5.70m)
WS09	1.00m to 3.50m
	(0.80m to 3.80m)
WS10	1.00m to 2.20
	(0.90m to 2.20m)

Monitoring of the gas and groundwater levels at the site commenced on 20^{th} October 2015 with further visits on 3^{rd} and 19^{th} November 2015.

On each of the monitoring visits a record of the groundwater level in each standpipe was obtained. On the second visit where water was recorded, samples were obtained (where possible) following purging of water in the standpipes.

The following parameters were recorded using a multi-parameter flow cell during the collection of the surface water samples, which continued until such time as the parameters reached a steady level.

- Temperature (°C)
- Electrical Conductivity (mS/cm)
- Dissolved Oxygen Concentration (%)
- pH
- Redox Potential (mV)

In addition to the groundwater levels, the following parameters were measured and recorded in each standpipe using a Gas Data LMSxi Gas Analyser:-

- Concentrations (% Vol) of CH₄, O₂, CO₂, along with (% LEL) CH₄ and (ppm) H₂S, CO
- Flow Rate
- Barometric Pressure

The results of the monitoring are presented in Appendix 4.

6.0 LABORATORY TESTING

6.1 Geotechnical

The laboratory testing schedule was specified by Atkins Limited. Unless otherwise stated, the tests were carried out in Geotechnics Limited's UKAS accredited Laboratory (Testing No. 1365) and were undertaken in accordance with the appropriate Standards as indicated below and on the Laboratory



Summary Sheets in Appendix 5. Any descriptions, opinions and interpretations are outside the scope of UKAS accreditation.

The tests undertaken can be summarised as follows:-

BS EN ISO 17892-1:2014

42 No. Water Content Determination

BS EN ISO 17892-2:2014

	l No.	Bulk Density Determination
BS 1377: Test No.		Test Description
Part 2 4.3 & 5.3	10 No.	Liquid and Plastic Limit Determination
8.3	19 No.	Particle Density Determination.
9.2 & 9.3	25 No.	Mechanical Analysis – Wet Sieving
9.4	14 No.	Mechanical Analysis - Sedimentation
Part 7 9	3 No.	Shear Strength Measurement - 100mm diameter (Multi-Stage)

The results of these tests are presented in Appendix 5.

Quick Undrained Triaxial Compression Test.

The following testing was carried out at the laboratories of Jones Environmental Laboratory Limited (UKAS Accredited Laboratory, No. 4225).

BRE Special Digest I Suite

17 No. Suites comprising:-Soluble Sulphate pH

The results of these BRE tests are presented in Appendix 6.

6.2 Contamination

Selected samples of soil and groundwater were tested at the laboratories of Jones Environmental

Laboratory Limited (UKAS No. 4225) for a number of determinants in order to check on potential site contamination. The determinants were specified by the Atkins Limited. The selected determinants are detailed on the results sheets in Appendix 6 together with the test result as well as the test method, accreditation and detection limit. In addition, a number of leachate samples were also prepared from selected soil samples in accordance with the NRA Leachate Protocol and analysed for the determinants detailed on the results sheets.

In addition, some of the samples scheduled for geotechnical testing were suspected to contain Asbestos. These samples were submitted to the laboratories of Derwentside Environmental Testing Services Limited (UKAS No. 2139) for Asbestos screening prior to any geotechnical testing being carried out on the samples. The results of this Asbestos screening have also been included in Appendix 6.

6.3 Bacteriological

Selected samples of surface water were tested at the laboratories of Cheshire Scientific Limited (UKAS No. 4145) for a number of determinants to check on the bacteriological status of the surface water. The determinants were specified by Atkins Limited and are detailed on the results sheets in Appendix 7 together with the test result as well as the test method, accreditation and detection limit.

Signed for and on behalf of Geotechnics Limited.

Prepared by: Steph Goldie MGeol, FGS **Graduate Engineer**

Reviewed by: Colin Dodd, BSc (Hons), MSc, CEng, MICE **Principal Engineer**



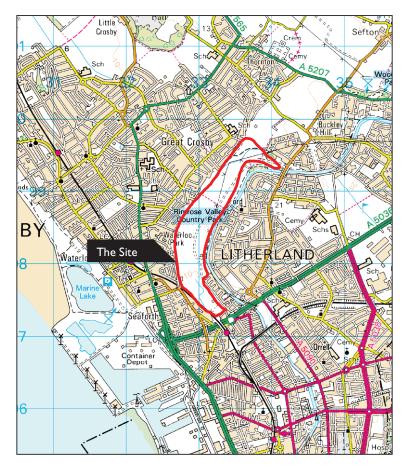
APPENDIX I

Site Location Plan

SITE LOCATION PLAN

PN153396

Ground Investigation At A5036 Port of Liverpool Access Study for Atkins Limited



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APPENDIX 2

Cable Percussion Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample	e Types	Groundwater		Strata, Continued	
В	Bulk disturbed sample	Water Strike	∇	Mudstone	
BLK	Block sample	Depth Water Rose To			
С	Core sample	Depth Water Rose To	*		00000
D	Small disturbed sample (tub/jar)	Instrumentation		Siltstone	× ×
E	Environmental test sample			Metamorphic Rock	× × × × ×
ES	Environmental soil sample	Seal		Fine Grained	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
EW	Environmental water sample		2 2 2 2 4 ■ ■	Madian Castad	~~~
G	Gas sample		1 1	Medium Grained	~~~
L	Liner sample	Filter	5 -	Course Contract	~~~
LB	Large bulk disturbed sample	Tillei	1 1	Coarse Grained	$\sim\sim$
Р	Piston sample (PF - failed P sample)			Igneous Rock	
TW	Thin walled push in sample			Fine Grained	
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)	Seal		Medium Grained	++++ ++++ +++++ +++++ +++++
UT	Thin wall open drive tube sampler - 102mm diameter	Strata	Legend	Coarse Grained	
	with blows to take sample. (UTF - failed UT sample)	Made Ground Granular		Backfill Materials	
V	Vial sample				\sim
W	Water sample	Made Ground Cohesive		Arisings	×.
#	Sample Not Recovered	Concerne			X
Insitu T	Festing / Properties	Topsoil		Bentonite Seal	
CBRP	CBR using TRL probe				
CHP	Constant Head Permeability Test	Cobbles and Boulders		Concrete	- 4 - - -
COND	Electrical conductivity	Gravel	* <i>a z</i>		·
HV	Strength from Hand Vane	Cluvol	° • • •	First Carried Filters	
ICBR	CBR Test		* 0 °	Fine Gravel Filter	
IDEN	Density Test	Sand			
IRES	Resistivity Test			General Fill	
MEX	CBR using Mexecone Probe Test	Silt	× × ×		·
PKR	Packer Permeability Test		* * *	Gravel Filter	
PLT	Plate Load Test		×		
PP	Strength from Pocket Penetrometer	Clay		Grout	
Temp	Temperature				4
VHP	Variable Head Permeability Test	Peat	NK2	Sand Filter	
VN	Strength from Insitu Vane		NIZ.	ound moon	000
w%	Water content		ALC.		
(All oth undraine	er strengths from ed triaxial testing)	Note: Composite soil typ by combined symbols	es shown	Tarmacadam	
S	Standard Penetration Test	Chalk		Rotary Core	
С	(SPT) SPT with cone			RQD Rock Quality De	
N	SPT Result	Limestone		(% of intact core FRACTURE INDEX	e >100mm)
-/-	Blows/penetration (mm)			Fractures/metre	:
7 -	after seating drive			FRACTURE Maximum SPACING (m) Minimum	
-*/-	Total blows/penetration	Sandstone		NI Non-intact	
(mm) ()	Extrapolated value			NR No core re AZCL Assumed zo loss	
-		Coal		(where core recovery is unknov assumed to be at the base of th	



G

ROPEHOI E DECODO Cable Percussion

PID=0.0ppm

555

37

PID=0.0ppm

PID=0.0ppm

24 PID=0.0pp

PID=0.0ppm

s2

s6

S1

s0

s25

PID=0.0ppm

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D

D B

в L

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D

4.25 (WET)

5.35 (4.70)

6.45 (2.70)

7.50 (2.50)

8.50 (2.80)

9.70 (1.70)

4.00

4.70

5.00

6.00

4.25- 4.70

5.15 5.35- 5.80

5.80- 6.45

6.45- 6.90

6.90- 7.50 7.00

7.50- 7.95

7.95- 8.50

8.50- 8.95

9.00- 9.70 9.00

9.70-10.15

8.00

Project	A5036 PORT (OF LIVE	RPOOL AC	CESS S	STUDY	Engineer	ATKINS	Boreho Project		CP1 PN153396	
Client	ATKINS LIMI	red				National Grid Coordinates	332889.31 E 397727.29 N	Ground	Level	7.54	m OD
Sampl	ing		Proper	ties		Strata				Scale 1	1:50
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description			Depth	Legend	Level m OD
0.40 0.50 0.50 1.00 1.00	ES 1.00 B W ES 1.65 B	1.20 (0.70)		-9.2ppr -18.2pf		MADE GROUND angular fin	TOPSOIL: Brown fine sand.): Very loose dark brown and bla he to coarse gravel of clinker, l bone. Ash present.		G.L		7.54
2.75- 3.00	- D - ES - 2.75 B - 3.15 B - ES	2.30 (2.00)		-12.2pr	C1	Very soft s	pongy dark brown pseudofibrous	PEAT .	2.3	ی میلاد میلاد میلاد	5.24
3.60	3.60 UT5	3.15 (WET)	PID=	=17.9pp	þm.					, , , , , , , , , , , , , , , , , , ,	

Very loose grey slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of various lithologies.

Very loose brown silty fine to medium SAND, locally with pockets of clay.

.....

E

5.20

7.50

٠×

MZ. 317

MZ. 317

SIL. 317 312

۰x

317 11.

M/

2.34

0.04

Depth Dia Technique Crew of Hole Cased Water Date Time Struck Cased Rose to Mins Sealed Ground 1.20 0.40 Inspection Pit KP/LP G.L. 28/09/15 08:00 0.50 0.40 20 Medium in 3.20 0.20 Cable Percussion KP/LP G.L. 28/09/15 18:00 0.50 0.40 20 Medium in 10.15 0.15 Cable Percussion KP/LP 10.15 9.70 1.70 28/09/15 18:00 0.50 0.40 20 Medium in Remarks Inspection pit hand excavated to 1.20m depth. Water was added to assist boring between 5.50m and 7.00m. ES sample = 1 x vial, 1 x plastic jar and 1 amber jar A 50mm standpipe was installed to 9.50m with a geowrapped slotted section from 5.50m to 9.50m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 5.50m, sand filter up to 5.40m, bentonite seal up to 1.00m, arisings up to Figure 1			+ + +	Progre	various lithologies. Progrèss						r				
3.20 0.20 Cable Percussion KP/LP 10.15 9.70 1.70 28/09/15 18:00 Image: Cable Percussion Logged by Lo	Depth		Technique				Date	Time			Rose to			Remarks on Groundwate	
Symbols and abbreviations are explained on the accompanying 5.50m, sand filter up to 5.50m, sand filter up to 5.40m, bentonite seal up to 1.00m, arisings up to Figure 1	3.20	0.20	Cable Percussion	KP/LP								0.40	20		Medium inflow
key sheet. 0.20m, concrete up to ground level.	Symbols a abbreviati	and ons are on the	Water was added to a ES sample = 1 x vial A 50mm standpipe was 9.50m with flush loc	ssist l , 1 x p instal kable p sand f	ooring 1 plastic lled to protect llter u	between jar an 9.50m ive com p to 5	n 5.50m nd 1 amb with a ver. Bac	er jar geowrapp kfill de	ed slo tails	from ba	ase of 1	hole: g	ravel	Figu	, , , , , , , , , , , , , , , , , , ,

Project	A503	6 PORT C	OF LIVE	RPOOL AC	CCESS	STUDY	Engine	er	ATKINS				l	Boreho Project	DIE C No P	P1 N153396	
Client	ATKI	NS LIMIT	TED				Nation Coordi	al Grid nates	332889. 397727.	31 E 29 N			(Ground	I Level 7	.54	m OD
Samp				Prope			Strat									Scale 1	
Depth		Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Descri	ption							Depth	Legend	Level m OD
		-													- 10.15	× · · · · ×	2.0
		-							E	nd of E	Borehol	e			-		
		F													Ē		
		-													-		
															-		
		-													F		
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Dening	-					Dram					1 (-				
Boring) Hole		T I :	_	0	Progr Depth of Hole	ess Depth	Depth to Water	Data	T :	Depth	ndwate Depth Cased		in	Depth	Rema	irks on
Depth	Dia		Techniqu	e	Crew	of Hole	Cased	Water	Date	Time	Struck	Cased	NUSE LU	Mins	Sealed	Grour	ldwater
Rema	rks 🛤										ļ					ged by	LP
Symbols	and	2													Figu	ıre	2 of 2
abbreviat explained	ions are on the															_	21/01/2016
accompa key sheet	ilyinig t.														<u>e</u>	<u>sole</u> d	niæ

oject _{A5036}	5 PORT (OF LIVER	POOL A	CCESS S	STUDY			P2 N153396	
ient ATKIN	IS LIMIT	TED				National Grid 332954.11 E Coordinates 398076.86 N G	ound Level 1	6.91 n	n OD
ampling			Prope	rties		Strata		Scale 1:	50
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
0.20- 1.00 0.20 0.50 0.50	B ES ES		PID=	=0.0ppn	n.	Grass over MADE GROUND: Brown slightly gravelly fine to coarse sand. Gravel is angular fine to coarse of sandstone, brick and clinker. MADE GROUND: Very loose to loose black and brown silty very sandy angular fine to coarse gravel of			16.9 16.7
1.00 1.00 1.20- 1.65	ES B	1.20 (DRY)	PID=	=0.0ppn	C3	clinker. Ash present.			
2.00 2.00 2.00 2.25- 2.70	- D - ES - B	1.70 (DRY)	PID=	=0.0ppn 41	n C8				
3.00 3.00 3.00 3.25- 3.70	D ES B	3.00 (DRY)	PID=	=12.7p _I	m C9	MADE GROUND: Loose to medium dense brown clayey gravelly fine to coarse sand with a high cobble content of brick, timber, concrete and plastic.	 		13.
4.00 4.00 4.00 4.20- 4.65	- D - ES - B	4.20 (DRY)	PID=	=9.8ppn 16	c14	Gravel is angular fine to coarse of concrete and brick.			
5.00 5.00 5.25- 5.70	D B	4.50 (DRY)	PID=	=6.0ppn	C18				
6.00 6.00 6.00 6.20- 6.65 6.20- 6.65	- D - ES - B	6.00 6.00 (DRY)	PID=	=0.0ppn	c11				
7.00 7.00 7.25- 7.70	D	7.00 (WET)	PID=	=0.0ppn	с9	MADE GROUND: Loose to medium dense dark brown an black gravelly clayey fine sand with black organ debris. Gravel is angular to subangular fine to coarse of brick, ceramic and various lithologies Ash present.	ic		9.
8.00 8.00 8.00 8.20- 8.65	D ES B	7.50 (DRY)	PID=	=0.0ppn 52	c13	Between 8.20m and 8.65m, locally grading to very sandy gravel with a medium cobble content.	,		
9.00 9.00 9.20- 9.65	- D - B -	8.50 (8.75)	PID=	=0.0ppn 19	c18	Medium dense greyish brown clayey gravelly fine coarse SAND. Gravel is subangular to rounded fi to coarse of various lithologies.			7.

				U U										
Depth	Hole Dia	Technique	Crew	Depth of Hole		Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20 10.00 13.80	0.20	Inspection Pit Cable Percussion Cable Percussion	KP/LP KP/LP KP/LP	13.30 13.30	13.20 13.20 13.50	10.10 8.25	24/09/15 24/09/15 25/09/15 25/09/15	18:00 08:00	9.20	6.50 8.50		20		Seepage - no rise Slow inflow
Remarks Inspection pit hand excavated to 1.20m depth. Water was added to assist boring between 1.20m and 6.50m. Exception of the picture is a single transmission of the picture is a single transmission.														

Symbols and abbreviations are explained on the accompanying key sheet. All dimensions are in metres. Mark water was added to assist boring between 1.20m and 0.30m. Somm standpipe was installed to 8.00m with a geowrapped slotted section from 6.00m to 8.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 8.00m, gravel filter up to 6.00m, sand filter up to 5.85m, bentonite seal up to 0.40m, concrete up to ground level. Chiselling: 3.80-3.90m for 15 minutes and 4.80-4.90m for 30 minutes and 13.30-13.70m for 60 Logged in accordance with BS5930:1999 + A2:2010

Project A503			RPOOL AG		STUDY	Engine	er	ATKINS					Borehc Project	No PN	72 153396	
	NS LIMI	TED	D			Nationa Coordir	nates	332954.1 398076.8	1 E 6 N				Ground	Level 16		m OD
Sampling	Sample	Depth Cased &	Prope Strength		ODT N	Strata	3								Scale 1	1
Depth	Туре	Cased & (to Water)	- U	%	SPT N	Descrip	otion							Depth	Legend	Level m OD
10.00 10.00 10.20-10.65	ES B	10.20	PID=	=0 . 0ppr	n C14	fine	to coar	e light g se SAND. e to coar	Grave	l is su	ıbangul	ar to	-			
10 70 11 20	-	(9.00)				Soft	to firm	n brown s	andy C	LAY.				- 10.45 - 10.70		6.4
10.70-11.30 10.70-11.30 11.00	B UF94		PID=	=0.0ppr	n.	fine round	to coar led fine	e greyish se SAND. e to coar grading t	Grave se of	l is su various	bangul lithc	ar to logies.	-	- 10.70		6.21
11.30-11.75	в	11.30 (8.90)		9.5	C44									- 11.55		5.3
12.00 12.00	- - - D -		PID=	=0 . 0ppr		coars to me	se SAND.	light gre Gravel various	is sub	angula	r to ro	fine t ounded f	o ine	-		5.50
12.25-12.45	- B - -	12.00 (9.40)			C50/90											
13.00 13.00 13.20-13.31	- - - - -	13.20 (10.10)		=0 . 0ppr	C50/38											
13.50-13.60 13.70-13.80	_ D	13.50			s50/28									-	0.00	
13.70-13.80		(9.40)			550728			Er	nd of B	orehole	5			13.80	0	3.11
	- - -															
	-															
	- - - -															
														-		
	- - - -															
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	<u>-</u>													E		
	-															
	-															
	-													-		
Boring					Progre						ndwate	r				
Depth Hole Dia		Technique	e	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed		rks on dwater
	minutes	3.												Logg		LP 2 of 2
Symbols and abbreviations are explained on the accompanying key sheet.														Figur		2 of 2 21/01/2016
All dimensions are in metres.	Logged in	accordance	e with BS59	30:1999 +	A2:2010									حاع	الكحيت	

roject	A5036	PORT C	F LIVEF	RPOOL AG	CCESS S	STUDY	Engineer		ATKINS					Boreho Project		P3 1153396	
Client		IS LIMIT	ED	i			National G Coordinate		332924.7 398343.9				(Ground	Level 16		m OD
Sampl	ing		Denth	Prope			Strata									Scale	1:50
Depth		Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	ı							Depth	Legend	Level m OE
0.20		- - - D					Grass ov	ver T	OPSOIL:	Brown	silty s	sand.			G.L.		16.0
0.20 0.40		ES D							Grey sa		gular n	nedium	to coar	se	0.40		15.6
0.50	0.85	ES B		PID=	=0.0ppr	n .	gravel d	ot li	mestone.								
1.00 1.00 1.00		D ES		DTD-	=13.7pg	_									1.20		14.8
	1.34	В D	(DRY)		16	C50/40	angular	fine	Very de to coar h presen	se gra					-		
2.00-	2.38	В	1.60 (DRY)			C50/ 225									-		
2.00		D ES	(DRI)												-		
2.50		- - -		PID=	=18.4pr	m									-		
2.80	3.45	D ES B	3.00		27	S10			Medium to coar						2.80		13.2
	5.45		(DRY)					plast	ic and t						-		
3.50		 - -		PID=	=18.0pp	m									 - -		
3.80	4.45	D ES B	4.00			C11									-		
4.00-	4.45		4.00 (DRY)												- - -		
4.80		D			22										-		
4.80 4.80 5.00-	5.45	ES B	4.00	PID=	=17.0pp	m C12									 - -		
		-	(DRY)			-									-		
5.80	6.45	D B	6.00		41	C27									- - -		
6.00	0.45		(DRY)	PID=	=16.3pg										 		
		-													-		
6.80 6.80		D ES													-		
7.00-	7.45	- В	7.00 (DRY)			C25										V	
7.00		-		PID	=14.2pp	m									-		
7.80	8.45	D B	7.60			C28									-		
8.00	0.45		(DRY)	PID=	=5.7ppr												
8.70 8.70 8.80		- D ES D			64		Soft dai		ey and b	lack o	rganic	CLAY w	ith poc	kets	8.70 9.00	×	7.3
9.00-	9.45 9.45	B D	9.00 (7.30)			S24	Medium d	lense	- greyish							NI/	
		-					content	Gra	e to coa vel is s rious li	ubangu	lar to				-	0 - 0 - 0	
9.70	10.45	- D - #	10.00			S6	Dark bro	own s	ilty sli is suba	ghtly	gravell			ium	9.70 10.00	• × • •	6.3
Boring		#	(7.80)			Progre	various		ologies.			ndwate			_ 10.00	-ri• • • • •	0.0
Depth	Hole Dia	-	Techniqu	e	Crew	Depth of Hole	Depth Dep	oth to ater	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed		arks on ndwater
1.20 9.10 13.09	0.20	Inspect Cable P Cable P	ercussi	ion	NF/SM NF/SM NF/SM			7.90	24/09/15 24/09/15 25/09/15	18:00		8.50	7.20	20		Medium	inflow.
-	-								25/09/15								
Remar	ks 📕	Inspect ES samp	ion pit le = 1	hand of x vial	excavat , 1 x p	ted to	1.20m dept jar and 1	th. Lamb	er jar		L	<u> </u>	ļ ļ		Logg	led by	LP
ymbols a bbreviati	and ons are	Backfil	l detai ing: 1.	ils from	n base	of hol	e: bentoni utes and 2	ite s	eal up t				.80-13.	00m foi	c 60 Figu	re	1 of 2 21/01/2016
xplained ccompar ey sheet	on the lying																كأشر
- J Sneet	sions														Ľ	19198	immæ

oject _{A503}	6 PORT (OF LIVER	RPOOL AC	CESS	STUDY	Engineer ATKINS Boreho Project	ole No	CP3 PN153396	
ient ATKII	NS LIMI	TED				National Grid 332924.75 E Coordinates 398343.97 N Ground	Level	16.03	m OD
ampling			Proper	ties		Strata		Scale 1	
epth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
0.00-10.45 0.20 0.20	- B - D - ES			9.0		Loose to medium dense greyish brown silty very sandy rounded to subangular fine to coarse GRAVEL of various lithologies, with a low cobble content.	- 10.0		6.03
1.00-11.45	- - В -	11.00 (9.40)			C23				
1.70	- D						E	×	
2.00-12.45	в	12.00			C37		E	· · · · ×	
2.20	- - -	(10.80)				Stiff brown mottled bluish grey gravelly CLAY. Gravel is tabular angular and fine to coarse of mudstone.	12.2 12.4		3.8 3.6
2.80-13.00 3.00-13.09		12.80			C50/40	Weak brown MUDSTONE.	E		
		(11.20)				End of Borehole	- 13.0	9	2.9

Boring						Progre	ess				Groun	Idwate	r				_
Depth	Hole Dia	Т	echnique	9	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed		arks on ndwater
Remai	'ks 📕														Logg	jed by	LP
Symbols abbreviati explained accompar key sheet	ons are on the nying														Figur		2 of 2 21/01/2016
All dimen		Longed in a	ccordance	with BS59	30.1999 +	A2.2010									5-	~~~~	

All dimensions are in metres. Logged in accordance with BS5930:1999 + A2:2010

Project A5036 PORT OF LIVERPOOL ACCESS STUDY Engineer

ATKINS

Borehole Project No CP4 PN153396

Samplin	g			Prope	rties		Strata								Scale 1	:50
Depth		Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description							Depth	Legend	Level m OD
0.20 0.20 0.50 0.50 1.00 1.00 1.20-1	1.65	D ES ES ES ES ES B	(DRY)		15	S21	Grass over is angular MADE GROUND medium to c content of and fine to present. Between 1.2 gravel with	fine to co Medium of coarse sand brick and coarse of Om and 1.0	dense o d with concre f bric 65m, lo	of brid grey an a low ete. Gr k and c ocally	k and o d black angular avel is concrete silty s	concret c grave r cobbl s angul e. Ash	e. lly e ar	G.L. 		16.9 16.8
2.00- 2 2.00 2.00 2.00	2.45	- - - - - - - - - - - - - - -	1.60 (DRY)	PID	=0.0ppn	C37	At 2.00m, d	ense.						- - - - - - - - - - - -		~~~ <u>~~~~~~~~~</u>
3.00- 3 3.00 3.00 3.00	3.45	B D ES	2.80 (DRY)	PID=	=18.2pp	C47								- - - - - - - - - -		****
4.00-4 4.00 4.00 4.00	4.45	B - D - ES	4.00 (DRY)	PID=	=37.0pg	C37								- - - - - - - -		11 <u>111111111111</u>
5.00- 5 5.00 5.00 5.00	5.45	B D ES	4.60 (DRY)	PID=	21 =23.1pp	C9 m	MADE GROUND clayey sand fragments.	with plas	stic, 1				У	5.00		11.9
6.00- 6 6.00 6.00	6.45	- B - D 	6.00 (DRY)	PID=	=34.0pp	C15	Between 6.0	Om and 6.4	45m, 10	ocally	medium	dense.				
7.00- 7 7.00 7.00 7.00	7.45	- B - D - ES -	6.00 (DRY)	PID=	=15.8pp	C4	Between 7.3 paste-like			ockets	of a so	oft whi	te		Y	
8.00- 8 8.00 8.30 8.30 8.30 8.30	8.45	B D D ES	7.60 (7.10)		=15.8pr =13.4pr		Very loose SAND.	to loose 1	browni	sh grey	fine f	to coar	se	8.20	∑ 	8.7
9.00- 9 9.00- 9 9.30		- # - B - D	9.00 (8.50)		27	s2	Below 9.00m layers.	, becomes	grey (clayey	with so	ome pea	ty			
10.00-10	0.45	В														
	Hole Dia		Technique	9	Crew	Depth of Hole	Depth Depth to	D Date	Time	Groun Depth Struck	dwater Depth Cased	Rose to	in Mins	Depth Sealed		rks on dwater
1.20 (9.00 (0.40	Cable 1	tion Pit Percussi Percussi	on	NF/SM NF/SM NF/SM	G.L. 9.00 9.00	9.00 8.60 9.00 6.90	22/09/15 22/09/15 23/09/15 23/09/15	18:00 08:00	7.90	7.60	7.10	20	Startu	Medium i	
ymbols and obreviations kplained on ccompanyir ey sheet.	i s are i the ng	A 50mm 8.20m v seal uj 6.10m, Chisel	standpi with flu p to 8.3 bentoni	pe was sh lock 0m, san te seal 30-2.60	instal cable p nd filt l up to)m for	led to protect er up 0.20m 60 min	1.20m depth. jar and 1 am 8.20m with a ive cover. Ba to 8.20m, gra , concrete up utes and 3.40	geowrappe ckfill def vel filter to ground	tails : r up to d leve	from ba o 6.20m l.	se of h , sand	nole: b filter	entoni up to	te Figu	re	LP 1 of 2 21/01/2016

Project	A5036	PORT C	OF LIVEF	RPOOL AG	CCESS	STUDY	Enginee	er	ATKINS					Boreho Project		P4 153396	
Client							Nationa Coordin	I Grid	333128.9 398650.1	95 E				-			
Sampl		IS LIMI	ED	Prope	rties		Coordin Strata		398650.1	l3 N				Ground	Level 1	Scale	m OD
Depth		Sample	Depth Cased & (to Water)		w	SPT N	Descript								Depth	Legend	Level
		Туре —		kPa	%										_		m OD
10.00-	-10.27	- D	10.00 (8.10)		22	S50/ 120									10.30		6.68
10.30		D ES			33			mely we and gra	ak greyi	ish bro	wn SANI	DSTONE	recover	ed as	_ 10.30		0.00
		L					Sana	una 920							-		
11.00- 11.00-	-11.45 -11.10	_ В _ D	11.00			s50/50											
11.30		D	(9.10)												-		
		F													F		
12.00-		_ В	10.00												<u> </u>		
12.00-	-12.08	- D - -	12.00 (9.60)			s50/50											
12.30		- ES													F		
		Ē															
13.00-	-13.07	D	13.00 (9.50)			S50/40			E	nd of B	orehold	<u> </u>			13.07		3.91
		E.							21	OL D	JIENOI	-			E		
		L													-		
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Boring) Hole	: 	.	•	6	Progro Depth		Depth to	2		Grour Depth	ndwate Depth		in	Depth	Rem	arks on
Depth	Dia		Technique	9	Crew	of Hole	Cased	Water	Date	Time	Struck	Depth Cased	Rose to	Mins	Sealed		ndwater
Remai	rks 🛄										ļ				Log	jed by	LP
Symbols a	and														Figu		2 of 2
abbreviati explained	on the															_	21/01/2016
accompar key sheet All dimens															Ø	eled	<u>EEIM</u>
are in me	tres.	Logged in	accordance	with BS59	30:1999 +	A2:2010											

Project A503	6 PORT (OF LIVER	RPOOL AC	CESS	STUDY	Engineer ATKINS Boreh Project		CP5 PN153396	
lient ATKI	NS LIMI	TED				National Grid 333347.40 E Coordinates 398978.34 N Ground	l Level 1	.5.60	m OD
Sampling			Proper	ties		Strata		Scale ·	1:50
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OE
0.10- 0.40 0.20	B ES					Grass over MADE GROUND: Brown sandy gravelly silt. with rootlets. Gravel is angular fine to coarse of brick, concrete and limestone.	G.L.		15.0
0.50- 0.80 0.50 0.85	B ES D					MADE GROUND: Dark brown and black gravelly fine to coarse sand with pockets of clay and a low to medium cobble content of brick and concrete. Gravel	- 0.50 L 0.85		15. 14.
1.00	ES	1 00		14		is angular fine to coarse of brick, concrete and sandstone. Ash present.	Æ		
1.20- 1.65	в - - -	1.20 (DRY)		14	C23	MADE GROUND: Loose to medium dense black gravelly fine to coarse sand. Gravel is angular and fine to coarse of concrete, timber and plastic. Ash present. Between 1.20m and 1.65m, locally silty very sandy			
2.00 2.00	D - ES					gravel with a low cobble content.	-		
2.20- 2.65	- B - - -	1.70 (DRY)			C8				
3.00 3.00 3.20- 3.65	- D - ES - B	3.00 (DRY)		43	С7		3.40		12.
	- - - -					MADE GROUND: Domestic refuse including plastic, ceramic, cloth, glass and timber with occasional sand and gravel.			
4.00 4.00	D - ES						-		
4.30- 4.75	В	4.30 (DRY)			C15			V	
5.00	- - - D					Between 4.75 and 5.10m, driller denotes **large obstructions.	Ē	∇	
5.20- 5.65	в	5.20			C15		-		
	-	(4.95)				Firm to stiff brown slightly sandy to sandy slightly gravelly CLAY. Gravel is subangular fine	5.40		10.
5.65- 6.00 6.00	- B - ES			22		to coarse of sandstone.	-	······································	
6.10 6.25- 6.70	- D - D -	6.00 (DRY)			C14				
6.75- 7.15	- в						-		
7.15- 7.60	UT63	7.00 (DRY)	182	12		From 7.15m, with closely spaced bands of brown sand. At 7.15m, very high strength			
7.60 7.75 7.85- 8.25	- D - D - B			15					
8.25- 8.70	- D	8.25 (DRY)			s31				
9.00	- - - D						-		
9.25- 9.70	- UT89	9.00 (8.70)	442	14		Extremely weak reddish grey fine to coarse grained SANDSTONE.	9.25		6.
9.70	- D	0.00			SE0 (- -		

10.00-10.30 в Boring Progress Groundwater Hole Depth Depth Depth to Water Depth Depth in Mins Depth Sealed Remarks on Date Rose to Depth Technique Crew Time Dia of Hole Cased Struck Cased Groundwater 22/09/15 22/09/15 23/09/15 23/09/15 1.20 6.00 10.42 0.40 KP/LP KP/LP KP/LP 08:00 18:00 08:00 4.75 7.60 8.75 4.30 7.00 6.00 Slow inflow. 8.25 Slow inflow Inspection Pit Cable Percussion Cable Percussion G.L. 6.70 6.70 4.50 7.45 20 20 6.70 6.00 6.70 6.00 10.42 10.30 DRY Seepage - no 0.15 8.25 9.00 DRY rise Slow inflow 8.85 18:00 9.25 9.00 8.70 20 Logged by \mathbf{LP}

Remarks Symbols and abbreviations are explained on the accompanying key sheet. All dimensions The spectrum of the spect All dimensions Logged in accordance with BS5930:1999 + A2:2010

are in metres.

9.75- 9.95

D E

D

9.00

(8.70)

s50/

102

Figure 1 of 2 21/01/2016 geolechnics

F

Project	A5036	PORT (OF LIVEP	RPOOL AC	CCESS S	STUDY	Engine	er	ATKINS					Boreho Project	le C No PN	P5 153396	
Client	ATKINS	5 LIMI	red				Nationa Coordin	al Grid nates	333347.4 398978.3	0 E 4 N				Ground	Level 15	5.60 n	n OD
Sampli				Proper			Strata									Scale 1:	50
Depth		Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Descrip	otion							Depth	Legend	Level m OD
10.30-	10.42		10.30			s50/41									10.42		5.18
	-	-	(8.85)						En	d of B	orehole	e			-		
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Poring		_				Urogr					Crour	aduvata	~		_		
Boring Depth	Hole Dia		Technique	e	Crew	Progro Depth of Hole		Depth to Water	Date	Time	Depth Struck	ndwate Depth Cased	Rose to	in Mins	Depth Sealed	Remar Ground	
	Dia						Cased	vvaler			SUUCK	Cased		Mins	Sedleu	Ground	water
Remar	ks 📕					1	<u> </u>	ļ	ļ	ļ	1	ļ	<u> </u>		Logg	ed by I	P
Symbols a abbreviation	nd														Figu	re 2	of 2
explained explai	on the																
All dimensi are in metr	ions	_ogged in	accordance	with BS59	30:1999 +	A2:2010									Ľ	VEEner 7	

Project A503	5 PORT C	F LIVEF	POOL A	CCESS S	STUDY	Engineer	ATKINS					Boreno Project		P6 N153396	
Client ATTEN	NS LIMIT	סיפי				National Grid Coordinates	333524.4 399177.8					Ground	Level 12	, 20 I	n OD
Sampling	AS LIMIT		Prope	rties		Strata		55 14				oround		Scale 1	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	I W %	SPT N	Description							Depth	Legend	Level m OD
0.20	D ES					Grass over	TOPSOIL:	Dark bı	rown sl	lightly	silty	sand.	G.L.		12.28
0.20 0.50 0.30 0.50 0.55- 0.95	- D - ES - B			=18.3pr =16.2pr 15		Dark brown SAND.	very clay	yey grav	relly f	fine to	coarse	2	0.50 - - - - 1.00		11.78
1.00 1.00 1.00 1.20- 1.65	- D ES - B	200.00		=20.1pr	m S7	Loose brow							1.50	×	10.78
1.20- 1.65 1.50 1.50 1.50 2.00- 2.45	- D D ES 	(DRY) 1.60 (Dry)	PID 17	21 =18.5pr 16	m	Soft to fi CLAY. Below 1.80 fine to co At 2.00m,	m, becomes arse of mu	gravel dstone.	Lly. Gi				- - - - - - -		•
2.50 2.50 2.50 2.50 2.80 3.00- 3.37	- C - D - ES - D - B	150.00		19 =18.0pr	m s50/	Extremely gravel.	weak bluis	sh grey	MUDSTO	DNE rec	overed	as	2.80	⊻	9.48
3.00- 3.45	D	(2.30)			220								- - - - -		
4.00- 4.11	- - - -	150.00 (3.40)			s50/50		Er	nd of Bo	orehole	2			4.11		8.17
Boring					Progr					idwate	r				
Depth Hole Dia 1.20 0.40 4.11 0.15	Inspect Cable F		:	Crew NF/SM NF/SM	Depth of Hole G.L. 4.11	Cased Wate			Depth Struck 2.80	Depth Cased 2.6	Rose to	in Mins 20	Depth Sealed		rks on dwater nflow.
Remarks Symbols and abbreviations are explained on the accompanying key sheet. All dimensions are in metres.	A 50mm 2.80m w	standpi with flu to 2.8 level. .ing: 3.	pe was ish loc 30m, gr 70-4.0	instal kable p avel fi Om for	lled to protect llter u 60 min	1.20m depth. 2. jar and 1 a 2.80m with tive cover. B up to 1.00m, mutes.	a geowrapp Backfill de	etails f	from ba	ase of	hole: b	entonit	Figu	re :	JG 1 of 1 21/01/2016

Project	A5036	PORT (OF LIVER	RPOOL A	CCESS	STUDY	Engineer		ATKINS					Boreho Project		P7 N153396	
Client	ΑΨΚΤΝ	S LIMI	UED				National Coordina		333690.4 399564.1					Ground	Level 1	2.42	m OD
Sampl				Prope	rties		Strata		555501.1					oround	20001 1		1:50
Depth		Sample Type	Depth Cased & (to Water)	Strengtl kPa	n w %	SPT N	Descripti	ion							Depth	Legend	Level m OD
0.20			(to water)		70		Grass	over 7	TOPSOIL:	Dark b	rown s	ilty s	and.		G.L.		12.42
0.20 0.20 0.40		ES D		PID	=53.4pj	pm	Dark b	rown c	organic f	ine to	coars	e SAND			0.40	×	12.02
0.50 0.50	- 1.20	ES B		PID	=64.4p	pm			e brown t avelly fi				ightly	silty	0.75	×	11.67
	· 1.65	ES B	1.20	PID	=66.6pj 17	pm S17			_								
1.20		- W	(WET)														
2.00		D													-		
2.25-	2.70	- D	2.25 (1.50)			S26									-		
2.75-	- 3.20	в															
3.20-	3.65	- - - D	3.20 (1.90)			S25									-		
3.70-	- 4.25	- - - в			15										-		
		- - -													-		
4.25-	- 4.70	- D -	4.25 (2.35)			S25									-		
4.70 4.85-	- 5.30	D B					Extrem	nelv w	eak reddi	sh bro	wn mot	tled o	reen ar	d grey	4.85		7.57
5.30-	- 5.75	 	5.30				MUDSTO	ONE loc	cally gra Recovere	ding t	o sand	stone	and	u grey	-		
5.75		- - - D	(3.05)														
6.00-	6.40	В													-		
6.40-	6.60	D	6.40 (2.15)			C50/90											
6.80-	- 7.15	в	(2.13)												Ē		
7.15-	7.20		6.80 (1.90)			C50/19			En	d of B	orehol	e			7.20		5.22
		-															
		- - -													- -		
		-															
		- - -															
		- - -															
		-													<u>-</u> -		
		- - 													-		
Boring Depth	Hole		Techniqu		Crew	Progr Depth	Depth D		Date	Time	Depth		Pose t	in	Depth		arks on
1.20		Inspect	tion Pit	t	KP/LP	of Hole G.L.		Water	29/09/15	08:00			1.15	IVIINS	Sealed	Grou Slow in	ndwater flow.
7.25	0.15	Cable I	Percussi	LON	KP/LP	6.00 6.00 7.20	6.00	1.20	29/09/15 30/09/15 30/09/15	08:00							
Remar	ks 📕	Inspect ES sam	tion pit	t hand x vial	excava	ted to	1.20m de jar and	pth.	per jar		<u> </u>	ļ	<u> </u>		Log	ged by	LP
Symbols a abbreviati	and ons are	Water v A 50mm	was adde standpi	ed to a ipe was	ssist l insta	boring lled to	between 7.00m w	1.20m vith a	and 4.5 geowrapp ckfill de	ed slo					Figu	ıre	1 of 1 21/01/2016
explained accompar key sheet	nying	filter ground	up to 5 level.	5.00m,	sand f	ilter u	up to 4.9	90m, be	entonite	seal u	p to O	.50m, o				eoled	പ്പുപ
All dimens	sions		Ling: 6				utes and	1 6.80-	-7.15m fc	or 60 m	inutes				별	3-3133	

Project No PN153396

Client ATKINS LIMITED

Hole			Туре	SWP	Seating Drive			Test	Drive		SPT 'N'		Uncor		d SP1	РТ		
r	Depth m bgl	m OD	iype	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50		
P1	1.20	6.34	с	-	-	-	-	-	-	1	1	* !	 	 	 			
P1	2.30	5.24	С	-	-	-	-	-	1	-	1	*			 	 		
P1	5.35	2.19	S	-	-	-	-	-	1	1	2	* ¦	 	 	 	 		
CP1	6.45	1.09	S	-	1	-	-	-	2	4	6	*	 	 	 	 		
CP1	7.50	0.04	S	-	1	1	1	-	-	-	1	*						
P1	8.50	-0.96	S	-	1	1	-	-	-	-	0	*	 		 			
P1	9.70	-2.16	s	-	1	-	-	3	15	7	25			*				
Driller				Pember	ton		Remar Equipm		ked and c	alibration	carried out	in accord	dance	with E	BS EN	ISO		
Hammer No.	-		BL01				22476-											
Energy Ratio,			65.00															
Calibration Da	ate		17/10	/2014														

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level m OD	Туре	SWP	Seating Drive			Test	Drive		SPT 'N'		Uncorrected SF				
IUIC	m bgl		i ype	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1) 20	'N' 30	40	50	
CP2	1.20	15.71	С	-	1	1	-	1	1	1	3	*	1		 	 	
P2	2.25	14.66	С	-	1	2	3	3	1	1	8	*	1		1		
P2	3.25	13.66	С	-	2	4	4	1	2	2	9	*			 	 	
CP2	4.20	12.71	С	-	2	5	5	2	3	4	14		*			 	
CP2	5.25	11.66	С	-	6	10	5	5	4	4	18		*				
CP2	6.20	10.71	С	-	4	5	4	2	3	2	11		*				
CP2	7.25	9.66	С	-	1	1	2	2	3	2	9	*			1		
CP2	8.20	8.71	С	-	1	2	3	2	3	5	13		*				
CP2	9.20	7.71	С	-	1	2	3	4	5	6	18		*			 	
CP2	10.20	6.71	С	-	2	3	5	3	3	3	14		*		1		
CP2	11.30	5.61	С	-	3	5	5	9	14	16	44				*	 	
CP2	12.25	4.66	С	-	13	12/39	38	12/15			50/90		I 			- A -	
CP2	13.20	3.71	С	-	25/74		50/38				50/38					- A-	
CP2	13.70	3.21	S	-	25/69		50/28				50/28		1	 		>_	
Driller			Keith	Pember	ton		Remar	ks					 		1	 	
Hammer No.			BL01				Equipm 22476-3		ked and c	alibration	carried out	in acco	ordance	e with E	3S EN	ISC	
Energy Ratio), Er (%)		65.00														
Calibration I	Date		17/10	/2014													
/- Blows/p	enetratio	n (mm) ;	l	ating		S - S	tandard F	Penetratio	n Test (S	PT)							

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level	Туре	SWP (mm)	Seating Drive			Test	Drive	SPT 'N'	Uncorrected SPT					
noie	m bgl	m OD			0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
CP3	1.20	14.83	С	-	16	9/20	50/40				50/40		 	 	 	+
CP3	2.00	14.03	С	-	7	5	14	18	18		50/225		 	1		>
CP3	3.00	13.03	s	-	2	2	3	2	2	3	10	*	 	 	 	
CP3	4.00	12.03	С	-	4	8	5	2	2	2	11	*		 		
CP3	5.00	11.03	С	-	4	8	7	1	2	2	12	*			 	
CP3	6.00	10.03	С	-	2	5	11	6	5	5	27		k	r		
CP3	7.00	9.03	С	-	3	4	5	5	7	8	25		k	r		
CP3	8.00	8.03	С	-	5	5	6	7	7	8	28	1	k	r ¦	 	
CP3	9.00	7.03	S	-	2	3	5	5	6	8	24	1	*	1	 	
CP3	10.00	6.03	S	-	6	5	2	1	1	2	6	*	 		 	
CP3	11.00	5.03	С	-	4	5	6	6	5	6	23	1	*		 	
CP3	12.00	4.03	С	-	9	9	8	10	9	10	37		 	1	*	
CP3	13.00	3.03	С	-	25/50		50/40				50/40					
Driller			Noil E	orrester			Remar	ke							1	
Hammer No.			SPT4				Equipm	ent checl	ked and c	alibration	carried out i	n accord	ance v	vith E	S EN	ISC
Energy Ratio	, Er (%)		75.00				22476-	3:2005								
Calibration D			29/01													
/- Blows/p		n (mm) ;	ļ				tandard F	Donotrotio	n Toot (S							

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level m OD	Туре	SWP (mm)	Seating Drive			Test	Drive		SPT 'N'	Uncorrected SPT					
Hole	m bgl				0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1	0 20	'N' 30	40	50	
CP4	1.20	15.78	s	-	4	3	4	7	5	5	21		*		 	 	
CP4	2.00	14.98	С	-	6	3	3	9	15	10	37			k	r ¦		
CP4	3.00	13.98	С	-	9	9	5	22	10	10	47		I I		 	*	
CP4	4.00	12.98	С	-	10	10	7	8	9	13	37			k	r		
CP4	5.00	11.98	С	-	2	2	2	3	2	2	9	*					
CP4	6.00	10.98	С	-	2	4	3	5	3	4	15		*		 		
CP4	7.00	9.98	С	-	2	1	1	1	1	1	4	*					
CP4	8.00	8.98	С	-	3	4	2	2	2	2	8	*			 		
CP4	9.00	7.98	s	-	2	1	1	-	1	-	2	*			 		
CP4	10.00	6.98	s	-	9	12	22	28/45			50/120				1	>	
CP4	11.00	5.98	S	-	25/50		50/50				50/50		I 		1	->	
CP4	12.00	4.98	S	-	25/30		50/50				50/50		I 			- A -	
	13.00	3.98	S	-	25/30		50/40				50/40					- A	
Driller			Neil F	orrester			Remar				·						
Hammer No.			SPT4				Equipm 22476-3		ked and c	alibration	carried out	in acco	ordance	with B	3 EN	IISC	
Energy Ratio	o, Er (%)		75.00														
Energy Ratio, Er (%)			29/01	/2015													

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	ا میما	Туре	SWP (mm)	Seating Drive			Test	Drive		SPT 'N'		Un	Uncorrected SPT		
INC	m bgl	m OD	1. he		0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1() 2	'N 203		50
P5	1.20	14.40	с	-	4	3	5	5	6	7	23			*	1	
P5	2.20	13.40	С	-	3	2	2	2	2	2	8	*		 		
P5	3.20	12.40	С	-	1	2	2	1	2	2	7	*			I 	
CP5	4.30	11.30	С	-	1	2	4	2	4	5	15		*			
CP5	5.20	10.40	С	-	2	4	6	3	3	3	15		*		 	
CP5	6.25	9.35	С	-	1	1	2	3	4	5	14		*		1	
P5	8.25	7.35	S	-	1	3	5	7	9	10	31			*		
CP5	9.75	5.85	S	-	12	13/23	30	20/27			50/102			 	1	>
CP5	10.30	5.30	s	-	25		50/41				50/41					>
Driller			Keith	Pember	ton		Remar	45								
				Pember	ton				ked and c	alibration	carried out i	n acco	ordan	ce with	n BS El	N ISC
Hammer No.			BL01 65.00				22476-3	3: 2005								
Energy Ratio				/2014												
/- Blows/p			ļ				tandard F									

Project No PN153396

Level m OD 11.08 9.28 8.28	S S S	SWP (mm) - -	0-75 (mm) 1 6 25/60	75-150 (mm) 1 9	0-75 (mm) 1 18 50/50	75-150 (mm) 2 21	150-225 (mm) 2 11/70	225-300 (mm) 2 /0	Value 7 50/220	10 *	20	'N' 30	40	50
9.28	S	-	1	1	1 18	2	2	2		*				
				9		21	11/70	/0	50/220		1			1
8.28	S	-	25/60		50/50									>
									50/50		1			->
					Equipm	ent checl	ked and c	alibration	carried out in	n accord	lance	with B	S EN	ISO
1					224/6-	3:2005								
	on (mm) a	SPT4 75.00 29/01 on (mm) after se	SPT4	75.00 29/01/2015	SPT4 75.00 29/01/2015	SPT4 Equipm 75.00 29/01/2015	SPT4 Equipment check 75.00 29/01/2015	SPT4 Equipment checked and c 75.00 29/01/2015	SPT4 Equipment checked and calibration of 22476-3: 2005 75.00 29/01/2015	SPT4 Equipment checked and calibration carried out in 22476-3: 2005 75.00 29/01/2015	SPT4 Equipment checked and calibration carried out in accord 75.00 29/01/2015	SPT4 Equipment checked and calibration carried out in accordance 22476-3: 2005 75.00 29/01/2015	SPT4 Equipment checked and calibration carried out in accordance with B 75.00 29/01/2015	SPT4 Equipment checked and calibration carried out in accordance with BS EN 22476-3: 2005 75.00 29/01/2015

Project No PN153396

L LUVE	Depth	Level	Type	SWP	Seatin	g Drive		Test	Drive		SPT 'N'		Unco	rrecte	d SP1	г
Hole	m bgl	m OD	i ype	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
P7	1.20	11.22	s	-	1	1	3	3	5	6	17		*	i i		
CP7	2.25	10.17	S	-	2	3	5	6	7	8	26	1	 	*	1	
CP7	3.20	9.22	s	-	1	2	4	6	7	8	25		 	*	 	
CP7	4.25	8.17	s	-	1	2	3	5	7	10	25	1		*		
CP7	6.40	6.02	С	-	13	12/34	39	11/15			50/90				 	- A -
CP7	7.15	5.27	С	-	25/30		50/19				50/19		1			- A-
Driller			Keith	Pember	ton		Remar Equipm		ked and c	alibration	carried out ir	n accord	dance	e with E	3S EN	ISO
Hammer No.			BL01				22476-3		0.10 0							
Energy Ratio			65.00													
Calibration D	libration Date 17/10/2014															

APPENDIX 3

Dynamic Sample Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample	e Types	Groundwater		Strata, Continued	
В	Bulk disturbed sample	Water Strike	∇	Mudstone	
BLK	Block sample	Depth Water Rose To			
С	Core sample	Depth Water Rose To	*		00000
D	Small disturbed sample (tub/jar)	Instrumentation		Siltstone	× ×
E	Environmental test sample			Metamorphic Rock	× × × × ×
ES	Environmental soil sample	Seal		Fine Grained	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
EW	Environmental water sample		2 2 2 2 4 ■ ■	Madian Castad	~~~
G	Gas sample		1 1	Medium Grained	~~~
L	Liner sample	Filter	5 -	Course Contract	~~~
LB	Large bulk disturbed sample	Tiller	1 1	Coarse Grained	$\sim\sim$
Р	Piston sample (PF - failed P sample)			Igneous Rock	
TW	Thin walled push in sample			Fine Grained	
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)	Seal		Medium Grained	++++ ++++ +++++ +++++ +++++
UT	Thin wall open drive tube sampler - 102mm diameter	Strata	Legend	Coarse Grained	
	with blows to take sample. (UTF - failed UT sample)	Made Ground Granular		Backfill Materials	
V	Vial sample				\sim
W	Water sample	Made Ground Cohesive		Arisings	×.
#	Sample Not Recovered	Concerne			X
Insitu T	Festing / Properties	Topsoil		Bentonite Seal	
CBRP	CBR using TRL probe				
CHP	Constant Head Permeability Test	Cobbles and Boulders		Concrete	- 4 - 4 - 7
COND	Electrical conductivity	Gravel	* <i>a z</i>		· **
HV	Strength from Hand Vane	Cluvol	° • • •	First Consult Filters	
ICBR	CBR Test		* 0 °	Fine Gravel Filter	
IDEN	Density Test	Sand			
IRES	Resistivity Test			General Fill	
MEX	CBR using Mexecone Probe Test	Silt	× × ×		·
PKR	Packer Permeability Test		* * *	Gravel Filter	
PLT	Plate Load Test		×		
PP	Strength from Pocket Penetrometer	Clay		Grout	
Temp	Temperature				4
VHP	Variable Head Permeability Test	Peat	NK2	Sand Filter	
VN	Strength from Insitu Vane		NIZ.	ound inter	000
w%	Water content		ALC.		
(All oth undraine	er strengths from ed triaxial testing)	Note: Composite soil typ by combined symbols	es shown	Tarmacadam	
S	Standard Penetration Test	Chalk		Rotary Core	
С	(SPT) SPT with cone			RQD Rock Quality De	
N	SPT Result	Limestone		(% of intact core FRACTURE INDEX	e >100mm)
-/-	Blows/penetration (mm)			Fractures/metre	:
7 -	after seating drive			FRACTURE Maximum SPACING (m) Minimum	
-*/-	Total blows/penetration	Sandstone		NI Non-intact	
(mm) ()	Extrapolated value			NR No core re AZCL Assumed zo loss	
-		Coal		(where core recovery is unkno assumed to be at the base of th	



G

Project	A5036	PORT (OF LIVER	RPOOL A	CCESS S	STUDY	Engine	er	ATKINS					Boreho Project		/S01 N153396	
0							Nationa	al Grid	333211.8	4 E							
Client Sampl		IS LIMI	FED	Prope	rtios		Coordin Strata	nates	397299.1					Ground	Level 4	.83 Scale 1	m OD
-	ing	Sample	Depth Cased &	Strength											Dauth		Level
Depth		Туре	(to Water)		%		Descrip	otion							Depth	Legend	m OD
							Grass fine bricl	s over 1 to med:	MADE GROU ium sand.	ND: Da Grave	rk bro l is a	wn silt ngular	y grave fine of	lly	0.20		4.63
							MADE	GROUND	: Greyish rse sand	brown	very	silty v	ery gra	velly			× × ×
							\ conte	ent of l	brick and ow boulde	l concr	ete.	angurar	CODDIE	/	0.80		4.03
		F							En	d of B	orehol	e			F		
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Boring	1	<u> </u>				Progr	266				Grou	ndwate	r		F		
Depth	Hole		Technique	9	Crew	Depth	Depth	Depth to	Date	Time	Depth	Depth	Rose to	in Mine	Depth		rks on
0.90	Dia 0.40		tion Pit		PB/JG	of Hole G.L.		Water	07/10/15 07/10/15		Struck	Cased		Mins	Sealed	None	dwater
						0.90			07/10/15	18:00						encounte	red.
											l						
Remai	rks 💾	The Winto the	ndow Sam presenc	nple Bo ce of b	rehole uried d	was te concret	rminate e and f	ed with: the rig	in the in was move	specti d to W	on pit S01A.	at a d	lepth of	0.90m	due Log	ged by	JG
Symbols a abbreviati	and	Backfi	ll detai	ls fro	m base	of hol	e: aris	sings u	p to grou	nd lev	el.				Figu		1 of 1 21/01/2016
explained accompar	on the																
key sheet															<u>e</u>	elet	Miss
are in me	tres.	Logged in	accordance	with BS59	30:1999 +	A2:2010										7	

roject	A503	5 PORT (OF LIVEF	RPOOL A	CCESS S	STUDY	Enginee		ATKINS					Boreho Project	No i	NS01A PN15339		
Client Sampl		NS LIMI	FED	Prope	rties		Nationa Coordin Strata	ates	333207.3 397291.6					Ground	Level	6.98 Scale	m OI	2
Depth	<u> </u>	Sample	Depth Cased &	Strength	w	SPT N	Descrip								Depth	Lege	d Lu	eve
Boptii		Туре	(to Water)	kPa	%		Becomp								_ G.L.		n	
0.20- 0.20 0.20 0.50 0.30 0.50 0.70- 1.00 1.00	- 0.70 - 1.20 - 1.65	Type B ES D ES D ES V V V V	(DRY)	PID: PID:	% =0.7ppn =0.3ppn =1.0ppn	n.	Grass fine brick MADE fine conte Betwe	over 1 to med: GROUND to coan nt of 1 en 1.00	MADE GROU ium sand. : Greyish prick and 0 and 1.2 ith fragm En	Grave brown with a concr Om, cr ents o	l is an very : high a ete. eosote	ngular silty v angular odour. 1.	fine of ery gra cobble	velly				<u>1 OL</u> 6.: 5.:
Boring	,					Progra		Depth to				ndwate	1	in			marks of	
Depth	Hole Dia		Technique	е	Crew	Depth of Hole		Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed		marks or oundwate	
1.20 1.65	0.40	Inspect Dynamic			PB/JG PB/JG	G.L. 1.65		1.25	07/10/15 07/10/18	08:00 18:00	1.20					No ri	se.	
Remar Symbols a abbreviati explained accompar acy sheet All dimens	and ons are on the nying	ES sam	le = 1	x vial	. 1 x r	lastic	iar an	d 1 amb	depth of ber jar seal up t						evel. ^{Fig}		JG 1 of 21/01/2	2016

iont							National		333247.9					Project		153396	
ient ampl		IS LIMIT	ED	Dropo	rtioc		Coordina Strata	ates	397266.6					Ground	Level 7		n OD
	ing	Sample	Depth Cased &	Prope Strength		SPT N										Scale 1:	50 Level
Depth		Туре	Cased & (to Water)		%	SFIN	Descript	ion							Depth	Legend	m Ol
0 20-	- 0.50	-					Grass	over !	TOPSOIL:	Dark b	rown sa	andy si	lt.		G.L. 0.15		7. 6.
0.20- 0.20 0.20	- 0.50	B ES		PID=	=3.1ppn	n			: Brown s l is angu				lly fin	e	0.40		6.
0.50 0.50		D ES					MADE	GROUND	: Black s	andy s	lightly	y grave		/	-		
0.50 0.60- 1.00	• 1.20	- B - D		PID=	=47.2pp	m			ngular fi lass, pla						-		
1.00		ES		PID=	=205.0p	pm									-		
1.20-	• 1.23	-	(DRY)		_	50/20									1.65		5.
		Ę							En	d of B	orehole	2			-		
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oring	,	: I	:	•		Progr		Jonth to				dwate	· · · · ·	In	Donth	Dome	10.05
epth	Hole Dia		Techniqu		Crew	Depth of Hole	Depth I Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarl Ground	
L.20 L.65			cion Pit Sample		SJ/MJ SJ/MJ	G.L. 1.65		DRY	08/10/15 08/10/15	08:00 18:00						None encounter	red.
-	ko 💶	The Wi-	ndow car	nnle Por	cebol c	wae +-	rminato	- + - F	denth of	1 65-	due +		structi	07			
emar		Backfil	ll detai	ils from	n base	was te of hol	e: aris:	ings u	depth of p to grou	nd lev	el.	, an ob	structl			5	G
	ons are														Figu		of 1 1/01/201
ompar																	_0
sheet															(1)-	olech	Inlia

NI:							Nationa	I Grid	332729.0	1 E				Project		N153396	
lient Sampl		IS LIMIT	ED	Prope	rtios		Coordin Strata	ates	397858.8					Ground	Level 1		n OD :50
	ing	Sample	Depth Cased &	Strength		SPT N									D		Level
Depth		Туре	(to Water)		%		Descript	tion							Depth G.L.	Legend	m OE
0.20		ES					Grass	over !	TOPSOIL:	Dark b	rown sa	andy si	lt.		0.20	ť	10.9
0.20 0.50 0.50		D ES			=1.5ppr			Grave	: Dark br l is angu						0.35		10.
1.00 1.00	• 1.20	В D ES			=2 . 5ppr		fine	to med:	: Very lo ium sand. linker an	Grave	l is a	ngular	fine to		-		
	1.65 1.70	ם	(DRY)	PID	=2 . 7ppr	s1/450											
1.70-	2.00 2.00 2.45	_ ES _ D _	2.00 (DRY)	PID	=1.0ppr	s5	At 2.	00m, be	ecomes si	lty.							
	· 2.70 · 3.00	D ES															
2.70-	· 3.00 · 3.45	D	2.00 (DRY)	PID:	=0.7ppr	s10		1			h. h				- - 3.10		8.
	· 3.70	- - D			33				to loose lty fine				ally gr	ey	-	×	
3.70-	· 4.00 · 4.00 · 4.45	- ES - D	2.00 (DRY)	PID	=0.9ppr	n S3										× · · · · · · · · · · · · · · · · · · ·	
	· 4.70 · 5.00	- D 			344		Dark 1	brown s	spongy fi	brous	PEAT.				4.30	alla alla	6.
	5.00			PID	=1.1ppr	n.									- - 5.00		6.
Boring		- - - -				Progre	222				Groun	ndwate	n r		- - - -		
Depth	Hole Dia	-	Technique	9	Crew	Depth of Hole	Depth	Depth to Water	Date	Time	Depth Struck	Depth		in Mins	Depth Sealed	Remar Ground	
1.20 5.00	0.40	Inspect Dynamic	ion Pit	:	SJ/MJ SJ/MJ	G.L. 4.45			08/10/15 08/10/15	08:00 18:00		Cased		CIIIVI	Jeaneu	None encounte	
Ymbols a bbreviati xplained ccompar ey sheet.	and ons are on the nying	A 50mm 3.00m w	dow Sam standpi vith flu l up to	nple Bo: .pe was .sh lock o 3.70m	rehole instal kable <u>p</u> , bento	was te lled to protect onite s	rminate 3.00m ive cov eal up	d at 5 with a er. Bao to 3.00	.00m afte geowrapp ckfill de Dm, grave	ed slo tails	from ba	ection ase of	from 1. hole: c	00m to collaps	ed Figu seal	re 1	յ L of 1 21/01/2016

Al dimensions are in metres. Logged in accordance with BS5930:1999 + A2:2010

Project A5036 PORT OF LIVE	RPOOL ACCESS STUDY	Engineer	ATKINS	Borehol Project N	-	VS03 N153396	
Client ATKINS LIMITED		National Grid Coordinates	333115.86 E 397896.98 N	Ground	Level 1	5.63	m OD
Sampling	Properties	Strata				Scale 1	:50
Depth Sample Depth Type (to Wate	SPIN SPIN	Description			Depth	Legend	Level m OD
0.15-0.55 в		Grass over	TOPSOIL: Dark brown sandy silt.		G.L. 0.15		15.63 15.48

$\begin{array}{c} 0.15- \ 0.55\\ 0.20\\ 0.50\\ 0.50\\ 0.70- \ 1.20\\ 1.00\\ 1.20- \ 2.15\\ 1.40- \ 1.70\\ 1.40- \ 1.70\\ 1.40- \ 1.70\\ 1.40- \ 1.70\\ 2.00- \ 2.45\\ 2.15- \ 3.00\\ 2.40- \ 2.70\\ 2.60- \ 2.80\\ 2.60- \ 2.80\\ 2.60- \ 2.80\\ 2.60- \ 2.80\\ 3.00- \ 3.45\\ 3.40- \ 3.70\\ 3.70- \ 4.00\\ 4.20- \ 4.70\\ 4.20- \ 4.70\\ 4.70- \ 5.00\\ 4.70- \ 4.90\\ \end{array}$	ES PID=0 - D - ES PID=0 - ES PID=0 - ES PID=0 - D (DRY) - ES PID=0 - D (DRY) - B - ES PID=0 - D 2.00 - D 3.00 - ES	0.3ppm 0.1ppm 13 S8 0.3ppm S8 22 0.1ppm S0/450 (0.1ppm 23 S8 0.9ppm 15	MADE GROUND: Dark grayish brown slightly gravelly sity fito coarse sant. Graval is angular fine present. 0.55 15.08 Loose dark brown sity fine to medium SAND. Between 0.55 and 0.65m, brick fragments fallen into samples from above strata. At 1.00m, becomes orangish brown. 0.55 13.08 Soft to firm yellowish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of various lithologies. At 2.50m, becomes reddish brown. 2.15 13.48 Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of various lithologies. 3.00 2 Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of various lithologies. 5.00 10.63 End of Borehole 5.00 10.63
Boring Doath Hole	Tartuinu a	Progrès	Denth Denth in Denth Remarks on
Depth Dia 1.20 0.40	Inspection Pit Pi	Crew of Hole (PB/JG G.L.	Cased Water Date Time Struck Cased Nose to Mins Sealed Groundwater 06/10/15 08:00 3.00 Wet stratum
5.00 0.10	Dynamic Sampler P	РВ/JG 5.00	3.00 DRY 06/10/15 18:00
Remarks Symbols and abbreviations are explained on the accompanying key sheet. All dimensions are in metres.	Inspection pit hand ex. The Window Sample Borel Backfill details from 1 0.30m, arisings up to 0 Logged in accordance with BS5930	base of hole: ground level.	.20m depth. minated at 5.00m after the borehole collapsed in to 4.60m. Logged by JG : collapsed material up to 4.60m, bentonite seal up to Figure 1 of 1 :

oject	A5036	PORT	OF LIVEP	RPOOL AC	CCESS S	STUDY	Enginee	r	ATKINS					Boreho Project		VSO4 N153396	
lient		S LIMI	red	i _			Nationa Coordin	ates	332753.4 398248.2					Ground	Level 1		m OD
Sampli	ing	<u> </u>	Denth	Proper			Strata									Scale	-
Depth		Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Descript	tion							Depth	Legend	mO
0.15-	0.60	в					Grass	over	TOPSOIL:	Dark b	rown sa	andy si	lt.	/	G.L. 0.15		14. 13.
0.20 0.20 0.50 0.50		ES D ES			=<0.1pp		coars concr coars	e sand ete. e of c	: Black g with a h Gravel is linker, b	igh co angul rick,	bble co ar to a	ontent subrour	of bric ded fin	k and e to			
0.50 0.60- 1.00	1.20	- - В - D		PID=	=0.1ppr	n.		-	. Ash pr : Reddish		grave	lly fin	e to me	dium	0.95 -		13.
1.00 1.00 1.20-	1.65	ES D	(DRY)	PID=	=0.3ppr	s11	\		l is angu : Loose t					/	1.20		12.
1.50-	1.80 1.80 1.90	- ES D		PID=	=0.4ppr	n.	sandy of cl	angul inker,	ar to sub brick an lt. Ash	angula d glas	r fine s. Loca	to coa	rse gra	vel	- - -		
	2.45	D	2.00 (DRY)			S4	5	-		-					- - -		
	2.70	ES		BID	=1.6ppr		MADE ash.	GROUND	: Grey si	lty fi	ne to 1	nedium	sand wi	th	2.40		11.
2.80-	2.90	D		PID-	-1.0pp		At 2.		ocket of			Lt.		/	2.70		11.
3.00-	3.45	D 	3.00 (DRY)			S15	\		: Grey sa : Medium			ng very	loose	/ black	3.00 		11.
	3.70 3.70	ES		PID=	=0.1ppr	n .	silty grave	sandy l of c	angular linker, b silt. A	to sub rick a	angula: nd gla:	r ⁻ fine ⁻	to coar	se	-		
	4.00		2.00			a 1		_		_					-		
4.00-	4.45 4.70 4.70	D - ES -	3.00 (DRY)	PID=	=0.4ppr	s1 1	At 4.	00m, v	ery loose	•							
4.70-	5.00	- - D													-		
5.00-	5.45 5.70 5.70	D ES	3.00 (DRY)	PID=	=0.3ppn	s3									- - - -		
5.70-	6.00	- - - D													- - -		
6.00-	6.45	D	3.00 (DRY)			S4									- - - - -		
		-							En	d of B	orehole	9			6.45		7.
		-													-		
		- - -													-		
															-		
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		- - -													-		
															-		
oring	Hole		Techniqu	e	Crew	Progr Depth	Depth		Date	Time	Depth	ndwate Depth	r Rose to	in	Depth		arks on
1.20 6.45			tion Pit	:	PB/JG PB/JG	of Hole G.L. 6.45		Water DRY	06/10/15 06/10/15	08:00	Struck	Cased		Mins	Sealed	Grou None encount	ndwater
		_	-														

Logged EES sample = 1 x vial, 1 x plastic jar and 1 amber jar Backfill details from base of hole: bentonite seal up to 0.30m, arisings up to ground level. Figure Symbols and abbreviations are explained on the accompanying key sheet.

1 of 1 21/01/2016

geolechnics

All dimensions are in metres.

Logged in accordance with BS5930:1999 + A2:2010

roject	A5036	PORT O	F LIVER	RPOOL AC	CESS S	TUDY	Enginee	r	ATKINS					Boreho Project		V S05 N153396	
lient		S LIMIT	ED	Dropor	tico		National Coordina	ates	333075.3 398213.4					Ground	Level 1		m OD
Sampli	ng	Sample	Depth	Proper Strength		SPT N	Strata									Scale 1	
Depth		Туре	Cased & (to Water)	kPa	%	SPIN	Descript	tion							Depth	Legend	Level m OE
0.00- 0.20 0.20 0.50- 0.50 0.50 0.80 1.00		B B B B B B B B B B B B B B B B B B B			=1.7ppm =0.5ppm		grave subrou MADE (coarse	lly sau unded : GROUND	TOPSOIL: ndy silt. fine to c : Very lo el of cli	Grave oarse ose bl	l is an of var: ack and	ngular ious li gular f	to tholog:	/	0.40		17.9
1.00 1.20- 1.30- 1.30- 1.50- 1.80- 2.00-	1.50 1.50 2.70 1.90	- D - ES - B - D - D	(DRY) 2.00 (DRY)		=0.6ppm	S1											
2.30- 2.30- 2.80-	2.50	ES		PID=	=0.6ppn				: Very lo						2.70		15.6
3.00- 3.30- 3.30- 3.50-	3.50 3.50	D ES D	3.00 (DRY)	PID=	=1.6ppm	s3 1			gravelly subangula								
4.00- 4.00- 4.00-	4.45 4.30	- - - D - ES -	4.00 (DRY)	PID=	=0.6ppm	S6	Clinke MADE (er, br: GROUND	: Black a ick, glas : Loose g	s and rey sl	potter ightly	y. silty	fine to	/ >	3.70 3.95		14.0
4.70- 5.00- 5.00- 5.00- 5.60-	5.45 5.60 5.60		4.00 (DRY)	PID=	=0.5ppn	S1	MADE (slight Grave	GROUND tly si l is an	with occ : Very lo lty very ngular to brick and	ose to gravel suban	loose ly fine gular :	orangi e to co fine to	ish brom barse sa b coarse	wn and.	f 4.30		
6.00-		- D	4.00 (DRY)			s10									- - - - - - - - - - - - - - - - - - -		11.9
									En	d of B	orehol	e					
Boring		-				Progre	222				Grour	ndwate	ar		-		
Depth	Hole Dia	-	Fechnique	e	Crew	Depth of Hole	Depth I Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Poso to	in Mins	Depth Sealed		rks on dwater
1.20 6.45	0.40	Inspect Dynamic			PB/JG PB/JG	G.L. 6.45			05/10/15 05/10/15		Clubh			141113		None encounte	
emaries with the second	nd ons are on the ying ions	A 50mm 5.00m w	standpi ith flu to 5.0 level.	pe was Ish lock Om, gra	instal able p vel fi	led to protect. lter u	ive cove	with a er. Bao	per jar geowrapp ckfill de entonite	tails	from ba	ase of	hole: 1	pentoni	te Figu	ire	JG 1 of 1 21/01/2016

Dynamic Sample -1 1/

roject	A5036	PORT C	OF LIVEF	RPOOL AG	CCESS S	STUDY	Engineer ATKIN	IS			rehole ject No	WS PN1	53396	
lient		S LIMI	'ED				Coordinates 39851	55.53 E 6.30 N			ound Level	13.	99 r	n OD
Sampl	ing	Sample	Depth Cased &	Prope Strength		SPT N	Strata					<u> </u>	cale 1:	
Depth		Туре	Cased & (to Water)		%	SPIN	Description				Dep		Legend	Level m OE
0.00- 0.20 0.20	0.40	B ES		PID=	=0.5ppr		Grass over TOPSO fragments of brid		n sandy si	lt with so	ome	5.L. 0.40		13.9
	1.20	B D ES			=0.4ppr		MADE GROUND: Dark some to many frag metal, brick and	ments and col			F	0.70		13.2
1.00 1.00 1.00		D ES	()		=0.4pp		MADE GROUND: Dark of brick and cond		wn silty s	andy cobbi	E			10
1.40-	1.65 1.90 1.90		(DRY)	PID=	=0.2ppr	-	MADE GROUND: Dark silt with some to brick, concrete a	many fragmen	nts of ash	, clinker	ndy ′	40		12.5
2.00-	2.45 2.50 2.50	D ES	2.00 (DRY)	PID=	=0.8ppr	S4	MADE GROUND: Blac	k ash with f:	ibres up t	o 7mm long		90		12.0
2.50-	2.80	- - D -					MADE GROUND: Firm gravelly clay wit				2	2.50		11.4
3.00-	3.45 3.70 3.70	- D - ES	3.00 (DRY)	PID=	=0.5ppr	s15	fragments of brid MADE GROUND: Blad brick, glass and	k ash with so	ome fragme		3	8.00		10.9
		- - - -					gravel to silt.							
4.00-	4.45 4.50 4.50	D - ES -	3.00 (DRY)	PID=	=0 . 5ppr	s1 1	MADE GROUND: Firm slightly gravelly				Ľ 4	.20		9. 9. 9.
	5.00	- D - - - ES					subrounded fine t MADE GROUND: Pre references)	co medium of	various li	thologies	· /-	5.00 V		8.
5.00-	5.45	£3 - - -	3.00 (DRY)	PID=	=0.6ppr	s3 1	MADE GROUND: Brow brick, concrete a		some fragm	ents of		.00 🗹		0.
5.70-	6.00	- D - D - D	3.00			S4	MADE GROUND: Blac brick, glass and gravel to silt.							
0.00-	0.45		(DRY)			54								7
		- - - -						End of Borel	hole		- 6	5.45		7.
		- - - -												
		- - - -												
		-									-			
		- - - -												
		+ - - -												
		- - - -												
Boring						Progre	SS	Gr	oundwate	r				
Depth	Hole Dia		Technique	Э	Crew	Depth of Hole	Depth Depth to Det	De	pth Depth uck Cased	Rose to	in Dept ⁄lins Seale		Remar Ground	
1.20 6.45	0.40	Inspect	cion Pit Sample	:	PB/JG PB/JG	G.L. 6.45	06/10	30	.00	, in	Juino Seale	M	edium in o rise a inutes.	nflow,

Anspection pit hand excavated to 1.20m depth. ES sample = 1 x vial, 1 x plastic jar and 1 amber jar A 50mm standpipe was installed to 5.70m with a slotted section from 2.70m to 5.70m with flush lockable protective cover. Backfill details from base of hole: collapsed material up to 5.70m, gravel filter up to 2.70m, bentonite seal up to 0.20m, concrete up to ground level. Symbols and abbreviations are explained on the accompanying key sheet.

Logged by	00
Figure	1 of 1
-	21/01/2016

geolechnics

All dimensions are in metres. Logged in accordance with BS5930:1999 + A2:2010

roject	A5036	PORT C	F LIVE	RPOOL AC	CCESS S	STUDY	Engineer		ATKINS					Boreho Project		S07 1153396	
Client Sampli		IS LIMIT	ED	Prope	rties		National Coordinat		333150.4 398491.6					Ground	Level 17	Scale 1	m OD
Depth	5	Sample Type	Depth Cased & (to Water)	Strength		SPT N	Descriptio	on							Depth	Legend	Level m OD
0.50- 0.50 0.50 1.00 1.00	0.50	- ES - B - B - D - ES - D - ES		PID= PID=	=0.2ppn =0.7ppn	a.	gravel: subround MADE GI silt with to cobb various MADE GI	ly sar nded f ROUND: ith ma ble si s lith ROUND:	TOPSOIL: hdy silt. Fine to c Dark br any fragm Lze. Grav hologies. Very lo	Grave oarse own sl ents o el is ose bl	l is an of var: ightly f brich angula: ack dor	ngular ious li gravel k and c r fine mestic	to ithologi Lly sand concrete to coar refuse	ly sup cse of	G.L. 0.30 0.80		17.5 17.2 16.7
1.50- 1.50- 1.70-	1.70 1.90 2.45		(DRY) 2.00 (DRY)		=17.0pr	S5			sh, paper timber wi								
2.50- 2.70-		_ ES - D - D	3.00 (DRY)	PID=	=7.1ppn	s5											
3.50-	3.70 3.70 3.90	- - - ES - - D	(DAI)	PID=	=2.4ppn	n.											
4.00- 4.00-	4.45 4.50 4.50	D ES 	4.00 (DRY)	PID=	=16.4pp	S24 m	At 4.10	Om cok	ble size	brick	fragmo	ent.					
	4.90 5.45	- D - - - D -	5.00 (DRY)			s2									- - - - -		
5.30- 5.65- 5.65-	5.65 5.65 6.00 6.00 6.45	- ES - ES - D	6.00 (DRY)		=1.6ppn =1.4ppn 16	•	fine to of time At 5.45 Grey si	o medi ber. 5m bec lightl is ar	Very lo ium sand, comes gre Ly gravel ngular fi	initi yish b ly sil	ally w rown ty find	ith som	ne fragm Darse SA	ND.	5.30		12. 11. 11.
		- - - - - - - -					slight: subrou	ly gra nded f	Ef orangi avelly CL fine to m wn silty En	AY. Gr edium fine t	avel is of var:	s angul ious li um SANI	lar to ithologi	.es.	L 6.45		11.
Boring		<u> </u>				Progre	èss				Grour	ndwate	er		<u> </u>		
Depth	Hole Dia		Techniqu	e	Crew	Depth of Hole	Depth De	epth to Water	Date	Time	Depth Struck	Depth Cased	Pose to	in Mins	Depth Sealed	Remai Ground	rks on dwater
1.20 6.45		Inspect Dynamic			PB/JG PB/JG	G.L. 6.45	4.00	DRY	05/10/15 05/10/15							None encounte	red.
Remar ymbols a bbreviatio kplained ccompan ey sheet. Il dimens	and ons are on the lying	Inspect ES samp Backfil	tion pit ble = 1 l detai	t hand e x vial, ils from	excavat , 1 x p n base	ced to plastic of hol	1.20m deg jar and e: benton	pth. 1 amk nite s	per jar seal up t	o 0.30	m, ari:	sings ı	up to gr	cound le	evel. Figu	e :	JG L of 1 21/01/2016

			OF LIVE	RPOOL AC		,	Engineer	ATKINS					Boreho Project		S08	
Client Sampli		IS LIMI	FED	Proper	tios		National Grid Coordinates Strata	333075.6 398936.1					Ground	Level 12	. 28 Scale	m OD
	ing	Sample	Depth	Strength		SPT N										Level
Depth		Туре	Cased & (to Water)		%	51114	Description							Depth	Legend	m OD
0.00- 0.20 0.20 0.50 0.50 0.50	0.90	- B - ES - D - ES			=0.0ppn =0.0ppn		very silty of brick. coarse of	TOPSOIL: fine to m Gravel is various li	edium angul tholog	sand wi ar to s ies.	ith som subroun	e fragm ded fir	nents ne to	G.L.		12.2
1.00 1.00 1.00 1.20-	1.20	B D ES B	1 00	PID=	=0.0ppn		MADE GROUN sand.	ID: Yellowi	.sh bro	wn slig	ghtly s	ilty fi	ne			
1.70- 1.80- 1.80- 2.00-	1.65 1.80 2.00 2.00 2.60 2.45		1.20 (DRY) 2.00 (DRY)	PID≠	=0.0ppm	\$12 \$10	organic la and potter	D: Firm da andy silt yers and c y. Gravel thologies.	with m occasio is ang	uch ash nal fra	n and c agments	linker, of bri	some .ck	1.70		10.5
2.80- 2.80- 3.00-	2.80 3.00 3.00 3.60	- D - ES - B	3 00	PID=	=0.0ppn		MADE GROUN							- - - 3.00		9.2
3.60- 3.80-	3.45 3.80 4.00	D D ES	3.00 (3.25)			S1		om fine sa of brick,				with s	some		*	
4.00-	4.00 4.45 4.70	- D - D	4.00	PID=	=0.0ppm	s6	Soft dark	brown sand	1. QTT M					4.10	×····	8.1
	4.70		(3.00)		30		Dark brown		_		edium S	AND.		4.40	× × × ×	7.8
4.70- 5.00- 5.00-	5.00 5.00 5.45 5.50	- ES - D - D	4.00 (3.70)	₽ID≠	=0.0ppn 20	s22	Below 5.00 yellowish sand.	m: Becomes	mediu	m dense	e brown	and	coarse	- - - - - - -	×	
	6.00			PID=	=0.0ppn	h		Er	ld of B	orehole	2			6.00	×	6.2
Boring	Hole		- · ·			Progro Depth	èSS Depth Depth	to p.		Grour Depth	ndwate Depth	1	in	Depth	Rem	arks on
Depth 1.20 6.00	Dia 0.40	Inspect	Technique tion Pit c Sample	5	Crew SM/JB SM/JB	G.L. 6.00	Cased Wate			Struck	Cased 3.00	Rose to	Mins	Sealed	Grou	ndwater flow, no ter 20
Symbols a bbreviation xplained ccompan ey sheet. Ill dimens re in met	and ons are on the lying ions	Backfil	tion pit ple = 1 11 detai accordance	ils from	n base	of hol	1.20m depth. jar and 1 a e: bentonite	mber jar seal up t	:0 0.30	m, aris	sings u	p to gr	cound le	evel. Figur	\sum	JG 1 of 1 21/01/2016

Project		5 PORT C					Engineer		ATKINS					Boreho Project		/S09 153396	
Client		IS LIMIT	ED				National Coordina		333261.8 398770.2					Ground	Level 1		n OD
Sampli	ng		Liopth	Proper			Strata									Scale 1:	50
Depth		Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Descripti	ion							Depth	Legend	Level m OD 16.3
0.00- 0.20 0.20 0.30- 0.50 0.50 0.50 0.80- 1.00	0.80	- B - ES - B - D - ES - B - D			=0.0ppn =0.0ppn		MADE G sandy sandst	ROUND silt w	Dark gr i Dark gr with frag asonry. G rse of va	eyish ment o ravel	brown s f bricl is angu	slightl c, conc ilar to	y grave	lly	0.30		16.0
1.00 1.00 1.20- 1.23- 1.40- 1.40- 1.80- 1.90- 2.00-	1.65 1.70 1.70 1.90 3.30 2.45	- ES - D - ES - D - B - D	1.20 (DRY) 2.00 (DRY)		=0.0ppn =5.0ppn	S8	timber and br gravel substa MADE G occasi	r, glas rick fr . Pocl nce. ROUND onal r	: Loose d ss, metal ragments kets of a : Firm sl fragments	, pape with o soft ightly of br	r, plas ccasion white p grave: ick. G	stic, c nal san paste-1 lly san ravel i	eramic, d and ike dy silt s angul		1.30		15.0 14.5
2.40- 2.40- 2.70- 3.00-	2.70 2.90 3.45	_ ES	3.00 (DAMP)	PID=	=0.0ppn	s4			rse predo						3.30		13.0
3.40- 3.70- 4.00- 4.30- 4.30- 4.70-	3.70 3.90 4.45 4.70 4.70		4.00 (MOIST)		0.0ppn	S4	timber	;, glas	ragments	, pape	r, plas	stic, c	eramic,	ash			
5.00- 5.30- 5.30- 5.70-	5.70 5.70		4.00 (5.25)	PID=	=0.0ppm 20	s34	Dense SAND.	dark 1	orown sli	ghtly	silty :	fine to) medium	l	5.25	×	11.1
									En	d of B	orehole	3			- 6.00		10.3
															-		
Boring	Hole					Progr Depth	èss Depth D	Depth to			Grour Depth	ndwate Depth	1	in	Depth	Remar	ks on
Depth 1.20 6.00	Dia 0.50	Inspect Dynamic		:	Crew SM/JB SM/JB	of Hole G.L. 6.00	Cased	Water	Date 02/10/15 02/10/15		Struck	Cased 4.00	Rose to	Mins 20	Sealed	Ground Slow inf	dwater
Remari Symbols a bbreviatio explained o ccompan ey sheet.	nd ons are on the ying	A 50mm 3.50m w flooded	standpi vith flu l Back	.pe was ish lock fill de	instal able p tails	led to protect from b	ive cove ase of h	rith a er; 19, ole: b	per jar geowrapp /11/2015: pentonite up to gr	Unabl seal	e to ma up to 3	onitor,	boreho	le loca	up	re 1	7G L of 1 11/01/2016

							National Gr		333254.6	6 E							
lient Sampli		IS LIMIT	ED	Prope	rties		Coordinate Strata		399188.6					Ground	Level 10	0.80 Scale 1	m OD
Depth		Sample	Depth Cased &	Strength	w	SPT N	Description								Depth	Legend	Leve
		-	(to Water)	kPa	%		Grass ov		OPSOIL: 1	Dark b	rown si	lty fi	ne to m	edium	G.L.		m Ol 10.
0.20 0.20 0.30- 0.50	0.60	ES B D		PID	=0.0ppr	n .								and	0.30		10. 10.
0.50 0.50 0.60- 1.00	1.20	ES B D		PID	=0.0ppr	n.	MADE GRO medium s and occa	OUND:	Dark browith man	ownish y frag	grey s	silty f	ine to	/	- - - -		
1.00 1.00 1.20-	1.65	ES D	1.20 (DRY)	PID	=0.0ppn	s4	At 1.20m MADE GRO fragment	OUND :	Firm da	rk gre	y sandy		with so	me	1.40		9.
1.80- 1.80-	1.80 1.95 1.95		(2212)	PID	=2.5ppr	n .									2.00		8.
2.00- 2.00- 2.00-	3.00 2.45 2.20 2.20 2.70	- B - D - ES - D	2.00 (MOIST)		19 =0.0ppn	S9	Loose da organic							wn	-	×	
	3.45	ם - - - ם	2.00 (2.30)			S5									- - -	×···	
		-	(2.30)												- - -	×	
		-													4.00	× · · · · · · · · · · · · · · · · · · ·	6.
		-							En	d of B	orehole	2			- - -		
		-													- - -		
		- - -															
		-													- - -		
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		-													- - - -		
		-													- - -		
		-													-		
oring	Hole			:		Progr Depth		th to	_		Grour Depth	dwate Depth		in	Depth	Rema	rks on
epth 1.20 4.00	Dia 0.40	Inspect Dynamic		:	Crew SM/JB SM/JB	of Hole G.L. 4.00	Cased Wa	ater (Date 01/10/15 01/10/15	Time 08:00 15:30	Struck 2.10	Cased 2.00	Rose to	Mins 20	Sealed		dwater
mbols a	ind	ES samp	le = 1	x vial	, 1 x <u>r</u>	lastic	1.20m dept rminated a jar and 1 2.20m wit	. ambe	er jar						Logg Figu	re	JG 1 of 1
breviatio plained compan y sheet.	iying	2.20m w	ith flu l up to	sh loc 3.30m	kable p , bento	protect	ive cover. eal up to	Back	kfill de	tails	from ba	ase of	hole: c	ollapse	seal		21/01/201

roject _{A503}	D PORT	OF LIVE	RPOOL AG	CCESS S	STUDY	Engine	51	ATKINS					Boreho Project		S11 153396	
lient ATKI	NS LIMI	TED				Nationa Coordin		333588.2 399109.2					Ground	Level 14		n OD
Sampling	1	Dopth	Prope			Strata	3								Scale 1:	50
Depth	Sample Type	Cased & (to Water)		¥ %	SPT N	Descrip	otion							Depth	Legend	
	- B - ES - D - ES - D - ES - D - B - D - B - D - B - D - ES - D - ES - D - B - D - B - B - D - B - B - B - B - B - B - B - B - B - B	Caseu &	Strength kPa PID= PID= PID= PID=	w	a s15 s22	Descrip Grass MADE subro Firm Reddi angul lithe Firm sandy predd Firm CLAY lithe At 1 silty Stiff Grave	GROUND GROUND y fine to bunded soludies reddish reddish reddish y CLAY. Solucies . Gravel ologies .85m: 50 y fine to f reddish y fine to solucies .85m: 50 y fine to .85m: 50 y fine to	h brown s wn gravel subrounde h brown s Gravel i ly of san h brown s l is angu Omm layer to coarse sh brown ery angul (possibl	a brown a sand. ledium lightl ly ver d fine lightl s angu dstone lightl lar fi c of re s sand slightl ar fin	sligh Grave of ash y sandy y clay to med y grav lar fin y sand ne to r ddish l and gr ly sand e to c hered n	tly grat l is an , brick y CLAY. ey SAND dium of elly sa ne to c y sligh medium brown s avel. dy grav oarse p mudston	velly v gular t and va c. Grave variou ndy to coarse tly gra of vari lightly relly CI redomin	very very very very very very very	Depth G.L. 0.30 0.90 1.20 1.35 2.60		50 Leve m Ol 14. 13. 13. 13. 13. 10.
Boring Depth Hole	_	Tochnia		Crow	Progr Depth	Depth	Depth to	Data	Time	Depth	ndwate Depth	1	in	Depth	Remar	
Dia Dia 1.20 0.50		Techniqu tion Pit c Sample	5	Crew SM/JB SM/JB	of Hole G.L. 3.50	Cased	Water	Date 02/10/15 02/10/15		Struck 1.85 3.30	Cased	Rose to	Mins	Sealed	Ground Wet mater Slow infl rise after minutes.	water ial low, n

Remarks At	Inspection pit hand excavated to 1.20m depth. Set BES sample = 1 x vial, 1 x plastic jar and 1 amber jar	Logged by	JG
Symbols and abbreviations are	Unable to drive sample barrel past 3.50m Backfill details from base of hole: bentonite seal up to 0.30m, arisings up to ground level.	Figure	1 of 1 21/01/2016

<u>geolecimies</u>

explained on the
accompanying
key sheet.

All dimensions are in metres.

metres. Logged in accordance with BS5930:1999 + A2:2010

Project							Enginee		ATKINS					Boreho Project		/S12 1153396	
Client		S LIMIT	ED	Deces	.		National Coordina	ates	333478.8 399448.8					Ground	Level 11		n OD
Sampli	ng	Sample	Depth	Proper Strength		ODT N	Strata									Scale 1:	
Depth		Туре	Depth Cased & (to Water)	kPa	%	SPT N	Descript	ion							Depth G.L.	Legend	Level m OD 11.41
0.00- 0.20 0.40- 0.50 0.50 0.50 0.90- 1.00	0.90	- B - ES - D - B - D - ES - B - D			=0.0ppn =0.0ppn 10		slight timber medium Orangi Medium SAND	tly gra r. Grav n predo ish bro n dense locally	COPSOIL: avelly sa rel is an ominantly own silty e yellowi y becomin	ndy si gular of sau fine sh broug dark	lt with to subm ndstone to medi wn silt brown	ium SAN	fragmer l fine t D. to med ganic.	.o/	0.40	× · · · · ×	11.41
1.00 1.00 1.20- 1.40 1.70- 1.80- 1.80- 2.00-	1.80 2.00 2.00	- ES - D - B - D - ES -	(DRY) 2.00 (DAMP)		=0.0ppn 19 =0.0ppn	S20			Slightl					lvel	- - - - - - - - -	× · · · · · · · · · · · · · · · · · · ·	
2.80- 2.80- 3.00-	3.00	- - - - - - - - -	3.00 (2.30)	₽ID≠	=0.0ppn	a S12									- - - - - - - - - -		
3.80- 3.80- 4.00-	4.00	ES	3.00 (2.30)	PID=	-0.0ppn	s16			Er	d of B	orehole	2			4.00	× · · · · ×	7.41
Douine													-				
Boring	Hole	-	Faalers'		0	Progr Depth		Depth to	D-t	T2	Grour Depth	ndwate Depth	1	in	Depth	Remar	ks on
Depth 1.20 4.45	Dia 0.40	Inspect Dynamic		:	Crew SM/JB SM/JB	of Hole G.L. 4.45	Cased	Water	Date 01/10/15 01/10/15	Time 08:00 16:00	2.00	Cased	Rose to	Mins	Sealed	Ground Slow inf rise afte minutes.	lwater low, no
Remark Symbols ar abbreviatio explained o accompany key sheet. All dimensi are in metro	nd ons are on the ying ions	The Win	dow Sam 1 detai	ple Bor ls from	ehole base	was te of hol		1 at a	per jar depth of seal up t					round le	evel. ^{Figu}	re 1	rg of 1 1/01/2016

Project No PN153396

Hole	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'	- I	Uncor		d SP1	Г
100	m bgl	m OD	1,900	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
VS01A	1.20	5.78	s	-	2	6	11	12	10	10	43				*	
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Driller	1		Paul I	L Bridges			Remar			LI						
Hammer No.			MGW	S5			Equipm 22476-		ked and c	alibration	carried out in	n accord	ance	with E	S EN	ISO
Energy Ratio	o, Er (%)		82.00													
Calibration [Date		17/04	/2015												
/- Blows/p	enetratio	n (mm) a	after se	ating		S - S	tandard F	Penetratic	on Test (S	PT)						
	ows/pene	etration (mm)			C - S	PT with c				Ē	30		ដ្រា	កាំ	æ
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Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Jncor		d SP1	r -
	m bgl	m OD	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
VS01B	1.20	5.89		-	25/10		50/20				50/20		 	 	 	>
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Driller			Steve	Jones			Remar	ks					1			1
Hammer No.			MGW					ent checl	ked and c	alibration	carried out in	n accord	ance	with B	S EN	ISO
Energy Ratio			82.00					. 2005								
Calibration [Date		17/04	/2015												
			!													
			- (1 -	- 4'-					- T · / 2							
	enetratio ows/pene	etration (I	mm)			C - S	PT with c		n Test (S	PT)		ÌŒ	ے ا	-^		

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Unc	orrecte	ed SP1	Г
	m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1	0 20	'N') 30	40	50
VS02	1.20	9.97	s	-	1	-	-	-	-	-	1/450	*		l l		
VS02	2.00	9.17	s	-	2	2	2	1	2	-	5	*				
VS02	3.00	8.17	S	-	1	1	2	2	3	3	10		*		 	
WS02	4.00	7.17	S	-	1	-	1	-	1	1	3	*			 	
Driller	1		Steve	Jones			Remar							itle		
Hammer No.			MGW	S5			Equipm 22476-:		ked and c	alipration	carried out	in acc	ordanc	e with	DO EN	150
Energy Ratic	o, Er (%)		82.00													
Calibration I	Date		17/04	/2015												

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level	Type	SWP	Seatin	g Drive		Test	Drive		SPT 'N'		Unco		d SP1	Г
noie	m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
VS03	1.20	14.43	s	-	1	2	2	2	2	2	8	*	l I	 	i i i	
VS03	2.00	13.63	S	-	1	-	2	1	2	3	8	*		 	 	
VS03	3.00	12.63	S	-	-	-	-	-	-	-	0/450	*		 	 	
WS03	4.00	11.63	S	-	-	-	1	2	2	3	8	*				
Driller			Paul I	L Bridges			Remar			······						
lammer No.			MGW	S5			Equipm 22476-3		ked and c	alibration	carried out	in accor	dance	with E	S EN	ISC
Energy Ratio	o, Er (%)		82.00													
Calibration I	Date		17/04	/2015												

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		U	Inco		d SP1	Г
	m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value		10	20	'N' 30	40	50
VS04	1.20	12.84	s	-	3	3	2	3	3	3	11		- *	 	l L L		l I I
VS04	2.00	12.04	S	-	1	-	1	2	1	-	4	*	1		l I I	1	1
VS04	3.00	11.04	S	-	1	3	3	4	4	4	15		*				
VS04	4.00	10.04	s	-	1	-	-	1	-	-	1	*	 				
VS04	5.00	9.04	S	-	1	-	-	1	1	1	3	*	1				
VS04	6.00	8.04	S	-	1	1	1	1	1	1	4	*	1	 			
Driller			Paul	Bridges			Remar	ks									
Hammer No.			MGW					ent checl	ked and c	alibration	carried out	in acc	corda	ance	with E	BS EN	ISC
), Er (%)		82.00				224/0-0	5.2005									
=nergy Ratic	Date			/2015													

Project No PN153396

Client ATKINS LIMITED

Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		U	ncor		d SP1	Г
m bgl	m OD	ype	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	.	10	20	'N' 30	40	50
1.20	17.18	S	-	-	-	1	-	-	-	1	*	 	 			
2.00	16.38	s	-	1	-	-	-	-	-	1/450	*	 	 	1	1	
3.00	15.38	s	-	1	2	1	1	1	-	3	*	 	 	 	 	
4.00	14.38	s	-	1	1	2	2	1	1	6	*	 	<u> </u>			
5.00	13.38	s	-	1	-	-	-	1	-	1	*	 	1	I I	1	
6.00	12.38	s	-	3	6	3	3	2	2	10		*		1		
		Paul I	 Bridaes			Remar	ks					<u> </u>	<u>_</u>		i	i
						Equipm	ent checl	ked and c	alibration	carried out	in acc	orda	nce	with E	BS EN	ISC
, Er (%)		82.00				224/0-	5. 2000									
ate		17/04														
	2.00 3.00 5.00 6.00	2.00 16.38 3.00 15.38 4.00 14.38 5.00 13.38 6.00 12.38 9 9<	2.00 16.38 S 3.00 15.38 S 4.00 14.38 S 5.00 13.38 S 6.00 12.38 S 1 15.38 S 1 15.38 S 1 15.38 S 1 14.38 S 1 15.38 S 1 12.38 S 1 13.38 S 1 14.38 S 1 15.38 S 1 15.38 S 1 15.38 S 1 15.38 S 1<	2.00 16.38 S - 3.00 15.38 S - 4.00 14.38 S - 5.00 13.38 S - 6.00 12.38 S - 9 12.38 S - 9 12.38 S - 9 14.38 S - 9 12.38 S - 9 12.38 S - 9 12.38 S - 9 14.38 S - <t< td=""><td>2.00 16.38 S 1 3.00 15.38 S 1 4.00 14.38 S 1 5.00 13.38 S 1 6.00 12.38 S 6.00 12.38 S 9.00 12.38 S 9.01 Paul Hotes 9.01 NGW-S </td><td>2.00 16.38 S - 1 - 3.00 15.38 S - 1 1 4.00 14.38 S - 1 1 5.00 13.38 S - 3 6 6.00 12.38 S - 3 6 1 12.38 S - 3 6 6.00 12.38 S - 3 6 1 12.38 S - 3 6 1 12.38 S - 3 6 1 14.38 S - 3 6 1 15.38 S - 3 6 1 14.38 S - 3 6 1 15.38 S - 3 6 1 - - - - - 1 - - - - - 1 - - - - - - -</td><td>2.00 16.38 S 1 3.00 15.38 S 1 2 1 4.00 14.38 S 1 1 2 5.00 13.38 S 3 6 3 6.00 12.38 S 3 6 3 6.00 12.38 S 3 6 3 9 12.38 S 3 6 3 9 1 S 3 6 3 9 1 S 3 6 3 9 1 S 3 6 3 9 1 1 S <!--</td--><td>2.00 16.38 S - 1 - - - 3.00 15.38 S - 1 2 1 1 4.00 14.38 S - 1 1 2 2 5.00 13.38 S - 3 6 3 3 6.00 12.38 S S - 3 6 3 3 6.00 12.38 S S - 3 6 3 3 7 H</td><td>2.00 16.38 S 1 3.00 15.38 S 1 2 1 1 1 4.00 14.38 S 1 2 1 1 5.00 13.38 S 3 6 3 3 2 6.00 12.38 S 3 6 3 3 2 6.00 12.38 S 3 6 3 3 2 6.00 12.38 S 3 6 5 3 3 2 7 No No <</td><td>2.00 16.38 S 1 1- 1- 1- 1- 3.00 14.38 S 1 1 2 1 1 1 1 1 4.00 14.38 S 1</td><td>2.00 16.38 S 1 <t< td=""><td>2.00 16.38 S 1 1.1450 * 3.00 15.38 S 1 2 1 1 1 3.0 * 4.00 14.38 S 1 1 2 2 1 1 6 * 5.00 13.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5</td><td>10.0 1.638 S 1 1 4.0 3.0 1 3.0 1.0 1.0 1.0 1.0 1.0 1.0 3.0 * 1.0</td><td>100 10. 1.0 1</td><td>1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 3.00 13.8 S - 1 1 2 2 1 1 6 * 1 1 1 1 1 6 * 1 1 1 1 1 6 * 1</td><td>2.00 16.38 S - 1 - - - - 1/450 * -<</td></t<></td></td></t<>	2.00 16.38 S 1 3.00 15.38 S 1 4.00 14.38 S 1 5.00 13.38 S 1 6.00 12.38 S 6.00 12.38 S 9.00 12.38 S 9.01 Paul Hotes 9.01 NGW-S	2.00 16.38 S - 1 - 3.00 15.38 S - 1 1 4.00 14.38 S - 1 1 5.00 13.38 S - 3 6 6.00 12.38 S - 3 6 1 12.38 S - 3 6 6.00 12.38 S - 3 6 1 12.38 S - 3 6 1 12.38 S - 3 6 1 14.38 S - 3 6 1 15.38 S - 3 6 1 14.38 S - 3 6 1 15.38 S - 3 6 1 - - - - - 1 - - - - - 1 - - - - - - -	2.00 16.38 S 1 3.00 15.38 S 1 2 1 4.00 14.38 S 1 1 2 5.00 13.38 S 3 6 3 6.00 12.38 S 3 6 3 6.00 12.38 S 3 6 3 9 12.38 S 3 6 3 9 1 S 3 6 3 9 1 S 3 6 3 9 1 S 3 6 3 9 1 1 S </td <td>2.00 16.38 S - 1 - - - 3.00 15.38 S - 1 2 1 1 4.00 14.38 S - 1 1 2 2 5.00 13.38 S - 3 6 3 3 6.00 12.38 S S - 3 6 3 3 6.00 12.38 S S - 3 6 3 3 7 H</td> <td>2.00 16.38 S 1 3.00 15.38 S 1 2 1 1 1 4.00 14.38 S 1 2 1 1 5.00 13.38 S 3 6 3 3 2 6.00 12.38 S 3 6 3 3 2 6.00 12.38 S 3 6 3 3 2 6.00 12.38 S 3 6 5 3 3 2 7 No No <</td> <td>2.00 16.38 S 1 1- 1- 1- 1- 3.00 14.38 S 1 1 2 1 1 1 1 1 4.00 14.38 S 1</td> <td>2.00 16.38 S 1 <t< td=""><td>2.00 16.38 S 1 1.1450 * 3.00 15.38 S 1 2 1 1 1 3.0 * 4.00 14.38 S 1 1 2 2 1 1 6 * 5.00 13.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5</td><td>10.0 1.638 S 1 1 4.0 3.0 1 3.0 1.0 1.0 1.0 1.0 1.0 1.0 3.0 * 1.0</td><td>100 10. 1.0 1</td><td>1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 3.00 13.8 S - 1 1 2 2 1 1 6 * 1 1 1 1 1 6 * 1 1 1 1 1 6 * 1</td><td>2.00 16.38 S - 1 - - - - 1/450 * -<</td></t<></td>	2.00 16.38 S - 1 - - - 3.00 15.38 S - 1 2 1 1 4.00 14.38 S - 1 1 2 2 5.00 13.38 S - 3 6 3 3 6.00 12.38 S S - 3 6 3 3 6.00 12.38 S S - 3 6 3 3 7 H	2.00 16.38 S 1 3.00 15.38 S 1 2 1 1 1 4.00 14.38 S 1 2 1 1 5.00 13.38 S 3 6 3 3 2 6.00 12.38 S 3 6 3 3 2 6.00 12.38 S 3 6 3 3 2 6.00 12.38 S 3 6 5 3 3 2 7 No No <	2.00 16.38 S 1 1- 1- 1- 1- 3.00 14.38 S 1 1 2 1 1 1 1 1 4.00 14.38 S 1	2.00 16.38 S 1 <t< td=""><td>2.00 16.38 S 1 1.1450 * 3.00 15.38 S 1 2 1 1 1 3.0 * 4.00 14.38 S 1 1 2 2 1 1 6 * 5.00 13.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5</td><td>10.0 1.638 S 1 1 4.0 3.0 1 3.0 1.0 1.0 1.0 1.0 1.0 1.0 3.0 * 1.0</td><td>100 10. 1.0 1</td><td>1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 3.00 13.8 S - 1 1 2 2 1 1 6 * 1 1 1 1 1 6 * 1 1 1 1 1 6 * 1</td><td>2.00 16.38 S - 1 - - - - 1/450 * -<</td></t<>	2.00 16.38 S 1 1.1450 * 3.00 15.38 S 1 2 1 1 1 3.0 * 4.00 14.38 S 1 1 2 2 1 1 6 * 5.00 13.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S 3 6 3 3 2 2 10 * 6.00 12.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S - 3 6 3 3 2 2 10 * 6.00 I.3.38 S I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5 I.4.5	10.0 1.638 S 1 1 4.0 3.0 1 3.0 1.0 1.0 1.0 1.0 1.0 1.0 3.0 * 1.0	100 10. 1.0 1	1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 3.00 13.8 S - 1 1 2 2 1 1 6 * 1 1 1 1 1 6 * 1 1 1 1 1 6 * 1	2.00 16.38 S - 1 - - - - 1/450 * -<

Project No PN153396

Client ATKINS LIMITED

epth Leve bgl m OE .20 12.79 2.00 11.99 3.00 10.99 6.00 9.99 5.00 7.99	S	SWP (mm) 0 0 0 0 0	0-75 (mm) 3 1 1 1 1 1	75-150 (mm) 3 - 3 - 1	0-75 (mm) 2 1 3 - - 1	75-150 (mm) 3 2 4 1 1 1	150-225 (mm) 3 1 4 - 1 1	225-300 (mm) 3 - 4 - 1 1	Value 11 4 15 1 3 4 4	* * *	10 		'N' 30 	40	50
2.00 11.99 3.00 10.99 4.00 9.99 5.00 8.99	S S S S	0 0 0 0	3 1 1 1 1	3	2 1 3 -	3 2 4 1 1	3 1 4 - 1	3 - 4 - 1	4 15 1 3	*					
3.00 10.99 1.00 9.99 5.00 8.99	S S S	0 0 0	1 1 1	3	3 - -	4 1 1	4	4 - 1	15 1 3	*	 	Ì			
i.00 9.99 5.00 8.99	S S	0	1	-	-	1	- 1	- 1	1 3	*	 ★ 	Ì			
5.00 8.99	S	0	1	-	-	1	1	1	3	*		Ì			
	_											Ì			
5.00 7.99	S	0	1	1	1	1	1	1	4	*	 		Ì		
															1
	Paul	L Bridges												1	
							ked and c	alibration	carried out	in acc	corda	ince	with E	BS EN	ISC
r (%)						. 2000									
•															
_	(%)	(%) MGW	Paul Bridges MGWS5 (%) 82.00 17/04/2015	MGWS5 (%) 82.00	MGWS5 (%) 82.00	MGWS5 Equipm (%) 82.00	MGWS5 Equipment check %) 82.00	MGWS5 Equipment checked and cr (%) 82.00	MGWS5 Equipment checked and calibration of 22476-3: 2005 (%) 82.00	MGWS5 Equipment checked and calibration carried out (%) 82.00	MGWS5 Equipment checked and calibration carried out in acceleration (%) 82.00	MGWS5 Equipment checked and calibration carried out in accorda (%) 82.00	MGWS5 Equipment checked and calibration carried out in accordance 22476-3: 2005 (%) 82.00	MGWS5 Equipment checked and calibration carried out in accordance with E 22476-3: 2005 (%) 82.00	MGWS5 Equipment checked and calibration carried out in accordance with BS EN 22476-3: 2005 (%) 82.00

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Client ATKINS LIMITED

Hole VS07	Depth		Туре	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Un	cor		d SP1	Г
VS07	m bgl	m OD	i ype	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1	0 2	20	'N' 30	40	50
	1.20	16.38	s	-	1	-	1	2	1	1	5	*	l l l	1		 	
VS07	2.00	15.58	s	-	1	1	-	1	-	1	2	*	 	1	 	 	
VS07	3.00	14.58	s	-	1	-	1	-	1	3	5	*	 	1 1 1	 	 	
VS07	4.00	13.58	s	-	2	2	4	11	7	2	24		1	*		 	
VS07	5.00	12.58	s	-	1	-	-	1	-	1	2	*	l I	 		 	
VS07	6.00	11.58	s	-	1	3	4	4	6	7	21		1	*			
Driller			Paul I	L Bridges		I	Remar						1	1		I	
Hammer No.			MGW				Equipm 22476-3		ked and c	alibration	carried out	in acc	ordan	ice \	with B	BS EN	ISC
Energy Ratio	, Er (%)		82.00				22770-0	. 2000									
	ate		17/04	/2015													

Project No PN153396

Client ATKINS LIMITED

	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Unc	orrect	ed SP	г
Hole	m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1	0 20	'N' 30	40	50
VS08	1.20	11.08	s	-	1	2	2	3	3	4	12		*		i i	
VS08	2.00	10.28	S	-	1	1	1	2	3	4	10		*			
/S08	3.00	9.28	S	-	1	-	1	-	-	-	1	*				
VS08	4.00	8.28	s	-	-	1	1	2	1	2	6	*				
VS08	5.00	7.28	S	-	2	3	4	6	6	6	22			*		
Driller			Paul I	l Bridges			Remar						i i	i	i	
Hammer No.			MGW					ent checl	ked and c	alibration	carried out	in acco	ordanc	e with	BS EN	IISC
Energy Ratio			82.00				227/07	5.2000								
	Date		17/04	/2015												

Project No PN153396

Hole		Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Uncor		d SP1	Г
	Depth m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
VS09	1.20	15.17	s	-	2	3	4	1	2	1	8	*	 		 	
VS09	2.00	14.37	S	-	1	1	1	1	1	1	4	*		1	 	
VS09	3.00	13.37	S	-	2	1	1	1	1	1	4	*	I		 	
VS09	4.00	12.37	S	-	1	1	-	1	1	2	4	*	 			
VS09	5.00	11.37	S	-	6	5	5	8	9	12	34		 	*	 	
Driller				Bridges			Remarl Equipm		ked and c	alibration	carried out i	n accore	dance	with B	S EN	IISC
Hammer No.			MGW				22476-3						'			-
Energy Ratio,			82.00													
Calibration D	ate		17/04	/2015												

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Hole	Depth	Level	Type	SWP	Seatin	g Drive		Test	Drive		SPT 'N'		Uncor		d SP1	Г
noie	m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
VS10	1.20	9.60	s	-	1	2	1	1	1	1	4	*	 		 	
VS10	2.00	8.80	S	-	1	2	1	2	2	4	9	*			 	
VS10	3.00	7.80	S	-	-	-	2	1	1	1	5	*			 	
			MGW				Equipm 22476-		ked and c	alibration	carried out i	n accord	dance	with E	BS EN	ISO
Energy Ratio	, Er (%)		82.00													
Calibration D	ate		17/04	/2015												
	enetratio pws/pene	tration (I	MGW 82.00 17/04 after se mm)	/2015 ating		C - S	22476- tandard F PT with c	ent chec 3: 2005 Penetratic	on Test (S							

Project No PN153396

Hole	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Unc	orrecte	ed SP	Г
1016	m bgl	m OD	1.366	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	10	20	'N' 30	40	50
WS11	1.20	13.29	s	-	2	2	3	4	4	4	15		*	I I I	1	
WS11	2.00	12.49	S	-	2	2	4	5	6	7	22		1	*		
VS11	2.85	11.64	S	-	7	8	8	7	7	8	30		1	*		
Driller							Remar									
Hammer No.			MGW	Bridges				ent chec	ked and c	alibration	carried out in	n accor	danc	e with	BS EN	ISO
Energy Ratio	o, Er (%)		82.00					2. 2000								
Calibration I			17/04	/2015												
	penetratio ows/pene ation unde	etration (mm)			C - S	PT with c	cone n with line		PT) 2016 Page				طبر م	<u>سا</u>	Œ

Project No PN153396

Client ATKINS LIMITED

Hole	Depth	Level	Type	SWP	Seating	g Drive		Test	Drive		SPT 'N'		Unco		d SP1	Г
noie	m bgl	m OD	Type	(mm)	0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)	Value	1() 20	'N' 30	40	50
VS12	1.20	10.21	s	-	2	3	4	5	5	6	20		*	 	i i i	
VS12	2.00	9.41	S	-	2	2	3	4	5	5	17		*	 	 	
VS12	3.00	8.41	S	-	1	2	2	3	3	4	12	ł	•	 	 	
WS12	4.00	7.41	S	-	1	2	3	3	5	5	16		*			
Driller			Paul I	L Bridges		<u> </u>	Remar		<u> </u>							
Hammer No.			MGW				Equipm 22476-:		ked and c	alibration	carried out i	n acco	rdance	with E	3S EN	ISC
Energy Ratio	o, Er (%)		82.00													
Calibration I	Date		17/04	/2015												

APPENDIX 4

Monitoring Results

FIELDWORK - Water Level Monitoring

Project A5036 PORT OF LIVERPOOL ACCESS STUDY

Project No PN153396

Borehole		CP1		CP2		CP4		CP5		CP6		CP7	
Instrument (dia	a. mm)	S (50mm)	S (50mm	1)	S (50mm	ı)	S (50mm	ı)	S (50mm	ו)	S (50mm)
Depth to Base	(m)	9.50 (Not	te 1)	8.00		8.20		8.90		2.80		7.00	
Filter Zone	(m)	5.40-10.1	15	5.85-8.00)	6.10-8.30)	6.75-8.90)	1.00-2.80	0	4.90-7.20)
Level		7.54 m C	D	16.91 m	OD	16.98 m	OD	15.60 m	OD	12.28 m	OD	12.42 m	OD
Date	Time	Depth (m)	Level	Depth (m)	Leve								
20 Oct 2015		0.17	7.37	8.00	8.91	6.51	10.47	6.47	9.13	1.80	10.48	1.26	11.1
3 Nov 2015		0.00	7.54	DRY		6.48	10.50	6.42	9.18	1.73	10.55	1.08	11.3
19 Nov 2015		0.00	7.54	8.00	8.91	6.54	10.44	6.51	9.09	1.28	11.00	0.98	11.4

abbreviations are explained on the accompanying key sheet. All dimensions are in metres.



FIELDWORK - Water Level Monitoring

Project A5036 PORT OF LIVERPOOL ACCESS STUDY

Project No PN153396

Borehole		WS02		WS05		WS06		WS09		WS10			
Instrument (dia	a. mm)	S (50mm)	S (50mm)	S (50mm	ı)	S (50mm	ı)	S (50mm	ı)		
Depth to Base	(m)	3.00		5.00		5.70		3.50 (Not	te 2)	2.20			
Filter Zone	(m)	1.00-3.00)	3.00-5.00)	2.70-5.70)	0.80-3.80)	0.90-2.20)		
Level		11.17 m	OD	18.38 m	OD	13.99 m	OD	16.37 m	OD	10.80 m	OD		
Date	Time	Depth (m)	Level	Depth (m)	Leve								
20 Oct 2015		3.00	8.17	5.00	13.38	5.26	8.73	3.50	12.87	1.78	9.02		
3 Nov 2015		3.00	8.17	5.00	13.38	5.30	8.69	DRY		1.70	9.10		
19 Nov 2015		3.00	8.17	4.99	13.39	5.28	8.71	Flooded		1.51	9.29		
													Í



FIELDWORK - Insitu Gas Monitoring - Daily Record

, 	5 PORT OF LIV	ERPOOL ACC	Project No Date Sheet No.		PN153396 20/10/2015 1 (1 of 2)				
Equipment Us GI Infra R Other									
Weather / Site Conditions Wind Cloud Cover		\$	Still		Light x Slight x		Moderate Cloudy		Strong
Precipitation		Dry x		Slight		Moderate		Heavy	
Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane CH4 (% VOL)	Methane CH4 (% LEL)	Carbon Dioxide CO2 (% VOL)	Oxygen O2 (% VOL)	Nitrogen N2 (% VOL)	Remarks
СР1	9.50	0.17	9.37	-	-	-	-	-	Water over valve / maybe artesian
CP4 CP5 CP6 CP7 WS02 WS05 WS06 WS09 WS10	8.20 8.90 2.80 7.00 3.00 5.70 3.50 2.20	6.51 6.47 1.80 1.26 3.00 5.00 5.26 3.50 1.78	8.00 8.84 2.69 6.92 3.05 4.99 5.58 3.62 2.27	26.0 5.5 0.0 0.0 0.0 0.4 1.0 3.9	MAX MAX 0.0 0.0 2.8 20.9 31.9	25.0 5.9 0.0 0.0 1.9 21.0 1.6 18	7.3 17.9 20.9 21.4 21.0 19.9 2.7 20.1 3.3	41.6 70.6 79.2 78.5 78.9 78.1 75.8 77.2 74.7	
Remarks								」 回	

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project A5036	5 PORT OF LIV	ERPOOL ACCESS		Project No Date	PN153396 20/10/2015							
Client ATKINS LIMITED Sheet No. 1 (2 of 2)												
Equipment Us	sed											
GI Infra Red Gas Analyser MK1 MK2 GA2000												
Other Gas Data LMSxi gas analyser;												
Weather / Site Conditions												
Wind			Still	Light	x Mod	erate	Strong					
Cloud Cover			None	Slight	x C	loudy	Overcast					
Precipitation			Dry 🗴	Slight	Mod	erate	Heavy					
Borehole	Depth to Base	Hydrogen Sulphide H2S	Carbon Monoxide CO	Barometric Pressure	Flow Rate	Flow Rate (Steady)	Remarks					
	(m)	(ppm)	(ppm)	(mBars)	(l/hr)	(l/hr)						
CP1	9.50	-	-	1018	-	-	Water over valve /					
CP2	8.00	0.0	0.0	1018	0.6	0.2	maybe artesian					
CP4	8.20	0.0	1.5	1018	0.8	0.6						
CP5	8.90	0.0	0.0	1018	0.3	0.1						
CP6	2.80	0.0	0.0	1018	0.0	0.0						
CP7	7.00	0.0	0.0	1018	0.0	0.0						
WS02	3.00	0.0	0.0	1018	0.0	0.0						
WS05	5.00	0.0	0.0	1018	0.0	0.0						
WS06	5.70	0.0	0.0	1018	-0.1	0.0						
WS09	3.50	0.0	0.0	1018	-0.1	0.0						
WS10	2.20	0.0	1.1	1018	-0.4	0.0						
Remarks	Remarks											
						e)	- Collinber 199					

, , , , , , , , , , , , , , , , , , ,	5 PORT OF LIV	ERPOOL ACC	ESS STUDY				Date	ect No) et No.	PN153396 03/11/2015 1 (1 of 2)
	sed Red Gas Ana Gas Data LMSx		MK yser;	1	MK	2	GA200	0	
Weather / Sit Wind Cloud Co		3	Sti Non		Ligh Sligh	nt	Moderat Cloud		Strong Overcast _x
Precipitat	ion		Dr	y x	Sligh	nt 🗌	Moderat	e 🗌	Heavy
Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane CH4 (% VOL)	Methane CH4 (% LEL)	Carbon Dioxide CO2 (% VOL)	Oxygen O2 (% VOL)	Nitrogen N2 (% VOL)	Remarks
CP2 CP4 CP5 CP6 CP7 WS02 WS05 WS06 WS09 WS10	8.00 8.20 8.90 2.80 7.00 3.00 5.00 5.70 3.50 2.20	DRY 6.48 6.42 1.73 1.08 3.00 5.00 5.30 DRY 1.70	8.02 8.00 8.84 2.69 6.92 3.05 4.99 5.58 3.62 2.27	0.0 37.0 4.7 0.0 0.0 0.0 0.4 34.5 1.8	0.0 MAX 88.4 0.0 0.0 0.0 3.0 MAX 24.7	0.3 35.0 9.4 0.0 3.5 8.3 25.0 30.0 13.0	21.2 0.9 18.1 21.4 21.5 19.3 12.2 1.9 0.8 10.0	78.4 27.0 67.7 78.5 78.4 77.1 79.4 72.6 34.6 75.1	
Remarks								 	 30136hnies

5	FORT OF LIV	ERPOOL ACCESS	STUDY			Project No Date	PN153396 03/11/2015
Client ATKIN	IS LIMITED					Sheet No.	1 (2 of 2)
Equipment Us					_	_	
GI Infra R	ed Gas Ana	lyser	MK1	MK2	GA	2000	
Other G	as Data LMSx	i gas analyser	;				
Weather / Site	e Conditions	3					
Wind			Still x	Light	Mod	erate	Strong
Cloud Co	ver		None	Slight	С	loudy	Overcast x
Precipitat	ion		Dry x	Slight	Mod	erate	Heavy
Borehole	Depth to Base	Hydrogen Sulphide H2S	Carbon Monoxide CO	Flow Rate	Flow Rate (Steady)	Remarks	
	(m)	(ppm)	(ppm)	(mBars)	(l/hr)	(l/hr)	
CP1	9.50	-	-	1004	-	-	Artesian
CP2	8.00	0.0	0.0	1004	-0.1	0.0	
CP4	8.20	0.0	1.80	1004	1.4	1.3	
CP5	8.90	0.0	0.0	1004	1.1	0.0	
CP6	2.80	0.0	0.0	1004	0.0	0.0	
CP7	7.00	0.0	0.0	1004	0.0	0.0	
WS02	3.00	0.0	0.0	1004	0.0	0.0	
WS05 WS06	5.00 5.70	0.0	0.0	1004 1004	0.0	0.0	
WS08	3.50	0.0	0.0	1004	1.4	1.2	
WS10	2.20	0.0	0.0	1004	0.3	0.2	
Remarks						្រា	

, 	5 PORT OF LIV	ERPOOL ACC	ESS STUDY				Date	ect No et No.	PN153396 19/11/2015 1 (1 of 2)
i							5110	st NO.	1 (1 01 2)
Equipment Us		lucor	NAK	1	NALZ	2 —	C A 200		
	ed Gas Ana	-	MK	' 🛄	MK		GA200		
	Gas Data LMSx		yser;						
Weather / Sit	e Conditions	8	0.1			. 🖂			
Wind			Sti		Ligh	it 🔄	Moderat	e x	Strong
Cloud Co	ver		Non	e 🗌	Sligh	nt 🗌	Cloud	ух	Overcast
Precipitat	ion		Dr	у	Sligh	it x	Moderat	e	Heavy
Borehole	Depth to Base	Depth to Current Methane M Water Hole Depth				Carbon Dioxide	Oxygen	Nitrogen	Domorko
Borenole	(m)	CH4 CH4				CO2 (% VOL)	02 (% VOL)	N2 (% VOL)	Remarks
CP1	9.50	0.00	9.37	-	-	-	-	-	Artesian
CP2	8.00	8.00	8.02	0.0	0.0	0.0	21.0	78.9	
CP4	8.20	6.54	8.00	38.0	MAX	32.0	1.1	28.8	
CP5	8.90	6.51	8.84	0.0	0.0	0.0	21.3	78.6	
CP6	2.80	1.28	2.64	0.0	0.0	0.0	21.4	78.5	
CP7 WS02	7.00 3.00	0.98	6.92 3.05	0.0	0.0	0.0 3.0	21.4 18.3	78.5 78.6	
WS02	5.00	4.99	4.99	0.0	0.0	0.0	21.0	78.9	
WS06	5.70	5.28	5.58	0.0	0.0	8.1	12.6	79.2	
WS09	3.50	Flooded		-	-	-	-	-	
WS10	2.20	1.51	2.27	4.3	39.5	17.0	4.8	73.8	
Remarks									
								<u>ور</u>	ESIMBEIOS

5	FORT OF LIV	ERPOOL ACCESS	STUDY			Project No Date	PN153396 19/11/2015
Client ATKIN	IS LIMITED					Sheet No.	1 (2 of 2)
Equipment Us					_		
GI Infra R	ed Gas Ana	lyser	MK1	MK2	GA	2000	
Other G	as Data LMSx	i gas analyser	;				
Weather / Site	e Conditions	5					<u> </u>
Wind			Still	Light	Mod	erate x	Strong
Cloud Co	ver		None	Slight	С	loudy x	Overcast
Precipitat	ion		Dry	Slight	x Mod	erate	Heavy
Borehole	Depth to Base	Hydrogen Sulphide H2S	Carbon Monoxide CO	Flow Rate	Flow Rate (Steady)	Remarks	
	(m)	(ppm)	(ppm)	(mBars)	(l/hr)	(l/hr)	
CP1	9.50	-	-	1001	-	-	Artesian
CP2	8.00	0.0	0.0	1001	1.0	0.9	
CP4	8.20	0.0	2.0	1001	0.0	0.0	
CP5	8.90	0.0	0.0	1001	-0.3	0.0	
CP6	2.80	0.0	0.0	1001	0.0	0.0	
CP7	7.00	0.0	0.0	1001	-0.9	-0.6	
WS02	3.00	0.0	0.0	1001	0.6	0.5	
WS05 WS06	5.00 5.70	0.0	0.0	1001 1001	-1.5 -0.6	-0.3 -0.2	
WS09	3.50	- 0.0	- 0.0	1001	-0.8	-0.2	
WS10	2.20	0.0	0.0	1001	0.0	0.0	
Remarks						្រា	

APPENDIX 5

Laboratory Test Results - Geotechnical

DATA SHEET - Laboratory Test Symbols

Classification and Strength

Symbol	C - Clay M - Silt (0 - containing organic matter) Plasticity L - Low I - Intermediate H - High V - Very High E - Extremely High
lp	Plasticity Index
%	$\%$ Retained on 425 μm sieve, shown under Ip value
WL	Liquid Limit
W _P	Plastic Limit
NP	Non-Plastic
NAT	Sample tested in natural state
w	Water Content
P _d	Particle Density
Test	Quick undrained triaxial testsSSSingle stage - 102mm diameter.S3Single stage - set of 3 38mm diameter.MSMultistage - 102mm diameter.DDrained TestHVHand VanePPPocket Penetrometer (kg/cm²)NSTNot suitable for test
γ_{b}	Bulk Density
σ_3	Triaxial Cell Pressure
σ_1 - σ_3	Deviator Stress
##	Excessive Strain
C _u	Undrained Cohesion
с	Cohesion Intercept
φ	Angle of Shearing Resistance
Linear Shrink	Linear Shrinkage

Consolidation

m _v	Coefficient of Volume Compressibility
C _{v50}	Coefficient of Consolidation - Log t

 c_{v90} Coefficient of Consolidation - \sqrt{t}

Rock

UF Unacceptable Failure

Chemical Analysis

Acid Soluble	Total sulphate in specimen, expressed as SO ₃ %, value in brackets expressed as SO ₄ %
Water Soluble	Soluble sulphate in 2:1 water : soil extract, expressed as SO ₃ g/l, value in brackets expressed as SO ₄ g/l
In Water	Sulphate content of groundwater, expressed as SO_3 g/l, value in brackets expressed as SO_4 g/l
PН	pH value
Organic content	Organic content expressed as a percentage of dry weight
Chloride	Chloride lon content expressed as a percentage of dry weight

G

MCV, Compaction, CBR

MCV	Moisture	Condition Value at natural
	water co	ntent
MCC	Moisture	Condition Calibration
CCV	Chalk Cr	ushing Value
Compac	tion	
Туре	2.5 = 4.5 = V =	BS 2.5 kg Rammer BS 4.5 kg Rammer BS Vibrating Hammer
γ_{b}	Bulk Den	sity
γ_{d}	Dry Den	sity
CBR Ca	lifornia B	earing Ratio
Туре	2.5 =	Test on Specimen Recompacted using BS 2.5 kg Rammer
	4.5 =	
	V =	
	M =	Test on open drive mould specimen cut in field
	S =	
Тор	CBR at to	op of mould
Bottom	CBR at b	ottom of mould
		etected

Tests performed in accordance with BS 1377: Parts 1-9:1990 incorporating amendments where appropriate and BS EN ISO 17892: Parts 1-2:2014.



Project A5036 PORT OF LIVERPOOL ACCESS STUDY

Samp	le				Cla	ssific	atior	1		Strength					
Hole	Depth (Specimen Depth) m	Туре	Sample Ref	Description	Symbol	lp (>425) %	w _L %	wp %	w (p _d) %	Test	$\begin{array}{c} \gamma_b \\ (\gamma_d) \\ \text{Mg/m}^3 \end{array}$	σ ₃ kN/m	σ₁−σ₃ kN/㎡	C _u kN/m	C _{Avg} kN/ń
CP1	4.70 (4.70)	D	N60640	Very soft dark brown PEAT.					555						
CP1	5.80- 6.45 (5.80)	В	N60647	Grey slightly silty slightly gravelly fine to coarse SAND.					37.0 (2.63)						
CP1	7.95- 8.50 (7.75)	В	N60648	Brown silty fine to medium SAND with pockets of clay.					23.8 (2.65)						
CP2	2.25- 2.70 (2.25)	В	N60637	MADE GROUND: Black and brown silty very sandy fine to coarse gravel.					40.6 (2.45)						
CP2	4.20- 4.65 (4.20)	В	N60634	MADE GROUND: Brown clayey very sandy fine to coarse gravel with a high cobble content.					16.1 (2.57)						
CP2	8.20- 8.65 (8.20)	В	N60635	MADE GROUND: Dark brown and black clayey very sandy fine to coarse gravel with a medium cobble content.					51.8 (2.50)						
CP2	9.20- 9.65 (9.20)	В	N60636	Greyish brown clayey gravelly fine to coarse SAND.					18.9 (2.60)						
CP2	11.30- 11.75 (11.30)	В	N60639	Greyish brown clayey very sandy fine to coarse GRAVEL.					9.5 (2.69)						
CP3	1.20 (1.20)	D	N60641	MADE GROUND: Grey and black sandy fine to coarse gravel with clinker and ash.					15.9						
CP3	3.00- 3.45 (3.00)	В	N60644	MADE GROUND: Black silty very sandy fine to coarse gravel.					27.2 (2.62)						
CP3	4.80 (4.80)	D	N60643	MADE GROUND: Black sandy fine to coarse gravel with clinker, glass, metal, plastic and timber.					22.3 (2.56)						
CP3	6.00- 6.45 (6.00)	В	N60645	MADE GROUND: Black silty very sandy fine to coarse gravel.					40.8						
CP3	8.70 (8.70)	D	N60642	Soft dark grey and black organic CLAY with pockets of peat.					63.5						
CP3	10.00- 10.45 (10.00)	В	N60646	Greyish brown silty very sandy fine to coarse GRAVEL with a low cobble content.					9.0 (2.67)						
CP4	1.20- 1.65 (1.20)	В	N60631	MADE GROUND: Grey and black silty sand and gravel with a high cobble content.					14.7 (2.61)						
Remar		Water	r Conten	able for Test t Test performed in accordance with BS I performed in accordance with BS1377:		D 17892	2 - 1: 2	2014			[920			

Project A5036 PORT OF LIVERPOOL ACCESS STUDY

Samp	е				Cla	ssific	atior	ו		Strength					
Hole	Depth (Specimen Depth) m	Туре	Sample Ref	Description	Symbo	I _p (>425) %	w _L %	w _p %	w (p _d) %	Test	$\begin{array}{c} \gamma_b \\ (\gamma_d) \\ \text{Mg/m}^3 \end{array}$	σ ₃ kN/m ²	σ₁−σ₃ kN/m²	C _u kN/m ²	C _{Avg} kN/m
CP4	5.00- 5.45 (5.00)	В	N60632	MADE GROUND: Black clayey very sandy fine to coarse gravel.					20.9 (2.60)						
CP4	9.00- 9.45 (9.00)	В	N60633	Grey clayey fine to coarse SAND.					27.3 (2.64)						
CP4	10.30 (10.30)	D	N60630	Greyish brown SAND and GRAVEL.					32.8						
CP5	1.20- 1.65 (1.20)	В	N60653	MADE GROUND: Black silty very sandy fine to coarse gravel with a low cobble content.					14.1 (2.53)						
CP5	3.20- 3.65 (3.20)	В	N60800	MADE GROUND: Dark brown/black silty sand and gravel with a medium cobble content.					43.1 (2.60)						
CP5	5.65- 6.00 (5.65)	В	N60652	Firm to stiff brown slightly gravelly sandy CLAY.	CL	13 (40%)	29	16	22.3 (2.67)						
CP5	7.15- 7.60 (7.15)	UT	N60649	Stiff very high strength brown slightly sandy slightly gravelly CLAY. PP = 2.25, 3.25	CL	13 (17%)	26	13	11.8 11.8 11.8	MS	2.31 2.31 2.31	75 150 300	365	182	182
CP5	7.85- 8.25 (7.85)	В	N60654	Firm to stiff brown slightly gravelly sandy CLAY.	CL	15 (12%)	28	13	14.6		2.22 (2.22)				
CP5	9.25- 9.70 (9.25)		N60650	Extremely weak reddish grey fine to coarse grained SANDSTONE. PP = 0.25, 1.50		(11%)	20	NP	13.9 13.9 13.9	MS	2.21 2.21 2.21	100 200 400	574 814 1264	287 407 632	442
CP6	0.55- 0.95 (0.55)	В	N60655	Dark brown very clayey gravelly fine to coarse SAND.					14.9 (2.62)						
CP6	1.50 (1.60)	D	N60656	Firm reddish brown mottled grey slightly gravelly CLAY.	CL	15 (23%)	33	18	21.0						
CP6	2.00- 2.45 (2.00)		N60658	Soft to firm very low strength reddish brown mottled bluish grey gravelly CLAY. PP = 1.25, 0.25	CL	16 (39%)	32	16	15.5 15.5 15.5	MS	2.19 2.19 2.19	40 80 160	67	34 ##	17
CP6	2.50 (2.50)	D	N60657	Soft to firm reddish brown mottled bluish grey gravelly CLAY.	CL	14 (42%)	33	19	19.2						
CP7	1.20- 1.65 (1.20)		N60659	Brown slightly silty gravelly fine to medium SAND.					16.6 (2.63)						
Remai		Water	r Conten	able for Test t Test performed in accordance with BS performed in accordance with BS1377:		D 17892	2 - 1:2	2014			[læ		35

Project A5036 PORT OF LIVERPOOL ACCESS STUDY

Sampl	е				Cla	ssific	atior	1		Str	Strength					
Hole	Depth (Specimen Depth) m	Туре	Sample Ref	Description	Symbol	lp (>425) %	w _L %	w p %	w (p _d) %	Test	$\begin{array}{c} \gamma_b \\ (\gamma_d) \\ \text{Mg/m}^3 \end{array}$	σ ₃ kN/m ²	σ ₁ −σ ₃ kN/m ²	c _u kN/m²	C _{Avg}	
CP7	3.70- 4.25 (3.70)	В	N60660	Brown slightly silty slightly gravelly fine to coarse SAND.					14.6 (2.64)							
WS2	3.50- 3.70 (3.50)	D	N60784	Yellowish brown slightly silty fine to medium SAND.					32.6							
WS2	4.50- 4.70 (4.50)	D	N60785	Dark brown PEAT.					344							
WS03	1.20- 2.15 (1.20)	В	N60788	Orangish brown slightly silty fine to medium SAND.					13.0							
WS03	2.15- 3.00 (2.15)	В	N60789	Soft to firm yellowish brown slightly sandy slightly gravelly CLAY.	CL	17 (5%)	34	17	21.7							
WS03	3.70- 4.00 (3.70)	D	N60786	Reddish brown very clayey gravelly fine to coarse SAND.					22.9							
WS03	4.70- 5.00 (4.70)	D	N60787	Stiff reddish brown slightly sandy slightly gravelly CLAY.	CI	19 (15%)	36	17	14.6							
WS07	6.00- 6.45 (6.00)	D	N60791	Firm to stiff orangish brown slightly sandy slightly gravelly CLAY.					16.0							
WS08	4.50- 4.70 (4.50)	D	N60792	Dark brown peaty silty fine to medium SAND.					30.0							
WS08	5.00- 5.45 (5.00)	D	N60793	Dark brown slightly peaty silty fine to coarse SAND.					19.6							
WS09	5.70- 6.00 (5.70)	D	N60794	Dark brown slightly silty fine to medium SAND.					19.9							
WS10	2.00- 3.00 (2.00)	В	N60795	Dark greyish brown slightly silty fine to coarse SAND.					19.5							
WS11	0.90- 1.20 (0.90)	В	N60796	Reddish brown very clayey gravelly fine to coarse SAND.					12.9							
WS11	1.50- 1.60 (1.50)		N60797	Firm reddish brown slightly sandy slightly gravelly CLAY.	CI	22 (10%)	39	17	17.5							
Remar		Water	r Conten	able for Test t Test performed in accordance with BS performed in accordance with BS1377:		D 17892	2 - 1: 2	2014			[læ		35	

Project A5036 PORT OF LIVERPOOL ACCESS STUDY

Depth Specimen Depth) m 0.90- 1.20 (0.90) 1.70- 1.80 (1.70)	В	Ref N60799	Description Yellowish brown and dark brown slightly silty slightly gravelly fine to medium SAND. Yellowish brown silty fine to medium SAND.	Symbol	Ip (>425) %	w _L %	^w р %	w (p _d) % 10.5	Test	$\begin{array}{c} \gamma_{b} \\ (\gamma_{d}) \\ Mg/m^{3} \end{array}$		σ ₁ −σ ₃ kN/m ²	c _u kN/m	C _{Avg}
1.20 (0.90) 1.70- 1.80			slightly silty slightly gravelly fine to medium SAND. Yellowish brown silty fine to medium					10.5						1
1.80	D	N60798												
								19.1						
ALC .	Water	Content	Test performed in accordance with BS) 17892	2 - 1: 2	2014		-	[<u>/</u>	<u>س</u>	æ
		Water	Water Content	Water Content Test performed in accordance with BST	NST - Not suitable for Test Water Content Test performed in accordance with BS EN ISC All other Tests performed in accordance with BS 1377: 1990	Water Content Test performed in accordance with BS EN ISO 17892	Water Content Test performed in accordance with BS EN ISO 17892 - 1:2	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014	Water Content Test performed in accordance with BS EN ISO 17892 - 1: 2014

Project: Project No			OF LIVE	RPOOL ACC	ESS STU	IDY					Hole Sample Sample Sample	е Туре	CP1 5.80-6 B N6064		
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SAND		90	6	37.5 mm 20 mm 14 mm 10 mm 5 mm		100 100 100 99 99						Fine Method Pre-trea with	Particle	Analysis	5
COBBLE			D D	2 mm 1.18 mm 600 μm 300 μm 150 μm 63 μm		99 98 70 17 16 3						 % loss of Pre-treat Particle Density 	utment		
Remarks	ads Tes	t performe	ed in acco	rdance with F	3S 1377:F	Part 2:199	0						2 Led		8/01/201

Project: Project N		036 POF)F L	IVER	POC	DL A	ACC	ES	SS	STU	DY											Sa Sa	ole am am am	ple ple	e Ty	yp		CP ⁻ 7.98 B N60				
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Classification % of each Size % Finer Size % Finer CLAY 4 125 mm 100 100 13 6 μm 13 SILT 13 50 mm 100 63 mm 100 20 μm 13 SILT 13 50 mm 100 100 8 2 μm 4 SILT 13 50 mm 100 100 100 8 2 μm 4 Sieving Method SILT 13 50 mm 100 100 100 100 Wet sieve SAND 29 14 mm 79 10 mm 71 10 mm 10 mm 11 mm 9 10 mm 11 mm 9 10 mm 10 mm 11 mm 9 10 mm 11 mm 9 10 mm 10	1	2 5-2.70m 0637	В	vpe	ту	ple ple	ole amp amp amp	Sa Sa													STU									RT	POI	36	A 70 A50 PN ⁻		t:	ojec	Pr
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	45036 PORT OF L	IVERPOOL ACCE	Particle Size		Julion	Samp	le Type B)-1.65m
Sample Des MADE GRO	-	ack silty sand and	gravel with a high c	obble conter	nt.	Samp	le Ref N60)631
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60 50 40								
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0.001 Classification CLA ¹		01 dium Coarse	0.1 Fine Medium SAND	1 article Size (mr Coarse	n) Fine	10 Medium Coa Gravel	arse Cobbles	1000 Boulders
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Sample Description Mode GROUND: Black clayay vary sandy line to coarse grave! Image: Clay in the coarse grave! Image: Clay in t	roject: roject Ne		036 F 11533			OF	= L	IVE	RP	00	DL	AC	C	ΞS	S	STI	JD	Y														S S	an an	npl npl	le '	Ту	/p	е	В	4 0-5 063		m		
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Project:	sject No: PN153396 S									Sa	ole ample Depth ample Type ample Ref			WS12).90-1.20 3 N60799	m		
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Classification		% of each		Size		% Finer 100		s	ize	%	% Finer		Uniformity C			icien	t
				100 mm 75 mm	ı	100 100								Siev	2.53 ing Meth	bod	
SILT (including CLAY)		3		63 mm 50 mm	ı	100 100									Vet sieve		
SAND		95		37.5 mm 20 mm	ı	100 100 100								Fine Particle Analysis			
				14 mm 10 mm 5 mm	ı	100 100 99							Met Pre-	hod treated			
GRAVEL		2		2 mm 1.18 mm	1	98 98							with				
COBBLES		0		600 μm 300 μm	ı	97 78								oss on treatme	ent		
BOULDERS		0		150 μm 63 μm		18 3							Part Den				
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APPENDIX 6

Laboratory Test Results - Contamination



Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. L

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781



Attention :	Paul Hayes
Date :	12th November, 2015
Your reference :	PN153396
Our reference :	Test Report 15/15750 Batch 1
Location :	A5036
Date samples received :	4th November, 2015
Status :	Final report
Issue :	1

Ten samples were received for analysis on 4th November, 2015 of which ten were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc Project Manager

	Geotechni PN153396 A5036						Report :	Liquid					
	Paul Haye 15/15750	es					• •	oducts: V= Z=ZnAc, N=		≔glass bottl ∺HN0 ₃	e, P=plastic	bottle	
J E Sample No.	1-5	6-10	11-15	16-19	20-24	25-28	29-36	37-44	45-52	53-60			
Sample ID	CP1	CP4	CP5	CP6	CP7	WS10	SW1	SW3	SW4	SW5			
Depth											Please se	e attached n	otes for all
COC No / misc				Grab Sample		Grab Sample						ations and a	
Containers	VPG	VPG	VPG	VPG	VPG	VPG	V H HN N P G	V H HN N P G	V H HN N P G	V H HN N P G			
Sample Date							03/11/2015						
Sample Type		Ground Water			Ground Water		Surface Water						
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015			NO.
Dissolved Arsenic [#]	<2.5	18.5	14.5	9.9	5.0	7.7	<2.5	<2.5	2.6	3.9	<2.5	ug/l	TM30/PM14
Dissolved Boron	32	2532	605	64	53	225	130	358	78	78	<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	0.7	0.7	0.9	< 0.5	0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM30/PM14
Total Dissolved Chromium [#] Dissolved Copper [#]	<1.5 <7	2.8 <7	<1.5 <7	<1.5 <7	<1.5 <7	<1.5 13	<1.5 <7	<1.5 <7	<1.5 <7	<1.5 <7	<1.5 <7	ug/l ug/l	TM30/PM14 TM30/PM14
Total Dissolved Iron #	948	9811	22	446	<20	41840 _{AA}	274	63	65	109	<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	6	<5	<5	<5	<5	<5	ug/l	TM30/PM14
Dissolved Mercury [#]	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM30/PM14
Dissolved Nickel [#]	4	6	29	3	5	3	<2	<2	2	<2	<2	ug/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	2.6	1.7	<1.5	<1.5	2.5	<1.5	<1.5	<1.5	<1.5	<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	13	<3	17	<3	5	4	19	7	<3	6	<3	ug/l	TM30/PM14
PAH MS													
Naphthalene	<0.1	0.4	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1	ug/l	TM4/PM30
Acenaphthylene	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Acenaphthene	0.01	1.09	0.02	0.01	<0.01	0.04	<0.01	0.01	0.01	<0.01	<0.01	ug/l	TM4/PM30
Fluorene	0.01	0.62	0.02	0.01	< 0.01	0.04	< 0.01	< 0.01	0.01	< 0.01	< 0.01	ug/l	TM4/PM30
Phenanthrene Anthracene	0.02 <0.01	2.19 0.39	0.09	0.02 <0.01	0.01 <0.01	0.07	<0.01 <0.01	0.01 <0.01	0.01 <0.01	0.01 <0.01	<0.01 <0.01	ug/l ug/l	TM4/PM30 TM4/PM30
Fluoranthene	<0.01	0.39	0.02	0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	ug/l	TM4/PM30
Pyrene	0.01	0.50	0.08	0.01	0.01	0.08	< 0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Benzo(a)anthracene	<0.01	0.06	0.03	0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Chrysene	<0.01	0.07	0.04	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Benzo(bk)fluoranthene	<0.01	0.03	0.04	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Benzo(a)pyrene	<0.01	0.02	0.03	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Indeno(123cd)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
PAH 16 Total	<0.1	6.2	0.5	<0.1	<0.1	0.6	<0.1	<0.1	0.1	<0.1	<0.1	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	0.02	0.03	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	0.01	< 0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	86	85	80	88	85	89	83	91	91	84	<0	%	TM4/PM30
Methyl Tertiary Butyl Ether#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ug/l	TM15/PM10
Benzene [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
Toluene [#]	<0.5	< 0.5	< 0.5	< 0.5	<0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
Ethylbenzene [#]	<0.5	< 0.5	< 0.5	< 0.5	<0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
p/m-Xylene#	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10 TM15/PM10
o-Xylene # Surrogate Recovery Toluene D8	<0.5 98	<0.5 100	<0.5 100	<0.5 100	<0.5	<0.5 100	<0.5 98	<0.5 98	<0.5	<0.5 99	<0.5	ug/l %	TM15/PM10 TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98 104	100	100	100	98 103	100	98 104	98	100 105	99 104	<0 <0	%	TM15/PM10 TM15/PM10
Currogale Necovery 4-brombliuorobenzene	104	103	103	103	103	100	104	103	103	104	~0	/0	TWI OF MITU

Geotechnics

PN153396

Paul Hayes

A5036

Client Name: Reference: Location: Contact: JE Job No.:

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₃

	Paul Haye 15/15750	25						oducts: V= Z=ZnAc, N=		-	le, P=plastic	bottle	
J E Sample No.	1-5	6-10	11-15	16-19	20-24	25-28	29-36	37-44	45-52	53-60			
Sample ID	CP1	CP4	CP5	CP6	CP7	WS10	SW1	SW3	SW4	SW5			
Depth											Please se	e attached n	otes for all
COC No / misc				Grab Sample		Grab Sample						ations and a	
Containers	VPG	VPG	VPG	VPG	VPG	VPG	VHHNNPG	VHHNNPG	VHHNNPG	V H HN N P G			
Sample Date													
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water			1
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method
Date of Receipt	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015			No.
TPH CWG Aliphatics													
>C5-C6 [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM36/PM12
>C6-C8 [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM36/PM12
>C8-C10 [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM36/PM12
>C10-C12 [#] >C12-C16 [#]	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	<5 <10	ug/l ug/l	TM5/PM30 TM5/PM30
>C12-C10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM30
>C21-C35 [#]	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/TM36/PM30
Aromatics													
>C5-EC7#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM36/PM12
>EC7-EC8 [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM36/PM12
>EC8-EC10#	<5	<5	<5	6	<5	<5	<5	<5	<5	<5	<5	ug/l	TM36/PM12
>EC10-EC12#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM30
>EC12-EC16 [#]	<10 <10	<10	<10 <10	<10 <10	<10 <10	<10 <10	<10 <10	<10	<10 <10	<10 <10	<10	ug/l	TM5/PM30 TM5/PM30
>EC16-EC21 # >EC21-EC35 #	<10	<10 <10	<10	<10	<10	<10	<10	<10 <10	<10	<10	<10 <10	ug/l ug/l	TM5/PM30
Total aromatics C5-35 [#]	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM30
Total aliphatics and aromatics(C5-35)#	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/TM36/PM30
Sulphate #	503.45	<0.05	11.66	44.82	88.57	<0.05	148.15	155.90	86.97	87.60	<0.05	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	-	-	-	-	-	-	<0.06	0.25	<0.06	<0.06	<0.06	mg/l	TM38/PM0
Free Cyanide #	<0.01	< 0.01	< 0.01	<0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	mg/l	TM89/PM0
Total Cyanide [#]	0.01	<0.01	0.02	0.02	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.54	240.07	2.41	0.03	0.04	44.66	0.04	0.03	0.04	0.04	<0.03	mg/l	TM38/PM0
Hexavalent Chromium #	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	-	-	-	-	-	-	170	282	150	166	<1	mg/l	TM75/PM0
Dissolved Iron II	1.01	0.10	<0.02	<0.02	<0.02	0.06	0.02	0.02	<0.02	0.02	<0.02	mg/l	TM48/PM0
Dissolved Iron III	<0.02	9.71	0.02	0.45	<0.02	41.78	0.25	0.04	0.07	0.09	<0.02	mg/l	TM30/TM48/PM0
pH [#]	6.55	6.96	6.90	7.41	7.16	6.98	6.97	7.68	7.79	7.13	<0.01	pH units	TM73/PM0
Total Suspended Solids#	-	-	-	-	-	-	<10	16	12	13	<10	mg/l	TM37/PM0

Client Name:GeotechnicsReference:PN153396Location:A5036Contact:Paul HayesJE Job No.:15/15750

SVOC Report : Liquid

JE Job No.:	15/15750												
J E Sample No.	1-5	6-10	11-15	16-19	20-24	25-28	29-36	37-44	45-52	53-60			
Sample ID	CP1	CP4	CP5	CP6	CP7	WS10	SW1	SW3	SW4	SW5			
Depth COC No / misc				Grab Sample		Grab Sample						e attached n ations and a	
Containers	VPG	VPG	VPG	V P G	VPG	V P G		V H HN N P G	V H HN N P G	V H HN N P G			oronymo
Sample Date	03/11/2015	03/11/2015		03/11/2015	03/11/2015	03/11/2015			03/11/2015	03/11/2015			
Sample Type	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water								
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method
Date of Receipt SVOC MS	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015	04/11/2015			No.
Phenols													
2-Chlorophenol#	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylphenol [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol [#]	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol 2,4,5-Trichlorophenol [#]	<1 <0.5	<1 <0.5	<1 <0.5	<1 <0.5	<1 <0.5	ug/l ug/l	TM16/PM30 TM16/PM30						
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	2	<1	88**	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phenol PAHs	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Chloronaphthalene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylnaphthalene#	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Phthalates												_	
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Di-n-butyl phthalate [#] Di-n-Octyl phthalate	<1.5 <1	<1.5 <1	<1.5 <1	<1.5 <1	<1.5 <1	ug/l ug/l	TM16/PM30 TM16/PM30						
Diethyl phthalate #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Other SVOCs												_	
1,2-Dichlorobenzene#	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene#	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
1,3-Dichlorobenzene [#] 1,4-Dichlorobenzene [#]	<1 <1	<1 <1	<1 <1	<1 <1	<1 <1	ug/l ug/l	TM16/PM30 TM16/PM30						
2-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30 TM16/PM30
4-Chloroaniline 4-Chlorophenylphenylether [#]	<1 <1	<1 <1	<1 <1	<1 <1	<1 <1	ug/l ug/l	TM16/PM30						
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Azobenzene [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Carbazole [#]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ug/l	TM16/PM30 TM16/PM30
Dibenzofuran [#] Hexachlorobenzene [#]	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	ug/l ug/l	TM16/PM30 TM16/PM30						
Hexachlorobutadiene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachloroethane [#]	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine [#] Nitrobenzene [#]	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	ug/l ug/l	TM16/PM30 TM16/PM30						
Surrogate Recovery 2-Fluorobiphenyl	83	73	83	82	82	76	82	82	82	81	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	84	84	91	89	88	85	90	91	91	89	<0	%	TM16/PM30
													I

 Client Name:
 Geotechnics

 Reference:
 PN153396

 Location:
 A5036

 Contact:
 Paul Hayes

 JE Job No.:
 15/15750

VOC Report : Liquid

JE Job No.:	15/15750												
J E Sample No.	1-5	6-10	11-15	16-19	20-24	25-28	29-36	37-44	45-52	53-60			
Sample ID	CP1	CP4	CP5	CP6	CP7	WS10	SW1	SW3	SW4	SW5			
Depth COC No / misc Containers Sample Date	V P G 03/11/2015	V P G 03/11/2015	V P G	Grab Sample V P G 03/11/2015	V P G 03/11/2015	Grab Sample V P G			V H HN N P G 03/11/2015	V H HN N P G 03/11/2015		e attached r ations and a	
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water			
Batch Number Date of Receipt	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	1 04/11/2015	LOD/LOR	Units	Method No.
VOC MS Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ug/l	TM15/PM10
Chloromethane [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Vinyl Chloride [#] Bromomethane	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	<0.1 <1	ug/l	TM15/PM10 TM15/PM10
Chloroethane [#]	<1	<1	<1	<3	<3	<1	<3	<1	<3	<3	<1	ug/l ug/l	TM15/PM10 TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Dichloromethane (DCM)#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3	ug/l	TM15/PM10 TM15/PM10
1,1-Dichloroethane [#] cis-1-2-Dichloroethene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3 <3	ug/l ug/l	TM15/PM10 TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chloroform [#]	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1-Trichloroethane [#]	<2	<2	<2	<2	<2	<2 <3	<2	<2	<2	<2	<2	ug/l	TM15/PM10 TM15/PM10
1,1-Dichloropropene [#] Carbon tetrachloride [#]	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	ug/l ug/l	TM15/PM10 TM15/PM10
1,2-Dichloroethane [#]	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Benzene [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,2-Dichloropropane [#]	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Dibromomethane [#] Bromodichloromethane [#]	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	ug/l ug/l	TM15/PM10 TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Toluene#	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,2-Trichloroethane [#]	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) [#] 1,3-Dichloropropane [#]	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	<3 <2	ug/l ug/l	TM15/PM10 TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2-Dibromoethane#	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2	3	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Ethylbenzene [#] p/m-Xylene [#]	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	<0.5 <1	ug/l ug/l	TM15/PM10 TM15/PM10
o-Xylene [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
Isopropylbenzene#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane Bromobenzene [#]	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	<4 <2	ug/l ug/l	TM15/PM10 TM15/PM10
Bromobenzene " 1,2,3-Trichloropropane #	<2	<2 <3	<2	<2	<2	<2	<2 <3	<2	<2	<2	<2 <3	ug/i ug/i	TM15/PM10 TM15/PM10
Propylbenzene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
2-Chlorotoluene#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-Chlorotoluene [#] tert-Butylbenzene [#]	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3	<3 <3	<3	ug/l	TM15/PM10 TM15/PM10
1,2,4-Trimethylbenzene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3 <3	<3	<3 <3	ug/l ug/l	TM15/PM10
sec-Butylbenzene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
4-lsopropyltoluene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,3-Dichlorobenzene#	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
1,4-Dichlorobenzene [#]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10 TM15/PM10
n-Butylbenzene [#] 1,2-Dichlorobenzene [#]	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	<3 <3	ug/l ug/l	TM15/PM10 TM15/PM10
1,2-Dibromo-3-chloropropane	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/i ug/i	TM15/PM10 TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8 Surrogate Recovery 4-Bromofluorobenzene	98 104	100 103	100 103	100 105	98 103	100 106	98 104	98 103	100 105	99 104	<0 <0	%	TM15/PM10 TM15/PM10
gate recovery - DromondorobenZene	104	105	100	100	105	100	104	105	100	104	-0	/0	. 10/1 10/1

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/15750

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

# ISO17025 (UKAS) accredited - UK. B Indicates analyte found in associated method blank. DR Dilution required. M MCERTS accredited. NA Not applicable NAD No Asbestos Detected. NDP None Detected (usually refers to VOC and/SVOC TICs). NDP No Elemination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. +++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample		
DR Dilution required. M MCERTS accredited. NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample R Trip Blank Sample OC Outside Calibration Range	#	ISO17025 (UKAS) accredited - UK.
M MCERTS accredited. NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	В	Indicates analyte found in associated method blank.
NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample N Client Sample OC Outside Calibration Range	DR	Dilution required.
NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	М	MCERTS accredited.
ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample N Client Sample OC Outside Calibration Range	NA	Not applicable
NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	NAD	No Asbestos Detected.
SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	ND	None Detected (usually refers to VOC and/SVOC TICs).
SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	NDP	No Determination Possible
W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	SS	Calibrated against a single substance
+ AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	W	Results expressed on as received basis.
* Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	++	Result outside calibration range, results should be considered as indicative only and are not accredited.
CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	*	Analysis subcontracted to a Jones Environmental approved laboratory.
LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	AD	Samples are dried at 35°C ±5°C
ME Matrix Effect NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	CO	Suspected carry over
NFD No Fibres Detected BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
BS AQC Sample LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	ME	Matrix Effect
LB Blank Sample N Client Sample TB Trip Blank Sample OC Outside Calibration Range	NFD	No Fibres Detected
N Client Sample TB Trip Blank Sample OC Outside Calibration Range	BS	AQC Sample
TB Trip Blank Sample OC Outside Calibration Range	LB	Blank Sample
OC Outside Calibration Range	N	Client Sample
	ТВ	Trip Blank Sample
AA x5 Dilution	OC	Outside Calibration Range
	AA	x5 Dilution

Method Code Appendix

JE Job No: 15/15750

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 80158. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM035: Modified USEPA 80158. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.				
ТМ30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM30/TM48	Calculation of Fe (III) based on Iron and Fe(II)	PM0	No preparation is required.				

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Method Code Appendix

JE Job No: 15/15750

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified USEPA 160.2. Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM48	Determination of Ferrous Iron by reaction with Sodium Carbonate and Morfamquat Sulphate which is analysed spectrophotometrically.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM0	No preparation is required.	Yes			

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. L

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781



Attention :	Paul Hayes
Date :	9th December, 2015
Your reference :	PN153396
Our reference :	Test Report 15/15750 Batch 1 Schedule D
Location :	A5036
Date samples received :	4th November, 2015
Status :	Final report
Issue :	1

Ten samples were received for analysis on 4th November, 2015 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60-20

Simon Gomery BSc Project Manager

Geotechnics

PN153396

Paul Hayes

A5036

Client Name: Reference: Location: Contact: JE Job No.:

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₃

	Paul Haye 15/15750	:5				H=H ₂ SO ₄ , 2		≔glass bottl ∺HN0 ₃	e, P=plastic	DOTTIE	
J E Sample No.	29-36	37-44	45-52	53-60							
Sample ID	SW1	SW3	SW4	SW5							
Depth									Please se	e attached n	otes for all
COC No / misc									abbrev	iations and ac	ronyms
Containers	V H HN N P G	V H HN N P G	V H HN N P G	V H HN N P G							
Sample Date	03/11/2015	03/11/2015	03/11/2015	03/11/2015							
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water							. <u> </u>
Batch Number	1	1	1	1					LOD/LOR	Units	Method No.
Date of Receipt											
Total Hardness Dissolved (as CaCO3)	325	418	183	186					<1	mg/l	TM30/PM14
Chloride #	78.2	81.3	32.5	32.7					<0.3	mg/l	TM38/PM0
Enterno colt										050/400	Outras in the
Enterococci*	<1	<1	<1	<1						CFU/100ml	Subcontracted
											i

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/15750

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

Method Code Appendix

JE Job No: 15/15750

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
Subcontracted	Subcontracted analysis, sent to an ISO 17025 accredited laboratory where possible.						

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

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Attention : Jon Hutchinson 8th October, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 1 Location : A5036 Liverpool 24th September, 2015 Date samples received : Status : Final report Issue : 1

Seventeen samples were received for analysis on 24th September, 2015 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc Project Manager

Client Name:
Reference:
Location:
Contact:
JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759										
J E Sample No.	7-9	16-18	22-24	25-27							
Sample ID	CP4	CP4	CP4	CP4							
Depth	1.00	4.00	6.00	8.30					Please se	e attached n	otes for all
COC No / misc										ations and a	
Containers	VJT	VJT	VJT	VJT							
	~	~	~	~							
Sample Date											
Sample Type	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1					LOD/LOR	Units	Method
Date of Receipt	24/09/2015	24/09/2015	24/09/2015	24/09/2015							No.
Arsenic #M	12.1	10.8	13.9	2.6					<0.5	mg/kg	TM30/PM15
Cadmium ^{#M}	0.4	<0.1	0.5	<0.1					<0.1	mg/kg	TM30/PM15
Chromium ^{#M}	82.0	73.2	112.4	139.5					<0.5	mg/kg	TM30/PM15
Copper ^{#M}	100	30	145	9 5244					<1	mg/kg	TM30/PM15
Iron Lead #M	23310 175	31780 41	32590 100	5244 19					<20 <5	mg/kg mg/kg	TM30/PM15 TM30/PM15
Mercury ^{#M}	<0.1	<0.1	3.3	<0.1					<0.1	mg/kg	TM30/PM15
Nickel ^{#M}	39.5	28.5	26.9	11.3					<0.7	mg/kg	TM30/PM15
Selenium ^{#M}	<1	<1	1	<1					<1	mg/kg	TM30/PM15
Vanadium	32	30	24	7					<1	mg/kg	TM30/PM15
Zinc ^{#M}	232	62	478	35					<5	mg/kg	TM30/PM15
PAH MS											
Naphthalene ^{#M}	17.85 _{AB}	0.17	<0.40 _{AB}	<0.04					<0.04	mg/kg	TM4/PM8
Acenaphthylene	1.19 _{AB}	0.19	0.42 _{AB}	< 0.03					< 0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M} Fluorene ^{#M}	25.37 _{AB}	1.58 1.63	<0.50 _{AB}	<0.05 <0.04					<0.05 <0.04	mg/kg mg/kg	TM4/PM8 TM4/PM8
Phenanthrene #M	14.51 _{AB} 81.96 _{AB}	14.63	0.56 _{AB} 4.84 _{AB}	0.15					<0.04	mg/kg	TM4/PM8
Anthracene #	25.51 _{AB}	4.50	2.00 _{AB}	<0.04					<0.04	mg/kg	TM4/PM8
Fluoranthene #M	86.37 _{AB}	17.92	12.31 _{AB}	0.24					<0.03	mg/kg	TM4/PM8
Pyrene [#]	63.86 _{AB}	14.06	9.95 _{AB}	0.23					<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene#	33.38 _{AB}	5.81	8.26 _{AB}	0.15					<0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	41.72 _{AB}	6.04	9.31 _{AB}	0.13					<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	56.67 _{AB}	9.08	13.27 _{AB}	0.24					<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	40.83 _{AB}	6.30	8.54 _{AB}	0.18					<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	21.89 _{AB}	3.49	4.92 _{AB}	0.11					<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	4.46 _{AB}	0.58	0.61 _{AB}	< 0.04					< 0.04	mg/kg	TM4/PM8 TM4/PM8
Benzo(ghi)perylene [#] PAH 16 Total	14.98 _{AB} 530.6 _{AB}	3.32 89.3	3.52 _{AB} 78.5 _{AB}	0.11					<0.04 <0.6	mg/kg mg/kg	TM4/PM8
Benzo(b)fluoranthene	40.80 _{AB}	6.54	9.55 _{AB}	0.17					<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	15.87 _{AB}	2.54	3.72 _{AB}	0.07					<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	101 _{AB}	109	103 _{AB}	83					<0	%	TM4/PM8
Methyl Tertiary Butyl Ether #M	-	<6	<6	<6					<6	ug/kg	TM15/PM10
Benzene ^{#M}	-	<5	19	<5					<5	ug/kg	TM15/PM10
Toluene #M	-	9	35	<3					<3	ug/kg	TM15/PM10
Ethylbenzene #M	-	<3	8	<3					<3	ug/kg	TM15/PM10
p/m-Xylene ^{#M}	-	<4	18	<4					<4	ug/kg	TM15/PM10
o-Xylene ^{#M}	-	<4	14	<4					<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	113	99	114					<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	120	97	134					<0	%	TM15/PM10
		L	l			1					1

Client Name:	Geotechn					Report :	Solid							
Reference:	PN153390 A5036 Liv							1-050 e el	: T	lastic tub				
Location: Contact:	Jon Hutch	-				Solius: v-	60g VOC jai	, J–2509 gi	ass jai, 1-p					
JE Job No.:	15/13759													
		40.40	00.04	05.07										
J E Sample No.	7-9	16-18	22-24	25-27										
Sample ID	CP4	CP4	CP4	CP4										
Depth	1.00	4.00	6.00	8.30						Please se	e attached n	otes for all		
COC No / misc										abbrevia	ations and a	cronyms		
Containers	VJT	VJT	VJT	VJT										
Sample Date	<>	<>	<>	<>										
Sample Type	Soil	Soil	Soil	Soil										
Batch Number	1	1	1	1								Method		
Date of Receipt	24/09/2015	24/09/2015	24/09/2015	24/09/2015						LOD/LOR	Units	No.		
TPH CWG														
Aliphatics														
>C5-C6 #M	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM1		
>C6-C8 #M	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM1		
>C8-C10	0.4	<0.1	1.7	<0.1						<0.1	mg/kg	TM36/PM1		
>C10-C12 ^{#M}	<0.2	<0.2	<0.8 _{AA}	<0.2						<0.2	mg/kg	TM5/PM1		
>C12-C16 #M	<4	<4	<16 _{AA}	<4						<4	mg/kg	TM5/PM1		
>C16-C21 #M	11	10	<28 _{AA}	<7						<7	mg/kg	TM5/PM1		
>C21-C35 #M	166	32	202 _{AA}	<7						<7	mg/kg	TM5/PM1		
Total aliphatics C5-35	177	42	204 _{AA}	<19						<19	mg/kg	TM5/TM36/PM12/PM		
Aromatics														
>C5-EC7	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM1		
>EC7-EC8	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM1		
>EC8-EC10 #M	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM1		
>EC10-EC12	<0.2	<0.2	<0.8 _{AA}	<0.2						<0.2	mg/kg	TM5/PM1		
>EC12-EC16	16	7	<16 _{AA}	<4						<4	mg/kg	TM5/PM1		
>EC16-EC21	99	89	255 _{AA}	<7						<7	mg/kg	TM5/PM1		
>EC21-EC35	404	272	704 _{AA}	<7						<7	mg/kg	TM5/PM1		
Total aromatics C5-35	519	368	959 _{AA}	<19						<19	mg/kg	TM5/TM36/PM12/PM		
Total aliphatics and aromatics(C5-35)	696	410	1163 _{AA}	<38						<38	mg/kg	TM5/TM36/PM12/PM		
MTBE [#]	<5	-	-	-						<5	ug/kg	TM31/PM1		
Benzene#	<5	-	-	-						<5	ug/kg	TM31/PM1		
Toluene [#]	19	-	-	-						<5	ug/kg	TM31/PM1		
Ethylbenzene #	<5	-	-	-						<5	ug/kg	TM31/PM1		
m/p-Xylene [#]	12	-	-	-	 					<5	ug/kg	TM31/PM1		
o-Xylene [#]	<5	-	-	-						<5	ug/kg	TM31/PM1		
Natural Moisture Content	18.1	15.0	34.8	18.4						<0.1	%	PM4/PM0		
Ammoniacal Nitrogen as NH4	1.0	10.4	<0.6	11.8						<0.6	mg/kg	TM38/PM2		
Hexavalent Chromium [#]	<0.3	<0.3	1.4	<0.3						<0.3	mg/kg	TM38/PM2		
Free Cyanide	<0.5	<0.5	<0.5	<0.5						<0.5	mg/kg	TM89/PM4		
Total Cyanide ^{#M}	<0.5	<0.5	6.7	<0.5						<0.5	mg/kg	TM89/PM4		
Organic Matter	13.6	6.8	34.1	0.7						<0.2	%	TM21/PM2		
		0.0	5 7.1	0.7						- J.L	70			

pH ^{#M}

Sample Type

Other Items

Sample Colour

7.73

Sandy Loam

Dark Brown

stones

9.95

Loamy Sand

Dark Brown

stones

7.87

Sandy Loam

Dark Brown

tones, bark, pla

8.13

Sand

Dark Grey

NA

TM73/PM11 PM13/PM0

PM13/PM0

PM13/PM0

<0.01

pH units

None

None

None

Client Name: Reference: Location: Contact: JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759											
J E Sample No.	7-9	16-18	22-24	25-27]		
Sample ID	CP4	CP4	CP4	CP4								
Depth	1.00	4.00	6.00	8.30						Please se	e attached n	otes for all
COC No / misc											ations and a	
Containers	VJT	VJT	VJT	VJT								
Sample Date	<>	<>	<>	<>								
Sample Type	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1						LOD/LOR	Units	Method No.
Date of Receipt	24/09/2015	24/09/2015	24/09/2015	24/09/2015								
Dissolved Arsenic [#]	3.6	17.4	9.0	10.9						<0.9	ug/l	TM30/PM14
Dissolved Cadmium#	0.25	< 0.03	0.24	< 0.03						< 0.03	ug/l	TM30/PM14
Dissolved Chromium [#]	<0.2	0.5	0.6	0.3						<0.2	ug/l	TM30/PM14
Dissolved Copper [#]	4 26.4	7 4.8	<3 34.7	<3 105.4						<3 <4.7	ug/l ug/l	TM30/PM14 TM30/PM14
Dissolved Iron Dissolved Lead #	2.6	8.8	4.2	2.3						<0.4	ug/l	TM30/PM14
Dissolved Nickel [#]	6.3	1.6	9.6	1.4						<0.2	ug/l	TM30/PM14
Dissolved Selenium [#]	<1.2	<1.2	<1.2	<1.2						<1.2	ug/l	TM30/PM14
Dissolved Vanadium [#]	2.2	86.3	2.8	6.3						<0.6	ug/l	TM30/PM14
Dissolved Zinc#	19.8	2.9	10.9	4.9						<1.5	ug/l	TM30/PM14
Mercury Dissolved by CVAF #	0.08	0.09	0.71	0.80						<0.01	ug/l	TM61/PM38
PAH MS												
Naphthalene	<0.1	<2.0 _{AC}	0.2	<0.1						<0.1	ug/l	TM4/PM30
Acenaphthylene	0.06	0.23 _{AC}	0.05	< 0.01						<0.01	ug/l	TM4/PM30
Acenaphthene Fluorene	0.49	4.49 _{AC} 2.67 _{AC}	0.95	0.05						<0.01 <0.01	ug/l ug/l	TM4/PM30 TM4/PM30
Phenanthrene	2.04	18.74 _{AC}	2.58	0.18						<0.01	ug/l	TM4/PM30
Anthracene	0.66	4.57 _{AC}	0.63	0.04						<0.01	ug/l	TM4/PM30
Fluoranthene	4.30	26.80 _{AC}	2.92	0.23						<0.01	ug/l	TM4/PM30
Pyrene	3.36	21.37 _{AC}	2.33	0.19						<0.01	ug/l	TM4/PM30
Benzo(a)anthracene	2.06	9.63 _{AC}	1.10	0.09						<0.01	ug/l	TM4/PM30
Chrysene	1.93	12.40 _{AC}	1.15	0.11						 <0.01	ug/l	TM4/PM30
Benzo(bk)fluoranthene	3.35	15.71 _{AC}	1.88	0.15						<0.01	ug/l	TM4/PM30
Benzo(a)pyrene	2.45	11.23 _{AC}	1.25	0.08						<0.01	ug/l	TM4/PM30
Indeno(123cd)pyrene	1.02	5.07 _{AC}	0.48	0.02						<0.01	ug/l	TM4/PM30
Dibenzo(ah)anthracene	0.20	0.44 _{AC}	0.10	<0.01 0.03						<0.01 <0.01	ug/l	TM4/PM30 TM4/PM30
Benzo(ghi)perylene PAH 16 Total	23.2	3.95 _{AC} 137.3 _{AC}	16.7	1.2						<0.01	ug/l ug/l	TM4/PM30
Benzo(b)fluoranthene	2.41	11.31 _{AC}	1.35	0.11						<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	0.94	4.40 _{AC}	0.53	0.04						<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	79	77 _{AC}	90	84						<0	%	TM4/PM30
Methyl Tertiary Butyl Ether	-	<1	<1	<1						<1	ug/l	TM15/PM69
Benzene	-	<1	<1	<1						<1	ug/l	TM15/PM69
Toluene	-	<2	<2	<2						<2	ug/l	TM15/PM69
Ethylbenzene	-	<2	<2	<2						<2	ug/l	TM15/PM69
p/m-Xylene	-	<3	<3	<3						<3	ug/l	TM15/PM69
o-Xylene	-	<2	<2	<2						<2	ug/l	TM15/PM69
Surrogate Recovery Toluene D8		102	102	101						<0	%	TM15/PM69
Surrogate Recovery 4-Bromofluorobenzene	-	113	115	113						<0	%	TM15/PM69
				1		1	L	1	1			

Client Name:
Reference:
Location:
Contact:

PN153396 A5036 Liverpool Jon Hutchinson

Geotechnics

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759									
J E Sample No.	7-9	16-18	22-24	25-27						
Sample ID	CP4	CP4	CP4	CP4						
Depth	1.00	4.00	6.00	8.30				Please se	e attached n	otes for all
COC No / misc									ations and a	
Containers	VJT	VJT	VJT	VJT						
Sample Date		<>	<>	~						
-										
Sample Type		Soil	Soil	Soil						
Batch Number	1	1	1	1				LOD/LOR	Units	Method No.
Date of Receipt	24/09/2015	24/09/2015	24/09/2015	24/09/2015						NO.
TPH CWG										
Aliphatics >C5-C6	<5	<5	<5	<5				-5		TM36/PM69
>C5-C8	<5	<5	<5	<5				<5 <5	ug/l ug/l	TM36/PM69
>C8-C10	<5	<5	<5	<5				<5	ug/l	TM36/PM69
>C10-C12	<5	<5	<5	<5				<5	ug/l	TM5/PM30
>C12-C16	<10	<10	<10	<10				<10	ug/l	TM5/PM30
>C16-C21	<10	<10	<10	<10				<10	ug/l	TM5/PM30
>C21-C35	<10	<10	<10	<10				<10	ug/l	TM5/PM30
Total aliphatics C5-35	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM30/PM69
Aromatics	-	-	-					-		TH 40.0 (DI 40.0
>C5-EC7 >EC7-EC8	<5 <5	<5 <5	<5 <5	<5 <5				<5 <5	ug/l ug/l	TM36/PM69 TM36/PM69
>EC8-EC10	<5	<5	<5	<5				<5	ug/l	TM36/PM69
>EC10-EC12	<5	<5	<5	<5				<5	ug/l	TM5/PM30
>EC12-EC16	<10	40	<10	<10				<10	ug/l	TM5/PM30
>EC16-EC21	<10	430	130	<10				<10	ug/l	TM5/PM30
>EC21-EC35	<10	800	850	<10				<10	ug/l	TM5/PM30
Total aromatics C5-35	<10	1270	980	<10				<10	ug/l	TM5/TM36/PM30/PM69
Total aliphatics and aromatics(C5-35)	<10	1270	980	<10				<10	ug/l	TM5/TM36/PM30/PM69
МТВЕ	<5	-	<5	-				<5	ug/l	TM36/PM69
Benzene	<5	-	<5	-				<5	ug/l	TM36/PM69
Toluene	<5	-	<5	-				<5	ug/l	TM36/PM69
Ethylbenzene m/p-Xylene	<5 <5	-	<5 <5	-				<5 <5	ug/l ug/l	TM36/PM69 TM36/PM69
o-Xylene	<5	-	<5	-				<5	ug/l	TM36/PM69
Sulphate [#]	212.75	43.85	131.10	0.53				<0.05	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 [#]	240	5080	20590	17490				<30	ug/l	TM38/PM0
Free Cyanide [#]	<10	<10	<10	<10				<10	ug/l	TM89/PM0
Total Cyanide #	<5	<5	9	<5				<5	ug/l	TM89/PM0
Hexavalent Chromium	<2	<2	<2	<2				<2	ug/l	TM38/PM0
pН	7.97	9.98	8.07	8.17				<0.01	pH units	TM73/PM0

Geotechnics **Client Name:** VOC Report : Solid PN153396 Reference: A5036 Liverpool Location: Contact: Jon Hutchinson JE Job No.: 15/13759 J E Sample No. 16-18 25-27 22-24 Sample ID CP4 CP4 CP4 Depth 4.00 6.00 8.30 Please see attached notes for all COC No / misc abbreviations and acronyms VJT VJT VJT Containers Sample Date <> ~ <> Soil Soil Sample Type Soil Batch Number Method 1 1 1 LOD/LOR Units No. Date of Receipt 24/09/2015 24/09/2015 24/09/201 VOC MS TM15/PM10 Dichlorodifluoromethane <2 <2 <2 <2 ug/kg Methyl Tertiary Butyl Ether #M TM15/PM10 <6 <6 <6 <6 ug/kg Chloromethane * <3 <3 <3 <3 ug/kg TM15/PM10 Vinyl Chloride <2 <2 <2 <2 TM15/PM10 ug/kg TM15/PM10 Bromomethane <1 <1 <1 <1 ug/kg Chloroethane # <6 <6 <6 <6 ug/kg TM15/PM10 Trichlorofluoromethane #M <3 <3 <3 <3 ug/kg TM15/PM10 1,1-Dichloroethene (1,1 DCE) #M <6 <6 TM15/PM10 <6 <6 ug/kg Dichloromethane (DCM) # <7 TM15/PM10 <7 <7 <7 ug/kg trans-1-2-Dichloroethene # <3 <3 <3 <3 ug/kg TM15/PM10 1,1-Dichloroethane #M <6 <6 <6 <6 ug/kg TM15/PM10 TM15/PM10 cis-1-2-Dichloroethene # <7 <7 <7 <7 ug/kg 2,2-Dichloropropane <4 <4 <4 <4 ug/kg TM15/PM10 <4 <4 <4 <4 TM15/PM10 Bromochloromethane #M ug/kg Chloroform ^{#M} <5 <5 <5 <5 ug/kg TM15/PM10 1,1,1-Trichloroethane #M TM15/PM10 <5 <5 <5 <5 ug/kg 1,1-Dichloropropene <3 <3 <3 <3 ug/kg TM15/PM10 Carbon tetrachloride^{#M} TM15/PM10 <4 <4 <4 <4 ug/kg 1,2-Dichloroethane #M <5 <5 <5 <5 TM15/PM10 ug/kg Benzene ^{#№} <5 19 <5 <5 ug/kg TM15/PM10 TM15/PM10 Trichloroethene (TCE)^{#M} <5 <5 <5 <5 ug/kg <4 <4 <4 TM15/PM10 <4 1.2-Dichloropropane ug/kg Dibromomethane # <4 TM15/PM10 <4 <4 <4 ug/kg Bromodichloromethane #M <4 <4 <4 <4 ug/kg TM15/PM10 <4 <4 <4 cis-1-3-Dichloropropene <4 TM15/PM10 ug/kg Toluene ^{#M} 9 35 <3 <3 TM15/PM10 ug/kg trans-1-3-Dichloropropene <3 <3 <3 <3 ug/kg TM15/PM10 1,1,2-Trichloroethane# <4 <4 <4 <4 ug/kg TM15/PM10 <3 <3 <3 <3 TM15/PM10 Tetrachloroethene (PCE)* ua/ka 1,3-Dichloropropane # <4 <4 <4 <4 ug/kg TM15/PM10 Dibromochloromethane #M <5 <5 <5 <5 TM15/PM10 ug/kg 1,2-Dibromoethane # <3 <3 <3 <3 TM15/PM10 ug/kg <4 <4 <4 <4 TM15/PM10 Chlorobenzene # ug/kg 1,1,1,2-Tetrachloroethane ^{#M} <5 <5 <5 <5 ug/kg TM15/PM10 <3 TM15/PM10 Ethylbenzene #M <3 8 <3 ug/kg <4 18 <4 TM15/PM10 <4 p/m-Xvlene ua/ka o-Xylene ^{#M} <4 14 <4 <4 ug/kg TM15/PM10 Styrene <3 <3 <3 <3 TM15/PM10 ug/kg Bromoform <4 <4 <4 <4 TM15/PM10 ug/kg lsopropylbenzene # TM15/PM10 <3 15 <3 <3 ug/kg 1,1,2,2-Tetrachloroethane #M <3 <3 <3 <3 ug/kg TM15/PM10 <2 <2 <2 <2 TM15/PM10 Bromobenzene ug/kg 1,2,3-Trichloropropane #M TM15/PM10 <4 <4 <4 <4 ug/kg Propylbenzene # <4 14 <4 <4 ug/kg TM15/PM10 2-Chlorotoluene <3 <3 <3 <3 TM15/PM10 ug/kg TM15/PM10 1.3.5-Trimethylbenzene <3 <3 <3 <3 ug/kg 4-Chlorotoluene <3 <3 <3 <3 ug/kg TM15/PM10 tert-Butylbenzene * <5 <5 <5 <5 TM15/PM10 ug/kg TM15/PM10 1,2,4-Trimethylbenzene# <6 38 <6 <6 ug/kg TM15/PM10 <4 36 <4 <4 sec-Butylbenzene ug/kg 4-Isopropyltoluene # <4 56 <4 <4 ug/kg TM15/PM10 1,3-Dichlorobenzene #M <4 <4 <4 <4 ug/kg TM15/PM10 <4 <4 <4 TM15/PM10 <4 1.4-Dichlorobenzene ug/kg TM15/PM10 n-Butylbenzene# <4 <4 <4 <4 ug/kg 1,2-Dichlorobenzene #M <4 TM15/PM10 <4 <4 <4 ug/kg 1.2-Dibromo-3-chloropropane <4 <4 <4 <4 ug/kg TM15/PM10 TM15/PM10 <7 <7 <7 <7 1,2,4-Trichlorobenzene ug/kg Hexachlorobutadiene <4 <4 <4 <4 ug/kg TM15/PM10 <27 <27 TM15/PM10 Naphthalene 280 200 ug/kg TM15/PM10 1.2.3-Trichlorobenzene <7 <7 <7 <7 ug/kg Surrogate Recovery Toluene D8 113 99 114 <0 % TM15/PM10

ogate Recovery 4-Bromofluorobe

97

120

134

Jones Environmental Laboratory

TM15/PM10

<0

0/

Client Name:	Geoteo
Reference:	PN153
Location:	A5036
Contact:	Jon Hu
IE Job No :	15/127

Client Name:	Geotechn				VOC Rep	ort :	CEN 10:1	1 Batch			
Reference:	PN15339										
Location:	A5036 Liv										
Contact:	Jon Hutch	linson									
JE Job No.:	15/13759										
J E Sample No.	16-18	22-24	25-27								
Sample ID	CP4	CP4	CP4								
Depth	4.00	6.00	8.30							e attached i ations and a	notes for all
COC No / misc Containers	VJT	VJT	VJT						abbievie		loronymis
Sample Date	<>	<>	<>								
Sample Type	Soil	Soil	Soil								
Batch Number	1	1	1						LOD/LOR	Units	Method
Date of Receipt	24/09/2015	24/09/2015	24/09/2015						LODILOIT	onno	No.
VOC MS	-0	-0	-0						-2		TM15/DMC
Dichlorodifluoromethane Methyl Tertiary Butyl Ether	<2 <1	<2 <1	<2 <1						<2 <1	ug/l ug/l	TM15/PM6 TM15/PM6
Chloromethane	<3	<3	<3						<3	ug/l	TM15/PM6
Vinyl Chloride	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM6
Bromomethane	<1	<1	<1						<1	ug/l	TM15/PM6
Chloroethane	<3	<3	<3						<3	ug/l	TM15/PM6
Trichlorofluoromethane	<3	<3	<3						<3	ug/l	TM15/PM6
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3						<3	ug/l	TM15/PM6
Dichloromethane (DCM) trans-1-2-Dichloroethene	<3 <3	<3 <3	<3 <3						<3 <3	ug/l ug/l	TM15/PM6 TM15/PM6
1,1-Dichloroethane	<3	<3	<3						<3	ug/l	TM15/PM6
cis-1-2-Dichloroethene	<3	<3	<3						<3	ug/l	TM15/PM6
2,2-Dichloropropane	<1	<1	<1						<1	ug/l	TM15/PM6
Bromochloromethane	<2	<2	<2						<2	ug/l	TM15/PM6
Chloroform	<2	<2	<2						<2	ug/l	TM15/PM6
1,1,1-Trichloroethane	<2 <3	<2 <3	<2 <3						<2 <3	ug/l	TM15/PM6 TM15/PM6
1,1-Dichloropropene Carbon tetrachloride	<3	<3	<3						<3	ug/l ug/l	TM15/PM6
1,2-Dichloroethane	<2	<2	<2						<2	ug/l	TM15/PM6
Benzene	<1	<1	<1						<1	ug/l	TM15/PM6
Trichloroethene (TCE)	<3	<3	<3						<3	ug/l	TM15/PM6
1,2-Dichloropropane	<2	<2	<2						<2	ug/l	TM15/PM6
Dibromomethane	<3	<3	<3						<3	ug/l	TM15/PM69
Bromodichloromethane	<2	<2	<2						<2	ug/l	TM15/PM69
cis-1-3-Dichloropropene Toluene	<2 <2	<2 <2	<2 <2						<2 <2	ug/l ug/l	TM15/PM6 TM15/PM6
trans-1-3-Dichloropropene	<2	<2	<2						<2	ug/l	TM15/PM6
1,1,2-Trichloroethane	<2	<2	<2						<2	ug/l	TM15/PM6
Tetrachloroethene (PCE)	<3	<3	<3						<3	ug/l	TM15/PM6
1,3-Dichloropropane	<2	<2	<2						<2	ug/l	TM15/PM6
Dibromochloromethane	<2	<2	<2						<2	ug/l	TM15/PM6
1,2-Dibromoethane Chlorobenzene	<2 <2	<2 <2	<2 <2						<2 <2	ug/l	TM15/PM6 TM15/PM6
1,1,1,2-Tetrachloroethane	<2	<2	<2						<2	ug/l ug/l	TM15/PM6
Ethylbenzene	<2	<2	<2						<2	ug/l	TM15/PM6
p/m-Xylene	<3	<3	<3						<3	ug/l	TM15/PM6
p-Xylene	<2	<2	<2						<2	ug/l	TM15/PM6
Styrene	<2	<2	<2						<2	ug/l	TM15/PM6
Bromoform	<2	<2	<2						<2	ug/l	TM15/PM6
sopropylbenzene	<3	<3 <4	<3						<3	ug/l	TM15/PM6 TM15/PM6
1,1,2,2-Tetrachloroethane Bromobenzene	<4 <2	<4 <2	<4 <2						<4 <2	ug/l ug/l	TM15/PM6 TM15/PM6
1,2,3-Trichloropropane	<3	<2	<2						<2	ug/l	TM15/PM6
Propylbenzene	<3	<3	<3						<3	ug/l	TM15/PM6
2-Chlorotoluene	<3	<3	<3						<3	ug/l	TM15/PM6
1,3,5-Trimethylbenzene	<3	<3	<3						<3	ug/l	TM15/PM6
4-Chlorotoluene	<3	<3	<3						<3	ug/l	TM15/PM6
ert-Butylbenzene	<3	<3	<3						<3	ug/l	TM15/PM6
I,2,4-Trimethylbenzene	<3 <3	<3 <3	<3 <3						<3 <3	ug/l	TM15/PM6 TM15/PM6
ec-Butylbenzene	<3	<3	<3						<3	ug/l ug/l	TM15/PM6 TM15/PM6
,3-Dichlorobenzene	<3	<3	<3						<3	ug/l	TM15/PM6
,4-Dichlorobenzene	<3	<3	<3						<3	ug/l	TM15/PM6
-Butylbenzene	<3	<3	<3						<3	ug/l	TM15/PM6
,2-Dichlorobenzene	<3	<3	<3						<3	ug/l	TM15/PM6
,2-Dibromo-3-chloropropane	<2	<2	<2						<2	ug/l	TM15/PM6
1,2,4-Trichlorobenzene	<3	<3	<3						<3	ug/l	TM15/PM6
Hexachlorobutadiene	<3 <2	<3	<3 <2						<3 <2	ug/l	TM15/PM6 TM15/PM6
Naphthalene	<2 <3	<2 <3	<2 <3						<2 <3	ug/l ug/l	TM15/PM6 TM15/PM6
Surrogate Recovery Toluene D8	102	102	101						<0	%	TM15/PM6
urrogate Recovery 4-Bromofluorobenzene	113	115	113						<0	%	TM15/PM6

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested. Opinions lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

If asbestos fibres are reported at trace levels there will not be enough fibres to quantify and will be less than 0.001%.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	1	CP4	1.00	8	29/09/2015	Mass of Dry Sample	49.2 (g)
					30/09/2015	General Description (Bulk Analysis)	soil-stones-roots
					30/09/2015	Asbestos Containing Material	None
					30/09/2015	Asbestos Containing Material (2)	None
					30/09/2015	Asbestos Screen	NAD
					30/09/2015	Asbestos Screen (2)	NAD
					30/09/2015	Asbestos Level	NAD
15/13759	1	CP4	4.00	17	01/10/2015	Mass of Dry Sample	46.9 (g)
					01/10/2015	General Description (Bulk Analysis)	Soil/Stone
					01/10/2015	Asbestos Containing Material	None
					01/10/2015	Asbestos Containing Material (2)	None
					01/10/2015	Asbestos Screen	NAD
					01/10/2015	Asbestos Screen (2)	NAD
					01/10/2015	Asbestos Level	NAD
15/13759	1	CP4	6.00	23	29/09/2015	Mass of Dry Sample	42.9 (g)
					30/09/2015	General Description (Bulk Analysis)	soil-roots-vegetation
					30/09/2015	Asbestos Containing Material	None
					30/09/2015	Asbestos Containing Material (2)	None
					30/09/2015	Asbestos Screen	NAD
					30/09/2015	Asbestos Screen (2)	NAD
					30/09/2015	Asbestos Level	NAD
15/13759	1	CP4	8.30	26	01/10/2015	Mass of Dry Sample	45.0 (g)
					01/10/2015	General Description (Bulk Analysis)	Sand/Stone
					01/10/2015	Asbestos Containing Material	None
					01/10/2015	Asbestos Containing Material (2)	None
					01/10/2015	Asbestos Screen	NAD
					01/10/2015	Asbestos Screen (2)	NAD
					01/10/2015	Asbestos Level	NAD

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range
x4 Dilution
x10 Dilution
x20 Dilution

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5/TM36	TM005: Modified USEPA 80158. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into alphatic and aromatic fractions by GC-FID. TM035: Modified USEPA 80158. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM12/PM16	CWG GC-FID			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbrox [EPH) including columin fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM005: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM30/PM69	PM030: Eluate samples are extracted with solvent using a magnetic stirrer to create a vortex.PM069: One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM69	Modified BS EN 12457 method.One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM69	Modified BS EN 12457 method.One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes		AR	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM69	Modified BS EN 12457 method.One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325 2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325 2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with delonised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with delonised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.			AR	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM0	No preparation is required.	Yes		AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

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Jones Environmental Laboratory

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Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 20th November, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 1 Schedule B Location : A5036 Liverpool 24th September, 2015 Date samples received : Status : Final report Issue : 1

Seventeen samples were received for analysis on 24th September, 2015 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc **Project Manager**

Jones Environmental Laboratory Report: Solid Client Name: Geotechnics Report: Solid Reference: PN153396 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub Location: A5036 Liverpool Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Contact:	Jon Hutch				Condo. V	oog rooja	., o 2009 g.			
JE Job No.:	15/13759									
J E Sample No.	13-15	37	44-46					1		
Sample ID	CP4	CP5	CP5							
Depth	3.00	2.00	4.00					Please se	otes for all	
COC No / misc									ations and ad	
Containers	VJT	т	VJT					1		
Sample Date		<>	22/09/2015					1		
Sample Type		Soil	Soil					1		
Batch Number		1	1					ļ		
Date of Receipt								LOD/LOR	Units	Method No.
Sulphate as SO4 (2:1 Ext) #M	0.1286	0.4286	1.6723					 <0.0015	g/l	TM38/PM20
рН ^{#м}	11.05	7.93	7.75					<0.01	pH units	TM73/PM11
Sample Type Sample Colour	Sandy Loam Medium Brown		Clayey Loam Medium Brown						None None	PM13/PM0 PM13/PM0
Other Items	stones, brick	stones	plastic, stones						None	PM13/PM0 PM13/PM0

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes	Yes	AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No

QF-PM 3.1.10 v14

Please include all sections of this report if it is reproduced



Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. L

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 13th October, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 2 Location : A5036 Liverpool 25th September, 2015 Date samples received : Status : Final report Issue : 1

Twenty one samples were received for analysis on 25th September, 2015 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc Project Manager

Client Name: Reference: Location: Contact: JE Job No.: Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759										
J E Sample No.	56-58	59-61	62-64	74-75	91-93	103-105					
Sample ID	CP2	CP2	CP2	CP2	CP3	CP3					
Depth	1.0	2.0	3.0	10.0	2.8	8.7			Please se	e attached n	otes for all
COC No / misc										ations and a	
Containers	VJT	VJT	VJT	V J	VJT	VJT					
Sample Date	<>	<>	<>	<>	<>	<>					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	2	2	2	2	2	2				11-16-	Method
Date of Receipt	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015			LOD/LOR	Units	No.
Arsenic #M	31.7	67.0	55.6	22.2	56.6	32.8			<0.5	mg/kg	TM30/PM15
Cadmium ^{#M}	0.3	0.9	0.4	0.2	1.1	0.4			<0.1	mg/kg	TM30/PM15
Chromium #M	95.5	59.2	64.6	122.2	99.0	96.6			<0.5	mg/kg	TM30/PM15
Copper ^{#M}	316 _{AA}	269 _{AA}	605 _{AA}	1433 _{AA}	190	75			<1	mg/kg	TM30/PM15
Iron	73910 _{AA}	67780 _{AA}	66120 _{AA}	23770	98970 _{AA}	41110			<20	mg/kg	TM30/PM15
Lead #M	243	259	292	174	306	193			<5	mg/kg	TM30/PM15
Mercury ^{#M} Nickel ^{#M}	0.1 112.6	<0.1 72.2	0.3 95.2	0.2 28.5	0.3 64.3	0.3 32.5			<0.1 <0.7	mg/kg mg/kg	TM30/PM15 TM30/PM15
Selenium ^{#M}	1	2	95.2 2	<1	7	4			<0.7	mg/kg	TM30/PM15
Vanadium	87	77	68	21	72	61			<1	mg/kg	TM30/PM15
Zinc ^{#M}	520	2810 _{AA}	930	253	392	633			<5	mg/kg	TM30/PM15
2.110									-		
PAH MS											
Naphthalene ^{#M}	0.34	<0.04	<0.04	<0.04	0.25	<0.40 _{AB}			<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.11	<0.03	<0.03	<0.03	0.10	<0.30 _{AB}			<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	1.14	<0.05	<0.05	<0.05	1.31	<0.50 _{AB}			<0.05	mg/kg	TM4/PM8
Fluorene #M	0.63	<0.04	<0.04	<0.04	1.01	<0.40 _{AB}			<0.04	mg/kg	TM4/PM8
Phenanthrene #M	9.79	0.20	0.10	0.08	6.36	0.81 _{AB}			<0.03	mg/kg	TM4/PM8
Anthracene #	2.00	0.05	<0.04	<0.04	1.60	<0.40 _{AB}			<0.04	mg/kg	TM4/PM8
Fluoranthene #M	14.86	0.39	0.18	0.13	7.11	0.68 _{AB}			<0.03	mg/kg	TM4/PM8
Pyrene [#]	12.91	0.37	0.16	0.10	5.43	0.51 _{AB}			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	6.86	0.27	0.14	0.12	2.23	<0.60 _{AB}			<0.06	mg/kg	TM4/PM8
Chrysene #M	7.89	0.38	0.16	0.17	2.97	0.67 _{AB}	 		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	11.23	0.58	0.27	0.26	4.03	<0.70 _{AB}			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	7.24 4.30	0.38	0.18	0.18	2.58 1.33	<0.40 _{AB}			<0.04 <0.04	mg/kg	TM4/PM8 TM4/PM8
Indeno(123cd)pyrene ^{#M} Dibenzo(ah)anthracene [#]	0.71	0.19	<0.04	<0.04	0.19	<0.40 _{AB} <0.40 _{AB}			<0.04	mg/kg mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	3.80	0.00	0.10	0.04	1.24	<0.40 _{AB}			<0.04	mg/kg	TM4/PM8
PAH 16 Total	83.8	3.1	1.4	1.2	37.7	<6.0 _{AB}	 		<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	8.09	0.42	0.19	0.19	2.90	<0.50 _{AB}			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	3.14	0.16	0.08	0.07	1.13	<0.20 _{AB}			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	104	98	107	102	100	85 _{AB}			<0	%	TM4/PM8
Methyl Tertiary Butyl Ether #M	<6	<6	<6	-	<6	-			<6	ug/kg	TM15/PM10
Benzene ^{#M}	<5	<5	<5	-	<5	-			<5	ug/kg	TM15/PM10
Toluene #M	<3	<3	18	-	18	-			<3	ug/kg	TM15/PM10
Ethylbenzene ^{#M}	<3	6	11	-	5	-			<3	ug/kg	TM15/PM10
p/m-Xylene ^{#M}	<4	<4	15	-	12	-			<4	ug/kg	TM15/PM10
o-Xylene ^{#M}	<4	<4	8	-	7	-			<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	107	106	102	-	95	-			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	90	68	70	-	85	-			<0	%	TM15/PM10

Client Name:
Reference:
Location:
Contact:
JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759											
J E Sample No.	56-58	59-61	62-64	74-75	91-93	103-105						
Sample ID	CP2	CP2	CP2	CP2	CP3	CP3						
Depth	1.0	2.0	3.0	10.0	2.8	8.7			Please see attached notes f abbreviations and acrony			
COC No / misc												
Containers	VJT	VJT	VJT	VJ	VJT	VJT						
Sample Date	<>	<>	<>	<>	<>	<>						
-		Soil	Soil	Soil	Soil	Soil						
Sample Type												
Batch Number	2	2	2	2	2	2			LOD/LOR	Units	Method No.	
Date of Receipt	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015					110.	
TPH CWG												
Aliphatics	<0.1	<0.1	<0.1	-	<0.1	-			<0.1	mg/kg	TM36/PM12	
>C6-C8 ^{#M}	<0.1	<0.1	<0.1	-	<0.1	-			<0.1	mg/kg	TM36/PM12	
>C8-C10	<0.1	<0.1	<0.1	-	<0.1	-			<0.1	mg/kg	TM36/PM12	
>C10-C12 ^{#M}	<0.2	<0.2	<0.2	-	<0.2	-			<0.2	mg/kg	TM5/PM16	
>C12-C16 ^{#M}	<4	<4	<4	-	<4	-			<4	mg/kg	TM5/PM16	
>C16-C21 ^{#M}	<7	<7	<7	-	27	-			<7	mg/kg	TM5/PM16	
>C21-C35 ^{#M}	12	25	19	-	327	-			<7	mg/kg	TM5/PM16	
Total aliphatics C5-35	<19	25	19	-	354	-			<19	mg/kg	TM5/TM36/PM12/PM16	
Aromatics	-0.1	-0.1	-0.1	-	-0.1	-			-0.1		TM36/PM12	
>C5-EC7 >EC7-EC8	<0.1 <0.1	<0.1 <0.1	<0.1 <0.1	-	<0.1 <0.1	-			<0.1 <0.1	mg/kg mg/kg	TM36/PM12	
>EC8-EC10 #M	<0.1	<0.1	<0.1	-	<0.1	-			<0.1	mg/kg	TM36/PM12	
>EC10-EC12	<0.2	<0.2	<0.2	-	<0.2	-			<0.2	mg/kg	TM5/PM16	
>EC12-EC16	7	<4	<4	-	11	-			<4	mg/kg	TM5/PM16	
>EC16-EC21	67	67	<7	-	135	-			<7	mg/kg	TM5/PM16	
>EC21-EC35	190	233	96	-	591	-			<7	mg/kg	TM5/PM16	
Total aromatics C5-35	264	300	96	-	737	-			<19	mg/kg	TM5/TM36/PM12/PM16	
Total aliphatics and aromatics(C5-35)	264	325	115	-	1091	-			<38	mg/kg	TM5/TM36/PM12/PM16	
Natural Moisture Content	22.1	26.5	36.7	30.3	36.7	58.4			<0.1	%	PM4/PM0	
Ammoniacal Nitrogen as NH4	-	-	-	7.6	6.4	176.8			<0.6	mg/kg	TM38/PM20	
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20	
рН #М	8.27	7.06	7.38	7.36	7.38	7.41			<0.01	pH units	TM73/PM11	
Sample Type	Sand	Sand	Clayey Sand		Loamy Sand					None	PM13/PM0	
Sample Colour	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown					None	PM13/PM0	
Other Items	stones	stones	glass, stones, brick	stones, wet	stones, bricks, roots	stones				None	PM13/PM0	

Client Name:	Geotecl
Reference:	PN1533
Location:	A5036 l
Contact:	Jon Hut
JE Joh No 1	15/1375

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759 VOC Report : Solid

JE Job No.:	15/13759									
J E Sample No.	56-58	59-61	62-64	91-93				1		
Sample ID	CP2	CP2	CP2	CP3						
Depth	1.0	2.0	3.0	2.8					e attached n	
COC No / misc Containers	VJT	VJT	VJT	VJT				abbrevia	ations and a	cronyms
Sample Date	<>	<>	<>	<>						
Sample Type	Soil	Soil	Soil	Soil						
Batch Number Date of Receipt	2	2 25/09/2015	2 25/09/2015	2 25/09/2015				LOD/LOR	Units	Method No.
VOC MS	23/09/2013	23/09/2013	23/09/2013	23/09/2013						
Dichlorodifluoromethane	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #M	<6	<6	<6	<6				<6	ug/kg	TM15/PM10
Chloromethane#	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
Bromomethane	<1	<1	<1	<1				<1	ug/kg	TM15/PM10
Chloroethane ^{#M}	<6	<6	<6	<6				<6	ug/kg	TM15/PM10
Trichlorofluoromethane #M	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #M	<6	<6 137	<6 172	<6 161				<6 <7	ug/kg	TM15/PM10 TM15/PM10
Dichloromethane (DCM) [#] trans-1-2-Dichloroethene [#]	101 <3	<3	<3	<3				<7 <3	ug/kg ug/kg	TM15/PM10 TM15/PM10
1,1-Dichloroethane ^{#M}	<6	<6	<6	<6				<6	ug/kg ug/kg	TM15/PM10
cis-1-2-Dichloroethene #M	<7	<7	<7	<7				<7	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Bromochloromethane #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Chloroform ^{#M}	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
1,1,1-Trichloroethane #M	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Carbon tetrachloride #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2-Dichloroethane ^{#M}	<5 <5	<5 <5	<5	<5 <5				<5	ug/kg	TM15/PM10 TM15/PM10
Benzene ^{#M} Trichloroethene (TCE) ^{#M}	<5	<5	<5 <5	<5 <5				<5 <5	ug/kg ug/kg	TM15/PM10 TM15/PM10
1,2-Dichloropropane #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Dibromomethane #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Bromodichloromethane #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Toluene #M	<3	<3	18	18				<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane	<4	<4	<4	<4				<4	ug/kg	TM15/PM10 TM15/PM10
Tetrachloroethene (PCE) [#] 1,3-Dichloropropane ^{#M}	<3 <4	<3 <4	<3 <4	<3 <4				<3 <4	ug/kg ug/kg	TM15/PM10 TM15/PM10
Dibromochloromethane #M	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Chlorobenzene #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane ^{#M}	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
Ethylbenzene #M	<3	6	11	5				<3	ug/kg	TM15/PM10
p/m-Xylene #M	<4	<4	15	12				<4	ug/kg	TM15/PM10
o-Xylene ^{#M} Styrene	<4 4	<4 <3	8 <3	7 <3				<4 <3	ug/kg	TM15/PM10 TM15/PM10
Bromoform	4 <4	<4	<4	<4				<4	ug/kg ug/kg	TM15/PM10
Isopropylbenzene [#]	<3	<3	<3	<3				<4	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #M	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Propylbenzene [#]	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene [#]	<3	<3 <3	<3	<3 <3				<3	ug/kg	TM15/PM10 TM15/PM10
4-Chlorotoluene tert-Butylbenzene [#]	<3 <5	<3 <5	<3 <5	<3 <5				<3 <5	ug/kg ug/kg	TM15/PM10 TM15/PM10
1,2,4-Trimethylbenzene [#]	<5	<5	<6	15				<6	ug/kg ug/kg	TM15/PM10
sec-Butylbenzene [#]	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #M	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene#	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene ^{#M}	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane [#]	<4 <7	<4	<4 <7	<4 <7				<4 <7	ug/kg	TM15/PM10 TM15/PM10
1,2,4-Trichlorobenzene [#] Hexachlorobutadiene	<7 <4	<7 <4	<7	<7				<7 <4	ug/kg ug/kg	TM15/PM10 TM15/PM10
Naphthalene	<27	<27	<27	<4				<27	ug/kg ug/kg	TM15/PM10 TM15/PM10
1,2,3-Trichlorobenzene [#]	<7	<7	<7	<7				<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	107	106	102	95				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	90	68	70	85				<0	%	TM15/PM10

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

-	1
#	ISO17025 (UKAS) accredited - UK.
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
Ν	Client Sample
ТВ	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution
	1

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into alphalic and aromatic fractions by GC-FID. TM035: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM12/PM16	CWG GC-FID			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

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Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781



Jon Hutchinson
5th November, 2015
PN153396
Test Report 15/13759 Batch 2 Schedule D
A5036 Liverpool
25th September, 2015
Final report
1

Twenty one samples were received for analysis on 25th September, 2015 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60-20

Simon Gomery BSc Project Manager

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested. Opinions lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Any questionable sample will automatically be assumed to have breached the Waste Limit and further testing may be required.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	2	CP2	1.0	57	02/11/2015	Mass of Dry Sample	44.0 (g)
					04/11/2015	General Description (Bulk Analysis)	Soil-Silt/Clay/Brick/Stone
					04/11/2015	Asbestos Containing Material	Asbestos Insulating Board Debris
					04/11/2015	Asbestos Screen	Chrysotile
					04/11/2015	Asbestos Level	Quantifiable
					04/11/2015	Waste Limit	Asbestos waste limit cannot be determined from the analysis scheduled
15/13759	2	CP2	2.0	60	02/11/2015	Mass of Dry Sample	41.2 (g)
					04/11/2015	General Description (Bulk Analysis)	Soil-Silt/Clay/Brick/Stone
					04/11/2015	Asbestos Containing Material	Fibre Bundles
					04/11/2015	Asbestos Screen	Chrysotile
					04/11/2015	Asbestos Level	Quantifiable
					04/11/2015	Waste Limit	<0.1%
15/13759	2	CP2	3.0	63	02/11/2015	Mass of Dry Sample	38.9 (g)
					04/11/2015	General Description (Bulk Analysis)	Soil-Silt/Clay/Brick/Stone
					04/11/2015	Asbestos Containing Material	Fibre Bundles
					04/11/2015	Asbestos Screen	Chrysotile
					04/11/2015	Asbestos Level	Quantifiable
					04/11/2015	Waste Limit	<0.1%
15/13759	2	CP2	10.0	75	02/11/2015	Mass of Dry Sample	47.2 (g)
					04/11/2015	General Description (Bulk Analysis)	Soil/Stone
					04/11/2015	Asbestos Containing Material	Fibre Bundles
					04/11/2015	Asbestos Screen	Chrysotile
					04/11/2015	Asbestos Level	Quantifiable
					04/11/2015	Waste Limit	<0.1%
15/13759	2	CP3	2.8	92	02/11/2015	Mass of Dry Sample	40.2 (g)
					04/11/2015	General Description (Bulk Analysis)	Soil/Stone
					04/11/2015	Asbestos Containing Material	Fibre Bundles
					04/11/2015	Asbestos Screen	Chrysotile
					04/11/2015	Asbestos Level	Quantifiable
					04/11/2015	Waste Limit	<0.1%
15/13759	2	CP3	8.7	104	02/11/2015	Mass of Dry Sample	35.1 (g)
					04/11/2015	General Description (Bulk Analysis)	Soil/Stone/Silt
					04/11/2015	Asbestos Containing Material	Fibre Bundles
					04/11/2015	Asbestos Screen	Chrysotile

Client N Referer Locatio Contac	nce: on:		Geotechr PN15339 A5036 Liv Jon Hutcl	96 verpool			
J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	2	CP3	8.7	104	04/11/2015	Asbestos Level	Quantifiable
					04/11/2015	Waste Limit	<0.1%
				1		1	

Client Name:GeotechnicsReference:PN153396Location:A5036 LiverpoolContact:Jon Hutchinson

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason						
	No deviating sample report results for job 15/13759											

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

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4 of 7

Notification of Deviating Samples

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	

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Attention : Jon Hutchinson 15th October, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 3 Location : A5036 Liverpool 1st October, 2015 Date samples received : Status : Final report Issue : 1

Fourteen samples were received for analysis on 1st October, 2015 of which fourteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc Project Manager

Client Name: Reference: Location: Contact: JE Job No.: Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

	15/13/59												
J E Sample No.	112-114	115-117	118-120	121-123	124-126	127-129	130-132	133-135	136-138	139-141			
Sample ID	CP1	CP1	CP1	CP1	CP1	CP3	CP6	CP6	CP6	CP6			
Depth	0.20	0.50	1.00	2.00	3.00	10.70	0.20	0.50	1.00	1.50	Please se	e attached n	otes for all
COC No / misc												ations and a	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date			28/09/2015			28/09/2015		28/09/2015	28/09/2015				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	3	3	3	3	3	3	3	3	3	3	LOD/LOR	Units	Method
Date of Receipt	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015			No.
Arsenic ^{#M}	190.0	79.8	53.0	48.4	18.1	4.5	47.0	8.3	5.0	5.2	<0.5	mg/kg	TM30/PM15
Barium #M	422	572	284	197	477	104	317	82	50	94	<1	mg/kg	TM30/PM15
Beryllium	6.4	7.3	3.9	3.2	<0.5	1.0	2.3	0.6	<0.5	1.2	<0.5	mg/kg	TM30/PM15
Cadmium ^{#M}	0.2	0.3	0.4	< 0.1	< 0.1	< 0.1	0.5	< 0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Chromium ^{#M} Copper ^{#M}	50.9 167	69.8 219	72.8 242	43.7 128	55.6 14	105.3 39	62.7 202	68.0 31	64.4 16	76.1 30	<0.5 <1	mg/kg	TM30/PM15 TM30/PM15
Lead #M	515	1172	1215	3055 _{AA}	14	39	202 609	78	44	30 10	<1 <5	mg/kg mg/kg	TM30/PM15 TM30/PM15
Mercury ^{#M}	0.7	0.8	0.7	0.5	<0.1	<0.1	3.8	0.3	0.2	<0.1	<0.1	mg/kg	TM30/PM15
Nickel ^{#M}	97.6	103.0	52.4	35.2	8.2	39.3	41.0	15.9	9.2	35.4	<0.7	mg/kg	TM30/PM15
Selenium #M	3	2	2	1	2	<1	1	1	<1	<1	<1	mg/kg	TM30/PM15
Total Sulphate ^{#M}	2943	1213	1636	1883	2555	147	633	213	128	52	<50	mg/kg	TM50/PM29
Vanadium	79	107	38	30	17	38	46	20	12	45	<1	mg/kg	TM30/PM15
Water Soluble Boron #M	2.3	3.8	4.5	6.1	11.7	2.1	0.8	0.6	0.3	0.5	<0.1	mg/kg	TM74/PM32
Zinc ^{#M}	380	440	352	195	24	70	258	48	26	57	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #M	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.17	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #M	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	< 0.04	<0.04	<0.04	0.07	<0.04	< 0.04	0.08	< 0.04	< 0.04	<0.04	< 0.04	mg/kg	TM4/PM8
Phenanthrene #M	0.35	0.32 <0.04	0.21 <0.04	0.69	<0.03 <0.04	<0.03 <0.04	1.33 0.24	0.11 <0.04	0.07 <0.04	<0.03 <0.04	<0.03 <0.04	mg/kg	TM4/PM8 TM4/PM8
Anthracene [#] Fluoranthene ^{#M}	0.08	0.53	0.33	0.10	<0.04	<0.04	2.27	0.18	0.04	<0.04	<0.04	mg/kg mg/kg	TM4/PM8
Pyrene [#]	0.72	0.53	0.33	0.33	<0.03	<0.03	2.23	0.19	0.07	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.39	0.34	0.24	0.38	<0.06	< 0.06	1.21	0.12	0.07	< 0.06	< 0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	0.57	0.45	0.35	0.62	<0.02	< 0.02	1.67	0.17	0.09	<0.02	< 0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	0.69	0.70	0.47	0.67	<0.07	<0.07	2.32	0.22	0.11	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	0.32	0.45	0.28	0.41	<0.04	<0.04	1.48	0.12	0.05	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	0.22	0.28	0.14	0.23	<0.04	<0.04	0.83	0.06	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene#	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.18	<0.04	0.05	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.22	0.27	0.17	0.23	<0.04	<0.04	0.86	0.08	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	4.3	3.9	2.5	5.1	<0.6	<0.6	15.1	1.3	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.50	0.50	0.34	0.48	<0.05	<0.05	1.67	0.16	0.08	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.19	0.20	0.13	0.19	<0.02	<0.02	0.65	0.06	0.03	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	94	94	94	98	82	97	84	80	97	91	<0	%	TM4/PM8
Mothyl Tortics: Publ 5ther #M	<6	-	<6	-	-		-	-	-	-	<6	ua/ka	TM15/PM10
Methyl Tertiary Butyl Ether ^{#M} Benzene ^{#M}	<b <5</b 	-	<0 <5	-	-	-	-	-	-	-	<6 <5	ug/kg ug/kg	TM15/PM10 TM15/PM10
Toluene #M	10	-	9	-	-	-	-	-	-	-	<3	ug/kg	TM15/PM10
Ethylbenzene #M	5	-	<3	-	-	-	-	-	-	-	<3	ug/kg	TM15/PM10
p/m-Xylene ^{#M}	13	-	9	-	-	-	-	-	-	-	<4	ug/kg	TM15/PM10
o-Xylene ^{#M}	7	-	<4	-	-	-	-	-	-	-	<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	116	-	116	-	-	-	-	-	-	-	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	88	-	94	-	-	-	-	-	-	-	<0	%	TM15/PM10

Client Name: Reference: Location: Contact: JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson

Report : Solid

Contact: JE Job No.:	Jon Hutch 15/13759												
J E Sample No.	112-114	115-117	118-120	121-123	124-126	127-129	130-132	133-135	136-138	139-141			
Sample ID	CP1	CP1	CP1	CP1	CP1	CP3	CP6	CP6	CP6	CP6			
Depth	0.20	0.50	1.00	2.00	3.00	10.70	0.20	0.50	1.00	1.50	Plaasa sa	e attached n	otes for all
COC No / misc												ations and a	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date													
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	3	3	3	3	3	3	3	3	3	3	LOD/LOR	Units	Method No.
Date of Receipt	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015	01/10/2015			
TPH CWG Aliphatics													
>C5-C6 #M	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>C12-C16 ^{#M}	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM16
>C16-C21 #M	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
>C21-C35 ^{#M}	<7	<7	<7	<7	52	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
Total aliphatics C5-35 Aromatics	<19	<19	<19	<19	52	<19	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM12/PM16
>C5-EC7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>EC12-EC16	<4	<4	<4	<4	<4	<4	6	<4	<4	<4	<4	mg/kg	TM5/PM16
>EC16-EC21	<7	19	<7	<7	<7	<7	36	<7	<7	<7	<7	mg/kg	TM5/PM16
>EC21-EC35	75	15	<7	<7	625	<7	109	<7	<7	<7	<7	mg/kg	TM5/PM16
Total aromatics C5-35	75	34	<19	<19	625	<19	151	<19	<19	<19	<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	75	<38	<38	<38	677	<38	151	<38	<38	<38	<38	mg/kg	TM5/TM36/PM12/PM16
MTBE [#]	-	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Benzene #	-	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Toluene [#]	-	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	-	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
m/p-Xylene #	-	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
o-Xylene [#]	-	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Natural Moisture Content	74.8	69.6	74.8	60.6	629.0	26.1	17.9	12.9	13.2	17.3	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	1.7	<0.6	<0.6	<0.6	15.5	29.1	<0.6	33.5	<0.6	<0.6	<0.6	mg/kg	TM38/PM20
PID Reading	-	-	-	-	-	-	-	-	-	-	<0.1	ppm	TM120/PM0
рН ^{#м}	6.77	7.11	7.31	7.84	6.81	8.50	6.36	7.12	8.02	7.86	<0.01	pH units	TM73/PM11
Sample Type	Loamy Sand	Loamy Sand	Loamy Sand	Loamy Sand	Loam	Clayey Sand	Sandy Loam	Clayey Sand	Sand	Clay		None	PM13/PM0
Sample Colour	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Light Brown	Dark Brown	Medium Brown	Medium Brown	Medium Brown		None	PM13/PM0
Other Items	stones and roots	stones	stones	stores and brick fragment and Sies	roots and peat	stones	stones and roots	loam	none	stones		None	PM13/PM0

Client Name: Reference: Location: Contact: JE Job No.:

PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Geotechnics

Report : Solid

JE Job No.:	15/13759							_		
J E Sample No.	142-144	145-147	148-150	151-153						
Sample ID	CP6	CP7	CP7	CP7						
Depth	2.50	0.20	0.50	1.00				Please se	e attached r	otes for all
COC No / misc									ations and a	
Containers	VJT	VJT	VJT	VJT						
Sample Date				29/09/2015						
Sample Type	Soil	Soil	Soil	Soil						1
Batch Number	3	3	3	3				LOD/LOR	Units	Method
Date of Receipt	01/10/2015	01/10/2015	01/10/2015	01/10/2015						No.
Arsenic ^{#M}	3.2	7.6	0.8	<0.5				<0.5	mg/kg	TM30/PM15
Barium #M	80	74	18	25				<1	mg/kg	TM30/PM15
Beryllium	2.2	0.8	<0.5	<0.5				<0.5	mg/kg	TM30/PM15
Cadmium ^{#M}	<0.1	0.1	<0.1	< 0.1				< 0.1	mg/kg	TM30/PM15
Chromium ^{#M} Copper ^{#M}	47.9 6	62.1 22	73.3 2	72.1 2				<0.5 <1	mg/kg	TM30/PM15 TM30/PM15
Lead #M	<5	45	<5	<5				<5	mg/kg mg/kg	TM30/PM15
Mercury ^{#M}	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM30/PM15
Nickel #M	35.1	16.7	4.2	2.3				<0.7	mg/kg	TM30/PM15
Selenium ^{#M}	1	<1	<1	<1				<1	mg/kg	TM30/PM15
Total Sulphate ^{#M}	337	250	72	<50				<50	mg/kg	TM50/PM29
Vanadium	42	23	6	5				<1	mg/kg	TM30/PM15
Water Soluble Boron #M	0.8	0.3	0.1	0.1				<0.1	mg/kg	TM74/PM32
Zinc ^{#M}	60	44	<5	<5				<5	mg/kg	TM30/PM15
DALLMO										
PAH MS Naphthalene ^{#M}	<0.04	0.06	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Acenaphthylene	< 0.04	< 0.03	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Acenaphthene #M	<0.05	< 0.05	<0.05	< 0.05				< 0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Phenanthrene #M	<0.03	0.07	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Fluoranthene #M	<0.03	0.15	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Pyrene [#]	<0.03	0.14	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	0.10	<0.06	< 0.06				< 0.06	mg/kg	TM4/PM8
Chrysene ^{#M} Benzo(bk)fluoranthene ^{#M}	<0.02 <0.07	0.09	<0.02 <0.07	<0.02 <0.07				<0.02 <0.07	mg/kg	TM4/PM8 TM4/PM8
Benzo(a)pyrene [#]	<0.07	0.15	<0.07	<0.07				<0.07	mg/kg mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	<0.04	0.09	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene#	<0.04	0.06	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	1.0	<0.6	<0.6				<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	0.11	<0.05	<0.05				<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	0.04	<0.02	<0.02				<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	94	97	93				<0	%	TM4/PM8
Method Testion: Dut J Ethou#M				-				-0		TM15/PM10
Methyl Tertiary Butyl Ether ^{#M} Benzene ^{#M}	-	-	-	-				<6 <5	ug/kg ug/kg	TM15/PM10 TM15/PM10
Benzene Toluene ^{#M}	-	-	-	-				<3	ug/kg	TM15/PM10
Ethylbenzene #M	-	-	-	-				<3	ug/kg	TM15/PM10
p/m-Xylene #M	-	-	-	-				<4	ug/kg	TM15/PM10
o-Xylene ^{#M}	-	-	-	-				<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	-				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	-				<0	%	TM15/PM10

Client Name:	Geotechn						Report :	Solid					
Reference:	PN15339						0.11.1			· · ·			
Location:	A5036 Liv						Solids: V=	60g VOC jai	r, J=250g gl	ass jar, T=p	lastic tub		
Contact:	Jon Hutch 15/13759												
JE Job No.:	15/13/59										1		
J E Sample No.	142-144	145-147	148-150	151-153									
Sample ID	CP6	CP7	CP7	CP7									
Depth	2.50	0.20	0.50	1.00								e attached nations and ad	
COC No / misc											4551011		longino
Containers	VJT	VJT	VJT	VJT									
Sample Date	28/09/2015	29/09/2015	29/09/2015	29/09/2015									
Sample Type	Soil	Soil	Soil	Soil									1
Batch Number	3	3	3	3							LOD/LOR	Units	Method
Date of Receipt	01/10/2015	01/10/2015	01/10/2015	01/10/2015									No.
TPH CWG													
Aliphatics													
>C5-C6 #M	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 #M	< 0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 <0.2	0.1 <0.2	<0.1 <0.2	<0.1 <0.2							<0.1 <0.2	mg/kg	TM36/PM12 TM5/PM16
>C10-C12 ^{#M} >C12-C16 ^{#M}	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg mg/kg	TM5/PM16
>C12-C18	<7	<7	<7	<7							<7	mg/kg	TM5/PM16
>C10-C21	<7	<7	<7	<7							<7	mg/kg	TM5/PM16
Total aliphatics C5-35	<19	<19	<19	<19							<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics													
>C5-EC7	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM16
>EC12-EC16	<4	<4	<4	<4							<4	mg/kg	TM5/PM16
>EC16-EC21	<7	<7	<7	<7							<7	mg/kg	TM5/PM16
>EC21-EC35	<7	<7	<7	<7							<7	mg/kg	TM5/PM16
Total aromatics C5-35	<19	<19	<19	<19							<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38							<38	mg/kg	
MTBE [#]	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Benzene [#]	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Toluene [#]	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Ethylbenzene [#]	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
m/p-Xylene [#]	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
o-Xylene [#]	<5	<5	<5	<5							<5	ug/kg	TM31/PM12
Natural Moisture Content	20.2	12.1	10.9	26.0							<0.1	%	PM4/PM0
	20.2	12.1	10.5	20.0							-0.1	/0	
Ammoniacal Nitrogen as N	<0.6	<0.6	<0.6	<0.6							<0.6	mg/kg	TM38/PM20
PID Reading	-	66.6	53.4	64.4							<0.1	ppm	TM120/PM0
pH ^{#M}	8.16	5.70	7.05	6.66							<0.01	pH units	TM73/PM11
Sample Type	Clay			Sand								None	PM13/PM0
Sample Colour	Light Brown	Medium Brown	Dark Brown	Dark Brown								None	PM13/PM0
Other Items	stones	stones and roots	roots	none								None	PM13/PM0
	1	1	1	1	1								1

Client Name:	Geotechn	ics			VOC Rep	ort :	Solid			
Reference:	PN153396	6								
Location:	A5036 Liv	verpool								
Contact:	Jon Hutch									
JE Job No.:	15/13759									
							-	1		
J E Sample No.	112-114	118-120								
Sample ID	CP1	CP1								
Depth	0.20	1.00						Please se	e attached n	notes for all
COC No / misc	0.20	1.00							ations and a	
Containers	VJT	VJT								·
Sample Date		28/09/2015								
Sample Type	Soil	Soil						i i		
Batch Number	3	3						LOD/LOR	Units	Method
Date of Receipt	01/10/2015	01/10/2015						LOBILOIT	erinte	No.
VOC MS										
Dichlorodifluoromethane	<2	<2						<2	ug/kg	TM15/PM1
Methyl Tertiary Butyl Ether #M	<6	<6						<6	ug/kg	TM15/PM1
Chloromethane [#]	<3	<3						<3	ug/kg	TM15/PM1
Vinyl Chloride Bromomethane	<2 <1	<2 <1						<2 <1	ug/kg ug/kg	TM15/PM1 TM15/PM1
Bromomethane #M	<1	<1 <6						<1 <6	ug/kg ug/kg	TM15/PM1 TM15/PM1
Trichlorofluoromethane #M	<0	<0						<0	ug/kg ug/kg	TM15/PM1 TM15/PM1
1,1-Dichloroethene (1,1 DCE) ^{#™}	<6	<6						<6	ug/kg	TM15/PM1
Dichloromethane (DCM) [#]	<7	<7						<7	ug/kg	TM15/PM1
trans-1-2-Dichloroethene #	<3	<3						<3	ug/kg	TM15/PM1
1,1-Dichloroethane #M	<6	<6						<6	ug/kg	TM15/PM1
cis-1-2-Dichloroethene ^{#M}	<7	<7						<7	ug/kg	TM15/PM1
2,2-Dichloropropane	<4	<4						<4	ug/kg	TM15/PM1
Bromochloromethane #M	<4	<4						<4	ug/kg	TM15/PM1
Chloroform ^{#M}	<5	<5						<5	ug/kg	TM15/PM1
1,1,1-Trichloroethane ^{#M}	<5	<5						<5	ug/kg	TM15/PM1
1,1-Dichloropropene [#]	<3	<3						<3	ug/kg	TM15/PM1
Carbon tetrachloride #M	<4	<4						<4	ug/kg	TM15/PM1 TM15/PM1
1,2-Dichloroethane ^{#M} Benzene ^{#M}	<5 <5	<5 <5						<5 <5	ug/kg ug/kg	TM15/PM1 TM15/PM1
Trichloroethene (TCE) ^{#M}	<5	<5						<5	ug/kg	TM15/PM1
1,2-Dichloropropane ^{#M}	<4	<4						<4	ug/kg	TM15/PM1
Dibromomethane ^{#M}	<4	<4						<4	ug/kg	TM15/PM1
Bromodichloromethane #M	<4	<4						<4	ug/kg	TM15/PM1
cis-1-3-Dichloropropene	<4	<4						<4	ug/kg	TM15/PM1
Toluene ^{#M}	10	9						<3	ug/kg	TM15/PM1
trans-1-3-Dichloropropene	<3	<3						<3	ug/kg	TM15/PM1
1,1,2-Trichloroethane #M	<4	<4						<4	ug/kg	TM15/PM1
Tetrachloroethene (PCE)#	<3	<3						<3	ug/kg	TM15/PM1
1,3-Dichloropropane ^{#M}	<4	<4						<4	ug/kg	TM15/PM1
Dibromochloromethane #M	<5	<5						<5	ug/kg	TM15/PM1
1,2-Dibromoethane [#]	<3	<3						<3	ug/kg	TM15/PM1
Chlorobenzene #M	<4	<4						<4	ug/kg	TM15/PM1
1,1,1,2-Tetrachloroethane #M	<5	<5						<5	ug/kg	TM15/PM1 TM15/PM1
Ethylbenzene ^{#M} p/m-Xylene ^{#M}	5 13	<3 9						<3 <4	ug/kg ug/kg	TM15/PM1 TM15/PM1
p/m-Xylene [™] o-Xylene ^{#M}	13	9 <4						<4 <4	ug/kg ug/kg	TM15/PM1 TM15/PM1
Styrene	<3	<4 <3						<4	ug/kg ug/kg	TM15/PM1
Bromoform	<4	<4						<4	ug/kg	TM15/PM1
Isopropylbenzene [#]	<3	<3						<3	ug/kg	TM15/PM1
1,1,2,2-Tetrachloroethane ^{#M}	<3	<3						<3	ug/kg	TM15/PM1
Bromobenzene	<2	<2						<2	ug/kg	TM15/PM1
1,2,3-Trichloropropane #M	<4	<4						<4	ug/kg	TM15/PM1
Propylbenzene #	<4	<4						<4	ug/kg	TM15/PM1
2-Chlorotoluene	<3	<3						<3	ug/kg	TM15/PM1
1,3,5-Trimethylbenzene #	<3	<3						<3	ug/kg	TM15/PM1
4-Chlorotoluene	<3	<3						<3	ug/kg	TM15/PM1
tert-Butylbenzene#	<5	<5						<5	ug/kg	TM15/PM1
1,2,4-Trimethylbenzene #	12	<6						<6	ug/kg	TM15/PM1
sec-Butylbenzene #	<4 7	<4						<4	ug/kg	TM15/PM1 TM15/PM1
4-lsopropyltoluene [#] 1,3-Dichlorobenzene ^{#M}		<4						<4	ug/kg	TM15/PM1 TM15/PM1
1,3-Dichlorobenzene "" 1,4-Dichlorobenzene #	<4 <4	<4 <4						<4 <4	ug/kg ug/kg	TM15/PM1 TM15/PM1
1,4-Dichlorobenzene " n-Butylbenzene #	<4	<4						<4 <4	ug/kg ug/kg	TM15/PM1 TM15/PM1
1,2-Dichlorobenzene	<4	<4						<4	ug/kg ug/kg	TM15/PM1
1,2-Dibromo-3-chloropropane [#]	<4	<4						<4	ug/kg	TM15/PM1
1,2,4-Trichlorobenzene [#]	<7	<7						<7	ug/kg	TM15/PM1
Hexachlorobutadiene	<4	<4						<4	ug/kg	TM15/PM1
Naphthalene	<27	<27						<27	ug/kg	TM15/PM1
1,2,3-Trichlorobenzene #	<7	<7						<7	ug/kg	TM15/PM1
Surrogate Recovery Toluene D8	116	116						<0	%	TM15/PM1
Surrogate Recovery 4-Bromofluorobenzene	88	94						<0	%	TM15/PM1

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested. Opinions lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Any questionable sample will automatically be assumed to have breached the Waste Limit and further testing may be required.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	3	CP1	0.20	113	08/10/2015	Mass of Dry Sample	34.3 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone/Veg
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP1	0.50	116	08/10/2015	Mass of Dry Sample	30.6 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP1	1.00	119	08/10/2015	Mass of Dry Sample	32.7 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP1	2.00	122	08/10/2015	Mass of Dry Sample	34.8 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP1	3.00	125	08/10/2015	Mass of Dry Sample	20.4 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD

Client Name:
Reference:
Location:
Contact:

Geotechnics PN153396 A5036 Liverpool

Contact	t:		Jon Hutc	hinson			
J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	3	CP6	0.20	131	08/10/2015	Mass of Dry Sample	52.7 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP6	0.50	134	08/10/2015	Mass of Dry Sample	53.7 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP6	1.00	137	08/10/2015	Mass of Dry Sample	50.4 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP6	1.50	140	08/10/2015	Mass of Dry Sample	52.8 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Stone
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
					09/10/2015	Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP6	2.50	143	08/10/2015	Mass of Dry Sample	47.4 (g)
					09/10/2015	General Description (Bulk Analysis)	Soil/Clay
					09/10/2015	Asbestos Containing Material	None
					09/10/2015	Asbestos Containing Material (2)	None
					09/10/2015	Asbestos Screen	NAD
						Asbestos Screen (2)	NAD
					09/10/2015	Asbestos Level	NAD
15/13759	3	CP7	0.20	146		Mass of Dry Sample	49.5 (g)
						General Description (Bulk Analysis)	Soil/Stone
					08/10/2015	Asbestos Containing Material	None
					08/10/2015	Asbestos Containing Material (2)	None
						Asbestos Screen	NAD
						Asbestos Screen (2)	NAD
					08/10/2015	Asbestos Level	NAD
15/13759	3	CP7	0.50	149		Mass of Dry Sample	49.8 (g)
						General Description (Bulk Analysis)	Soil/Stone
						Asbestos Containing Material	None
					08/10/2015	Asbestos Containing Material (2)	None
					08/10/2015	Asbestos Screen	NAD

Client N Referen Locatio Contact	n:		Geotech PN15339 A5036 Li Jon Hutc	96 iverpool			
J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	3	CP7	0.50	149	08/10/2015	Asbestos Screen (2)	NAD
					08/10/2015	Asbestos Level	NAD
15/13759	3	CP7	1.00	152		Mass of Dry Sample	47.6 (g)
						General Description (Bulk Analysis)	Soil/Stone
						Asbestos Containing Material	None
						Asbestos Containing Material (2)	None
						Asbestos Screen	NAD
						Asbestos Screen (2)	NAD
					08/10/2015	Asbestos Level	NAD
					1		

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

# ISO17025 (UKAS) accredited - UK. B Indicates analyte found in associated method blank. DR Dilution required. M MCERTS accredited. NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surgate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. +++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected PS AOC Sample		
DR Dilution required. M MCERTS accredited. NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	#	ISO17025 (UKAS) accredited - UK.
M MCERTS accredited. NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	В	Indicates analyte found in associated method blank.
NA Not applicable NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	DR	Dilution required.
NAD No Asbestos Detected. ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. +++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	М	MCERTS accredited.
ND None Detected (usually refers to VOC and/SVOC TICs). NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. +++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	NA	Not applicable
NDP No Determination Possible SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	NAD	No Asbestos Detected.
SS Calibrated against a single substance SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	ND	None Detected (usually refers to VOC and/SVOC TICs).
SV Surrogate recovery outside performance criteria. This may be due to a matrix effect. W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	NDP	No Determination Possible
W Results expressed on as received basis. + AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	SS	Calibrated against a single substance
+ AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page. ++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
++ Result outside calibration range, results should be considered as indicative only and are not accredited. * Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	W	Results expressed on as received basis.
* Analysis subcontracted to a Jones Environmental approved laboratory. AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
AD Samples are dried at 35°C ±5°C CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	++	Result outside calibration range, results should be considered as indicative only and are not accredited.
CO Suspected carry over LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	*	Analysis subcontracted to a Jones Environmental approved laboratory.
LOD/LOR Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS ME Matrix Effect NFD No Fibres Detected	AD	Samples are dried at 35°C ±5°C
ME Matrix Effect NFD No Fibres Detected	CO	Suspected carry over
NFD No Fibres Detected	LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
	ME	Matrix Effect
RS ACC Sample	NFD	No Fibres Detected
	BS	AQC Sample
LB Blank Sample	LB	Blank Sample
N Client Sample	Ν	Client Sample
TB Trip Blank Sample	ТВ	Trip Blank Sample
OC Outside Calibration Range	OC	Outside Calibration Range
AA x5 Dilution	AA	x5 Dilution

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	TM005: Modified USEPA 80158. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into alphalic and aromatic fractions by GC-FID. TM003: Modified USEPA 80158. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM12/PM16	CWG GC-FID			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
ТМ30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
ТМ30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM31	Modified USEPA 8015B. Determination of Methyttertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyttertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.			AR	Yes
TM50	Acid soluble sulphate analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes	Yes	AD	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Buik Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Buik Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts delonised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM120	Hand-held broadband VOC gas monitor with Photoionisation Detection .	PM0	No preparation is required.			AR	No

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. L

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 23rd November, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 3 Schedule D Location : A5036 Liverpool 1st October, 2015 Date samples received : Status : Final report Issue : 1

Fourteen samples were received for analysis on 1st October, 2015 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc Project Manager

Jones Environmental Laboratory Client Name: Geotechnics Report : Solid PN153396 Reference: Location: A5036 Liverpool Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub Jon Hutchinson Contact: 15/13759 JE Job No.: J E Sample No. 133-135 139-141 Sample ID CP6 CP6 Depth 0.50 1.50 Please see attached notes for all abbreviations and acronyms COC No / misc Containers VJT VJT Sample Date 28/09/2015 28/09/2015 Sample Type Soil Soil Batch Number 3 3 Method LOD/LOR Units No. Date of Receipt 01/10/2015 01/10/2015 Sulphate as SO4 (2:1 Ext) #M 0.0168 0.0300 <0.0015 TM38/PM20 g/l

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes	Yes	AD	Yes

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Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 28th October, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 4 Location : A5036 Liverpool 7th October, 2015 Date samples received : Status : Final report Issue : 1

Thirty four samples were received for analysis on 7th October, 2015 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc Project Manager

Client Name: Reference: Location: Contact: JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

JE Job No.:	15/13759											
J E Sample No.	163-165	172-174	176-177	184-186	187-189	196-198	208-210	214-216	235-237			
Sample ID	WS08	WS08	WS08	WS09	WS09	WS09	WS10	WS10	WS12			
Depth	1.80-2.00	4.70-5.00	5.50-6.00	1.00	1.40-1.70	4.30-4.70	1.00	2.00-2.20	0.20	Please se	e attached n	otes for all
COC No / misc											ations and a	
Containers	VJT	VJT	VJ	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	4	4	4	4	4	4	4	4	4			Method
Date of Receipt	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	LOD/LOR	Units	No.
Arsenic ^{#M}	62.1	1.2	30.5	NDP	17.4	22.4	12.8	0.7	4.2	<0.5	mg/kg	TM30/PM15
Arsenic	-	-	-	13.4	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium #M	4.2	<0.1	6.1	NDP	0.3	1.2	0.2	<0.1	0.2	<0.1	mg/kg	TM30/PM15
Cadmium	-	-	-	0.5	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium #M	101.4	115.3	114.3	NDP	76.0	93.3	78.5	111.3	63.1	<0.5	mg/kg	TM30/PM15
Chromium	-	-	-	17.5	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper ^{#M}	327 _{AA}	4	12	NDP	96	111	50	3	14	<1	mg/kg	TM30/PM15
Copper	-	-	-	48	-	-	-	-	-	<1	mg/kg	TM30/PM62
Iron	43720	2040	28160	NDP	38750	45040	21950	1977	10520	<20	mg/kg	TM30/PM15
Iron	-	-	-	15437	-	-	-	-	-	<20	mg/kg	TM30/PM62
Lead #M	770	<5	116	NDP	167	183	92	<5	25	<5	mg/kg	TM30/PM15
Lead	-	-	-	155	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury ^{#M}	0.9	<0.1	0.2	NDP	0.1	0.3	0.2	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Mercury	-	-	-	0.4	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel #M	56.1	4.2	19.8	NDP	35.6	49.1	27.2	3.2	26.4	<0.7	mg/kg	TM30/PM15
Nickel	-	-	-	18.9	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium #M	1	<1	<1	NDP	1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Selenium	-	-	-	<1	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	67	3	6	NDP	46	46	36	7	16	<1	mg/kg	TM30/PM15
Vanadium Zinc #M	- 2366	- <5	-	24 NDP	- 370	- 394	- 113	- <5	- 93	<1 <5	mg/kg	TM30/PM62 TM30/PM15
Zinc	-	-5	3213 _{AB}	161		- 394	-	-5	-	<5	mg/kg mg/kg	TM30/PM15
2110		_		101	_	_		_	_	~0	iiig/kg	11000/11002
PAH MS												
Naphthalene #M	0.19	<0.04	<0.04	0.11	0.69	<0.04	0.57	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.09	<0.03	<0.03	0.05	0.09	<0.03	0.14	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	0.59	<0.05	<0.05	0.18	0.57	0.11	1.12	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #M	0.44	<0.04	<0.04	0.15	0.47	0.11	0.80	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #M	5.27	<0.03	<0.03	1.11	3.54	1.01	10.10	<0.03	0.08	<0.03	mg/kg	TM4/PM8
Anthracene #	1.36	<0.04	<0.04	0.25	0.91	0.20	2.40	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #M	9.77	<0.03	<0.03	1.57	5.42	1.38	12.36	<0.03	0.18	<0.03	mg/kg	TM4/PM8
Pyrene [#]	8.88	<0.03	<0.03	1.49	4.80	1.22	10.72	<0.03	0.18	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	5.04	<0.06	<0.06	0.69	2.54	0.53	4.63	<0.06	0.10	<0.06	mg/kg	TM4/PM8
Chrysene #M	4.76	<0.02	<0.02	0.82	2.46	0.63	5.72	<0.02	0.11	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	6.69	<0.07	<0.07	1.22	3.50	0.93	8.08	<0.07	0.19	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	4.69	<0.04	<0.04	0.83	2.09	0.62	5.41	<0.04	0.12	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	2.87	<0.04	<0.04	0.52	1.47	0.38	3.52	<0.04	0.09	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene#	0.59	<0.04	<0.04	0.11	0.28	0.08	0.63	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	2.80	<0.04	<0.04	0.52	1.40	0.38	3.35	<0.04	0.09	<0.04	mg/kg	TM4/PM8
PAH 16 Total	54.0	<0.6	<0.6	9.6	30.2	7.6	69.6	<0.6	1.1	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	4.82	< 0.05	< 0.05	0.88	2.52	0.67	5.82	< 0.05	0.14	< 0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	1.87	< 0.02	<0.02	0.34	0.98	0.26	2.26	<0.02	0.05	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	98	103	105	105	108	100	119	106	109	<0	%	TM4/PM8

Client Name: Reference: Location: Contact: JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

JE Job No.:	15/13759											
J E Sample No.	163-165	172-174	176-177	184-186	187-189	196-198	208-210	214-216	235-237			
Sample ID	WS08	WS08	WS08	WS09	WS09	WS09	WS10	WS10	WS12			
Depth	1.80-2.00	4.70-5.00	5.50-6.00	1.00	1.40-1.70	4.30-4.70	1.00	2.00-2.20	0.20	Please se	e attached n	otes for all
COC No / misc											ations and a	
Containers	VJT	VJT	νJ	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Ì		
Batch Number	4	4	4	4	4	4	4	4	4			Method
Date of Receipt	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	07/10/2015	LOD/LOR	Units	No.
Natural Moisture Content	37.0	22.9	24.7	NDP	17.1	36.4	13.4	19.0	7.5	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	<0.6	9.0	2.3	<0.6	46.6	60.9	<0.6	4.4	<0.6	<0.6	mg/kg	TM38/PM20
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Free Cyanide Total Cyanide ^{#M}	<0.5 <0.5	<0.5 <0.5	<0.5 0.8	<0.5 <0.5	<0.5 1.2	<0.5 2.0	<0.5 <0.5	<0.5 <0.5	<0.5 <0.5	<0.5 <0.5	mg/kg mg/kg	TM89/PM45 TM89/PM45
	-0.0	-0.0	0.0	-0.0	1.2	2.0	-0.0	-0.0	-0.0	-0.0	ing/ig	
Organic Matter	10.2	0.9	3.5	NDP	3.4	36.1	9.1	0.3	1.4	<0.2	%	TM21/PM24
рН #М	7.96	7.55	7.17	7.88	7.80	7.48	8.22	7.81	7.49	<0.01	pH units	TM73/PM11
		L										

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested. Opinions lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Any questionable sample will automatically be assumed to have breached the Waste Limit and further testing may be required.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	4	WS08	1.80-2.00	164	21/10/2015	Mass of Dry Sample	44.0 (g)
					21/10/2015	General Description (Bulk Analysis)	Soil/Stone/Silt
					21/10/2015	Asbestos Containing Material	None
					21/10/2015	Asbestos Containing Material (2)	None
					21/10/2015	Asbestos Screen	NAD
					21/10/2015	Asbestos Screen (2)	NAD
					21/10/2015	Asbestos Level	NAD
					21/10/2015	Waste Limit	<0.1%
15/13759	4	WS08	4.70-5.00	173	21/10/2015	Mass of Dry Sample	45.6 (g)
					21/10/2015	General Description (Bulk Analysis)	Soil/Stone
					21/10/2015	Asbestos Containing Material	None
					21/10/2015	Asbestos Containing Material (2)	None
					21/10/2015	Asbestos Screen	NAD
					21/10/2015	Asbestos Screen (2)	NAD
					21/10/2015	Asbestos Level	NAD
					21/10/2015	Waste Limit	<0.1%
15/13759	4	WS08	5.50-6.00	177	21/10/2015	Mass of Dry Sample	47.9 (g)
					21/10/2015	General Description (Bulk Analysis)	Soil/Stone
					21/10/2015	Asbestos Containing Material	None
					21/10/2015	Asbestos Containing Material (2)	None
					21/10/2015	Asbestos Screen	NAD
					21/10/2015	Asbestos Screen (2)	NAD
					21/10/2015	Asbestos Level	NAD
					21/10/2015	Waste Limit	<0.1%
15/13759	4	WS09	1.00	185	21/10/2015	Mass of Dry Sample	50.3 (g)
					21/10/2015	General Description (Bulk Analysis)	soil/stones
					21/10/2015	Asbestos Containing Material	Fibre Bundles
					21/10/2015	Asbestos Screen	Chrysotile
					21/10/2015	Asbestos Level	Quantifiable
					21/10/2015	Waste Limit	<0.1%
15/13759	4	WS09	1.40-1.70	188	21/10/2015	Mass of Dry Sample	44.9 (g)
					21/10/2015	General Description (Bulk Analysis)	soil/stones
					21/10/2015	Asbestos Containing Material	None
					21/10/2015	Asbestos Containing Material (2)	None
					21/10/2015	Asbestos Screen	NAD

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Contac							
JE	Potob	Sample ID	Donth	JE	Date Of	Analysia	Deputé
Job No.	Batch	Sample ID	Depth	Sample No.	Analysis	Analysis	Result
15/13759	4	WS09	1.40-1.70	188	21/10/2015	Asbestos Screen (2)	NAD
					21/10/2015	Asbestos Level	NAD
					21/10/2015	Waste Limit	<0.1%
15/13759	4	WS09	4.30-4.70	197	21/10/2015	Mass of Dry Sample	39.1 (g)
					22/10/2015	General Description (Bulk Analysis)	Soil/Stone
					22/10/2015	Asbestos Containing Material	None
					22/10/2015	Asbestos Containing Material (2)	None
					22/10/2015	Asbestos Screen	NAD
					22/10/2015	Asbestos Screen (2)	NAD
					22/10/2015	Asbestos Level	NAD
					22/10/2015	Waste Limit	<0.1%
15/13759	4	WS10	1.00	209	21/10/2015	Mass of Dry Sample	48.0 (g)
					22/10/2015	General Description (Bulk Analysis)	Soil/Stone
					22/10/2015	Asbestos Containing Material	None
					22/10/2015	Asbestos Containing Material (2)	None
					22/10/2015	Asbestos Screen	NAD
					22/10/2015	Asbestos Screen (2)	NAD
					22/10/2015	Asbestos Level	NAD
					22/10/2015	Waste Limit	<0.1%
15/13759	4	WS10	2.00-2.20	215	21/10/2015	Mass of Dry Sample	49.3 (g)
					22/10/2015	General Description (Bulk Analysis)	Sand/Stone
					22/10/2015	Asbestos Containing Material	None
					22/10/2015	Asbestos Containing Material (2)	None
					22/10/2015	Asbestos Screen	NAD
					22/10/2015	Asbestos Screen (2)	NAD
					22/10/2015	Asbestos Level	NAD
					22/10/2015	Waste Limit	<0.1%
45/40750		WC10	0.00		0444040045		
15/13759	4	WS12	0.20	236	21/10/2015	Mass of Dry Sample	52.7 (g)
					22/10/2015	General Description (Bulk Analysis)	Sand/Soil/Stone
					22/10/2015	Asbestos Containing Material	None
					22/10/2015	Asbestos Containing Material (2) Asbestos Screen	None
					22/10/2015	Asbestos Screen (2)	NAD
						Asbestos Level	NAD
						Waste Limit	<0.1%
					22/10/2013		¹ 0, 170
1							
1							
						1	1

Matrix : Solid

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	NDP Reason
15/13759	4	WS09	1.00	184-186	Asbestos detected in sample

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

-	1
#	ISO17025 (UKAS) accredited - UK.
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
Ν	Client Sample
ТВ	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution
	1

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Elira TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with delonised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with delonised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.			AR	Yes

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9 of 10

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes

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10 of 10



Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. L

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781

Attention :	Jon Hutchinson
Date :	9th November, 2015
Your reference :	PN153396
Our reference :	Test Report 15/13759 Batch 4 Schedule C
Location :	A5036 Liverpool
Date samples received :	7th October, 2015
Status :	Final report
Issue :	1

Thirty four samples were received for analysis on 7th October, 2015 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc Project Manager

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested. Opinions lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Any questionable sample will automatically be assumed to have breached the Waste Limit and further testing may be required.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	4	WS09	1.00	185	09/11/2015	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
					09/11/2015	Asbestos Gravimetric & PCOM Total	<0.001 (mass %)

Client Name:GeotechnicsReference:PN153396Location:A5036 LiverpoolContact:Jon Hutchinson

 J.E.
 Batch
 Sample ID
 Depth
 J.E. Sample No.
 Analysis
 Reason

 Image: Sample ID
 Depth
 J.E. Sample ID
 No.
 Analysis
 Reason

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

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Notification of Deviating Samples

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Buik Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Unit 3 Deeside Point Zone 3 **Deeside Industrial Park** Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 27th November, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 4 Schedule D Location : A5036 Liverpool 7th October, 2015 Date samples received : Status : Final report Issue : 1

Thirty four samples were received for analysis on 7th October, 2015 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc **Project Manager**

Jones Environment	tal Labo	ratory									
Client Name:	Geotechn				Report :	Solid					
Reference: Location:	PN153390 A5036 Liv						r 1=250g gl	lass jar, T=p	lactic tub		
Contact:	Jon Hutch				3011us. v-1	ooy voc ja	i, J-2509 gi	ass jai, 1–p			
JE Job No.:	15/13759										
J E Sample No.	172-174	229-231									
Sample ID	WS08	WS11									
Depth COC No / misc		1.60-1.80							Please se abbrevi	e attached no ations and ac	otes for all cronyms
Containers		VJT									
Sample Date		<>									
Sample Type	Soil	Soil									
Batch Number	4	4							LOD/LOR	Units	Method
Date of Receipt											No.
Sulphate as SO4 (2:1 Ext) ^{#M}	0.0683	0.0552							<0.0015	g/l	TM38/PM20
рН ^{#м}	-	8.06							<0.01	pH units	TM73/PM11

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

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MCERTS accredited.
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Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
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Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
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AQC Sample
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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes	Yes	AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

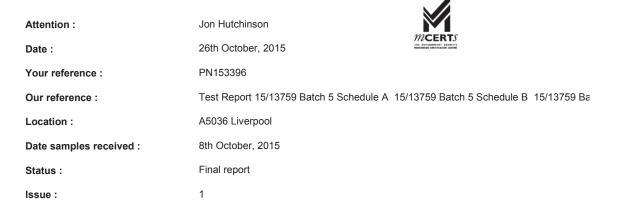
Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. L

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Fifty four samples were received for analysis on 8th October, 2015 of which fifty three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc Project Manager

Client Name: Reference: Location: Contact: JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

J E Sample No.	253-255	256-258	259-261	262-264	265-267	268-270	271-273	274-276	277-279	280-282			
Sample ID	WS01B	WS01B	WS01B	WS02	WS02	WS02	WS02	WS02	WS02	WS02			
Depth	0.20	0.50	1.00	0.20	0.50	1.00	1.70-2.00	2.70-3.00	3.70-4.00	4.70-5.00	Please se	e attached n	otes for all
COC No / misc												ations and a	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date		<>	<>	08/10/2015	08/10/2015			08/10/2015	08/10/2015				
-													
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method No.
Date of Receipt	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015			INU.
Arsenic ^{#M}	-	NDP	NDP	-	-	27.8	-	-	2.8	3.7	<0.5	mg/kg	TM30/PM15
Arsenic #M	-	11.8	8.9	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium ^{#M}	-	NDP	NDP	-	-	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	TM30/PM15 TM30/PM62
Cadmium Chromium ^{#M}	-	0.3 NDP	12.2 NDP	-	-	- 81.0	-	-	- 126.5	- 31.1	<0.1 <0.5	mg/kg mg/kg	TM30/PM62
Chromium	-	12.9	96.5	_	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper ^{#M}	-	NDP	NDP	-	-	301 _{AA}	-	-	3	3	<1	mg/kg	TM30/PM15
Copper	-	31	503 _{AA}	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Iron	-	NDP	NDP	-	-	94380 _{AA}	-	-	5101	3584	<20	mg/kg	TM30/PM15
Iron	-	14185	80006 _{AA}	-	-	-	-	-	-	-	<20	mg/kg	TM30/PM62
Lead #M	-	NDP	NDP	-	-	709	-	-	<5	6	<5	mg/kg	TM30/PM15
Lead	-	99	1010	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury ^{#M}	-	NDP	NDP	-	-	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Mercury	-	0.6	0.5	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel ^{#M}	-	NDP	NDP	-	-	65.2	-	-	7.5	5.1	<0.7	mg/kg	TM30/PM15
Nickel Selenium ^{#M}	-	10.5 NDP	29.0 NDP	-	-	- 1	-	-	- <1	- 1	<0.7 <1	mg/kg mg/kg	TM30/PM62 TM30/PM15
Selenium	-	<1	1	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	-	NDP	NDP	-	-	77	-	-	8	5	<1	mg/kg	TM30/PM15
Vanadium	-	18	22	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Zinc ^{#M}	-	NDP	NDP	-	-	325	-	-	24	<5	<5	mg/kg	TM30/PM15
Zinc	-	113	886	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene #M	-	<0.04	10.62	-	-	0.26	-	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	< 0.03	0.57	-	-	0.09	-	-	< 0.03	< 0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #M	-	< 0.05	0.48	-	-	0.74	-	-	< 0.05	< 0.05	< 0.05	mg/kg	TM4/PM8
Fluorene ^{#M} Phenanthrene ^{#M}	-	<0.04 0.31	1.05 3.04	-	-	0.58	-	-	<0.04 <0.03	<0.04 <0.03	<0.04 <0.03	mg/kg	TM4/PM8 TM4/PM8
Anthracene [#]	-	0.08	0.56	-	-	1.73	-	-	<0.03	<0.03	<0.03	mg/kg mg/kg	TM4/PM8
Fluoranthene #M	-	0.59	2.15	-	-	11.52	-	-	< 0.03	< 0.03	<0.03	mg/kg	TM4/PM8
Pyrene [#]	-	0.56	2.29	-	-	10.03	-	-	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	0.34	0.68	-	-	4.13	-	-	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #M	-	0.33	0.84	-	-	4.89	-	-	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	-	0.51	1.08	-	-	7.80	-	-	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	-	0.34	0.67	-	-	5.16	-	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	-	0.22	0.43	-	-	3.04	-	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	-	0.06	0.09	-	-	0.75	-	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	0.22	0.46	-	-	3.12	-	-	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	3.6	25.0	-	-	61.6	-	-	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene Benzo(k)fluoranthene	-	0.37	0.78	-	-	5.62 2.18	-	-	<0.05 <0.02	<0.05 <0.02	<0.05 <0.02	mg/kg mg/kg	TM4/PM8 TM4/PM8
PAH Surrogate % Recovery	-	105	99	-	-	99	-	-	97	111	<0.02	%	TM4/PM8
											-		

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JE JOD NO.:	15/13/59												
J E Sample No.	253-255	256-258	259-261	262-264	265-267	268-270	271-273	274-276	277-279	280-282			
Sample ID	WS01B	WS01B	WS01B	WS02	WS02	WS02	WS02	WS02	WS02	WS02			
Depth	0.20	0.50	1.00	0.20	0.50	1.00	1.70-2.00	2.70-3.00	3.70-4.00	4.70-5.00	Please se	e attached n	otes for all
COC No / misc												ations and a	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	\diamond	<>	<>	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method
Date of Receipt	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	LOBILOR	01110	No.
Natural Moisture Content	-	NDP	NDP	-	-	21.8	-	-	20.2	154.5	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	-	<0.6	<0.6	-	-	0.8	-	-	<0.6	19.3	<0.6	mg/kg	TM38/PM20
Hexavalent Chromium [#]	-	<0.3	<0.3	-	-	<0.3	-	-	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Free Cyanide Total Cyanide ^{#M}	-	<0.5 <0.5	<0.5 0.6	-	-	<0.5 6.0	-	-	<0.5 <0.5	<0.5 <0.5	<0.5 <0.5	mg/kg	TM89/PM45 TM89/PM45
Total Cyanide	-	~ 0.5	0.0	-	-	0.0	-	-	~ 0.5	~ 0.5	~ 0.5	mg/kg	1103/11045
Organic Matter	-	NDP	NDP	-	-	19.3	-	-	0.2	33.7	<0.2	%	TM21/PM24
PID Reading	3.1	47.2 7.81	205.0 7.93	1.5	2.5	2.7 7.54	1.0	0.7	0.9 7.45	1.1 6.61	<0.1 <0.01	ppm pH units	TM120/PM0 TM73/PM11
Sample Type	-	Loamy Sand		-	-	Sandy Loam	-	-	Sand	Loam	0.01	None	PM13/PM0
Sample Colour	-	Dark Brown	Dark Brown	-	-	Dark Brown	-	-	Light Grey	Dark Brown		None	PM13/PM0
Other Items	-	roots	stones, bricks, roots	-	-	stones	-	-	NA	stones, roots		None	PM13/PM0
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J E Sample No.	283-285	286-288	289-291	292-294	295-297	298-300	301-303	304-306	307-309	310-312			
Sample ID	WS05	WS05	WS05	WS05	WS05	WS05	WS05	WS05	WS01A	WS01A			
Depth	0.20	0.50	1.00	1.30-1.50	2.30-2.50	3.30-3.50	4.00-4.30	5.00-5.60	0.20	0.50	Please se	e attached n	otes for all
COC No / misc												ations and a	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5			
Date of Receipt		08/10/2015	08/10/2015						08/10/2015		LOD/LOR	Units	Method No.
Arsenic ^{#M}	-	14.7	-	-	38.0	-	-	6.4	-	-	<0.5	mg/kg	TM30/PM15
Arsenic	-	-	-	-	-	-	-	-	-	_	<0.5	mg/kg	TM30/PM62
Cadmium ^{#M}	-	<0.1	-	-	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM30/PM15
Cadmium	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium #M	-	105.1	-	-	70.7	-	-	101.5	-	-	<0.5	mg/kg	TM30/PM15
Chromium	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper ^{#M}	-	64	-	-	111	-	-	14	-	-	<1	mg/kg	TM30/PM15
Copper	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Iron	-	43290	-	-	45070	-	-	15110	-	-	<20	mg/kg	TM30/PM15
Iron	-	-	-	-	-	-	-	-	-	-	<20	mg/kg	TM30/PM62
Lead #M	-	21	-	-	139	-	-	35	-	-	<5	mg/kg	TM30/PM15
Lead	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury ^{#M}	-	<0.1	-	-	1.2	-	-	<0.1	-	-	<0.1	mg/kg	TM30/PM15
Mercury	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel ^{#M}	-	68.5	-	-	67.4	-	-	16.1	-	-	<0.7	mg/kg	TM30/PM15
Nickel	-	-	-	-	-	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium ^{#M}	-	2	-	-	2	-	-	<1	-	-	<1	mg/kg	TM30/PM15
Selenium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	-	83	-	-	54	-	-	163	-	-	<1	mg/kg	TM30/PM15
Vanadium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Zinc #M	-	49	-	-	75	-	-	77	-	-	<5	mg/kg	TM30/PM15
Zinc	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene #M	-	0.13	-	-	9.38 _{AC}	-	-	<0.04	-	-	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	< 0.03	-	-	61.37 _{AC}	-	-	< 0.03	-	-	< 0.03	mg/kg	TM4/PM8
Acenaphthene #M	-	<0.05	-	-	2.57 _{AC}	-	-	<0.05	-	-	<0.05	mg/kg	TM4/PM8
Fluorene #M	-	<0.04	-	-	13.11 _{AC}	-	-	<0.04	-	-	<0.04	mg/kg	TM4/PM8
Phenanthrene ^{#M} Anthracene [#]	-	0.16 <0.04	-	-	59.46 _{AC}	-	-	0.46	-	-	<0.03 <0.04	mg/kg mg/kg	TM4/PM8 TM4/PM8
Anthracene " Fluoranthene #M	-	0.19	-	-	47.31 _{AC} 60.78 _{AC}	-	-	0.09	-	-	<0.04	mg/kg	TM4/PM8
Pyrene [#]	-	0.19	-	-	87.38 _{AC}	-	-	0.59	-	-	< 0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	0.17	-	-	44.68 _{AC}	-	-	0.30	-	-	<0.03	mg/kg	TM4/PM8
Chrysene #M	-	0.15	-	-	46.03 _{AC}	-	-	0.29	-	-	<0.00	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	-	0.22	-	-	77.12 _{AC}	-	-	0.40	-	-	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	-	0.14	-	-	26.69 _{AC}	-	-	0.30	-	-	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	-	0.09	-	-	30.00 _{AC}	-	-	0.17	-	-	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	-	<0.04	-	-	7.83 _{AC}	-	-	<0.04	-	-	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	-	0.12	-	-	30.91 _{AC}	-	-	0.20	-	-	<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	1.5	-	-	604.6 _{AC}	-	-	3.4	-	-	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	0.16	-	-	55.53 _{AC}	-	-	0.29	-	-	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	0.06	-	-	21.59 _{AC}	-	-	0.11	-	-	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	116	-	-	112 _{AC}	-	-	100	-	-	<0	%	TM4/PM8

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JE Job No.:	15/13759												
J E Sample No.	283-285	286-288	289-291	292-294	295-297	298-300	301-303	304-306	307-309	310-312			
Sample ID	WS05	WS05	WS05	WS05	WS05	WS05	WS05	WS05	WS01A	WS01A			
Depth	0.20	0.50	1.00	1.30-1.50	2.30-2.50	3.30-3.50	4.00-4.30	5.00-5.60	0.20	0.50	Please se	e attached n	otes for all
COC No / misc											abbrevi	ations and a	cronyms
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	\diamond	<>	\diamond	\diamond	\diamond	\diamond	<>	\diamond	\diamond	<>			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method
Date of Receipt	08/10/2015		08/10/2015	08/10/2015		08/10/2015	08/10/2015		08/10/2015	08/10/2015			No.
Natural Moisture Content	-	10.1	-	-	22.5	-	-	14.0	-	-	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	-	<0.6	-	-	<0.6	-	-	<0.6	-	-	<0.6	mg/kg	TM38/PM20
Hexavalent Chromium #	-	<0.3	-	-	<0.3	-	-	<0.3	-	-	<0.3	mg/kg	TM38/PM20
Free Cyanide	-	<0.5	-	-	1.2	-	-	<0.5	-	-	<0.5	malka	TM89/PM45
Total Cyanide	-	<0.5	-	-	1.3 384.6	-	-	<0.5	-	-	<0.5	mg/kg mg/kg	TM89/PM45 TM89/PM45
Organic Matter	-	15.1	-	-	68.4	-	-	0.9	-	-	<0.2	%	TM21/PM24
PID Reading	1.7	0.5	0.1	0.5	0.6	1.6	0.6	0.5	0.7	0.3	<0.1	ppm	TM120/PM0
рН ^{#М}	-	7.52	-	-	6.85	-	-	8.08	-	-	<0.01	pH units	TM73/PM11
Sample Type	-	Sandy Loam	-	-	Sand	-	-	Clayey Sand	-	-		None	PM13/PM0
Sample Colour Other Items	-	Dark Brown stones, clinker	-	-	Black stones	-	-	Medium Brown stones	-	-		None None	PM13/PM0 PM13/PM0
	-	stories, cliniker	-	-	stones	-	-	stones	-	-		None	FIWIT3/FIWIO

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Sample ID Sample ID Depth COC No / misc Containers Sample Date Sample Type Batch Number Date of Receipt 08/ Arsenic Cadmium M Cadmium	313-315 WS01A 1.00 V J T <> Soil 5 8/10/2015 - - - - - - - - -	317-319 wso7 0.20 V J T <> Soil 5 08/10/2015 - - - -	320-322 wso7 0.50 V J T <> Soil 5 08/10/2015 - -	323-325 WS07 1.00 V J T <> Soil 5 08/10/2015 34.0	326-328 wso7 1.50-1.70 V J T <> Soil 5 08/10/2015	329-331 wso7 2.50-2.70 V J T <> Soil 5	332-334 wso7 3.50-3.70 V J T <> Soil	335-337 wso7 4.00-4.50 V J T <> Soil	338-340 wso7 5.30-5.65 ∨ J T <> Soil	341-343 wso7 5.80-6.00 ∨JT <>		e attached n ations and ac	
Depth COC No / misc Containers Sample Date Sample Type Batch Number Date of Receipt 08/ Arsenic *** Arsenic 2005	1.00 V J T <> Soil 5 8/10/2015 - - - -	0.20 V J T <> Soil 5 08/10/2015 - -	0.50 V J T <> Soil 5 08/10/2015 -	1.00 V J T <> Soil 5 08/10/2015	1.50-1.70 V J T <> Soil 5	2.50-2.70 V J T <> Soil	3.50-3.70 V J T <>	4.00-4.50 V J T <>	5.30-5.65 V J T <>	5.80-6.00 V J T <>			
COC No / misc Containers Sample Date Sample Type Batch Number Date of Receipt 08/ Arsenic #M Arsenic Cadmium #M	V J T <> Soil 5 8/10/2015 - - - -	V J T <> Soil 5 08/10/2015 - -	V J T <> Soil 5 08/10/2015 -	V J T <> Soil 5 08/10/2015	V J T <> Soil 5	V J T <> Soil	VJT <>	VJT <>	VJT <>	VJT <>			
Containers Containers Cample Date Cample Type Cate of Receipt Cadmium Cadmium Cadmium Cadmium	<> Soil 5 8/10/2015 - - - -	<> Soil 5 08/10/2015 - -	<> Soil 5 08/10/2015 -	<> Soil 5 08/10/2015	<> Soil 5	<> Soil	<>	<>	<>	<>			
Sample Date Sample Type Batch Number 08/ Arsenic #M Arsenic #M Cadmium #M Cadmium	<> Soil 5 8/10/2015 - - - -	<> Soil 5 08/10/2015 - -	<> Soil 5 08/10/2015 -	<> Soil 5 08/10/2015	<> Soil 5	<> Soil	<>	<>	<>	<>			
Sample Type Batch Number Date of Receipt 08/ Arsenic #M Cadmium #M Cadmium M	Soil 5 8/10/2015 - - - -	Soil 5 08/10/2015 - -	Soil 5 08/10/2015 -	Soil 5 08/10/2015	Soil 5	Soil							
Batch Number 08/ Date of Receipt 08/ Arsenic #M 1 Cadmium #M 1 Cadmium 1	5 8/10/2015 - - -	5 08/10/2015 - -	5 08/10/2015 -	5 08/10/2015	5		Soil	Soil	Soil	0.1			
Batch Number 08/ Date of Receipt 08/ Arsenic #M 1 Cadmium #M 1 Cadmium 1	B/10/2015 - - - -	08/10/2015 - -	08/10/2015 -	08/10/2015		5			301	Soil			
Date of Receipt 08/ Arsenic #M 7 Cadmium #M 7 Cadmium 7	B/10/2015 - - - -	08/10/2015 - -	08/10/2015 -	08/10/2015		U	5	5	5	5			
Arsenic #M Arsenic Cadmium #M Cadmium	- - -	-	-		00/10/2013	08/10/2015	08/10/2015		08/10/2015	08/10/2015	LOD/LOR	Units	Method No.
Arsenic Cadmium #M Cadmium	- -	-		04.0	-	-	80.1	-	44.7	-	<0.5	mg/kg	TM30/PM15
Cadmium #M Cadmium	-	-		-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	22.4	-	-	0.6	-	0.2	-	<0.1	mg/kg	TM30/PM15
			-		-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium #M		-	-	138.0	-	-	62.0	-	85.1	-	<0.5	mg/kg	TM30/PM15
Chromium	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper #M	-	-	-	372 _{AB}	-	-	819 _{AB}	-	134	-	<1	mg/kg	TM30/PM15
Copper	-	-	-	- 45	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Iron	-	-	-	92480 _{AB}	-	-	68210 _{AB}	-	38350	-	<20	mg/kg	TM30/PM15
Iron	-	-	-	-	-	-	-	-	-	-	<20	mg/kg	TM30/PM62
Lead #M	-	-	-	550	-	-	218	-	353	-	<5	mg/kg	TM30/PM15
Lead	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury #M	-	-	-	1.3	-	-	<0.1	-	1.5	-	<0.1	mg/kg	TM30/PM15
Mercury	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel #M	-	-	-	144.6	-	-	71.8	-	33.8	-	<0.7	mg/kg	TM30/PM15
Nickel	-	-	-	-	-	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium ^{#M}	-	-	-	2	-	-	3	-	1	-	<1	mg/kg	TM30/PM15
Selenium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	-	-	-	46	-	-	96	-	43	-	<1	mg/kg	TM30/PM15
Vanadium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Zinc ^{#M}	-	-	-	17670 _{AB}	-	-	968	-	172	-	<5	mg/kg	TM30/PM15
Zinc	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene #M	-	-	-	0.12	-	-	0.27	-	<0.04	-	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	-	-	0.14	-	-	0.06	-	<0.03	-	<0.03	mg/kg	TM4/PM8
Acenaphthene #M	-	-	-	0.26	-	-	0.30	-	0.11	-	<0.05	mg/kg	TM4/PM8
Fluorene #M	-	-	-	0.24	-	-	0.44	-	0.09	-	<0.04	mg/kg	TM4/PM8
Phenanthrene #M	-	-	-	3.56	-	-	1.06	-	0.86	-	<0.03	mg/kg	TM4/PM8
Anthracene [#]	-	-	-	1.08	-	-	0.48	-	0.19	-	< 0.04	mg/kg	TM4/PM8
Fluoranthene #M	-	-	-	7.01	-	-	0.91	-	1.47	-	< 0.03	mg/kg	TM4/PM8
Pyrene#	-	-	-	5.36	-	-	0.64	-	1.43	-	< 0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	-	-	-	3.18	-	-	0.34	-	0.76	-	< 0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	-	-	-	2.81	-	-	0.34	-	0.89	-	< 0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	-	-	-	4.48 2.55	-	-	0.61	-	1.45 0.94	-	<0.07 <0.04	mg/kg	TM4/PM8 TM4/PM8
Benzo(a)pyrene [#] Indeno(123cd)pyrene ^{#M}						-		-				mg/kg	
Dibenzo(ah)anthracene #	-	-	-	1.68 0.30	-	-	0.26	-	0.57 0.16	-	<0.04 <0.04	mg/kg mg/kg	TM4/PM8 TM4/PM8
Benzo(ghi)perylene #	-	-	-	1.55	-	-	0.07	-	0.10	-	<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	-	-	34.3	-	-	6.3	-	9.5	-	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	-	-	3.23	-	_	0.3	-	1.04	-	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	-	-	1.25	-	-	0.44	-	0.41	-	<0.03	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	-	-	96	-	-	104	-	99	-	<0	%	TM4/PM8
											v		

Client Name:
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JE JOD NO.:	15/13/59										_		
J E Sample No.	313-315	317-319	320-322	323-325	326-328	329-331	332-334	335-337	338-340	341-343			
Sample ID	WS01A	WS07	WS07	WS07	WS07	WS07	WS07	WS07	WS07	WS07			
Depth	1.00	0.20	0.50	1.00	1.50-1.70	2.50-2.70	3.50-3.70	4.00-4.50	5.30-5.65	5.80-6.00	Please se	e attached n	otes for all
COC No / misc												ations and a	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5			Method
Date of Receipt	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	LOD/LOR	Units	No.
Natural Moisture Content	-	-	-	59.2	-	-	40.7	-	22.1	-	<0.1	%	PM4/PM0
A second a set billion and a set bill to				100.7			100.4		101.0		-0.0		TN 00 (DN 00
Ammoniacal Nitrogen as NH4 Hexavalent Chromium [#]	-	-	-	130.7 <0.3	-	-	489.1 1.0	-	101.6 <0.3	-	<0.6 <0.3	mg/kg mg/kg	TM38/PM20 TM38/PM20
												09	
Free Cyanide	-	-	-	<0.5	-	-	<0.5	-	<0.5	-	<0.5	mg/kg	TM89/PM45
Total Cyanide ^{#M}	-	-	-	2.4	-	-	<0.5	-	<0.5	-	<0.5	mg/kg	TM89/PM45
Organic Matter	-	-	-	26.3	-	-	50.7	-	13.0	-	<0.2	%	TM21/PM24
PID Reading	11.1	0.2	0.7	17.0	8.4	7.1	2.4	16.4	1.6	1.4	<0.1	ppm	TM120/PM0
pH ^{#M} Sample Type	-	-	-	7.24 Loam	-	-	6.95 Sandy Loam	-	8.13 Sand	-	<0.01	pH units None	TM73/PM11 PM13/PM0
Sample Colour	-	-	-	Medium Brown	-	-	Dark Brown		Dark Brown	-		None	PM13/PM0
Other Items	-	-	-	plastic, paper, glass	-	-	stones	-	NA	-		None	PM13/PM0

Client Name: Reference: Location: Contact: JE Job No.:

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J E Sample No.	344-346	347-349	350-352	353-355	356-358	359-361	362-364	365-367	368-370	371-373			
Sample ID	WS06	WS06	WS06	WS06	WS06	WS06	WS06	WS06	WS03	WS03			
Depth	0.20	0.50	1.00	1.40-1.90	1.90-2.50	3.00-3.70	4.00-4.50	5.00-5.70	0.20	0.50	Please se	e attached n	otes for all
COC No / misc												ations and ad	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>			
•													
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method No.
Date of Receipt	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015			NO.
Arsenic ^{#M}	-	-	16.0	-	52.5	-	26.9	-	-	-	<0.5	mg/kg	TM30/PM15
Arsenic	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium ^{#M}	-	-	0.2	-	<0.1	-	<0.1	-	-	-	<0.1	mg/kg	TM30/PM15
Cadmium	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium ^{#M}	-	-	196.7	-	436.9 _{AB}	-	142.5	-	-	-	<0.5	mg/kg	TM30/PM15
Chromium	-	-	- 70	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper #M	-	-	72	-	<1	-	300 _{AA}	-	-	-	<1	mg/kg	TM30/PM15 TM30/PM62
Copper Iron	-	-	-	-	-	-	-	-	-	-	<1 <20	mg/kg	TM30/PM62 TM30/PM15
Iron	-	-	104000 _{AA}	-	198500 _{AB}	-	113400 _{AA}	-	-	-	<20	mg/kg mg/kg	TM30/PM15
Lead #M	-	-	95	-	<5	-	48	-	-	-	<20	mg/kg	TM30/PM15
Lead	_	_	-	-	-	_		-	-	-	<5	mg/kg	TM30/PM62
Mercury ^{#M}	-	-	<0.1	-	<0.1	-	<0.1	-	-	-	<0.1	mg/kg	TM30/PM15
Mercury	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel ^{#M}	-	-	21.1	-	1.7	-	34.6	-	-	-	<0.7	mg/kg	TM30/PM15
Nickel	-	-	-	-	-	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium ^{#M}	-	-	15	-	21	-	20	-	-	-	<1	mg/kg	TM30/PM15
Selenium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	-	-	97	-	196	-	82	-	-	-	<1	mg/kg	TM30/PM15
Vanadium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Zinc ^{#M}	-	-	741	-	1329	-	770	-	-	-	<5	mg/kg	TM30/PM15
Zinc	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene #M	-	-	<0.80 _{AC}	-	<0.04	-	<0.04	-	-	-	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	-	<0.60 _{AC}	-	<0.03	-	<0.03	-	-	-	<0.03	mg/kg	TM4/PM8
Acenaphthene #M	-	-	<1.00 _{AC}	-	<0.05	-	<0.05	-	-	-	<0.05	mg/kg	TM4/PM8
Fluorene #M	-	-	<0.80 _{AC}	-	<0.04	-	<0.04	-	-	-	<0.04	mg/kg	TM4/PM8
Phenanthrene #M	-	-	2.59 _{AC}	-	<0.03	-	0.36	-	-	-	<0.03	mg/kg	TM4/PM8
Anthracene #	-	-	<0.80 _{AC}	-	<0.04	-	0.06	-	-	-	<0.04	mg/kg	TM4/PM8
Fluoranthene #M	-	-	3.52 _{AC}	-	<0.03	-	1.42	-	-	-	<0.03	mg/kg	TM4/PM8
Pyrene [#]	-	-	2.91 _{AC}	-	< 0.03	-	1.76	-	-	-	< 0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	-	1.99 _{AC}	-	< 0.06	-	0.69	-	-	-	<0.06	mg/kg	TM4/PM8
Chrysene #M	-	-	1.69 _{AC}	-	< 0.02	-	0.92	-	-	-	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	-	-	2.85 _{AC}	-	<0.07 <0.04	-	0.77	-	-	-	<0.07 <0.04	mg/kg	TM4/PM8 TM4/PM8
Benzo(a)pyrene #	-	-	1.67 _{AC}		<0.04	-	0.38	-	-	-	<0.04	mg/kg	
Indeno(123cd)pyrene #M Dibenzo(ah)anthracene #	-	-	1.34 _{AC} <0.80 _{AC}	-	<0.04	-	0.17	-	-	-	<0.04	mg/kg mg/kg	TM4/PM8 TM4/PM8
Benzo(ghi)perylene #	-	-	<0.80 _{AC}	-	<0.04	-	0.07	-	_	-	<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	-	19.9 _{AC}	-	<0.04	-	6.8	-	-	-	<0.04	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	-	2.05 _{AC}	-	<0.05	-	0.55	-	-	-	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	-	0.80 _{AC}	-	<0.03	-	0.22	-	-	-	<0.03	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	-	108 _{AC}	-	114	-	99	-	-	-	<0	%	TM4/PM8
			AC										

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Report : Solid

JE JOD NO.:	15/13/59												
J E Sample No.	344-346	347-349	350-352	353-355	356-358	359-361	362-364	365-367	368-370	371-373			
Sample ID	WS06	WS06	WS06	WS06	WS06	WS06	WS06	WS06	WS03	WS03			
Depth	0.20	0.50	1.00	1.40-1.90	1.90-2.50	3.00-3.70	4.00-4.50	5.00-5.70	0.20	0.50	Please se	e attached n	otes for all
COC No / misc											abbrevi	iations and a	cronyms
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	\diamond	\diamond	\diamond	\diamond	\diamond	\diamond	\diamond	\diamond	\diamond			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method No.
Date of Receipt								08/10/2015		08/10/2015			
Natural Moisture Content	-	-	11.0	-	1.5	-	9.2	-	-	-	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	-	-	<0.6	-	<0.6	-	13.6	-	-	-	<0.6	mg/kg	TM38/PM20
Hexavalent Chromium #	-	-	<0.3	-	<0.3	-	<0.3	-	-	-	<0.3	mg/kg	TM38/PM20
Free Cyanide	-	-	<0.5	-	<0.5	-	<0.5	-	-	-	<0.5	mg/kg	TM89/PM45
Total Cyanide ^{#M}	-	-	<0.5	-	<0.5	-	<0.5	-	-	-	<0.5	mg/kg	TM89/PM45
Organic Matter	-	-	4.9	-	<0.2	-	10.5	-	-	-	<0.2	%	TM21/PM24
	-	-	4.9	-	<0.2	-	10.5	-	-	-	<0.2	70	111/2 17/211/24
PID Reading	0.5	0.4	0.4	0.2	0.8	0.5	0.5	0.6	0.3	0.1	<0.1	ppm	TM120/PM0
pH ^{#M}	-	-	8.20	-	8.71 Othor	-	7.95 Sandy Loam	-	-	-	<0.01	pH units	TM73/PM11 PM13/PM0
Sample Type Sample Colour	-	-	Sandy Loam Dark Brown	-	Other Black	-	Dark Brown	-	-	-		None None	PM13/PM0 PM13/PM0
Other Items	-	-	stones	-	NA	-	paper, bricks, stone	-	-	-		None	PM13/PM0

Client Name: Reference: Location: Contact: JE Job No.:

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Report : Solid

JE Job No.:	15/13759												
J E Sample No.	374-376	377-379	380-382	383-385	386-388	389-391	392-394	395-397	398-400	401-403			
Sample ID	WS03	WS03	WS03	WS03	WS03	WS04	WS04	WS04	WS04	WS04			
Depth	1.00	1.40-1.70	2.40-2.70	3.40-3.70	4.20-4.70	0.20	0.50	1.00	1.50-1.80	2.40-2.70	Please se	e attached n	otes for all
COC No / misc												ations and ad	
Containers	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT	VJT			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	\diamond			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method No.
Date of Receipt						08/10/2015			08/10/2015				
Arsenic ^{#M}	-	-	-	-	-	-	-	10.6	-	-	<0.5	mg/kg	TM30/PM15
Arsenic	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium #M	-	-	-	-	-	-	-	0.3	-	-	<0.1	mg/kg	TM30/PM15
Cadmium	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium ^{#M}	-	-	-	-	-	-	-	81.5	-	-	<0.5	mg/kg	TM30/PM15
Chromium	-	-	-	-	-	-	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper #M	-	-	-	-	-	-	-	49	-	-	<1	mg/kg	TM30/PM15
Copper	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Iron	-	-	-	-	-	-	-	16930	-	-	<20	mg/kg	TM30/PM15
Iron	-	-	-	-	-	-	-	-	-	-	<20	mg/kg	TM30/PM62
Lead ^{#M}	-	-	-	-	-	-	-	195	-	-	<5	mg/kg	TM30/PM15
Lead	-	-	-	-	-	-	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury ^{#M}	-	-	-	-	-	-	-	0.1	-	-	<0.1	mg/kg	TM30/PM15
Mercury	-	-	-	-	-	-	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel ^{#M}	-	-	-	-	-	-	-	17.2	-	-	<0.7	mg/kg	TM30/PM15
Nickel	-	-	-	-	-	-	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium ^{#M}	-	-	-	-	-	-	-	<1	-	-	<1	mg/kg	TM30/PM15
Selenium	-	-	-	-	-	-	-	-	-	-	<1	mg/kg	TM30/PM62
Vanadium	-	-	-	-	-	-	-	19	-	-	<1	mg/kg	TM30/PM15
Vanadium	_	-	-	-	-	_	-	-	-	-	<1	mg/kg	TM30/PM62
Zinc ^{#M}	-	_	-	-	_	_	-	178	-	_	<5	mg/kg	TM30/PM15
Zinc	-	-	-	_	-	-	-	-	-	_	<5	mg/kg	TM30/PM62
2110	-	_	-	-	_	_	_	-	-	-	~5	iiig/kg	110100/110102
PAH MS													
								0.40			10.04		TM4/DM0
Naphthalene #M	-	-	-	-	-	-	-	0.18	-	-	<0.04	mg/kg	TM4/PM8 TM4/PM8
Acenaphthylene	-	-	-	-	-	-	-	0.03		-	< 0.03	mg/kg	
Acenaphthene #M	-	-	-	-	-	-	-	0.26	-	-	< 0.05	mg/kg	TM4/PM8
Fluorene #M	-	-	-	-	-	-	-	0.19	-	-	<0.04	mg/kg	TM4/PM8
Phenanthrene #M	-	-	-	-	-	-	-	2.20	-	-	<0.03	mg/kg	TM4/PM8
Anthracene #	-	-	-	-	-	-	-	0.41	-	-	<0.04	mg/kg	TM4/PM8
Fluoranthene #M	-	-	-	-	-	-	-	3.00	-	-	<0.03	mg/kg	TM4/PM8
Pyrene [#]	-	-	-	-	-	-	-	2.74	-	-	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	-	-	-	-	-	-	1.34	-	-	<0.06	mg/kg	TM4/PM8
Chrysene #M	-	-	-	-	-	-	-	1.37	-	-	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	-	-	-	-	-	-	-	1.94	-	-	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-	-	-	-	-	-	-	1.18	-	-	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	-	-	-	-	-	-	-	0.73	-	-	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-	-	-	-	-	-	-	0.20	-	-	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	-	-	-	-	-	-	0.72	-	-	<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	-	-	-	-	-	-	16.5	-	-	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	-	-	-	-	-	-	1.40	-	-	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	-	-	-	-	-	-	0.54	-	-	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	-	-	-	-	-	-	109	-	-	<0	%	TM4/PM8

Client Name:
Reference:
Location:
Contact:
JE Job No.:

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Report : Solid

JE Job No.:	15/13759												
J E Sample No.	374-376	377-379	380-382	383-385	386-388	389-391	392-394	395-397	398-400	401-403			
Sample ID	WS03	WS03	WS03	WS03	WS03	WS04	WS04	WS04	WS04	WS04			
Depth	1.00	1.40-1.70	2.40-2.70	3.40-3.70	4.20-4.70	0.20	0.50	1.00	1.50-1.80	2.40-2.70	Please se	e attached n	otes for all
COC No / misc											abbrevi	ations and a	cronyms
Containers	VJT	VJT	VJT										
Sample Date	\diamond	<>	\diamond	\diamond	\diamond	<>	<>	<>	<>	<>			
Sample Type	Soil	Soil	Soil										
Batch Number	5	5	5	5	5	5	5	5	5	5	LOD/LOR	Units	Method
Date of Receipt	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015	08/10/2015			No.
Natural Moisture Content	-	-	-	-	-	-	-	11.7	-	-	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	-	-	-	-	-	-	-	<0.6	-	-	<0.6	mg/kg	TM38/PM20
Hexavalent Chromium #	-	-	-	-	-	-	-	<0.3	-	-	<0.3	mg/kg	TM38/PM20
Free Cyanide	-	-	-	-	-	-	-	<0.5	-	-	<0.5	mg/kg	TM89/PM45
Total Cyanide #M	-	-	-	-	-	-	-	<0.5	-	-	<0.5	mg/kg	TM89/PM45
Organic Matter	-	-	-	-	-	-	-	3.8	-	-	<0.2	%	TM21/PM24
PID Reading	0.3	0.3	0.1	<0.1	0.9	<0.1	0.1	0.3	0.4	1.6	<0.1	ppm	TM120/PM0
pH ^{#M}	-	-	-	-	-	-	-	8.33	-	-	<0.01	pH units	TM73/PM11
Sample Type	-	-	-	-	-	-	-	Sandy Loam	-	-		None	PM13/PM0
Sample Colour	-	-	-	-	-	-	-	Medium Brown	-	-		None	PM13/PM0
Other Items	-	-	-	-	-	-	-	stones	-	-		None	PM13/PM0

Client Name: Reference: Location: Contact: JE Job No.:

PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Geotechnics

Report : Solid

JE Job No.:	15/13759						_		
J E Sample No.	404-406	407-409	410-412						
Sample ID	WS04	WS04	WS04						
Depth	3.30-3.70	4.00-4.70	5.00-5.70						
COC No / misc	0.00 0.10		0.00 0.10					e attached n ations and a	
Containers	VJT	VJT	VJT				i		
Sample Date	<>	<>	<>						
Sample Type	Soil	Soil	Soil						
Batch Number	5	5	5				LOD/LOR	Units	Method No.
Date of Receipt	08/10/2015	08/10/2015	08/10/2015						NO.
Arsenic ^{#M}	29.7	23.4	-				<0.5	mg/kg	TM30/PM15
Arsenic	-	-	-				<0.5	mg/kg	TM30/PM62
Cadmium ^{#M}	<0.1	0.2	-				<0.1	mg/kg	TM30/PM15
Cadmium	-	-	-				<0.1	mg/kg	TM30/PM62
Chromium ^{#M}	95.6	80.2	-				<0.5	mg/kg	TM30/PM15
Chromium	-	-	-				<0.5	mg/kg	TM30/PM62
Copper ^{#M}	115	104	-				<1	mg/kg	TM30/PM15
Copper	-	- 37440	-				<1 <20	mg/kg	TM30/PM62 TM30/PM15
Iron	57110 _{AB}	-	-				<20	mg/kg	TM30/PM15
Lead #M	197	- 1181	-				<20	mg/kg mg/kg	TM30/PM15
Lead	-	-	-				<5	mg/kg	TM30/PM62
Mercury ^{#M}	0.1	<0.1	-				<0.1	mg/kg	TM30/PM15
Mercury	-	-	-				<0.1	mg/kg	TM30/PM62
Nickel ^{#M}	99.6	69.3	-				<0.7	mg/kg	TM30/PM15
Nickel	-	-	-				<0.7	mg/kg	TM30/PM62
Selenium ^{#M}	2	2	-				<1	mg/kg	TM30/PM15
Selenium	-	-	-				<1	mg/kg	TM30/PM62
Vanadium	93	72	-				<1	mg/kg	TM30/PM15
Vanadium	-	-	-				<1	mg/kg	TM30/PM62
Zinc ^{#M}	336	130	-				<5	mg/kg	TM30/PM15
Zinc	-	-	-				<5	mg/kg	TM30/PM62
PAH MS									
Naphthalene #M	0.06	0.09	-				<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.13	-				<0.03	mg/kg	TM4/PM8
Acenaphthene #M	<0.05	<0.05	-				<0.05	mg/kg	TM4/PM8
Fluorene #M	<0.04	<0.04	-				<0.04	mg/kg	TM4/PM8
Phenanthrene #M	0.07	0.10	-				<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	0.38	-				<0.04	mg/kg	TM4/PM8
Fluoranthene #M	0.13	0.30	-				< 0.03	mg/kg	TM4/PM8
Pyrene [#]	0.12	0.38	-				< 0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.09	0.19	-				< 0.06	mg/kg	TM4/PM8
Chrysene ^{#M} Benzo(bk)fluoranthene ^{#M}	0.11	0.25	-				<0.02 <0.07	mg/kg	TM4/PM8 TM4/PM8
Benzo(a)pyrene [#]	0.12	0.23	-				<0.07	mg/kg mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	0.09	0.23	-				<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.03	0.25	-				<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	0.09	0.24	-				<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.1	3.2	-				<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.15	0.43	-				< 0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.06	0.17	-				<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	102	104	-				<0	%	TM4/PM8

Jones Environmental Laboratory Client Name: Geotechnics Report : Solid PN153396 Reference: Location: A5036 Liverpool Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub Jon Hutchinson Contact: 15/13759 JE Job No.: 404-406 407-409 410-412 J E Sample No. Sample ID WS04 WS04 WS04 3.30-3.70 4.00-4.70 5.00-5.70 Depth Please see attached notes for all abbreviations and acronyms COC No / misc Containers VJT VJT VJT Sample Date <> <> <> Sample Type Soil Soil Soil Batch Number 5 5 5 Method LOD/LOR Units No. Date of Receipt 08/10/2015 08/10/2015 08/10/2015 PM4/PM0 Natural Moisture Content 19.1 23.3 <0.1 % TM38/PM20 Ammoniacal Nitrogen as NH4 <0.6 <0.6 <0.6 mg/kg TM38/PM20 Hexavalent Chromium # <0.3 <0.3 <0.3 mg/kg TM89/PM45 <0.5 <0.5 Free Cyanide <0.5 mg/kg Total Cyanide #M TM89/PM45 3.9 <0.5 <0.5 mg/kg 24.5 21.6 <0.2 TM21/PM24 Organic Matter % TM120/PM0 0.1 0.4 <0.1 PID Reading 0.3 ppm pH^{#M} TM73/PM11 7.38 7.73 <0.01 pH units PM13/PM0 Sample Type Sandy Loam Sandy Loam None PM13/PM0 Sample Colour Dark Brown Dark Brown None Other Items PM13/PM0 stones, clinke None stones

Client Name: Reference: Location: Contact: JE Job No.: Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : CEN 10:1 1 Batch

JE Job No.:	15/13759							_		
J E Sample No.	323-325	350-352	362-364	404-406	407-409					
Sample ID	WS07	WS06	WS06	WS04	WS04					
Depth	1.00	1.00	4.00-4.50	3.30-3.70	4.00-4.70			Please se	e attached n	otes for all
COC No / misc									ations and a	
Containers	VJT	VJT	VJT	VJT	VJT			i		
Sample Date	<>	<>	<>	<>	<>					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Batch Number	5	5	5	5	5					
								LOD/LOR	Units	Method No.
Date of Receipt			08/10/2015					 		Th (0.0 /D) (1.1
Dissolved Arsenic [#] Dissolved Cadmium [#]	10.1 0.78	<0.9 0.29	<0.9 0.37	<0.9 0.29	<0.9 0.41			<0.9 <0.03	ug/l ug/l	TM30/PM14 TM30/PM14
Dissolved Cadmium	1.2	2.2	<0.2	0.29	<0.2			<0.03	ug/l	TM30/PM14
Dissolved Copper [#]	9	9	<3	<3	<3			<3	ug/l	TM30/PM14
Dissolved Iron [#]	149.8	123.0	33.7	<4.7	8.7			<4.7	ug/l	TM30/PM14
Dissolved Lead #	8.7	1.5	1.1	<0.4	4.6			<0.4	ug/l	TM30/PM14
Dissolved Nickel [#]	50.5	0.7	1.7	12.1	3.9			<0.2	ug/l	TM30/PM14
Dissolved Selenium [#]	<1.2	<1.2	<1.2	<1.2	<1.2			<1.2	ug/l	TM30/PM14
Dissolved Vanadium [#]	<0.6	2.1	<0.6	<0.6	<0.6			<0.6	ug/l	TM30/PM14
Dissolved Zinc#	514.4	7.0	3.3	38.0	9.9			<1.5	ug/l	TM30/PM14
Mercury Dissolved by CVAF *	0.75	1.36	<0.01	0.06	0.04			<0.01	ug/l	TM61/PM38
PAH MS										
Naphthalene	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM4/PM30
Acenaphthylene	0.01	0.01	<0.01	0.01	0.02			<0.01	ug/l	TM4/PM30
Acenaphthene	0.05	0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Fluorene	0.08	0.01	0.01	<0.01	0.01			<0.01	ug/l	TM4/PM30
Phenanthrene	0.38	0.03	0.02	<0.01	0.02			<0.01	ug/l	TM4/PM30
Anthracene	0.07	0.01	<0.01	<0.01	0.03			<0.01	ug/l	TM4/PM30
Fluoranthene	0.68	0.07	0.01	0.02	0.02			< 0.01	ug/l	TM4/PM30
Pyrene Benzo(a)anthracene	0.50 0.19	0.06	0.01 <0.01	0.02	0.04			<0.01 <0.01	ug/l ug/l	TM4/PM30 TM4/PM30
Chrysene	0.35	0.03	<0.01	0.03	0.02			<0.01	ug/l	TM4/PM30
Benzo(bk)fluoranthene	0.23	0.13	<0.01	0.06	0.05			<0.01	ug/l	TM4/PM30
Benzo(a)pyrene	0.18	0.24	<0.01	0.15	0.17			<0.01	ug/l	TM4/PM30
Indeno(123cd)pyrene	0.03	0.05	<0.01	0.02	0.01			<0.01	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	0.03	0.04	<0.01	0.02	0.01			<0.01	ug/l	TM4/PM30
PAH 16 Total	2.8	0.8	<0.1	0.4	0.4			<0.1	ug/l	TM4/PM30
Benzo(b)fluoranthene	0.17	0.09	< 0.01	0.04	0.04			< 0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene PAH Surrogate % Recovery	0.06 80	0.04 95	<0.01 95	0.02 97	0.01			<0.01 <0	ug/l %	TM4/PM30 TM4/PM30
PAR Surrogale % Recovery	80	95	95	97	100			~0	70	11014/1910130
Sulphate #	83.55	17.83	13.45	308.78	215.29			<0.05	mg/l	TM38/PM0
Free Cyanide [#]	10	<10	<10	<10	<10			<10	ug/l	TM89/PM0
Free Cyanide " Total Cyanide #	10	<10	15	<10	<10			<10	ug/l	TM89/PM0 TM89/PM0
	-	_	-	-	-			-	. 3.	
Hexavalent Chromium	<2	<2	<2	<2	<2			<2	ug/l	TM38/PM0
pН	7.92	8.11	8.11	7.74	7.65			<0.01	pH units	TM73/PM0

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested. Opinions lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Any questionable sample will automatically be assumed to have breached the Waste Limit and further testing may be required.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	5	WS01B	0.50	257	19/10/2015	Mass of Dry Sample	51.9 (g)
					20/10/2015	General Description (Bulk Analysis)	soil/stones
					20/10/2015	Asbestos Containing Material	Fibre Bundles
					20/10/2015	Asbestos Screen	Chrysotile
					20/10/2015	Asbestos Level	Quantifiable
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS01B	1.00	260	19/10/2015	Mass of Dry Sample	49.3 (g)
					20/10/2015	General Description (Bulk Analysis)	soil/stones
					20/10/2015	Asbestos Containing Material	Asbestos Cement Debris
					20/10/2015	Asbestos Screen	Chrysotile
					20/10/2015	Asbestos Level	Quantifiable
					20/10/2015	Waste Limit	Asbestos waste limit cannot be determined from the analysis scheduled
15/13759	5	WS02	1.00	269	19/10/2015	Mass of Dry Sample	43.0 (g)
					20/10/2015	General Description (Bulk Analysis)	soil/stones
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS02	3.70-4.00	278	19/10/2015	Mass of Dry Sample	47.7 (g)
					20/10/2015	General Description (Bulk Analysis)	Sand
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS02	4.70-5.00	281	19/10/2015	Mass of Dry Sample	23.2 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil/Veg
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson

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J E	Detab	Sample ID	Denth	J E Sampla	Date Of	Analysia	Desult
Job No.	Batch	Sample ID	Depth	Sample No.	Analysis	Analysis	Result
15/13759	5	WS02	4.70-5.00	281	20/10/2015	Waste Limit	<0.1%
15/13759	5	WS05	0.50	287	19/10/2015	Mass of Dry Sample	45.6 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil/Stone
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS05	2.30-2.50	296	19/10/2015	Mass of Dry Sample	46.1 (g)
					20/10/2015	General Description (Bulk Analysis)	soil/stones
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS05	5.00-5.60	305	19/10/2015	Mass of Dry Sample	53.7 (g)
					20/10/2015	General Description (Bulk Analysis)	soil/stones
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS07	1.00	324	19/10/2015	Mass of Dry Sample	33.7 (g)
					20/10/2015	General Description (Bulk Analysis)	soil/stones
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
						Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS07	3.50-3.70	333	19/10/2015	Mass of Dry Sample	41.1 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil/Stone
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
		14/007		0.55	10/10/2020		
15/13759	5	WS07	5.30-5.65	339	19/10/2015	Mass of Dry Sample	49.8 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil/Stone
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD

Jones	Env	rronmenta	il Labor	atory			Aspestos Analy
Client N Referer Locatio Contac	nce: on:		Geotechr PN15339 A5036 Liv Jon Hutcl	96 verpool			
J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	5	WS07	5.30-5.65	339	20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS06	1.00	351	19/10/2015	Mass of Dry Sample	54.8 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil/Stone
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS06	1.90-2.50	357	19/10/2015	Mass of Dry Sample	60.2 (g)
					20/10/2015	General Description (Bulk Analysis)	silt-soil
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
45/40750	F	WS06	4 00 4 50	262	10/10/2015	Mass of Day Somale	52.4 (-)
15/13759	5	W300	4.00-4.50	363	19/10/2015 20/10/2015	Mass of Dry Sample	53.1 (g)
					20/10/2015	General Description (Bulk Analysis) Asbestos Containing Material	soil-stones-roots None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS04	1.00	396	19/10/2015	Mass of Dry Sample	51.4 (g)
					20/10/2015	General Description (Bulk Analysis)	soil-stones
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS04	3.30-3.70	405	19/10/2015	Mass of Dry Sample	45.5 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil-Silt/Clay/Brick/Stone/MMMF
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Asbestos Screen	NAD
					20/10/2015	Asbestos Screen (2)	NAD
					20/10/2015	Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%
15/13759	5	WS04	4.00-4.70	408	19/10/2015	Mass of Dry Sample	48.8 (g)
					20/10/2015	General Description (Bulk Analysis)	Soil-Silt/Clay/Brick/Stone
					20/10/2015	Asbestos Containing Material	None
					20/10/2015	Asbestos Containing Material (2)	None
					20/10/2015	Achectos Screen	NAD

NAD

20/10/2015 Asbestos Screen

Client N		<i>ii</i> onnentu	Geotechr				/ oboctor / maryor
Referer			PN15339				
Locatio Contac			A5036 Li Jon Hutc	verpool hinson			
JE	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
15/13759	5	WS04	4.00-4.70	408	20/10/2015	Asbestos Screen (2)	NAD
						Asbestos Level	NAD
					20/10/2015	Waste Limit	<0.1%

Client Name:	Geotechnics	
Reference:	PN153396	
Location:	A5036 Liverpool	
Contact:	Jon Hutchinson	

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	NDP Reason
15/13759	5	WS01B	0.50	256-258	Asbestos detected in sample
15/13759	5	WS01B	1.00	259-261	Asbestos detected in sample

NDP Reason Report

Matrix : Solid

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
Ν	Client Sample
ТВ	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution
AC	x20 Dilution

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Elira TOC fumace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes		AR	Yes

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
ТМ30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
ТМ30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes
ТМЗ8	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2.1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2.1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.			AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	

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Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM0	No preparation is required.	Yes		AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes
TM120	Hand-held broadband VOC gas monitor with Photoionisation Detection .	PM0	No preparation is required.			AR	No
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Unit 3 Deeside Point Zone 3 **Deeside Industrial Park** Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 30th October, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 5 Schedule C Location : A5036 Liverpool 8th October, 2015 Date samples received : Status : Final report Issue : 1

Fifty four samples were received for analysis on 8th October, 2015 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc **Project Manager**

Client Name: Reference: Location: Contact: JE Job No.:

PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Geotechnics

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759									
J E Sample No.	265-267	268-270	274-276	280-282				1		
Sample ID	WS02	WS02	WS02	WS02						
Depth	0.50	1.00	2.70-3.00	4.70-5.00				Please see attached notes for a		
COC No / misc									ations and a	
Containers	VJT	VJT	VJT	VJT				Ì		
Sample Date	08/10/2015	08/10/2015	08/10/2015	08/10/2015				i		
Sample Type	Soil	Soil	Soil	Soil				i		
Batch Number	5	5	5	5						Method
Date of Receipt	08/10/2015	08/10/2015	08/10/2015	08/10/2015				LOD/LOR	Units	No.
TPH CWG							 			
Aliphatics										
>C5-C6 #M	<0.1	<0.1	<0.1	<0.2 _{AA}				<0.1	mg/kg	TM36/PM12
>C6-C8 #M	<0.1	<0.1	<0.1	<0.2 _{AA}				<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.2 _{AA}				<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM16
>C12-C16 #M	<4	<4	<4	<4				<4	mg/kg	TM5/PM16
>C16-C21 ^{#M} >C21-C35 ^{#M}	<7 15	<7 19	306 <7	278 <7				<7 <7	mg/kg	TM5/PM16 TM5/PM16
>C21-C35	15 <19	19	306	278				<7 <19	mg/kg mg/kg	TM5/PW12/PM16
Aromatics	~15	15	500	270				~13	ilig/kg	
>C5-EC7	<0.1	<0.1	<0.1	<0.2 _{AA}				<0.1	mg/kg	TM36/PM12
>EC7-EC8	<0.1	<0.1	<0.1	<0.2 _{AA}				<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	<0.1	<0.1	<0.1	<0.2 _{AA}				<0.1	mg/kg	TM36/PM12
>EC10-EC12	<0.2	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM16
>EC12-EC16	<4	<4	<4	<4				<4	mg/kg	TM5/PM16
>EC16-EC21	46	34	26	34				<7	mg/kg	TM5/PM16
>EC21-EC35	225	179	594	355				<7	mg/kg	TM5/PM16
Total aromatics C5-35	271	213	620	389				<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	271	232	926	667				<38	mg/kg	TM5/TM36/PM12/PM16
MTBE [#]	<5	<5	<5	<10 _{AA}				<5	ug/kg	TM31/PM12
Benzene [#]	<5	<5	<5	<10 _{AA}				<5	ug/kg	TM31/PM12
Toluene [#]	<5	<5	<5	<10 _{AA}				<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	<10 _{AA}				<5	ug/kg	TM31/PM12
m/p-Xylene [#]	<5	<5	<5	<10 _{AA}				<5	ug/kg	TM31/PM12
o-Xylene [#]	<5	<5	<5	<10 _{AA}				<5	ug/kg	TM31/PM12
Natural Moisture Content	27.4	-	71.2	-				<0.1	%	PM4/PM0

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range
x2 Dilution

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	TM005: Modified USEPA 80158. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM0036: Modified USEPA 80158. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM12/PM16	CWG GC-FID			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. U

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 20th November, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 6 Location : A5036 Liverpool 12th November, 2015 Date samples received : Status : Final report Issue : 1

Nineteen samples were received for analysis on 12th November, 2015 of which ten were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc Project Manager

Client Name:	Geotechnics
Reference:	PN153396
Location:	A5036 Liverpool
Contact:	Jon Hutchinson
JE Job No.:	15/13759

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/13759										_		
J E Sample No.	413	414	419	422	424	425	427	428	430	431			
Sample ID	CP1	CP1	CP2	CP3	CP4	CP4	CP5	CP5	CP7	CP7			
	1.20-1.65	3.60	9.20	9.70	7.00	9.30	6.10	8.25-8.70	2.00	4.25-4.70	Please se abbrevi	otes for all cronyms	
COC No / misc		-	-	-	-	-	-	-	-	-			
Containers	T <>	T <>	T	T <>	Т	T <>	T <>	T	T <>	T <>			
Sample Date		Soil	<> Soil		<>		Soil	<>		Soil			
Sample Type Batch Number	6	6	Soil 6	Soil 6	Soil 6	Soil 6	6	Soil 6	Soil 6	6			
Date of Receipt					12/11/2015		12/11/2015				LOD/LOR	Units	Method No.
Sulphate as SO4 (2:1 Ext) #M	0.7275	0.6870	0.1506	< 0.0015	0.2439	0.0738	0.0987	0.0279	<0.0015	0.0120	<0.0015	g/l	TM38/PM20
												5	
рН ^{#м}	7.57	7.44	7.48	8.69	7.87	8.94	8.30	8.91	7.30	7.55	<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay	Sand	Silt Medium Brown	Clay	Sand Medium Brown	Clay Medium Brown	Clay	Sand	Sand		None	PM13/PM0
Sample Colour Other Items	mostly stores, vegetation, gives	vegetation, stones	Dark Brown	stones, wet			stones, sand		Dark Brown wet, stones	Dark Brown stones		None None	PM13/PM0 PM13/PM0
		Vogetation, otoneo	stories, wet	stories, wet		stories, wet	Stories, sund	3101103	wet, stories	3101103		None	

Report : Solid

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

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All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

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As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

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A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

Method Code Appendix

JE Job No: 15/13759

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes	Yes	AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No

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Geotechnics Unit 1B

River Lane Chester Cheshire CH4 8RJ

Borders Industrial Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. U

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781





Attention : Jon Hutchinson 30th November, 2015 Date : Your reference : PN153396 Our reference : Test Report 15/13759 Batch 7 Location : A5036 Liverpool 19th November, 2015 Date samples received : Status : Final report Issue : 1

Eleven samples were received for analysis on 19th November, 2015 of which eleven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

5.60

Simon Gomery BSc Project Manager

Client Name:
Reference:
Location:
Contact:
JE Job No.:

Geotechnics PN153396 A5036 Liverpool Jon Hutchinson 15/13759

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE JOD NO.:	15/13759													
J E Sample No.	432	433	434	435	436	437	438	439	440	441				
Sample ID	WS04	WS03	WS05	WS05	WS06	WS06	WS07	WS08	WS09	WS10				
Depth	4.00-4.45	1.20-1.65	1.50-2.70	5.00-5.45	0.40-1.20	4.00-4.45	3.00-3.45	1.20-1.70	1.90-3.30	0.60-1.20	Please se	Please see attached notes for a		
COC No / misc												cronyms		
Containers	т	т	т	Т	т	т	т	т	т	т				
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	7	7	7	7	7	7	7	7	7	7	LOD/LOR	Units	Method	
Date of Receipt													No.	
Sulphate as SO4 (2:1 Ext) ^{#M}	1.1307	0.0169	1.0206	0.0801	0.1047	0.6664	2.4546	0.0964	0.2610	0.0295	<0.0015	g/l	TM38/PM20	
рН ^{#м}	7.66	8.11	7.07	8.55	8.16	7.89	7.09	8.26	8.05	8.09	<0.01	pH units	TM73/PM11	
Sample Type	Sandy Loam	Sand	Sandy Loam	Sand	Sandy Loam	Sandy Loam	Sandy Loam	Clay	Clay	Sandy Loam		None	PM13/PM0	
Sample Colour	Dark Brown	Medium Brown	Dark Brown	Medium Brown			Dark Brown			Dark Brown		None	PM13/PM0	
Other Items	stores, vegetation and clinker	NA	stones and clinker	stones	sizes, into baseds, we show and	stores, bick features, doc and a	sines, intelligencia dare chine en	stones	stones	stores, brick fragments and roots		None	PM13/PM0	
	auters, regelation and canver	INA	Stories and cliniker	Siones				Stones	Stones			NULLE	FINITS/FINIO	

Jones Environmental Laboratory Client Name: Geotechnics Report : Solid PN153396 Reference: Location: A5036 Liverpool Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub Jon Hutchinson Contact: 15/13759 JE Job No.: J E Sample No. 442 Sample ID WS10 2.50-2.70 Depth Please see attached notes for all abbreviations and acronyms COC No / misc Containers Т Sample Date <> Sample Type Soil Batch Number 7 LOD/LOR Units Date of Receipt 19/11/2015

Sulphate as SO4 (2:1 Ext) ^{#M}	0.0173						<0.0015	g/l	TM38/PM20
рН #М	7.70						<0.01		TM73/PM11
Sample Type	Clay							None	PM13/PM0
Sample Colour	Dark Brown							None	PM13/PM0
Other Items	stones							None	PM13/PM0
	1	 L	1	 	L	 1			

Method

No.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/13759

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

ISO17025 (UKAS) accredited - UK.
Indicates analyte found in associated method blank.
Dilution required.
MCERTS accredited.
Not applicable
No Asbestos Detected.
None Detected (usually refers to VOC and/SVOC TICs).
No Determination Possible
Calibrated against a single substance
Surrogate recovery outside performance criteria. This may be due to a matrix effect.
Results expressed on as received basis.
AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
Result outside calibration range, results should be considered as indicative only and are not accredited.
Analysis subcontracted to a Jones Environmental approved laboratory.
Samples are dried at 35°C ±5°C
Suspected carry over
Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
Matrix Effect
No Fibres Detected
AQC Sample
Blank Sample
Client Sample
Trip Blank Sample
Outside Calibration Range

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TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes	Yes	AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No

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Certificate of Analysis Certificate Number 15-51224

26-Nov-15

Client Geotechnics LTD 203 Torrington Avenue Tile Hill Coventry CV4 9AP

- Our Reference 15-51224
- Client Reference PN153396
 - Order No OC14293
 - Contract Title A5036 PORT OF LIVERPOOL
 - Description 6 Soil samples.
 - Date Received 23-Nov-15
 - Date Started 23-Nov-15
- Date Completed 26-Nov-15

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

Notes Opinions and interpretations are outside the scope of UKAS 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

-6Q.

Rob Brown Business Manager





Summary of Asbestos Analysis Soil Samples

Our Ref 15-51224 *Client Ref* PN153396 *Contract Title* A5036 PORT OF LIVERPOOL

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
904059	CP3 3.00-3.45	SOIL	NAD	none	D Wilkinson
904060	CP3 6.00-6.45	SOIL	NAD	none	D Wilkinson
904061	CP2 2.25-2.70	SOIL	NAD	none	D Wilkinson
904062	CP2 4.20-4.65	SOIL	NAD	none	D Wilkinson
904063	CP2 6.20-6.65	SOIL	Chrysotile	Chrysotile present as fibre bundle and small cement fragment	D Wilkinson
904064	CP2 8.20-8.65	SOIL	NAD	none	D Wilkinson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.



Information in Support of the Analytical Results

Our Ref 15-51224 *Client Ref* PN153396 *Contract* A5036 PORT OF LIVERPOOL

Containers Received & Deviating Samples

		Date		Holding time exceeded for	Inappropriate container for
Lab No	Sample ID	Sampled	Containers Received	tests	tests
904059	CP3 3.00-3.45 SOIL	20/11/15	PT 1L		
904060	CP3 6.00-6.45 SOIL	20/11/15	PT 1L		
904061	CP2 2.25-2.70 SOIL	20/11/15	PT 1L		
904062	CP2 4.20-4.65 SOIL	20/11/15	PT 1L		
904063	CP2 6.20-6.65 SOIL	20/11/15	PT 1L		
904064	CP2 8.20-8.65 SOIL	20/11/15	PT 1L		

Key: P-Plastic T-Tub!

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers 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

APPENDIX 7

Laboratory Test Results - Bacteriological



Cheshire Scientific Ltd Unit 7 Brunel Road Croft Business Park Bromborough Wirral CH62 3NY

t: 0151 343 1280 f: 0151 343 1686 admin@cheshirescientific.co.uk www.cheshirescientific.co.uk

For the attention of Paul Hayes	Our Ref:	108437
Geotechnics Ltd	Your Ref:	AUTH-ON13782 PN153396 A5036 Port Of
The Geotechnical Centre		Liverpool Access Study
Unit 1B, Borders Ind Prk	Date Received:	Wednesday 04 November 2015
Chester	Time Received:	08:30
CH4 8RJ	Sample Type:	Water
Date Sampled: 03/11/2015	Date Started:	04 Nov 2015
Num Samples: 4	Date Reported:	07 November 2015

Certificate of Analysis

Sample Ref	Lab Ref	E coli -Enumeration cfu/100ml	Faecal Streptococci cfu/100ml
SW1 A5306	335263	15	51
SW3 A5306	335264	49	30
SW4 A5306	335265	32	40
SW5 A5306	335266	25	37
N.D. = Not Detected, $cfu = Colony Forming Unit, n/a = Test Not Applicable \dots =$	Estimated Pag	sulte relate only to camples analyse	

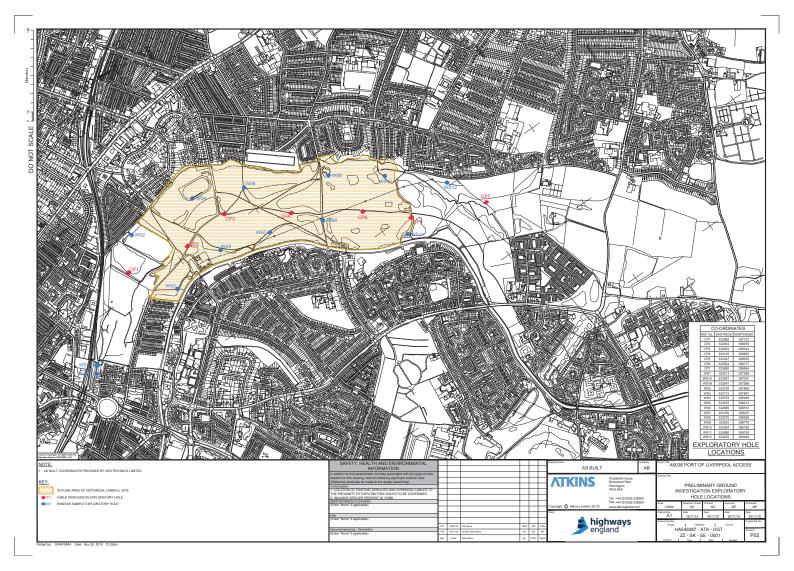
N.D. = Not Detected, cfu = Colony Forming Unit, n/a = Test Not Applicable, ~ = Estimated, Results relate only to samples analysed

This Certificate has been generated electronically (Digital Signature Code:=77747) and is authorised by Anthony Griffiths BSc. Authorised Signatory

Page 1 of 1

APPENDIX 8

Exploratory Hole Location Plan



APPENDIX 9

Investigation Techniques and General Notes

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the most simple yet effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances ground conditions to some 1.20 metres can be closely inspected, subject to stability assessment, but below this depth, entrance into the pit is not permitted in the absence of shoring and hence observations will have been made from ground surface and samples taken from the excavator bucket.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for backfilling. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, insitu Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in more dense strata. Small disturbed samples are obtained throughout.

The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used. Where open hole rotary drilling is employed, descriptions of strata result from examination at surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained. Small scale plant can be used for auger drilling to limited depths where access is constrained.

Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

WINDOW SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This has now been superseded by the use of a thin-walled plastic liner within a sampler which has a solid wall. Diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1 m lengths. The hole formed is not cased, however, and hence the success of this technique is limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 8m can be achieved in suitable circumstances but depths of 4m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Window Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the TRL to provide a profile of CBR values over a range of depths of up to 1.50m.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dipmeter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.



- 1. The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.
- Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.
- 3. The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.
- 4. The assessment of the significance of the factual data, where called for, is provided to assist the Client and his Engineer and/or Advisers in the preparation of their designs.
- 5. The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.
- 6. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.
- 7. The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.
- The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses of BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.
- Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.
- Any unavoidable variations from specified procedures are identified in the report.
- Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated.
- 12. All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid

understanding and assimilation for design purposes. Where all details are required, these can be made available.

- 13. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.
- 14. Classification of materials as Made Ground is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for fill materials that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.
- 15. The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882 (2007). Specific testing would be necessary where such definition is a requirement.
- 16. Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.
- 17. Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.
- 18. Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. The foundations should be designed in accordance with the good practice embodied in BS 8004:1986 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.
- 19. Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.
- 20. The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.

Appendix D. Ground Gas Results

All Cae Manita			
All Gas Monitor	ing Results		
	Carbon dioxide	Methane concentration	
BH Number	concentration (%)	(%)	Flow Rate
CP1	0		0
CP2	0.4	0.1	1
CP4	35	38	1.4
CP5	9.4	5.5	1.1
CP6 CP7	0.1	0.1	0.1
WS02	3.5	0.1	0.1 0.6
WS02	8.3	0	0.0
WS05	25	0.4	0.3
WS09	30	34.5	1.4
WS10	18	4.3	0.3
BH12	0	0	0.0
WS1	0		0
NS2	0	0	0
WS3	0	0	0
WS4	0	0	0
WS5	0	0	0
WS6	0	0	0
WS7	0	0	0
WS8	0	0	0
WS9	0	0	0
	How many rounds of cost	nonitoring undertaken?	0
	How many rounds of gas r	nonitoring undertaken?	3 6 weeks
	Over what time period? How many boreholes were	assessed?	6 weeks 8
	now many potenoies were	: 00000001	0
	0		
Determining the	e Gas Screeni	ng Value	
Maximum Carbon dioxide	Maximum methane		
concentration	concentration	Maximum Flow rate	
35		1.4	
	•		I
Gas Screening \	/alue (l/hr) = Max.	borehole flow rate	(I/hr) x Max. gas co
Ŭ			· · · · · · · · · · · · · · · · · · ·
		_	
Gas Screening Value =	0.532		
ž		•	

CP1CP2CP4CCP5CCP6CCP7CWS02CWS06CWS10CBH12CWS2CWS3CWS5CWS6CWS6CWS1CCC<	0.00 0.40 35.00 9.40	0.00 0.10 38.00	0
CP4 Image: CP5 CP6 Image: CP7 WS02 Image: CP7 WS05 Image: CP7 WS06 Image: CP7 WS06 Image: CP7 WS06 Image: CP7 WS07 Image: CP7 WS10 Image: CP7 BH12 Image: CP7 WS1 Image: CP7 WS2 Image: CP7 WS3 Image: CP7 WS4 Image: CP7 WS5 Image: CP7 WS6 Image: CP7 WS7 Image: CP7 WS8 Image: CP7	35.00	38.00	1
CP5 CP6 CP7 WS02 WS05 WS06 WS09 WS10 BH12 WS1 WS2 WS3 WS4 WS5 WS6 WS7 WS8			
CP6 CP7 WS02 WS05 WS06 WS09 WS10 BH12 WS1 WS2 WS3 WS2 WS3 WS4 WS5 WS6 WS7 WS8	9.40		1.4
CP7 Image: CP7 WS02 Image: CP7 WS02 Image: CP7 WS05 Image: CP7 WS05 Image: CP7 WS06 Image: CP7 WS06 Image: CP7 WS10 Image: CP7 BH12 Image: CP7 WS1 Image: CP7 WS2 Image: CP7 WS4 Image: CP7 WS6 Image: CP7 WS7 Image: CP7 WS8 Image: CP7		5.50	1.1
WS02 WS05 WS06 WS09 WS10 BH12 WS1 WS1 WS2 WS3 WS4 WS5 WS5 WS6 WS5 WS6 WS7 WS8	0.10	0.10	0.1
WS05 WS06 WS09 WS10 BH12 WS1 WS2 WS3 WS4 WS5 WS6 WS7 WS8	0.10	0.10	0.1
WS06 WS09 WS10 BH12 WS1 WS1 WS2 WS3 WS4 WS5 WS5 WS6 WS7 WS8	3.50	0.00	0.6
WS09 WS10 BH12 WS1 WS2 WS3 WS4 WS5 WS6 WS7 WS8	8.30	0.00	0.1
WS10 BH12 BH12 WS1 WS1 WS2 WS3 WS3 WS4 WS5 WS6 WS7 WS8 WS8	25.00	0.40	0.3
BH12Image: Second systemWS1WS2WS2WS3WS3WS4WS5MS6WS7MS8	30.00	34.50	1.4
WS1 WS2 WS2 WS3 WS4 WS5 WS6 WS7 WS8 I	18.00	0.30	0.3
WS2 WS2 WS3 WS4 WS5 WS6 WS7 WS8	0.00	0.00	0
WS3 WS4 WS5 WS6 WS7 MS8	0.00	0.00	0
WS4 WS5 WS5 WS6 WS7 WS8	0.00	0.00	0
WS5 WS6 WS7 WS8	0.00	0.00	0
WS6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0.00	0.00	0
WS7 ////////////////////////////////////	0.00	0.00	0
WS8	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00	0.00	0
	0.00 0.00	0.00	0
			0
	0.00	0.00	0
Typical Maximum CO2	16.225		
Typical Maximum CH4	10.220	9.875	
Maximum Flow			1.4
Typical Maximum CO2	16.23	I	
Typical Maximum CH4	9.88		
Gas Screening Value CO2			
Gas Screening Value CH4	0.49		

Appendix E. CAT Waste Results

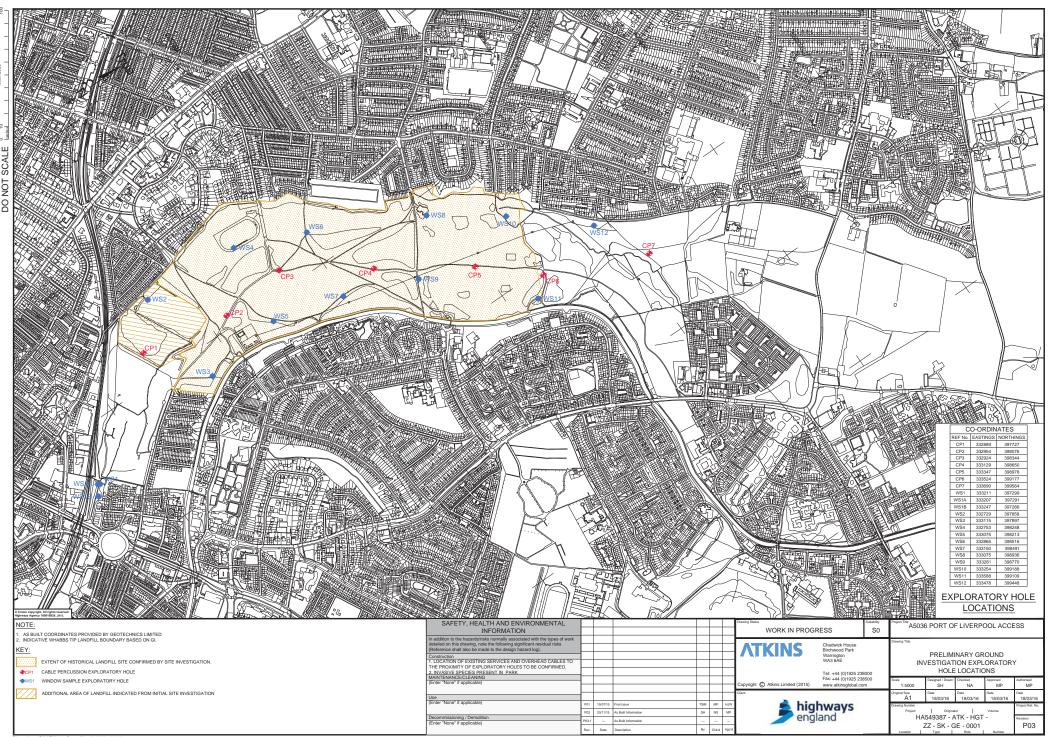
Classification Assessment Tool of Soil Wastes - Hazard Summary Sheet

ATKINS CatWasteSoil

0'/ NI	45000 D (()
Site Name	A5036 - Port of Liverpool
Location	Rimrose Valley Park
Site ID	
Job Number	5136024
Date	11/12/2015
User Name	lucy.rutland@atkinsglobal.com
Company Name	Atkins

Hole ID	Sample Depth	Hazardous Waste Y/N	HP1	HP2	HP3	HP4	HP5	HP6	HP7	HP8	HP9	HP10	HP11	HP12	HP13	HP14	HP15	HP16
WS01B	0.5	N	No	No	No	No	No	No	No									
WS01B	1	Y	No	No	No	No	Yes	No	No									
WS02	0.5	N	No	No	No	No	No	No	No									
WS02	1	N	No	No	No	No	No	No	No									
WS02	2.70-3.00	N	No	No	No	No	No	No	No									
WS02	3.70-4.00	N	No	No	No	No	No	No	No									
WS02	4.70-5.00	N	No	No	No	No	No	No	No									
WS04	1	N	No	No	No	No	No	No	No									
WS04	3.30-3.70	N	No	No	No	No	No	No	No									
WS04	4.00-4.70	N	No	No	No	No	No	No	No									
WS05	0.5	N	No	No	No	No	No	No	No									
WS05	2.30-2.50	Y	No	No	No	No	Yes	No	No									
WS05	5.00-5.60	N	No	No	No	No	No	No	No									
WS06	1	N	No	No	No	No	No	No	No									
WS06	1.90-2.50	Y	No	No	No	No	Yes	No	No									
WS06	4.00-4.50	N	No	No	No	No	No	No	No									
WS07	1	Y	No	No	No	No	Yes	No	No									
WS07	3.50-3.70	Y	No	No	No	No	Yes	No	No									
WS07	5.30-5.65	N	No	No	No	No	No	No	No									
WS08	1.80-2.00	Y	No	No	No	No	Yes	No	No									
WS08	4.70-5.00	N	No	No	No	No	No	No	No									
WS08	5.50-6.00	Y	No	No	No	No	Yes	No	No									
WS09	1	N	No	No	No	No	No	No	No									
WS09	1.40-1.70	N	No	No	No	No	No	No	No									
WS09	4.30-4.70	N	No	No	No	No	No	No	No									
WS10	1	N	No	No	No	No	No	No	No									
WS10	2.00-2.20	N	No	No	No	No	No	No	No									
WS12	0.2	N	No	No	No	No	No	No	No									

Appendix F. Revised Landfill Boundary



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