Appendix 9.12

Ove Arup and Partners Ltd, Northern Gateway, Ground Conditions Desk Study, reference MNG-ARP-SW-RP-CG-102, dated 15 August 2019

FEC

Northern Gateway

Ground Conditions Desk Study

MNG-ARP-SW-RP-CG-102

Issue | 15 August 2019

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 257920-00

Ove Arup & Partners Ltd
6th Floor 3 Piccadilly Place
Manchester M1 3BN
United Kingdom
www.arup.com

ARUP

Contents

			Page
1	**Introduction**		**4**
	1.1	Commission	4
	1.2	Scope	4
	1.3	Sources of information	4
	1.4	Report structure	4
	1.5	Use and limitations of this report	5
2	**Site Description**		**6**
	2.1	Site location and extent	6
	2.2	Topography	7
	2.3	Current site usage and key site features	8
	2.4	Utilities and drainage	8
3	**Site History**		**9**
	3.1	Red Bank North	9
	3.2	Red Bank Central	9
	3.3	Red Bank South	10
	3.4	Red Bank East	10
	3.5	Summary of site history for each date of mapping	10
4	**Ground Investigations**		**14**
	4.1	Historical ground investigation data	14
	4.2	2019 AEG ground investigation	15
5	**Ground Conditions and Environmental Setting**		**18**
	5.1	Geology	18
	5.2	Hydrogeology & hydrology	22
	5.3	Flooding	22
	5.4	Environmental permits & incidents	22
	5.5	Landfills	22
	5.6	Unexploded Ordnance (UXO)	23
	5.7	Archaeology and heritage features	23
6	**Development Assumptions**		**25**
	6.1	Summary of development proposals	25
7	**Geotechnical Considerations**		**26**
	7.1	Approach	26
	7.2	Buried obstructions	26
	7.3	Voids	26

7.4 Tunnels and culverts 27
7.5 Soft ground 28
7.6 Shallow rockhead 28
7.7 New foundations 28
7.8 Steep slopes and retaining walls 29
7.9 Groundwater 29
7.10 Earthworks balance and phasing 29
7.11 Easements and party wall 30
7.12 Archaeology 30
7.13 UXO 30
7.14 Utilities 31
7.15 Vibration 31

8 Conceptual Site Model 32

8.1 Introduction 32
8.2 Sources of contamination 32
8.3 Receptors 34
8.4 Pathways 34
8.5 Plausible pollutant linkages 34
8.6 Summary 35

9 Environmental Risk Assessment 38

9.1 Introduction 38
9.2 Human Health 38
9.3 Controlled waters 40
9.4 Ground gas 40
9.5 Soft landscaping 40
9.6 Buried structures and services 41
9.7 Updated conceptual site model 41

10 Conclusions 43

10.1 Geotechnical 43
10.2 Geoenvironmental 44
10.3 Recommendations for subsequent work 45

References

Figures

Figure 1: Site Location

Figure 2: Site development zones: Yellow (Red Bank North), Blue (Red Bank Central), Orange (Red Bank South) and Green (Red Bank East).

Figure 3 Locations of BGS boreholes (labelled) and other investigation records

Figure 4: Locations of AEG's 2019 ground investigation

Figure 5: Inferred geological cross sections across the Northern Gateway site. Top image: N-S orientation, Bottom image: NE-SW orientation.

Figure 6: Proposed masterplan. Each development zone is split into sub-plots. The site areas outside of the defined development zones are to be developed into a park and walkways with soft landscaping.

Drawings

1. Contamination Potential
2. Geotechnical Constraints

Appendices

Appendix A

Historical Maps

Appendix B

AEG Factual Report (2019)

Appendix C

Soil Screening

Appendix D

Phytotoxic Screening

1 Introduction

1.1 Commission

Ove Arup and Partners Ltd (Arup) has been commissioned by the Far East Consortium (FEC) to provide engineering support to assist in assessing the feasibility of redeveloping an area of land located in north-east Manchester, known as Northern Gateway. Arup's commission includes the provision of engineering support and identifying constraints and opportunities to assist in refining the masterplan and development options and supporting the development of a cost plan as part of a wider team.

1.2 Scope

The objectives of this desk study are to review existing readily available data and information for the site and its immediate area and highlight specific site conditions and geotechnical and geoenvironmental constraints that may affect the proposed development. An initial assessment of the ground related hazards and their implications for the proposed development has been undertaken to input into a cost plan and the development of a site masterplan being prepared by others. Recommendations have been presented for further assessment of these hazards and constraints in the future to verify the assumptions made and refine cost estimates.

1.3 Sources of information

The following sources of information has been reviewed as part of this desk study:

- Published geological information (BGS);
- Information obtained as part of an earlier intrusive ground investigation by AEG in 2019.
- Historical ground investigation data provided by the client team, and
- Groundsure reports including historical mapping and environmental data.

Details of the sources used are indicated in subsequent sections and are provided in the references section.

Supporting information has been included in the appendices where appropriate.

1.4 Report structure

This report has the following structure:

- Section 2: Provides a description of the site in its current condition;
- Section 3: Documents the known site history
- Section 4: Summarises a previous ground investigation undertaken in 2019

- Section 5: Outlines the ground conditions and environmental setting of the site
- Section 6: Discusses the proposed development and assumptions made at this stage of optioneering;
- Section 7: Provides a summary of the key geotechnical constraints identified in relation to the proposed development;
- Section 8: Develops a conceptual site model of the site
- Section 9: Provides a summary of the environmental risk assessment
- Section 10: Concludes findings within this report and recommendations for subsequent works.

1.5 Use and limitations of this report

This report was prepared by Arup on behalf of the FEC in connection with their Northern Gateway site. It also takes into account our Client's particular instructions and requirements and addresses their priorities at the time. This report was not intended for, and should not be relied on, by any third party and no responsibility is undertaken to any third party in relation to it.

All reasonable skill, care and diligence have been exercised within the timescale available and in accordance with the technical requirements of the brief.

This report has been produced from a large volume and variety of data sources. Certain data gaps have been identified and are documented within Section 10 but include ground investigations and site surveys. Assumptions have been made which will require further validation and these are presented within Sections **Error! Reference source not found.**. Notwithstanding the efforts made by the professional team in preparing the report it is possible that other ground contamination or conditions as yet undetected may exist and consequently reliance on this report must be limited accordingly.

2 Site Description

2.1 Site location and extent

The full Northern Gateway area comprises approximately 155 hectares of land to the north-east of Manchester city centre. The site covered by this report is the first phase of the Northern Gateway development and is situated in the southern part of the larger site. The site is in an area known as Red Bank. The site measures approximately 12.4ha and is centred at National Grid reference SJ8461 9954.

The site is bound to the east by Collyhurst Road; to the south by the Hope Valley Line railway viaduct; to the northwest by Red Bank Street and for alignment of the disused Red Bank Viaduct adjacent to Collingham Street, and to the northeast by an historical pedestrian railway bridge. The River Irk and Dantzic Street run through the site. The approximate site boundary is presented in

Figure 1.

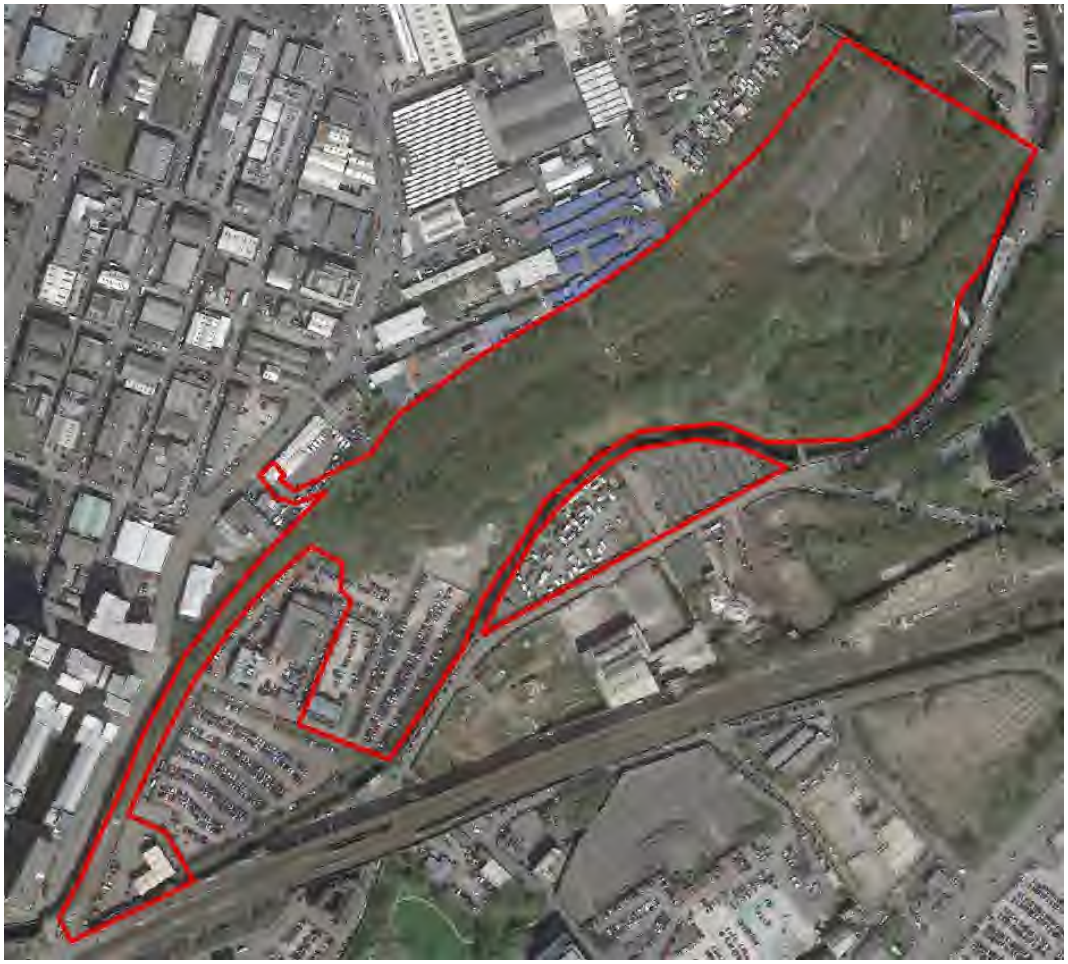


Figure 1: Site Location

For the purposes of this report, the site has been divided into four development zones, shown in Figure 2: Red Bank North (north-western area, located on a

topographical high); Red Bank Central (central plot, adjacent and west of the River Irk); Red Bank South (south-western area adjacent to the NR viaduct), and Red Bank East (central plot, adjacent and east of the River Irk, comprised of two plots split by Warford Street). These zones represent the areas proposed for development.

The remaining areas within the red line boundary comprise an existing railway viaduct in the southern part of the site (Red Bank Viaduct), which is to be retained as part of the development, and an area of woodland in the north-eastern part of the site called St. Catherine's Wood, which is also to be retained. The remaining areas comprise steep vegetated slopes.



Figure 2: Site development zones: Yellow (Red Bank North), Blue (Red Bank Central), Orange (Red Bank South) and Green (Red Bank East).

2.2 Topography

The topography of the site has been interpreted from 1m resolution government LiDAR data [1]. The site is spread across a valley, with topographical highs in the north and south-east of the site and a topographical low represented by the River Irk. The River Irk runs from north-east to south-west through the site, from 30mOD to 26.8mOD. Red Bank North is located on a topographical high which slightly slopes south-west, with elevations of 43.3mOD in the north-east to

40.5mOD in the south-west. It is bound by a steep slope along its southern flank, and slopes and retaining walls along its northern edge. Red Bank Central and East are at similar elevations of 30.2mOD to 31.4mOD. Red Bank South is relatively flat with an elevation of 29mOD. A more detailed 3D topographical survey of the site would be recommended.

2.3 Current site usage and key site features

The majority of Red Bank North is currently vacant land. The north of this area is comprised of tarmac and light vegetation, and the south is covered with dense vegetation. Historical rail features have been observed in this zone, such as the structure of a rail turn-table in the centre of the zone. A small spur of land is attached to this zone, which is the route of a proposed new access road into the site. This spur is on land currently occupied by Creamline Dairies. In the far south of this zone is a disused railway viaduct, Red Bank Viaduct, which is overgrown on the top but has small businesses operating from the arches beneath.

Red Bank Central is comprised of multiple independently-owned car parking businesses.

Red Bank South comprises a gated building and associated car park and is occupied by The Game Larder (GLM Foods). The site is constrained by two Network Rail viaduct structures, an active viaduct to the south and the disused Red Bank viaduct to the north. The River Irk runs in a covered culvert adjacent to and partially under the live viaduct to the south.

Located in the south-west of Red Bank East is a travellers site. The north-east of this zone comprises a large building occupied by Theo's Timber. Both these sites back on to retaining walls adjacent to the River Irk.

2.4 Utilities and drainage

The existing site utilities and drainage have been reviewed by Arup as part of a study to support the submission of a Housing Infrastructure Fund application for Northern Gateway. The study identified maximum utility demands anticipated for the developments within the Red Bank area for electricity, gas, potable and foul water, to determine the likely network requirements required to support the proposed scheme [18]. A report on SuDS drainage has also been developed for the scheme [19].

3 Site History

The history of the site has been summarised below based on historical mapping, aerial photography and satellite imagery. The following information has been reviewed:

- Published Ordnance Survey (OS) mapping dating from 1848 to 1992 obtained from Groundsure [2];
- Aerial photographs sourced from Historic England [6] and
- Satellite imagery from Google Earth.

Review of the data has identified an industrial history dating back to the 1840's. Since the 1840's, the River Irk's flow path has been modified and minor channels infilled, and the north of the site has seen large scale earthworks and raising of ground levels.

3.1 Red Bank North

In 1848, the River Irk meandered into the north east of this zone. A divergent channel, off the River Irk, also flowed through the east/south of this zone, re-joining with the River Irk within Red Bank Central further downstream. In the west of Red Bank North, a small stream ran through the area, from north to south, and two large reservoirs were also present in the west of the zone. The ground level in 1848 appeared to be continuous with the River Irk, and no steep banks were indicated. The Collyhurst Dye Works were located partially within the north of this zone. No rail infrastructure is evident in 1848.

In 1891, there was large-scale re-development of this zone including significantly raised ground levels, resulting in the steep banks running along the southeast of the zone today, and installation of rail sidings, a viaduct and buildings across the entire zone. The River Irk was also diverted to its current alignment (east of the site boundary). Since 1891, development within Red Bank North has included a small gasworks (likely to have been associated with the railway, to produce gas for lighting railway carriages) which included two gasometers shown on the 1906 mapping, and the infilling of the two western reservoirs. By 1992, most of the rail sidings had been removed, and by 2000, all rail infrastructure had been removed. The land is now largely vacant and overgrown.

3.2 Red Bank Central

From 1848 to 2013, Red Bank Central has had a wide variety of industrial uses including: plate works, dye works, chemical works, a metal foundry, glass works, timber works and scrap yards. There is indication of residential properties in the north of this area prior to the 1938 map. The land is now predominantly used for car parking.

3.3 Red Bank South

The zone was already fully developed with unlabelled development on the earliest 1848 map. Since 1892, Red Bank South has been the location of industries including: an oil works, tannery, print/dye works, joinery works, engineering works, iron works and garage. A subway is marked on historical mapping in the 1930s, which appeared to pass under the railway viaduct, but no evidence of this feature is now visible within the site. The site is now occupied by a commercial property and some small businesses occupy the railway arches under Red Bank Viaduct.

3.4 Red Bank East

The site was developed with unlabelled development, possibly residential, on the earliest 1848 map. In 1891, two large gasometers (associated with the nearby Rochdale Road Gas Works) were developed in the west of this zone. These gasometers are indicated on the 1964 map but were no longer shown on 1972 mapping, and the land left vacant until around 2000, at which point it became a travellers site. Residential property and a rope walk occupied the land in the east of this zone until the 1933 mapping, after which a large garage was constructed. This property is now occupied by Theo's Timber.

3.5 Summary of site history for each date of mapping

A more detailed summary of the site history is presented in Table Error**! Unknown switch argument.** below. The mapping with overlaid boundaries of the zone locations is presented in Appendix A:

Table **Error! Unknown switch argument.**: Summary of site history (See Figure 2 for zone locations)

Map	Observations
1848 Ordnance Survey 1:10,560	Red Bank North: mainly comprises fields. The River Irk meanders into the zone in the north, and splits with a minor river running along the southern edge of the zone. The Collyhurst Dye Works is located in the north of the site, to the east of Red Bank North, and Travis Isle Corn Mill is located in the area known as St. Catherine's Wood today. In the south-west of the North zone are unidentified works, with two water bodies. The eastern linear area comprises residential property. Red Bank Central: comprised of small densely packed unidentified buildings, possibly residential and small factories. Red Bank South: comprised of small densely packed unidentified buildings and tanks, possibly tanneries. Red Bank East: comprised of long unidentified buildings, likely to be residential.

Map	Observations
1891 Ordnance Survey 1:10,560	Red Bank North: All but the south of the zone is occupied by rail sidings. A rail turn-table is present in the south of the zone. A large carriage shed is present in the north, and some smaller buildings are present in the south. The River which ran via Travis Isle Mill has been infilled to St. Catherine's Wood. Red Bank Central and South: No data Red Bank East: Two large gasometers now make up the south-west of the site (south-west of Warford Street), labelled Rochdale Road gas works.
1892 Ordnance Survey 1:2,500	Red Bank North, Central and East: No Data Red Bank South: A tannery is located in the south-west of the zone.
1893 Ordnance Survey 1:2,500	Red Bank North: the area is occupied by railway sidings, a large carriage shed and other smaller buildings. In the south of this zone some unidentified buildings are present. Travis Isle Mill, a school and a church are present to the south of this zone, in the area which is now St. Catherine's Wood. Red Bank Central: a dye works and chemical works are located within this zone. Red Bank East: the area of land north of Warford Street is occupied by residential properties. Red Bank South: no data.
1906-1908 Ordnance Survey 1:10,560	Red Bank North: Two small gasometers and a gasworks are shown in the north-eastern corner of the zone. More railway lines have been laid within this zone and a fireproof plate works is located in the far south. The spur is occupied by residential properties. Red Bank Central: The north and east of the zone is comprised of works (fireproof plate works, dye works (labelled as disused), chemical works), the west remains residential. Red Bank South: A large iron works (Union Bridge Iron Works) is labelled to the north of this zone but it is possible the works extend into this zone. Red Bank East: a rope walk is shown behind the residential buildings in the eastern part of this zone. The Gasometers are still shown in the west.
1922 Ordnance Survey 1:2,500	Red Bank North: Few significant changes. Removal of some structures from west of zone, removal of reservoirs and extension to fill platform. Red Bank Central: Demolition of the disused dye works Red Bank South: Removal of former structures within this zone. Red Bank East: Removal of some of housing within the eastern part of this zone.
1931 Ordnance Survey	Red Bank North: Few changes from 1922.

Map	Observations
1:10,250 & 1: 2,500	Red Bank Central: Works have changed and now comprises a metal foundry and glass works. Red Bank South: Several new small structures present. Re Bank East: No significant changes.
1933 Ordnance Survey 1: 10,560 & 1: 2,500	Red Bank South: A joinery works and subway are shown in this area. The Union Bridge iron works is still shown to the north but no longer extends inside this zone. No significant changes in other zones.
1949 Ordnance Survey 1: 2,500	Red Bank North: Few significant changes Red Bank Central: A timber works, Metal Foundry and Glue works are now present. The residential properties have been removed. Red Bank East: The housing has been removed and replaced by a large single building (garage) Gas holders labelled as 'Rochdale Road Gasworks'. Red Bank South: Subway no longer indicated. Two small works, an engineering works and Spring and Axle works present in part of zone.
1952 Ordnance Survey 1:2,500	Red Bank North: Carriage shed no longer present. Red bank Central: An additional structure is indicated in north west of zone. Red Bank East: No significant changes. Red Bank South: No significant changes
1964 Ordnance Survey 1:1,250	Red Bank North: No significant changes. Red bank Central: Former timber yard is now a depot. Crane is situated on former vacant land Red Bank East: No significant changes. Red Bank South: Some additional small structures present.
1972 Ordnance Survey 1: 10,000	Red Bank East: The two large gasometers have been removed and the land left vacant. No significant changes to other zones.
1990 Ordnance Survey 1: 2,500	Red Bank North: the two small gasometers in the north-east of the site have been replaced by a depot.
1992 Ordinance Survey 1: 2,500	Red Bank South: A garage now occupies the zone.
2000 Google Earth Imagery	Red Bank North: All rail sidings have been removed and the area has been cleared. Red Bank Central: Comprises a car park and two buildings. Red Bank South: single building and car park.

Map	Observations
	Red Bank East: The land where the gasometers were located is now occupied by caravans.
2009 Google Earth Imagery	Red Bank North: The south of the area has become densely vegetated. Red Bank Central: a building has been removed and the land made into a car park. Scrap yards are present in the north of this zone.
2018 Google Earth Imagery	Red Bank Central: There are buildings in the south-east and north of this zone. The area is mainly used for car parking, with scrap yards in the north.

4 Ground Investigations

4.1 Historical ground investigation data

The following data has been reviewed and used to inform the ground conditions section of this desk study (see Section 5). The locations of the data points are shown in Figure 3.

4.1.1 BGS borehole records

The BGS holds records of historical boreholes drilled in the area of the site, of which many are confidential and the detail cannot be viewed. However, two records lie within the site boundary itself (both of which are in the Central zone), together with over 20 publicly-available records from the area immediately surrounding the site. These records have been reviewed as part of this desk study. The boreholes were drilled to depths ranging between 4.1 and 117m.

4.1.2 Other investigations

The records of other ground investigations within, or close to, the site have been reviewed, including:

- Planning application 066297/Site Ref. 110 Cheetham Hill Road. Geotechnical Developments (UK) Ltd 1998 Factual Report on Ground Investigation at Cheetham Hill, Strangeways, Manchester, included three records possibly within the boundary of Red Bank South, which confirmed the presence of made ground over alluvial deposits. Bedrock was sandstone. Groundwater was found to contain hydrocarbons. Planning records confirm that hydrocarbon contaminated soils were removed from an area outside the site boundary in 2003 as part of new residential development on Cheetham Hill Road, which may have had a positive impact on groundwater quality within Red Bank South;
- WSPE (2010) Due diligence assessment, Dantzic Street, Manchester. Prepared for Network Rail. The investigation comprised six windowless sampling boreholes up to 6m bgl in the eastern part of Red Bank East (Theo's Timber site). Made ground was encountered over Glacial Till and bedrock of mudstone (Manchester Marl) and sandstone (Collyhurst Sandstone). Three trial pits were also dug on land to the north, locations not specified but possibly in the St. Catherine's Wood area. Note this report identifies that the Theo's Timber building has a basement;
- Planning application 082285 Fairholme caravan park, forms part of the northern boundary of Red Bank North. Made ground was proven up to a maximum of 12.2m, together with elevated methane and carbon dioxide in the ground, believed to be migrating from the adjacent Queens Road Tip landfill;
- Planning application 083788 Irish World Heritage Centre, Queens Road. Investigation of former landfill site (Queens Road landfill) which is located on the northern site boundary. The investigation confirmed made ground up to

10.2m thickness, together with elevated methane and carbon dioxide concentrations in the ground, and hydrocarbon contamination believed to be associated with a former petrol station and garage. A remediation strategy was approved for implementation during construction of the Irish World Heritage Centre, but no record of validation is available.



Figure 3 Locations of BGS boreholes (labelled) and other investigation records

4.2 2019 AEG ground investigation

A ground investigation was undertaken within the site during January 2019 by contractor AEG on behalf of FEC. The investigation was designed to provide information on ground conditions within the site boundary to inform a high-level cost plan for the proposed Northern Gateway development.

The investigation included 37 intrusive locations (as shown in Figure 4 and summarised in Table 2); soil testing, summarised in Table 3; and groundwater monitoring across seven locations between 07/01/2019 and 24/01/2019 (Table 4).

No rotary coring was conducted as part of this work therefore penetration into rockhead was limited. This should be conducted in any further GI stages.



Figure 4: Locations of AEG's 2019 ground investigation

Table 2: 2019 AEG ground investigation summary table

Ground investigation technique	Quantity (Nr)	Installation (Nr)	Maximum Depth (mbgl)	Average depth (mbgl)
Cable-percussion borehole	10	7 (Groundwater)	15	8.1
Trial Pit	21	N/A	5.45	4.9
Window-Sample Borehole	6	N/A	4.5	3.5

Table 3: 2019 AEG soil geochemical testing summary

Geochemical Testing	Samples Tested
Asbestos	56
Metals and metalloids (As, Be, Cd, Cr, Cr (VI), Cu, Hg, Ni, Pb, Sb, Se, V, Zn)	64
Phenol	3
Free cyanide	64
TPH-CWG (aliphatic and aromatic speciation)	59
PAH (US EPA Priority 16)	57

VOC and SVOC	5

Table 4: 2019 AEG groundwater monitoring summary

Monitoring well ID	Monitoring dates	Average GW level (mAOD)
BH101	7th, 8th, 9th, 24th January 2019	38.49
BH102	7th, 8th, 9th, 24th January 2019	Wet at tip
BH103	8th, 9th, 24th January 2019	40.01
BH104	9th, 24th January 2019	33.07
BH105	9th, 24th January 2019	36.15
BH106	9th, 24th January 2019	Dry
BH112	11th, 24th January 2019	Dry

Groundwater levels were only recorded at four locations. All groundwater monitoring wells are in the North, and groundwater depths ranged from 32.64 to 41.66mAOD. These groundwater levels may represent perched water and therefore subsequent GI installations and monitoring over a range of isolated depths is recommended.

5 Ground Conditions and Environmental Setting

5.1 Geology

The following sources of information have been reviewed:

- British Geological Survey (BGS) GeoIndex online viewer
- Groundsure GeoInsight report [3] which included 1:10,000 and 1:50,000 geological maps;
- BGS map sheet SJ89NW [7];
- Historical ground investigation data and reports from the planning portal, and
- AEG's 2019 ground investigation data.

5.1.1 Superficial deposits

The 1:10,000 scale geological map indicates that Glacial Till underlies the site in the area south-east of the River Irk and along the north-western site boundary. Although not indicated, it was assumed that alluvial deposits are found in association with the River Irk running NE-SW through the centre of the site.

The 2019 ground investigation identified Glacial Till in the north and west of the site. The Glacial Till was thickest in the north and pinched out towards the south west. Glacial Till was generally absent south of the River Irk, with made ground directly overlying bedrock. Alluvium was encountered in St. Catherine's Wood and other locations located close to the River Irk.

5.1.2 Solid geology

The bedrock varies from east to west across the site, which has also been proven with available ground investigation data. The Chester Pebble Beds Formation makes up the west of the site; The Manchester Marls Formation makes up the centre of the site; and the Collyhurst Sandstone Formation makes up the north-eastern corner of the site [7]. All three units are shown on mapping to be gently dipping (5 degrees) SSW although there is insufficient GI available to confirm this.

A fault, trending NNW-SSE, cuts across the centre of the site, within the Manchester Marl Formation. The BGS map indicates that this is a normal fault, downthrown to the west, with limited displacement.

5.1.3 Coal mining

A Coal Authority mining report was obtained for the entire Northern Gateway area from Groundsure [3]. This reports that the site is within an area affected by past coal mining at depth, with the last date of working being 1967. The depth to the worked seams is quoted as between 110m and 970m, but within the Red Bank

area specifically, data from other sources [14] indicates that the depth to worked seams is around 300m to 700m. No mine entries are recorded within the site boundary and no historical shallow mineworkings.

5.1.4 2019 AEG ground investigation

In January 2019, AEG completed a ground investigation within the Red Bank area (summarised in Table 2 above). The ground conditions from the 2019 investigation have been summarised in Table 5 below. It should be noted that differentiation between Alluvium, Glacial Till deposits, and weathered bedrock proved challenging and multiple lithologies were often logged for single strata (refer to factual report presented in Appendix B).

Table 5: Ground conditions summary (from 2019 ground investigation)

Stratum	Thickness (range) (m)	Typical thickness (m)	Top of strata (mbgl)	Description and distribution
Made ground	0.8 – 10	3.3	0	Grey brown fine to coarse sand and gravel with high cobble contents. Includes sandstone, limestone, concrete, brick and clinker.
Alluvium	0.5 – 6.2	2.5	2.4	Soft brown very sandy slightly gravelly clay. Gravel is firm to medium sub-rounded sandstone and mudstone Located adjacent to the River Irk, in St. Catherine's Wood and in Central. Also present in the south-west of North.
Glacial till deposit	0.5 – 3.9	2.4	2.5	Firm brown very sandy slightly gravelly clay with interbeds of sand. Located in North and Central, pinching out towards the south-west. Generally absent south of the River Irk, expect at high elevations (e.g. in the west of New Town)
Bedrock	Not proven	N/A	4.8 – 10.8	Chester Pebble Beds Formation: Very weak to weak red fine to coarse grained partially weathered sandstone Manchester Marl Formation: Extremely weak red brown slightly sandy calcareous mudstone Collyhurst Sandstone Formation: Extremely weak to very weak red fine to coarse grained sandstone with occasional lenses of red marl

				Generally, ~5mbgl. Found at >10m depth in the south-west of Red Bank North.

As can be seen in Table 5 and Figure 5 there is significant variation across the site. Made ground thickness was found to be highly variable, with a maximum thickness of 10m (in the south-west of Red Bank North). The 2019 ground investigation indicates that the entire site is likely underlain by made ground.

Alluvial deposits comprised of sandy gravelly clay have been found in association with the River Irk in St. Catherine's Wood and the south-west of North. They are typically 2.5m thick and found at 2 – 3mbgl.

Glacial Till is extensive across the north and west of the site. It is typically 2.4m thick and found at 2.5mbgl. It has a limited lateral extent and pinches from NE to SW, becoming absent south-west of Central. South of the River Irk it was only identified at high elevations in the west of New Town.

Three lithological units comprise the bedrock across the site. The depth to bedrock was identified to be between 4.8 – 10.8mbgl but is typically ca. 5mbgl. The upper layer of the bedrock was found to be highly weathered.

Two indicative cross sections indicating a summary of the inferred geology are shown in Figure 5.

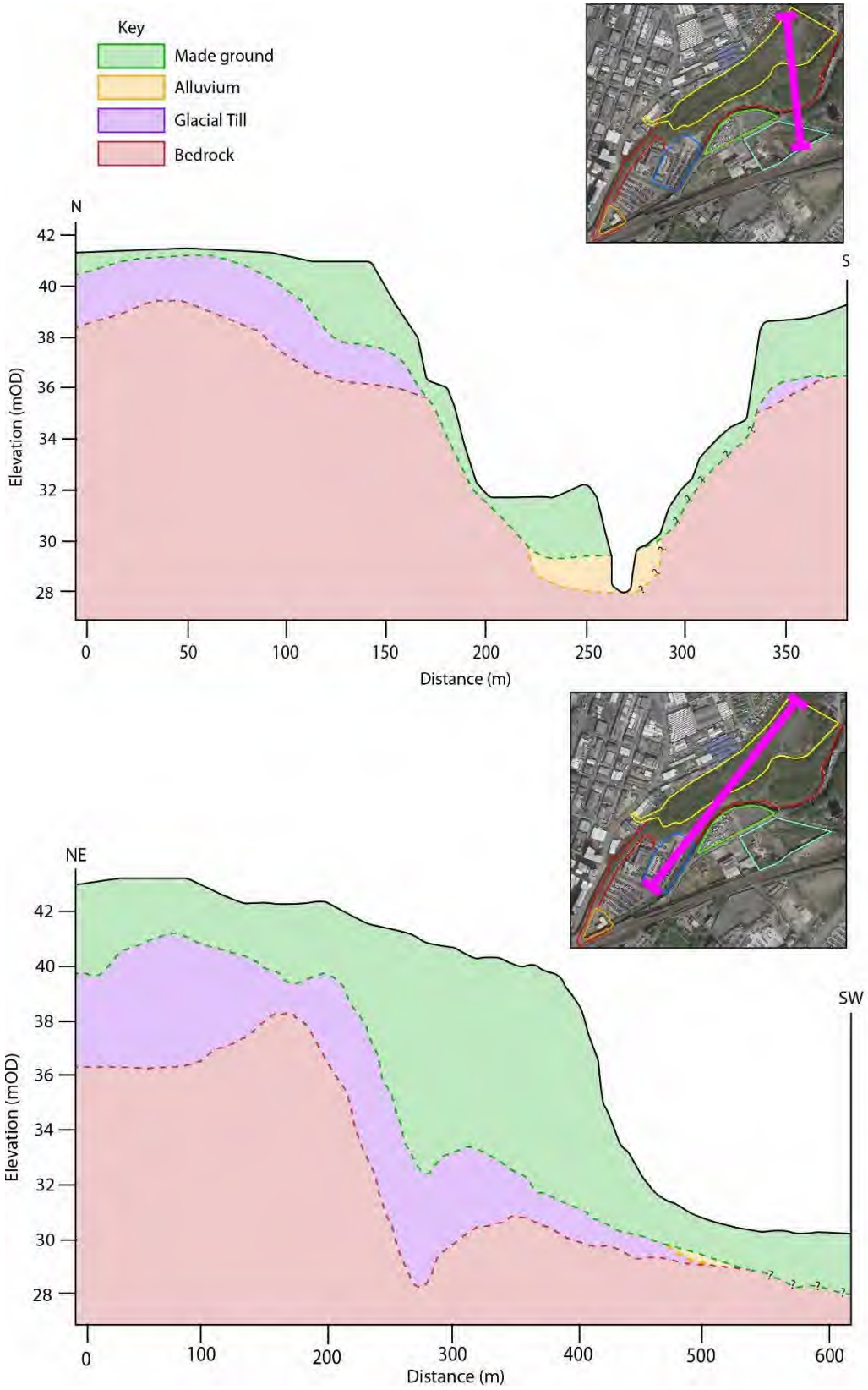


Figure 5: Inferred geological cross sections across the Northern Gateway site. Top image: N-S orientation, Bottom image: NE-SW orientation.

5.2 Hydrogeology & hydrology

The superficial geology within the site is classified as a Secondary (A) Aquifer (Undifferentiated). There is small area in St. Catherine's Wood which is classified as a Secondary (A) Aquifer (Permeable layers), associated with Alluvial deposits. Secondary Aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The Manchester Marl bedrock is classified as a Secondary (B) Aquifer – Lower Permeability Layers, whereas the Chester Pebble Beds Formation and Collyhurst Sandstone Formation are classified as Principal Aquifers. Principal Aquifers are defined as geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

No Source Protection Zones are located within 500m of the site. Four abstraction wells are present within 500m of the site (to the west).

5.3 Flooding

The Red Bank Central, South, and East zones are within a Zone 2 Floodplain, and the land immediately adjacent to the River Irk is a Zone 3 Floodplain.

A hydraulic modelling exercise for the proposed development has been undertaken by Arup [15] which has identified that Scotland Street weir, located outside the south-west of the site, acts as a flow limiting location during flooding, causing flooding upstream. It was recommended that the weir be removed and the river bed level regraded along a 460m stretch upstream of the weir, to protect against flooding.

5.4 Environmental permits & incidents

There are nine on-site locations with existing licensed discharge consents (sewage discharge) along the River Irk. There are further discharge consents (sewage discharge) along the River Irk within 250m of the site boundary. There are multiple recorded pollution incidents (involving asbestos) on Honey Street, immediately north of the site boundary.

5.5 Landfills

5.5.1 Queens Road Tip

Queens Road Tip immediately borders the Red Bank North zone. The Queens Road Tip site was originally excavated for brick making, then a planning consent was granted in 1948 for private tipping on the site. Manchester Council acquired the site in 1954 for domestic tipping purposes. The site was permitted to receive inert, industrial, commercial, household, special and liquid sludge waste.

Landfilling by Manchester Council was carried out between 1960 and 1972, with a reported depth of tipping up to 45 feet (13.7m).

Site investigations carried out for planning application 082285 (Fairholme caravan park) and 083788 (Irish World Heritage Centre) proved made ground up to a maximum of 12.2m, together with elevated methane and carbon dioxide in the ground [14].

5.5.2 Sand Street landfill

Sand Street landfill is located approximately 50m east of the site boundary and was part of a former quarry filled before 1974. The nature of the fill placed within the landfill is not known, but reportedly the made ground has a maximum depth of 22m [14]. The land was later used for industrial purposes and remediation carried out for use of the site as public open space included the installation of a cut-off trench and topsoil capping.

5.5.3 Fitzgeorge Street landfill

This landfill is located approximately 150m east of the site boundary. The landfill was completed prior to 1974 and no details of the waste type are known. The site is now used as public open space [14].

5.6 Unexploded Ordnance (UXO)

A preliminary UXO risk assessment report was obtained for the site and was prepared by Dynasafe BACTEC Ltd [8]. The report indicates that as Manchester was a bombing target during WWII the entire of Manchester, including the site, potentially has a medium UXO risk.

A similar medium UXO risk was identified from the online UXO risk map provided by Zetica [9]. The Zetica risk map also identified two Luftwaffe bombing targets onsite, the large historical gasometers in Red Bank East, and the land in Red Bank Central. A map of recorded bomb damage in Manchester [10] shows seven recorded bomb strikes within the site boundary, five of which are concentrated on the gasometers formerly present in Red Bank East, off Dantzic Street. Given the heavy industrial usage of the site pre war and the proximity to Victoria Station the areas are very likely to have been targeted and there is the potential for further unrecorded strikes having taken place.

A detailed, site-specific risk assessment was carried out by Zetica in line with CIRIA C681 for the entire Northern Gateway area [16], which identified the site to be at low risk of UXO. This is lower than would be expected for a site of similar history and further clarifications should be sought from the specialist.

5.7 Archaeology and heritage features

A high level archaeological appraisal was carried out for the entire Northern Gateway area in December 2017 by Orion Heritage Ltd [17]. The report concluded that the potential for significant archaeological remains within the site

is low and the potential for remains pre-dating the Post-Medieval period is low. There is potential for localised survival of below-ground remains relating to the Post-Medieval and earlier Modern periods.

The report identifies two HER records that in the 1890s, two dome-shaped caves or chambers were identified in Hargreaves Street, in a plot previously occupied by W. Clemson & Company (located in the Central zone). A local antiquarian interpreted the remains as prehistoric caves.

6 Development Assumptions

6.1 Summary of development proposals

The current masterplan for the site comprises a mixture of high-density residential properties and soft-landscaping. The current plan identifies six development plots within Red Bank North (01 to 05b), two within Red Bank Central (06 and 07), one within Red Bank South (10) and two within Red Bank East (16 and 17).

St. Catherine's Wood and the existing steep slope that forms the southern boundary of Red Bank North is proposed to remain as a vegetated/wooded area. The existing disused Red Bank viaduct along the south-western site boundary is to be developed into a high level walkway with soft landscaping. Figure 6 outlines the proposed masterplan below.



Figure 6: Proposed masterplan. Each development zone is split into sub-plots. The site areas outside of the defined development zones are to be developed into a park and walkways with soft landscaping.

Parts of the site close to the River Irk lie within a flood zone. Current development proposals include the removal of the weir at the southern end of the site (known as Scotland Weir) and reducing river bed levels upstream, in order to alleviate flooding upstream of the weir.

7 Geotechnical Considerations

7.1 Approach

This section presents a high-level summary of geotechnical constraints and ground-related hazards that have been identified as a result of reviewing the desk-based information available for the site. This section should be read in conjunction with the geotechnical constraints drawing (Drawing 2). Note that due to the density of historical developments, site wide constraints such as historical buildings and foundations are not indicated on this drawing.

7.2 Buried obstructions

Given the past usages of the site including heavy and light industry, rail and residential properties there is a high potential for the presence of buried obstructions. These include:

- Former rail infrastructure located in Red Bank North. Rail sleepers and foundations for a historical railway turn-table were encountered during the 2019 ground investigation. Below-ground structures may be present associated with the former gasworks and carriage works within this zone;
- Former basements/cellars associated with historical residential and industrial buildings;
- Structures associated with the former course of the River Irk and divergent water courses, e.g. retaining walls, weirs, basins, and former bridge and foundations which may have been filled and/or build over;
- Redundant utilities;
- Made ground which may contain demolition rubble and large boulder sized obstructions of concrete and former brick structures.

These types of obstruction, if not dealt with prior to development, would have a significant impact on the ability to construct piled foundations, retaining walls and substructure for new developments as well as forming hardspots for new building slabs and external pavements and roads.

It is recommended that this risk is mitigated as part of an Enabling earthworks/remediation works.

7.3 Voids

A review of the available site information indicated the potential for voids resulting from uncontrolled backfill of historical below ground structures, for example basements to former industrial buildings, former gasholder bases and chimneys (Red Bank North and East), a former subway in Red Bank South, infilled water bodies and the former channels and streams which ran through Red Bank North in the 1800s.

It should be noted that the existing Theo's Timber building (Red Bank East) is reported to have a basement and the Archaeological Appraisal report [17] mentions that prehistoric caves were found on land off Hargreaves Street (Red Bank Central).

Is hasn't been possible to inspect the existing basement to Theo's to determine its extent and general condition. This should be surveyed such that its included in any earthworks volumetric assessment and a suitable foundation removal strategy developed.

Voids resulting from poor historical backfilling may result in instabilities during excavation and the potential for these features within made ground means this stratum is unlikely to be suitable for founding shallow foundations, and potentially even external works, without some form of treatment such as excavation/replacement.

Further investigation of potential voided ground would need to be conducted prior to development. The investigation could include probing or non-intrusive surveys (e.g. geophysical surveys) to provide greater certainty in relation to the nature and extent of the voids to determine mitigation requirements.

Remediation methods could include excavation and replacement with compacted suitable engineering fill or grouting of the voids where these are at depth.

Where voided ground straddles the phasing areas it would be preferable to undertake the remediation concurrently on both sides of the phasing line.

7.4 Tunnels and culverts

The River Irk was culverted by 1906 in the south-western tip of the site and runs beneath the rail viaducts. The Irk is within sections of both closed culvert and open channel along the southern edge of the site. The southern edge of the channel is adjacent to a live Network Rail viaduct and MCC land.

There is currently no information available on the structure and foundations of the existing Network Rail viaduct and Irk culvert although searches are ongoing with Network Rail.

Further intrusive investigation may be needed to confirm the existing geometry of these elements and inform a structural analysis to determine the impact of any new development on these NR and MCC assets.

Mitigation measures may be required to reduce the impact of the new development and provide further stabilisation to the river walls and other adjacent structures.

A subway, present on historical mapping until 1938, also runs beneath the south-western tip of the site. It is unknown whether this feature is still present on site or if it has been infilled. Further searches should be carried out by Network Rail and intrusive GI conducted to confirm the presence and condition and allow remedial works to be developed.

7.5 Soft ground

Some areas of the site, such as St. Catherine's Wood, are underlain by alluvium/ soft superficial deposits. Soft deposits may also exist within the areas of the infilled reservoirs and the former river Irk channel (1848 map). Made ground may also contain soft spots where historical compaction has not been to a controlled specification. These materials are unlikely to provide sufficient strength for shallow building foundations and potentially are unsuitable for external works without some form of treatment/ground improvement. Without ground improvement or earthworks to an appropriate performance specification, ground floor slabs are likely to be required to be designed as suspended rather than ground bearing.

7.6 Shallow rockhead

The depth to bedrock is generally found at ca. 5mbgl. However, bedrock was encountered at depths up to 10mbgl in the Red Bank North area of the site, where ground levels are high. The ease of excavation of the bedrock is determined by the degree of weathering and cementation, strength and discontinuity spacing. All three bedrock lithologies were found to be extremely weak to weak within their shallow highly weathered surfaces (top 2 metres). Therefore, excavation using typical excavation plant is likely to be possible, but this assumption should be validated by a further ground investigation which should include rock coring and detailed logging.

The shallow rockhead could present opportunity in relation to the foundations to buildings but may restrict the use of driven sheet piles which may be required for temporary works.

7.7 New foundations

Given the historical uses of the site and the likely magnitudes of loads from the proposed development it is unlikely that shallow foundations will be suitable for anything other than lightweight ancillary structures which are insensitive to ground movements.

The use of bored piles, either conventional bored or Contiguous Flight Auger (CFA) is recommended, with pile lengths socketed in to the underlying bedrock.

Further investigation to include rotary coring of the bedrock and detailed logging will be required in order to inform the foundation design at each plot location.

The pile installation will require the building areas to be largely de-obstructed and free of any significant voids. The Conventional Bored pile method is more adept at dealing with unforeseen obstructions in the ground but is more expensive than the CFA method.

Initial discussions should be held with experienced piling contractors following further intrusive GI to assist in the development of an outline design for the site and construction advice for cost plan purposes.

Given the thickness and variability of the Made Ground deposits, the use of suspended floor slabs should be assumed. It may be possible to develop engineered fill platforms which would facilitate ground bearing slabs of low to moderate capacity as part of an earthworks/remediation phase in advance of plot development.

7.8 Steep slopes and retaining walls

Bounding the southern edge of Red Bank North are steep slopes. In addition, slopes are also present along part of the northern edge of Red Bank North. These slopes are assumed to be comprised of made ground, placed to form the railway sidings area. Some of these slopes appear of an unnatural angle and may not be suitable for any new loading regime placed by the proposed development. In addition, the slopes are highly vegetated and this vegetation may be enhancing the existing stability and cannot be relied upon long term.

The stability of the slopes needs to be assessed following future ground investigations.

Retaining walls are present along the northern edge of Red Bank North and along the majority of the River Irk. The geometry and founding levels of these structures in unknown. The stability of these retaining walls needs to be assessed following future ground investigations.

7.9 Groundwater

During the 2019 ground investigation four monitoring wells, all located in Red Bank North, recorded groundwater at depths ranged from 32.64mOAD (8.95mbgl) to 41.66mAOD (0.91mbgl). Given the large range of values within a small area, it is likely that some of these values represent perched water. Details of the groundwater monitoring can be found in Table 4**Error! Reference source not found.**, and in Appendix B.

Groundwater can have a significant impact on earthworks and excavations and further installations and monitoring will be needed as part of any future intrusive ground investigation to allow the ground water to be better understood and any ground water control measures to be developed.

7.10 Earthworks balance and phasing

7.10.1 Cut and fill balance

The proposed development levels for the site are not known at present, however it is likely that some cut and fill will be required to create the final landform.

Changes in levels will result in a requirement for either importation of new engineered materials, on site reuse or off-site disposal, all of which have cost implications for a development of this size.

A topographical 3D survey should be conducted to replace/update the current LIDAR ground surface model.

7.10.2 Earthworks phasing

Phasing the development may lead to inefficiencies and costs associated with undertaking earthworks in small areas. This may include:

- Reduced flexibility for reusing potentially suitable fills resulting in additional offsite disposal or import of suitable fill materials.
- The need for additional temporary earthworks batters or retaining structures at the edges of plots.

Materials which are to be re-used or imported materials will need to be suitable from both a geotechnical and geoenvironmental perspective.

Given that it is likely that site levels will be altered, temporary retaining structures may be required to form the final site levels while maintain adjacent existing site levels.

7.11 Easements and party wall

There are potentially sensitive structures within and adjacent to the site which are likely to have specific easements. These include the two Network Rail viaducts as well as existing retaining walls with adjacent properties. Party wall issues may also need to be resolved which may result in additional costs and implications to programme whilst solutions are agreed.

Working adjacent to these structures may affect ground investigations, foundation design/construction and earthwork activities.

7.12 Archaeology

There is potential for archaeological interest in parts of the site, which may result in delays during earthworks and additional costs associated with surveys. The details of any intrusive investigations or mitigation measures will be covered in a separate archaeological desk study report, in preparation.

7.13 UXO

Preliminary UXO risk assessment provided by Groundsure suggested there was a medium risk of encountering UXO at the site. This may impact on below ground construction activity including ground investigation (boreholes and probe holes, trial excavations), utility trenches, excavations for earthworks and foundations and piling.

However, a detailed risk assessment carried out by Zetica in line with CIRIA C681 for the entire Northern Gateway area identified the Red Bank site to be at low risk of UXO. The Zetica assessment reported an estimated bomb penetration

depth on average between 4m and 8,5m, depending on the weight of the bomb. They recommended the following mitigation measures:

- Industry good practice is to raise the awareness of those involved in excavations so that in the unlikely event that a suspect item is discovered, appropriate action is taken. This can be achieved through UXO awareness briefings to staff, and
- Clearance certification for borehole or pile locations is only prudent if a zero tolerance to risk is adopted.

Further clarification should be sought from Zetica in relation to the UXO risk.

7.14 Utilities

Existing utilities present a constraint to the development in some areas of the site. Diversion and protection works will be needed in advance of earthworks and remediation.

The site utilities and drainage have been reviewed by Arup as part of a study to support the submission of a Housing Infrastructure Fund application for Northern Gateway. The study identified maximum utility demands anticipated for the developments within the Red Bank area for electricity, gas, potable and foul water, to determine the likely network requirements required to support the proposed scheme. A sustainable urban drainage strategy report has also been prepared for the study area.

7.15 Vibration

Network Rail should be consulted in relation to works conducted close to their assets (including the viaducts) as vibration limitations are likely to be stipulated and will require monitoring.

8 Conceptual Site Model

8.1 Introduction

The Environment Agency has developed guidance that defines the approach for assessing and managing land affected by contamination (CLR11) [12]. The guidance presents a procedure to assess whether land is suitable for use. One of the key requirements in assessing this is the conceptual site model. A conceptual site model (CSM) is a method of describing the linkages between potential sources of contamination and receptors at a site. The conceptual model considers the interaction of contaminants in the natural environment and transport in media including soil, groundwater and air. The linkage between a potential source of contamination and a receptor is considered in the CSM and a risk exists and requires further investigation only if a complete pollutant linkage is identified.

8.2 Sources of contamination

Potential sources of site-based contamination are principally associated with historical land uses which may have resulted in contamination. The primary potential contamination sources within the site boundary are rail sidings (in Red Bank North), historical works (in Red Bank Central, South and East), gasworks and gasometers (in Red Bank North and East). Potential sources external to the site include the former Queens Road Tip landfill and Sand Street landfill. A summary of the contamination potential is in Drawing 1.

Ground investigations have identified that made ground is present across the site, which was found to contain various materials such as clinker which may be potential sources of contamination with chemicals such as heavy metals, inorganics and polycyclic aromatic hydrocarbons (PAH). Asbestos was identified within a few soil samples. The Department of Environment (DoE) Industry Profiles [11] were used to identify potential contaminants associated with historical land uses. The potential sources of contamination are summarised in Table 6 below.

Table 6: Potential sources of contamination

Potential Source	Potentially Contaminative Materials	Comments
Made ground from site historical site operations including: Rail sidings [1] Historical works [2,3,4,5,6,7] Gasworks and gasometers [8]	Organic compounds Metals and metalloids including lead, arsenic, mercury, nickel, copper, zinc, and iron Asbestos PAHs Total petroleum hydrocarbons (TPH) including lubricating oils, heating oils, petrol and diesel range organics Solvents (VOCs and SVOCs) Cyanide (free and complex) Phenol Extremes of pH	The ground investigation identified material such as clinker in the made ground. Asbestos was identified at TP105, TP120, TP125, TP126, TP127, BH110, WS104 and it may also be present in other areas of contaminated soil not yet identified Hydrocarbon odours were noted in TP101, TP120, BH103, WS106 (Table 10). WS106 was drilled through a former gasholder in Red Bank East. Further contamination is evidenced in Table 9. Works include: chemical works, dye works, oil works, engineering works, garage, glass works, metal works, printing works, tannery, and timber works
Historical demolition rubble in made ground	Asbestos	Previous buildings within the site boundary may have contained asbestos, which may have become of the made ground during demolition
Perched groundwater within made ground/relic structures Leachate from adjacent landfill sites (predominantly Queens Road Tip landfill)	Potential for leachable contaminants from made ground	No leachate data is available It is recommended that soil leachate tests are included within the scope of subsequent ground investigations to investigate this
Made ground containing degradable materials Former landfill sites (offsite, including Queens Road tip, Sand Street landfill and Fitzgeorge Street landfill)	Hazardous ground gases (methane, carbon dioxide, hydrogen sulphide, carbon monoxide)	No gas data is available within the site boundary, but monitoring carried out at Queens Road Tip on the northern site boundary indicated elevated methane and carbon dioxide concentrations. It is recommended that gas monitoring is undertaken in subsequent ground investigations to assess the gas risk.

DoE Industrial Profile document titles:

[1] Railway Land

[2] Chemical works – coatings, paints and printing inks manufacturing works

[3] Timber treatment works

[4] Timber manufacturing works

[5] Road vehicle fuelling, service and repair – garages and filling stations

[6] Metal manufacturing, refining and finishing works – iron and steel works

[7] Textile and dye works

[8] Gas works, coke works and other coal carbonisation plants

8.3 Receptors

Receptors both during construction and after completion of the development include:

- Construction workers;
- Future site users (residents, public);
- Groundwater within Chester Pebble Beds Formation, Collyhurst Sandstone Formation (Principal Aquifers) and Manchester Marls, alluvium (Secondary Aquifers);
- River Irk;
- Buried structures, buildings and services;
- Plants in new soft landscaped areas.

8.4 Pathways

Potential pathways that may be present during redevelopment and operation include:

- Human health – ingestion of soils and dust;
- Human health – inhalation of dust, vapour, fibres or ground gas;
- Human health – dermal contact with soils;
- Controlled waters – migration of dissolved or free phase contamination within groundwater (preferential flow paths may exist such as abandoned drainage channels);
- Ground gas – ingress of ground and landfill gas into the buildings
- Building and services – building materials such as concrete and plastic pipework may be subject to attack by aggressive ground conditions, where present.

8.5 Plausible pollutant linkages

8.5.1 Human Health

The development includes the construction of new high density residential properties, together with external landscaping and car parking. Based on the current proposals, human contact with soil is likely in landscaped areas.

The construction phase will include cut and fill earthworks to create the required development platforms. During this phase dermal, inhalation and ingestion pathways will be present to construction workers and site neighbours.

Pathways present post-construction include dermal, inhalation and ingestion pathways between future site users and near surface soils.

8.5.2 Controlled waters

There is a potential for pathways to exist between any mobile contaminants in the made ground and groundwater, as made ground has been noted to directly overlie bedrock or alluvium in some areas of the site (Red Bank South, Central and East). However, Glacial Till, typically 2.4m thick, covers much of the site and therefore may act as an aquitard preventing this pathway in some areas (e.g. in Red Bank North).

Two former landfill sites, Queens Road Tip and Sand Street landfill, are present to the north and east of the site boundary, which may be potential sources of contaminated groundwater entering the site, assuming groundwater flow is towards the River Irk.

The River Irk runs through the site and therefore a potential pathway exists between contaminants and the river, particularly any contaminants released during construction e.g. from accidental spillages or runoff from stockpiles.

The primary controlled waters receptors within the site are considered to be the River Irk and the principal aquifers in the sandstone bedrock.

8.5.3 Planting

Plants being grown in new soft landscaping areas may be at risk of phytotoxicity from any contamination present within the soil or groundwater via root uptake of dissolved contaminants or leaf uptake of vapours.

8.5.4 Building materials and services

A potential pollutant linkage exists between below-ground building materials such as water pipes and concrete foundations and areas of contamination within the made found. All buildings also have a potential for ground gas ingress.

8.6 Summary

A summary of the plausible pollutant linkages requiring assessment in relation to the site is presented in Table 7 and Table 8 below:

Table 7: Potential pollutant linkages during construction

Source		Pathway		Receptor	Linkage?
Made Ground (containing solid contaminants, asbestos fibres and possible hydrocarbons)	→	Dermal contact	→	Construction worker	Yes
		Ingestion of soil/ soil dust	→		Yes
		Inhalation of soil vapour	→		Yes
		Inhalation of soil and soil dust	→	Construction worker	Yes
			→	Site users and neighbours	Yes
	→	Leaching and runoff	→	Surface water drainage	Yes

Source		Pathway		Receptor	Linkage?
Temporary stockpiles of excavated arisings Accidental leaks and spills during construction			→	River Irk	Yes
		Leaching and infiltration	→	Principal aquifers in bedrock River Irk	Yes
Impacted shallow groundwater, including groundwater entering the site from landfill to the north	→	Dermal contact	→	Construction worker	Yes
		Ingestion	→	Construction worker	Yes
		Lateral migration	→	River Irk	Yes
Ground gases/landfill gases	→	Ingress and accumulation of toxic, asphyxiating or explosive concentrations within excavations	→	Construction worker in deep trenches and chambers	Yes

Table 8: Potential pollutant linkages during operation

Source		Pathway		Receptor	Linkage?
Made Ground (containing solid contaminants and possible hydrocarbons from historical spills)	→	Dermal contact	→	Future site user in soft landscaping areas only Pathways broken where hard surfacing and buildings present	Yes
		Ingestion of soil/ soil dust	→		Yes
		Inhalation of soil vapour	→		Yes
		Inhalation of soil and soil dust	→		Yes
		Leaching and infiltration	→	Principal aquifers River Irk	Yes, where Glacial Till absent
		Direct contact	→	Buried structural concrete	Yes
			→	Potable water supply pipes	Yes
Impacted shallow groundwater, including groundwater entering the site from landfill to the north	→	Dermal contact	→	Future site resident	No
		Ingestion	→	Future site resident	No
		Direct contact	→	River Irk	Yes

Ground gases/landfill gases	→	Ingress and accumulation to toxic, asphyxiating or explosive concentrations within buildings	→	Future site user Building structures	Yes

9 Environmental Risk Assessment

9.1 Introduction

Several plausible pollutant linkages have been identified at the site (Section 328). An environmental risk assessment has been undertaken for each of the receptors for which a plausible pollutant linkage has been identified. The process outlined in the CLR11 guidance [12] follows a tiered approach to assessing risk which begins with an initial screening assessment known as a generic quantitative risk assessment (GQRA). The GQRA makes use of published assessment criteria and when a soil/ groundwater concentration exceeds the screening value then further consideration is required. The GQRA is presented in the following sections.

The potential environmental risks have been considered in the context of a conceptual source-pathway-receptor (SPR) model of the site. A preliminary evaluation of the level of risk to each receptor from the identified plausible pathways and the level of mitigation that would be required for the proposed academic development is also provided.

Only data from the 2019 GI was included in the assessment.

9.2 Human Health

9.2.1 Assessment

A human health risk assessment has been undertaken in accordance with the Environment Agency Contaminated Land Exposure Assessment (CLEA) framework. The CLEA software estimates human exposure to soil contaminants for those potentially living, working and/or playing on contaminated sites over long-time periods (chronic exposure). A detailed account of the risk assessments carried out for the site are presented in Table 9 and Appendix C.

The soil chemical data was screened against generic assessment criteria (GAC) appropriate for residential developments (without plant uptake), which is considered appropriate for the proposed developments discussed in this report. The average soil organic matter (SOM) found across the site was found to be 14.65% and therefore generic assessment criteria at 6% SOM were used for screening. The high SOM value may derive from high quantities of coal present on site. A summary of the Soil GAC exceedances is presented in Table 9 below.

During the GI, evidence of contamination was noted. A summary of olfactory evidence is summarised in Table 10.

Table 9: Summary of Soil GAC exceedances identified from the 2019 ground investigation

Contaminant	GAC	Units	Total > LOD	Total > GAC	Max Conc.
Asbestos (Presence of)	Presence	mass %	7 of 56	7	<0.001%
Mercury	13.6	mg/kg	46 of 64	1	18

Contaminant	GAC	Units	Total > LOD	Total > GAC	Max Conc.
Arsenic	39.9	mg/kg	64 of 64	6	71
Beryllium	1.72	mg/kg	62 of 64	13	3.9
Lead	310	mg/kg	64 of 64	15	12000
Dibenz(ah)anthracene	0.32	mg/kg	18 of 57	2	2.4
Naphthalene	13.2	mg/kg	25 of 59	1	18
Benzo(b)fluoranthene	4.06	mg/kg	39 of 57	2	17
Benzo(a)pyrene	3.23	mg/kg	35 of 57	2	17
Benzo(a)anthracene	15	mg/kg	38 of 57	1	19
Dibenzofuran	3.23	mg/kg	2 of 3	1	8.3

The 2019 investigation encountered olfactory evidence of contamination in four locations. These are summarised below:

Table 10: Olfactory evidence encountered during the 2019 investigation

Hole ID	Depth	Occurrence type
BH103	0.1 – 1.3	Hydrocarbon odour (within former railway sidings)
WS106	2.8	Hydrocarbon (benzene) odour (within former gasholder base)
TP101	0.8 – 0.9	Slight hydrocarbon odour (within former railway sidings)
TP120	0.7 – 1.8	Strong hydrocarbon odour (within former engineering works)

9.2.2 Evaluation – Construction phase

A plausible pollutant linkage was identified in the conceptual model relating to construction workers and site users (direct contact/ingestion and inhalation) as excavation and re-use of made ground is to be undertaken.

The 2019 ground investigation provided a high-level overview of the ground conditions and it is possible that areas of contamination may exist which have not yet been identified. Mitigation measures will be required to deal with the potential for encountering unidentified contamination during construction.

It is recommended that specific precautions are taken during any future earthworks to reduce potential exposure to potentially contaminated soils in accordance with the principle of ‘as low as reasonably practical’ (ALARP). This would include appropriate briefings, dust suppression and protective equipment (PPE). Risk assessments to protect construction workers and the use of good construction practices will be required.

Assuming that appropriate mitigation measures are implemented during construction, it is assessed that the risk of harm to construction workers and neighbours can be reduced to acceptable levels.

9.2.3 Evaluation – Operational phase

The soil screening assessment identified several metal and PAH exceedances which pose an unacceptable risk to future site users. Asbestos contamination may pose a potential risk to the health of future site users if present in soils exposed at the surface.

Given that soil exceedances are present on site, it is recommended that a subsequent ground investigation is undertaken to assess the made ground in greater detail. Following this ground investigation, the data will be reassessed, and a detailed quantitative assessment will be undertaken if chemical exceedances persist.

Assuming that appropriate mitigation measures are implemented during construction, it is assessed that the risk of harm to human health during operation will be negligible.

9.3 Controlled waters

A plausible pollutant linkage was identified between surface run-off from stockpiles, or surface spillages during construction and the River Irk. This remains a potential risk and all materials will need to be managed to ensure that soil or other construction materials are not washed directly into the River Irk.

Another plausible pollutant linkage is between leached soil contaminants in shallow groundwater and the principal aquifers where Glacial Till is absent, and the River Irk. It is noted that groundwater quality entering the site from the north and east, from the former Queens Road Tip and Sand Street landfills, may be impacted by landfill leachate. To assess this risk, groundwater quality monitoring is required as part of future ground investigation.

9.4 Ground gas

No gas monitoring data is available and hence no gas risk assessment could be undertaken. Thick made ground deposits, particularly those with a significant degradable content, can be a potential source of ground gas.

In addition, the adjacent Queens Road Tip landfill, which immediately borders the site to the north, and Sand Street landfill which is close to the eastern part of the site, may be potential sources of landfill gas that could pose a risk to the proposed development. Within subsequent ground investigations it is recommended that the gas regime is assessed across the site, including the potential migration of landfill gas from adjacent sites.

9.5 Soft landscaping

9.5.1 Assessment

A plausible pollutant linkage was identified between existing site soils and plants in future landscaping areas. The risk to vegetation planted in soft landscaped soil

materials derived from site won materials has been assessed, based on the guideline values in the 1998 MAFF document "The Soil Code" [13].

The Soil Code values are pH dependent. The average pH across all samples was 8.4. Screening values relating to this pH were used and several exceedances were found. A summary of the exceedances is presented in Table 11 and the complete assessment is in Appendix D.

It is also possible that areas of contamination may exist which have not yet been identified. Mitigation measures will be required to deal with the potential for encountering unforeseen contamination during construction.

Table 11: Summary of phytotoxic soil chemical exceedances

Contaminant	Soil Code guideline value	Units	Number of samples	Number of exceedances	Maximum value
Zinc	300	mg/kg	64	7	1700
Mercury	1	mg/kg	64	5	18
Cadmium	3	mg/kg	64	1	4.7
Chromium	400	mg/kg	64	0	48
Copper	200	mg/kg	64	11	4200
Lead	300	mg/kg	64	15	12000
Nickel	110	mg/kg	64	0	53
Selenium	2	mg/kg	64	0	1
Arsenic	50	mg/kg	64	2	71
pH	-	-	64	0	11.7

9.5.2 Evaluation

The assessment has identified that site-won material may not be suitable to be re-used in the proposed soft landscaping areas without further treatment. Imported clean topsoil may be required in soft landscaping areas.

9.6 Buried structures and services

A concrete assessment has not previously been undertaken and therefore the impact of ground conditions on buried structures cannot be assessed. A concrete assessment should be included within subsequent ground investigations.

9.7 Updated conceptual site model

The conceptual site model has been updated to consider the residual risk at the site. The updated CSM is presented in Table 12, which identified the potential source-pathway-receptor linkages which are likely to be present during and post completion of the development. Mitigation measures to deal with these linkages are discusses in Section 10.

Table 12: Summary of identified pollutant linkages following risk assessment

Source	Receptor	Pathways
Made ground containing inorganic and organic contamination, including asbestos Contaminated groundwater entering site from adjacent landfill sites Landfill gases from adjacent landfill sites and deep made ground deposits	Construction workers	Dermal contact, ingestion of soil and groundwater, inhalation/ ingestion of fugitive dust, inhalation of vapours Inhalation of landfill/ground gases, causing asphyxiation/explosion
	Future site users	Dermal contact, ingestion of soil, inhalation/ ingestion of fugitive dust, inhalation of vapours Inhalation of landfill/ground gases, causing asphyxiation/explosion
	Ecology	Uptake of phytotoxic compounds by vegetation
	Buried structures	Soil or groundwater aggressive to concrete Potential damage caused by explosion of landfill/ground gases
	River Irk	Contaminated groundwater Runoff from stockpiled material into surface watercourses Accidental spillages entering surface watercourses
	Groundwater (bedrock, alluvium)	Vertical migration in areas where Glacial Till or hardstanding is absent

10 Conclusions

10.1 Geotechnical

The site was found to have several geotechnical constraints, some of which require further assessment. These constraints are summarised below:

- Buried obstructions: there is a potential for on-site obstructions from historical bridges, basements, infilled gasometers and rail infrastructure as well as redundant utilities, demolition rubble and structures associated with the River Irk;
- Voids: there is a potential for voids associated with infilled historical features;
- Tunnels: a subway and culverted River Irk are located in the southwest of the site. These areas require further investigation and subsequent assessment. They may require additional protection or stabilisation subject to final masterplan proposals in this area;
- Soft ground: Alluvium is present in St. Catherine's Wood and in other areas close to the River Irk, and provides a source for soft ground;
- Shallow rockhead: the upper layer of the bedrock was found to be extremely weak to weak and therefore likely to be highly excavatable. Further intrusive GI should include rotary coring and detailed logging;
- Steep slopes: steep slopes are present along the northern and southern edges of North. These may require stability assessments;
- Retaining walls: present along the northern site boundary and along the River Irk, these will require investigation and subsequent assessment;
- Groundwater: potential perched water was identified at a variety of depths in Red Bank North area. Groundwater quality in Red Bank area may be impacted by landfill leachate from Queens Road Tip. Further investigation required to gain better understanding of groundwater regime;
- Earthworks: In order to determine the earthworks quantities, there will need to be more certainty on the proposed site levels (See section **Error! Reference source not found.**). A topographical survey should also be conducted to replace or update the current LIDAR model;
- Easements: National Rail viaducts partially bound the site, coordination with external parties will be required;
- Archaeology: Further archaeological desk study has been commissioned by FEC for this development. It is possible that a watching brief may be required during future ground investigation, and archaeological investigation may be needed in advance of construction in some areas of the site;
- UXO: The site is at low risk of UXO although further clarification should be sought from the specialist. Awareness briefings are recommended during future investigation and construction works;

- Utilities: The existing site utilities and drainage have been reviewed by Arup as part of an earlier study and anticipated maximum utility demands estimated;
- Vibrations: Foundation construction near to viaducts and other existing structures are likely to have vibration restrictions.

10.2 Geoenvironmental

The environmental risk assessments presented in this report have identified that there are potential risks posed to human health, controlled waters, buried structures and services, and vegetation which require mitigation. These risks are typical of many brownfield redevelopments. A summary of the identified risks requiring mitigation are presented in Table 13 below.

Table 13: Summary of risks and proposed mitigation measures

Source	Receptor	Pathways	Proposed Mitigation
Made ground containing inorganic and organic contamination	Construction worker	Dermal contact, ingestion of soil, ingestion of fugitive dust	Dust control measures, measures to control dropping of mud on roads Use of PPE i.e. gloves, as appropriate Additional ground investigation to identify areas of contamination Watching brief during earthworks to identify other areas of potential contamination
		Inhalation of fugitive dust, vapours	Dust control measures as necessary e.g. damping down, grading stockpiles to prevent dust generation, road cleaning and ensuring bare surfaces are compacted and sealed. Appropriate PPE (e.g. dust masks) where necessary.
	Future site users	Dermal contact with, and ingestion of soil and soil-derived dust	Additional ground investigation to identify areas of contamination and develop remediation strategy
		Inhalation of vapours	

	Plants in soft landscaping areas	Uptake of phytotoxic compounds by vegetation	Additional ground investigation to identify areas of contamination and develop remediation strategy Use of clean imported topsoil if required
	Buried Structures	Soil aggressive to concrete	Additional ground investigation Use of protected concrete in foundations and structures in contact with the ground
	Surface waters	Runoff from stockpiled materials into River Irk Accidental spillages entering surface watercourses	Stockpiled material to be managed appropriately Spill kits to be maintained during construction
Groundwater containing dissolved and free phase contamination	Bedrock Aquifer River Irk	Vertical migration in areas where aquitard absent Lateral migration into river	Additional ground investigation to identify quality of groundwater across site and pathways
Ground gases and landfill gases migrating from offsite sources	Construction workers	Inhalation in trenches and chambers	Additional ground investigation to identify potential risk from ground gases
	Future site users	Inhalation in enclosed spaces such as buildings	

10.3 Recommendations for subsequent work

10.3.1 Ground investigation

A further phase of ground investigation is needed to obtain information for scheme and detailed design of foundations and to develop a remediation strategy for the site.

It is recommended that the subsequent investigation should focus on:

- Obtaining further soil samples, with locations targeted at key potentially contaminative historical features, to further assess contamination risks;
- Carry out groundwater level monitoring and sampling to assess the quality of groundwater, including that coming onto the site and its potential impacts on water receptors (River Irk and aquifers);
- Ensuring good spatial coverage. This will help refine the geological site model and enable assessment of each development plot;

- Installation of ground gas monitoring wells to determine the risk posed by ground gases including landfill gases from adjacent landfills and establish likely mitigation requirements;
- Geotechnical testing to enable an assessment of materials re-use to be carried out;
- Investigation of existing structures and retaining walls to assess their construction and condition;
- River investigation, to identify the depth of silt behind the weir and whether it contains contamination as a result of historical industries that were present along the river. This should include Waste Acceptance Criteria testing, as it is likely that materials from the weir removal will need to be disposed offsite. WAC tests provide insight regarding the cost of this;
- Depending on the findings of an archive search by Network Rail, further intrusive works may be needed to establish the geometry and construction type for their existing viaduct structures;
- Concrete (BRE) assessment, to inform future piling/foundation requirements.

It should be noted that the above recommendations may be sufficient to inform the development of an earthworks/remediation phase of works and the schematic design of foundations. However, follow on detailed ground investigations would be required to provide data for specific buildings, structures and external works once development plots, building footprint and other details are confirmed.

References

[1] GOV. 2019. DEFRA Survey Data. [ONLINE] Available at: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey.

[2] Groundsure Map Insight report, 2017, Report Reference: Northern Gateway

[3] Groundsure Geo Insight report, 2017, Report Reference: Northern Gateway

[4] Groundsure Enviro Insight report, 2017, Report Reference: Northern Gateway

[5] The Coal Authority, CON29M Non-Residential Mining Report, 2017, Report Reference: Northern Gateway

[6] Historic England, Aerial photography, Northern Gateway, File Location: \\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-05 Reports\4-05-11 Geotechnical\Data Records\Site History Info

[7] Ordnance Survey, 2010, Manchester: England and Wales Sheet 85 [ONLINE] Available at: http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1009338

[8] Dynasafe BACTEC Limited and FIND Mapping Limited, 2018, Preliminary Unexploded Ordnance Risk Assessment, Document Reference: 502549

[9] Zetica, UXO risk map, 2019, https://zeticauxo.com/downloads-and-resources/risk-maps/

[10] Manchester City Council Architect's Department, 1940-1941, Manchester bomb damage, [ONLINE] Available at: https://luna.manchester.ac.uk/luna/servlet/detail/maps002~1~1~342648~123260?qvq=q%3Abomb%20damage%20map&mi=12&trs=47#

[11] CL:AIRE. 2018. DoE Industry Profiles. [ONLINE] Available at: https://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/198-doe-industry-profiles. [Accessed 7 July 2019].

[12] Environment Agency (2004) Model procedures for the management of land contamination. R&D Report CLR11.

[13] Ministry of Agriculture, Fisheries and Food (1998) The Soil Code: Code of good agricultural practice for the protection of soil

[14] Manchester City Council (2013) Network Rail Land – Irk Valley Preliminary Risk Assessment. Prepared by Environmental Protection department, August 15th 2013.

[15] Arup (2019) Manchester Northern Gateway: River Irk Hydraulic Modelling Report. Prepared for Far East Consortium Limited. Ref. MNG-ARP-SW-FN-GX-0021. Issue 14th June 2019.

[16] Zetica UXO (2018) Northern Gateway, Manchester – UXO Desk Study & Risk Assessment. Document Ref. P8135-18-R1, Revision A 8th November 2018.

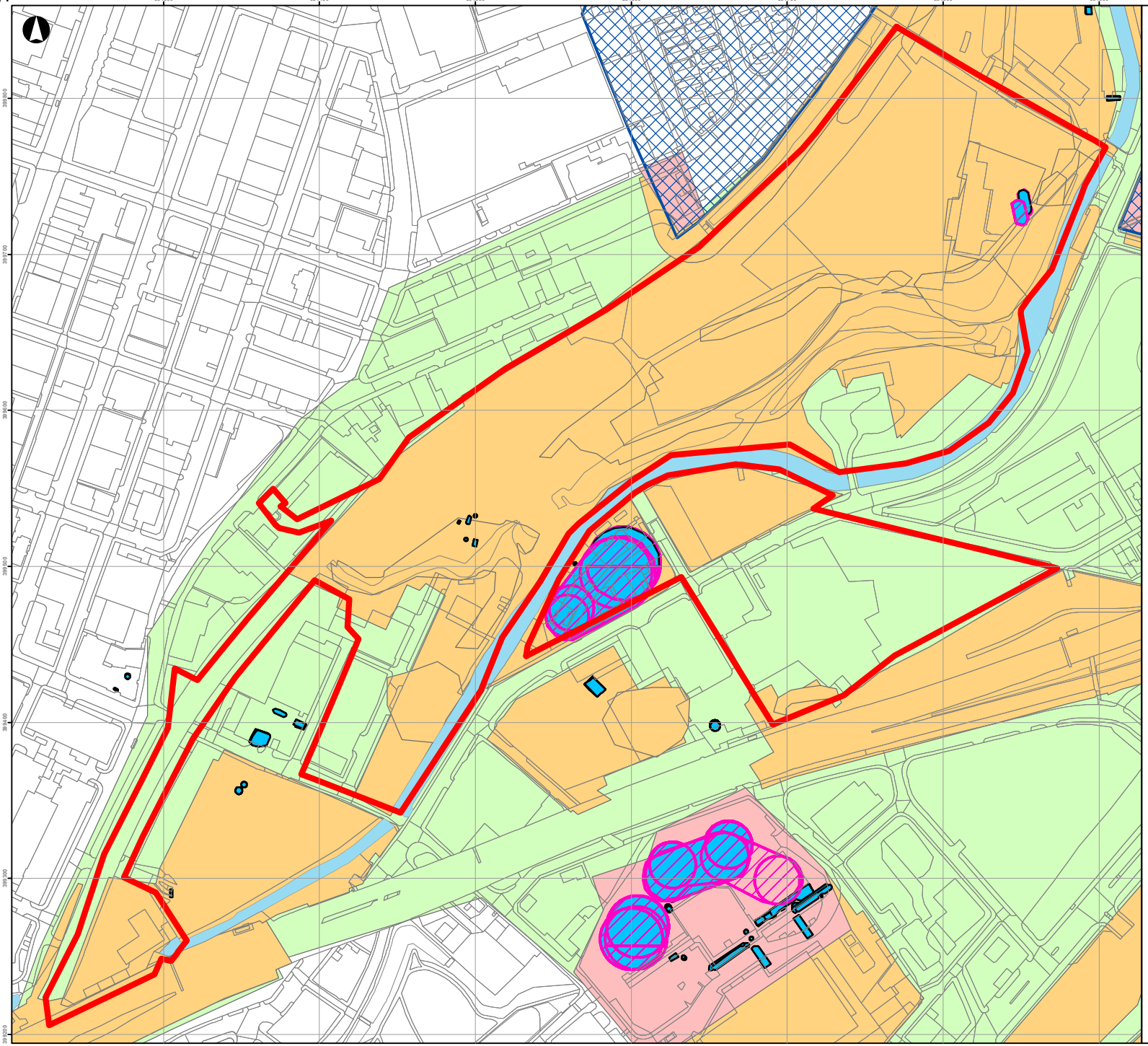
[17] Orion Heritage (2017) Northern Gateway, Manchester. High Level Archaeological Appraisal, December 2017. Prepared for FEC Northern Gateway Development Limited.

[18] Arup (2019) Manchester Northern Gateway, HIF Maximum Utility Demands. File note MNG-ARP-SW-FN-GX-0017, 28th February 2019.

[19] Arup (2019) Northern Gateway Masterplan, HIF SuDS Drainage – New Town and Red Bank. Ref. MNG-ARP-SW-FN-GX-0015, 7th January 2019

Drawings

A4



Legend

- 2019-06-20_Updated_RBL
- Historic Landfill

GS_Tanks_polygon

Use

- Gasometer
- Gasometers
- Tanks
- Unspecified Tank

Historical_Land_Use_Clip

Contamination Potential

- High
- Moderate
- Low

Coordinate System: British National Grid

Metres

0 45 90 180

Rev	Date	By	Chkd	Appd
1	08/08/2019	JW	JW	JW

ARUP

9th Floor, 3 St Paul's Place,
Norfolk Street,
Sheffield, S1 2JE
Tel +44 114 283 3728
www.arup.com

Client

FEC

Project Title

Northern Gateway

Drawing Title

Contamination Potential

Scale at A4

1:3,500

Role

Suitability

Arup Job No

257920-00

Rev

Name

11/06/2019 14:37:38

\\global\europe\Sheffield\users\joe.landers\Work Documents\GIS\Arup Layout Templates\Arup_London_Drawing_A4LV.mxd

© Arup

A4



Legend

- 2019-06-20_Updated_RBL
- Historic_Landfill_Sites

Geo_Env_Technical_Constraints

- Bridge
- Culverted River Irk
- Infilled Channel
- Infilled Water Body
- Railway Turntable
- Subway
- 2019_06_20_Additional_GI_Options_Constraints

Coordinate System: British National Grid

Metres

0 45 90 180

Rev	Date	By	Chkd	Appd
1	08/08/2019	JW	JW	JW

ARUP

9th Floor, 3 St Paul's Place,
Norfolk Street,
Sheffield, S1 2JE
Tel +44 114 283 3728
www.arup.com

Client

FEC

Project Title

Northern Gateway

Drawing Title

Geotechnical Constraints

Scale at A4

1:3,500

Role

Suitability

Arup Job No

257920-00

Rev

Name

Drawing 2

11/06/2019 14:37:38

\\global\europe\Sheffield\users\joe.landers\Work Documents\GIS\Arup Layout Templates\Arup_London_Drawing_A4LV.mxd

© Arup

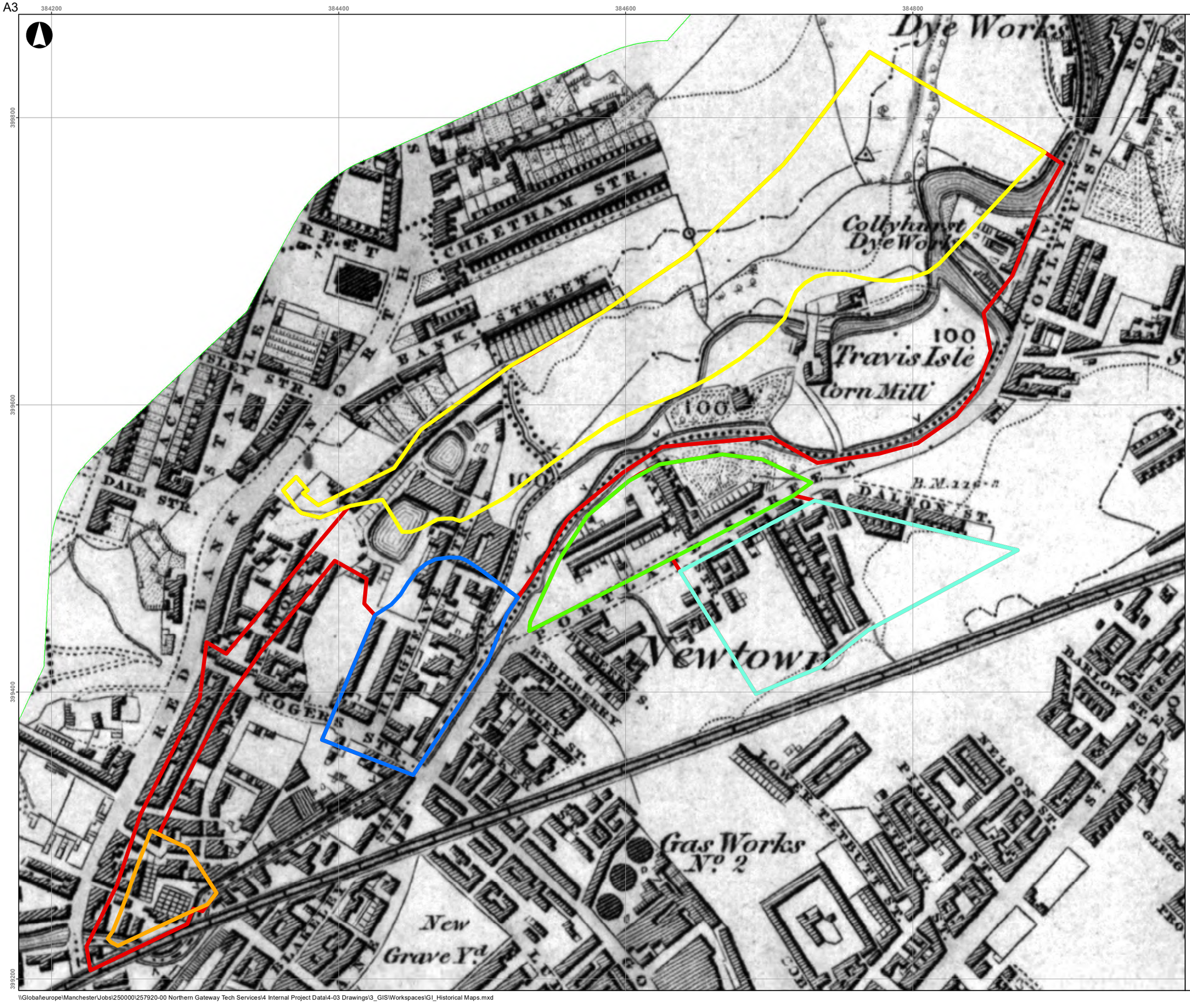
Appendix A

Historical Maps

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres
0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1848 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

31/07/2019 14:24:59

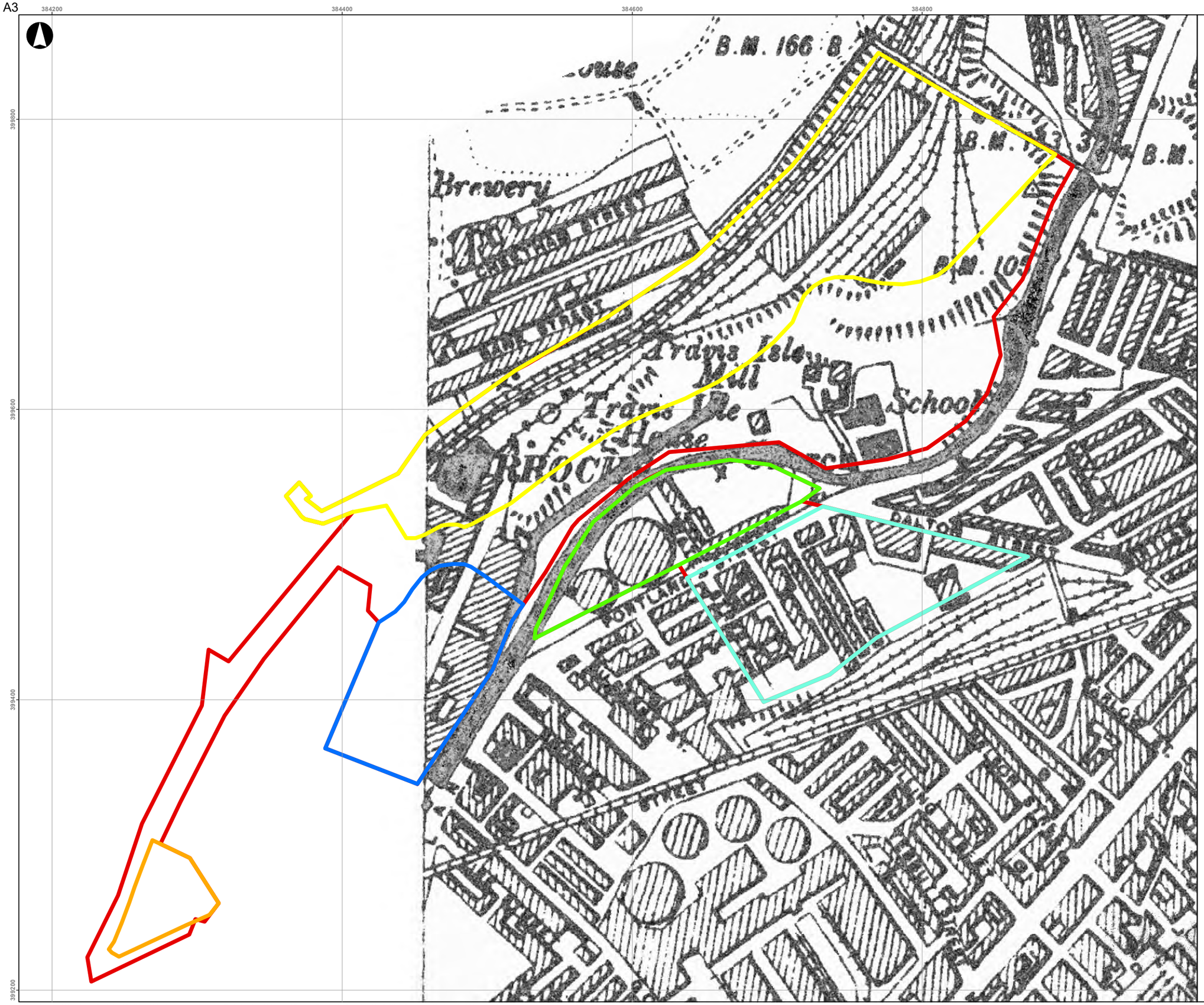
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1891 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No	Rev
257920-00	**P0**

Name
001

31/07/2019 14:36:50

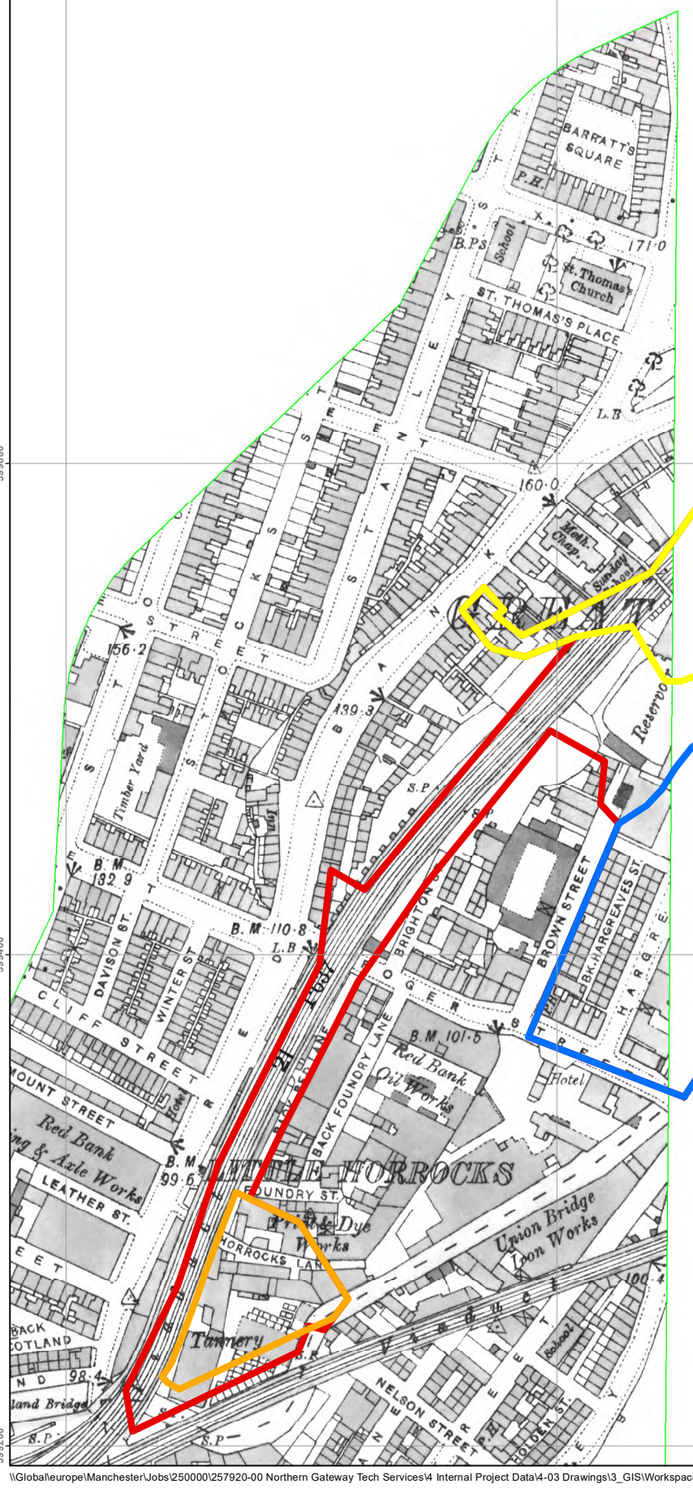
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1892 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

31/07/2019 14:42:56

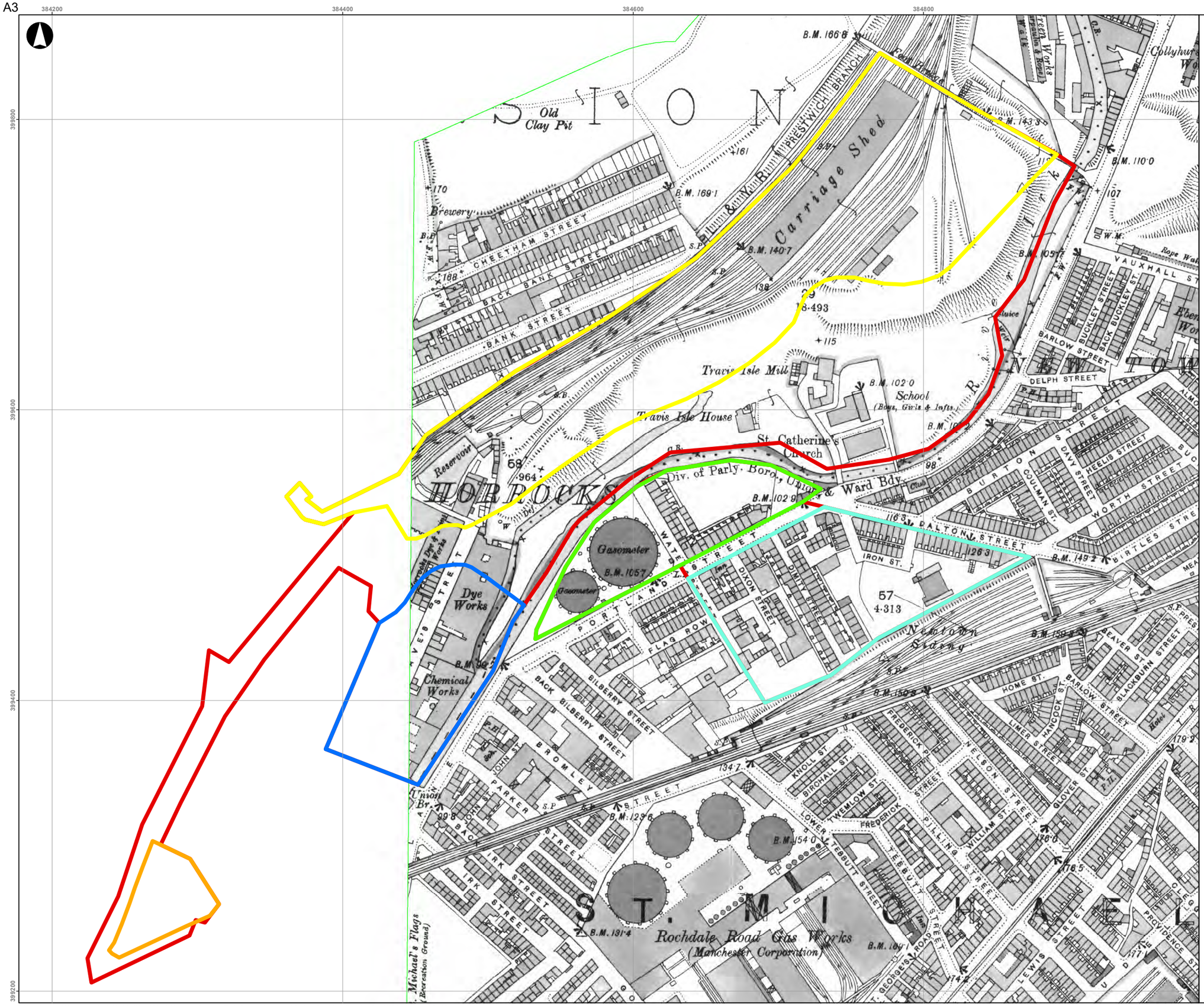
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

31/07/2019 14:44:10

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1893 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

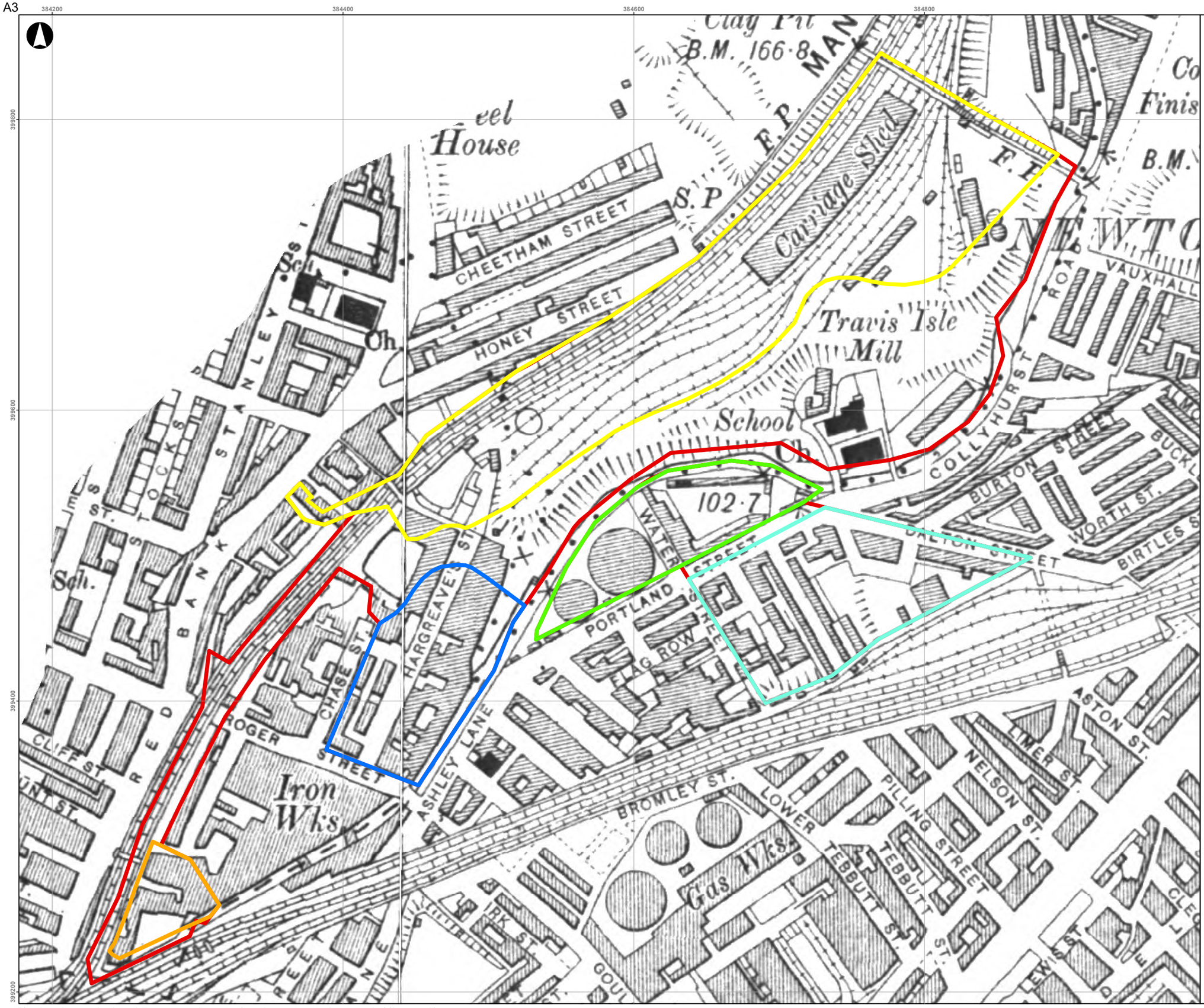
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 14:46:02

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1906 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

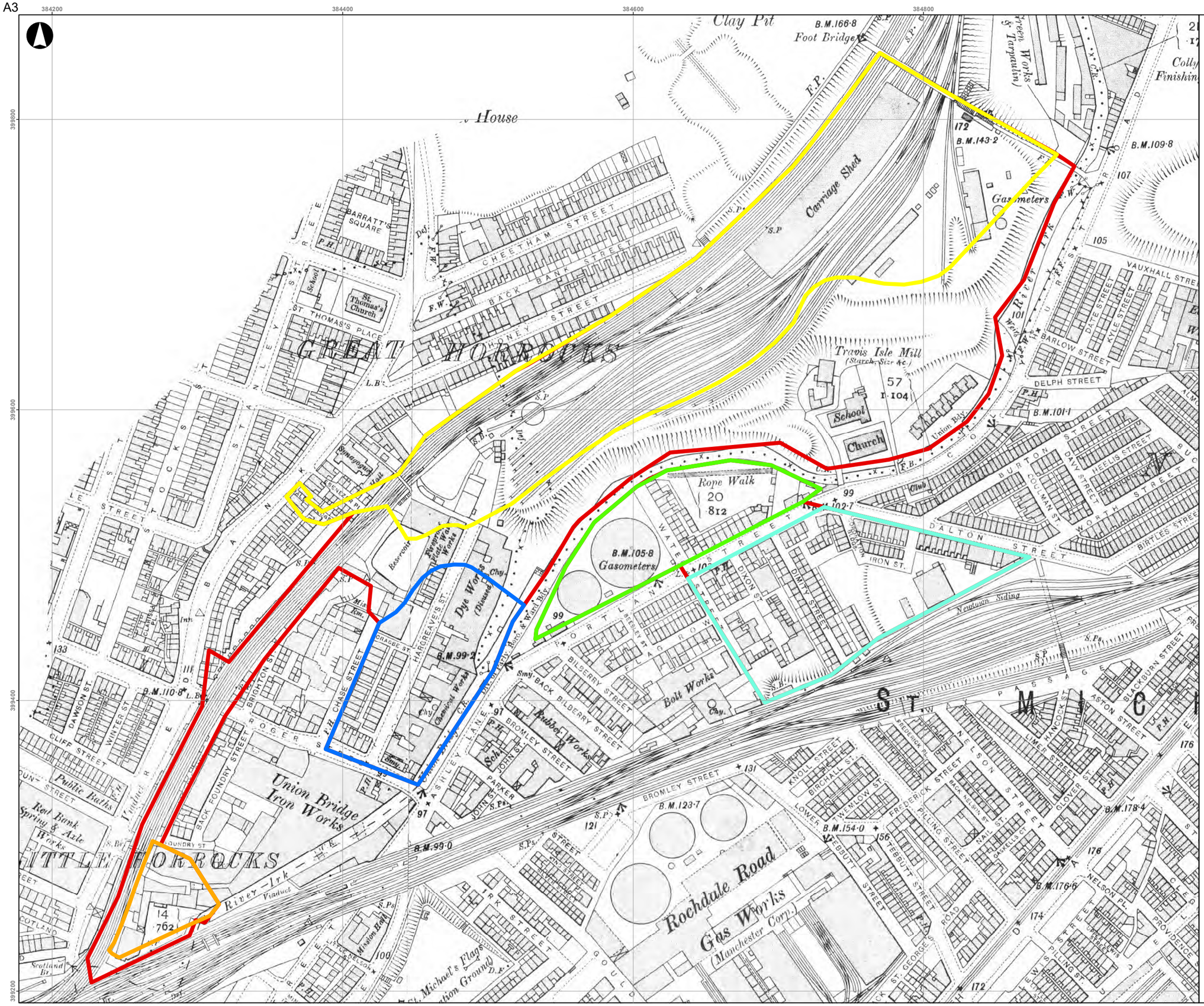
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1908 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No	Rev
257920-00	**P0**

Name
001

31/07/2019 14:47:30

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1916 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

31/07/2019 14:49:00

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 14:50:19

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1921 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

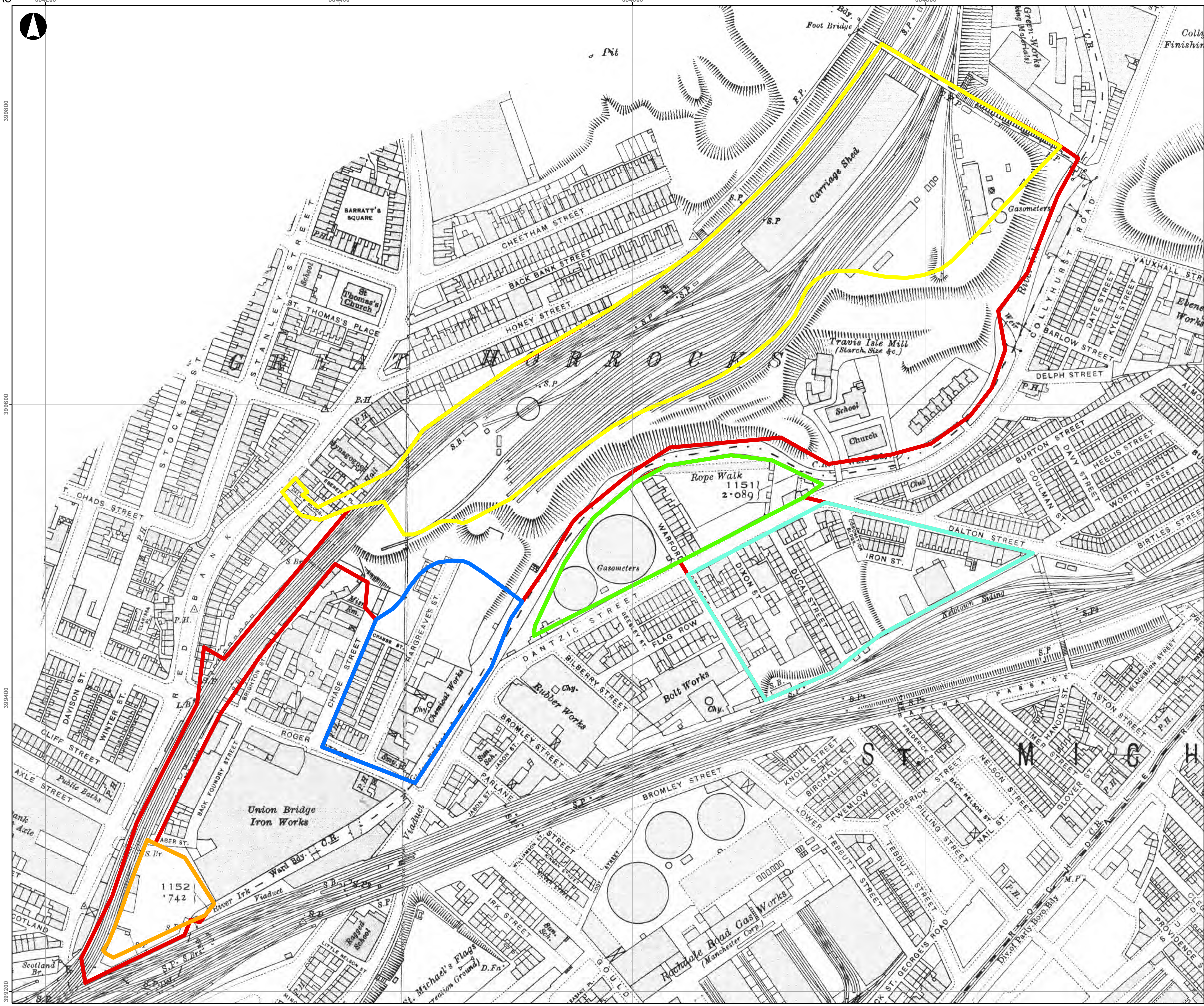
Rev
P0

Name
001

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres
0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1922 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

31/07/2019 14:51:57

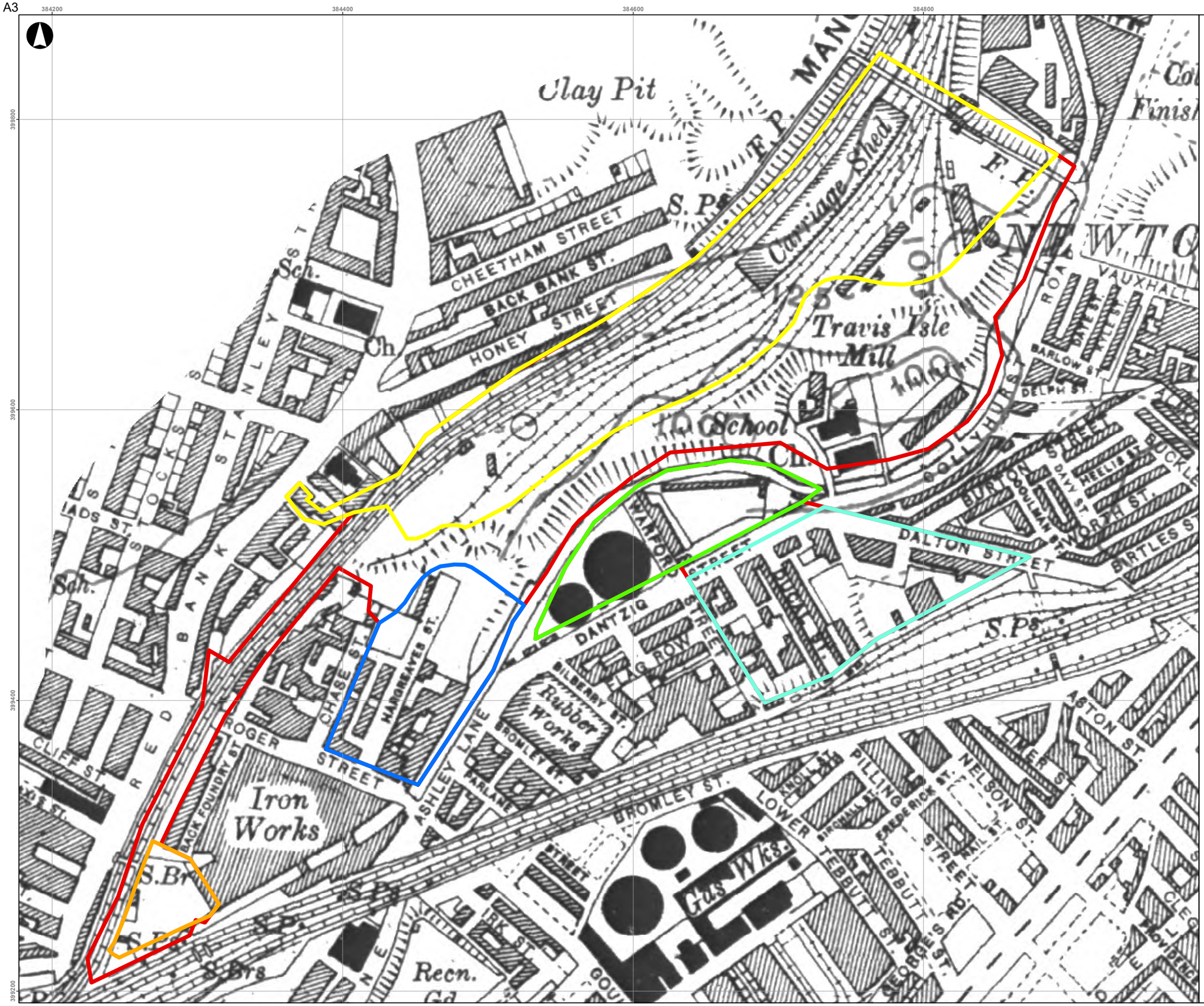
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1923 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

31/07/2019 14:53:15

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200

Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1931 1:10,560 & 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

31/07/2019 14:55:15

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200

31/07/2019 14:56:53

Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1933 1:10,560 & 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

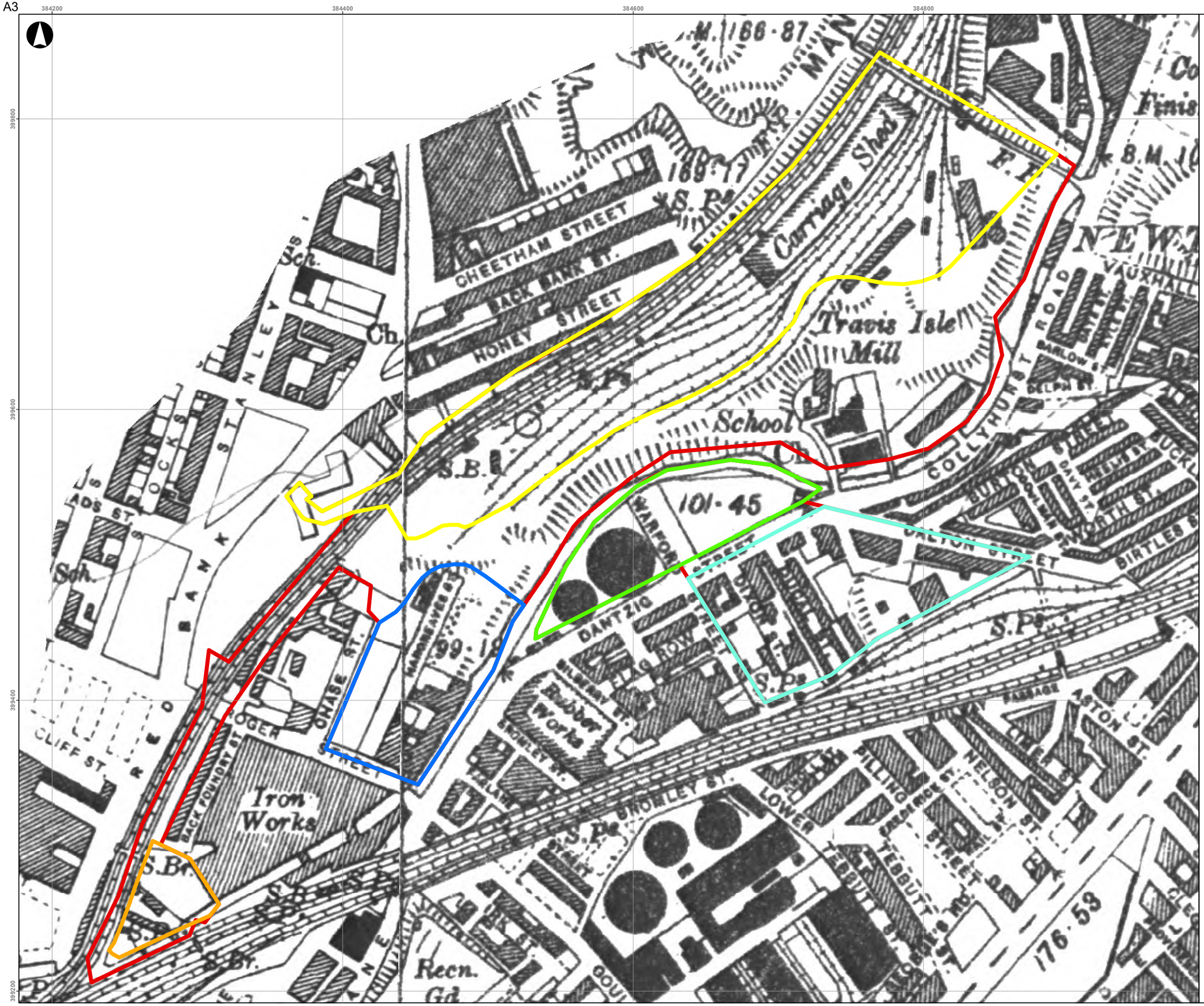
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 14:58:51

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1938 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200

Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:04:41

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1949 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No	Rev
257920-00	P0

Name
001

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200

Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1952 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No	Rev
257920-00	**P0**

Name
001

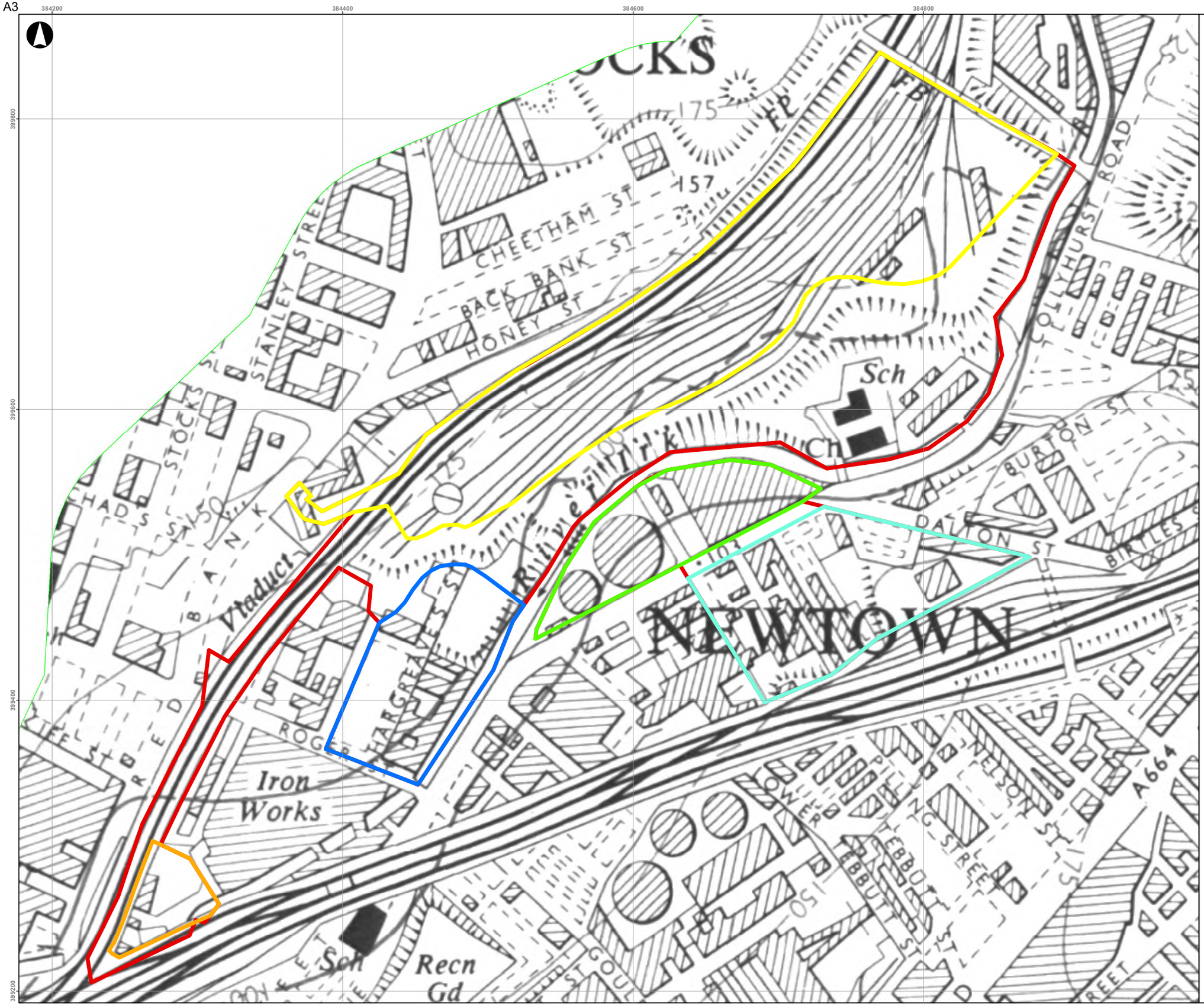
31/07/2019 15:06:42

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:08:40

Coordinate System: British National Grid

Metres
0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1956 1:10,560

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

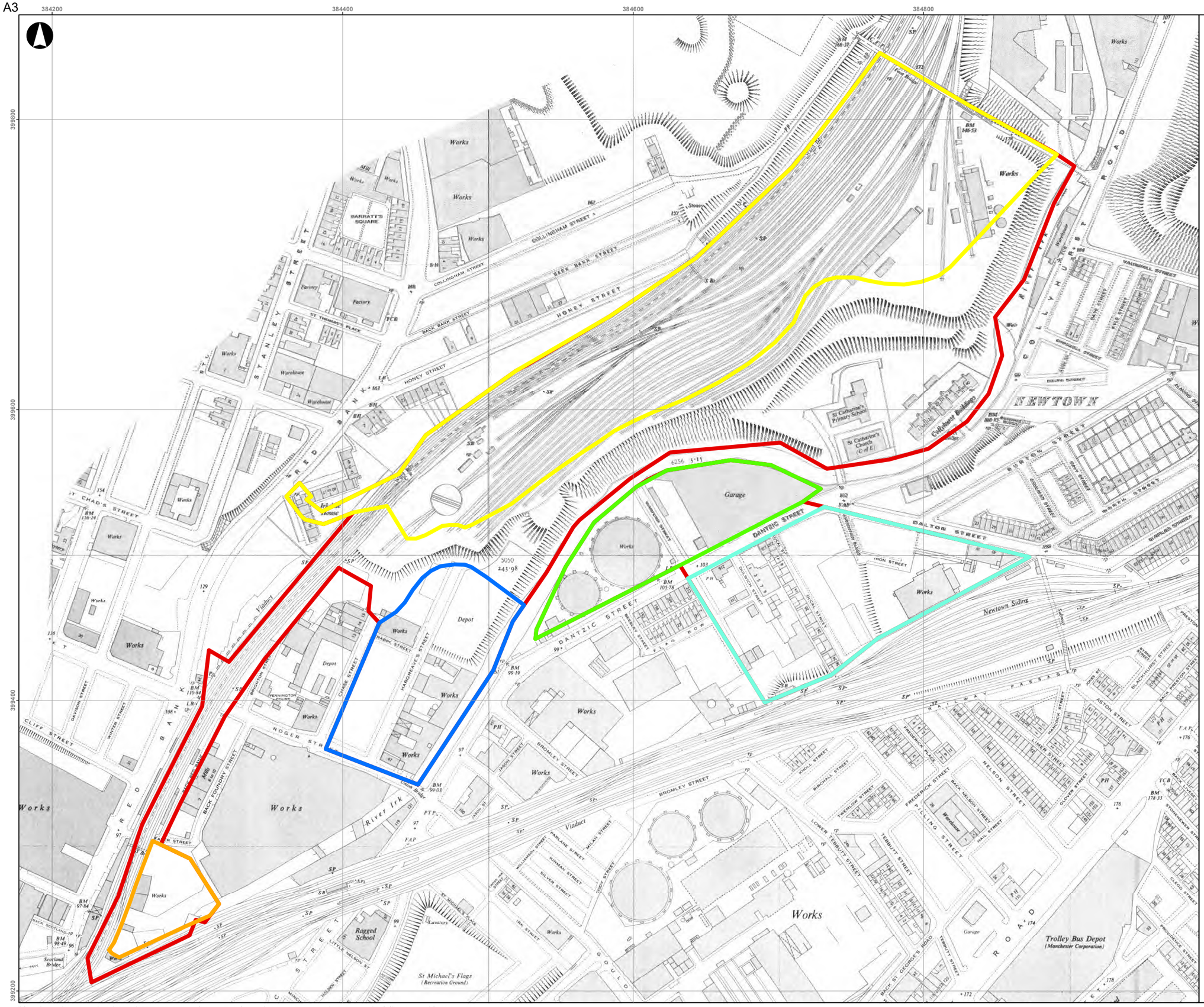
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:11:43

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1958 1:1,250

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200

Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:14:46

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1964 1:1,250

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

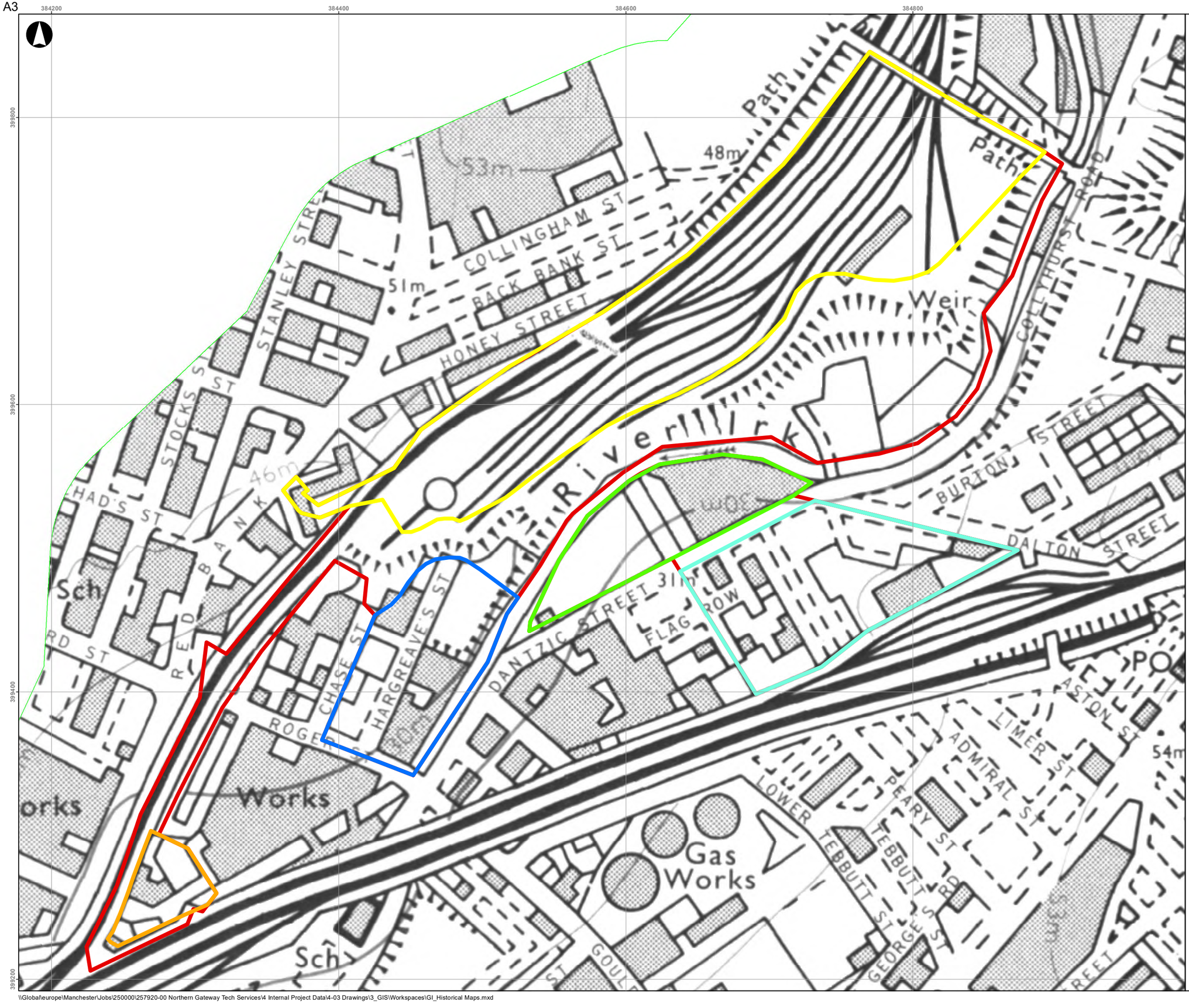
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:17:24

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1972 1:10,000

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

Name
001

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:18:49

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1980 1:10,000

Scale at A3
1:2,500

Role

Suitability
Preliminary

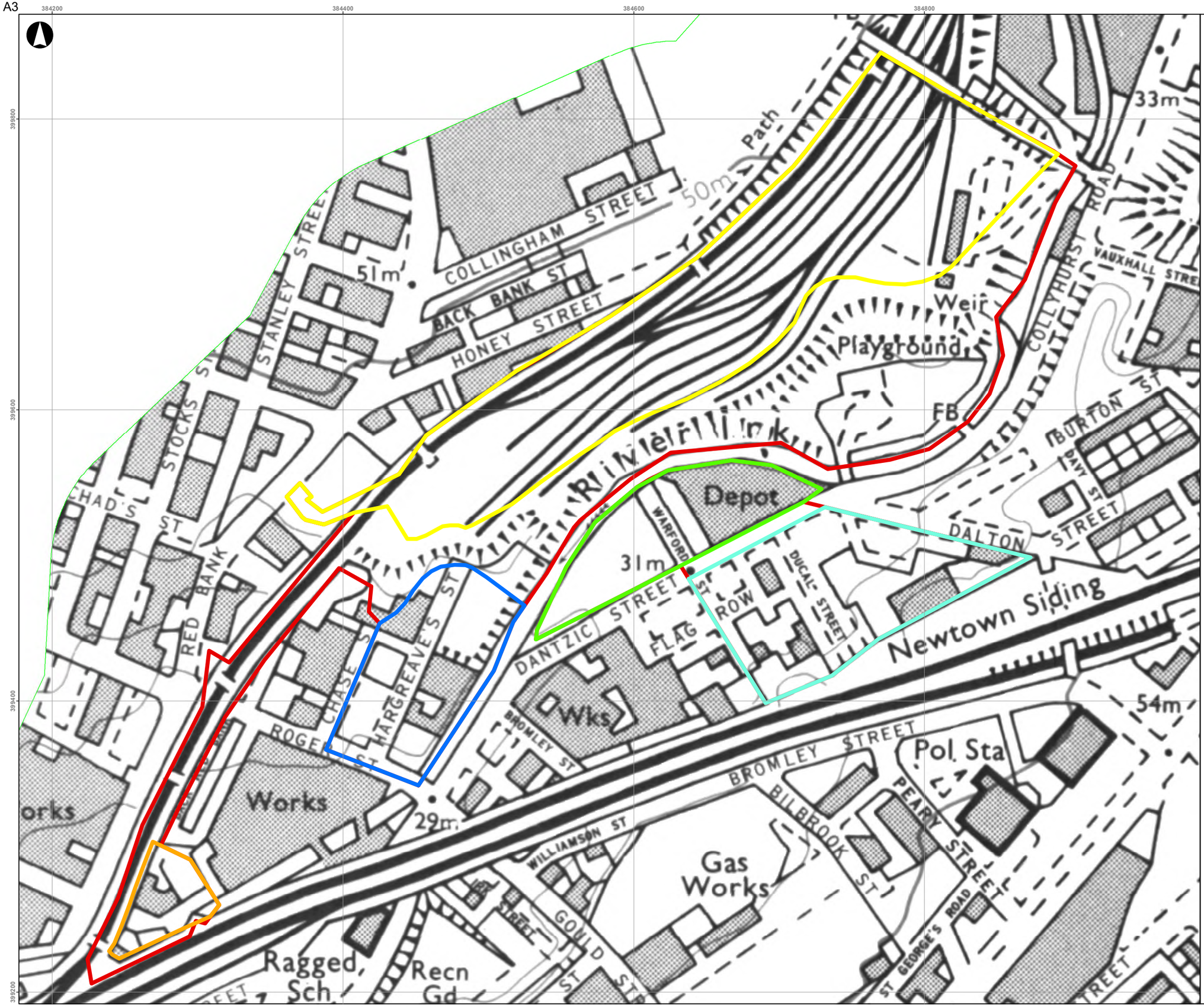
Arup Job No	Rev
257920-00	**P0**

Name
001

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:25:25

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1985 1:10,000

Scale at A3
1:2,500

Role

Suitability
Preliminary

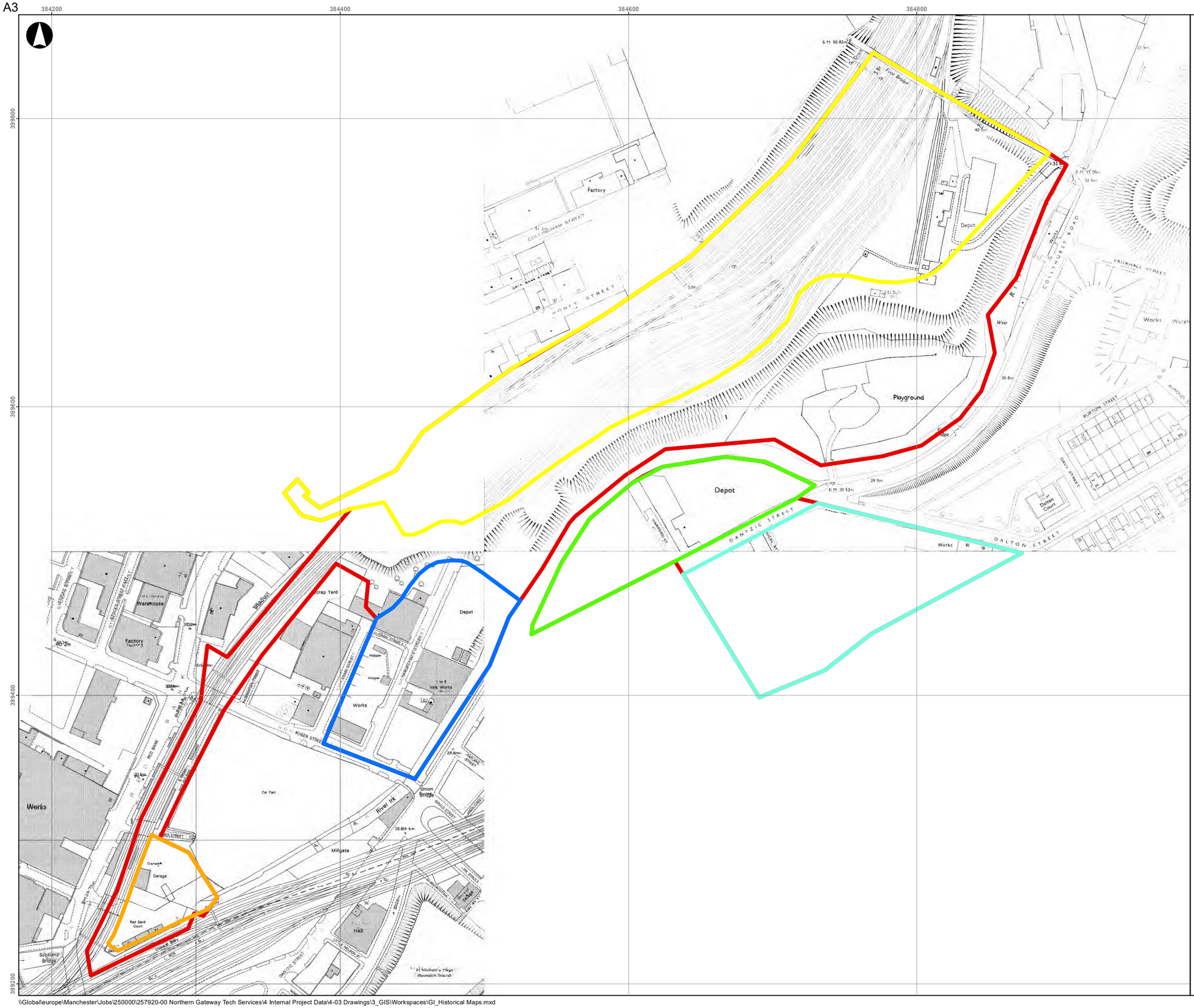
Arup Job No
257920-00

Rev
P0

Name
001

© Arup

A3



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

31/07/2019 15:27:52

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1990 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

Rev
P0

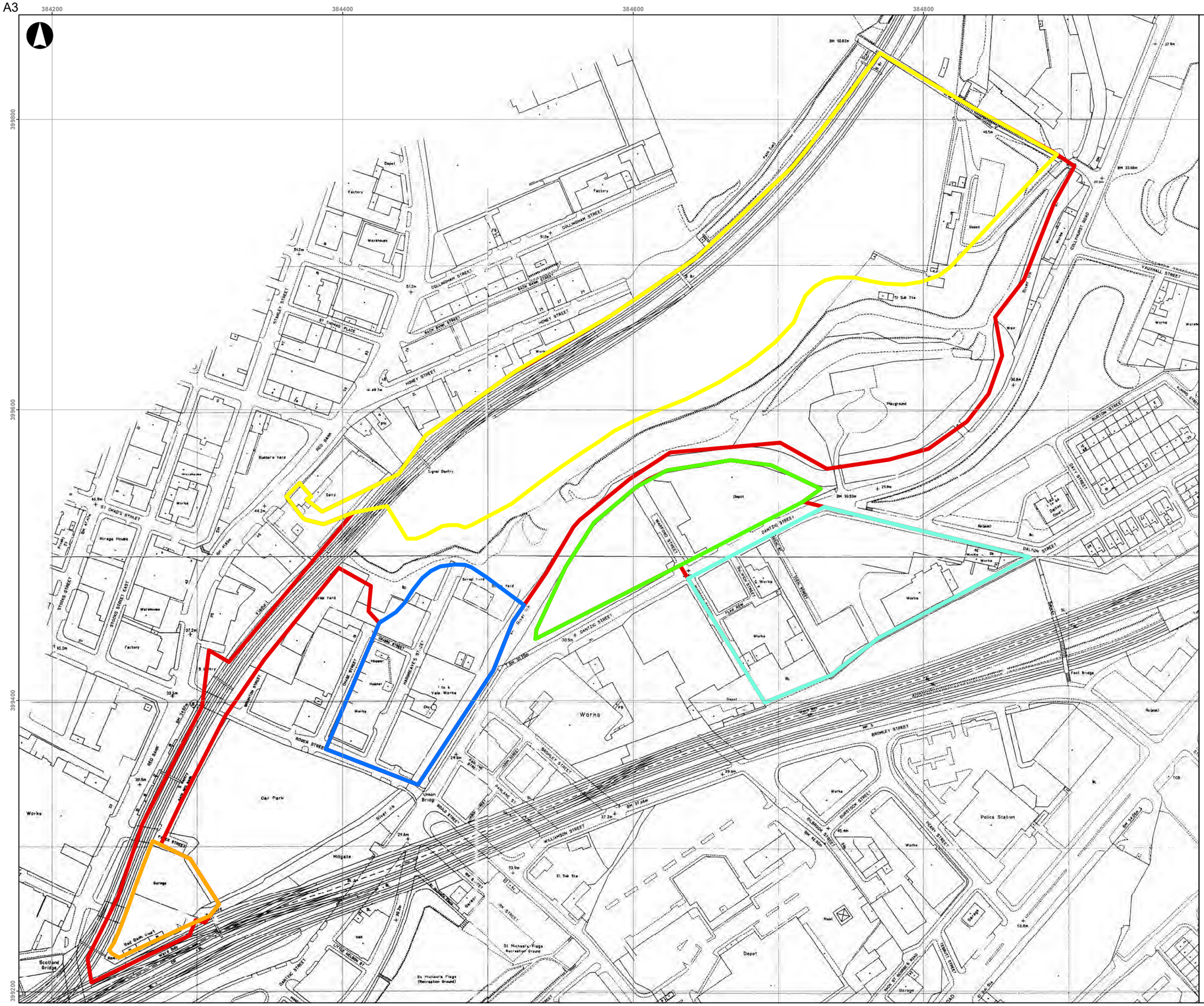
Name
001

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



31/07/2019 15:29:59

Coordinate System: British National Grid

Metres
0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1992 1:1,250

Scale at A3
1:2,500
Role

Suitability
Preliminary

Arup Job No	Rev
257920-00	**P0**

Name
001

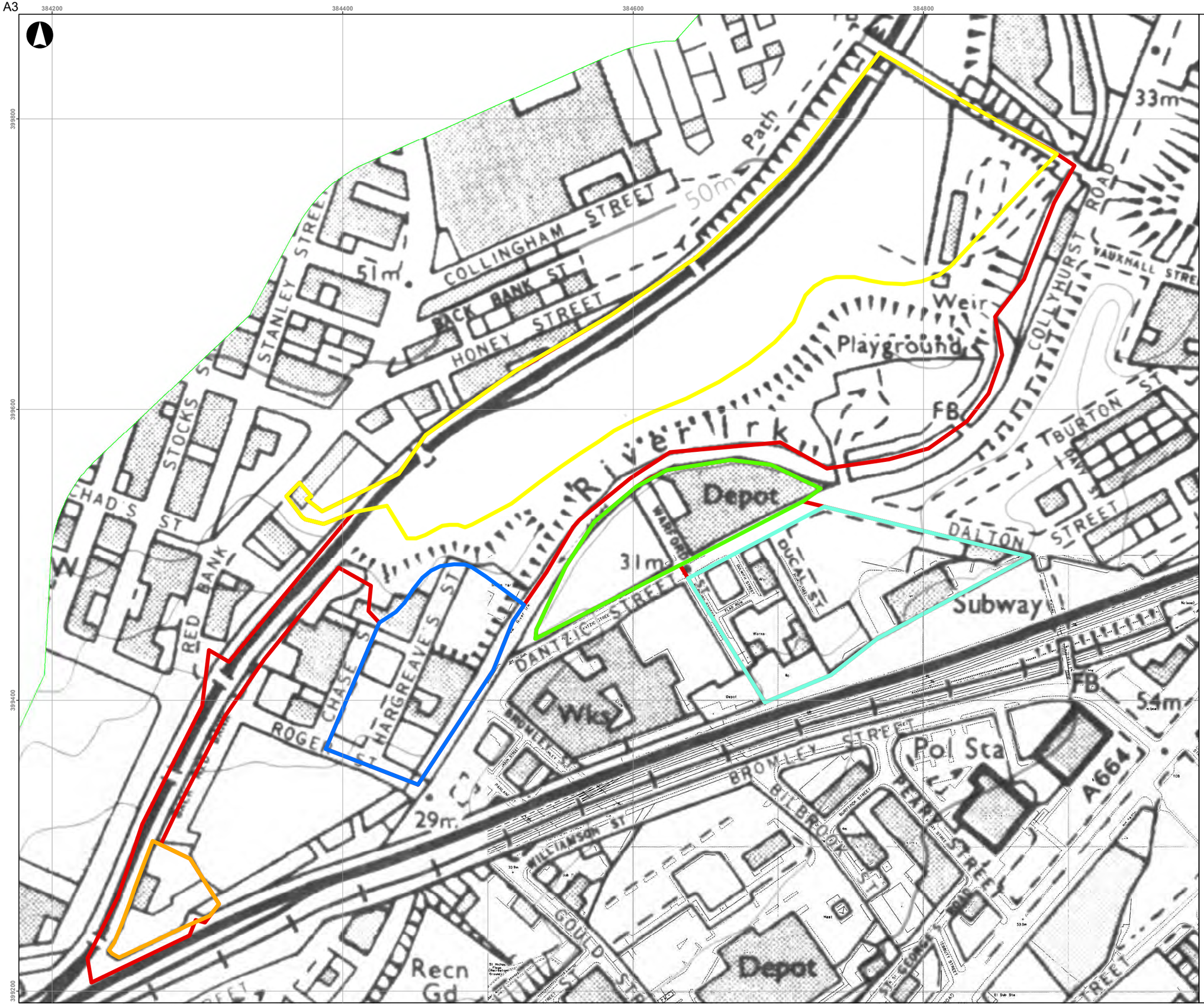
\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup

A3

384200 384400 384600 384800

399800 399600 399400 399200



Legend

- RB North
- RB Central
- RB South
- RB East
- New Town
- Site Boundary

Coordinate System: British National Grid

Metres

0 30 60 120

Rev	Date	By	Chkd	Appd
P0	31/07/2019	JW	JW	JW

ARUP

3 St Pauls Place
Sheffield S1 2JE
Tel +44 (0)114 272 8247
www.arup.com

Client
FEC Ltd

Project Title
Northern Gateway

Drawing Title
1994 1:2,500

Scale at A3
1:2,500

Role

Suitability
Preliminary

Arup Job No
257920-00

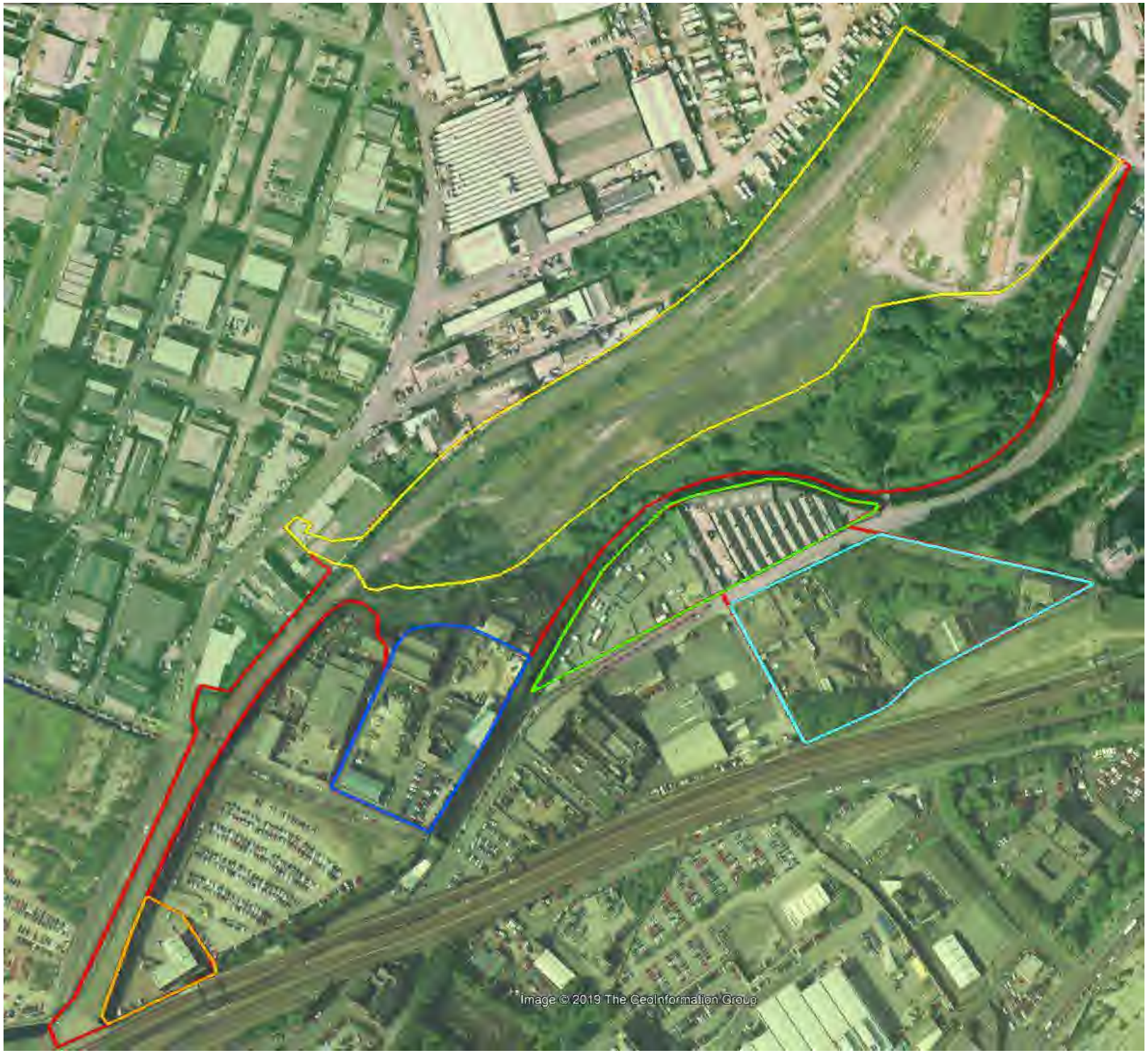
Rev
P0

Name
001

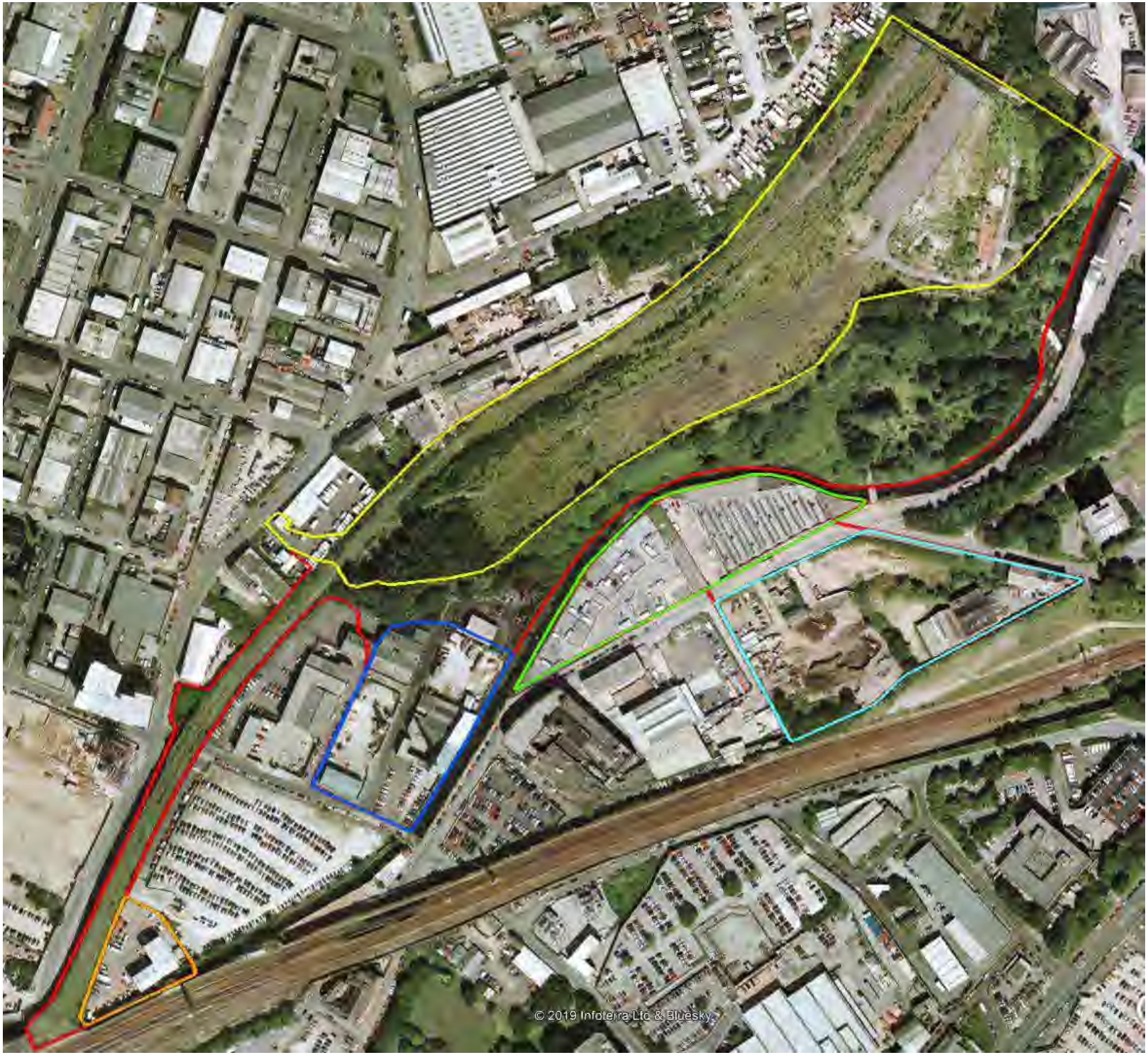
31/07/2019 15:31:32

\\Global\europe\Manchester\Jobs\250000\257920-00 Northern Gateway Tech Services\4 Internal Project Data\4-03 Drawings\3_GIS\Workspaces\GI_Historical Maps.mxd

© Arup



2000
Google Earth Imagery



2003
Google Earth Imagery



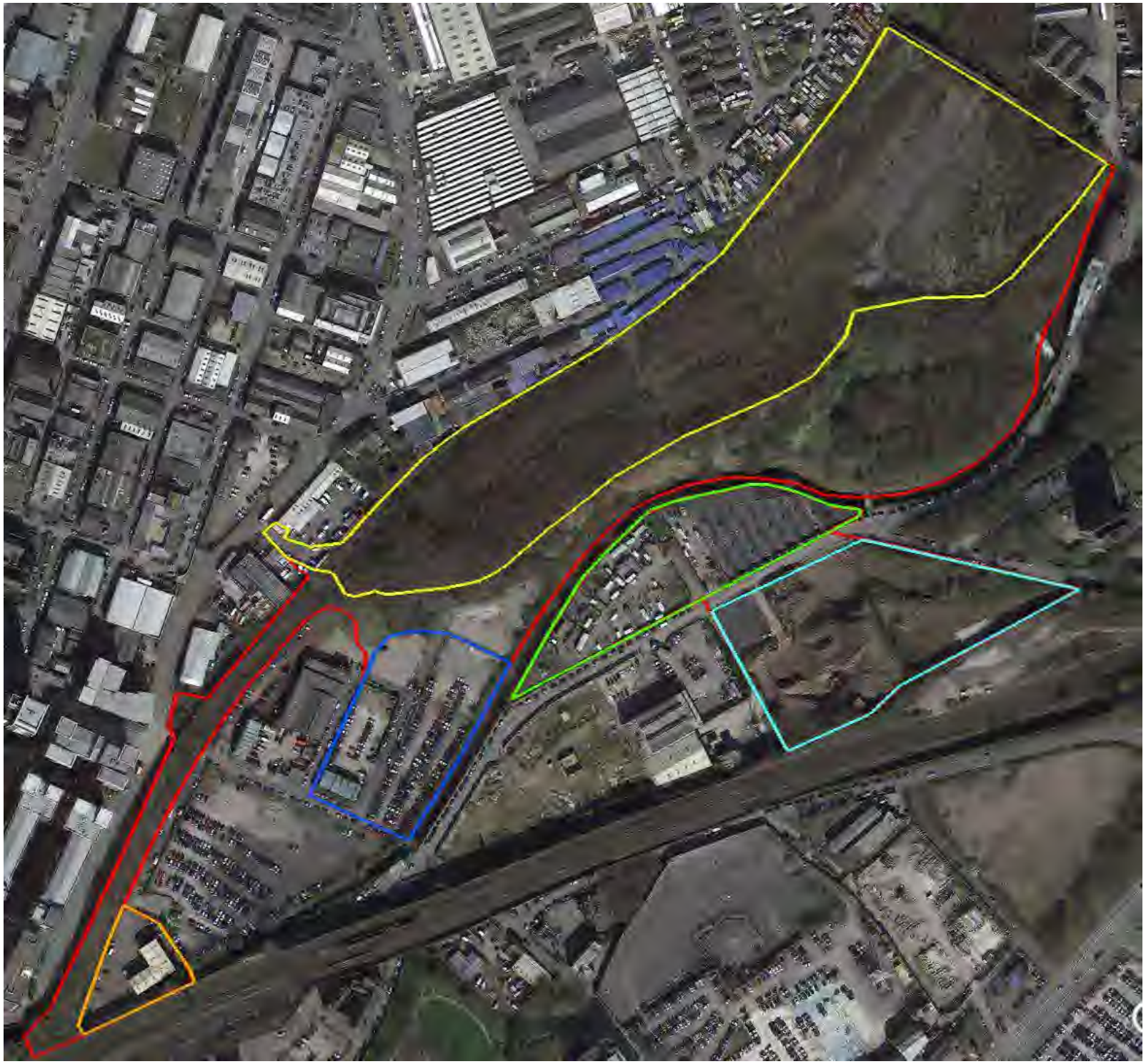
2005
Google Earth Imagery



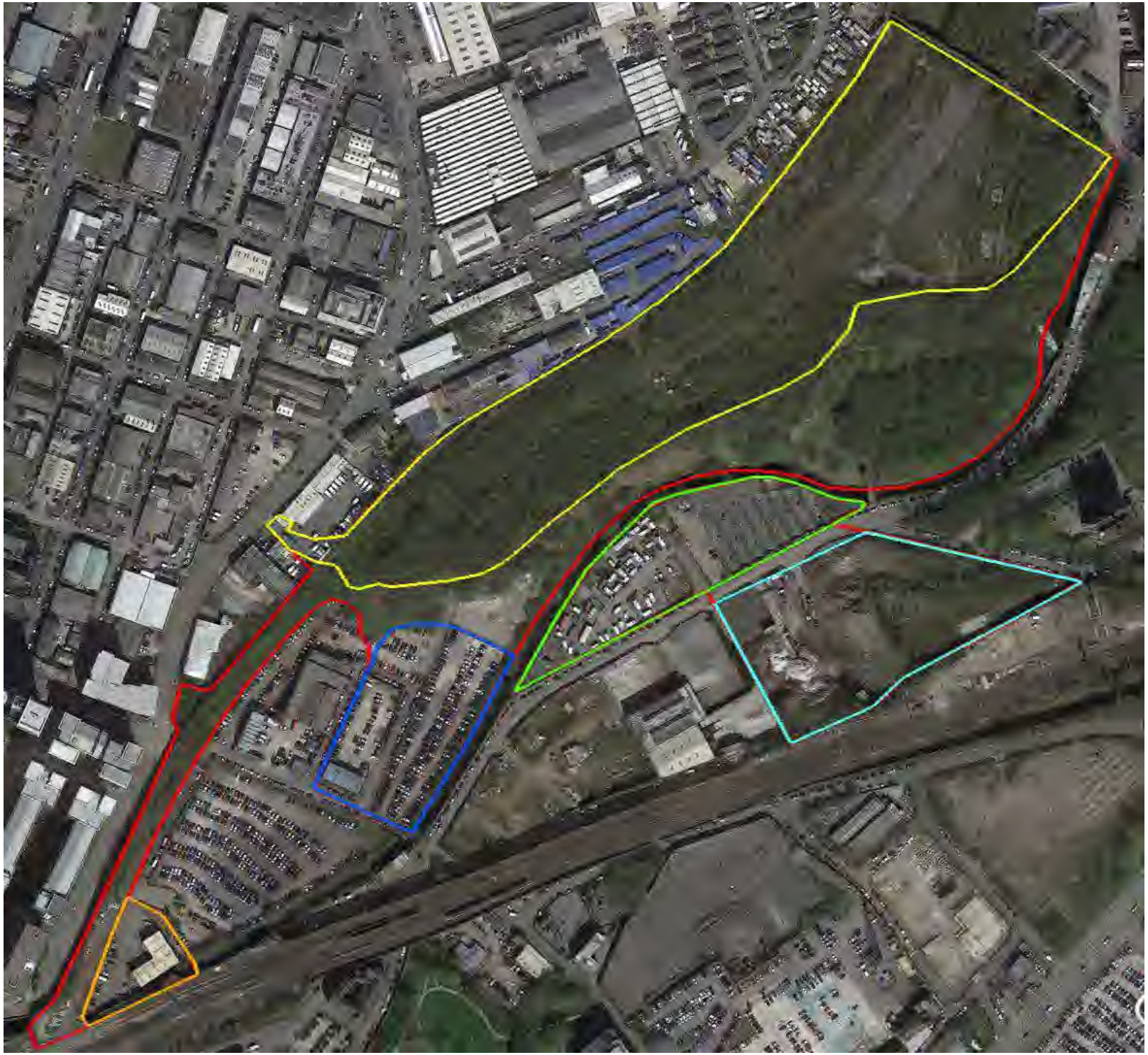
2009
Google Earth Imagery



2013
Google Earth Imagery



2017
Google Earth Imagery



2018
Google Earth Imagery

Appendix B

AEG Factual Report (2019)

NORTHERN GATEWAY



Final Factual Report (Rev.00)

Contract Number: NW1580
Client: Far East Consortium International Limited
Consulting Engineer: Ove Arup & Partners Limited

Date: March 2019

Allied Exploration & Geotechnics Ltd.

Head Office (Registered Office)
Unit 25 Stella Gill Industrial Estate
Pelton Fell
Chester-le-Street
Co. Durham
DH2 2RG
☎ 0191 3874700
🕮 0191 3874710

Regional Office
Unit 20 Business Development Centre
Eanam Wharf
Blackburn
BB1 5BL
☎ 01254 503 200
🕮 01254 662 590

NORTHERN GATEWAY

Contents Page

1. INTRODUCTION 4

1.1 Scope of Works 4

2. THE SITE 4

2.1 Location 4

Figure 1: Site Location Plan 5

2.2 Site Description and Topography 6

3. SITE OPERATIONS 6

3.1 General 6

Table 1: British Standard Reference Code Number 6

3.2 Health & Safety Considerations: Services 7

Table 2: Services Encountered 7

3.3 Exploratory Holes: Boreholes 8

Table 3: Borehole Summary 8

3.4 Exploratory Holes: Window/Windowless Sample Holes 8

Table 4: Window/Windowless Sample Hole Summary 8

3.5 Exploratory Holes: Mechanically Excavated Trial Pits 8

Table 5: Trial Pit Summary 9

3.6 Samples 9

3.7 Groundwater 10

3.8 Instrumentation & Monitoring 10

Table 6: Instrumentation Summary 10

3.9 Operative Observations: Potential Contamination 10

Table 7: Potential Contamination Encountered 11

3.10 Surveying 11

4. *IN-SITU* TESTING 11

4.1 General 11

4.2 Standard Penetration Test Results 11

4.3 Hand Shear Vane 12

4.4 *In-situ* Water Quality Parameter Testing 12

5. LABORATORY TESTING 12

5.1 General 12

5.2 Geotechnical Testing 12

Table 8: Geotechnical Testing *13*
5.3 Specialist Chemical Testing 13
5.4 Laboratory Identified Asbestos 13
Table 9: Laboratory Identified Asbestos *13*

FIELD DATA ENCLOSURES:

Key Sheets	0
Exploratory Hole Location Plan	1
Borehole Records	2
Window/Windowless Sample Hole Records	4
Trial Pit Records	5
Groundwater Observation Made at the Time of Siteworks	6
Groundwater Monitoring Results	7

***IN-SITU* TESTING ENCLOSURES:**

Test Report Certificate	0
Standard Penetration Test Results (SPT)	1
Hand Shear Vane Test Results (HSV)	2
In-situ Water Quality Parameter Test Results	3

LABORATORY ENCLOSURES:

Laboratory Report Certificate	0
Sample Description Sheets	1
Moisture Content/Plasticity Index and Moisture Content	2
Determination of Particle Density	3
Particle Size Distribution Sieving and Sedimentation	4
Determination of Loss on Ignition, Organic Content, Total Sulphur, Sulphate and pH (Tested Externally)	5
Determination of Dry Density/Moisture/CBR Relationship	6
Determination of MCV/Moisture Relationship	7
Determination of California Bearing Ratio	8
Determination of One Dimensional Consolidation Properties	9
Shear Strength by Hand Vane	10
Undrained Shear Strength in Triaxial Cell without Pore Water Pressure Measurement	11

APPENDICES:

Specialist Chemical Testing (Tested Externally) Appendix I

Abbreviation	Definition
CP	Cable Percussion Borehole
TP	Trial Pit
WLS	Windowless Sample Hole

Text Abbreviations

1. INTRODUCTION

It is proposed to redevelop several parcels of land situated in the Red Bank area of Manchester. The development will involve constructing new residential apartments, townhouses, associated infrastructure and road network.

Allied Exploration & Geotechnics Limited (AEG) were contracted by Far East Consortium International Limited with Ove Arup & Partners Limited acting in the capacity of Consulting Engineer to perform a ground investigation at this site in order to provide information on the subsurface ground and groundwater conditions as well as to obtain samples for geotechnical and specialist chemical testing.

1.1 Scope of Works

The investigation works consisted of the following main elements:

- Ten cable percussion boreholes
- Twenty one machine excavated trial pits
- Seven windowless sample holes
- *In-situ* standard penetration and hand shear vane testing
- Geotechnical and specialist chemical sampling
- Installation of gas and groundwater monitoring instrumentation
- Post site groundwater monitoring, sampling and associated water quality parameter testing
- Surveying

Site work was carried out between the 3rd and 11th January 2019 with subsequent post site work monitoring, laboratory testing and reporting thereafter. A factual report only was requested.

The comments and opinions expressed in this report are based on the ground conditions encountered during the site work and on the results of tests carried out in the field and in the laboratory. There may, however, be special conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report.

2. THE SITE

2.1 Location

The National Grid Reference of the approximate centre of the site is SJ 845 995. This can be found on Ordnance Survey 1:50,000 Sheet Number 109 (Manchester, Bolton & Warrington). Part of this sheet is reproduced as Figure 1, the Site Location Plan.

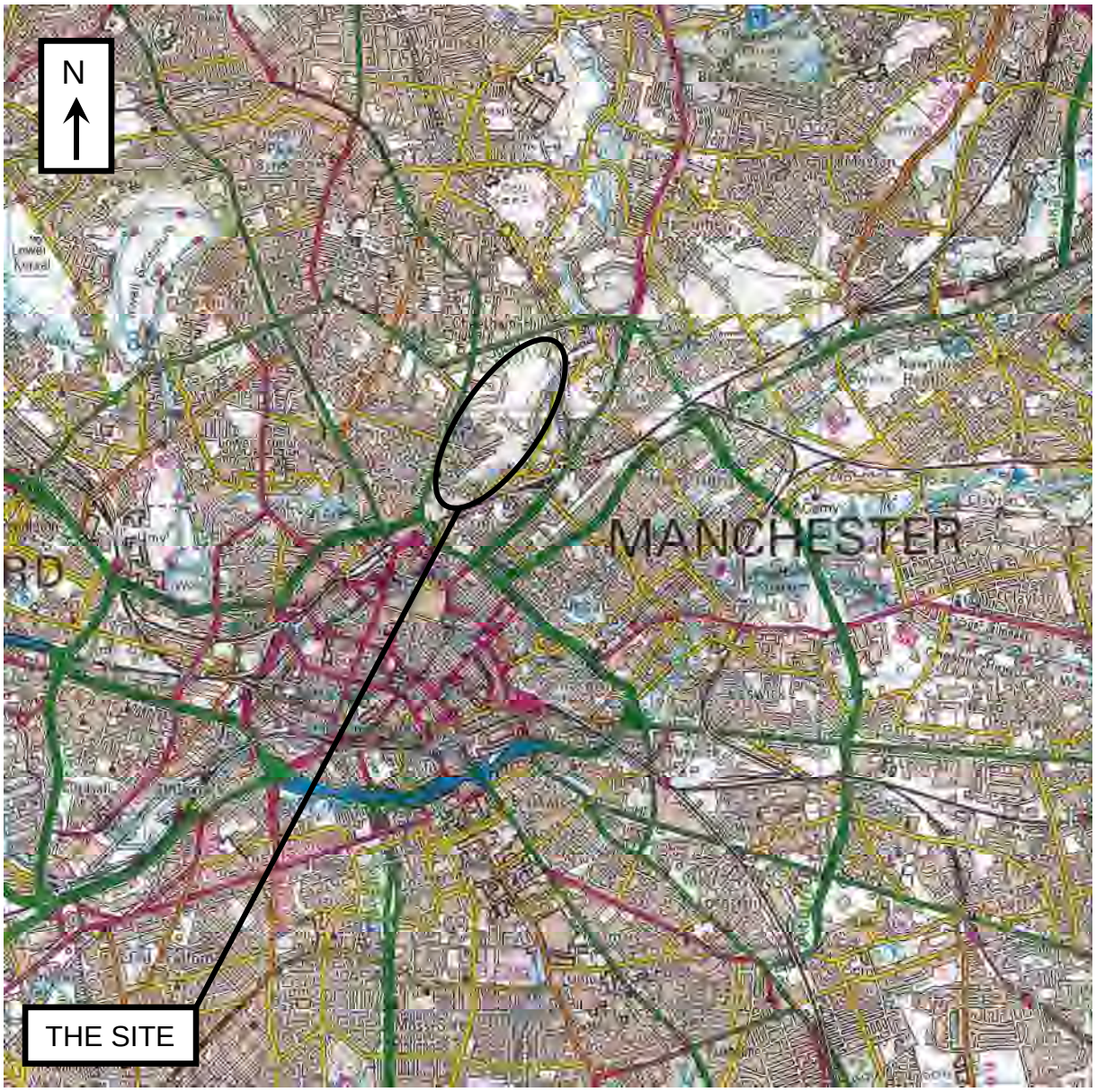


Figure 1: Site Location Plan

Reproduced from the Ordnance Survey 1:50,000 scale Landranger map by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, Crown Copyright. All rights reserved. Licence number AL 100002282.

The site is located on the northeast outskirts of Manchester City Centre and is located approximately 0.5km to the northeast of Victoria Railway Station.

2.2 Site Description and Topography

The site comprises parcels of land with varied use situated to the east of Red Bank. Land uses within this package include former rail sidings, commercial land, a traveller site, timber merchants and former rubber works and print works. The site is of variable topography and is bound to the east by Collyhurst Road/Dantzic Street and to the south by Union Street Bridge.

3. SITE OPERATIONS

3.1 General

All exploratory hole work, associated sampling, *in-situ* testing and logging was carried out in accordance with techniques outlined in Table 1, as appropriate; at positions as near as practicable to those supplied by the Consulting Engineer. These are shown on the Exploratory Hole Location Plan, Field Data Enclosure 1.

Reference Code Number	Title
BS 1377:1990	Methods of Test for Soils for Civil Engineering Purposes (where not in contravention or superseded by Eurocode references)
BS 5930:2015	Code of Practice for Ground Investigation (where not in contravention or superseded by Eurocode references)
BS EN ISO 14688-1:2002 & 14688-2:2004	Identification and Classification of Soil
BS 10175:2011+A1:2013	Investigation of Potentially Contaminated Sites
BS EN ISO 22476-3: 2005	Geotechnical investigation and testing - Field testing - Part 3 Standard Penetration Testing

Table 1: British Standard Reference Code Number

The depths of all exploratory holes, descriptions of the material encountered, details of any groundwater encountered, samples taken and *in-situ* testing carried out together with any other relevant information can be found on the Borehole, Window/Windowless Sample Hole and Trial Pit Records, Field Data Enclosure 2, 3 and 4 respectively. A key to all symbols and abbreviations used throughout the report is included in the Key Sheets.

In accordance with the Site Investigation Steering Group publication “Guidelines for the Safe Investigation by Drilling of Landfills and Contaminated Land” the site was classified YELLOW, however the traveller site off Dantzic Street and the north western corner of the former railway sidings at Red bank was classed as RED.

Parts of the site are known to have issues with crime and vandalism therefore site operatives were accompanied by two transport police officers for the duration of the works and again during the monitoring period.

A number of positions required tree clearance works to be undertaken in order to gain access. Tree clearance was carried out by specialist tree surgeons (Sunnybank Forestry).

The Unexploded Ordnance (UXO) risk was determined as being low for this site so it was arranged for a specialist UXO company (1st Line Defence) to attend site and provide an Ordnance Awareness Briefing to all site operatives at the beginning of site works.

The primary purpose of ground investigation exploratory holes is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusion should be drawn concerning the presence of, size, lithological nature, and numbers per unit volume of ground cobbles and boulders in soil types such as glacial till (boulder clay).

Stratigraphical formation names have been appended to the Exploratory Records in accordance with the requirements of the contract. It should be stressed that these have been attributed based on the available information, therefore no assurance can be provided herein with regards to their accuracy.

3.2 Health & Safety Considerations: Services

Before the commencement of any exploratory hole a search for underground services was conducted as prescribed in HSE publication '*Avoiding Underground Services (HSG47)*' and in accordance with in-house internal safety procedure AEG-14.

Service plans were provided by the Client and were consulted prior to using a service locating device (such as a Cable Avoidance Tool or C.A.T.) to scan a working area around the proposed exploratory hole location. Where no services were indicated a '*Permit-to-Work*' form was issued by the investigation supervisor and, with the exception of trial pits, the position was commenced with a hand excavated inspection pit. The inspection pit was also scanned during the excavation procedure. It should be noted that the digging of an inspection pit only confirms or guards against the possible presence of underground public utility services within the excavated pit. Where no services were indicated by the scanning procedure or inspection pit the exploratory hole was commenced in accordance with the Contract Specification.

Where services were located or there was reasonable belief that they were present, the position was relocated in agreement with the Client. Details of any services uncovered/located during this investigation are given in Table 2.

Exploratory Hole Number	Type of Service	Orientation & Depth (size where indicated)	Status (Damaged/Undamaged)	Additional Remarks
TP106	Plastic pipe	130-290° at 0.30m BGL (100mm diameter)	Undamaged	Located 0.50m from Face C.
TP107	Plastic cable	100-280° at 0.40m BGL (25mm diameter)	Undamaged	None

Table 2: Services Encountered

3.3 Exploratory Holes: Boreholes

Ten boreholes were sunk using a Dando 2000 drilling rig, utilising cable percussive (shell and clay cutter) techniques, to depths of between 3.50m (BH109) and 15.00m BGL (BH104). The Borehole Records are presented as Field Data Enclosure 2 and a summary of the boreholes and any relevant remarks are detailed in Table 3.

Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Installation	Remarks
BH101	CP	7.80	Yes – refer to Section 3.6	Advanced to required depth.
BH102	CP	8.50	Yes – refer to Section 3.6	Advanced to required depth.
BH103	CP	8.30	Yes – refer to Section 3.6	Advanced to required depth.
BH104	CP	15.00	Yes – refer to Section 3.6	Advanced to required depth.
BH105	CP	11.20	Yes – refer to Section 3.6	Advanced to required depth.
BH106	CP	11.30	Yes – refer to Section 3.6	Advanced to required depth.
BH107	CP	3.95	No – reinstated	Advanced to required depth.
BH109	CP	3.50	No – reinstated	Advanced to required depth.
BH110	CP	7.00	No – reinstated	Advanced to required depth.
BH112	CP	4.30	Yes – refer to Section 3.6	Advanced to required depth.
Any relevant photographs are presented after the applicable Borehole Record				

Table 3: Borehole Summary

3.4 Exploratory Holes: Window/Windowless Sample Holes

Seven windowless sample holes were sunk using a Premier Compact 110 Series tracked rig utilising a removable liner system, to depths of between 1.50m (WS105) and 5.45m BGL (WS101, WS102 and WS105A). The Window/Windowless Sample Hole Records are presented as Field Data Enclosure 3 and a summary of the windowless sample holes and any relevant remarks are detailed in Table 4.

Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Installation	Remarks
WS101	WLS	5.45	No – reinstated	Advanced to required depth.
WS102	WLS	5.45	No – reinstated	Advanced to required depth.
WS103	WLS	3.90	No – reinstated	Terminated encountering concrete.
WS104	WLS	5.00	No – reinstated	Advanced to required depth.
WS105	WLS	1.50	No – reinstated	Terminated due to refusal.
WS105A	WLS	5.45	No – reinstated	Advanced to required depth.
WS106	WLS	4.20	No – reinstated	Terminated due to collapse from 4.20m back to 2.70m BGL.
Any relevant photographs are presented after the applicable Window/Windowless Sample Hole Record				

Table 4: Window/Windowless Sample Hole Summary

3.5 Exploratory Holes: Mechanically Excavated Trial Pits

Twenty one trial pits were mechanically excavated using the back-hoe bucket of a JCB 3CX excavator to depths of between 1.80m (TP110) and 4.50m BGL (TP103, TP106, TP107, TP108, TP109, TP111, TP115,

TP124). The Trial Pit Records are presented as Field Data Enclosure 4 and a summary of the trial pits and any relevant remarks are detailed in Table 5.

Exploratory Hole Number	Excavation Method	Completion Depth (m BGL)	Remarks
TP101	Machine Excavated	3.60	Terminated due to instability.
TP102	Machine Excavated	4.10	Terminated due to cobble obstruction
TP103	Machine Excavated	4.50	Advanced to required depth
TP104	Machine Excavated	3.80	Terminated due to instability.
TP105	Machine Excavated	3.80	Terminated due to instability.
TP106	Machine Excavated	4.50	Advanced to required depth
TP107	Machine Excavated	4.50	Advanced to required depth
TP108	Machine Excavated	4.50	Advanced to required depth
TP109	Machine Excavated	4.50	Advanced to required depth
TP110	Machine Excavated	1.80	Terminated due to groundwater ingress.
TP111	Machine Excavated	4.50	Advanced to required depth
TP112	Machine Excavated	2.80	Terminated due to groundwater ingress.
TP115	Machine Excavated	4.50	Advanced to required depth
TP119	Machine Excavated	3.15	Advanced to required depth
TP120	Machine Excavated	3.70	Advanced to required depth
TP121	Machine Excavated	3.20	Terminated due to instability.
TP122	Machine Excavated	3.00	Advanced to required depth
TP124	Machine Excavated	4.50	Advanced to required depth
TP125	Machine Excavated	2.80	Advanced to required depth
TP126	Machine Excavated	3.20	Advanced to required depth
TP127	Machine Excavated	4.00	Advanced to required depth
Any relevant photographs are presented after the applicable Trial Pit Record			

Table 5: Trial Pit Summary

3.6 Samples

Representative samples of soil were obtained from the exploratory holes and were taken to the laboratory for selected geotechnical and specialist chemical testing.

Environmental samples were taken in accordance with the contract specification during the investigation using an approved selection of container types in order to suit the encountered material properties and designated laboratory analytical parameters. Full chain of custody procedures were in place post sampling and during the transportation stage to the nominated specialist chemical laboratory. Environmental samples were administered appropriately following the best practice guidance provided in the contract specification.

3.7 Groundwater

The comments on groundwater conditions are based on the observations made at the time of investigation. It should be noted that groundwater levels may vary due to seasonal and other effects. Furthermore, water was added during advancement of the boreholes in order to facilitate drilling operations. As a consequence there is a possibility that this could have masked the discrete ingress of natural groundwater into the boreholes, which subsequently may have been sealed as a result of progressing the casing.

Groundwater was encountered in the exploratory holes during the site works operation. Where groundwater observations were made details are given on the relevant exploratory hole record and in greater detail (collectively in tabulated format) as Field Data Enclosure 5: Groundwater Observations Made at the Time of Site Works. Standing groundwater levels were recorded at the beginning and/or end of each drilling shift. The water level is indicated on the applicable Borehole and Window/Windowless Sample Hole Record as part of the boring progress information.

3.8 Instrumentation & Monitoring

Seven boreholes were installed with monitoring instrumentation in accordance with the requirements of the Consulting Engineer. Details of the installations are shown in Table 6 and on the relevant Borehole Records.

Exploratory Hole Number	Instrumentation	Installation Depth (m BGL)	Response Zone (m BGL)
BH101	1No. 50mm diameter standpipe	5.00	1.00-5.00
BH102	1No. 50mm diameter standpipe	6.50	1.90-6.70
BH103	1No. 50mm diameter standpipe	3.50	1.00-3.50
BH104	1No. 50mm diameter standpipe	9.00	1.80-9.20
BH105	1No. 50mm diameter standpipe	9.50	3.00-9.50
BH106	1No. 50mm diameter standpipe	10.00	2.00-10.00
BH112	1No. 50mm diameter standpipe	4.00	0.50-4.00

Table 6: Instrumentation Summary

Instruments were monitored for groundwater during and after the completion of the site works in accordance with the Contract Specification. A record of the readings is presented as Field Data Enclosure 7 (Groundwater Monitoring Results).

3.9 Operative Observations: Potential Contamination

For the purposes of determining the condition of the site, with regard to human health and environmental issues, reference should specifically be made to any specialist chemical testing undertaken as part of the investigation scheme, as well as any supporting desk study and risk assessment documentation. The information given herein collates the observations made by the operatives involved in the investigation only and comments that have been indicated on the engineering records.

Where there was potential evidence of contamination, principally as a consequence of olfactory and visual identification, information is provided in Table 7.

Exploratory Hole Number	Occurrence (*in-situ*/surface/ laboratory sample)	Visual / Olfactory / Laboratory Testing	Depth (m BGL)	Occurrence Type	Additional Remarks
BH103	*In-situ*	Olfactory	0.10-1.30	Hydrocarbon odour	n/a
WS106	*In-situ*	Olfactory	2.80	Hydrocarbon (benzene) odour	Noted by Arup Engineer
TP101	*In-situ*	Olfactory	0.80-0.90	Slight hydrocarbon odour	n/a
TP120	*In-situ*	Olfactory	0.70-1.80	Strong hydrocarbon odour	n/a

Table 7: Potential Contamination Encountered

It should be stressed that the information provided herein is subjective, as it is based on the perceptions of individuals and not specialists routinely involved in the chemical determination of contaminated residues, liquors, vapours or solid contaminants.

3.10 Surveying

The investigation positions were surveyed after completion of site works by Site Surveying Services Ltd These positions have been subsequently plotted in AutoCAD® software and are shown on the Exploratory Hole Location Plan, Field Data Enclosure 1.

4. *IN-SITU* TESTING

4.1 General

In-situ testing as specified by the Consulting Engineer was carried out in selected boreholes, windowless sample holes and trial pits in accordance with techniques outlined in the relevant British Standard and/or AEG Quality Procedure. The results are presented in the *In-situ* Testing Enclosures with a number of the test results summarised at the relevant depth on the Borehole, Window/Windowless Sample Hole and Trial Pit Records.

4.2 Standard Penetration Test Results

Standard Penetration Testing (SPT) was carried out in the boreholes and windowless sample holes in accordance with techniques outlined in BS EN ISO 22476-3: 2005 in order to determine the relative density and consistency of the strata encountered. The ‘N’ value (number of blows per 300mm penetration) or the penetration per blow was recorded for each test. Uncorrected ‘N’ values or penetration per blow data are provided on the applicable Borehole and Window/Windowless Sample Hole Records. (Refer to page 6 of the key sheets for further details).

More detailed information concerning the standard penetration testing is given in *In-situ* Testing Enclosure 1 which includes the following;

- Initial exploratory hole conditions prior to the test procedure.
- Calibration and energy ratio (E_m) information for the SPT hammer device used to carry out the test.
- A breakdown of blows for each 75mm penetration interval.
- Rod length (C_R) and energy (C_E) correction ratios.
- Uncorrected 'N' value.
- Corrected 'N_{60}' value that applies the rod (C_R) and energy (C_E) corrections indicated.
- Pertinent remarks corresponding to the test procedure.

In addition to the above, a graph has been prepared for each exploratory hole which plots the uncorrected and corrected 'N' value results against depth. Calibration certificates for the SPT apparatus used during the testing procedure are also presented for reference within this *In-situ* Testing Enclosure.

4.3 Hand Shear Vane

Hand shear vane testing using a calibrated Edeco Pilcon equipment was carried out in the trial pits in accordance to the ground conditions encountered. The results are presented on the relevant Trial Pit Record and in further detail within *In-situ* Testing Enclosure 2.

4.4 *In-situ* Water Quality Parameter Testing

Groundwater sampling was undertaken from the installations during the post site works monitoring in accordance with techniques outlined in the relevant British Standard and/or AEG Quality Procedure. Water Quality Parameters were recorded for the purged water prior to sampling. The parameters tested were pH, temperature, electrical conductivity, redox potential, total dissolved solids and dissolved oxygen. The results are presented in tabular format as *In-situ* Testing Enclosure 3.

5. LABORATORY TESTING

5.1 General

Laboratory testing as scheduled by the Consulting Engineer was carried out on selected samples in accordance with techniques outlined in BS 1377:1990, AEG Laboratory Quality Procedures or other appropriate standard as quoted.

5.2 Geotechnical Testing

The results are presented in the Laboratory Enclosures with an outline list of the procedures undertaken given in Table 8.

Test	Procedure
Moisture Content	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)
Plasticity Index and Moisture Content	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)
Determination of Particle Density	BS 1377 Part 2 1990
Particle Size Distribution Sieving	BS 1377 Part 2 1990
Particle Size Distribution Sedimentation	BS 1377 Part 2 1990
Determination of Loss on Ignition, Organic content, Total Sulphur, Sulphate and pH (Tested externally)	See External Laboratory Certificates
Determination of Dry Density/Moisture/CBR Relationship	BS 1377 Part 4 1990
Determination of MCV / Moisture Relationship	BS 1377 Part 4 1990
Determination of California Bearing Ratio	BS 1377 Part 4 1990
Determination of One Dimensional Consolidation Properties	BS 1377 Part 5 1990
Shear Strength by Hand Vane	BS 1377 Part 7 1990
Undrained Shear Strength in Triaxial Cell without Pore Water Pressure Measurement	BS 1377 Part 7 1990

Table 8: Geotechnical Testing

5.3 Specialist Chemical Testing

Selected samples have been submitted for chemical analysis as specified by the Consulting Engineer, conducted under a subcontract arrangement with Derwentside Environmental Testing Services (DETS). The results of this testing are presented as Appendix I.

5.4 Laboratory Identified Asbestos

Selected samples were analysed for asbestos content as specified by the Consulting Engineer. Any identified asbestos is presented in Table 9 which has been summarised from specialist chemical testing results (see Appendix I for further details).

Exploratory Hole Number	Occurrence	Depth (m BGL)	Occurrence Type	Additional Remarks
BH110	Laboratory Sample	0.30	Brown asbestos	Bundle of Amosite fibres
BH112	Laboratory Sample	0.30	Brown asbestos	Bundles of Amosite fibres
TP105	Laboratory Sample	0.30	White asbestos	Chrysotile in microscopic board debris
TP120	Laboratory Sample	1.00	White asbestos	Chrysotile in microscopic cement
TP125	Laboratory Sample	0.30	White and brown asbestos	Chrysotile in microscopic bitumen and bundles of Chrysotile and Amosite in soil
TP126	Laboratory Sample	0.30	White and brown asbestos	Amosite in loose fibrous asbestos debris and bundles of Chrysotile fibres in soil
TP127	Laboratory Sample	0.30	White and brown asbestos	Bundles of Chrysotile and Amosite fibres
WS103	Laboratory Sample	1.00	Brown asbestos	Amosite present in small bundles
WS104	Laboratory Sample	1.00	Brown asbestos	Amosite present in small bundles
WS106	Laboratory Sample	1.00	Brown asbestos	Amosite present in small bundles

Table 9: Laboratory Identified Asbestos

KEY SHEETS

Key Sheets

Allied Exploration and Geotechnics Limited
Key Sheets

INTRODUCTION

The following explanatory notes define the terminologies, abbreviations and symbols pertaining to each individual column or section of the Exploratory Hole records. 'Exploratory Hole' is used as a general term in this report to comprise borehole, drillhole, and trial pit. All exploratory hole records have been produced using ' gINT®', which is an integrated software environment for the storage and manipulation of subsurface data.

The primary purpose of ground investigation exploratory holes is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusion should be drawn concerning the presence of, size, lithological nature, and numbers per unit volume of ground cobbles and boulders in soil types such as glacial till (boulder clay). With respect to rotary coring, driller's records and observations of the recovered core are used to determine any zones of no recovery (core loss). These zones are based on the interpretation of the logging engineer and are therefore potentially subjective.

INFORMATION COMMON TO ALL EXPLORATORY HOLE RECORDS

Status Box
The status box in the top right hand corner of each exploratory hole record gives the status of each individual record i.e. PRELIM1, PRELIM2, PRELIM3 FINAL etc. The date shown relates to the last instance the data was revised. This information is for AEG Quality Assurance only.

Exploratory Hole No
The identity number used throughout the report.

Project
The ground investigation project name. Occasionally the project name may be shortened or abbreviated due to string length restraints imposed by the gINT® computer programme.

Client
Client's name responsible for funding the ground investigation project. The Client's name may be shortened or abbreviated due to string length restraints imposed by the gINT® computer programme.

Location
The exploratory hole position given as either national grid co-ordinates, local grid if specified, or a reference name normally pertaining to the area of investigation.

Method (Equipment)
Represents the drilling, excavation or boring method(s) or equipment used.

Ground Level (m(AOD))
The precise ground level in metres above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated.

Date
The date relating to the start of the exploratory hole excavation.

Sheet
The sheet number and total number of sheets for the particular record.

Checked By
Printed signature of the person who has carried out the technical quality check on the log.

Logged By
The name of the engineer who has carried out the logging of the exploratory hole.

Contract No.
The Allied Exploration & Geotechnics Limited reference number for the project.

Allied Exploration and Geotechnics Limited
Key Sheets

INFORMATION RELEVANT TO BOREHOLE AND WINDOW/WINDOWLESS SAMPLE HOLE RECORDS

Sample & Tests Columns

Depth	The depth over which a sample or test is taken is shown in depth column of the exploratory hole record in a "from...to" format.
Type No	Indicates the type of sample/test and number given by the driller.
Test Result	Result of the test given in the applicable units.

Water Column

Water Strike	Level of groundwater strike within an exploratory hole. The symbol 1 denotes a water strike and is suffixed with a number, which indicates the strike order. The corresponding unfilled symbol 1 is the depth the strike rose to.
Seepage	Groundwater seepage within an exploratory hole is denoted by the symbol.

Strata Columns

Reduced Level	The corresponding reduced level of each soil or rock boundary in metres Ordnance Datum.
Legend	A graphical representation of the materials encountered using BS 5930:1999 Amendment No.2 (Aug 2010) recommended symbols for soil and rock.
Depth (Thickness)	The depth below ground level of each soil or rock boundary in metres and the thickness of each individual stratigraphic unit (given in brackets).
Description	Engineering description of each individual soil or rock type follows recommendations outlined in Section 6 of BS 5930:1999 Amendment No.2 (Aug 2010) with the following implementation:

1 The amendment of section 6 incorporates the guidance indicated in BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003 European Standard with particular emphasis on current UK practice.

2 Supplementary laboratory or in-situ assessed measurements of undrained strength are provided where applicable information is available in parenthesis in accordance with clause 41.3.2 BS 5930:1999 Amendment No.2 (Aug 2010) after the field strength determined consistency. The description based measurement table indicating the quantitative undrained strength classification divisions is provided in Key Sheets Table 1.

Term based on measurement	**Undrained strength classification definition cu, in kPa** (from BS EN ISO 14688-2:2004, 5.3, Table 5)
Extremely low	<10
Very low	10-20
Low	20-40
Medium	40-75
High	75-150
Very High	150-300
Extremely High	300-600

KEY SHEETS TABLE 1

3 Cobble and boulder content is expressed in accordance with the terms provided in EN ISO 14688-2: 2004 where visually identified in trial pit excavations, or inferred/recovered during the drilling operations. The assessment of frequency and spatial occurrence of coarse and very coarse rock material should not be considered as precise, but only an indicator or estimate of the potential conditions. It should be noted that the recovery of coarse or very coarse particles in boreholes is dependent on the limitations imposed by the casing diameter. The terminology used is outlined in Key Sheets Table 2.

Fraction	Percent by Mass	Term
Boulders	<5	Low boulder content
	5 to 20	Medium boulder content
	>20	High boulder content
Cobbles	<10	Low cobble content
	10 to 20	Medium cobble content
	>20	High cobble content

KEY SHEETS TABLE 2

4 Rock Strength based on assessed field or measured unconfined compressive strength follows the classification scheme given in clause 44.2.1 BS5930:1999 Amendment No.2 (Aug 2010) as outlined in Key Sheets Table 3.

Term for use in field or based on measurement	Definition for field use	Definition on basis of Unconfined Compressive Strength measurement (MPa)	*Old Classification of rock strength: Terminology (Strength Range MPa)*	*Old Classification of rock strength: Determination Method*
Extremely weak	Can be indented by thumbnail. Gravel sized lumps crush between finger and thumb.	0.6-1.0	*Very Weak (<1.25)*	*Lumps can be crushed between fingers*
Very weak	Crumbles under firm blows with point of geological hammer. Can be peeled by a pocket knife.	1-5	*Weak (1.25 – 5)*	*Lumps can be broken with heavy hand pressure*
Weak	Can be peeled by a pocket knife with difficulty. Shallow indentations made by firm blow with the point of geological hammer.	5-25	*Moderately Weak (5-12.50)*	*This slab can be broken with heavy pressure*
Medium Strong	Cannot be scraped with pocket knife. Can be fractured with a single firm blow of geological hammer.	25-50	*Moderately Strong (12.50-50)*	*Rock can be broken in the hand with a hammer*
Strong	Requires more than one blow of geological hammer to fracture.	50-100	*Strong (50-100)*	*Rock can be broken on a flat surface using a hammer*
Very Strong	Requires many blows of geological hammer to fracture.	100-250	*Very Strong (100-200)*	*Rock chipped by blows with a hammer*
Extremely strong	Can only be chipped with geological hammer.	>250	*Extremely Strong (>200)*	*Rock rings when hit with a hammer*
Based on BS EN ISO 14689-1:2003 4.2.7, Table 5			*BS5930: 1999 – Section 6 (Superseded Version)*	

KEY SHEETS TABLE 3

5 Where 'rock weathering classification' can be applied it is 'Approach 4' which will be used. If any other approach is used the factual text of the report will provide details of the applicable specific approach. (Ref.: Figure 19, p143, BS 5930:1999 Amendment No.2 (Aug 2010)). An outline of the 'Approach 4' rock weathering classification scheme is provided as Key Sheets Table 4.

APPROACH 4 CLASSIFICATION INCORPORATING MATERIAL AND MASS FEATURES		
Class	**Classifier**	**Typical characteristics**
A	Unweathered	Original strength, colour, fracture spacing
B	Partially weathered	Slightly reduced strength, slightly closer fracture spacing, weathering penetrating in from fractures, brown oxidation
C	Distinctly weathered	Further weathered, much closer fracture spacing grey reduction
D	Destructured	Greatly weakened, mottled, ordered lithorelics in matrix becoming weakened and disordered, bedding disturbed.
E	Residual or reworked	Matrix with occasional altered random or 'apparent' lithorelics, bedding destroyed. Classed as reworked when foreign inclusions are present as a result of transportation.

KEY SHEETS TABLE 4

Instrument/Backfill Column

A graphical representation of backfill material or instrumentation detail using graphic legends. Its placement in the column is relative to depth in metres and corresponds to the exploratory hole in scale.

Boring Progress and Water Observations Columns

This section provides information on each day's production as a daily log.

Date	Date of shift.
Depth	Depth of hole at the start of the shift.
Casing	Casing's depth at the start of the shift.
Casing Dia	Casing's diameter at the start of the shift.
Water Depth	Water level within the borehole at the start and end of shift.

Chiselling Columns

Indicates where hard strata occurred in the borehole and breaking out was carried out to advance the borehole.

From	The depth commenced.
To	The depth finished.
Hours	The time spent for breaking out.

Water Added Columns

Indicates the depth range where water was added to the borehole to facilitate boring or to prevent stress relief disturbance "blowing/boiling" in granular soils.

From	Depth in metres from where water was added.
To	Depth in metres to where water was added.

General Remarks

Any remarks believed to be relevant to the exploratory hole.

INFORMATION RELEVANT TO PIT/TRENCH RECORDS

The pit/trench records follow the same format as the borehole and window/windowless sample hole records for the Samples & Tests, Water and Strata columns. However, in addition to these there are the following:

Plan

A schematic plan view of the pit showing its excavated dimensions together with its orientation, given as a compass bearing to magnetic north.

Groundwater

Notes on water bearing horizons.

Stability

The engineer's comments outlining the stability of the sides during pit excavation.

General Remarks

The engineer's comments of any other information relevant to construction of the pit.

Additional Information

An indication if a sketch and/or photographs accompany the record.

Allied Exploration and Geotechnics Limited
Key Sheets

Underground Services

Depth	Depth service was encountered.
Orientation	Orientation given as a compass bearing to magnetic north.
Type	Type of service encountered.
Diameter	Diameter of service encountered.
Condition	Condition the service encountered was noticed in.

INFORMATION RELEVANT TO DRILLHOLE RECORDS AND ROTARY CONTINUATION

Run Details Columns

Depth	Each drill run is highlighted by a horizontal line with the top and bottom depths shown in metres. Core diameter (C Dia) is presented also within each run.
TCR (SCR) RQD	Information provided on the total core recovery, solid core recovery and rock quality designation. Refer to Abbreviations for further details.
Fracture Index	Information given relating to the fracture index of the rock.

Strata Columns

As the strata columns for borehole and window/windowless sample hole records except for description which is as follows:

Discontinuities Detail	Information on core discontinuities, localised variations in weathering, lithology, strength and structure follows recommendations outlined in Section 6 BS 5930:1999 Amendment No.2 (Aug 2010):Clause 44.
Main	Engineering description of each individual soil or rock type follows recommendations outlined in Section 6 of BS 5930:1999 Amendment No.2 (Aug 2010).

Instrument/Backfill Column

A graphical representation of backfill material or instrumentation detail using graphic legends. Its placement in the column is relative to depth in metres and corresponds to the exploratory hole in scale.

Drilling Progress and Water Observations Columns

Date	Date of shift.
Depth	Depth of hole at the start of the shift.
Casing	Casing's depth at the start of the shift.
Water Strike	Depth at which water was encountered.
Water Standing	Depth at which water in the hole levelled off.
Water Remarks	Any remarks believed to be relevant to the water e.g. Artesian.

Standard Penetration Test

Depth	The depth commenced.
Type	Type of standard penetration test (SPT).
Result	Result of SPT.

Flush

From	The depth commenced.
To	The depth finished.
Type	Details of the type of flush used. A = Air, F = Foam, W = Water and Pol = Polymer.
Returns	An indication of the percentage of the returned flush material.

General Remarks

Any remarks believed to be relevant to the exploratory hole.

Allied Exploration and Geotechnics Limited
Key Sheets

SAMPLES

B	Bulk disturbed sample.
ES	Environmental soil sample.
EW	Environmental water sample.
G	Gas sample.
J	Small disturbed sample.
LB	Large bulk disturbed sample.
P	Piston sample.
P*	An attempted but failed undisturbed piston sample.
U	Undisturbed sample.
U*	An attempted but failed general purpose undisturbed sample.
$U_{(ss)}$	Sample has been subsampled.
$ES_{(U)}$	Brackets following a sample denotes a subsample. The sample information within the brackets is the origin of the subsample.
W	Water sample.

IN-SITU TESTS

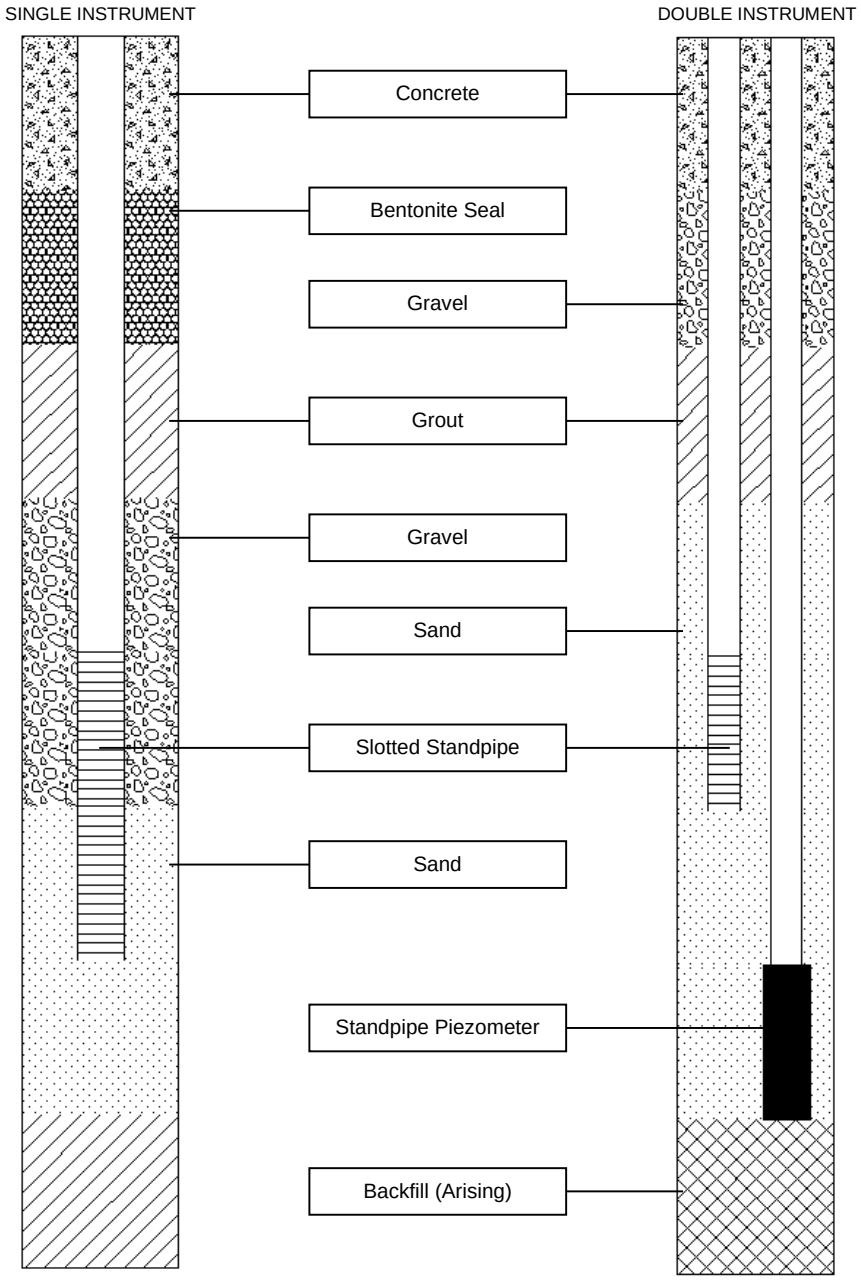
CBR	California Bearing Ratio mould sample or test.
HSV	In-situ hand shear vane.
HSV*	An attempted but failed in-situ hand shear vane.
HP	Hand penetrometer test.
K (F)	Falling head permeability test.
K (R)	Rising head permeability test.
K (C)	Constant head permeability test.
K (P)	Packer permeability test.
PT	Pressuremeter test.
PID	Photo ionisation detector test.
FID	Flame ionisation detector test.
S	Standard Penetration Test (SPT) using the split barrel sampler (shoe). The corresponding uncorrected 'N' value is given in the test result column with more detailed information provided in the In-Situ Testing Enclosures where applicable. Testing has been conducted in accordance with BS EN ISO 22476-3: 2005.
C	Denotes SPT test using a solid cone in preference to the split barrel sampler (usually in coarse granular soil) with all other reporting requirements as outlined above for the split barrel sampler.
S/C result of e.g. 1/2.94	Denotes where full penetration has not been achieved during the SPT test. In such cases the penetration (mm) per blow is recorded in the test result column e.g. 1/2.94 is 2.94mm of penetration per single blow.
SV	In-situ down-the-hole shear vane test. The remoulded shear strength is given in brackets.

ROCK QUALITY AND CORE RECOVERY

TCR	Total Core Recovery - the length of the recovered core expressed as a percentage of the length of core run.
SCR	Solid Core Recovery - the sum length of all core pieces that are recovered with at least one full diameter, expressed as a percentage of the length of core run.
RQD	Rock Quality Designation - The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.
FI	Fracture Index - The number of fractures per 1000mm length of solid core.
NI	Non-intact - The material recovered in a non-intact state.
NR	No recovery from the core run. These zones are based on the interpretation of the logging engineer and are therefore potentially subjective.

Allied Exploration and Geotechnics Limited
Key Sheets

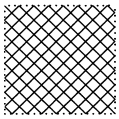
Symbols and Abbreviations: Explanation of Instrumentation Legends Used



Allied Exploration and Geotechnics Limited
Key Sheets

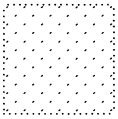
Symbols and Abbreviations: Explanation of Legends Used

Soils	Rocks		
	Sedimentary	*Metamorphic*	*Igneous*

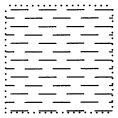

Made Ground


Cobbles and Boulders

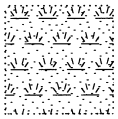

Gravel


Sand


Silt

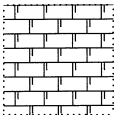

Clay

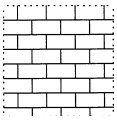

Peat

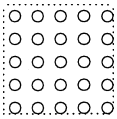

Topsoil

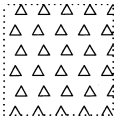
Note: Composite soil types will be signified by combined symbols e.g.

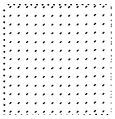

Silty Sand

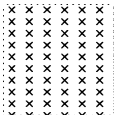

Chalk


Limestone


Conglomerate


Breccia


Sandstone


Siltstone

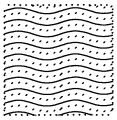

Mudstone

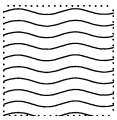

Shale


Coal

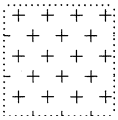

Pyroclastic (Volcanic Ash)

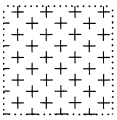

Gypsum


Coarse Grained


Medium Grained


Fine Grained

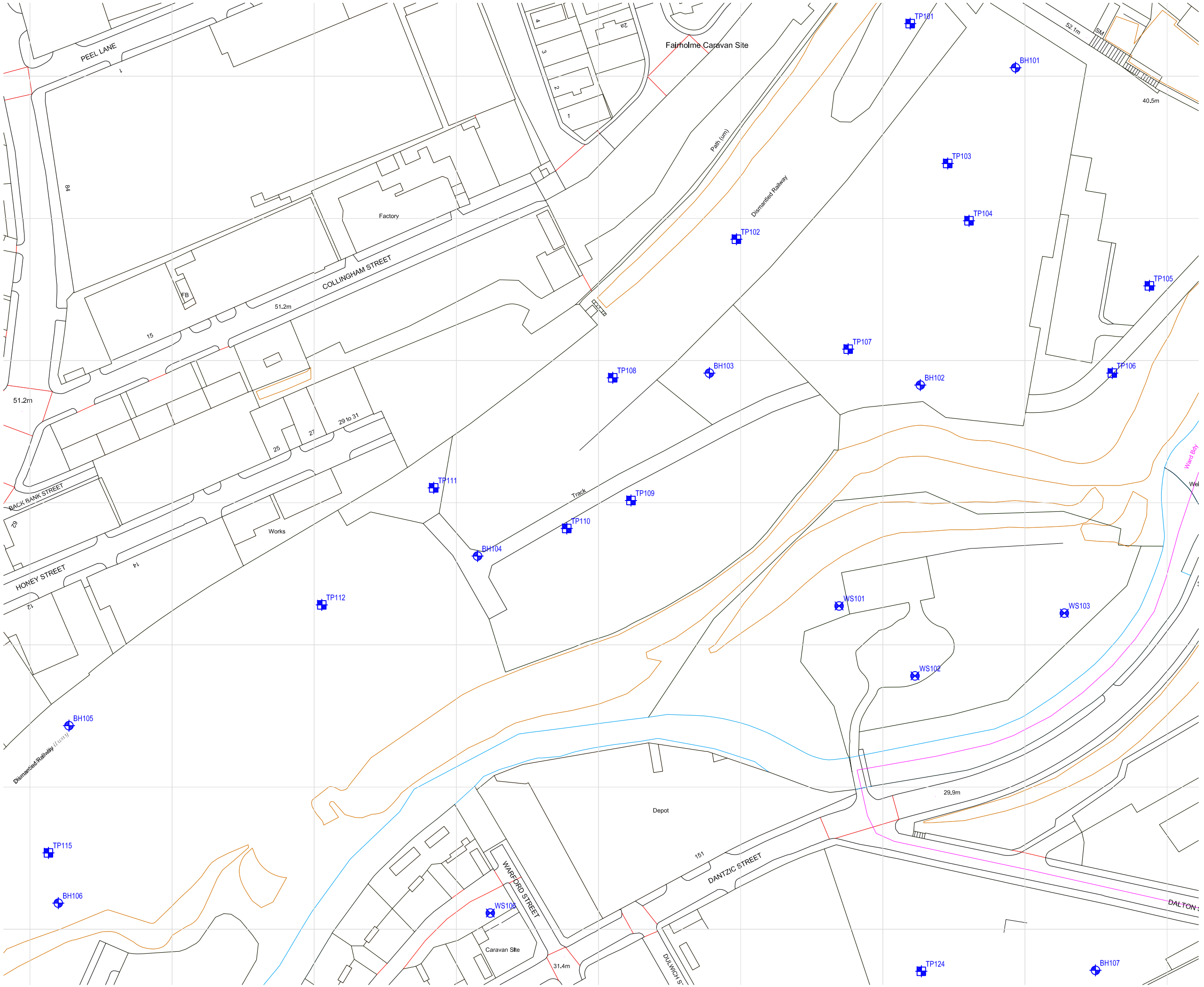

Coarse Grained


Medium Grained


Fine Grained

Exploratory Hole Location Plan

FIELD DATA ENCLOSURE 1



Allied Exploration and Geotechnics Limited
Unit 25 Stella Gill Industrial Estate
Pelton Fell
Chester - Le - Street
Co Durham
DH2 2RG
(Tel): 0191 387 4700
(Fax): 0191 387 4710
(Email): enquiries@aeg.uk.net

KEY:

BOREHOLE

WINDOW/WINDOWLESS SAMPLE HOLE

TRIAL PIT

N W E S

Base Plan Supplied by Consulting Engineer

Drawing Title:
ENC 01 : Exploratory Hole Location Plan

Drawing No.:
AEG/NW1580/01

Contract Title:
Northern Gateway

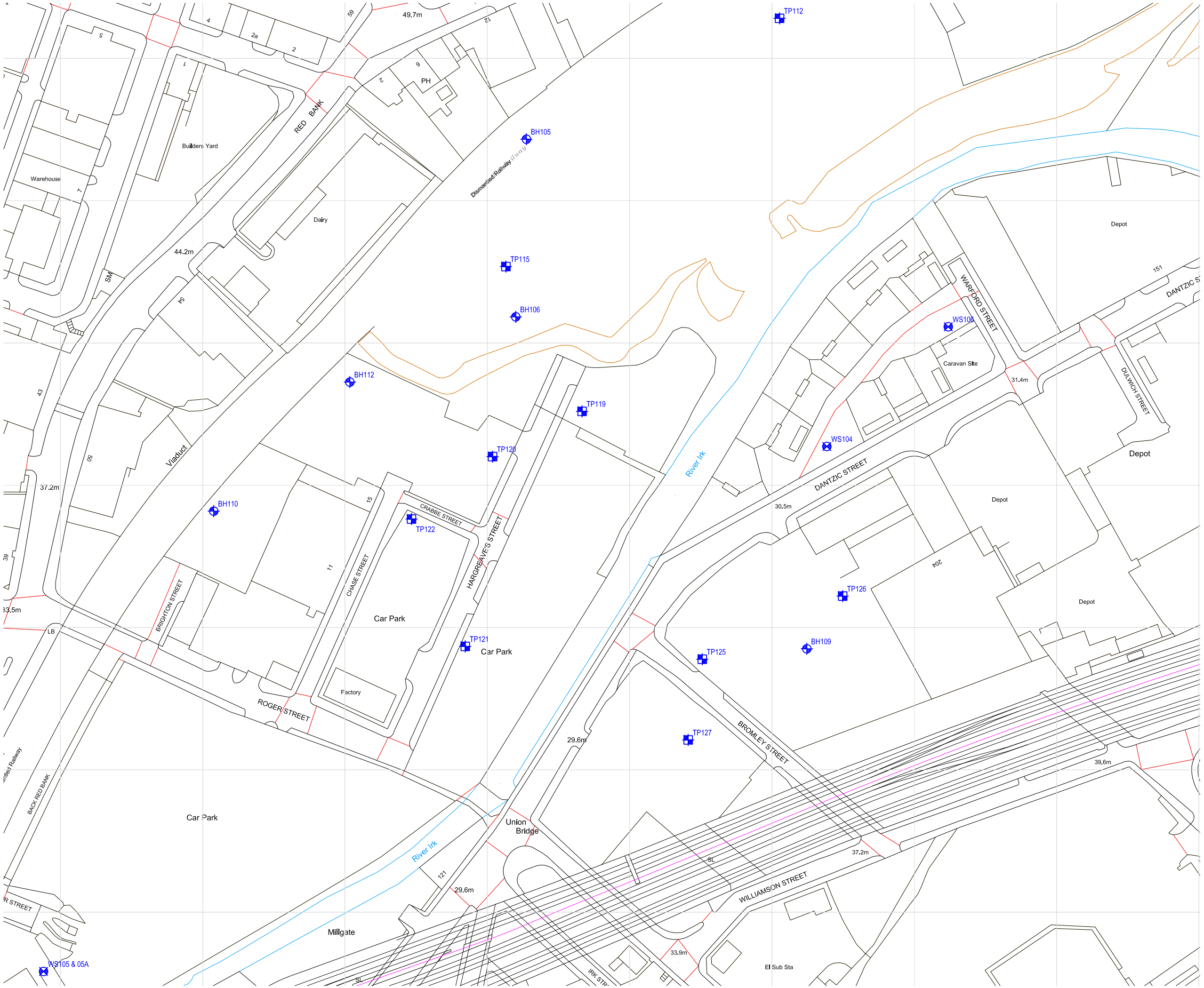
Client:
Far East Consortium International Limited
Second Floor, Northern Assurance Building,
Princess Street, Manchester, M2 4DN

Consultant:
Ove Arup & Partners Limited
9th Floor, St. Pauls Place,
Norfolk Street, Sheffield, S1 2JE

Contract No.:
NW1580

Scale:
1:1250 @ A3

Date:
05/02/2019



Allied Exploration and Geotechnics Limited

Unit 25 Stella Gill Industrial Estate
Pelton Fell
Chester - Le - Street
Co Durham
DH2 2RG
(Tel): 0191 387 4700
(Fax): 0191 387 4710
(Email): enquiries@aeg.uk.net

KEY:

BOREHOLE

WINDOW/WINDOWLESS SAMPLE HOLE

TRIAL PIT

N

W E

S

Base Plan Supplied by Consulting Engineer

Drawing Title:
ENC 01 : Exploratory Hole Location Plan

Drawing No.:
AEG/NW1580/02

Contract Title:
Northern Gateway

Client:
Far East Consortium International Limited
Second Floor, Northern Assurance Building,
Princess Street, Manchester, M2 4DN

Consultant:
Ove Arup & Partners Limited
9th Floor, St. Pauls Place,
Norfolk Street, Sheffield, S1 2JE

Contract No.:
NW1580

Scale:
1:1250 @ A3

Date:
05/02/2019

FIELD DATA ENCLOSURE 2

Borehole Records

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384796.682 N:399802.989		**BH101**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 43.377	**Start Date:** 03/01/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				43.327		0.05	MADE GROUND (Macadam).	
0.10	J1					(0.55)	MADE GROUND (Yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes limestone).	
0.30	ES2							
0.50	B3			42.777		0.60		
0.80	ES4					(0.50)	MADE GROUND (Black brown sandy gravel with fragments of wood. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular and includes brick, clinker and concrete).	
1.00	J5			42.277		1.10		
1.20	ES6					(0.40)	MADE GROUND (Soft brown grey black slightly sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium and includes clinker, brick, coal and concrete).	
				41.877		1.50		
1.50-2.00	B8						MADE GROUND (Firm brown slightly sandy slightly gravelly clay with fragments of wood. Sand is fine to coarse. Gravel is fine to medium and includes clinker, brick and concrete).	
1.50-1.95	SJ7	N11					at c.1.50m BGL ... clay is of low plasticity.	
2.20	ES9							
2.30	B10					(2.00)		
2.50-3.00	B12							
2.50-2.95	SJ11	N14						
3.20	ES13							
3.30	J14			39.877		3.50		
3.50-4.00	U*B15	(22)					MADE GROUND (Firm brown sandy slightly gravelly clay with fragments of wood. Sand is fine to coarse. Gravel is fine to medium and includes sandstone and coal). (Driller notes brick).	
4.00-4.50	B17						at c.4.00m BGL ... clay is of low plasticity.	
4.00-4.45	SJ16	N14				(1.90)		
4.80	ES18							
5.00	B19							
				37.977		5.40		
5.50-6.00	B21						Medium dense red brown SAND with occasional soft interbeds of clay. Sand is fine to coarse. (Glacial Till Deposits/Weathered Collyhurst Sandstone Formation).	
5.50-5.95	SJ20	N23						
6.20	ES22					(1.60)		
6.30	B23							
				36.377		7.00		
7.00-7.50	B25						Extremely weak to very weak red fine to coarse grained SANDSTONE with occasional lenses of red marl. (Collyhurst Sandstone Formation).	
7.00	SJ24	25/7mm				(0.80)		
7.50	SJ26	50/3mm						
				35.577		7.80		
7.80	S27	100/0mm					*Complete at 7.80m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
03/01/2019	0.00	0.00	200	
03/01/2019	7.80	7.80	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
7.50 - 7.80	1:00	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 1.00-5.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:45

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384763.180 N:399691.375		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 42.934	**Start Date:** 03/01/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.30 0.30 0.50-1.00	J1 ES2 B3					(1.20)	MADE GROUND (Black brown clayey very sandy gravel with cobbles noted and fragments of wood. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular and includes brick, clinker and concrete. Cobbles are angular and include brick). at c.0.30m BGL ... clay is of low plasticity.	
				41.734		1.20		
1.20-1.70 1.20-1.65 2.00 2.20 2.50-3.00	B5 SJ4 J6 ES7 U*B8	N9 (120)				(3.40)	MADE GROUND (Soft brown grey black slightly sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium and includes clinker, brick, coal and concrete). (Driller notes cobbles).	
3.00-3.50 3.50 3.60-4.05 4.10	SB9 ES10 SJ11 ES12	N19 N5					at c.3.00m BGL ... clay is of low plasticity.	
				38.334		4.60		
4.60-5.05 5.10	SJ13 ES14	N8				(0.90)	MADE GROUND (Loose black brown sandy gravel. Sand is fine to coarse and includes ash. Gravel is fine to medium angular and includes coal and sandstone).	
				37.434		5.50		
5.50-5.95 6.00 6.10-6.60	SJ15 ES16 U*B17	N12 (100)				(1.30)	Firm mottled brown yellow sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium and includes sandstone and mudstone. (Glacial Till Deposits/Weathered Manchester Marls Formation).	
				36.134		6.80		
6.80 6.90-7.40 6.90-7.35	J18 B20 SJ19	N27				(1.70)	Red brown clayey calcareous MUDSTONE with interbeds of sandy gravelly clay. Sand is fine to medium. Gravel is fine to coarse and angular. (Manchester Marls Formation). at c.6.80m BGL ... clay fines are of Intermediate plasticity. Laboratory notes brick fragments - probable fall in from above.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
03/01/2019	0.00	0.00	150	

Chiselling

From - To	Duration (hh:mm)
2.70 - 3.00	1:00

Water Added

From - To
3.80 - 5.10

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 1.90-6.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. NW1580

Print Date and Time: 19/03/2019 16:43:46

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384763.180 N:399691.375		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 42.934	**Start Date:** 03/01/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.00	J21			34.434		8.50		
8.50	SJ22	50/190mm					*Complete at 8.50m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
03/01/2019	8.50	7.10	150	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 1.90-6.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:46

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384689.014 N:399695.588		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 42.570	**Start Date:** 04/01/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				42.470		0.10	MADE GROUND (Black brown gravel. Gravel is fine to coarse subangular and includes limestone and slag).	
0.10	J1		1					
0.30	ES2						MADE GROUND (Black sandy gravel with fragments of wood, metal and plastic. Sand is fine to coarse. Gravel is fine to coarse and includes brick and concrete. Hydrocarbon odour noted).	
0.50	B3					(1.20)		
0.90-3.50	EW1							
1.00	ES4			41.270		1.30		
							MADE GROUND (Firm brown slightly sandy slightly gravelly clay with metal, ceramic and glass fragments. Gravel is fine to medium subangular to subrounded and includes sandstone, coal and mudstone).	
1.50-2.00	B6						at c.1.50m BGL ... clay is of intermediate plasticity.	
1.50-1.95	SJ5	N18						
2.20	ES7					(2.20)		
2.30	J8							
2.50-3.00	B10							
2.50-2.95	SJ9	N11						
3.20	ES11							
3.30	B12			39.070		3.50		
3.50-4.00	U*B13	(33)					Brown clayey GRAVEL. Gravel is fine to coarse subangular to subrounded and includes sandstone and limestone. (Glacial Till Deposits).	
				38.570		(0.50) 4.00		
							Stiff and very stiff brown red silty slightly sandy CLAY. (Weathered Manchester Marls Formation).	
4.00-4.50	B15							
4.00-4.45	SJ14	N39						
4.80	ES16							
5.00	J17							
5.50-6.00	B19						at c.5.50m BGL ... clay is of intermediate plasticity.	
5.50-5.95	SJ18	N20				(4.00)		
6.50	J20							
7.00-7.50	B22							
7.00	SJ21	50/164mm						
				34.570		8.00		

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
04/01/2019	0.00	0.00	200	
04/01/2019	5.00	5.00	200	Dry
07/01/2019	5.00	5.00	200	4.00

Chiselling

From - To	Duration (hh:mm)
8.00 - 8.30	1:00

Water Added

From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Water strike at 0.60m BGL - water level rose to 0.30m BGL (20mins).
(4) 50mm diameter slotted standpipe installed between 1.00-3.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:47

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384689.014 N:399695.588		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 42.570	**Start Date:** 04/01/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.00	J23						Extremely weak red brown calcareous MUDSTONE.	
				34.270		8.30	(Manchester Marls Formation).	
8.30	SJ24	100/9mm					*Complete at 8.30m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
07/01/2019	8.30	8.30	200	4.00

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Water strike at 0.60m BGL - water level rose to 0.30m BGL (20mins).
(4) 50mm diameter slotted standpipe installed between 1.00-3.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:47

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384607.460 N:399631.240		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 41.588	**Start Date:** 04/01/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.30	J1					(0.60)	MADE GROUND (Grey black gravel. Gravel is fine to medium subangular and includes limestone, clinker and burnt shale).	
0.40	ES2			40.988		0.60		
0.60	J3						MADE GROUND (Grey red orange gravel. Gravel is fine to coarse subangular and includes clinker and burnt shale).	
0.70	ES4							
0.70-1.20	B5							
1.50-2.00	B8					(1.90)	at c.1.50m BGL ... loose.	
1.50-1.95	SJ6	N6						
1.70	ES7							
				39.088		2.50		
2.50-3.00	B11						MADE GROUND (Soft brown slightly sandy slightly gravelly clay. Sand is fine to coarse and includes ash. Gravel is fine to medium subangular and includes clinker and brick).	
2.50-2.95	SJ9	N4						
2.70	ES10							
3.50-4.00	SB12	N4						
3.70	ES13					(3.50)		
4.50-5.00	B16						at c.4.50m BGL ... firm.	
4.50-4.95	SJ14	N12						
4.70	ES15							
5.30-5.80	U*B17	(50)						
				35.588		6.00		
6.00-6.50	B19						MADE GROUND (Loose to medium dense black brown very clayey sand and gravel. Sand is fine to coarse and includes ash. Gravel is fine to coarse subangular and includes clinker and brick).	
6.00-6.45	SJ18	N10						
6.70	ES20							
7.00	J21							
7.50-8.00	B24					(3.00)		
7.50-7.95	SJ22	N13						
7.70	ES23							

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
04/01/2019	0.00	0.00	150	
04/01/2019	1.20	0.00	150	Dry
07/01/2019	1.20	0.00	150	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) No groundwater inflow observed.
(4) 50mm diameter slotted standpipe installed to 1.80-9.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:48

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384607.460 N:399631.240		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 41.588	**Start Date:** 04/01/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.50	J25			32.588		9.00	MADE GROUND (Loose to medium dense black brown very clayey sand and gravel. Sand is fine to coarse and includes ash. Gravel is fine to coarse subangular and includes clinker and brick). *(continued)*	
9.00-9.50 9.00-9.45	B27 SJ26	N11				(1.00)	MADE GROUND (Soft and firm brown sandy gravelly clay. Sand is fine to coarse and includes ash. Gravel is fine to medium subangular and includes clinker).	
9.70	ES28			31.588		10.00		
10.00	J29						Soft brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subangular and includes coal and sandstone. (Engineer notes fine brick fragments - probable fall in from above). (Alluvium/Glacial Till Deposits). at c.10.50m BGL ... clay is of low plasticity.	
10.50-11.00 10.50-10.95 10.70	B32 SJ30 ES31	N5				(2.70)		
11.50	J33							
12.00-12.50 12.00-12.45 12.30	B35 SJ34 ES34	N6		28.888		12.70		
12.70	J36						Dense red brown SAND. Sand is fine to medium. (Glacial Till Deposits/Weathered Chester Formation).	
13.00-13.50 13.00-13.45	B38 SJ37	N45				(1.00)		
13.50	ES39			27.888		13.70		
13.70	J40			27.588		14.00	Firm to stiff red CLAY. (Glacial Till Deposits/Weathered Chester Formation).	
14.00-14.50 14.00	B42 SJ41	50/115mm				(1.00)	Very weak to weak red fine to coarse grained SANDSTONE partially weathered. (Recovered as gravel. Gravel is fine to coarse angular). (Chester Formation).	
14.80	SJ43	50/20mm		26.588		15.00		
15.00	J43						*Complete at 15.00m BGL.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
07/01/2019	10.00	9.73	150	Damp
08/01/2019	10.00	9.73	150	Damp
08/01/2019	15.00	14.50	150	13.46

Chiselling

From - To	Duration (hh:mm)
14.00 - 15.00	1:00

Water Added

From - To
12.50 - 13.50
13.70 - 14.70

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) No groundwater inflow observed.
(4) 50mm diameter slotted standpipe installed to 1.80-9.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:48

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway		**Exploratory Hole No.** BH105
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384463.735 N:399571.588	
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 40.666 / **Start Date:** 04/01/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.20	J1					(0.60)	MADE GROUND (Grey gravel. Gravel is fine to medium subangular and includes limestone).	
0.20-0.50	B3							
0.30	ES2			40.066		0.60		
0.60	J4						MADE GROUND (Soft and firm brown slightly sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium and includes sandstone and clinker). (Driller notes cobbles).	
0.60-1.20	B6							
0.70	ES5							
1.50-2.00	B8					(2.00)		
1.50-1.95	SJ7	N7						
2.20	J9							
2.30	ES10							
2.50-3.00	U*B11	(31)		38.066		2.60		
3.00	J12						Medium dense brown silty slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone. (Alluvium)	
3.20	B13							
3.30	ES14							
3.50-4.00	B16						at c.3.50m BGL ... sandy slightly gravelly silt.	
3.50-3.95	SJ15	N12						
4.20	J17							
4.30	ES18							
4.50-5.00	B20							
4.50-4.95	SJ19	N12						
4.52-9.00	EW1					(4.70)		
5.50	J21							
5.80	ES22							
6.00-6.50	B24							
6.00-6.45	SJ23	N12						
7.00	J25			33.366		7.30		
7.50-8.00	B27						Medium dense grey SAND. Sand is fine to coarse. (Alluvium).	
7.50-7.95	SJ26	N15						

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
04/01/2019	0.00	0.00	200	
04/01/2019	1.20	0.00	200	Dry
08/01/2019	1.20	0.00	200	Dry

Chiselling

From - To	Duration (hh:mm)

Water Added

From - To
1.20 - 11.20

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 3.00-9.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. NW1580

Print Date and Time: 19/03/2019 16:43:50

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384463.735 N:399571.588		**BH105**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 40.666	**Start Date:** 04/01/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
						(1.50)	Medium dense grey SAND. Sand is fine to coarse. (Alluvium). *(continued)*	
8.50	J28			31.866		8.80		
9.00-9.50	B30						Medium dense red brown slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium and includes sandstone. (Possible Weathered Chester Formation).	
9.00-9.45	SJ29	N15				(1.10)		
				30.766		9.90		
10.00	J31						Red brown slightly silty SAND. Sand is fine to coarse. (Possible Weathered Chester Formation).	
10.50-10.80	B33					(0.90)		
10.50-10.95	SJ32	N29		29.866		10.80		
10.80	SJ34	50/11mm				(0.40)	Very weak to weak red fine to coarse grained SANDSTONE partially weathered. (Recovered as gravel. Gravel is fine to coarse angular). (Chester Formation).	
11.20	SJ35	100/0mm		29.466		11.20	*Complete at 11.20m BGL.*	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
08/01/2019	11.20	11.20	200	Dry	10.80 - 11.20	1:00		(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 50mm diameter slotted standpipe installed between 3.00-9.50m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:50

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway		**Exploratory Hole No.** BH106
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384459.989 N:399509.165	
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 40.671 / **Start Date:** 07/01/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				40.471		0.20	MADE GROUND (Soft brown sandy clay with many rootlets. Sand is fine to medium).	
0.30	ES1						MADE GROUND (Loose and medium dense black brown grey clayey sandy gravel with cobble noted. Sand is fine to coarse. Gravel is fine to coarse and includes clinker, brick, coal and concrete. Cobbles are angular and includes sandstone and brick). (Driller noted poor recovery).	
0.70	J2							
1.30	ES3							
1.50	CB4	N9					at c.1.50m BGL ... cobbles with much clayey gravelly sand.	
2.30	ES5							
2.50-2.95	C6	N15				(5.60)		
3.30	ES7							
3.50-3.95	C8	N8						
4.30	ES9							
4.50-4.95	C10	N7						
5.30	ES11							
5.50-5.95	CB12	N11		34.871		5.80		
6.30	ES13					(1.10)	MADE GROUND (Soft and firm brown grey slightly sandy slightly gravelly CLAY with occasional laminae. Sand is fine to medium. Gravel is fine to medium subangular and includes clinker and brick). (Driller notes cobbles).	
6.50	J14							
6.60-6.80	B15			33.771		6.90		
7.00-7.45	CB16	N12					Firm brown very sandy slightly gravelly CLAY with interbeds of sand. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and coal. (Glacial Till).	
7.60	ES17							

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
07/01/2019	0.00	0.00		
07/01/2019	1.20	0.00		Dry
08/01/2019	1.20	0.00		Dry

Chiselling

From - To	Duration (hh:mm)

Water Added

From - To
1.20 - 11.30

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 2.00-10.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. NW1580

Print Date and Time: 19/03/2019 16:43:51

ALLIED EXPLORATION & GEOTECHNICS LIMITED

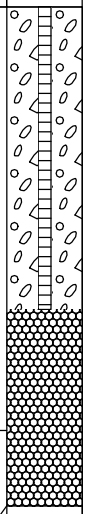
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH106
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384459.989 N:399509.165		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 40.671	**Start Date:** 07/01/2019	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
8.00	J18						Firm brown very sandy slightly gravelly CLAY with interbeds of sand. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and coal. (Glacial Till). *(continued)*	
8.30	ES19						at c.8.00m BGL ... clay is of low plasticity.	
8.50-9.00	U20	(26)				(3.90)	at c.8.50m BGL ... low strength.	
9.30	ES22							
10.00-10.45	B24							
10.00-10.45	SJ23	N15		29.871		10.80		
11.00	CB25	50/37mm				(0.50)	Weak red fine to coarse grained SANDSTONE partially weathered. (Recovered as gravel. Gravel is fine to coarse angular). (Chester Formation).	
11.20	J26			29.371		11.30		
11.30	C27	50/16mm					*Complete at 11.30m BGL.*	



Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
08/01/2019	11.30	10.90		Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
11.10 - 11.30	0:30	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 2.00-10.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:51

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- **FINAL**

Project: Northern Gateway		**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384824.812 N:399485.537	**BH107**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 41.293 / **Start Date:** 04/01/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.20-0.50 0.30	J1 B3 ES2			40.793		(0.50) 0.50	MADE GROUND (Brown black clayey very sandy gravel with fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and clinker).	
0.50 0.60-1.10 0.70	J4 B6 ES5			40.093		(0.70) 1.20	MADE GROUND (Firm brown sandy slightly gravelly clay. Sand is fine to medium Gravel is fine to medium and includes clinker, sandstone, coal and brick).	
1.50-1.95	CB7	N7		39.693		(0.40) 1.60	MADE GROUND (Brown black clayey sandy gravel with fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and clinker).	
2.00 2.10 2.20-2.40	ES8 J9 B10			39.193 38.893		(0.50) 2.10 2.40	MADE GROUND (Soft and firm brown sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium and includes clinker, sandstone, coal and brick). at c.1.60m BGL ... clay is of intermediate plasticity.	
2.50-2.95	CB11	N28					Firm red brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium and includes sandstone and coal). (Possible Weathered Manchester Marl Formation).	
3.00 3.10-3.40 3.50-3.95	J12 B13 C14	N37		37.343		(1.55) 3.95	Extremely weak red brown slightly sandy calcareous MUDSTONE and with interbeds of weak red fine to medium grained SANDSTONE. (Manchester Marl Formation). at c.2.50m BGL ... clay fines are of low plasticity.	
							Complete at 3.95m BGL.	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
04/01/2019	0.00	0.00	150	
04/01/2019	1.20	0.00	150	Dry
09/01/2019	1.20	0.00	150	Dry
09/01/2019	3.95	2.60	150	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
		1.20 - 3.50

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:52

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** BH109
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384562.256 N:399392.535		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 31.477	**Start Date:** 09/01/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.30 0.40 0.40-1.00	J1 ES2 B3					(1.30)	MADE GROUND (Red brown black clayey very sandy gravel with cobbles noted and fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and clinker).	
1.20 1.30-1.80	ES4 CB5	N20		30.177		1.30	MADE GROUND (Firm and stiff brown sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium and includes clinker, sandstone, coal and brick).	
2.00 2.30-2.80	ES6 CB7	N29				(1.70)	at c.2.00m BGL ... clay is of low plasticity.	
3.00 3.10-3.50 3.10	J8 B10 SJ9	50/95mm		28.477		3.00	Very weak to weak red fine to medium grained SANDSTONE partially weathered. (Chester Formation).	
3.50	S11	50/20mm		27.977		3.50	*Complete at 3.50m BGL.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
09/01/2019	0.00	0.00	150	
09/01/2019	3.50	3.10	150	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
3.20 - 3.50	1:00	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:53

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- **FINAL**

Project: Northern Gateway		**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384353.882 N:399440.903	**BH110**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 31.263 / **Start Date:** 10/01/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1						MADE GROUND (Red brown black sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick, clinker and wood).	
0.30	ES2					(1.60)		
1.20	S3	50/190mm					at c.1.20m BGL ... very dense/possible obstruction.	
1.40	J3			29.663		1.60		
1.60	J4						MADE GROUND (Firm brown sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, coal, clinker and sandstone).	
2.00	ES5						(Driller notes cobbles).	
2.10-2.60	SB6	N22				(2.30)		
3.00	ES7							
3.10-3.60	B9						at c.3.10m BGL ... silty gravelly sand. Silt fines are of intermediate plasticity.	
3.10-3.55	SJ8	N15						
				27.363		3.90		
3.90	J10			27.163		4.10	MADE GROUND (Brown very clayey sand. Sand is fine to coarse).	
4.00	ES11						(Driller notes cobbles).	
4.10-4.60	SB12	N13					MADE GROUND (Firm brown sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, coal, clinker and sandstone).	
4.80-5.30	U*B13					(2.30)		
5.30	B15							
5.30-5.75	SJ14	N12						
6.00	ES16							
				24.863		6.40		
6.40	J17						Extremely weak red fine to medium grained SANDSTONE distinctly weathered.	
6.60	SJ18	50/40mm				(0.60)	(Recovered as red slightly gravelly sand. Sand is fine to coarse. Gravel is fine to medium angular sand	
				24.263		7.00		
7.00	S19	50/30mm					(Chester Formation).	
							Complete at 7.00m BGL.	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
10/01/2019	0.00	0.00	150	
10/01/2019	7.00	6.70	150	4.73

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
1.20 - 1.50	0:30	5.50 - 6.70
6.70 - 7.00	1:00	

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:53

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384401.713 N:399486.259		**BH112**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 32.249	**Start Date:** 10/01/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
0.10	J1					(0.40)	MADE GROUND (Red brown black sandy gravel with fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, brick and clinker).	
0.30	ES2			31.849		0.40		
0.60	B3						MADE GROUND (Red brown clayey gravelly sand. Sand is fine to coarse. Gravel is fine to medium subrounded and includes sandstone and brick).	
0.90	ES4							
1.20	J5					(1.70)		
1.50-2.00	B7						at c.1.50m BGL ... medium dense.	
1.50-1.95	SJ6	N11						
				30.149		2.10		
2.20	J8						Medium dense red brown gravelly SAND. Gravel is fine to coarse subrounded and includes sandstone. (Possible Weathered Chester Formation).	
2.30	ES9							
2.50-3.00	CB10	N18				(1.90)		
3.20	J11							
3.30	ES12							
3.50-4.00	CB13	N21						
				28.249		4.00		
4.00	SJ14	50/6mm		27.949		4.30	Extremely weak red fine to medium grained SANDSTONE distinctly weathered. (Chester Formation).	
4.30	SJ15	100/3mm					*Complete at 4.30m BGL.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
10/01/2019	0.00	0.00		
10/01/2019	4.30	4.30		Dry

Chiselling

From - To	Duration (hh:mm)
4.00 - 4.30	1:00

Water Added

From - To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed to 0.50-4.00m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Portsmouth	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:43:54

Window/Windowless Sample Hole Records

FIELD DATA ENCLOSURE 3

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384734.621 N:399613.694		**WS101**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.187	**Start Date:** 08/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1			31.987		0.20	MADE GROUND (Brown clayey sand/sandy clay with many rootlets. Sand is fine to medium).	
0.20	J2							
0.30	ES3						MADE GROUND (Red brown clayey sandy gravel with cobbles noted and fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, clinker and sandstone).	
0.50-0.80	B4					(1.00)		
1.00	ES5			30.987		1.20		
1.20-2.20	U7	(110)					MADE GROUND (Medium dense brown clayey sandy gravel. Sand is medium to coarse. Gravel is fine to coarse angular to subangular and includes brick, dolomite and sandstone).	
1.20-1.65	SJ6	N11				(0.70)		
				30.287		1.90		
							MADE GROUND (Medium dense black clayey sandy gravel. Gravel is fine to coarse angular to subangular and includes brick, sandstone, clinker, coal and mudstone).	
2.20-3.20	U9	(58)						
2.20-2.65	SJ8	N11				(1.10)		
			1	29.187		3.00		
							Loose brown yellow slightly clayey SAND and GRAVEL. Sand is coarse to medium. Gravel is firm to medium subrounded to rounded and includes sandstone and mudstone. (Alluvium).	
3.20-4.20	U11	(43)						
3.20-3.65	SJ10	N5						
			1			(2.45)		
4.20-5.00	U13	(52)					from c.4.20m BGL ... loose to medium dense.	
4.20-4.65	SJ12	N10						
5.00-5.45	SJ14	N11						
				26.737		5.45		
							Complete at 5.45m BGL.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
08/01/2019	0.00			
08/01/2019	5.45			4.00

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	87	100	No
2.20 - 3.20	87	80	No
3.20 - 4.20	77	70	No
4.20 - 5.00	67	70	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Water strike at 4.20m - water level rose to 3.00m BGL (20mins).
(4) Engineer notes U-Liners were not split for logging purposes on clients request.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D.P/A.R	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:35

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS101
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384734.621 N:399613.694		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.187	**Start Date:** 08/01/2019	**Sheet:** 2 of 3

Figure WS101.1
1.20-2.20m BGL



Figure WS101.2
2.20-3.20m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS101
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384734.621 N:399613.694		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.187	**Start Date:** 08/01/2019	**Sheet:** 3 of 3

Figure WS101.3
3.20-4.20m BGL



Figure WS101.4
4.20-5.00m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- **FINAL**

Project: Northern Gateway		**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384761.314 N:399589.102	**WS102**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.203 / **Start Date:** 07/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				32.153		0.05	MADE GROUND (Brown clayey sand/sandy clay with many rootlets. Sand is fine to medium).	
0.05	J1			32.003		0.20		
0.10	J2			31.803		0.40	MADE GROUND (Black brown sandy gravel with fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, clinker and sandstone).	
0.20	J3							
0.50-0.80	B4					(1.00)	MADE GROUND (Yellow sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone and limestone).	
1.00	ES5							
1.20-2.20	U7	(89)		30.803		1.40	MADE GROUND (Red brown slightly clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, clinker and sandstone).	
1.20-1.65	SJ6	N12						
						(1.60)	MADE GROUND (Firm brown orange sandy gravelly clay. Sand is fine to coarse. Gravel is fine to medium angular and includes brick).	
2.20-3.20	U9	(39)						
2.20-2.65	SJ8	N17		29.203		3.00		
3.20-4.20	U11	(21)					Soft brown very sandy CLAY. (Alluvium).	
3.20-3.65	SJ10	N6				(2.00)		
4.20-5.00	U13	(26)						
4.20-4.65	SJ12	N5		27.203		5.00		
5.00-5.45	SJ14	N7				(0.45)	Loose brown slightly clayey SAND. (Alluvium).	
				26.753		5.45		
							Complete at 5.45m BGL.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
07/01/2019	0.00			
07/01/2019	5.45			Damp

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	87	100	No
2.20 - 3.20	87	70	No
3.20 - 4.20	77	70	No
4.20 - 5.00	67	80	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Engineer notes U-Liners were not split for logging purposes on clients request.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D.P/A.R	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:38

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384761.314 N:399589.102		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.203	**Start Date:** 07/01/2019	**Sheet:** 2 of 3

Figure WS102.1
1.20-2.20m BGL



Figure WS102.2
2.20-3.20m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384761.314 N:399589.102		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.203	**Start Date:** 07/01/2019	**Sheet:** 3 of 3

Figure WS102.3
3.20-4.20m BGL



Figure WS102.4
4.20-5.00m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384813.849 N:399611.160		**WS103**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.572	**Start Date:** 07/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.05 0.10	J1 J2			32.472		0.10	MADE GROUND (Brown clayey sand/sandy clay with many rootlets. Sand is fine to medium).	
0.50-0.80	B3					(1.10)	MADE GROUND (Red black brown sandy gravel with fragments of wood. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, clinker and sandstone).	
1.00	ES4			31.372		1.20		
1.20-2.20 1.20-1.65	U6 SJ5	(30) N6				(1.60)	MADE GROUND (Loose black brown clayey very sandy gravel. Sand is fine to coarse. Gravel is fine to medium angular to subangular and includes brick, clinker and coal).	
2.20-3.20 2.20-2.65	U8 SJ7	(33) N11		29.772		2.80	at c.2.20m BGL ... medium dense with cobbles noted. Cobbles are angular and include brick.	
3.20-3.90 3.20-3.65	U10 SJ9	(100) N6		28.872		(0.90) 3.70	MADE GROUND (Soft brown very sandy clay). at c.3.20m BGL ... liner includes probable fall in from above.	
3.90	SJ11	100/72mm		28.672		3.90	(1) MADE GROUND (Brick and ash fill). at c.3.90m BGL ... concrete. *Terminated at 3.90m BGL - due to encountering concrete.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
07/01/2019	0.00			
07/01/2019	3.90			Dry

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	87	70	No
2.20 - 3.20	87	80	No
3.20 - 3.90	77	70	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Engineer notes U-Liners were not split for logging purposes on clients request.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D.P/A.R	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:41

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384813.849 N:399611.160		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.572	**Start Date:** 07/01/2019	**Sheet:** 2 of 3

Figure WS103.1
1.20-2.20m BGL



Figure WS103.2
2.20-3.20m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384813.849 N:399611.160		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 32.572	**Start Date:** 07/01/2019	**Sheet:** 3 of 3

Figure WS103.3
3.20-3.90m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway		**Exploratory Hole No.** WS104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384569.278 N:399463.630	
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 31.490 / **Start Date:** 08/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				31.390		0.10	MADE GROUND (Macadam).	
0.10 0.20 0.30 0.40 0.50-0.80	J1 B2 ES3 J4 B5					(1.10)	MADE GROUND (Red black brown clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, clinker and sandstone).	
1.00	ES6			30.290		1.20		
1.20-2.20 1.20-1.65	U8 SJ7	(32) N9					MADE GROUND (Loose black grey clayey very sandy gravel. Sand is fine to coarse and includes ash. Gravel is fine to medium subangular to subrounded and includes sandstone, brick, coal and clinker).	
2.20-3.20 2.20-2.65	U10 SJ9	(15) N9	1					
						(3.80)	between c.2.90-3.20m BGL ... with interbeds of soft grey sandy gravelly clay of low plasticity.	
3.20-4.20 3.20-3.65	U12 SJ11	(42) N8						
4.20-5.00 4.20-4.65	U14 SJ13	(37) N11					4.00-4.20m BGL ... with interbeds of soft grey sandy gravelly clay. at c.4.20m BGL ... medium dense.	
				26.490		5.00		
							Complete at 5.00m BGL.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
08/01/2019	0.00			
08/01/2019	5.00			2.20

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	87	50	No
2.20 - 3.20	87	50	No
3.20 - 4.20	77	60	No
4.20 - 5.00	77	60	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Engineer notes U-Liners were not split for logging purposes on clients request.
(4) Water strike at 2.20m BGL - water level rose to 2.00m BGL (20mins).

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D.P/A.R	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:44

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384569.278 N:399463.630		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 31.490	**Start Date:** 08/01/2019	**Sheet:** 2 of 3

Figure WS104.1
1.20-2.20m BGL

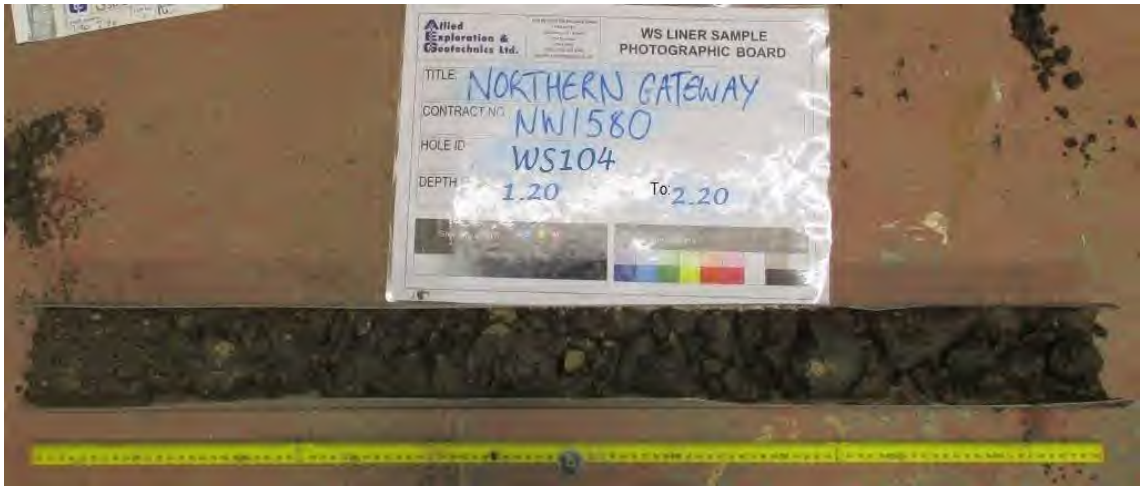


Figure WS104.2
2.20-3.20m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384569.278 N:399463.630		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 31.490	**Start Date:** 08/01/2019	**Sheet:** 3 of 3

Figure WS104.3
3.20-4.20m BGL



Figure WS104.4
4.20-5.00m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384294.085 N:399279.174		**WS105**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 29.447	**Start Date:** 10/01/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.20 0.30 0.40 0.50-0.80	J1 B2 ES3 J4 B5			29.147 29.047 28.547		0.30 0.40 (0.50) 0.90	MADE GROUND (Grass over slightly gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone. Driller notes compact roadstone). MADE GROUND (Black gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes clinker and brick).	
0.90 1.00 1.20-1.50	J6 ES7 SJ8	70/94mm		 27.947		(0.60) 1.50	MADE GROUND (Brown clayey sandy gravel and cobbles. Sand is fine to coarse. Gravel is fine to medium angular to subrounded and includes sandstone. Cobbles include sandstone). MADE GROUND (Black gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes clinker and brick). (Driller notes cobbles). *Terminated at 1.50m BGL - due to refusal.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
10/01/2019	0.00			
10/01/2019	1.50			Dry

Liner Sample Information			
From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: N. Waterhouse	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:47

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway		**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384294.085 N:399279.174	**WS105A**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 29.447 / **Start Date:** 10/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				29.147		0.30	MADE GROUND (Grass over slightly gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone. Driller notes compact roadstone).	
				29.047		0.40		
				28.547		(0.50) 0.90	MADE GROUND (Black gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes clinker and brick).	
1.20-2.20 1.20-1.65	U9 SJ8	(46) N6		28.247		1.20	MADE GROUND (Brown slightly gravelly sand with low cobble content. Sand is fine to coarse. Gravel is fine to medium angular to subrounded and includes sandstone. Cobbles include sandstone).	
				27.647		(0.60) 1.80	MADE GROUND (Loose black gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes clinker and brick).	
2.20-3.20 2.20-2.65	U11 SJ10	(32) N7					MADE GROUND (Black gravelly sand. Gravel is fine to medium angular to subrounded and includes clinker and brick). (Driller notes cobbles).	
3.20-4.20 3.20-3.65	U13 SJ12	(41) N3				(2.20)	MADE GROUND (Loose black clayey very gravelly sand and sandy gravelly clay. Sand is fine to coarse. Gravel is fine to medium angular to subangular and includes clinker and brick). (Driller notes cobbles). at c.2.20m BGL ... clay is of low plasticity. at c.3.20m BGL ... very loose.	
			1	25.447		4.00		
4.20-5.00 4.20-4.65	U15 SJ14	(109) N9	1			(1.45)	Loose dark brown clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone, limestone and quartzite. (Alluvium).	
5.00-5.45	SJ16	N13					at c.5.00m BGL ... medium dense.	
				23.997		5.45		
							Complete at 5.45m BGL.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
10/01/2019	0.00			
10/01/2019	5.45			Dry

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	87	90	No
2.20 - 3.20	87	80	No
3.20 - 4.20	77	100	No
4.20 - 5.00	67	90	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Water strike at 4.20m BGL - water level rose to 3.90m BGL (20mins).
(4) No samples between c.0.00-1.20m - please refer to WS05.
(5) Engineer notes U-Liners were not split for logging purposes on clients request.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: N.W/A.R	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:48

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS105A
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384294.085 N:399279.174		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 29.447	**Start Date:** 10/01/2019	**Sheet:** 2 of 3

Figure WS105A.1
1.20-2.20m BGL



Figure WS105A.2
2.20-3.20m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS105A
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384294.085 N:399279.174		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 29.447	**Start Date:** 10/01/2019	**Sheet:** 3 of 3

Figure WS105A.3
3.20-4.20m BGL



Figure WS105A.4
4.20-5.00m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384611.937 N:399505.689		**WS106**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 31.522	**Start Date:** 08/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.05	J1			31.422		0.10	MADE GROUND (Macadam).	
0.10	J2						MADE GROUND (Black brown sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular and includes brick, clinker and sandstone).	
0.30-0.80	ES3							
0.50	B4					(1.10)		
1.00	ES5			30.322		1.20		
1.20-2.20	U7	(46)					MADE GROUND (Loose brown black sand with interbeds of sandy gravel and sandy gravelly clay. Sand is medium to coarse and includes ash. Gravel is fine to coarse angular to subangular and includes sandstone, brick and clinker).	
1.20-1.65	SJ6	N9						
			1				at c.1.90m BGL ... soft brown sandy gravelly clay of intermediate plasticity.	
			1					
2.20-3.20	U9	(42)					from c.2.20m BGL ... medium dense.	
2.20-2.65	SJ8	N18				(2.80)		
							at c.2.80m BGL ... soft grey sandy gravelly clay. Arup Engineer noted hydrocarbon (benzene) odour .	
3.20-4.20	U11	(86)						
3.20-3.65	SJ10	N11						
				27.522		4.00		
				27.322		4.20	(1) Soft brown sandy CLAY. (Alluvium).	
							Terminated at 4.20m BGL - due to collapse from 4.20m back to 2.70m BGL.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
08/01/2019	0.00			
08/01/2019	4.20			1.64

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	87	80	No
2.20 - 3.20	87	60	No
3.20 - 4.20	77	60	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Water strike at 2.20m BGL - water level rose to 1.93m BGL (20mins).
(4) Engineer notes U-Liners were not split for logging purposes on clients request.
(5) Hole collapsed back to 2.70m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D.P/A.R	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:37:51

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS106
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384611.937 N:399505.689		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 31.522	**Start Date:** 08/01/2019	**Sheet:** 2 of 3

Figure WS106.1
1.20-2.20m BGL



Figure WS106.2
2.20-3.20m BGL



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** WS106
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384611.937 N:399505.689		
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 31.522	**Start Date:** 08/01/2019	**Sheet:** 3 of 3

Figure WS106.3
3.20-4.20m BGL



FIELD DATA ENCLOSURE 4

Trial Pit Records

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

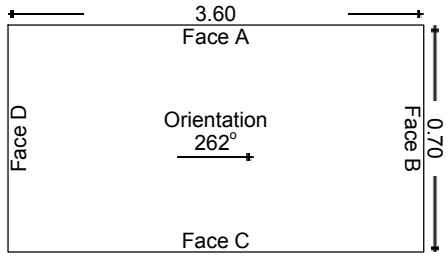
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384759.647 N:399818.495		**TP101**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.457	**Start Date:** 03/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black slightly clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes dolomite, granite, brick and concrete).
0.30	ES2					(0.90)	
0.80	LB3			42.56		0.90	at c.0.80-0.90m BGL ... slight hydrocarbon odour.
				42.36		1.10	MADE GROUND (Concrete and brick obstruction). (Recovered as gravel. Gravel is coarse and angular).
1.20	J4						Stiff grey sandy slightly gravelly CLAY with low cobble content. Sand is fine. Gravel is fine to medium subrounded and includes sandstone, mudstone, coal and limestone. Cobbles are subrounded and include limestone. (Glacial Till Deposits).
1.30	ES5						
1.80	LB6						at c.1.20m BGL ... clay/silt of low plasticity.
2.20	J7					(2.50)	
2.80	B8						
3.20	J9						
				39.86		3.60	at c.3.40-3.60m BGL ... limestone cobble obstruction.
							Terminated at 3.60m BGL - due to instability.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Terminated due to instability between 0.00-0.90m BGL.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:45:55

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP101
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384759.647 N:399818.495		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.457	**Start Date:** 03/01/2019	**Sheet:** 2 of 4

Figure TP101.1
Short Face



Figure TP101.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP101
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384759.647 N:399818.495		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.457	**Start Date:** 03/01/2019	**Sheet:** 3 of 4

Figure TP101.3
Long Face



Figure TP101.4
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP101
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384759.647 N:399818.495		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.457	**Start Date:** 03/01/2019	**Sheet:** 4 of 4

Figure TP101.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

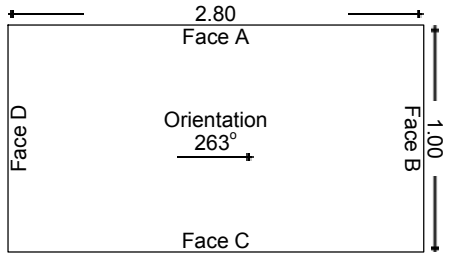
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384698.516 N:399742.661		**TP102**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.621	**Start Date:** 03/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes dolomite, granite, brick and concrete).
0.30	ES2					(0.90)	
0.50	LB3						
0.80	J4			41.72		0.90	
1.00	LB5			41.52		1.10	MADE GROUND (Concrete and brick obstruction). (Recovered as gravel. Gravel is coarse angular).
1.20	ES6						Stiff grey slightly sandy gravelly CLAY with interbeds of gravelly sand and low cobble content. Sand is fine. Gravel is fine to medium subrounded and includes sandstone, mudstone, coal and limestone. Cobbles are subrounded and include limestone. (Glacial Till Deposits).
1.40	J7						
1.80	LB8						
2.20	ES9						
2.40	J10					(3.00)	
2.80	B11						
3.20	J12						
3.60	LB13						at c.3.40-3.60m BGL ... limestone cobble/boulder obstruction.
				38.52		4.10	
4.10	J14						*Terminated at 4.10m BGL - due to cobble obstruction.*

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides moderately unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:45:59

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384698.516 N:399742.661		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.621	**Start Date:** 03/01/2019	**Sheet:** 2 of 4

Figure TP102.1
Short Face



Figure TP102.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384698.516 N:399742.661		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.621	**Start Date:** 03/01/2019	**Sheet:** 3 of 4

Figure TP102.3
Long Face



Figure TP102.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP102
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384698.516 N:399742.661		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.621	**Start Date:** 03/01/2019	**Sheet:** 4 of 4

Figure TP102.5
Spoil



Figure TP102.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

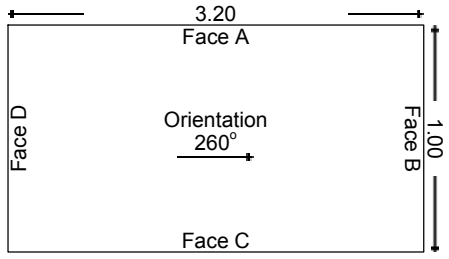
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384772.820 N:399769.313		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.178	**Start Date:** 03/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
				43.08		0.10	MADE GROUND (Macadam).
0.20	J1						MADE GROUND (Light brown sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular and includes dolomite).
0.30	ES2			42.78		0.40	
0.50	J3					(0.40)	MADE GROUND (Black slightly clayey sandy gravel with fragments of wood and glass. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes clinker, slag, dolomite, sandstone, macadam and concrete).
0.60	ES4			42.38		0.80	
0.70	LB5						
0.90	J6			42.08		1.10	
1.00	ES7						Red orange slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone. (Alluvium).
1.10	B8						
1.20	J9						
1.50	B10						
1.80	ES11					(1.90)	Soft and firm dark grey silty slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine subangular to rounded and includes mudstone, limestone and sandstone. (Glacial Till Deposits).
2.20	J12						at c.1.20m BGL ... clay is of low plasticity.
2.60	LB13						
				40.18		3.00	
3.20	J14						Firm to stiff red and brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium angular to subrounded and includes sandstone. (Glacial Till Deposits).
3.60	LB15					(1.50)	at c.3.20m BGL ... clay is of intermediate plasticity.
4.20	J16						
				38.68		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:46:07

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384772.820 N:399769.313		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.178	**Start Date:** 03/01/2019	**Sheet:** 2 of 4

Figure TP103.1
Short Face



Figure TP103.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP103
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384772.820 N:399769.313		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.178	**Start Date:** 03/01/2019	**Sheet:** 3 of 4

Figure TP103.3
Long Face



Figure TP103.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384772.820 N:399769.313		**TP103**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.178	**Start Date:** 03/01/2019	**Sheet:** 4 of 4

Figure TP103.5
Spoil



Figure TP103.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

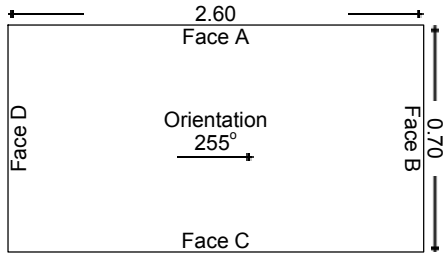
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384780.328 N:399749.164		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.131	**Start Date:** 03/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
				43.08		0.05	MADE GROUND (Brown sandy gravel with occasional rootlets. Sand is fine to coarse. Gravel is fine to coarse angular and includes concrete, brick, macadam and dolomite).
0.20	J1					(1.05)	
0.30	ES2						MADE GROUND (Black clayey very sandy gravel with fragments of wood and glass. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes brick, clinker, slag, dolomite, sandstone, macadam and concrete).
0.80	LB3			42.03		1.10	
1.20	J4					(0.90)	Red orange clayey very gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone. (Alluvium).
1.50	ES5						
1.80	LB6			41.13		2.00	
2.20	J7					(1.20)	Soft to firm dark grey silty slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine subangular to rounded and includes mudstone, limestone and sandstone. (Alluvium). at c.2.20m BGL ... clay is of low plasticity.
2.80	LB8			39.93		3.20	
3.30	J9		≈	39.33		(0.60) 3.80	Grey slightly silty/clayey SAND. Sand is fine to medium. (Alluvium).
							Terminated at 3.80m BGL - due to instability.

PLAN



GROUNDWATER
Groundwater seepage at 3.50m BGL (Slow inflow).

STABILITY
Pit sides unstable throughout excavation - collapsed at 1.50m-3.30m BGL (included running sand).

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:46:33

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384780.328 N:399749.164		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.131	**Start Date:** 03/01/2019	**Sheet:** 2 of 4

Figure TP104.1
Short Face



Figure TP104.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384780.328 N:399749.164		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.131	**Start Date:** 03/01/2019	**Sheet:** 3 of 4

Figure TP104.3
Long Face



Figure TP104.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP104
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384780.328 N:399749.164		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 43.131	**Start Date:** 03/01/2019	**Sheet:** 4 of 4

Figure TP104.5
Spoil



Figure TP104.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

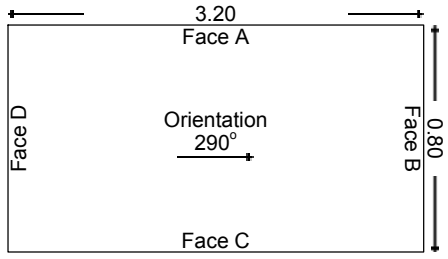
TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP105
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384843.779 N:399726.261		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.107	**Start Date:** 04/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Brown clayey slightly gravelly sand with low cobble content. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes concrete, clinker, brick and sandstone. Cobbles are angular and include concrete). between c.0.00-0.30m BGL ... occasional rootlets.
0.30	ES2						
0.80	LB3					(2.00)	
1.10	J4						
1.30	ES5						
1.80	B6		≈	39.11		2.00	
2.10	J7						MADE GROUND (Grey slightly sandy gravelly clay with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular and includes sandstone, concrete, clinker and brick. Cobbles are angular and includes brick).
2.30	ES8						
2.80	LB9					(1.80)	
3.10	J10						
3.30	B11						
				37.31		3.80	
							Terminated at 3.80m BGL - due to instability.

PLAN



GROUNDWATER
Groundwater seepage at 2.00m BGL.

STABILITY
Pit sides slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:46:38

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP105
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384843.779 N:399726.261		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.107	**Start Date:** 04/01/2019	**Sheet:** 2 of 4

Figure TP105.1
Short Face



Figure TP105.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP105
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384843.779 N:399726.261		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.107	**Start Date:** 04/01/2019	**Sheet:** 3 of 4

Figure TP105.3
Long Face



Figure TP105.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP105
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384843.779 N:399726.261		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.107	**Start Date:** 04/01/2019	**Sheet:** 4 of 4

Figure TP105.5
Spoil



Figure TP105.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

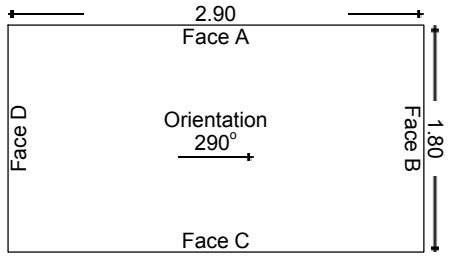
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384830.717 N:399695.601		**TP106**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.654	**Start Date:** 04/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1			42.35		0.30	MADE GROUND (Brown sandy slightly gravelly topsoil with many rootlets. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes clinker, concrete and slag).
0.20	J2						
0.40	ES3						
0.80	LB4						MADE GROUND (Black slightly clayey sandy gravel with low cobble content and cobbles and fragments of wood and glass. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes clinker, slag, dolomite, sandstone, macadam and concrete. Cobbles are angular and include brick).
1.20	J5					(2.10)	
1.50	ES6						at c.0.30m BGL ... 100mm diameter plastic pipe 0.50m from Face C running 290 degrees.
1.80	B7						
2.20	J8			40.25		2.40	
2.50	J9						MADE GROUND (Red orange slightly clayey gravelly sand. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded and includes sandstone).
2.80	ES10						
3.00	LB11					(1.30)	
3.50	J12			38.95		3.70	
4.00	J13					(0.80)	MADE GROUND (Soft to firm dark grey silty slightly sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine subangular to rounded and includes mudstone, limestone, sandstone and brick).
4.30	LB14			38.15		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:46:55

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP106
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384830.717 N:399695.601		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.654	**Start Date:** 04/01/2019	**Sheet:** 2 of 4

Figure TP106.1
Short Face



Figure TP106.2
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384830.717 N:399695.601		**TP106**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.654	**Start Date:** 04/01/2019	**Sheet:** 3 of 4

Figure TP106.3
Long Face



Figure TP106.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP106
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384830.717 N:399695.601		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.654	**Start Date:** 04/01/2019	**Sheet:** 4 of 4

Figure TP106.5
Spoil



Figure TP106.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

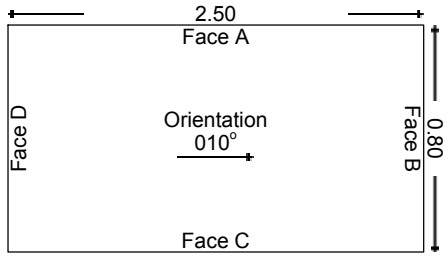
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP107
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384737.823 N:399704.019		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.764	**Start Date:** 03/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
				42.66		0.10	MADE GROUND (Light brown sandy gravel with occasional rootlets. Sand is fine to coarse. Gravel is fine to coarse angular and includes dolomite).
0.20	J1						
0.30	ES2			42.36		0.40	
0.40	LB3						MADE GROUND (Black slightly clayey sandy gravel with occasional wood and glass fragments. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes clinker, slag, dolomite, sandstone, macadam and concrete).
0.50	J4					(0.50)	
0.60	ES5			41.86		0.90	
0.70	LB6						
1.00	J7						MADE GROUND (Red orange slightly clayey gravelly fine to coarse sand. Gravel is fine to medium subangular to subrounded and includes sandstone).
1.20	ES8						at c.0.40m BGL ... 25mm diameter plastic cable 0.50m from Face D running perpendicular to pit.
1.60	LB9					(2.00)	
2.00	J10						MADE GROUND (Soft and firm dark grey silty slightly sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine subangular to rounded and includes mudstone, brick, limestone and sandstone).
2.50	B11			39.86		2.90	
3.00	J12						Firm and stiff red and brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium angular to subrounded and includes sandstone. (Glacial Till Deposits).
3.20	ES13						
3.60	LB14					(1.60)	
4.00	J15						
				38.26		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
Groundwater seepage at 0.60m BGL (slow inflow).

STABILITY
Pit sides and base slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:20

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384737.823 N:399704.019		**TP107**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.764	**Start Date:** 03/01/2019	**Sheet:** 2 of 4

Figure TP107.1
Short Face



Figure TP107.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP107
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384737.823 N:399704.019		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.764	**Start Date:** 03/01/2019	**Sheet:** 3 of 4

Figure TP107.3
Long Face



Figure TP107.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP107
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384737.823 N:399704.019		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.764	**Start Date:** 03/01/2019	**Sheet:** 4 of 4

Figure TP107.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

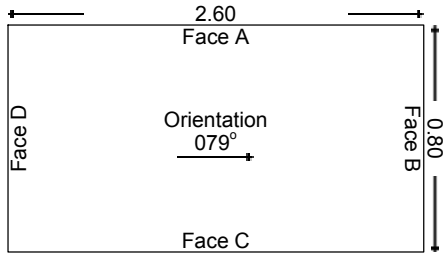
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384655.011 N:399693.930		**TP108**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.312	**Start Date:** 04/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black slightly clayey sandy gravel with low cobble content and rootlets. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes sandstone, clinker, slag, dolomite, brick, concrete and macadam. Cobbles are subangular and include concrete and brick).
0.30	ES2					(0.90)	
0.70	LB3			41.41		0.90	
1.00	J4						Red brown clayey slightly gravelly fine to coarse SAND with interbeds of sandy slightly gravelly clay. Gravel is fine to medium subangular to subrounded and includes sandstone. (Alluvium/Glacial Till Deposits).
1.30	ES5						
1.60	LB6						at c.1.60m BGL ... sandy slightly gravelly clay.
2.00	J7						
2.50	B8					(3.60)	
3.00	J9						
3.50	B10						
4.00	J11						
4.50	B12			37.81		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:26

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP108
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384655.011 N:399693.930		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.312	**Start Date:** 04/01/2019	**Sheet:** 2 of 4

Figure TP108.1
Short Face



Figure TP108.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP108
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384655.011 N:399693.930		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.312	**Start Date:** 04/01/2019	**Sheet:** 3 of 4

Figure TP108.3
Long Face



Figure TP108.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP108
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384655.011 N:399693.930		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 42.312	**Start Date:** 04/01/2019	**Sheet:** 4 of 4

Figure TP108.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

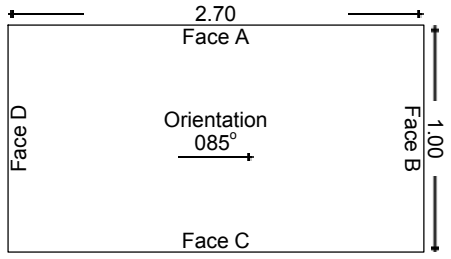
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384661.431 N:399650.774		**TP109**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.958	**Start Date:** 04/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black clayey very sandy gravel with low cobble content and occasional fragments of glass, wood and metal fragments. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes sandstone, clinker, slag, dolomite, macadam, brick and concrete. Cobbles are subangular and include brick).
0.30	ES2						
0.60	LB3						
							at c.0.80m BGL ... occasional rootlets.
1.10	J4						
1.30	ES5						
1.60	B6						
2.10	J7					(4.50)	
2.30	ES8						
2.60	B9						
3.10	J10						
3.30	ES11						
3.60	B12						
4.10	J13						
4.30	ES14			37.46		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:29

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP109
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384661.431 N:399650.774		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.958	**Start Date:** 04/01/2019	**Sheet:** 2 of 4

Figure TP109.1
Short Face



Figure TP109.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP109
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384661.431 N:399650.774		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.958	**Start Date:** 04/01/2019	**Sheet:** 3 of 4

Figure TP109.3
Long Face



Figure TP109.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP109
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384661.431 N:399650.774		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.958	**Start Date:** 04/01/2019	**Sheet:** 4 of 4

Figure TP109.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

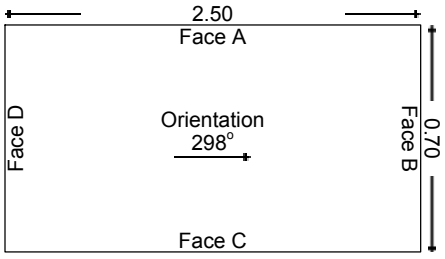
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384638.835 N:399640.942		**TP110**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.427	**Start Date:** 07/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black slightly clayey sandy gravel with occasional wood and glass fragments. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes clinker, slag, dolomite, sandstone, macadam and concrete).
0.30	ES2						
0.80	LB3					(1.80)	
1.10	J4						
1.30	ES5						
			1	39.63		1.80	
1.80	B6						*Terminated at 1.80m BGL - due to groundwater ingress.*

PLAN



GROUNDWATER
Water strike at 1.80m BGL (moderate inflow).

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:34

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP110
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384638.835 N:399640.942		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.427	**Start Date:** 07/01/2019	**Sheet:** 2 of 3

Figure TP110.1
Short Face



Figure TP110.2
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP110
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384638.835 N:399640.942		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.427	**Start Date:** 07/01/2019	**Sheet:** 3 of 3

Figure TP110.3
Spoil



Figure TP110.4
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

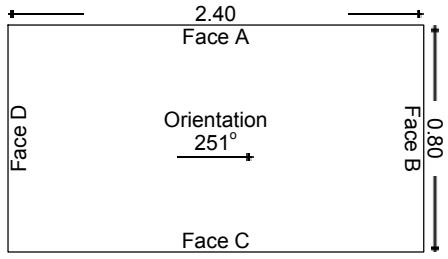
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384592.029 N:399655.215		**TP111**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.467	**Start Date:** 07/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black clayey very gravelly sand. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes dolomite, granite, some brick and concrete).
0.30	ES2					(0.90)	
0.80	LB3			40.57		0.90	
				40.37		1.10	MADE GROUND (Concrete and brick obstruction). (Recovered as coarse angular gravel).
1.20	J4						MADE GROUND (Soft and firm grey slightly sandy gravelly clay. Sand is fine. Gravel is fine to medium subrounded and includes sandstone, brick, concrete, clinker and limestone).
1.30	ES5					(0.80)	
1.80	LB6			39.57		1.90	
2.00	J7						Red brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to medium subangular to subrounded and includes sandstone. (Glacial Till Deposits/Weathered Chester Formation).
2.50	ES8						
2.80	LB9						
3.00	J10					(2.60)	
3.80	B11						
4.00	J12						
				36.97		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base moderately unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:37

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP111
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384592.029 N:399655.215		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.467	**Start Date:** 07/01/2019	**Sheet:** 2 of 4

Figure TP111.1
Short Face



Figure TP111.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP111
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384592.029 N:399655.215		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.467	**Start Date:** 07/01/2019	**Sheet:** 3 of 4

Figure TP111.3
Long Face



Figure TP111.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP111
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384592.029 N:399655.215		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 41.467	**Start Date:** 07/01/2019	**Sheet:** 4 of 4

Figure TP111.5
Spoil



Figure TP111.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

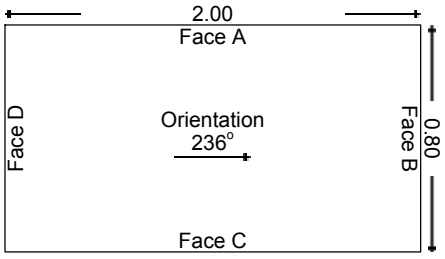
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP112
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384552.675 N:399614.062		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.830	**Start Date:** 07/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Brown and black clayey very gravelly sand with occasional wood, tile and metal fragments. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes dolomite, slag, clinker, brick and concrete). Face D 0.00-0.30m BGL ... concrete. 0.30-2.80m BGL ... brick wall. between c.0.30-0.70m BGL ... 0.40 x 0.40m metal girder located 0.80m from Face D.
0.30	ES2						
0.80	LB3						
1.10	J4						
1.30	ES5					(2.80)	
1.80	B6						
2.10	J7						
2.30	ES8						
			▼1	38.03		2.80	
2.80	B9						*Terminated at 2.80m BGL - due to groundwater ingress.*

PLAN



GROUNDWATER
Water strike at 2.80m BGL (moderate inflow).

STABILITY
Pit sides and base slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:43

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP112
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384552.675 N:399614.062		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.830	**Start Date:** 07/01/2019	**Sheet:** 2 of 4

Figure TP112.1
Short Face



Figure TP112.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP112
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384552.675 N:399614.062		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.830	**Start Date:** 07/01/2019	**Sheet:** 3 of 4

Figure TP112.3
Long Face



Figure TP112.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP112
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384552.675 N:399614.062		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.830	**Start Date:** 07/01/2019	**Sheet:** 4 of 4

Figure TP112.5
Spoil



Figure TP112.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

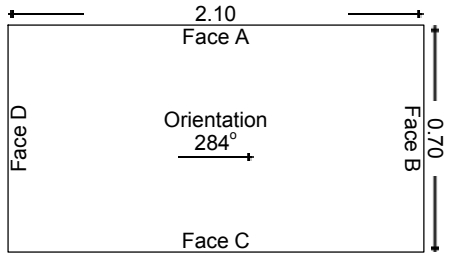
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP115
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384456.531 N:399526.838		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.513	**Start Date:** 07/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black clayey sand and gravel with occasional wood and glass fragments. Sand is fine to coarse and includes ash. Gravel is fine to coarse angular to subrounded and includes clinker, slag, dolomite, sandstone, macadam and concrete).
0.30	ES2						at c.0.80m BGL ... occasional rootlets.
0.80	LB3						
1.10	J4						
1.30	ES5						
1.80	B6						
2.10	J7					(4.50)	
2.30	ES8						
2.80	B9						
3.10	J10						
3.30	ES11						
3.80	B12						
4.10	J13						
4.30	ES14			36.01		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:50

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP115
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384456.531 N:399526.838		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.513	**Start Date:** 07/01/2019	**Sheet:** 2 of 4

Figure TP115.1
Short Face



Figure TP115.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP115
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384456.531 N:399526.838		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.513	**Start Date:** 07/01/2019	**Sheet:** 3 of 4

Figure TP115.3
Long Face



Figure TP115.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP115
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384456.531 N:399526.838		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 40.513	**Start Date:** 07/01/2019	**Sheet:** 4 of 4

Figure TP115.5
Spoil



Figure TP115.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

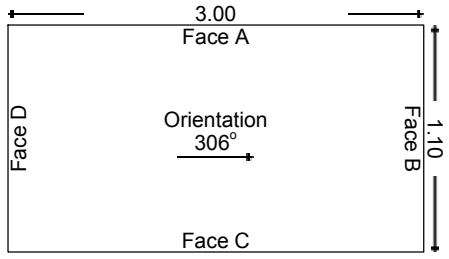
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384483.283 N:399475.961		**TP119**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.601	**Start Date:** 09/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20 0.30 0.40 0.50	ES1 J2 B3 J4			31.10		(0.50) 0.50	MADE GROUND (Grey slightly clayey sandy gravel with high cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, limestone, concrete, brick, slag and clinker. Cobbles are angular and include brick and concrete). at c.0.25m BGL ... plastic sheeting across pit.
1.00 1.50	ES5 B6					(1.50)	MADE GROUND (White grey sandy gravel with low cobble content. Sand is fine. Gravel is fine to coarse subangular to angular and includes sandstone, slag, slate and brick. Cobbles are angular and include brick and slate). (Engineer notes possibly lime kiln waste).
2.00 2.10	J7 ES8			29.60		2.00	at c.1.90m BGL ... layer of angular cobble sized slate flag stones. (Possible Floor/Basement).
2.50	B9					(1.10)	Orange brown gravelly SAND with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone and quartz. Cobbles are subrounded and include sandstone. (Possible Weathered Chester Formation).
3.00 3.10	ES10 J11			28.50 28.45		3.10 3.15	Weak yellow brown coarse grained SANDSTONE. (Recovered as gravel and cobbles. Gravel is coarse angular. Cobbles are angular). (Chester Formation). *Complete at 3.15m BGL.*

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Susnik	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:55

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP119
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384483.283 N:399475.961		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.601	**Start Date:** 09/01/2019	**Sheet:** 2 of 4

Figure TP119.1
Short Face



Figure TP119.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP119
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384483.283 N:399475.961		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.601	**Start Date:** 09/01/2019	**Sheet:** 3 of 4

Figure TP119.3
Long Face



Figure TP119.4
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP119
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384483.283 N:399475.961		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.601	**Start Date:** 09/01/2019	**Sheet:** 4 of 4

Figure TP119.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

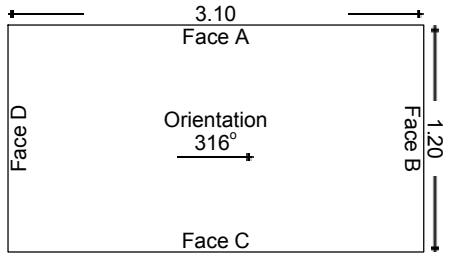
TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP120
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384451.844 N:399460.069		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.069	**Start Date:** 09/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.30	ES1					(0.70)	MADE GROUND (Grey brown sand and gravel with high cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, limestone, concrete, brick and clinker. Cobbles are angular and include brick and concrete).
0.40	J2						
0.50	B3			30.37		0.70	
0.70	J4						MADE GROUND (Very soft black brown silty slightly sandy slightly gravelly clay with some pseudo-fibrous peat content. Sand is fine. Gravel is coarse and includes brick. Strong hydrocarbon and organic odour noted. (Engineer notes possibly contaminated natural ground).
1.00	ES5					(1.10)	
1.20	B6						
				29.27		1.80	
1.80	J7						Soft orange brown CLAY. (Alluvium).
1.90	ES8					(0.50)	
2.00	B9						
2.00	HSV	23 (33)kPa		28.77		2.30	
2.30	J10						Light yellow brown SAND. Sand is fine to medium. (Alluvium/Glacial Till Deposits).
2.50	B11					(0.70)	
				28.07		3.00	
3.00	J12						Light yellow brown gravelly SAND with low cobble content. Sand is fine to coarse. Gravel is fine to coarse rounded to subrounded and includes sandstone and quartz. Cobbles are subrounded and include sandstone. (Alluvium/Glacial Till Deposits).
3.30	B13					(0.70)	
				27.37		3.70	
							Complete at 3.70m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Susnik	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:47:59

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP120
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384451.844 N:399460.069		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.069	**Start Date:** 09/01/2019	**Sheet:** 2 of 3

Figure TP120.1
Short Face



Figure TP120.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP120
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384451.844 N:399460.069		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.069	**Start Date:** 09/01/2019	**Sheet:** 3 of 3

Figure TP120.3
Long Face



Figure TP120.4
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

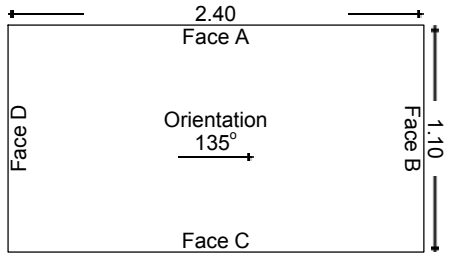
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384442.251 N:399393.368		**TP121**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.274	**Start Date:** 11/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1						MADE GROUND (Black clayey very gravelly sand with low cobble content and fragments of tile, metal, glass and wood. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes brick, concrete, sandstone, clinker and macadam. Cobbles are angular and include brick and concrete).
0.30	ES2						
0.80	LB3					(1.80)	between c.0.10-1.40m BGL ... brick wall present in faces A and C.
1.10	J4						
1.30	ES5						between c.1.50-3.00m BGL ... brick wall present in face D.
				28.47		1.80	
1.80	B6						MADE GROUND (Red brown clayey slightly gravelly sand with fragments of tile. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes sandstone, clinker, brick and concrete).
2.00	J7						
2.30	ES8					(1.40)	
2.80	LB9						
				27.07		3.20	
							Terminated at 3.20m BGL - due to instability.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation, collapse at 3.20m BGL back to 2.40m BGL.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:48:03

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP121
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384442.251 N:399393.368		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.274	**Start Date:** 11/01/2019	**Sheet:** 2 of 4

Figure TP121.1
Short Face



Figure TP121.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP121
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384442.251 N:399393.368		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.274	**Start Date:** 11/01/2019	**Sheet:** 3 of 4

Figure TP121.3
Long Face



Figure TP121.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP121
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384442.251 N:399393.368		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.274	**Start Date:** 11/01/2019	**Sheet:** 4 of 4

Figure TP121.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

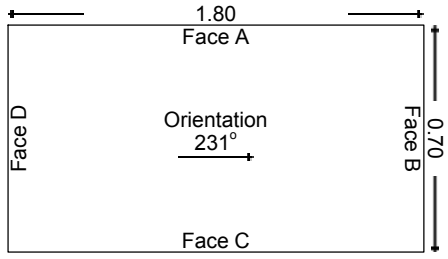
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.**
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384423.360 N:399438.117		**TP122**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.448	**Start Date:** 11/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10 0.30 0.80	J1 ES2 LB3			29.45		(1.00) 1.00	MADE GROUND (Black clayey very gravelly sand with fragments of tile, metal and wood. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes brick, concrete, sandstone, clinker and macadam).
1.10 1.30 1.50	J4 ES5 LB6			28.75		(0.70) 1.70	MADE GROUND (Black and orange slightly clayey gravelly sand with fragments of tile. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes sandstone, clinker, brick and concrete).
1.80 2.30 2.50	J7 ES8 LB9			27.45		(1.30) 3.00	MADE GROUND (Soft and firm orange and brown sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes sandstone, brick and clinker).
							Complete at 3.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation, repeated collapse of Faces A and C.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:48:08

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP122
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384423.360 N:399438.117		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.448	**Start Date:** 11/01/2019	**Sheet:** 2 of 4

Figure TP122.1
Short Face



Figure TP122.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP122
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384423.360 N:399438.117		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.448	**Start Date:** 11/01/2019	**Sheet:** 3 of 4

Figure TP122.3
Long Face



Figure TP122.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP122
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384423.360 N:399438.117		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.448	**Start Date:** 11/01/2019	**Sheet:** 4 of 4

Figure TP122.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

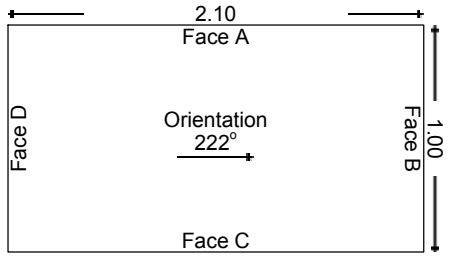
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP124
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384763.554 N:399485.198		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 39.485	**Start Date:** 11/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1			39.39		0.10	MADE GROUND (Black sandy gravelly topsoil with occasional rootlets. Sand is fine to coarse. Gravel is fine to medium angular to subrounded and includes sandstone, brick and macadam).
0.20	J2						
0.30	ES3						MADE GROUND (Black clayey very sandy gravel with low cobble content and fragments of tile, metal, wood, plastic and glass. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes concrete, clinker, slag, macadam, sandstone and brick. Cobbles are angular and include brick and concrete).
0.80	LB4					(1.40)	
1.20	J5						
1.30	ES6			37.99		1.50	
1.70	J7						MADE GROUND (Soft and firm red and grey slightly sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes sandstone, concrete and brick).
2.00	ES8					(1.30)	
2.40	LB9						at c.2.40m BGL ... clay is of low plasticity.
2.70	J9			36.69		2.80	
2.90	J10						Firm red brown with occasional bands of orange and grey mottling very sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine subrounded and includes sandstone. (Glacial Till Deposits).
3.20	ES11						
3.40	LB12					(1.70)	
3.90	J13						
4.40	B14			34.99		4.50	
							Complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides slightly unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: J. Myall	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:48:12

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP124
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384763.554 N:399485.198		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 39.485	**Start Date:** 11/01/2019	**Sheet:** 2 of 4

Figure TP124.1
Short Face



Figure TP124.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP124
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384763.554 N:399485.198		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 39.485	**Start Date:** 11/01/2019	**Sheet:** 3 of 4

Figure TP124.3
Long Face



Figure TP124.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP124
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384763.554 N:399485.198		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 39.485	**Start Date:** 11/01/2019	**Sheet:** 4 of 4

Figure TP124.5
Spoil



Figure TP124.6
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

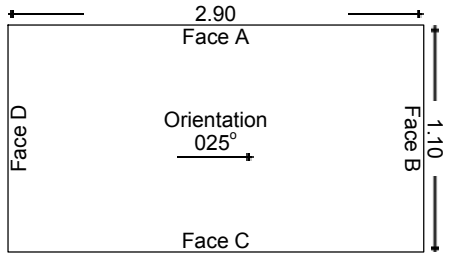
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP125
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384525.517 N:399388.873		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.685	**Start Date:** 10/01/2019	**Sheet:** 1 of 4

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.30 0.40 0.50	ES1 J2 B3						MADE GROUND (Brown very gravelly sand with high cobble content, low boulder content and fragments of metal and plastic. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, brick, slag and concrete. Cobbles are subangular to angular and include concrete and brick. Boulders are angular and include concrete (demolition rubble)).
1.00	ES4					(2.50)	at c.0.00-2.50m BGL ... occasional pockets of slightly sandy slightly gravelly clay.
1.40 1.50	J5 B6						
2.00	ES7						
2.20 2.30	J8 B9			28.19		2.50	
				27.89		2.80	Extremely weak red brown fine to medium grained SANDSTONE. (Recovered as sand and gravel. Sand is fine to coarse. Gravel is fine to coarse angular). (Chester Formation).
							Complete at 2.80m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Susnik	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:48:17

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP125
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384525.517 N:399388.873		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.685	**Start Date:** 10/01/2019	**Sheet:** 2 of 4

Figure TP125.1
Short Face



Figure TP125.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP125
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384525.517 N:399388.873		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.685	**Start Date:** 10/01/2019	**Sheet:** 3 of 4

Figure TP125.3
Long Face



Figure TP125.4
Long Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP125
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384525.517 N:399388.873		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 30.685	**Start Date:** 10/01/2019	**Sheet:** 4 of 4

Figure TP125.5
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

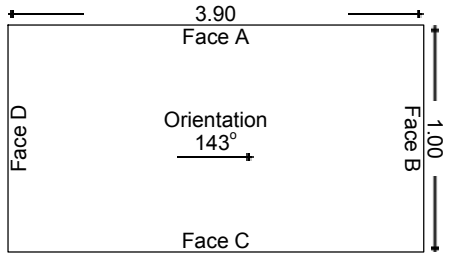
TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP126
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384574.850 N:399411.048		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.374	**Start Date:** 09/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.30	ES1						MADE GROUND (Brown very gravelly sand with high cobble content, low boulder content, occasional pockets of slightly sandy slightly gravelly clay and fragments of metal and plastic. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, brick, slag and concrete. Cobbles are subangular to angular and include concrete and brick. Boulders are angular and include concrete (demolition rubble)).
0.40	J2						
0.50	B3					(1.80)	
1.00	ES4						
1.40	J5						
1.50	B6						
1.70	ES7			29.57		1.80	
1.80	J8						MADE GROUND (Very soft to firm orange brown mottled grey slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded and includes sandstone, siltstone, coal and brick).
2.00	B9					(0.50)	
2.20	ES10			29.07		2.30	
2.30	J11						Red brown and black slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse subrounded to angular and includes sandstone and coal. (Possible Weathered Chester Formation).
2.50	B12					(0.80)	
3.00	ES13			28.27		3.10	
3.20	J14			28.17		3.20	Extremely weak red brown fine to medium grained SANDSTONE. (Recovered as sand and gravel. Sand is fine to coarse. Gravel is fine to coarse angular). (Chester Formation).
							Complete at 3.20m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Susnik	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:48:22

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP126
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384574.850 N:399411.048		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.374	**Start Date:** 09/01/2019	**Sheet:** 2 of 3

Figure TP126.1
Short Face



Figure TP126.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP126
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384574.850 N:399411.048		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.374	**Start Date:** 09/01/2019	**Sheet:** 3 of 3

Figure TP126.3
Long Face



Figure TP126.4
Spoil



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

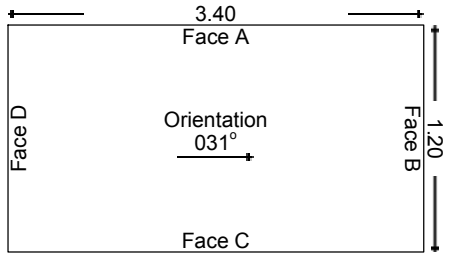
TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP127
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384520.567 N:399360.521		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.249	**Start Date:** 10/01/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.30 0.40 0.50	ES1 J2 B3						MADE GROUND (Brown very gravelly sand with high cobble content, low boulder content, occasional pockets of slightly sandy slightly gravelly clay and fragments of metal and plastic. Sand is fine to coarse. Gravel is fine to coarse subangular to angular and includes sandstone, brick, slag and concrete. Cobbles are subangular to angular and includes concrete and brick. Boulders are angular and include concrete (demolition waste)).
1.00	ES4						
1.40 1.50	J5 B6					(2.90)	
2.00	ES7						
2.40 2.50	J8 B9			28.35		2.90	
2.90	J10						Red brown and black slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse subrounded to angular and includes sandstone and coal. (Possible Weathered Chester Formation).
3.50 3.60	ES11 B12					(1.10)	
				27.25		4.00	
							Complete at 4.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides unstable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
N/A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: D. Susnik	Contract No. **NW1580**

Print Date and Time: 19/03/2019 16:48:26

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: Northern Gateway			**Exploratory Hole No.** TP127
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384520.567 N:399360.521		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.249	**Start Date:** 10/01/2019	**Sheet:** 2 of 3

Figure TP127.1
Short Face



Figure TP127.2
Short Face



ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: Northern Gateway			**Exploratory Hole No.** TP127
Client: Far East Consortium International Limited	**Location:** Northern Gateway, Red Bank, Manchester E:384520.567 N:399360.521		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 31.249	**Start Date:** 10/01/2019	**Sheet:** 3 of 3

Figure TP127.3
Long Face



Figure TP127.4
Spoil



FIELD DATA ENCLOSURE 5

Groundwater Observations Made at the Time of Site Works

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Registered Office: Unit 28 Block 3, Hong Kong Industrial Estate, 21-33 Lai Chi Kok Road, Cheung Sha Wan, Kowloon, Hong Kong Tel: (852) 2687 8881 Fax: (852) 2687 8661
Regional Office: Unit 22 Business Centre, Tsuen Wan, N.T. Tel: (0772) 35 662 Fax: (0772) 8 999

GROUNDWATER OBSERVATIONS MADE AT THE TIME OF SITE WORKS (WATER STRIKES)

Exploratory Hole No.	Date	Depth of Water (m)	Depth of Casing (m)	Depth Sealed (m)	Final Depth (m)	Total Time (mins)	Depth After 5 mins	Depth After 10 mins	Depth After 15 mins	Depth After 20 mins	Remarks
BH03	04/01/2019	0.60			0.30	20	0.50	0.40	0.45	0.30	Slow inflow
TP10	07/01/2019	1.80									Moderate inflow
TP12	07/01/2019	2.80									Moderate inflow.
WS101	08/01/2019	4.20			3.00	20	3.49	3.08	3.30	3.00	Moderate inflow.
WS104	08/01/2019	2.20			2.00	20	2.02	2.00	2.00	2.00	Moderate inflow
WS105a	10/01/2019	4.20			3.90	20	4.20	4.15	4.03	3.80	Slow inflow
WS105	09/01/2019	2.20			1.93	20	2.02	1.95	1.93	1.93	Moderate inflow.

Contract Title :- Northern Gateway			Client :- Far East Consortium International Limited	AEG Contract No :- NW1580
Date of Issue :- 12/03/2019	Page No :- 1 of 1	Checked By :- LC	Approved By :-	Certificate No :- GW/GWS/NW1580/1

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, 9/F., On Ho Ind. Bldg., 31-35 Au Pui Wan Street, Fotan, Shatin, N.T., Hong Kong. Tel: (852) 2691 7382 Fax: (852) 2695 4753
Registered Office: Unit 26, 9/F., On Ho Ind. Bldg., 31-35 Au Pui Wan Street, Fotan, Shatin, N.T., Hong Kong. Tel: (852) 2735 3822 Fax: (852) 2735 3833

GROUNDWATER OBSERVATIONS MADE AT THE TIME OF SITE WORKS (GROUNDWATER SEEPAGES)

Monitoring Point	Date	Depth (m)	Remarks
TP104	03/01/2019	3.50	Slow inflow.
TP105	04/01/2019	2.00	Slow inflow.
TP107	03/01/2019	0.60	Slow inflow.

Contract Title : Northern Gateway	Client : Far East Consortium International Limited

Certificate No. : GWOS/NW158071	Date of Issue : 12/03/2019	Page No. : 1 of 1
Checked By : LC	Approved By : KW	AEG Contract No. : NW/158

FIELD DATA ENCLOSURE 6

Groundwater Monitoring Results

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]
Tel: [illegible] Fax: [illegible]

GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Datum Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
BH101	07/01/2019 09:00	5.00m 50mm SP	43.24	4.95	38.49	
BH101	08/01/2019 09:00	5.00m 50mm SP	43.36	4.90	38.46	
BH101	09/01/2019 09:00	5.00m 50mm SP	43.56	4.87	38.69	
BH101	24/01/2019 10:25	5.00m 50mm SP	43.56	Water at Ite		
BH102	07/01/2019 09:00	7.50m 50mm SP	42.98	Water at Ite		
BH102	08/01/2019 09:00	7.50m 50mm SP	42.93	Water at Ite		
BH102	09/01/2019 09:00	7.50m 50mm SP	42.93	Water at Ite		
BH102	24/01/2019 09:02	7.50m 50mm SP	42.94	Water at Ite		
BH103	08/01/2019 09:00	6.50m 50mm SP	42.57	3.40	39.17	
BH103	09/01/2019 09:00	6.50m 50mm SP	42.57	3.36	39.21	
BH103	24/01/2019 09:40	6.50m 50mm SP	42.57	0.91	41.66	
BH104	08/01/2019 09:00	9.00m 50mm SP	41.59	3.10	38.49	
BH104	24/01/2019 10:55	9.00m 50mm SP	41.59	3.35	38.24	
BH105	24/01/2019 09:00	3.50m 50mm SP	40.67	Dry		
BH105	24/01/2019 11:06	3.50m 50mm SP	40.67	2.53	38.13	
BH106	09/01/2019 09:00	10.00m 50mm SP	40.67	Dry		
BH106	24/01/2019 11:19	10.00m 50mm SP	40.67	Dry		
BH107	09/01/2019 09:00	6.00m 50mm SP	40.58	Dry		
BH107	24/01/2019 11:17	6.00m 50mm SP	40.58	Dry		

SP = Standpipe, TWP = Tube with Piezometer

Contract Title: Northern Gateway

Client: [illegible] Rail Consulting International Limited

Certificate No: GWMR/NW1550/1

Date of Issue: 11/02/2019

Page No: 1 of 1

Checked By:

Approved By:

AEG Contract No: NW1550

In-situ Test Report Certificate

IN-SITU TESTING ENCLOSURES

ALLIED EXPLORATION & GEOTECHNICS LIMITED
Head Office: Unit 25 Stella Gill Industrial Estate, Pelaw Road, Chester-le-Street, Co. Durham, DH2 1AG – Tel: 0191 388 4766 Fax: 0191 387 1110
Registered Office: Unit 20 Business Development Centre, Eastern Wharf, Blackburn, BB1 1RL – Tel: 01254 682 200 Fax: 01254 682 560

IN-SITU TESTING REPORT CERTIFICATE

1867

Contract Title: Northern Gateway **AEG Reference:** NW1580

Client Address: Far East Consortium International Limited
Second Floor
Northern Assurance Building
Princess Street
Manchester
M2 4DN

I certify that *in situ* testing was carried out on the above contract in accordance with techniques outlined in BS 1377: 1990: Part 9 or other appropriate standards as quoted, and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

☑ Nick Vater (Technical Director)

☐ Kevin Warriner (HSE & Quality Director)

Signed _____ Date: 12 March 2019

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation.

IN-SITU TESTING REPORT CERTIFICATE

ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Test Report Certificate	N/A		2
1	Standard Penetration Test Results (SPT)	Yes	BS 1377 Part 9 1990	29
2	Hand Shear Vane Test Results	No		1
-	Variable Head Permeability Test Results	No	BS 5930 1999 Section 4	-
3	*In-situ* Water Quality Parameter Test Results	No		1
-	Density by Sand Replacement Method	Yes	BS 1377 Part 9 1990	-
-	Density by Core Cutter Method	Yes	BS 1377 Part 9 1990	-
	Determination of the Vane Shear Strength (Down the Hole)	Yes	BS 1377 Part 9 1990	-
-	Shallow Pad (skip) Load Test Results	No	BS 1377 Part 9 1990	-
-	Determination of the California Bearing Ratio	Yes	BS 1377 Part 9 1990	-
-	Plate Loading Test Results	No	BS 1377 Part 9 1990	-
-	Apparent Resistivity of Soil	No	BS 1377 Part 9 1990	-
-	Redox Potential of Soil	No	BS 1377 Part 9 1990	-
-	Determination of the Soil Infiltration Rate for Soakaway Design	No	BRE Digest 365:1991	-

Standard Penetration Test Results

IN-SITU TESTING ENCLOSURE 1

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, 9/F, Golden Star Industrial Building, 151 Hoi Bun Road, Kwun Tong, Kowloon, Hong Kong. Tel: 2345 2888 Fax: 2345 2222
Regional Office: Unit D, Kam Sun Industrial Centre, Kwai Chung, N.T. Tel: 2422 7888 Fax: 2422 7333

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Borehole / Hole No.	Top of Hole (mPD)	Water Depth (mBGL)	Run Length	Soil Description	Casing Depth (m)	SEATING DRIVE						TEST DRIVE										Dry Density of Core (Mg/m³)	Bulk Density of Core (Mg/m³)	Recovery (%)	RQD Value	SPT 'N' Value (Corr. to 60%)	Core Runs	Remarks
						150 mm	150 mm	300 mm	Blows	Total Pen.	Total Blows	150 mm	Blows	300 mm	Blows	300 mm	Blows	300 mm	Total Pen.	Total Blows								
	m	m	m		m	mm	mm	mm	no.	mm	no.	mm	no.	mm	no.	mm	no.	mm	mm	no.								
BH01																												
BH02																												
BH03																												
BH04																												
BH05																												
BH06																												
BH07																												
BH08																												
BH09																												
BH10																												

Note: Please refer to attached sheet for explanation of abbreviations and corresponding Exploratory Hole records/sampling details. Unmodified and corrected SPT 'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title: Northern Gateway	Client: Far East Consortium International Limited		AEG Contract No.: NW1580
Date of Issue: 12/03/2018	Page No.: 1 of 10	Checked By: LC	Approved By:	Certificate No.: SPT/NW1580/1

HKAS TESTING #367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Casing Depth (Depth) m	Rig	Hammer ref.	Energy Ratio %	CASING DRIVE No.	CASING DRIVE Blows	CASING DRIVE Pen. mm	CASING DRIVE Blows	CASING DRIVE Total Pen. mm	CASING DRIVE Time Taken	TESTDRIVE Pen. 1 mm	TESTDRIVE Blows 1 No.	TESTDRIVE Pen. 2 mm	TESTDRIVE Blows 2 No.	TESTDRIVE Pen. 3 mm	TESTDRIVE Blows 3 No.	TESTDRIVE Total Pen. mm	TESTDRIVE Time Taken Min.	Rod Length Corr. C_R	Energy Ratio Corr. C_E	Fall Time/Blow ms	SPT 'N' Value	SPT 'N' Value (Corr.) (N_{60})	Sheet or Core No.	Remarks
	m	m			%	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	Min.						SPT	
BH02	1.45 (+00.00)	0.17 (1.28)	1.20	ATH02	58	12	1	75		150	2	0	1	75	0	75	3	300	4	0.75	1.00	39.67	6	6	S	
BH03	3.45 (-00.00)	2.00 (0.50)	3.00	ATH02	58	75	5	75	0	150	3	75	2	75	3	75	5	300	17	0.87	1.00	29.60	12	9	S	
BH04	0.65 (-00.00)	0.15 (0.50)	0.50	ATH02	58		0	75	0	150	1	75	6	75	1	75	3	300	27	0.65	1.00	0.31	7	7*	S	
BH02	3.00 (-00.00)	2.00 (1.50)	2.50	ATH02	58	72		75	0	150	15	75	0	75	17	75	23	300	60	0.84	1.00	0.69		-	S	
BH01	1.50 (+00.00)	0.50 (0.50)	1.00	ATH01	59	75	5	75	0	150	4	75	4	75	1	75	4	75	8	300	18	1.00	1.00	16.67	10	12	S	
BH03	5.00 (+00.00)	2.00 (0.50)	4.50	ATH02	58	75	3	75	1	150	4	75	2	75	3	75	4	75	11	300	11	0.70	1.00	27.20	11	8	S	
BH05	9.00 (-00.00)	2.00 (1.00)	8.00	ATH01	59	75	6	75	1	150	14	75	3	75	15	75	6	75	14	300	29	0.75	1.00	7.00	30	28	S	
BH01	3.50 (-00.00)	2.00 (0.50)	3.00	ATH01	59	75	2	75	1	150	3	75	3	75	3	75	7	75	7	300	10	1.00	1.00	15.00	20	16	S	
BH05	7.00 (-00.00)	2.00 (1.50)	7.00	ATH01	59	75	7	75	12	150	19	0	0	75	11	14	18	164	50	1.00	1.00	3.75	-	-	S	
BH10	0.50 (-00.00)	0.15 (0.35)	0.50	ATH01	59	0	0			18	50	0	0**					0	100	1.00	1.00	0.00	-	-	S	

NOTE: Blank entries in this table indicate information not recorded or not available. Uncorrected and corrected SPT 'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :- Marmion Gateway	Client :- Far East Consortium International Limited		AEG Contract No :- NW1583
Date of Issue :- 12/03/2018	Page No :- 2 of 10	Checked By :-	Approved By :-

Certificate No :- SPT/NW1583/2

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No	Test Depth (Reduced Level) m	Strata Details (Legend)	Core Loss m	Blow Increments	Penetration mm	Penetration Blows	0-75mm Blows	75-150mm Blows	150-225mm Blows	225-300mm Blows	Total Pen mm	Total Blows	Pen 1 mm	Blows 1 No	Pen 2 mm	Blows 2 No	Pen 3 mm	Blows 3 No	Pen 4 mm	Blows 4 No	Total Pen mm	Total Blows No	Rod Length Corr r_d	Energy Ratio Corr E_R	Hammer Energy J	SPT N Value	SPT N Value (Field Value)	Groundwater Strike m	Remarks
BH104	1.50 (99.69)	Dry Grey Sandy GRAVEL	1.50	A2100	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	3.00 (98.19)	Dry Grey Sandy GRAVEL	1.50	A2101	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	4.50 (96.69)	Dry Grey Sandy GRAVEL	1.50	A2102	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	6.00 (95.19)	Dry Grey Sandy GRAVEL	1.50	A2103	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	7.50 (93.69)	Dry Grey Sandy GRAVEL	1.50	A2104	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	9.00 (92.19)	Dry Grey Sandy GRAVEL	1.50	A2105	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	10.50 (90.69)	Dry Grey Sandy GRAVEL	1.50	A2106	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	12.00 (89.19)	Dry Grey Sandy GRAVEL	1.50	A2107	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	13.50 (87.69)	Dry Grey Sandy GRAVEL	1.50	A2108	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		
BH104	15.00 (86.19)	Dry Grey Sandy GRAVEL	1.50	A2109	300	50	25	25			150	50	75	25	75	25					150	50	0.97	0.93	5000	50	50		

NOTE: Refer to Logs/Certificate for additional information and more accurate Exploratory Hole description. Uncorrected and corrected SPT 'N' values as presented on the attached graph or plot relate to the Exploratory Hole.

Contract Title: Northern Gateway	Client: Far East Consortium International Limited	AEC Contract No.: NW1580	
Date of Issue: 12/03/2019	Page No.: 9 of 10	Checked By: LC	Approved By: NW
Certificate No.: SPTNWH1580/3			

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Top Level (mPD)	Water Strike (Depth)	Rod Length	Hammer Type	Energy Ratio (%)	Drive						TEST DRIVE										Log Legend	Bulk Density (Mg/m³)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	SPT 'N' Value (Corrected)	Stroke Curve	Remarks
	m	m	m		%	Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Pen mm	Blows No.	Total Pen mm	Total Blows No.							
BH04	73.09 (57.69)	15.47 (1.15)	14.63	ATBH4	68	75	12	30	6	105	18	75	-	150	27					150	27		1.92	0.05	0.2			0	
BH01	71.80 (59.79)	14.1... (13.50)	14.62	ATBH1	68	0	0			50	50	50	50							50	50		1.95	0.99	0.16	1		0	
BH02	80 (60.11)	Dry (1.50)	7.50	ATBH2	68	75	4	75	1	150	5	75	5	75	1	75	5	75	5	300	10		1.98	0.98	40.66	1	8	0	
BH03	77.00 (57.11)	Dry (1.50)	7.50	ATBH3	68	75	4	60	2	135	6	75	4	75	3	75	3	75	4	300	11		1.74	0.06	28.50	19	8	0	
BH05	74.00 (59.11)	Dry (1.50)	4.50	ATBH5	68	75	5	75	2	150	7	75	5	75	5	75	5	75	4	300	19		2.08	1.96	25.40	16	10	0	
BH06	74.00 (59.11)	Dry (0.50)	2.50	ATBH6	68	75	5	75	2	150	7	75	5	75	5	75	5	75	5	300	20		2.04	1.96	23.50	17	10	0	
BH07	74.00 (59.11)	Dry (1.50)	7.50	ATBH7	68	75	5	75	3	150	8	75	5	75	5	75	4	75	5	300	19		2.03	0.90	22.70	15	12	0	
BH08	74.00 (59.11)	Dry (1.50)	9.00	ATBH8	68	75	3	75	3	150	6	75	4	75	4	75	5	75	4	300	17		2.08	0.96	20.30	16	11	0	
BH09	74.00 (59.11)	Dry (0.50)	10.50	ATBH9	68	75	5	75	3	150	8	75	4	75	5	75	6	75	11	300	26		1.98	0.94	21.30	17	20	0	
BH10	74.00 (59.11)	Dry (0.50)	11.00	ATBH10	68		41			17	18	14	50							0	50		1.60	0.92	0.72			0	

NOTE: Please refer to cable percussive borehole log for additional information. Unless otherwise stated, records for standing casing, uncorrected and corrected SPT'N' values are presented for attached graphical plot relative to each Exploratory Hole.

Contract Title :- Northern Gateway		Client :- Far East Consortium International Limited	AEG Contract No :- NW1560
Date of Issue :- 12/03/2015	Page No. :- 1 of 10	Checked By :- LC	Approved By :- KW
			Certificate No. :- SPT/NW1560/4

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 19 Fenlock Court, Blenheim Road, Epsom, Surrey, KT19 9QN, Tel: 01372 725721 Fax: 01372 726439
Unit 1 Sandpiper Court, Harlow Business Park, Harlow, Essex, CM19 5QE, Tel: 01279 414749 Fax: 01279 414740

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (mOD)	Depth to Upper Casing (mOD)	Hammer Mass	Hammer Fall	Driving System	Seating Drive: Blows	Seating Drive: Pen	Test Drive: Blows 1	Test Drive: Pen 1	Test Drive: Blows 2	Test Drive: Pen 2	Test Drive: Blows 3	Test Drive: Pen 3	Test Drive: Total Blows	Test Drive: Total Pen	Rod Length Corr.	Energy Ratio Corr.	(N1)60	SPT 'N' Value	Liner Used (Yes/No)	Stage Number	Remarks
	m	m	kg	m		No	mm	No	mm	No	mm	No	mm	No	mm							
BH101	1.00 (29.01)	0.00 (30.01)	63.5	0.76	A	50	1	50	0	50	0	0	50	0	50	0.97	0.98	0.00			0	
BH102	1.50 (29.47)	0.00 (30.00)	63.5	0.76	A	50	1	50	1	50	0	28	2	78	300	0.98	0.98	39.00	0	0	0	
BH103	2.50 (28.51)	0.00 (30.00)	63.5	0.76	A	50	1	75	2	150	6	0	3	75	300	0.99	0.98	38.00	15	15	0	
BH104	3.00 (27.97)	0.00 (30.00)	63.5	0.76	A	50	1	75	4	50	0	75	1	76	300	1.00	0.98	37.00	8	8	0	
BH105	4.00 (26.77)	0.00 (30.00)	63.5	0.76	A	50	1	75	2	50	0	75	1	76	300	1.01	0.98	42.86	7	8	0	
BH106	5.00 (25.77)	0.00 (30.00)	63.5	0.76	A	50	1	75	2	50	0	75	1	76	300	1.02	0.98	27.27	11	8	0	
BH107	6.00 (24.77)	0.00 (30.00)	63.5	0.76	A	50	1	75	2	50	0	75	2	75	300	1.03	0.98	25.00	10	10	0	
BH108	7.00 (23.77)	0.00 (30.00)	63.5	0.76	A	50	1	75	2	50	0	75	3	75	300	1.04	0.98	20.00		10	0	
BH109	1.00 (29.01)	0.00 (30.00)	63.5	0.76	A	50	13	50	0	25	0	37	32	69	300	0.97	0.98	0.00	-	-	0	
BH110	1.00 (29.01)	0.00 (30.00)	63.5	0.76	A	50	10	50	0	25	0	18	32	50	150	1.03	0.98	0.00	-	-	0	

SPT Hammer Calibration Certificate for quality of information only. Refer to Borehole records for additional details. Uncorrected / Corrected SPT 'N' values are presented on the attached graphical presentation of Exploratory Hole.

Contract Title :- Wyndham Gateway	Client :- Far East Consortium International Limited	AEG Contract No :- NW1580	
Date of Issue :- 12/09/2016	Page No :- 5 of 10	Checked By :-	Approved By :-

Certificate No :- SPT/NW/1580/5

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Weight Hammer (kg)	Hammer Fall (m)	SPT Hammer No.	Energy Ratio E_r %	DRIVE: Pen mm	DRIVE: Blows	0-75 mm: Pen mm	0-75 mm: Blows	0-150 mm: Total Pen mm	0-150 mm: Total Blows	TEST DRIVE: 1st 75 mm: Pen mm	TEST DRIVE: 1st 75 mm: Blows	TEST DRIVE: 2nd 75 mm: Pen mm	TEST DRIVE: 2nd 75 mm: Blows	TEST DRIVE: 3rd 75 mm: Pen mm	TEST DRIVE: 3rd 75 mm: Blows	TEST DRIVE: Pen mm	TEST DRIVE: Blows	Rod Length Corr. Factor C_R	Energy ratio Corr. Factor C_E	SPT'N' value (Blows/300mm)	SPT'N' value (Blows/300mm)	SPT'N' value (Blows/300mm)	Remarks
	m	kg	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						
TP101	1.50 (27.79)	Dry 63.5kg	0.50	A1H05	60	75	2	75	1	150	1	75		75	1	75	2	75		300	7	0.88	2.00	15.85	7	3	0
TP102	2.00 (27.70)	Dry 63.5kg	0.50	A1H05	60	75	4	75	6	150	10	75	3	75	7	75	7	75	6	300	26	0.75	2.00	19.71	23	19	0
TP103	1.50 (28.00)	Dry 63.5kg	0.50	A1H04	60	75	3	75	7	150	12	75	3	75	5	75	12	75	7	300	31	0.94	2.00	24.1	27	27	0
TP104	1.50 (28.19)	Dry 63.5kg	0.50	A1H01	59	75	3	75	5	150	9	75	4	75	5	75	9	75	7	300	28	0.89	2.00	22.03	25	14	0
TP105	1.50 (28.19)	Dry 63.5kg	0.50	A1H05	60	75	1	75	5	150	6	75	3	75	7	75	9	75	8	300	29	0.88	2.00	19.54	25	18	0
TP106	1.50 (28.28)	Dry 63.5kg	0.50	A1H05	59	75	4	75	8	150	75	75	38	20	12					95	50	0.72	2.00	7.40	-	-	0
TP107	1.50 (27.95)	Dry 63.5kg	0.50	A1H05	59	75	23			98	75	75	23							75	50	0.91	2.00	9.40	-		0
TP108	2.00 (28.00)	Dry 63.5kg	0.50	A1H05	59	75	5	75	10	150	13	75	15	75	25	75	13			150	50	0.85	2.00	9.50	-	-	0
TP109	2.00 (28.13)	Dry 63.5kg	0.50	A1H05	59	75	5	75	11	150	14	75	10	75	6	75	7	75	7	300	30	0.85	2.00	20.00	23	11	0
TP110	1.50 (28.15)	Dry 63.5kg	0.50	A1H05	59	75	2	75	3	150	5	75	3	75	5	75	5	75	4	300	13	0.92	2.00	23.00	15	10	0

NOTE: Please refer to exploratory hole records for ability of information and corresponding Geotechnical Investigation Report for sampling details. Uncorrected and corrected SPT 'N' values are presented in the attached graphical format relative to each exploratory hole.

Contract Title: Nonhert Gateway	Client: Far East Consortium International Limited	AEG Contract No.: NW1580	
Date of Issue: 12/03/08	Page No.: 6 of 10	Checked By:	Approved By: NW
Certificate No.: SPT/NW1580/6			

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Scotland Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Level (Above OD Level) m	Water Depth (Below Ground Level) m	Hammer No.	Rig / Hammer Ref.	Depth Reached m	SPT Test Drive: Pen. mm	Blows	Pen. mm	Blows	Total Pen. mm	Total Blows	Pen. mm	Blows	Test Drive: Pen. mm	Blows	Pen. mm	Blows	Test Drive: Pen. mm	Total Blows	Rod Weight Plus Hammer kg	Average Hammer Energy J	Rod Energy Ratio %	SPT 'N' Value	SPT 'N' Value (Rod Energy Corrected)	Shear Strength kPa	Remarks
BH10	4.00 (27.11)	1.00 (4.00)	1.10	ATE05	5.10	75	0	75	1	150	0	75	4	75	5	75	7	75	5	300	13	0.78	223	23.08	13	5	75	
BH10	3.50 (27.61)	0.50 (0.50)	1.10	ATE05	5.10	0	0	75	3	150	0	75	1	75	5	75	3	75	5	300	12	0.81	223	25.00	12	4	50	
BH10	5.60 (14.68)	2.50 (0.50)	5.60	ATE01	5.60	75	13	50	0	125	75	50	50							50	50	0.88	223	0.80			50	
BH12	7.00 (4.70)	3.00 (3.75)	7.50	ATE05	7.50	0	0			0	150	75	50	50	50					50	50	0.88	223	0.80		-	50	
BH10	1.50 (27.11)	50 (1.50)	1.50	ATE07	5.10	75	1	75	3	150	0	75	3	75	2	75	7	75	6	300	11	0.85	223	17.27	11	7	50	
BH12	2.00 (25.70)	1.00 (2.70)	2.20	ATE07	5.20	0	0	75	4	150	0	75	1	0	0	75	6	75	5	300	10	0.83	223	10.87	10	12	50	
BH10	2.50 (26.61)	1.00 (2.50)	2.60	ATE08	5.60	75	4	75	5	150	0	75	1	0	0	75	5	75	5	300	21	0.78	223	4.20	21	14	50	
BH12	4.00 (25.50)	2.00 (4.70)	4.00	ATE03	5.00	75	2	75	25	150	41	0	50	0	25					0	50	0.78	223	0.40	-	-	50	
BH10	4.30 (27.35)	3.00 (4.50)	5.30	ATE01	5.30	0	50			0	50	0	50							5	150	0.77	223	0.83	-		50	
WS01	1.20 (26.39)	0.70	1.20	ATE04	5.10	75	1	0	1	150		75	2	75	2	75	6	75	5	300	11	0.80	223	2.73	11	10	50	

NOTE: Please read all caution / limitation notes as it is not always possible for sampling equipment to reach specified depths. Unrecorded and unobserved SPT 'N' values are presented on the attached exploratory hole record sheets for information purposes only.

Contract Title:	Client:	AEG Contract No.
Northern Gateway	Far East Consortium International Limited	NW1580

Date of Issue:	Page No.	Checked By:	Approved By:	Certificate No.
12/03/2010	7 of 10	LC	[signature]	SPT/NW1580/7

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 9, Kings Hill Business Centre, Fairmile, Christchurch, Dorset, BH23 2FD. Tel: 01202 [illegible] Fax: 01202 [illegible]
Regional Office: Unit 10, Eastern Avenue, Coldhams Lane, Cambridge, CB1 3LU. Tel: 01223 [illegible] Fax: 01223 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Top of Hole Level (mOD)	Hole Diameter (mm)	Rig Type	Hammer Ref.	Energy Ratio E_R (%)	SPT Test Data: Pen. (mm)	Blows	Pen. (mm)	Blows	Total (mm)	Total Blows	Test Data: Pen. (mm)	Blows	Pen. (mm)	Blows	Total (mm)	Blows	Test Data: Pen. (mm)	Blows	Total Pen. (mm)	Total Blows	Field Leachate Odour	Field Leachate Colour	Rest Water Strike (mBGL)	SPT 'N' Value	SPT Test Duration (Hours)	Regrade Grade	Remarks
	m				%	mm		mm		mm	No.	mm	No.	mm		mm		mm	No.	mm	No.							
WS01	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	1	75	16	75	2	75	2	300		Odour	1.35	2.50	16	0	10	6	
WS02	24.70	Dry	3.00	DRI4	67	75	1	75		150	1	75	1	75	4	75		75	3	300	8	Odour	1.35	2.50	8	0	11	
WS03	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	2	75	0	75	3	75	3	300	14	Odour	1.35	2.50	16	0	15	8	
WS04	23.70	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	11	Odour	1.35	2.50	16	0	13	8	
WS05	23.37	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	13	Odour	1.35	2.50	16	0	14	8	
WS06	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	13	Odour	1.35	2.50	16	0	14	8	
WS07	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	13	Odour	1.35	2.50	16	0	14	8	
WS08	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	13	Odour	1.35	2.50	16	0	14	8	
WS09	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	13	Odour	1.35	2.50	16	0	14	8	
WS10	23.39	Dry	3.00	DRI4	67	75	1	75	0	150	1	75	3	75	1	75	7	75	3	300	13	Odour	1.35	2.50	16	0	14	8	

NOTE: Please refer to Logs for Additional Comments and Observations. Exploratory Hole records for sampling details. Unsupported and Consolidated Drilling Logs are presented in the attached appendix and relate to each Exploratory Hole.

Contract Title: Northern Gateway	Client: Far East Consortium International Limited	AEG Contract No.: NW1580	
Date of Issue: 12/03/2018	Page No.: 8 of 10	Checked By: LC	Approved By: NW
Certificate No.: SPT/NW/1580/8			

1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Hong Kong Office: [illegible]
Regional Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3 2005)

Exploratory Hole No.	Hole Depth (Reduced Level) m	Casing Depth (Diameter) m	Water Strike m	SPT Hammer Mass kg	Hammer Fall Height m	1st 75mm Blows No.	1st 75mm Penetration mm	2nd 75mm Blows No.	2nd 75mm Penetration mm	Total Blows No.	Total Penetration mm	Test Depth m	1st 75mm Blows No.	1st 75mm Penetration mm	2nd 75mm Blows No.	2nd 75mm Penetration mm	3rd 75mm Blows No.	3rd 75mm Penetration mm	Total Blows No.	Total Penetration mm	Test Duration min	Recovered Core %	Rock Quality Designation (RQD) %	Fracture Index No.	SPT 'N' Value	SPT 'N' Value (Corrected) N_{60}	Specimen Depth m	Remarks
WS109	4.50 (17.50)	7.00	5.00	63.50	760	12	300	2	75	14	375	4.50	7	75	7	75	7	75	21	225	11	080	4.00	7.77	75	10	10	5
WS110	3.00 (19.00)	3.00	3.00	DPSH	760	75	1	0	1	150	2	2.50	75	1	75	1	75	2	0	2	300	3	0.13	1.25	50.00	5	10	10	3
WS111	4.50 (17.50)	3.00	3.00	DPSH	760	3	75			3	75	3.50	75	225							225	3	0.13	1.25	6.77				3
WS112	4.50 (17.50)	3.00	3.00	DPSH	760	75	1	75	1	150	2	4.50	75	1	75	1	75	2	75	1	300	3	0.13	1.25	50.00	10	10	10	5
WS113	3.50 (18.50)	3.00	3.00	DPSH	760	75	1	75	1	150	2	3.50	75	1	75	1	75	3	75	1	300	3	0.13	1.25	50.00	10	10	10	4
WS114	3.00 (19.00)	3.00	3.00	DPSH	760	75	1	75	1	150	2	3.00	75	1	75	1	75	3	75	1	300	3	0.13	1.25	50.00	10	10	10	3
WS115	4.50 (17.50)	3.00	3.00	DPSH	760	75	1	75	1	150	2	4.50	75	1	75	1	75	3	75	1	300	3	0.13	1.25	50.00	10	10	10	5
WS116	4.50 (17.50)	3.00	3.00	DPSH	760	75	1	75	1	150	2	4.50	75	1	75	1	75	3	75	1	300	3	0.13	1.25	50.00	10	10	10	5
WS117	4.50 (17.50)	3.00	3.00	DPSH	760	75	1	75	1	150	2	4.50	75	1	75	1	75	3	75	1	300	3	0.13	1.25	50.00	10	10	10	5
WS118	4.50 (17.50)	3.00	3.00	DPSH	760	75	1	75	1	150	2	4.50	75	1	75	1	75	3	75	1	300	3	0.13	1.25	50.00	10	10	10	5

NOTE: Tests terminated on refusal or at specified depth or on encountering Exploratory Hole cased for sampling below. Uncorrected commercial SPT 'N' values are presented on the attached graphics and should not be used for Engineering purposes.

Contract Title :- Kwu Tung Gateway	Client Far East Consortium International Limited	AEG Contract No :- NW1580	UKAS TESTING 1367
Date of Issue :- 12/03/2019	Page No :- 9 of 10	Checked By :- LC	Approved By :- [illegible] Certificate No :- SPT/NW1580/9

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 3, Seaforth Industrial Estate, Kirkcaldy, Fife, KY1 3BH, Scotland. Tel: 01592 655 777 Fax: 01592 655 888
Regional Office: Unit 7, Block 2, Joppa Industry Centre, Edinburgh, EH15 2EU. Tel: 0131 669 6000 Fax: 0131 669 6001

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Depth to Top of Test (Reduced Level) m	Water Depth (if any) m	Push Length m	SPT Hammer Mass kg	Energy Ratio %	SPT Penetration						Test Drive										Rod Length Correction Factor C_R	Energy Ratio Correction Factor C_E	Penetration Resistance N_{60}	SPT 'N' Value	SPT Value Corrected for Rod Length (N_{60})	Sample Quality	Remarks
						Pen mm	Blows No.	mm	Blows No.	Total Pen mm	Total Blows No.	1st mm	Blows No.	2nd mm	Blows No.	3rd mm	Blows No.	4th mm	Blows No.	Total Pen mm	Total Blows No.							
	m	m	m	kg	%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.							
BH 04	0.50 (26.32)	0.0	9.20	SPT	81	75	1	75	1	150	2	75	2	75	4	75	1	75	1	300	8	0.75	1.35	100.00	8	8	15	
BH 04	1.00 (25.82)	0.0	9.20	SPT	81	75	1	75	1	150	2	75	2	75	4	75	3	75	3	300	12	0.75	1.35	100.00	12	12	15	
BH 04	1.50 (25.32)	0.0	9.20	SPT	81	75	2	75	3	150	5	75	3	75	5	75	4	75	4	300	16	0.75	1.35	100.00	16	16	15	
BH 04	2.00 (24.82)	0.0	9.20	SPT	81	75	2	75	3	150	5	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	2.50 (24.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	3.00 (23.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	3.50 (23.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	4.00 (22.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	4.50 (22.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	5.00 (21.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	5.50 (21.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	6.00 (20.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	6.50 (20.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	7.00 (19.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	7.50 (19.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	8.00 (18.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	8.50 (18.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	9.00 (17.82)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	
BH 04	9.50 (17.32)	0.0	9.20	SPT	81	75	1	75	2	150	3	75	3	75	5	75	5	75	5	300	18	0.75	1.35	100.00	18	18	15	

NOTE: Please refer to calculation sheet(s) for additional information and corresponding Soil/Rock/Groundwater/Borehole/Sampling details. Corrected and uncorrected SPT 'N' values presented on the attached graphical pdf relative to each Exploratory Hole.

Contract Title: Northern Gateway	Client: Far East Consortium International Limited	AEG Contract No.: NW1560	
Date of Issue: 12/08/2015	Page No.: 10 of 10	Checked By: LC	Approved By: NW
Certificate No.: SPT/NW1560/10			

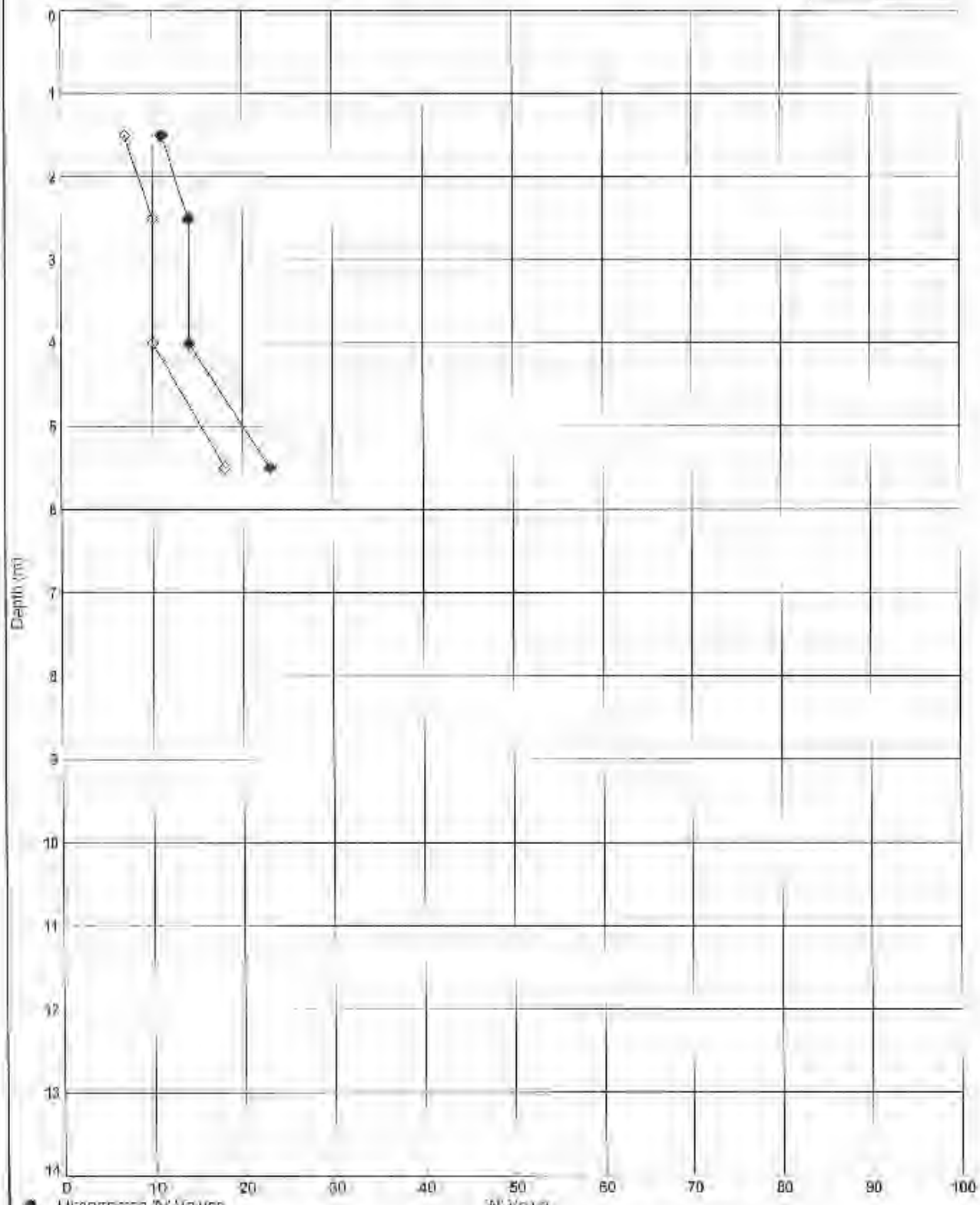
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 75 Sefton Commercial Park, Red Rum Drive, Birkenhead, Merseyside, CH41 9HP Tel: 0151 647 9700 Fax: 0151 647 9711
Regional Office: Unit 4, Kestrel Enterprise Centre, Eccleston Park, Prescot, L34 3NE Tel/Fax: 0151 430 0144

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH101



● Uncorrected 'N' Values
◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title: Northern Gateway	Client: Far East Consortium International Limited
Date of Issue: 2/03/2019	Certificate No: SPT (NW1580/Bore/BH101)
Operator: M. Smith	
Checked By: LC	Approved By: MW
AEG Contract No: NW1580	

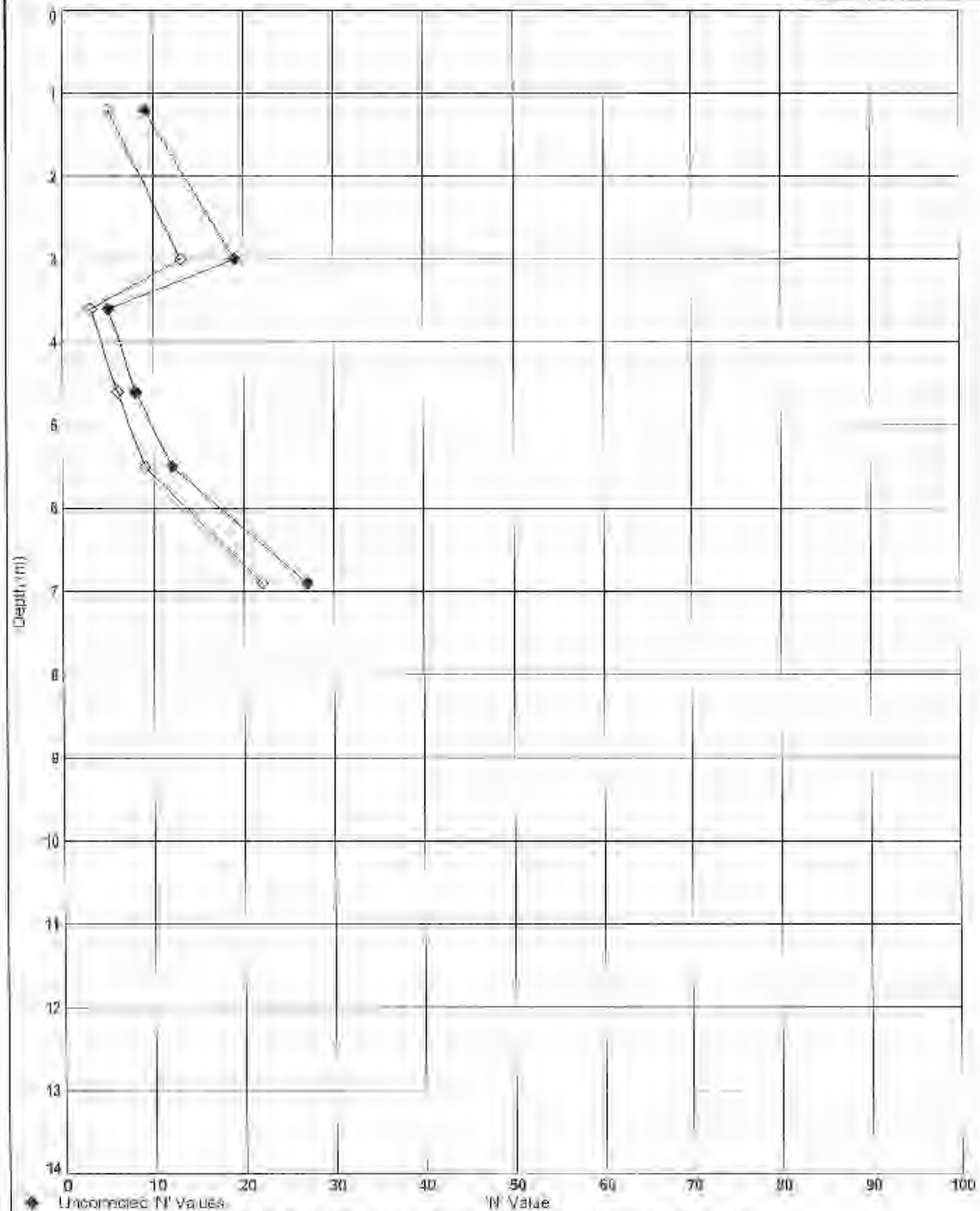
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Block D1 Industrial Estate, Pitreavie, Dunfermline, Fife, KY11 8QG Tel: 01383 737 400 Fax: 01383 737 410
Regional Office: Unit 20 Business Development Centre, Bridge of Allan, Stirling, FK9 4JZ Tel: 01786 [illegible] Fax: 01786 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH102



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-
Northern Gateway

Client :-
Far East Consortium International Limited

Date of Issue :-
12/03/2019

Certificate No :-
SPT/NW1550/Grp/BH102

Operator :-
C Brownlee

Checked By :-
LC

Approved By :-
NW

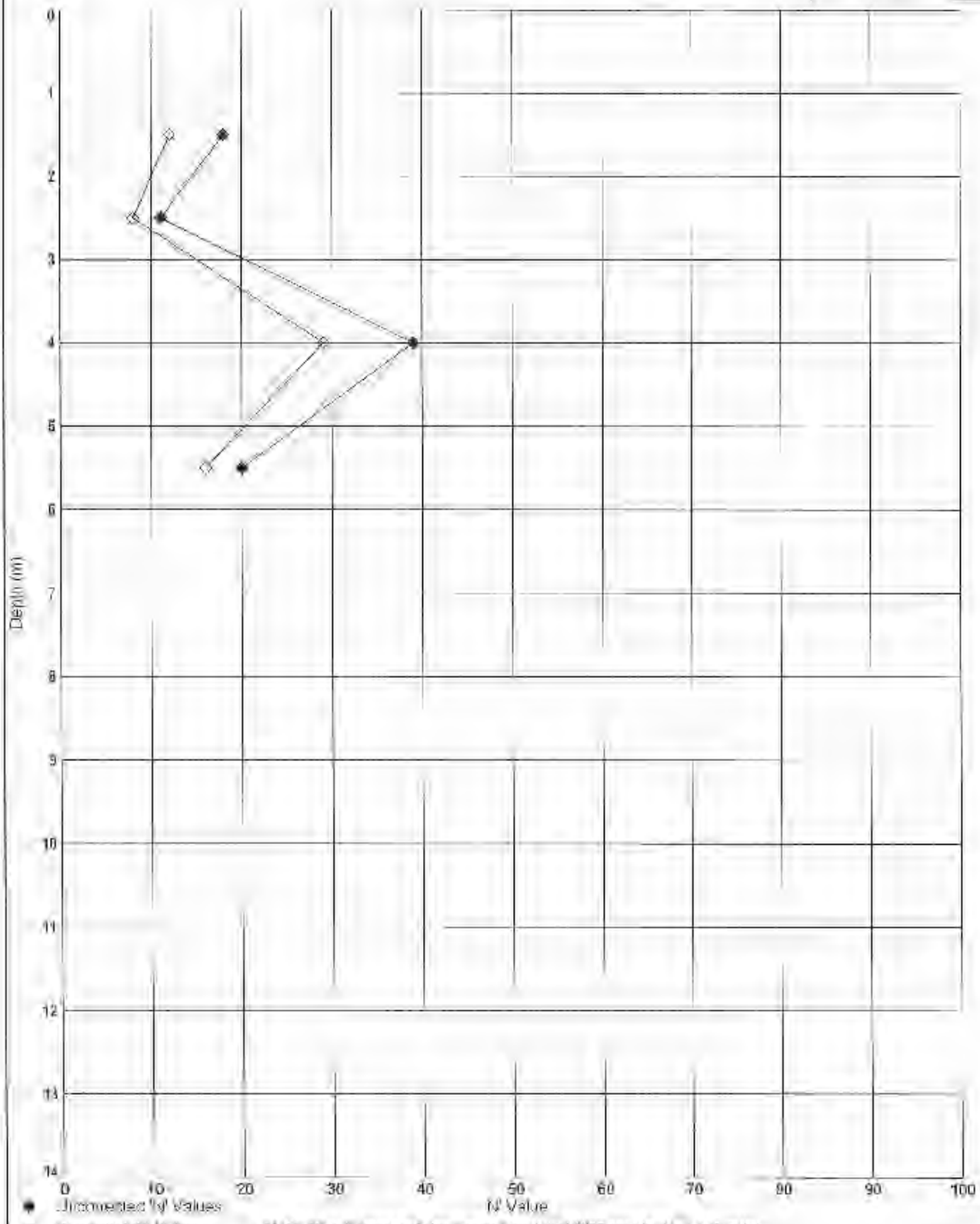
AEG Contract No :-
NW1550

UKAS TESTING
1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH103



Note: Graph does not display extrapolated SPT results (e.g. refusals)

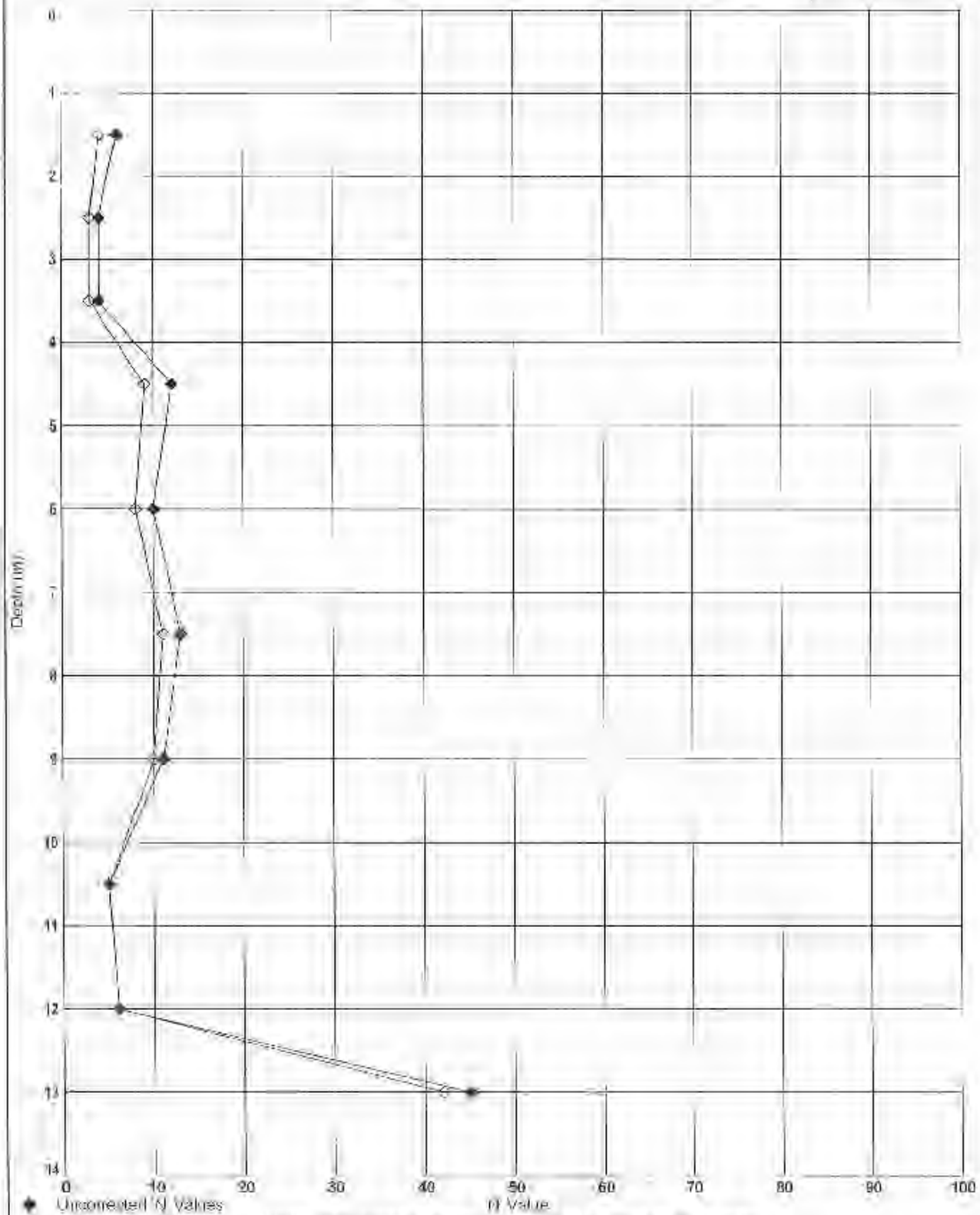
Contract Title :- Northern Gateway	Client :- Far East Consortium International Limited

Date of issue :- 26/6/2019	Certificate No :- SPT/NW1580/Graph/BH103	Operator :- M. Smith	
Checked By :- LC	Approved By :- NW	AEG Contract No :- NW1580	UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH104



◆ Uncorrected 'N' Values
◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :- Northern Gateway

Client :- Far East Consortium International Limited

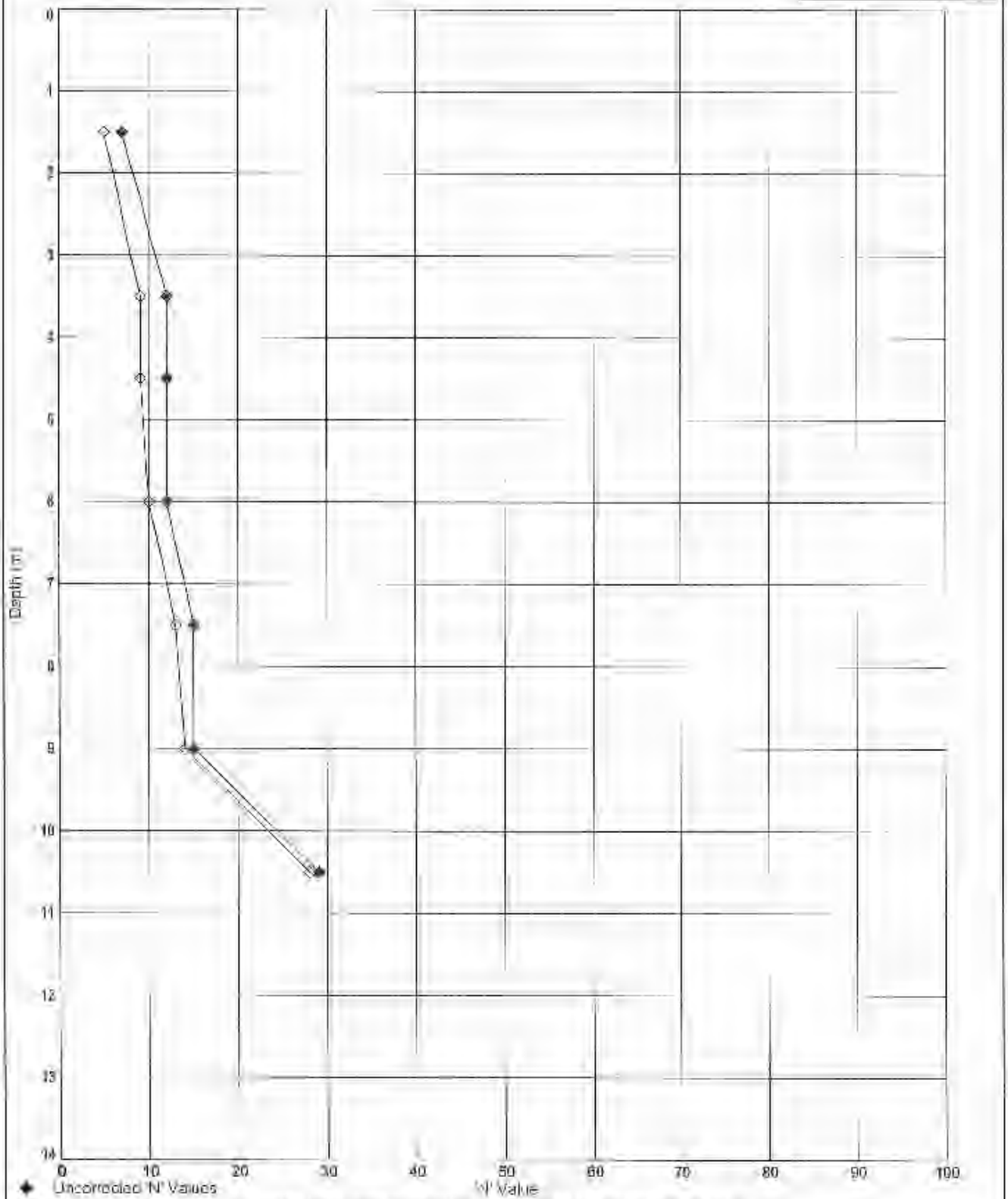
Date of Issue :- 12/03/2014	Certificate No :- SPT/NW1580/GraphBH104	Operator :- P Sweetlove	UKAS TESTING 1367
Checked By :- LC	Approved By :- NW	AEG Contract No :- NW1580	

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 35 Seafield Industrial Estate, Kilspindie Road, Port Glasgow, PA14 5TG. Tel: 01475 568744 Fax: 01475 568745
Regional Office: Unit 29 Shelford Court, Thane Gardens, Glasgow, G41 5RJ. Tel: / Fax: 0141 427 3999

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH105



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title: Northern Gateway	Client: Far East Consortium International Limited
Date of Issue: 13/03/2019	Certificate No: SPT/NW1560/Graph/Rimus
Checked By: LC	Approved By: NW
Operator: R. Butterfield	AEG Contract No: NW1560

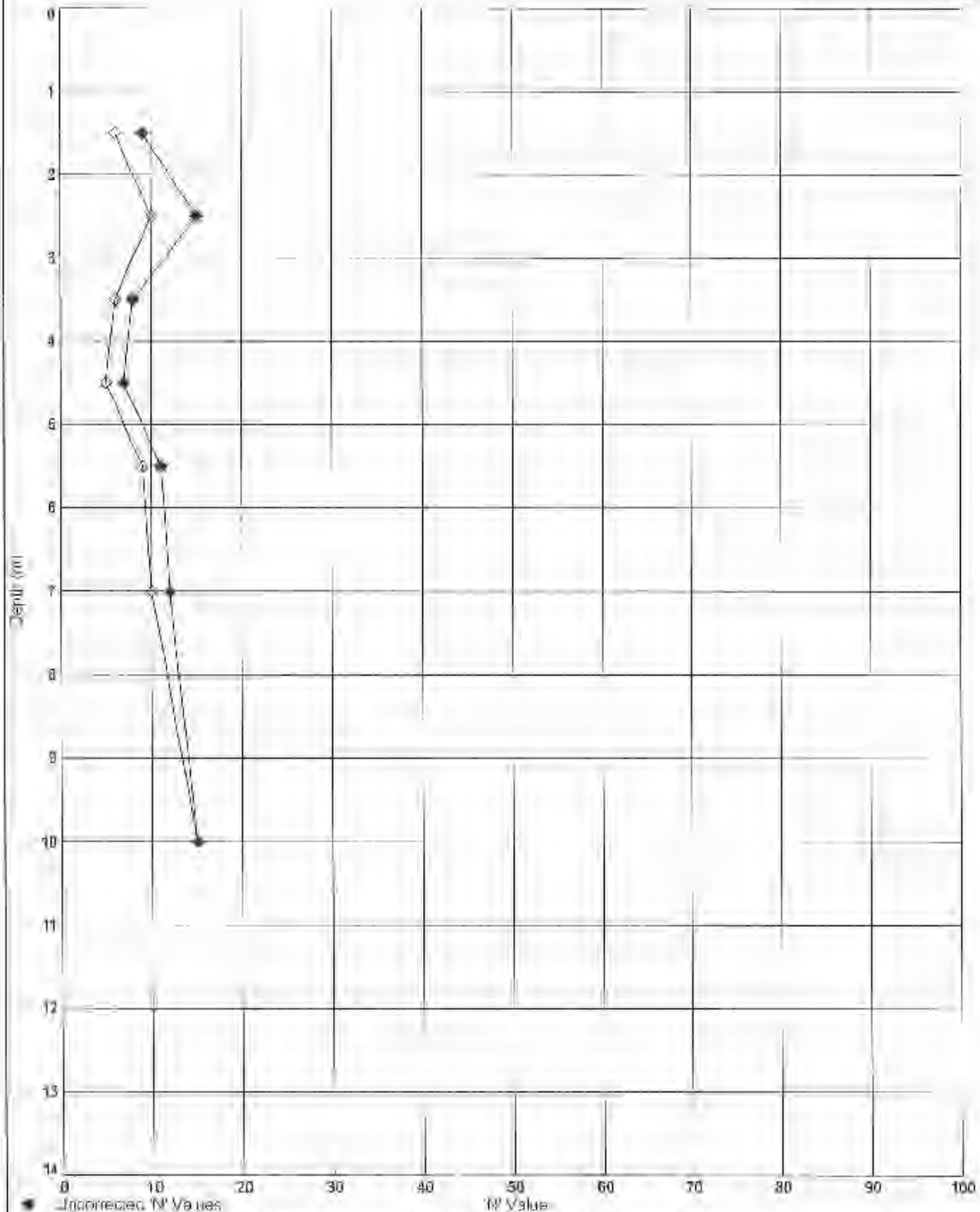
1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH106



Note: Graph does not display extrapolated 'N' results (e.g. refusals).

Contract Title: Northern Gateway	Client: Far East Consortium International Limited
Date of Issue: 19/03/2019	Dem no/ate No: SPT/NW1580/Graph/BH106
Operator: L Hayes	
Checked By: LC	Approved By: NW
AEG Contract No: NW1580	

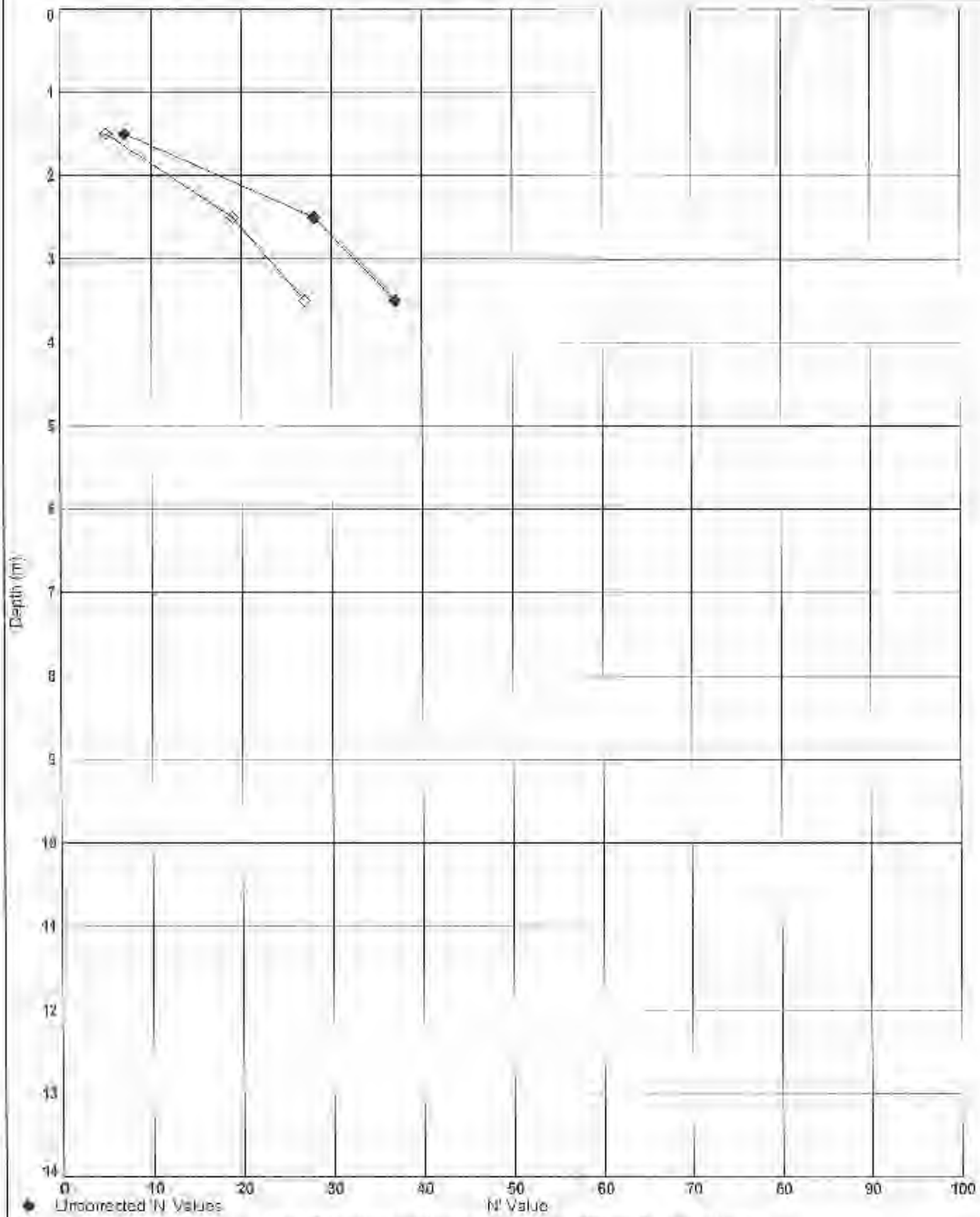
UKAS TESTING
1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Stella Cl Industrial Estate, Tullos, Aberdeen, AB12 4HY Tel: + 44 (0) 1224 898 898 Fax: + 44 (0) 1224 898 899
Regional Office: Unit 20 Business Development Centre, Bandon Road, Montrose, DD10 9RU Tel: + 44 (0) 1674 660 000 Fax: + 44 (0) 1674 660 999

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
BH107



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title:
Northern Gateway

Client:
Far East Consortium International Limited

Date of Issue:
12/03/2013

Certificate No:
SPT/NW1580/Graph/BH107

Operator:
P. Butterfield

Checked By:
LC

Approved By:
NW

AEG Contract No:
NW1580

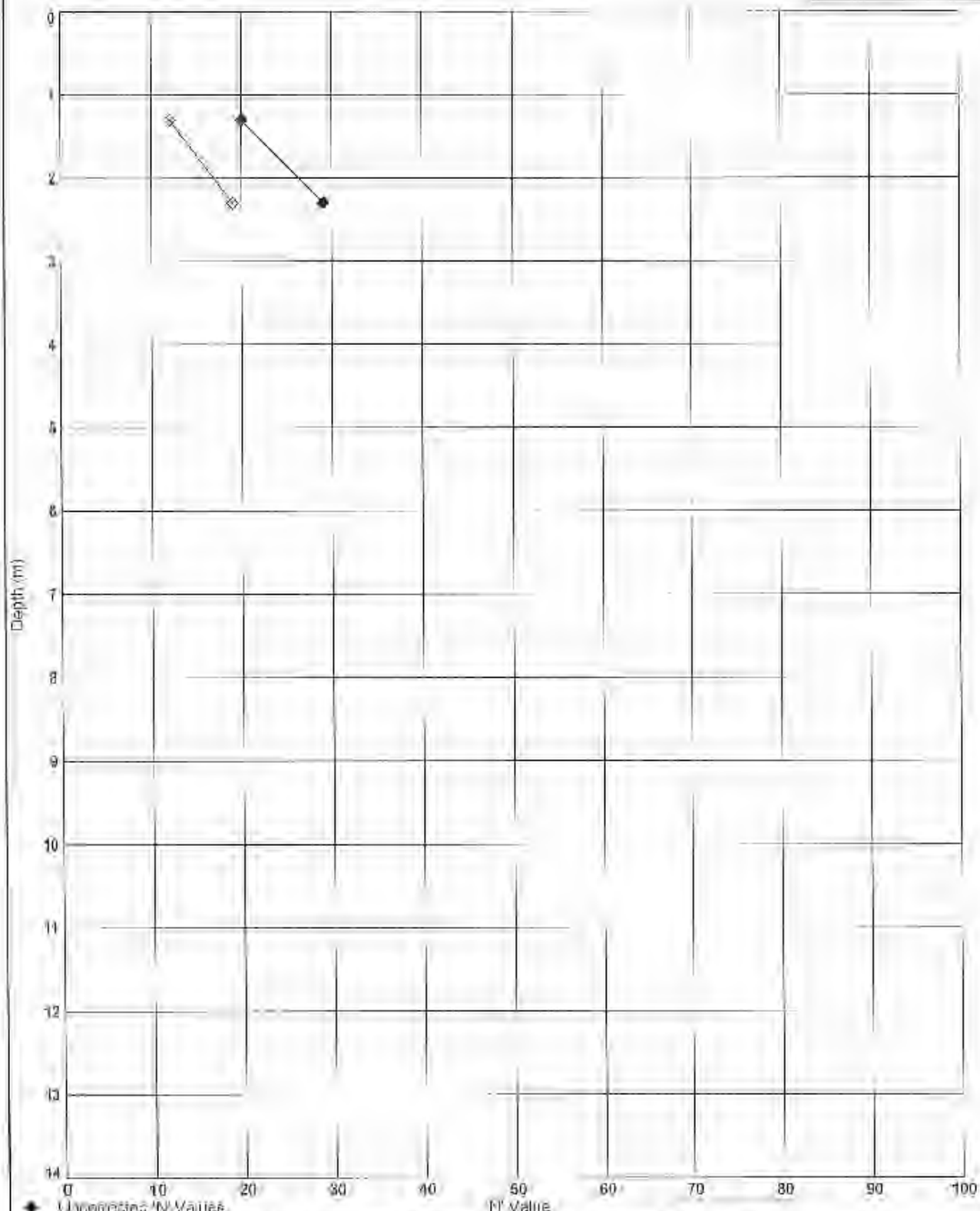
UKAS TESTING
1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2F 3660 Oil Industry Estate Peter Rd, Chickerell, Dorset, DT3 4YD Tel: 01305 [illegible] Fax: 01305 [illegible]
Regional Office: Unit 3B Business Development Centre, Tolpuddle, Dorset, DT2 7EA Tel: 07773 [illegible] Fax: 01747 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.
BH109



◆ Uncorrected 'N' Values
○ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title:
Northern Gateway

Client:
Far East Consortium International Limited

Date of Issue: 2/09/2019	Certificate No: SPT/NW/1560/Graph/BH109	Operator: P. Butterfield	
Checked By: LC	Approved By: NW	AEG Contract No.: NW1560	

1367

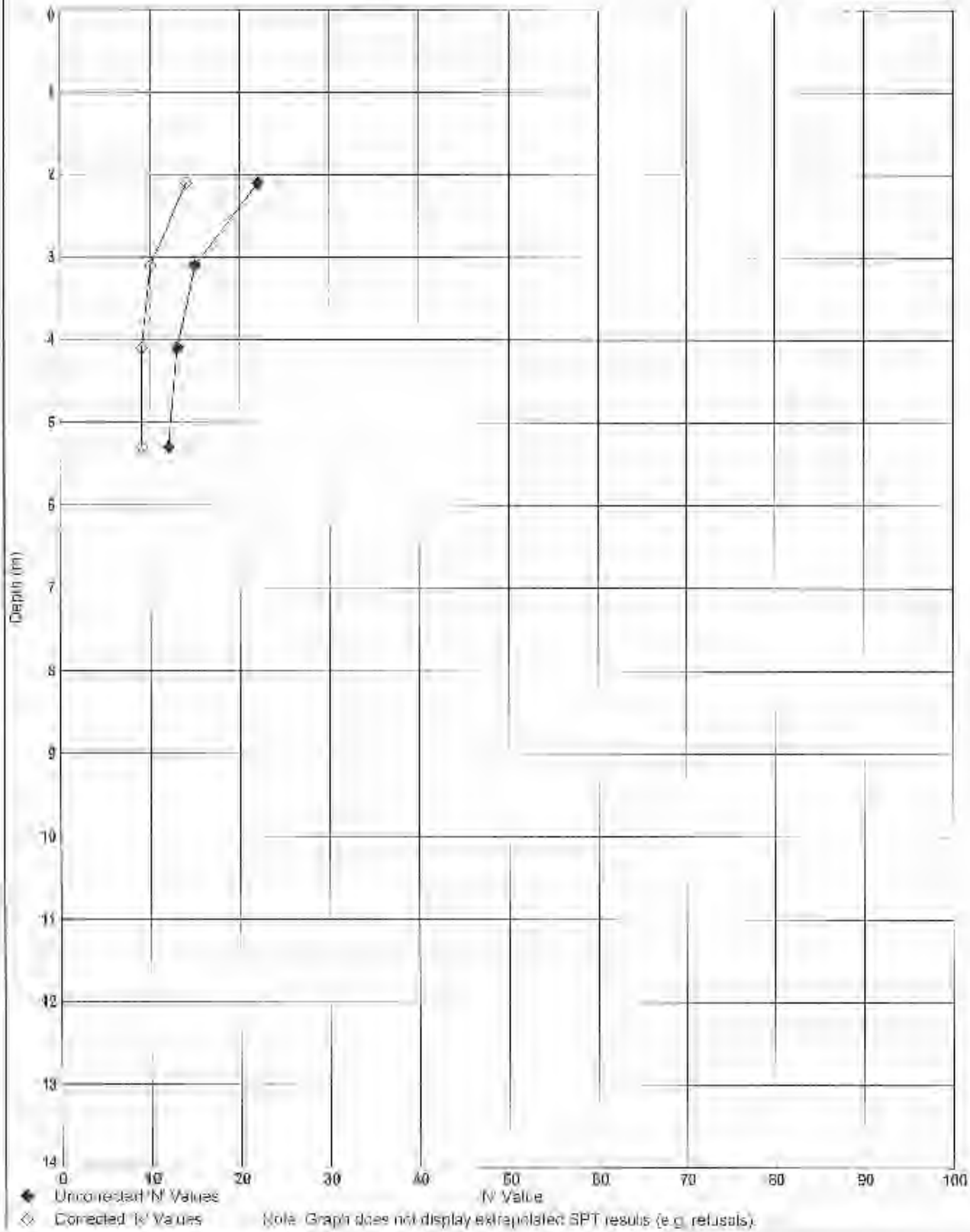
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Lab Office: [illegible]
Regional Office: [illegible]
Tel: 01732 759300 Fax: 01732 759301

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH110



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Date of Issue: 12/03/2010	Certificate No:- SPT/NW1580/Graph/BH110	Operator: R. Butterfield	UKAS TESTING 1367
Checked By: LC	Approved By: NW	AEG Contract No: NW1580	

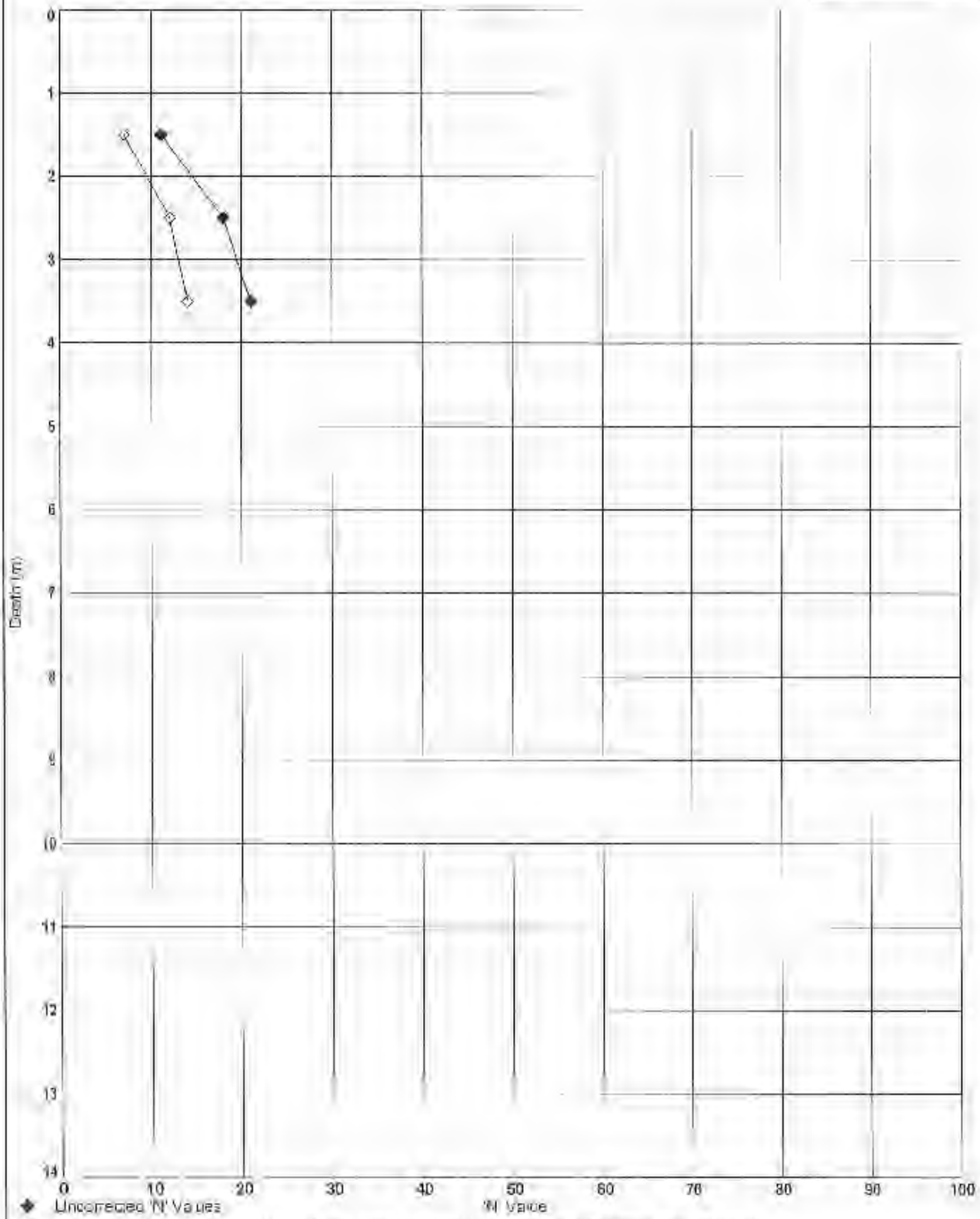
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 10 Calder Ct Industrial Estate, Calder Close, Preston, PR2 5RS Tel: 01772 653933 Fax: 01772 651 651
Regional Office: Unit 30 Business Development Centre, Bacup, Lancs, OL13 0BW Tel: 01772 653933 Fax: 01772 651 651

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH112



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title: - Northern Gateway

Client: - Far East Consortium International Limited

Date of Issue: - 12/09/2019

Certificate No: - SPT/NW1550/Graphs/BH112

Operator: - P. Butterfield

Checked By: - LC

Approved By: - NW

AEL Contract No: - NW1550

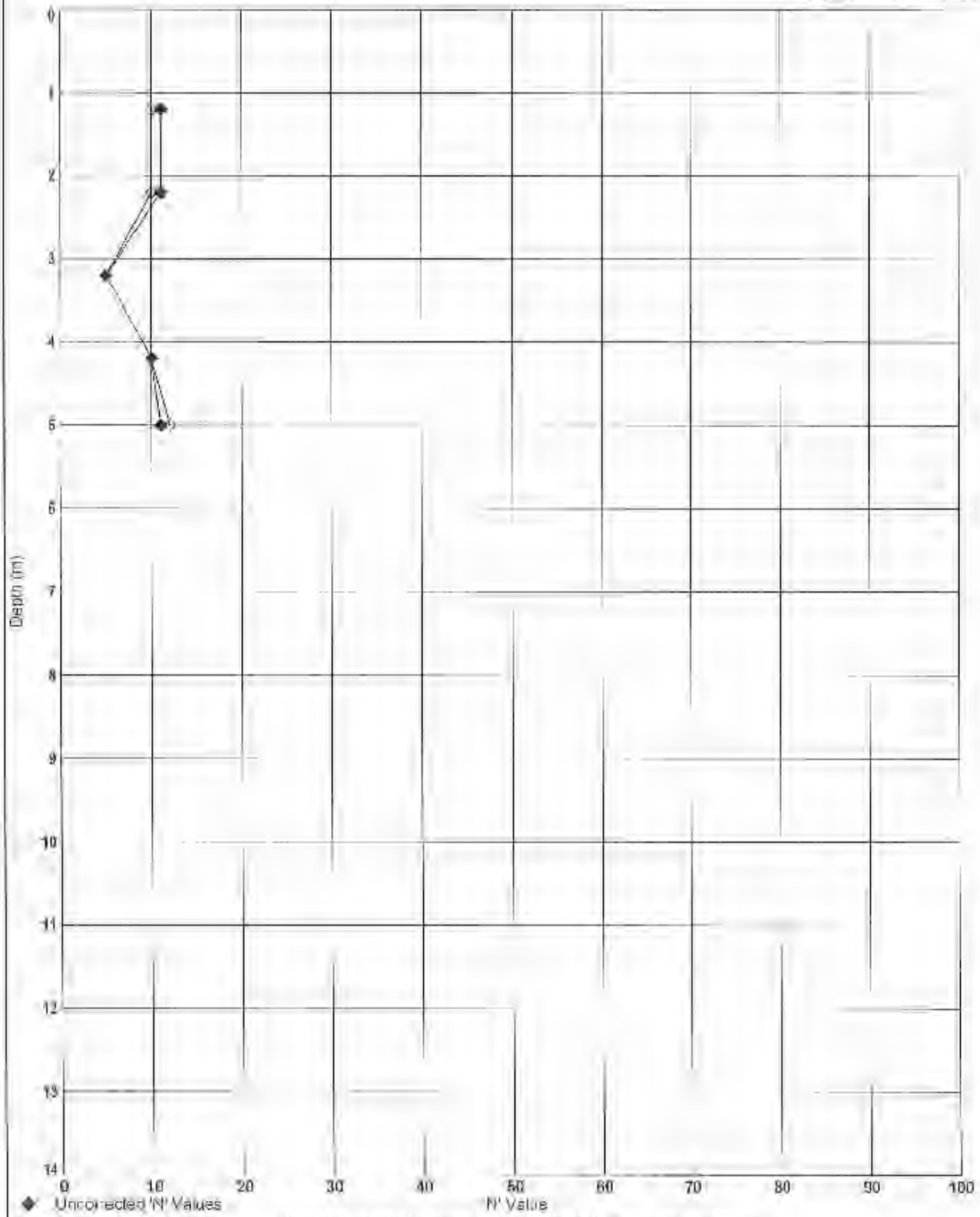
1867

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
WS101



Contract Title :-
Anthem Gateway

Client :-
Far East Consortium International Limited

Date of Issue :-
12/03/2019

Certificate No :-
SPT/NW1580/Graph/WS101

Operator :-
R Kennedy

Checked By
LC

Approved by
NW

AEG Contract No :-
NW1580

UKAS TESTING
1367

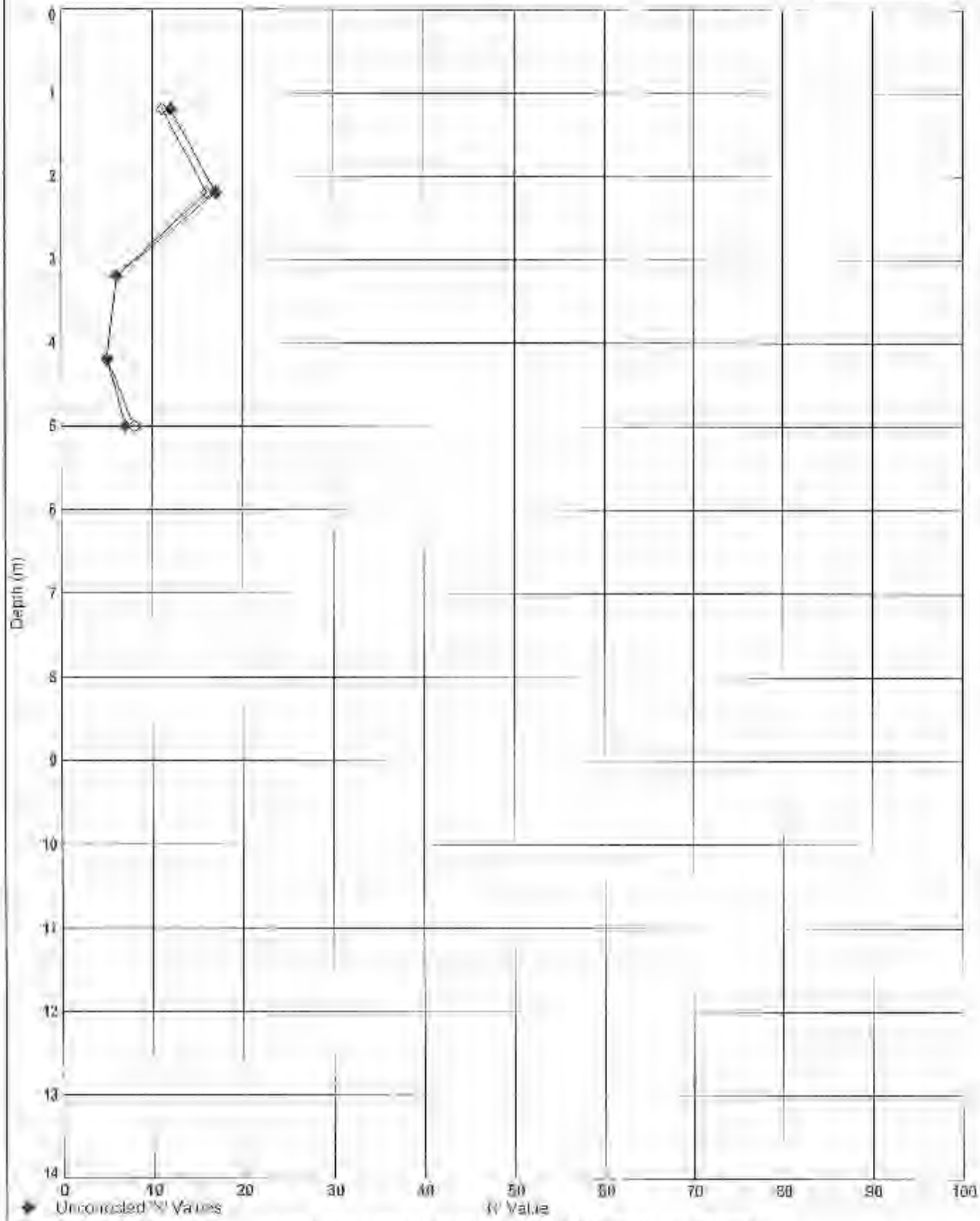
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]
Tel: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No.

WS102



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title :
Northern Gateway

Client :
Far East Consortium International Limited

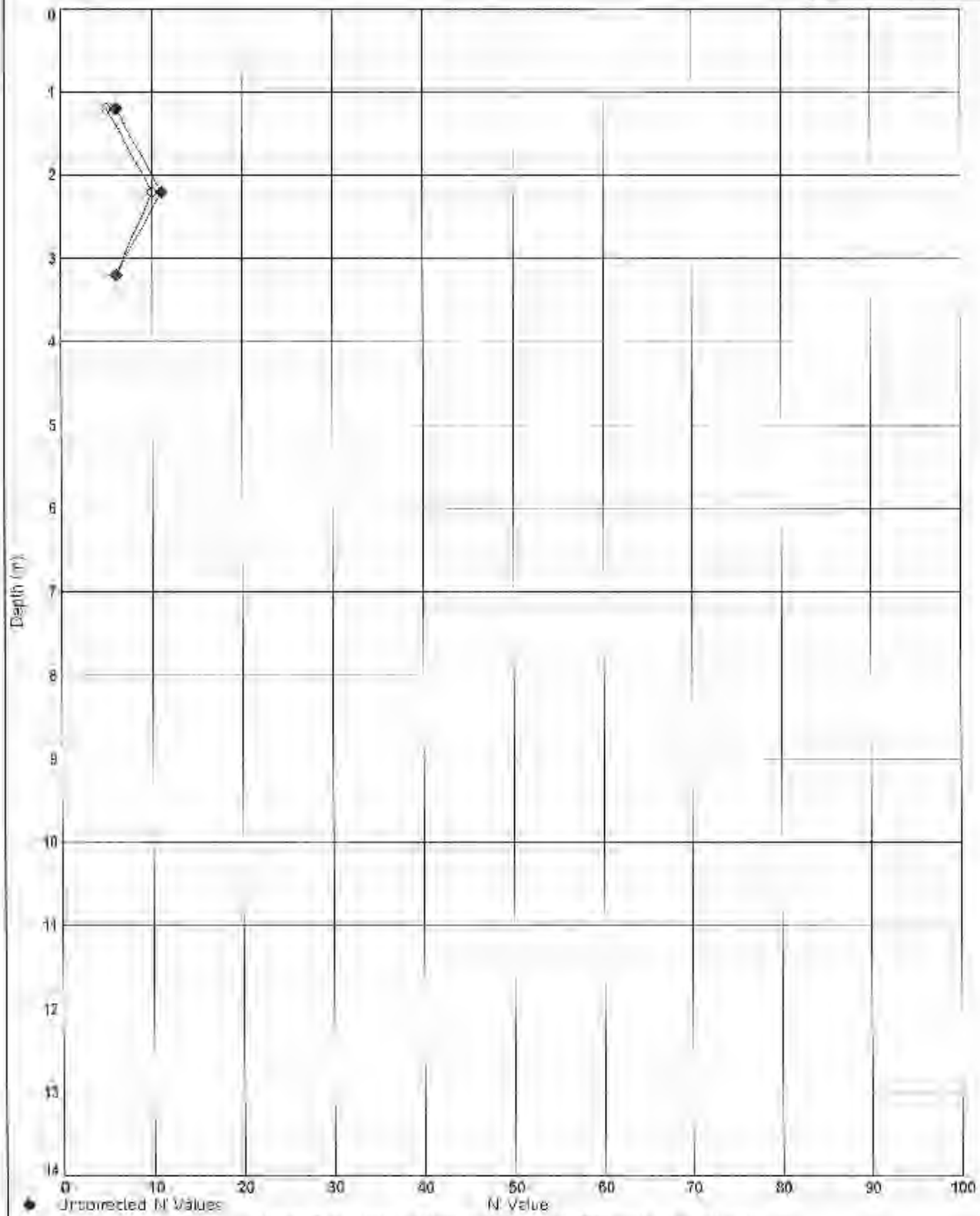
Date of Issue : 19/03/2015	Certificate No :- SPT/NW1580/Graph/WS102	Operator : R. Kennedy	
Checked By : LC	Approved By : NW	AEG Contract No NW1580	UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Block C1 Nangan Industrial Estate, Tuen Mun, New Territories, Hong Kong Tel: (852) 2467 4000 Fax: (852) 2467 4213
Regional Office: Unit 2, Lennon Development Centre, 6 Lennon Street, Blackburn, BB1 5AB Tel: (+44) 1254 55 44 44 Fax: (+44) 1254 69 666

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
WS103



Contract Title :
Northern Gateway

Client :
Far East Consortium International Limited

Date of Issue : 12/03/2014	Certificate No : SPT/NW1580/Graph/WS103	Operative : R. Kennedy	
Checked By : LC	Approved By : NW	AEG Contract No. : NW1580	UKAS TESTING 1367

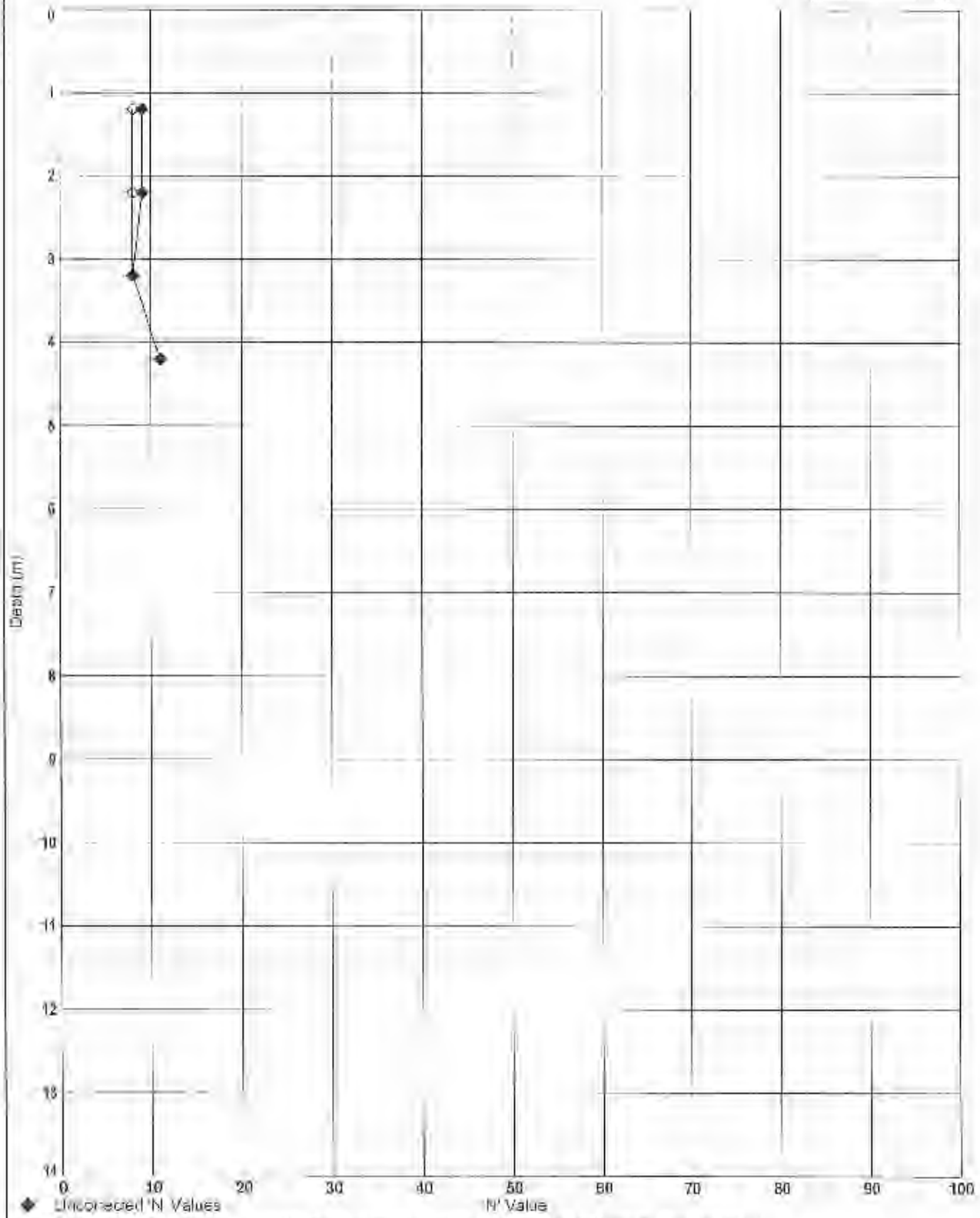
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Scale Hall Industrial Estate, Scale Hall Lane, Lancaster, LA1 2AG Tel: 01524 60 Fax: 01524 [illegible]
Regional Office: Unit 11 Enterprise Innovation Centre, Barnfield Way, Blackburn, BB1 3BL Tel & Fax: 01772 [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No

WS104



Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :
Northern Gateway

Client :
Far East Consortium International Limited

Date of Issue :
12/03/2019

Certificate No :
SPT/NW/1580/Graph/WS104

Operator :
P. Kennedy

Checked By :
LC

Approved By :
NW

AFG Contract No :
NW1580

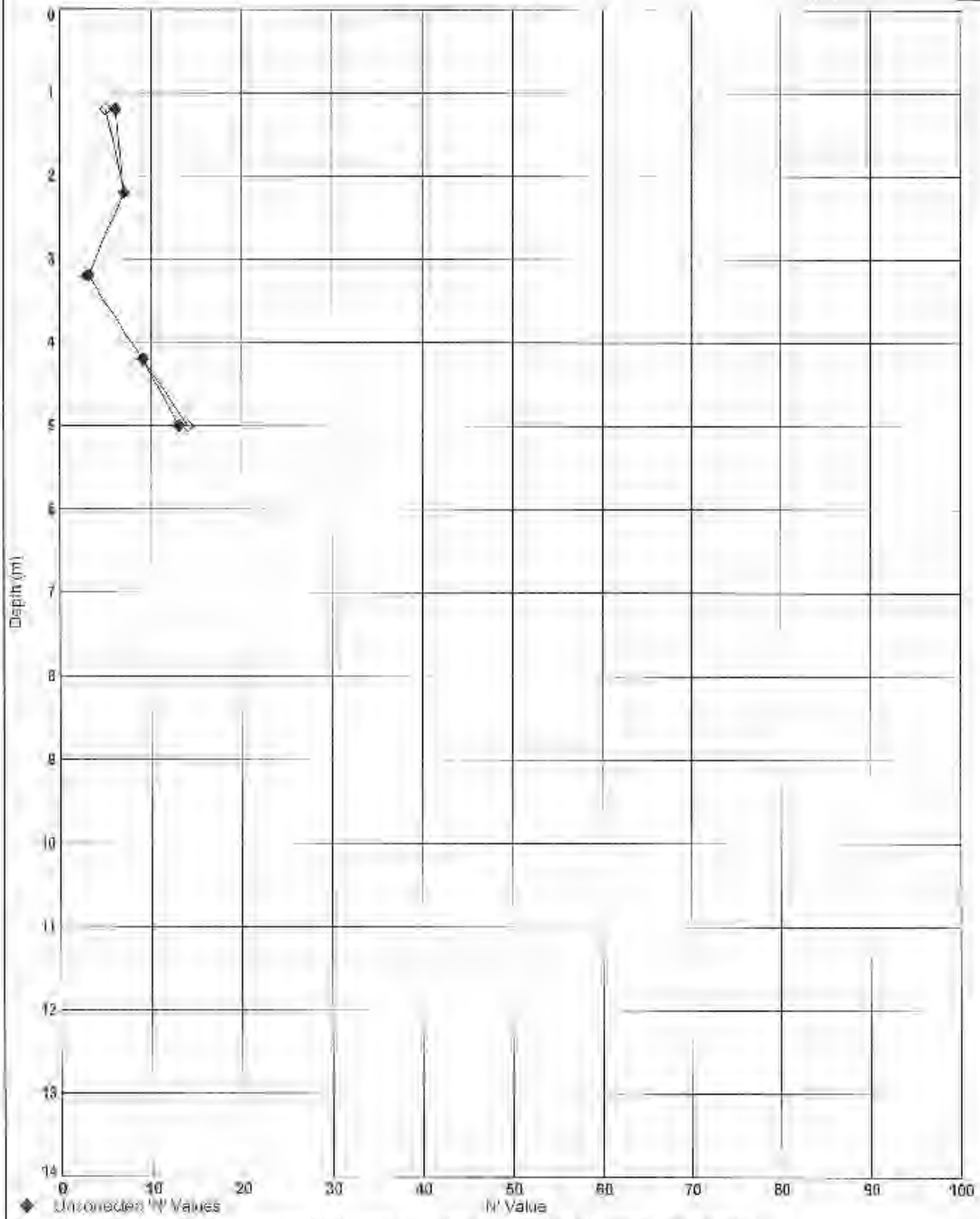
UKAS TESTING
1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
WS105A



Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title: Tamworth Gateway	Client: Far East Consortium International Limited
Date of Issue: 12/03/2019	Certificate No: SPT/WS105A
Operator: R. Kennedy	
Checked By: LC	Approved By:
APS Contract No: NW1680	

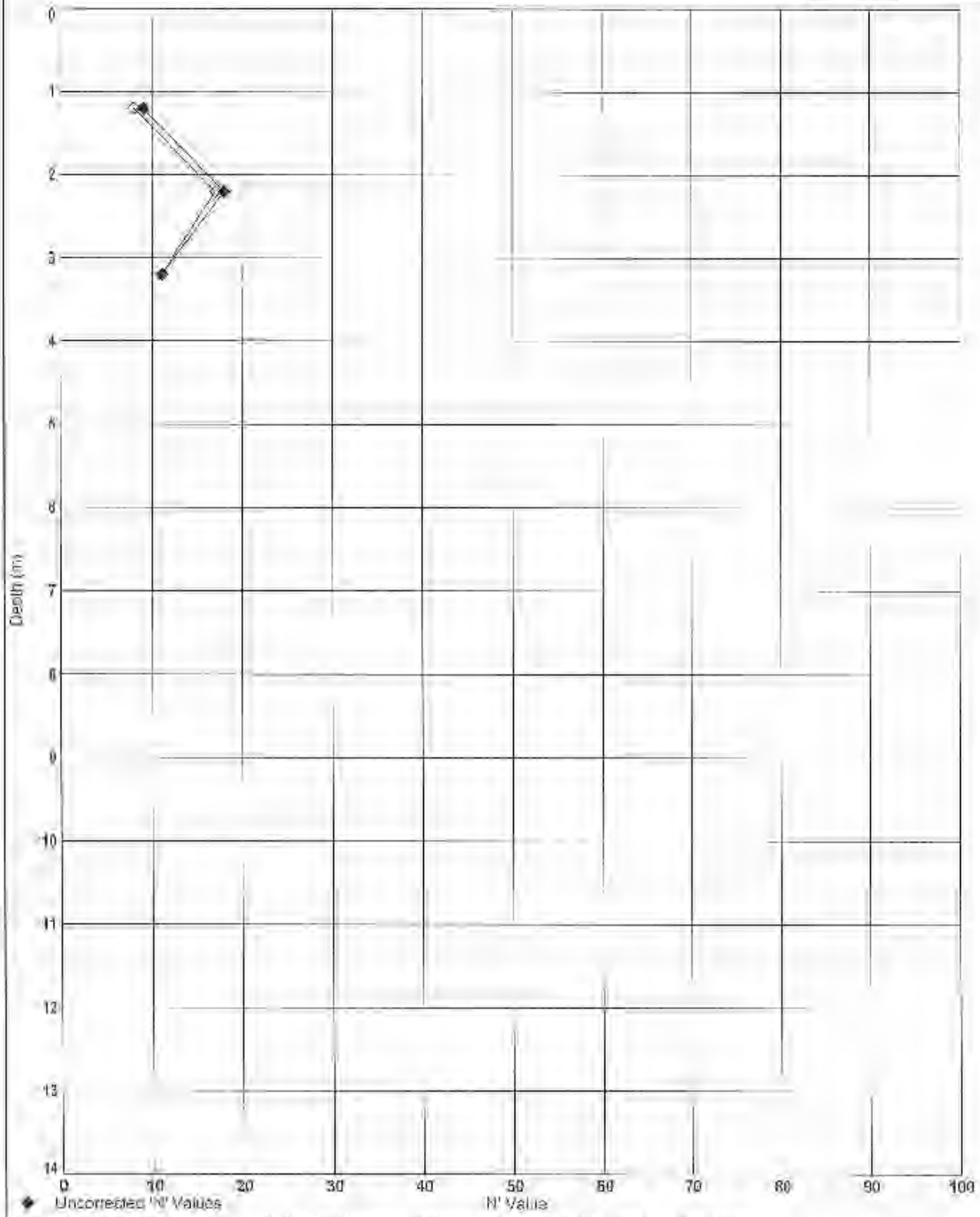
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Tel: [illegible]
Regional Office: [illegible] Tel: [illegible]

STANDARD PENETRATION TEST RESULTS
(BS EN ISO 22476-3: 2005)

Exploratory Hole No
WS106



◆ Uncorrected 'N' Values
× Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals)

Contract Title:	Client:
Northern Gateway	Far East Consortium International Limited

Date of Issue: 12/03/2019	Certificate No: RPT/NW1580/Graph/WS106	Operator: R. Kennedy
Checked By: LC	Approved By: NW	AEG Contract No: NW1580

UKAS TESTING 1387

Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH01
Test Date:	03/08/2018
Report Date:	03/08/2018
File Name:	ATH01.spt
Test Operator:	BP

QUALITY CONTROL CHECKED
03 AUG 2018

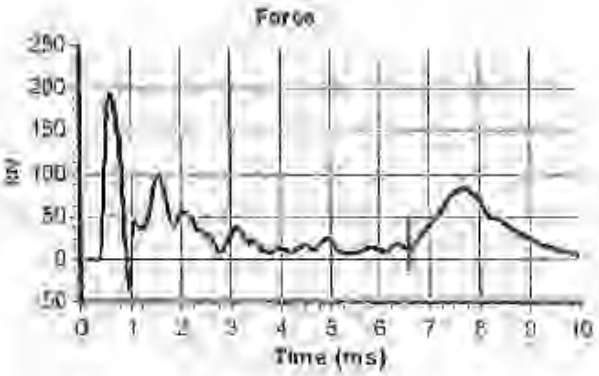
Instrumented Rod Data

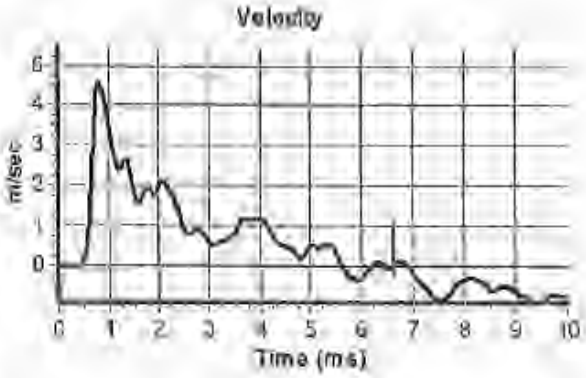
Diameter d_r (mm):	67
Wall Thickness t_r (mm):	8.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	6469
Accelerometer No.2:	11406

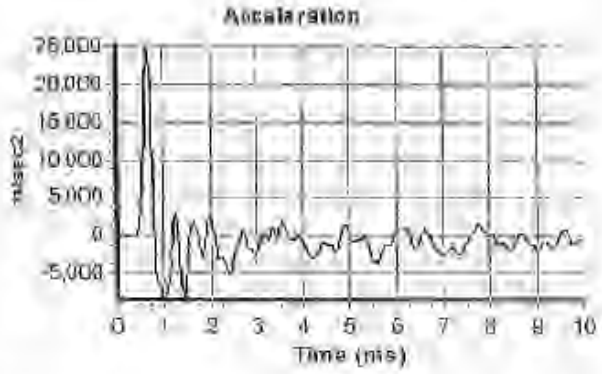
SPT Hammer Information

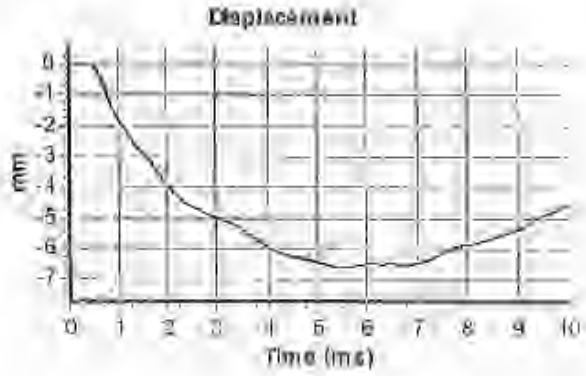
Hammer Mass m (kg):	63.8
Falling Height h (mm):	761
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	1562
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	278

Energy Ratio E_r (%): 59

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

SPTMAR Ver1.0/2 All rights reserved, Testmaster ©2010

Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH03
Test Date:	02/07/2018
Report Date:	02/07/2018
File Name:	ATH03.spt
Test Operator:	BP

QUALITY CONTROL
PASSED
02 JUL 2018

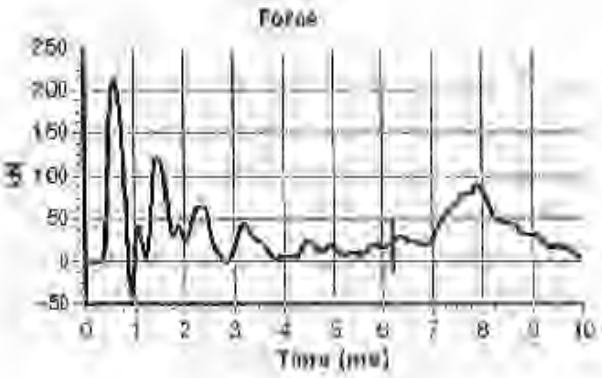
Instrumented Rod Data

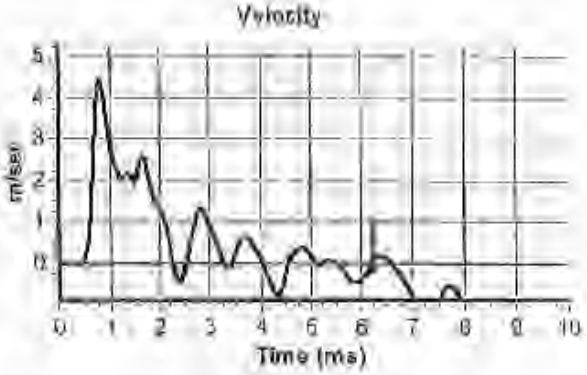
Diameter d_r (mm):	67
Wall Thickness t_r (mm):	8.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	6469
Accelerometer No.2:	11406

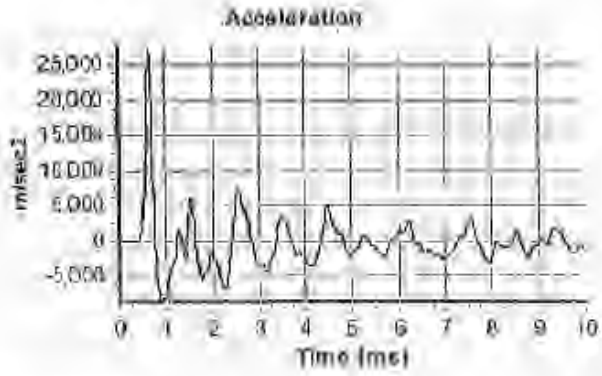
SPT Hammer Information

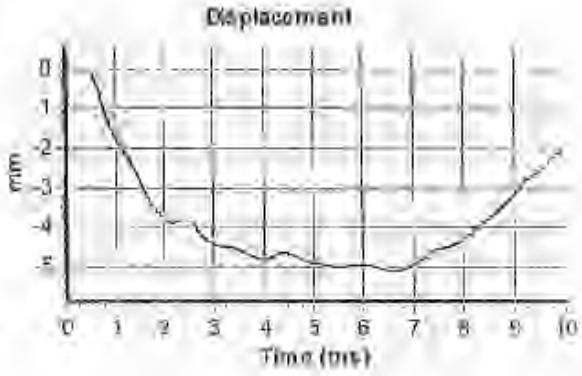
Hammer Mass m (kg):	63.24
Falling Height h (mm):	751
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	1562
Theoretical Energy E_{theo} (J):	473
Measured Energy E_{meas} (J):	263

Energy Ratio E_r (%): 56

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

SPTHAN ver 1.93 All rights reserved. Registered to:

Allied Exploration & Geotechnics Ltd.

Unit 25 Stella Gill Industrial Estate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref:	ATH04
Test Date:	17/09/2018
Report Date:	17/09/2018
File Name:	ATH04.spt
Test Operator:	BP

QUALITY CONTROL CHECKED 18 SEP 2018

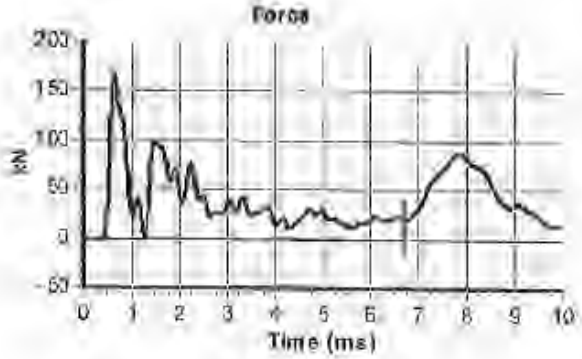
Instrumented Rod Data

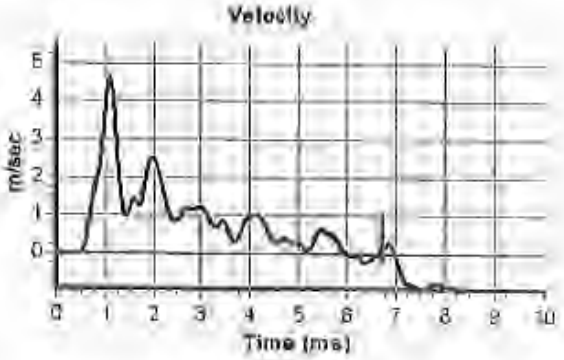
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

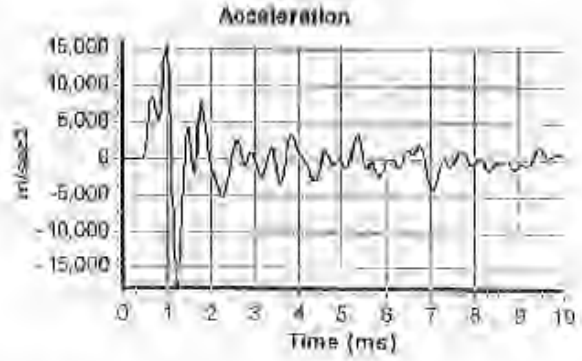
SPT Hammer Information

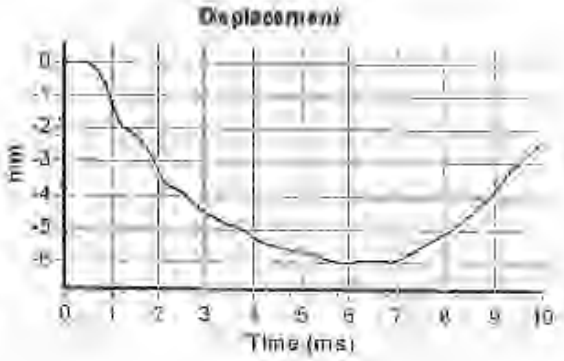
Hammer Mass m (kg):	63.70
Falling Height h (mm):	758
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm²):	970
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	279

Energy Ratio E_r (%): **59**

Signed: Brian Proctor

Title: Technician

The recommended calibration interval is 12 months

SPTHAN ver. 1.97 All rights reserved. Geotek Ltd 2010

Hand Shear Vane Test Results

IN-SITU TESTING ENCLOSURE 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2C Scale Hall Industrial Estate, Tarleton, Lancashire PR4 6UY Tel: 01772 735 300 Fax: 01772 735 599
Regional Office: Unit 7 Link 65 Business Centre, Eccles New Road, Salford M50 1HL Tel: 0161 707 4700 Fax: 0161 707 4710

HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
TP120	09/01/2019	2.00	24 (33)	25	21	23 (33)	

Residual results given in brackets. Where a results is ">" the result has been ignored for the average.

Contract Title :- Northern Gateway		Client :- Far East Consortium International Limited		AEG Contract No :- NW1580
Date of Issue :- 31/01/2019	Page No :- 1 of 1	Checked By :- LC	Approved By :-	Certificate No. :- HSV/NW1580/1

In-situ Water Quality Parameter Test Results

IN-SITU TESTING ENCLOSURE 3

ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 23 Sallis Oil Industrial Estate, Poole, Tel: [illegible] Tel: (852) 2811 4283 Fax: (852) 2811 4284
Registered Office: Unit 20, Eastman Development Centre, Eastern Wharf, Blackpool, FY1 5EL. Tel: 01772 736 909 Fax: 01772 736 353

IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test	24/01/2019	Operator	AM
Weather Condition (inc temperature)	Overcast & Foggy (4°C)		

Monitoring Point	Time	pH	Temp (°C)	Electrical Conductivity (µs)	Redox Potential (mv)	Dissolved Oxygen (%)	Total Dissolved Solids (ppm)
BH103	11:43:00	7.80	6.39	947.7	942.3	0.2	950.00
	11:45:00	7.70	7.33	942.0	995.0	2.1	923.00
	11:47:00	7.66	7.37	935.5	1013.9	2.0	917.51
	11:49:00	7.62	7.42	932.0	1030.0	1.8	911.12
	11:50:00	7.60	7.45	929.2	1040.1	1.7	907.97
BH105	12:37:00	7.94	9.61	722.4	1018.4	8.6	685.29
	12:39:00	7.83	9.47	724.6	1036.0	9.2	664.16
	12:41:00	7.75	9.65	726.2	1049.5	9.3	664.41
	12:42:00	7.67	9.94	728.1	1060.5	10.5	664.99
	12:44:00	7.60	9.99	729.0	1067.0	10.8	664.61
	12:46:00	7.55	9.99	731.4	1073.6	11.2	666.56

Remarks :	
Contract title: Northern Gateway	Client: Far East Consortium International Limited
Checked By:	Approved By:
Date Issued: 21/02/2019	Page No: 1 of 1
AEG Contract No: NW1580	

Laboratory Report Certificate

LABORATORY TESTING ENCLOSURES

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Sinclair Gill Industrial Estate, Kelso Rd., Cheswick Street, Gateshead, NE11 0HS. Tel: 0191 4874700 Fax: 0191 4874701
Regional Office: Unit 31 Business Development Centre, Eastern Way, Bury, Lancashire, BL9 5BT. Tel: 0161 705 3001 Fax: 0161 705 3002

1367

LABORATORY REPORT CERTIFICATE

Contract Title: Northern Gateway **AEG Reference:** NW1580

Client Address: Far East Consortium International Limited
Second Floor
Northern Assurance Building
Princess Street
Manchester
M2 4DN

We certify that Laboratory testing was carried out on samples from the above contract in accordance with techniques outlined in BS 1377: 1990, BS EN ISO 17892:2014 or other appropriate standards as quoted. The samples were received from January 2019 and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

- ☐ Nick Vaser (Technical Director)
- ☐ Kevin Warriner (HSE & Quality Director)
- ☑ Michelle Selkirk (Laboratory Manager)

Signed: _____ Date: 01 March 2019

Tests marked no. UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation.

Please note the material was derived from samples taken outside the control of this laboratory.

LABORATORY REPORT CERTIFICATE

ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Laboratory Report Certificate	N/A		3
1	Sample Description Sheets	N/A		5
2	Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	1
2	Plasticity Index and Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	3
-	Determination of Density by Linear Measurement	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-2:2014)	-
3	Determination of Particle Density	Yes	BS 1377 Part 2 1990	1
4	Particle Size Distribution Sieving	Yes	BS 1377 Part 2 1990	32
4	Particle Size Distribution Sedimentation	No	BS 1377 Part 2 1990	18
5	Determination of Loss on Ignition, Organic content, Total Sulphur, Sulphate and pH (Tested externally)	No	See DETS certificates	7
6	Determination of Dry Density/Moisture Content Relationship	Yes	BS 1377 Part 4 1990	3
-	Determination of Dry Density/Moisture/CBR Relationship	Yes	BS 1377 Part 4 1990	
-	Determination of Maximum and Minimum Dry Density	Yes	BS 1377 Part 4 1990	
7	Determination of MCV / Moisture Relationship	Yes	BS 1377 Part 4 1990	6
8	Determination of California Bearing Ratio	Yes	BS 1377 Part 4 1990	15
9	Determination of One Dimensional Consolidation Properties	Yes	BS 1377 Part 5 1990	8
-	Determination of Permeability (Falling Head)	Yes	*In-house* Method	-
-	Determination of Permeability in a Triaxial Cell	Yes	BS 1377 Part 5 1990	
10	Shear Strength by Hand Vane	No		3
	Shear Strength by Direct Shear	Yes	BS 1377 Part 7 1990	-
11	Undrained Shear Strength in Triaxial Cell Without Pore Water Pressure Measurement	Yes	BS 1377 Part 7 1990	1
-	Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Pressure	No	BS 1377 Part 8 1990	

LABORATORY REPORT CERTIFICATE

ABBREVIATIONS

All the abbreviations used on the laboratory certificates are given below:

Br	Brittle	**PSD**	Particle Size Distribution by sieve analysis
C	Compound	**SB**	Shear Box
CBR	California Bearing Ratio	**SED**	Sedimentation Analysis
CDT	Consolidated Drained Triaxial	**SO4**	Sulphate (total, water extract, groundwater)
CL	Chloride content (water or soil)	**CP2**	Dry Density/Moisture Content 2.5kg rammer
US	Unsuitable sample for test	**CP4**	As above using 4.5kg rammer
UUT	Undrained Unconsolidated Triaxial	**CPV**	As above using vibrating hammer
HSV	Vane Test	**CUT**	Consolidated Undrained Triaxial
IS	Insufficient sample for test	**R**	Remoulded
LOI	Loss On Ignition	**U**	Undisturbed
M	Multi-stage testing	**MC**	Moisture Content
MCV	Moisture Content Value	**PL**	Point Load
NAT	Natural preparation method	**NMC**	Natural (or as received) moisture content
P	Plastic	**PFH**	Permeability Falling Head Method
OED	Oedometer	**PTXL**	Permeability in Triaxial Cell
OMC	Optimum Moisture Content	**ORC**	Organic content
B	Large disturbed (bulk) sample	**PD**	Particle Density (SG)
J	Small disturbed (jar) sample	**PI**	Liquid limit, plastic limit and plasticity index

Typical Mode of Failure for Triaxial Testing



Sample Description Sheets

LABORATORY TESTING ENCLOSURE 1

ALLIED EXPLORATION & GEOTECHNICS LIMITED

[illegible]

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH101	1.00	J5	MADE GROUND (Black gravelly sand. Gravel includes ash)	MC PI(NP) SPG
BH101	1.50	J7	MADE GROUND (Brown slightly sandy slightly gravelly clay of low plasticity. Gravel includes brick fragments)	MC PI
BH101	1.50	J6	MADE GROUND (Brown slightly sandy slightly gravelly clay with occasional rootlets. Gravel includes brick fragments)	PSD SED Combined with B12
BH101	3.50	B15	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes brick fragments)	RDLT RDED
BH101	4.00	J16	MADE GROUND (Brown slightly sandy slightly gravelly clay of low plasticity)	MC PI
BH101	4.00	B17	MADE GROUND (Brown sandy slightly gravelly clay. Gravel includes wood,sandstone and coal)	BRE
BH102	0.80	J1	MADE GROUND (Black slightly sandy gravelly clay of low plasticity/very clayey slightly sandy gravel)	MC PI
BH102	0.80	B2	MADE GROUND (Brown clayey very sandy gravel with a high cobble content. Gravel includes wood, plastic, ceramic and brick fragments)	PSD
BH102	2.00	B5	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes metal and brick fragments)	PSD SED
BH102	2.00	J6	MADE GROUND (Brown slightly gravelly clay)	BRE ORG
BH102	2.50	B4	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes brick and coal fragments)	CBR
BH102	4.00	B9	MADE GROUND (Brown slightly sandy slightly gravelly clay of low plasticity. Gravel includes brick fragments)	MC PI
BH102	5.10	B17	MADE GROUND (Red brown sandy slightly gravelly clay. Gravel is fine to coarse angular to sub-angular and includes sandstone and mudstone)	MC OS for U.U.T Engineer Description
BH102	6.60	J18	MADE GROUND (Red brown slightly sandy slightly gravelly clay of intermediate plasticity. Gravel includes brick fragments)	MC PI
BH103	0.60	B2	MADE GROUND (Brown slightly sandy gravelly clay. Gravel includes plastic, ceramic and brick fragments)	BRE LOI
BH103	1.50	J5	MADE GROUND (Brown slightly sandy slightly gravelly clay of intermediate plasticity)	MC PI
BH103	3.50	B10	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes metal, glass and ceramic fragments)	PSD SED
BH103	4.50	J11	Red brown CLAY of intermediate plasticity	MC PI
BH103	5.00	B12	Red brown very sandy CLAY	BRE
BH103	6.50	B13	Red brown slightly sandy CLAY	BRE
BH104	0.50	B1	MADE GROUND (Brown clayey slightly sandy gravel with rootlets. Gravel includes brick fragments)	BRE

Contract Title: [illegible]

Client: for East Coast Offshore Wind Limited

Date: 17/8/20

Page 1 of 1

Checked by: [illegible]

Approved by: [illegible]

NW1520

UKAS TESTING 1207

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH104	3.50	B17	MADE GROUND (Brown slightly sandy slightly gravelly clay. Gravel includes brick fragments).	PSD, SED Combined with B16.
BH104	5.80	B18	MADE GROUND (Brown slightly sandy slightly gravelly clay).	BRE
BH104	5.30	B17	MADE GROUND (Brown slightly sandy clay).	RUUT, CDED
BH104	7.50	B24	MADE GROUND (Dark brown very clayey sand and gravel).	PSD
BH104	10.50	B32	MADE GROUND (Brown sandy slightly gravelly clay of low plasticity. Gravel includes brick fragments).	MC, PI, PSD, SED
BH104	9.50	B29	MADE GROUND (Brown sandy gravelly clay. Gravel includes brick fragments).	BRE
BH105	1.50	J7	Brown slightly sandy CLAY.	MC
BH105	3.50	B16	Brown sandy slightly gravelly SILT.	PSD Combined with B24
BH105	4.50	J15	Brown SAND.	MC
BH106	1.50	B4	Dark brown COBBLES with much clayey gravelly SAND.	PSD
BH106	2.00	J16	Brown slightly sandy CLAY of low plasticity.	MC, PI
BH106	9.50	U20	Low strength black amber with grey mottling silty sandy CLAY.	CUT
BH107	0.20	B3	MADE GROUND (Black brown clayey very sandy gravel with occasional rootlets. Gravel includes ceramic and brick fragments).	PSD, BRE
BH107	1.50	B7	MADE GROUND (Brown grey mottled slightly sandy slightly gravelly clay of intermediate plasticity. Gravel includes brick fragments).	MC, PI, OTS
BH107	2.00	B11	Red slightly sandy CLAY of low plasticity.	MC, PI
BH107	3.10	B10	Red sandy CLAY.	SED, BRE
BH109	0.40	B3	MADE GROUND (Brown clayey very sandy gravel with medium cobble content. Gravel includes concrete and coal fragments).	PSD, BRE, OPC
BH109	1.00	B5/6	MADE GROUND (Brown slightly sandy gravelly clay of low plasticity. Gravel includes coal and brick fragments).	MC, PI
BH110	1.00	J4	MADE GROUND (Brown sandy gravelly clay. Gravel includes ash and brick fragments).	OPC
BH110	3.00	B8	Brown clayey gravelly SAND (low to intermediate plasticity).	MC, PI, PSD, SED, BRE
BH110	4.00	B12	Brown slightly sandy slightly gravelly CLAY.	RUUT, CDED

Contract No.: Northern Gateway

Client: Far East Consortium International Limited

Approved: [signature]

Date: 2.10.2015

Certificate No.: 3011/1550/2

Page 2 of 2

AGS

UKAS TESTING

NWM320

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Suite 2, 2/F., Kaiser Estate Phase 1, 41 Man Yue Street, Hung Hom, Kowloon, Hong Kong. Tel: (852) 2764 3330 Fax: (852) 2764 3165
Suite 2, 2/F., Kaiser Estate Phase 1, 41 Man Yue Street, Hung Hom, Kowloon, Hong Kong. Tel: (852) 2764 3330 Fax: (852) 2764 3165

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH1/2	0.60	B6	Brown clayey gravelly SAND	MC, BRE, PSD Combined with BF for PSD
TP101	0.80	LB3	MADE GROUND (Black slightly clayey sandy gravel)	PSD
TP101	1.20	J4	Brown slightly sandy slightly gravelly CLAY/SILT of low plasticity	MC, PI
TP101	1.80	LB6	Brown sandy slightly gravelly CLAY	PSD
TP102	0.50	LB3	MADE GROUND (Black sandy gravel)	BRE
TP102	1.40	J7	Red slightly gravelly SAND	ORG
TP103	1.50	LB6	Brown SAND	BRE
TP103	1.70	J9	Brown CLAY of low plasticity	MC, PI
TP103	1.50	B10	Brown slightly sandy slightly gravelly CLAY	HSV CPS CBR MCV
TP103	3.70	J19	Red brown CLAY of intermediate plasticity	MC, PI
TP104	0.80	LB3	MADE GROUND (Brown clayey very sandy gravel including slag and brick fragments)	PSD
TP104	1.20	J6	Red gravelly SAND	MC
TP104	1.80	LB5	Red brown clayey very gravelly SAND. Brown nodules weathered sandstone	PSD
TP104	2.20	J7	Brown slightly sandy slightly gravelly CLAY of low plasticity	MC, PI, DWS
TP105	2.50	J9	Red gravelly SAND	MC
TP105	4.50	J17	Brown slightly sandy CLAY	MC
TP105	1.80	J4	Red clayey slightly gravelly SAND	MC
TP105	1.20	LB5	Brown sandy slightly gravelly CLAY	PSD, SPO
TP106	1.10	J4	MADE GROUND (Red slightly clayey sandy gravel with low cobble content and with brick, glass, wood and metal fragments)	BRE (S to M)
TP106	1.60	B8	MADE GROUND (Black brown slightly clayey sandy gravel including mudstone, slag and brick fragments)	PSD
TP111	0.50	LB2	MADE GROUND (Brown clayey very gravelly sand. Gravel includes rubble, clay pipe fragments)	HSV CBR MCV (S to M) Max & In Situ Density Combined with TP111 (B5)

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Approved: [signature]

Name:

Page 1 of 2

Date Printed: 27/02/2013

Sign Checked:

AGS Contract No.: HW1560

UKAS TESTING
7261

ALLIED EXPLORATION & GEOTECHNICS LIMITED

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
TP111	1.20	J4	Brown slightly gravelly CLAY	ORG
TP112	0.30	LB3	MADE GROUND (Brown clayey very gravelly sand. Gravel includes ceramic fragments)	PSD, MCV, CBR, MCV, OS for Max and Min Density Combined with TP111 LB3
TP112	1.10	J4	Black clayey slightly gravelly SAND	MC, BRE
TP112	2.10	J7	Black slightly clayey gravelly sand. Gravel includes wood.	ORG
TP115	0.80	LB5	MADE GROUND (Black clayey gravel and sand. Gravel includes charcoal, glass and ceramic fragments)	PSD, SED
TP115	1.10	J4	MADE GROUND (Black gravelly sand. Gravel includes ash and brick fragments)	BRE, ORG
TP119	0.50	B3	MADE GROUND (Grey slightly clayey sandy gravel including brick fragments).	PSD
TP119	1.50	B6	Grey slightly clayey gravelly SAND	BRE
TP120	2.00	B9	Brown mottled sandy CLAY	MC
TP121	0.50	LB2	MADE GROUND (Brown clayey very gravelly sand. Gravel includes brick fragments)	PSD, MCV, OPV, CBR, MCV, OS for Max and Min Density Combined with TP122 LB3
TP121	1.10	J4	Brown slightly sandy slightly gravelly CLAY	MC
TP124	0.80	LB4	MADE GROUND (Brown clayey very sandy gravel including coal, glass and ceramic fragments)	MC, PSD
TP124	2.40	LB9	Brown slightly sandy slightly gravelly CLAY of low plasticity	MC, PI
WS101	0.50	J3	MADE GROUND (Brown slightly sandy gravelly clay with low cobble content and occasional rootlets. Gravel includes steel fragments).	MC, BRE, ORG
WS101	2.00	J4	MADE GROUND (Brown slightly clayey slightly gravelly sand)	MC, FINES, ORG
WS101	1.20	J7	MADE GROUND (Brown gravelly sand becoming at 1.50m soft brown sandy gravelly clay. Becoming at 1.80m soft black sandy gravelly clay)	OS in OUT
WS101	2.40	J9	MADE GROUND (Brown sandy gravel including ash, glass and brick fragments. Becoming at 2.80m brown slightly gravelly sand becoming at 3.00m soft brown sandy clay/very clayey sand)	PI
WS101	4.20	J18	Red brown SAND	MC
WS101	1.00	LB	MADE GROUND (Red brown sandy gravelly clay. Gravel includes cobbles, glass and brick fragments)	OS, BRE Combined with WS101 J9
WS102	0.50	J3	Brown slightly sandy CLAY	MC, FINES for LL
WS102	1.10	J5	MADE GROUND (Brown sandy gravel including brick fragments)	ORG

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Signed: Date Printed:

Page 4 of 5

UKAS TESTING

357

ALLIED EXPLORATION & GEOTECHNICS LIMITED

[illegible]

LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
WS103	1.20	U8	MADE GROUND (Red brown clayey very sandy gravel including chalk, wood, concrete and brick fragments)	PSD BRE Combined with WS102 U7
WS103	3.20	B9	Brown clayey SAND	ORG
WS104	1.20	U8	Brown clayey very sandy GRAVEL	MC PI PSD BRE ORG Combined with U10 and U12
WS104	2.20	U10	Brown clayey very sandy GRAVEL with bands of soft grey sandy gravelly CLAY of low plasticity from 2.90 to 3.20m	MC PI PSD BRE ORG Combined with U8 and U12
WS104	3.20	U12	Brown clayey very sandy GRAVEL with bands of soft grey sandy gravelly CLAY from 3.90 to 4.20m	MC PI PSD BRE ORG Combined with U8 and U10
WS105	0.50	B5	Grey brown COBBLES with much clayey sandy GRAVEL	PSD BRE
WS105A	1.20	U9	MADE GROUND (Black brown slightly clayey gravelly sand. Gravel includes concrete, ash and brick fragments. Becoming at 1.70m soft brown black sandy gravelly clay. Gravel includes concrete and brick fragments).	BRE ORG
WS105A	2.20	U10	MADE GROUND (Black brown sandy gravelly clay of low plasticity/clayey gravelly sand. Gravel includes brick fragments)	MC PI
WS105A	3.20	U11	MADE GROUND (Brown clayey very gravelly sand. Gravel includes ash, clinker, glass and brick fragments. Becoming at 3.80m soft brown sandy gravelly clay. Gravel includes brick fragments)	PSD
WS105A	4.20	U13	Brown clayey SAND	PSD
WS106	1.20	U7	MADE GROUND (Brown very sandy gravel including ash and brick fragments becoming at 1.90m soft brown sandy gravelly clay of intermediate plasticity)	MC PI PSD PD BRE ORG LOI Combined with U8
WS106	2.20	U8	MADE GROUND (Brown sandy gravel including brick fragments. Becoming at 2.10m brown clayey gravelly sand becoming at 2.80m soft grey sandy gravelly clay. Gravel includes brick fragments).	MC PI PSD PD BRE ORG LOI Combined with U7.

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Checked: [illegible]

Date: [illegible]

Date Received: [illegible]

Date Tested: [illegible]

Report No: NW1560

LUKAS TESTING 3367

Moisture Content/Plasticity Index and Moisture Content

LABORATORY TESTING ENCLOSURE 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Allied Office, [illegible] Tel: [illegible]
Regional Office, [illegible] Tel: [illegible]

MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH102	6.10	B17	6.10	31.6	08/02/2019	
BH103	1.50	J7	1.50	19.2	30/01/2019	
BH103	4.50	J19	4.50	21.6	30/01/2019	
BH112	0.60	B3	0.60	14.5	29/01/2019	
TP104	1.20	J4	1.20	18.2	30/01/2019	
TP106	2.50	J9	2.50	14.1	30/01/2019	
TP109	4.00	J13	4.00	21.1	30/01/2019	
TP108	1.00	J4	1.00	12.8	30/01/2019	
TP112	1.10	J4	1.10	16.1	30/01/2019	
TP120	2.20	B9	2.20	30.9	30/01/2019	
TP121	1.10	J4	1.10	23.5	30/01/2019	
TP124	0.80	LB4	0.80	30.2	29/01/2019	
WS101	0.50	B4	0.50	15.2	29/01/2019	
WS101	3.20	J10	3.20	21.0	30/01/2019	

For description of sample please refer to Field Engineer's Sample Description Sheet

Contract Title :- Northern Gateway

Client :- Far East Consortium International Limited

Signed :- [signature]

Name :-

Page 1 of 1

Date of issue :- 14/02/2019

Certificate No :- [illegible]

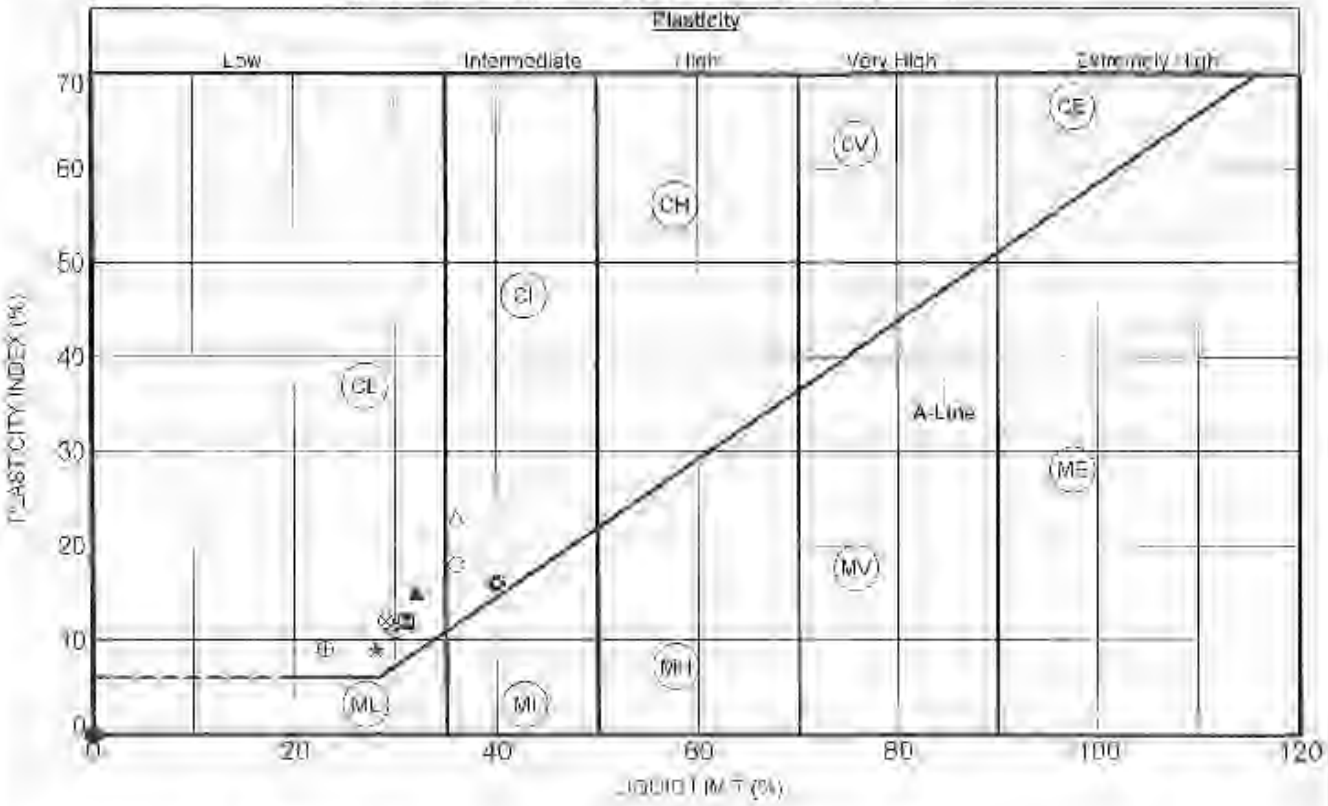
AEG Contract No :- NW1580

UKAS TESTING 1397

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method - BS 1377 Part 2 Clause 3.2, 4.3 & 5 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref	Specific Depth (m)	LL	PL	PI	I	Preparation Method	-0.425mm (%)	nat (%)	Date Tested	
BH101	1.00	J5	1.00	NP	NP	NP		Natural		7.3	30/01/2019	
BH101	1.50	J7	1.50	31	19	12	0.82	Natural		21.2	30/01/2019	
BH101	4.00	J16	4.00	32	17	15	0.83	Natural		19.5	30/01/2019	
BH102	0.30	J1	0.30	78	19	9	1.26	Natural		16.7	30/01/2019	#
BH102	3.00	B9	3.00	30	19	11	0.85	Natural		20.7	29/01/2019	
BH102	6.80	J18	6.80	40	24	16	1.10	Natural		21.5	30/01/2019	
BH103	1.50	J5	1.50	36	18	18	0.81	Natural		21.4	30/01/2019	
BH103	5.50	J12	5.50	36	13	23	0.82	Natural		17.2	30/01/2019	
BH103	10.50	B32	10.50	29	17	12	0.98	Natural	74.0	23.5	29/01/2019	
BH105	8.00	J18	8.00	23	14	9	0.44	Natural		15.0	30/01/2019	

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient fines for full PI. Test sample is passing the 425 micron test sieve as it is unable to determine % retained on the 425mm test sieve.

Contract Title: Northern Gateway

Client: for East Cheshire (on behalf of International Limited)

Signed:

Issued:

Page 1 of 1

Date of Issue: 11/02/2019

Certificate No: P NW/19/021

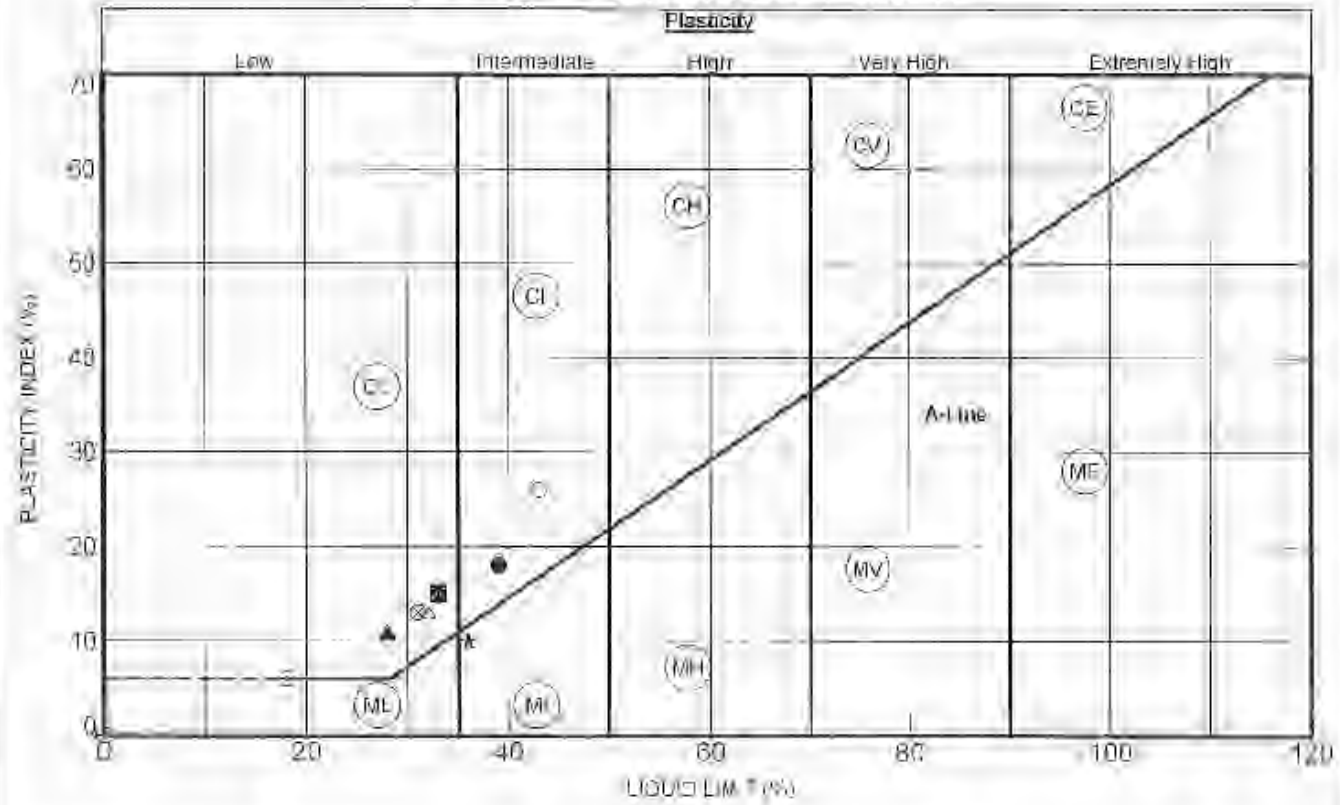
Any Comments: NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method - BS 1377 : Part 2 : Clause 3.2, 4.3 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I_c	Preparation Method	<0.425mm (%)	nmc (%)	Date Tested
● BH107	1.50	B7	1.50	33	21	16	0.61	Natural		28.0	29/01/2019
■ BH107	2.50	B11	2.50	33	18	15	0.89	Natural		19.8	29/01/2019
▲ BH109	2.00	ES6	2.00	28	17	11	0.75	Natural		18.8	30/01/2019
★ BH110	3.10	B9	3.10	38	28	10	0.06	Natural	70.0	35.4	29/01/2019
○ TP101	1.20	J4	1.20	18	12	6	1.67	Natural		8.0	30/01/2019
◆ TP103	1.20	J9	1.20	33	18	15	0.61	Natural		20.9	30/01/2019
◇ TP103	3.20	J14	3.20	43	17	25	0.95	Natural		18.2	30/01/2019
○ TP104	2.20	J7	2.20	32	19	13	0.58	Natural		24.4	30/01/2019 #
○ TP104	2.40	LB9	2.40	31	18	13	0.70	Natural		21.9	29/01/2019
○ WS10	1.20	J5	1.20	NP	NP	NP		Natural		11.6	30/01/2019

For description of Sample Preparation see the Laboratory Sample Description Sheet. # = non-Accredited for this test.
If sample is prepared in the natural state we are unable to determine % passing the 0.425mm test sieve.

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Signed: [signature] Name:

Date Issued: 1/02/2019

Approved Signatory:

Report No.: NW1580

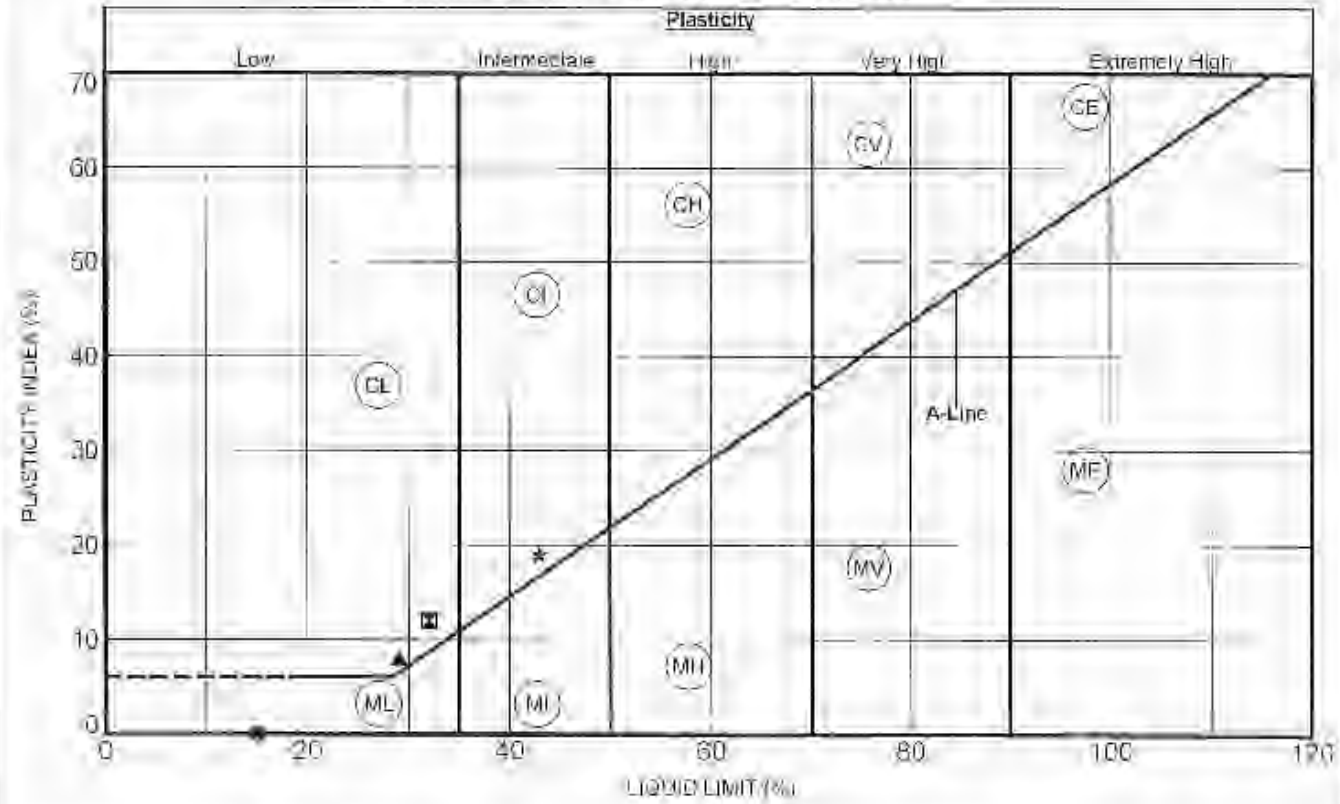
UKAS TESTING 4367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Tel: [illegible] Fax: [illegible]
Branch Office: [illegible] Tel: [illegible] Fax: [illegible]

ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method - BS 1377 Part 2 Clause 3.2, 4.3 to 4.4 & 5 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref	Specific Depth (m)	LL	PL	PI	I	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested	
●WS102	3.20	J10	3.20		15			Natural		18.6	30/01/2019	
■WS104	2.20	U10	3.00	32	20	12	0.95	Natural	30.0	20.6	30/01/2019	#
▲WS105A	2.20	J10	2.20	29	21	8	1.30	Natural		18.6	30/11/2019	
★WS105	1.20	U7	1.20	43	24	19	0.15	Natural	14.0	40.1	30/01/2019	

For description of sample please refer to the Laboratory Sample Description Sheet. # = insufficient for 4 point PI
If sample is prepared to the natural state we are unable to determine % passing on the 0.425 mm test sieve.

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Signed: [signature]

Date:

Sheet 1 of 1

Date of Issue: [illegible]/2019

Certificate No: [illegible]

AGS Group No: NW1580

UKAS TESTING 1367

Determination of Particle Density

LABORATORY TESTING ENCLOSURE 3

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible] Durham, DH3 3RG. Tel: [illegible] Fax: [illegible]
Regional Office: Unit 23, Business Development Centre, Bank, Ware, [illegible] Tel: 01279 755 553 Fax: 01279 755 559

DETERMINATION OF PARTICLE DENSITY

BS1377 Part 2 : Clause 8.2 : 1990

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Particle Density (Mg/m^3)	Date Tested
WS101	2.20	U9	2.20	2.45	31/01/2019
WS106	1.20	U7	1.20	2.46	31/01/2019

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title:	Client:
Northern Gateway	Far East Consortium International Limited

Signed: [illegible] Name: [illegible] Page 1 of 1

Date of Issue: 06/02/19 Certificate No: 124/W15001 AFI Contract No: NW1580

UKAS TESTING 1367

Particle Size Distribution Sieving and Sedimentation

LABORATORY TESTING ENCLOSURE 4

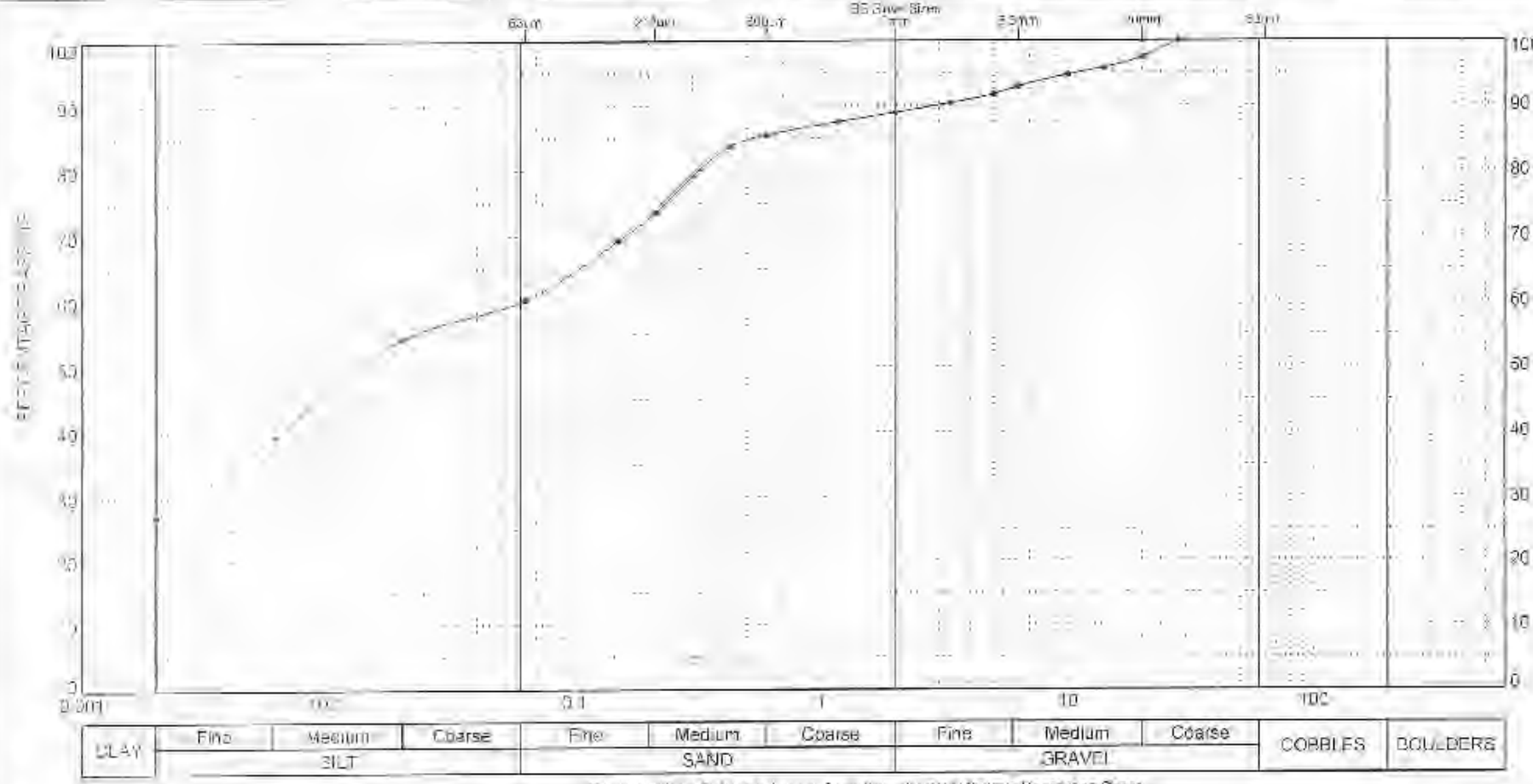
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 7 Block 11 (1 2) 3RD Avenue Team Valley Trading Estate Gateshead Tyne & Wear NE11 0XA Tel: 0191 487 1847 Fax: 0191 487 4110
Regional Office: Unit 29, Riverside Business Centre, Brancepeth, Durham DH7 8BL Tel: 0191 378 1463 Fax: 0191 378 1464

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. - BH101	Depth (m) - 1.50	Sample Type & No. - B8	Specific Depth (m) - 1.50	Date Tested - 29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	97.4
14	96.6
10	94.7
6.3	92.9
5	91.7
3.35	90.4
2	88.9
1.18	87.5
0.6	85.5
0.425	83.7
0.3	79.2
0.212	73.5
0.15	69.5
0.063	56.3
0.02	44.3
0.006	32.3
0.002	27.0

For presentation of sample please refer to the Laboratory Sample Description Sheet

Date of Issue - 3/02/2019	Certificate No. - PS/MW/1580/BH101/B8/1.50	Signed -	Name -	Page 1 of 1
Client -	Contract Title -			AEG Contract No. -
-	Northern Gateway			NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

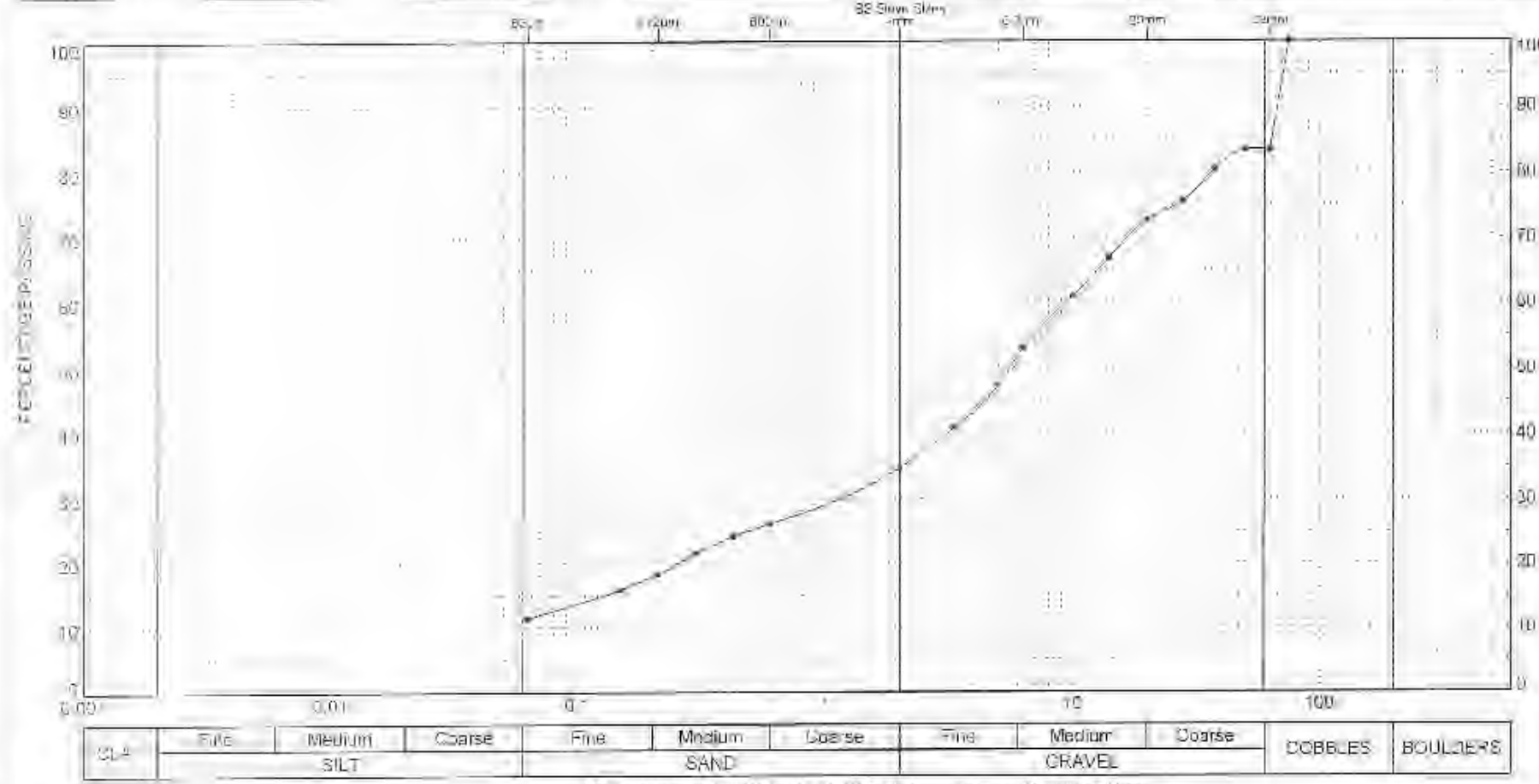
Head Office: Unit 20 Stone Hill Park Eco Business Park, Three Mile Stone, Co Durham DH1 3RH - Tel: 0191 378 1500 Fax: 0191 387 1580
Regional Office: Unit 20 Stone Hill Park Eco Business Park, Three Mile Stone, Co Durham DH1 3RH - Tel: 0191 378 1500 Fax: 0191 387 1580

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH102	Depth (m) :- 0.50	Sample Type & No :- B3	Specific Depth (m) :- 0.50	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	83.4
50	83.1
37.5	80.4
28	76.6
20	72.7
14	68.8
10	67.5
6.3	59.6
5	47.4
3.35	41.0
2	34.8
1.18	30.2
0.6	26.2
0.425	24.3
0.3	21.5
0.212	18.3
0.15	16.9
0.063	11.5

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 19/02/2019	Certificate No :- PSD/NW1680/BH102/B6/0.50	Signed :-	Name :-	Page 1 of 1
Client :- Fairhurst Consortium International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1680

UKAS TESTING 1367

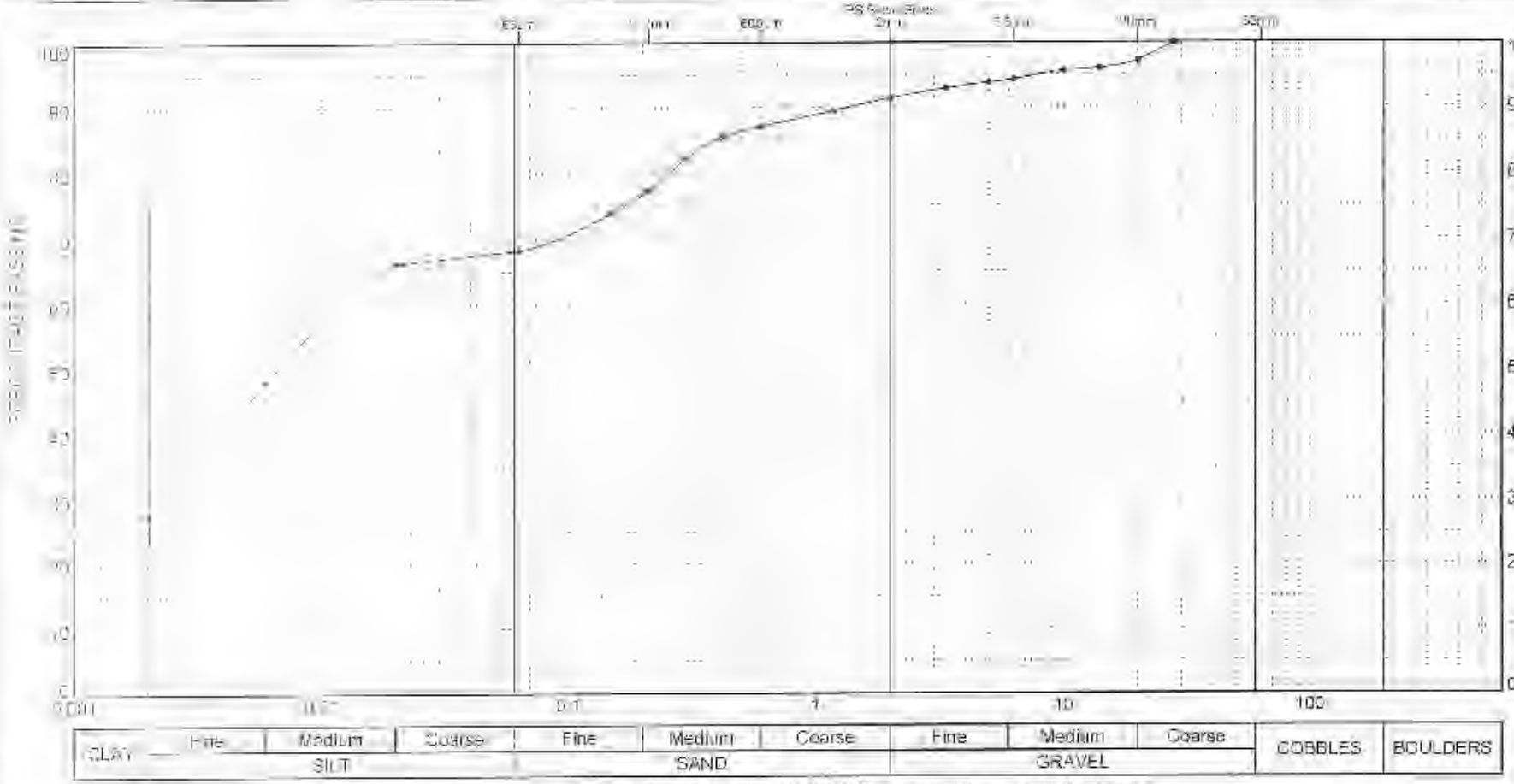
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 5, Block 01 Industrial Estate, Fotan, Kowloon, Hong Kong. Tel: (852) 2687 4710 Fax: (852) 2687 4715
Regional Office: Room 2, Business Development Centre, Fotan, Shatin, New Territories, Hong Kong. Tel: (852) 2635 3006 Fax: (852) 2635 3009

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH102	Depth (m) :- 1.20	Sample Type & No :- B5	Specific Depth (m) :- 1.20	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	97.2
14	96.0
10	95.5
6.3	94.3
5	93.6
3.35	92.9
2	91.4
1.18	89.5
0.6	87.1
0.425	85.6
0.3	82.3
0.212	77.4
0.15	73.9
0.063	68.2
0.02	56.2
0.006	48.3
0.002	28.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
1/02/2019	PSD/NW1580/BH102/B5/1.20			

Client :-	Contract Title :-	AEG Contract No :-
Far East Consortium International Limited	Northern Gateway	NW1580

UKAS 1367

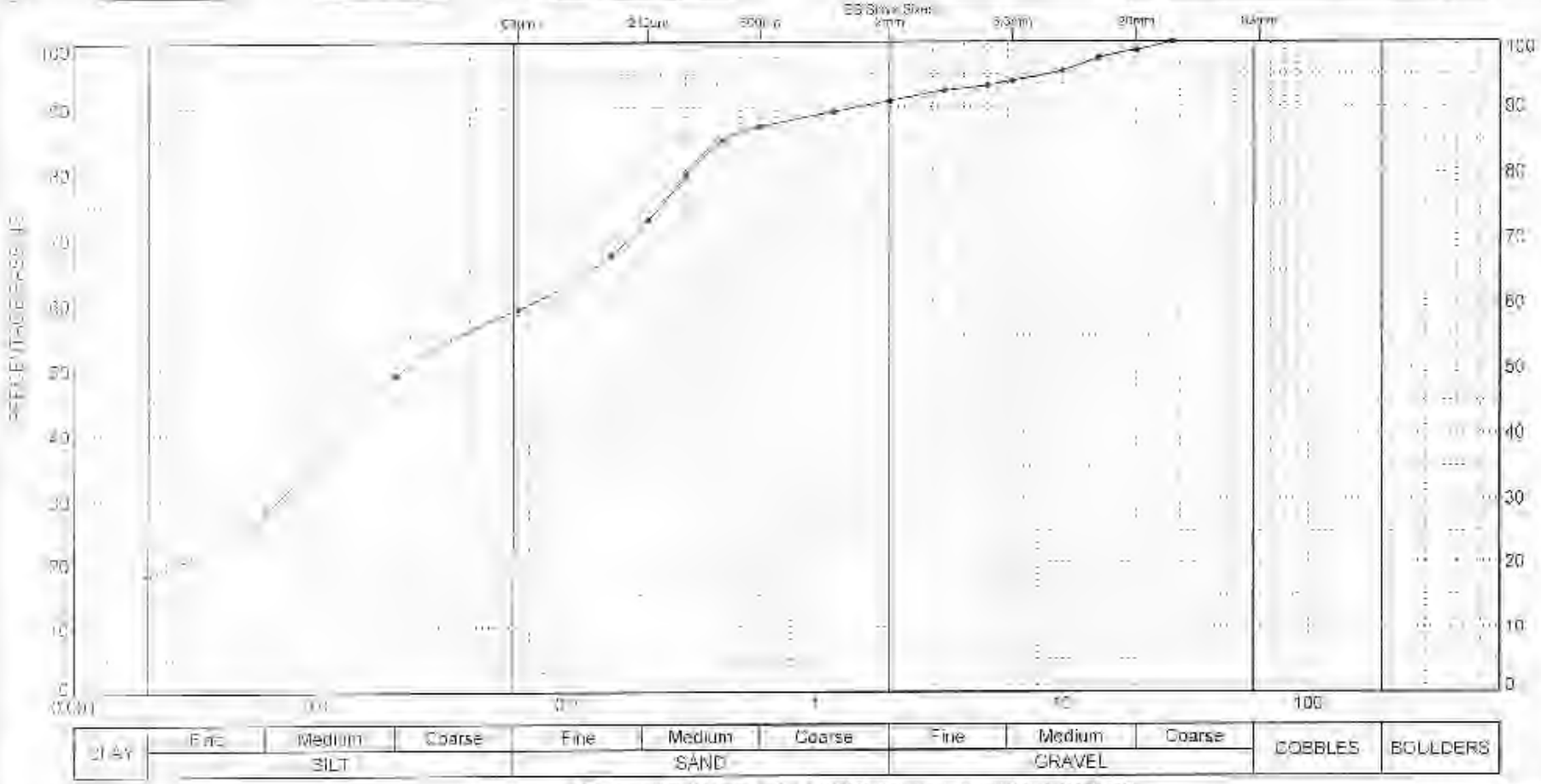
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2F Fuk Yu Industrial Building, 43-47 Wang Lung Street, Tsuen Wan, N.T. HONG KONG. Tel: 2416 3887 Fax: 2416 3877
Regional Office: 2nd/F, Business Development Centre, Lane Crawford Road, Shau Kei Wan, H.K. Tel: 2885 1613 Fax: 2885 1614

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. - BH103	Depth (m) - 2.50	Sample Type & No. - B10	Specific Depth (m) - 2.50	Date Tested - 29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	98.6
14	97.4
10	96.5
6.3	94.0
5	93.3
3.35	92.5
2	90.9
1.18	89.3
0.6	87.0
0.425	85.0
0.3	79.5
0.212	72.8
0.15	67.5
0.063	59.1
0.02	48.9
0.006	28.3
0.002	18.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
30/01/2019	ITSI/NW/1580/BH103/B10/2.50			
Client :- Far East Consortium International Limited	**Contract Title :-** Northern Gateway			**AEG Contract No :-** NW1580

UKAS TESTING 1367

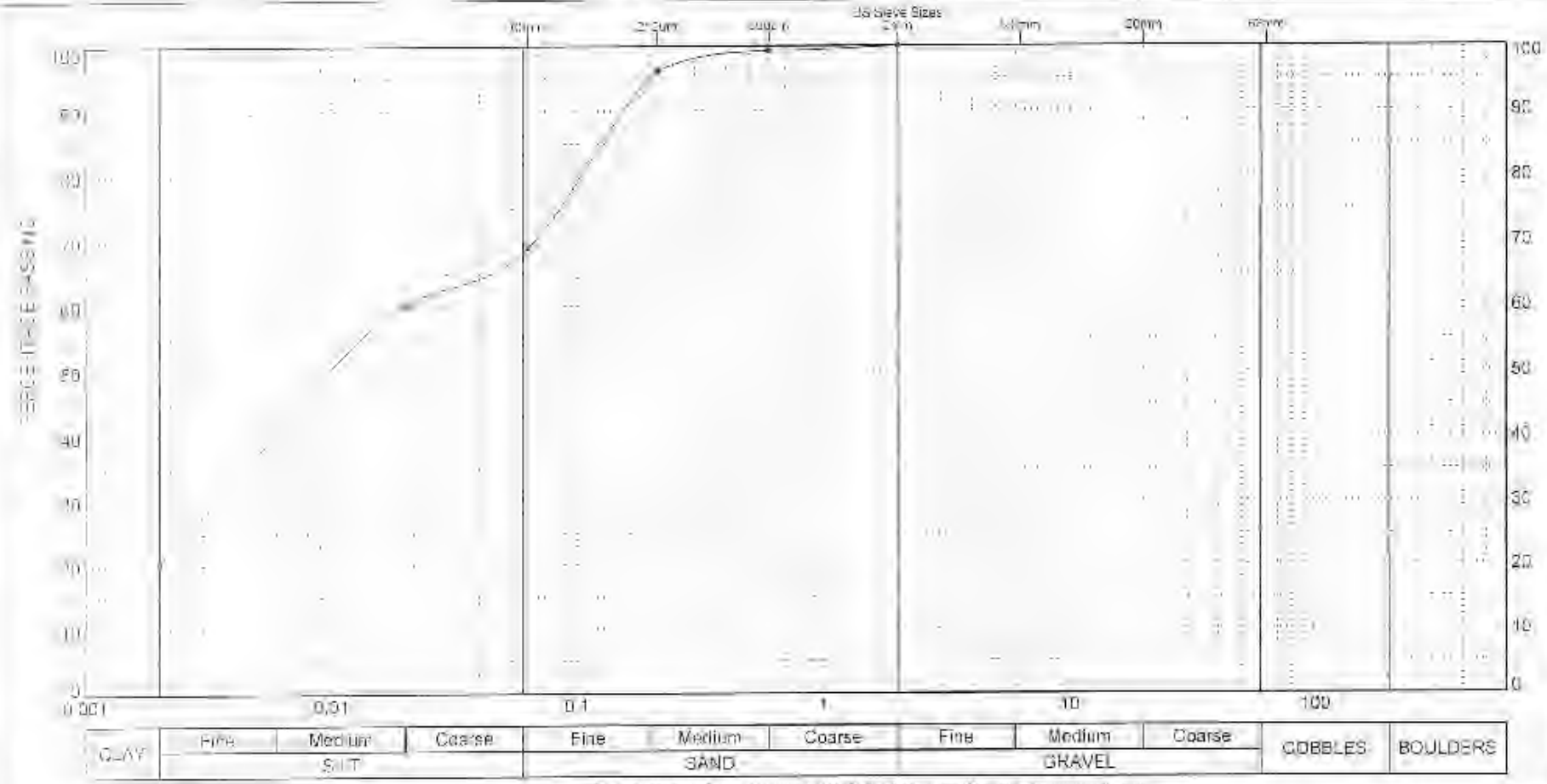
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 15 Kelvin Industrial Estate, East Mill, Phoenix Parkway, Corstorphine, EH12 8RA Tel: 0131 337 4700 Fax: 0131 337 4710
Regional Office: Unit 20, Business Development Centre, Forrest Street, Blackburn, BB1 2LD Tel: 01254 785 000 Fax: 01254 785 999

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Laboratory Hole No :- BH103	Depth (m) :- 5.50	Sample Type & No :- B19	Specific Depth (m) :- 5.50	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
2	100.0
0.6	98.2
0.212	96.2
0.063	69.0
0.02	60.3
0.006	40.6
0.002	20.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
13/02/2019	PSD/NW1580/BH103/B19/5.50			
Client :- Far East Consortium International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

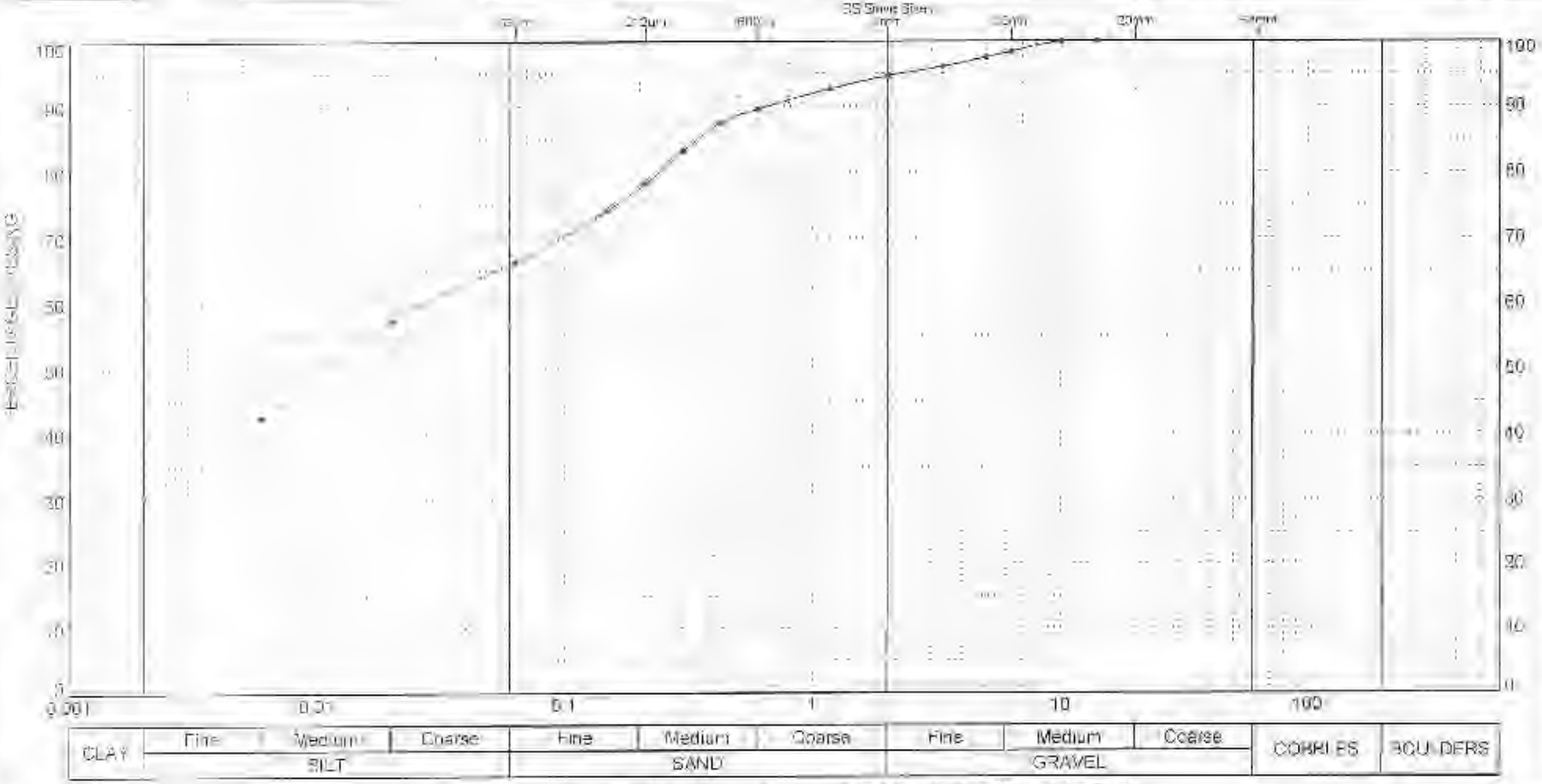
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH104 | Depth (m) :- 2.50 | Sample Type & No :- B11 | Specific Depth (m) :- 2.50 | Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
14	100.0
10	99.3
6.2	98.3
5	97.5
3.35	96.1
2	94.6
1.18	93.7
0.6	89.6
0.425	87.5
0.3	84.2
0.212	78.3
0.15	74.3
0.063	66.4
0.02	57.6
0.006	42.5
0.002	30.6

For description of samples please refer to the Laboratory Sample Description Sheet

Date of Issue :- 31/01/2019 | Certificate No :- PSD/NW1580/BH104/B11/2.50 | Signed :- | Name :- | Page 1 of 1

Client :- Far East Consortium International Limited | Contract Title :- Northern Gateway | AEG Contract No :- NW1580

UKAS TESTING 1367

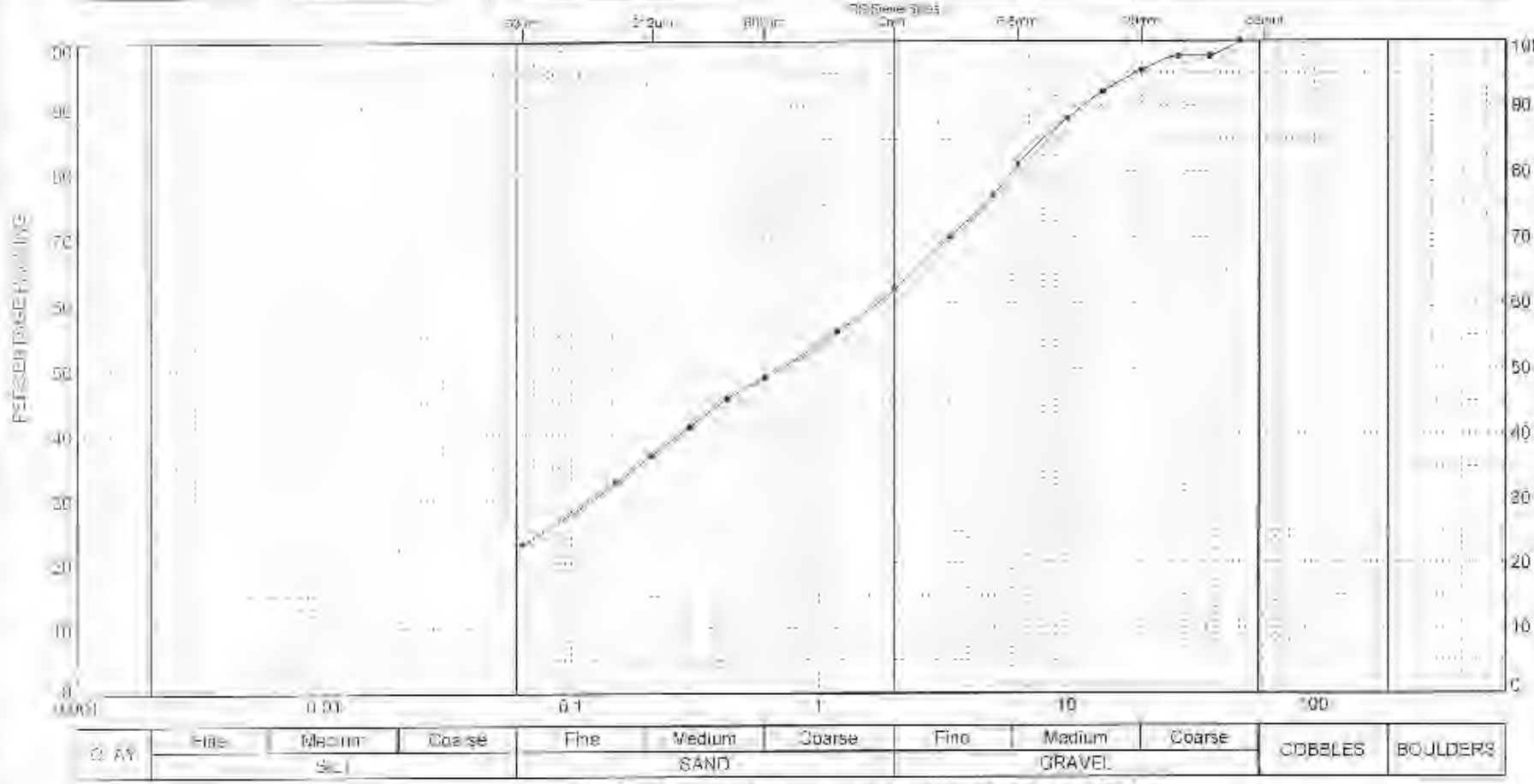
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Hertford Suite, Hall Place Barns, Bedmond Road, Abbots Langley, Hertfordshire, WD5 0RH. Tel: 01923 267767 Fax: 01923 267777
Registered Office: Suite 2, Pioneer Business Park, Kiln Road, Benfleet, Essex, SS7 2TR. Reg. No. 2737355

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 / 1990

Exploratory Hole No. - BH104	Depth (m) - 7.50	Sample Type & No. - B24	Specific Depth (m) - 7.50	Date Tested - 29/01/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	97.6
28	97.6
20	95.5
14	92.3
10	88.2
6.3	81.1
5	76.3
3.35	70.2
2	62.0
1.18	55.7
0.6	48.6
0.425	46.5
0.3	41.2
0.212	36.9
0.15	33.5
0.063	23.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue: 30/2/2019	Certificate No. - PSD/NW1580/BH104/B24/7.50	Signed :-	Name :-	Page 1 of 1
Client :- Far East Consortium International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

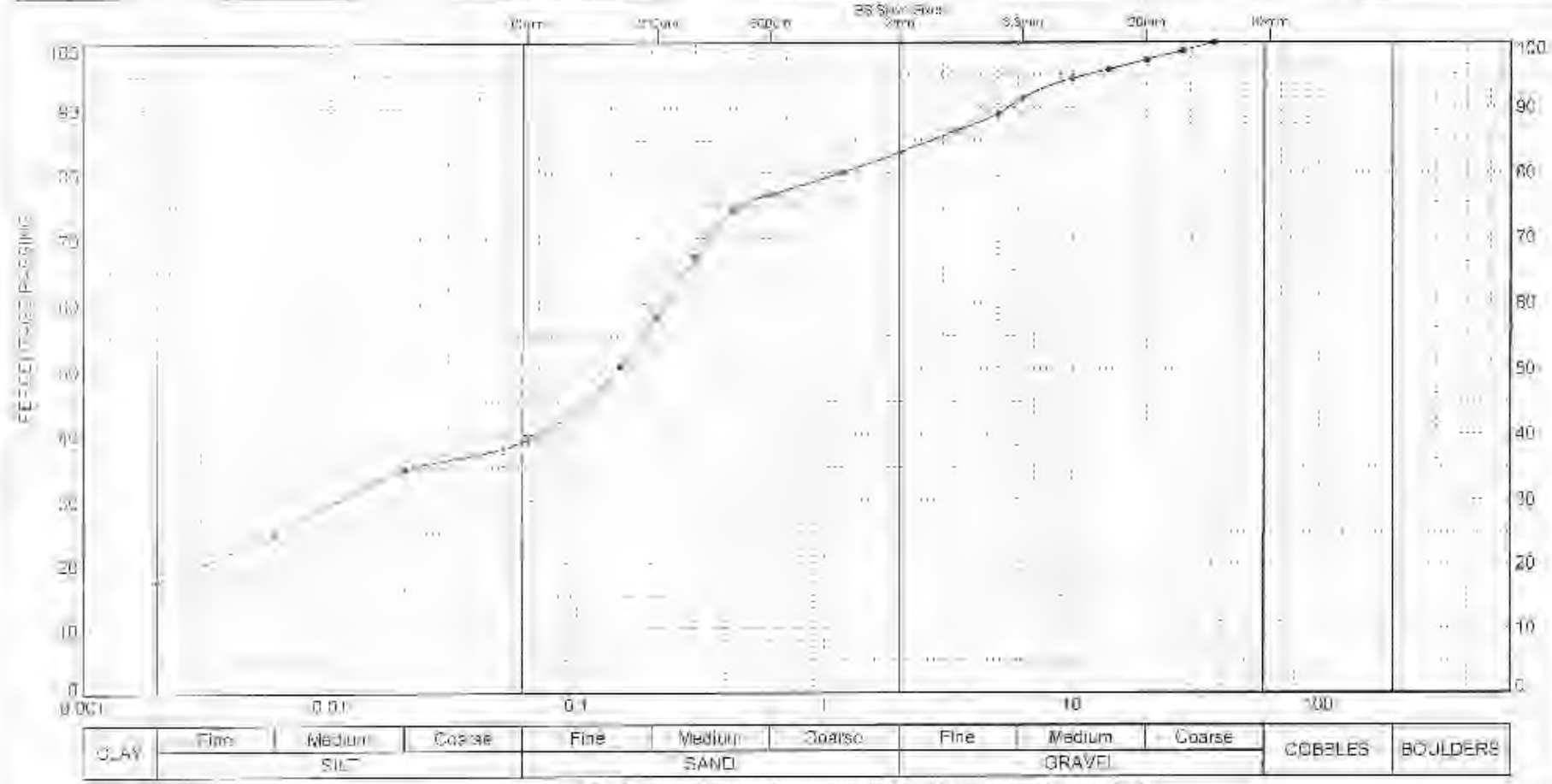
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH164	Depth (m) :- 10.50	Sample Type & No :- B32	Specific Depth (m) 10.50	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	98.6
20	97.3
14	95.8
10	94.4
6.3	91.5
5	89.1
3.35	86.4
2	83.1
1.18	80.1
0.6	76.7
0.425	74.2
0.3	67.1
0.212	58.1
0.15	50.6
0.063	39.2
0.02	34.7
0.006	25.0
0.002	17.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue: 1/02/2019	Certificate No: PSD/NW/1580/BH164/B32/10.50	Signed :-	Name	Page 1 of 1
Client: Far East Consortium International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

UKAS TESTING 1367

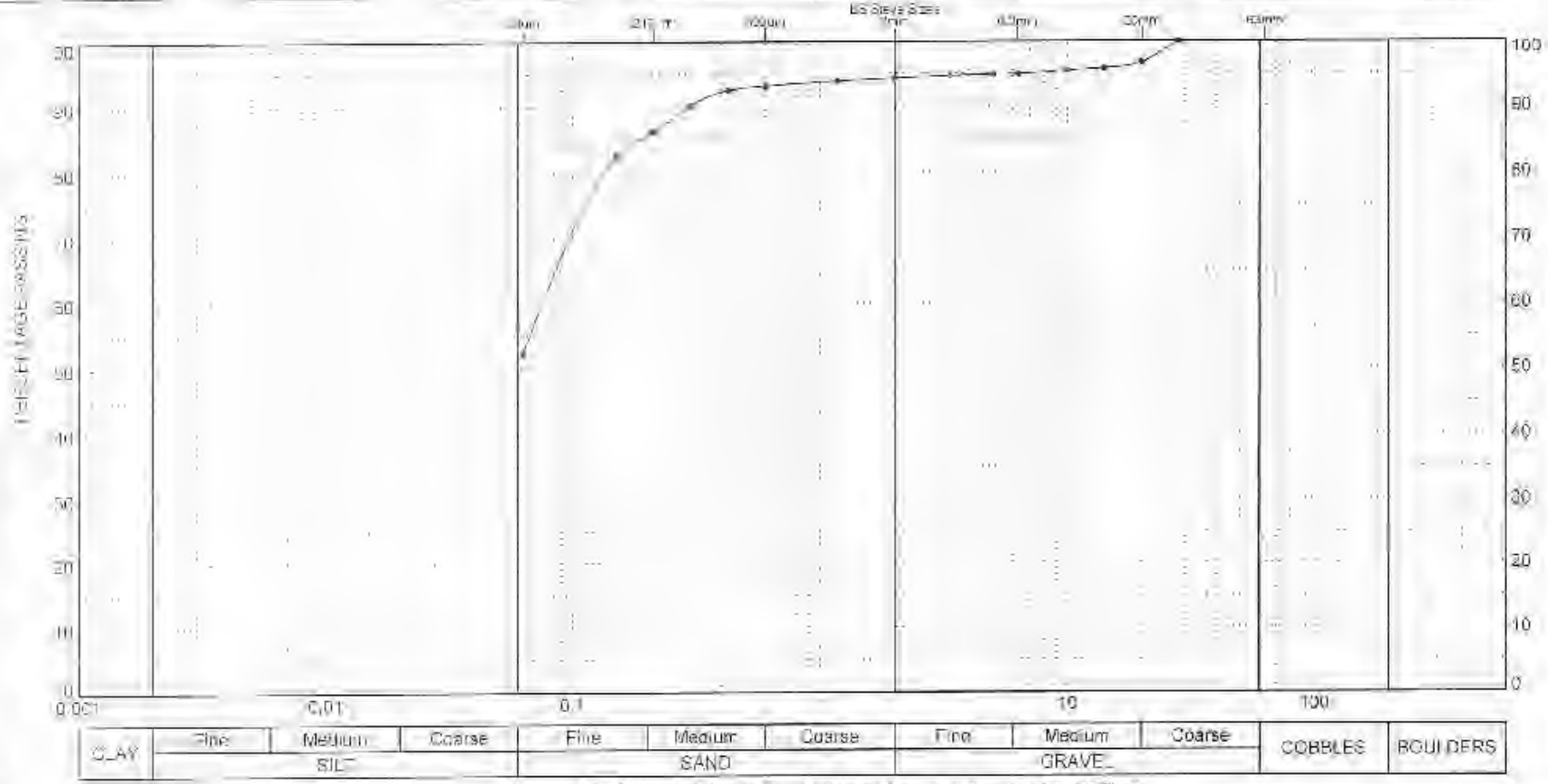
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 1 Hillhouse Int. Thornton Industrial Estate, Thornton, Kirkcaldy, Fife KY1 4AS Tel: 01592 771 300 Fax: 01592 774 040
Registered Office: 10 Dunsinane Court, Grange Road, Cambuslang Industrial Park, Cambuslang, Glasgow G72 4BG Tel: 0141 641 7441 Fax: 0141 641 7488

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH105	Depth (m) :- 3.50	Sample Type & No :- B16	Specific Depth (m) :- 3.50	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	96.7
14	95.8
10	95.4
6.3	94.9
5	94.8
3.35	94.6
2	94.3
1.18	93.9
0.6	93.2
0.425	92.5
0.3	90.2
0.212	86.2
0.15	82.4
0.063	52.5

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
19/02/2019	PSD/NW/1580/BH105/B16/3.50			
Client :-	Contract Title :-			AEG Contract No :-
For Eas[illegible] International Limited	Northern Gateway			NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

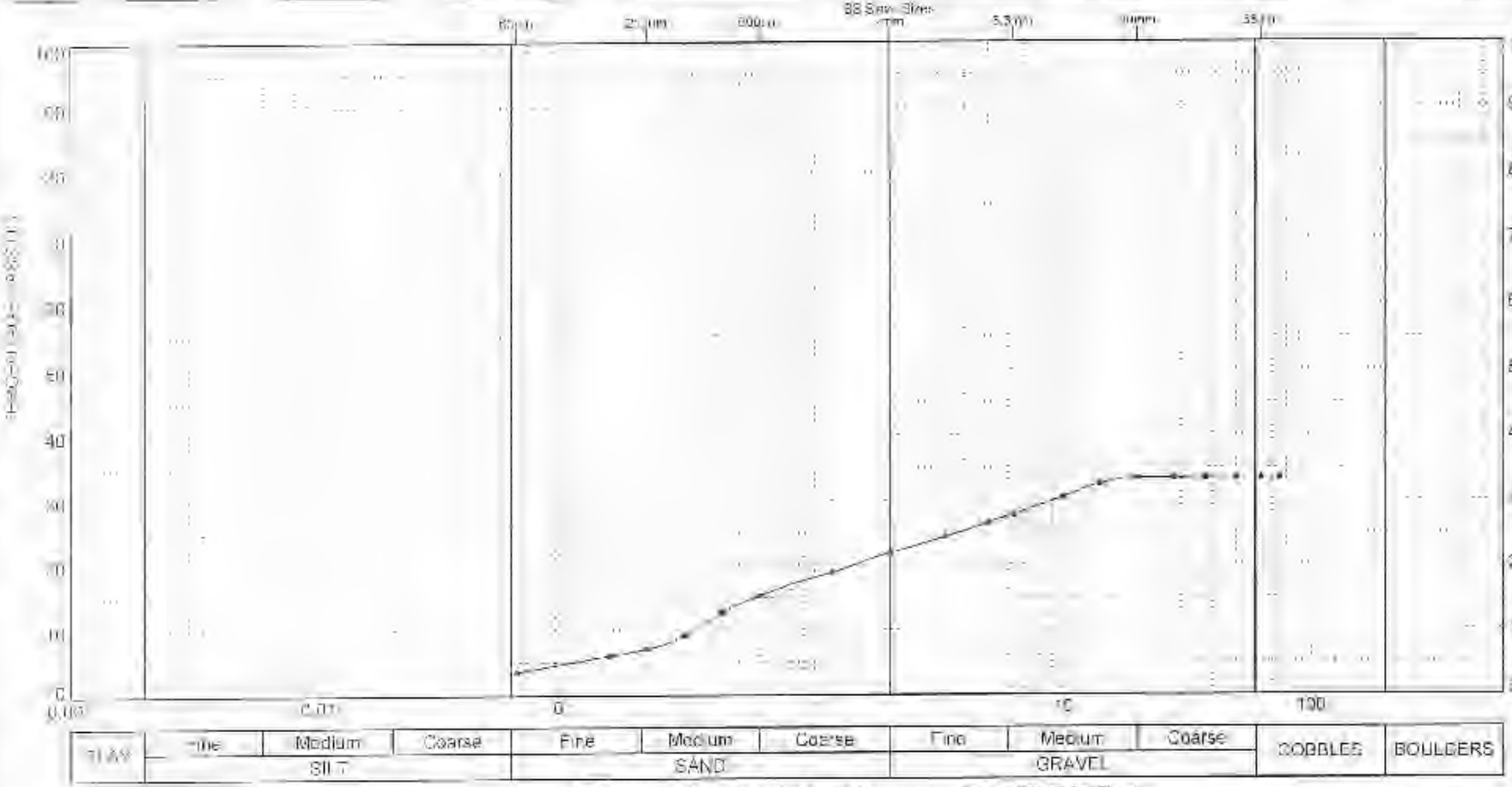
Head Office: Unit 2A, Wells Fargo Industrial Estate, Kings Hill, Dreghorn, Dreghorn, KA11 4AY. Tel: 01294 834 834
Regional Office: Unit 7, Block 22, Shawfarm Business Centre, Dalry Road, Shawfarm, BT48 0BL. Tel: 028 8676 2424

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- BH105	Depth (m) :- 1.50	Sample Type & No :- B4	Specific Depth (m) :- 1.50	Date Tested 29/01/2019



Sieve Size (mm)	Passing (%)
75	33.4
63	33.4
50	33.4
37.5	33.4
28	33.4
20	33.4
14	32.9
10	30.6
6.3	27.8
5	26.5
3.35	24.4
2	21.1
1.18	18.8
0.6	15.2
0.425	12.6
0.3	9
0.212	7.1
0.15	6.0
0.063	3.6

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 19/02/2019	Certificate No :- PSD/NW1580/BH105/B4/1.50	Signed :-	Name :-	Page 1 of 1
Client :- Far East Consortium International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

UKAS TESTING 1367

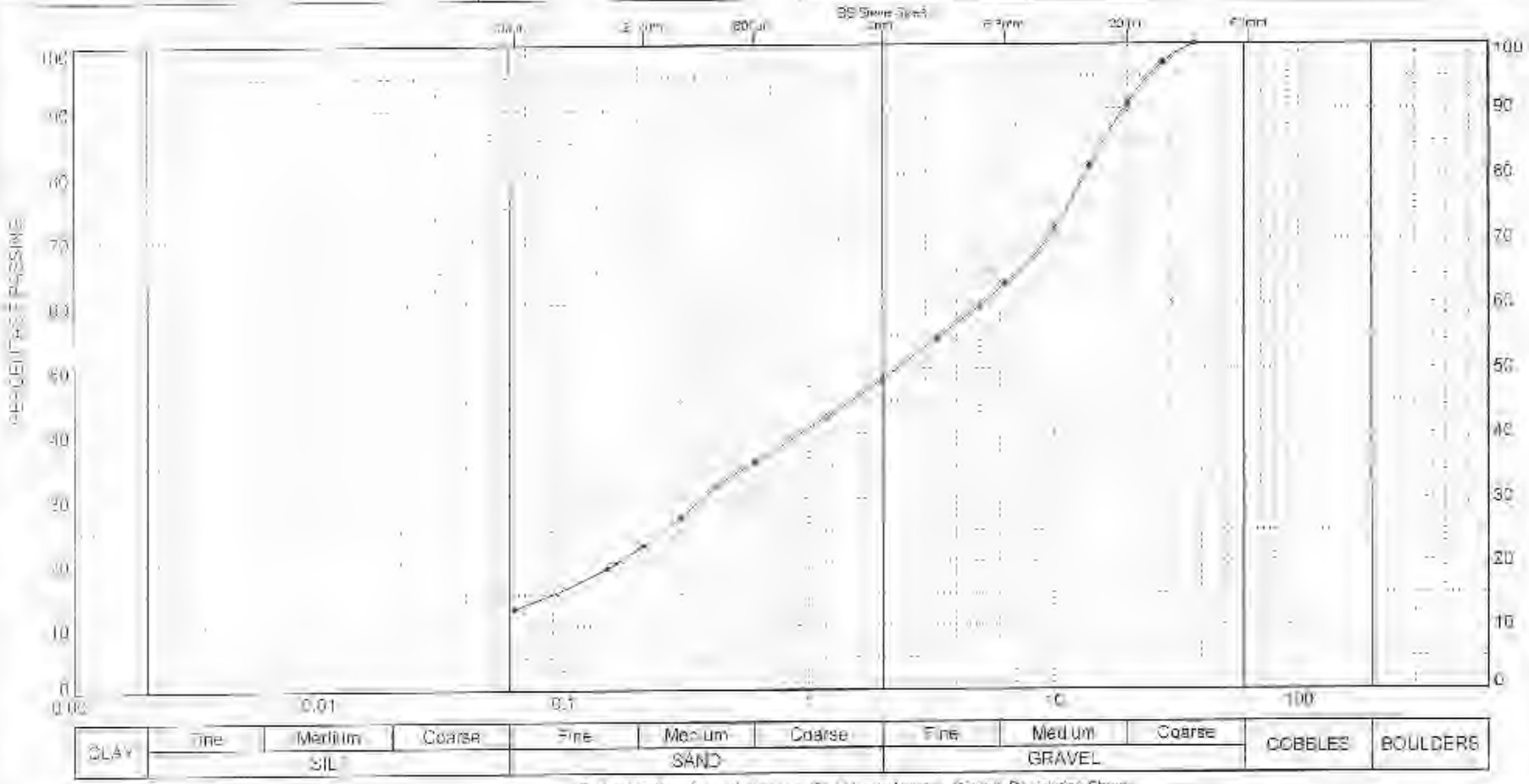
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office : [illegible]
Reading Office : [illegible]

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. - BH107	Depth (m) - 0.20	Sample Type & No. - B3	Specific Depth (m) :- 0.20	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	97.1
20	90.9
14	81.2
10	71.4
6.3	63.0
5	59.7
3.35	52.8
2	46.4
1.18	42.5
0.6	35.6
0.425	32.1
0.3	27.1
0.212	22.6
0.15	19.0
0.063	12.7

For description of sample please refer to the Laboratory Sample Description Sheet.

Date of Issue :- 13/02/2019	Certificate No :- I/SD/NW1580/BH107/B3/0.20	Signed :-	Name :-	Page 1 of 1
Client :- Far East Consortium International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

UKAS TESTING 1367

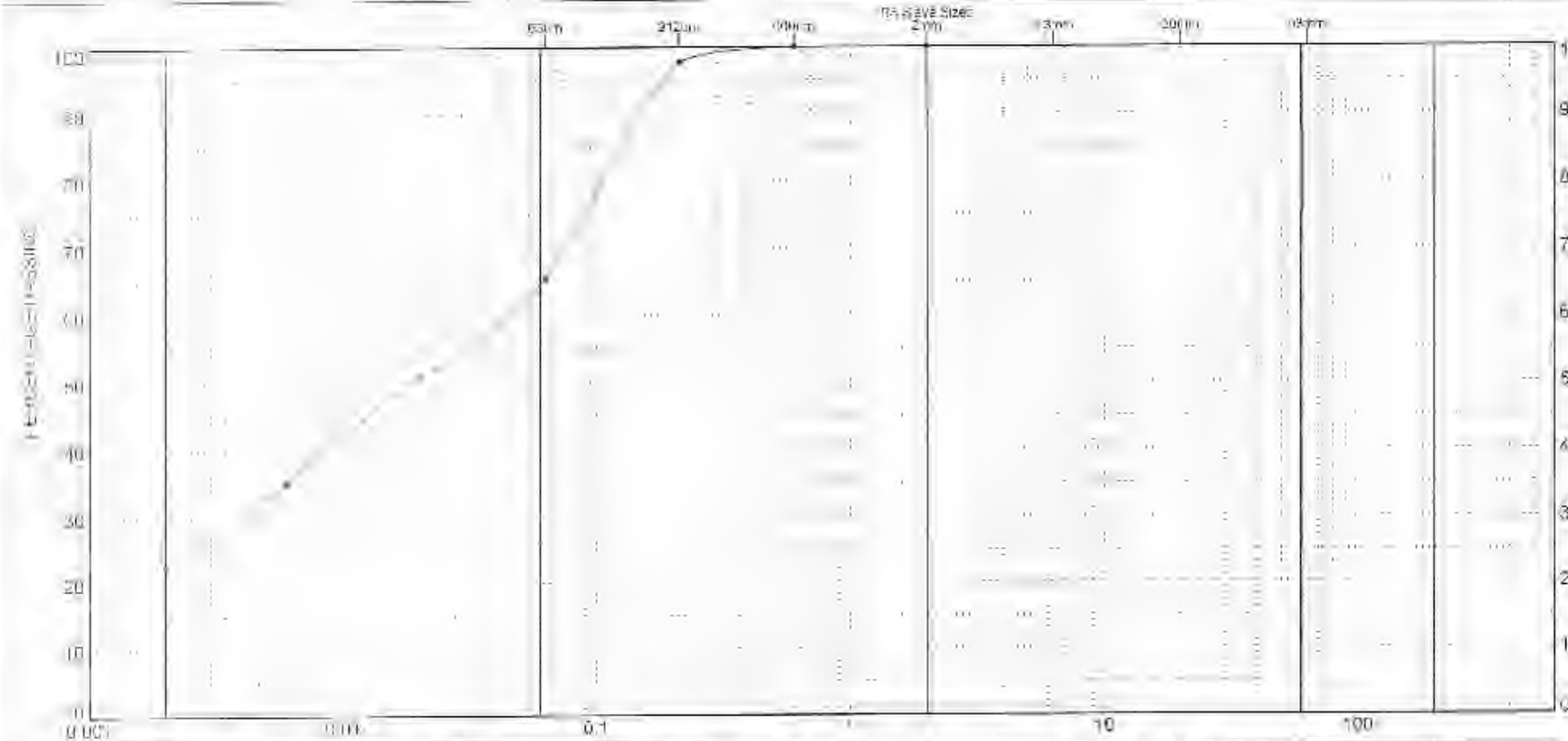
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 7 Sutts Of Industrial Estate, Hatfield Rd, Chadwell Heath, Co. Durham DH2 6HQ. Tel: (0191) 387 4700 Fax: (0191) 387 4703
Regional Office: Unit 20, Brindley Road Industrial Estate, Brindley Road, Warrington WA7 1PH. Tel: (01925) 655 508 Fax: (01925) 655 599

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No - BH107	Depth (m) - 3.10	Sample Type & No - B13	Specific Depth (m) - 3.10	Date Tested - 29/01/2019



Sieve Size (mm)	Passing (%)
2	100.0
0.6	100.0
0.212	97.8
0.063	85.8
0.02	50.9
0.006	35.4
0.002	22.6

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 13/2/2019	Certificate No :- 'SI'/NW/1580/BH107/B13/3.10	Signed :-	Name :-	Page 1 of 1
Client :- For and on behalf of Consortium Stena Jersey Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

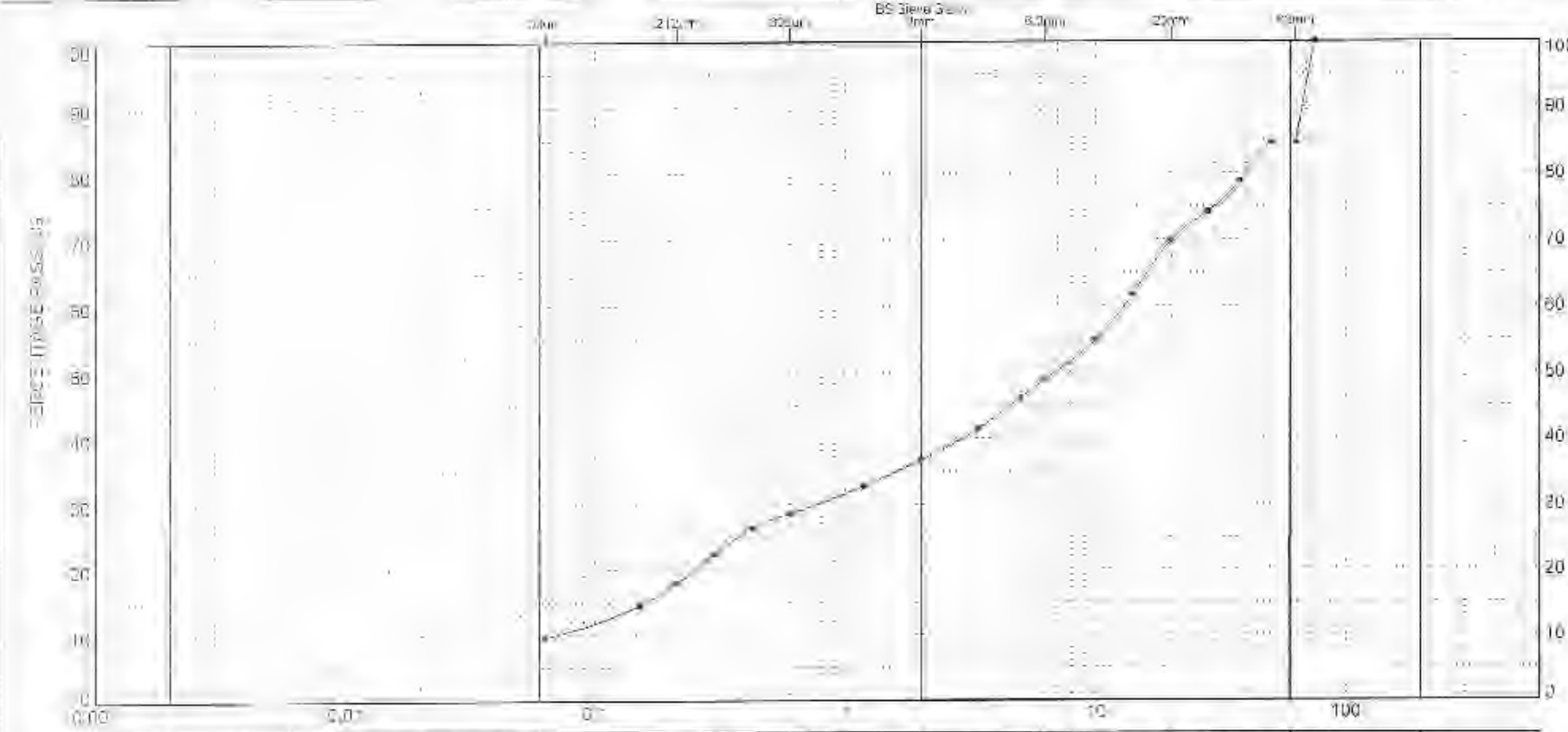
Head Office : 107 Station Street, Aintree, Liverpool, L9 7NJ. Tel: 0151 525 1000 Fax: 0151 525 1001
Regional Office : Unit 22, Deeside Industrial Park, Deeside, Flintshire, CH5 2LR. Tel: 01244 288 000 Fax: 01244 288 001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No. : BH109	Depth (m) : 0.40	Sample Type & No. : B3	Specific Depth (m) : 0.40	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
75	100.0
63	84.8
50	84.8
37.5	78.8
28	74.2
20	69.9
14	64.7
10	59.0
6.3	49.6
5	46.2
3.35	41.7
2	36.7
1.18	32.8
0.6	28.6
0.425	26.5
0.3	23.4
0.212	17.5
0.15	14.5
0.063	9.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 18/02/2019	Certificate No :- PSD/NW/1580/BH109/B3/0.40	Signed :-	Name :-	Page 1 of 1
Client :- For East Cheshire International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW/1580

UKAS TESTING 1357

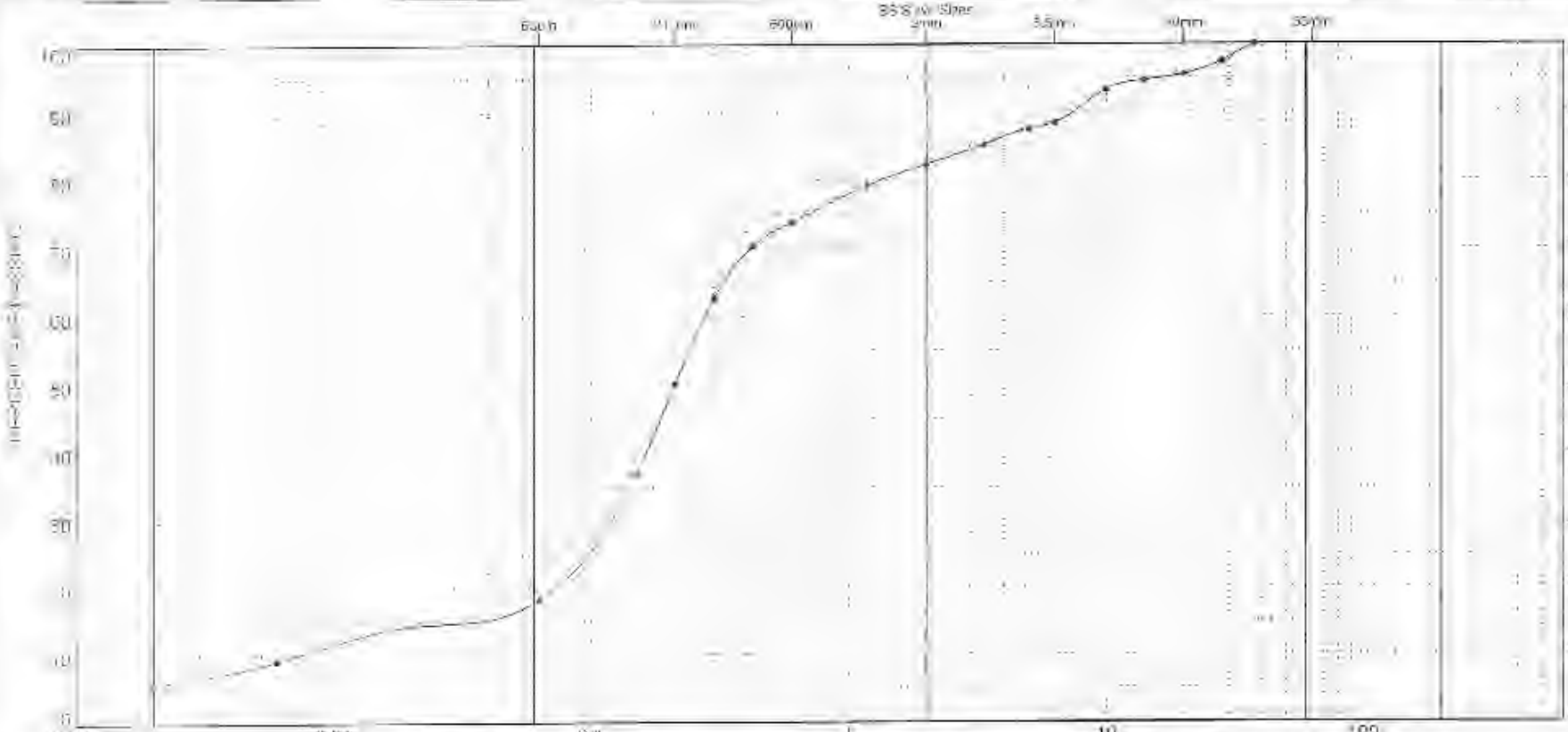
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Dove Lane Industrial Estate, Alsager, Tel: Crewe (0270) 8[illegible] Fax: (0270) 8[illegible]
Regional Office: 3 & 4, Business Drive, Barnton, Tel: (01606) 7[illegible] Fax: (01606) 7[illegible]

PARTICLE SIZE DISTRIBUTION

BS1377 Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No - BH110	Depth (m) - 3.10	Sample Type & No - B6	Specific Depth (m) - 3.10	Date Tested - 29/01/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	97.4
20	95.6
14	94.0
10	93.3
6.3	88.4
5	87.5
3.35	85.2
2	82.3
1.18	79.2
0.6	73.6
0.425	70.4
0.3	62.7
0.212	50.*
0.15	37.0
0.063	18.1
0.02	14.2
0.006	9.1
0.002	5.6

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue - 13/02/2019	Certificate No. - PSD/NW1580/BH110/B6/3.10	Signed -	Name -	Page 1 of 1
Client - For Peel Consortium International Limited	Contract Title - Northern Gateway			AEG Contract No - NW1580

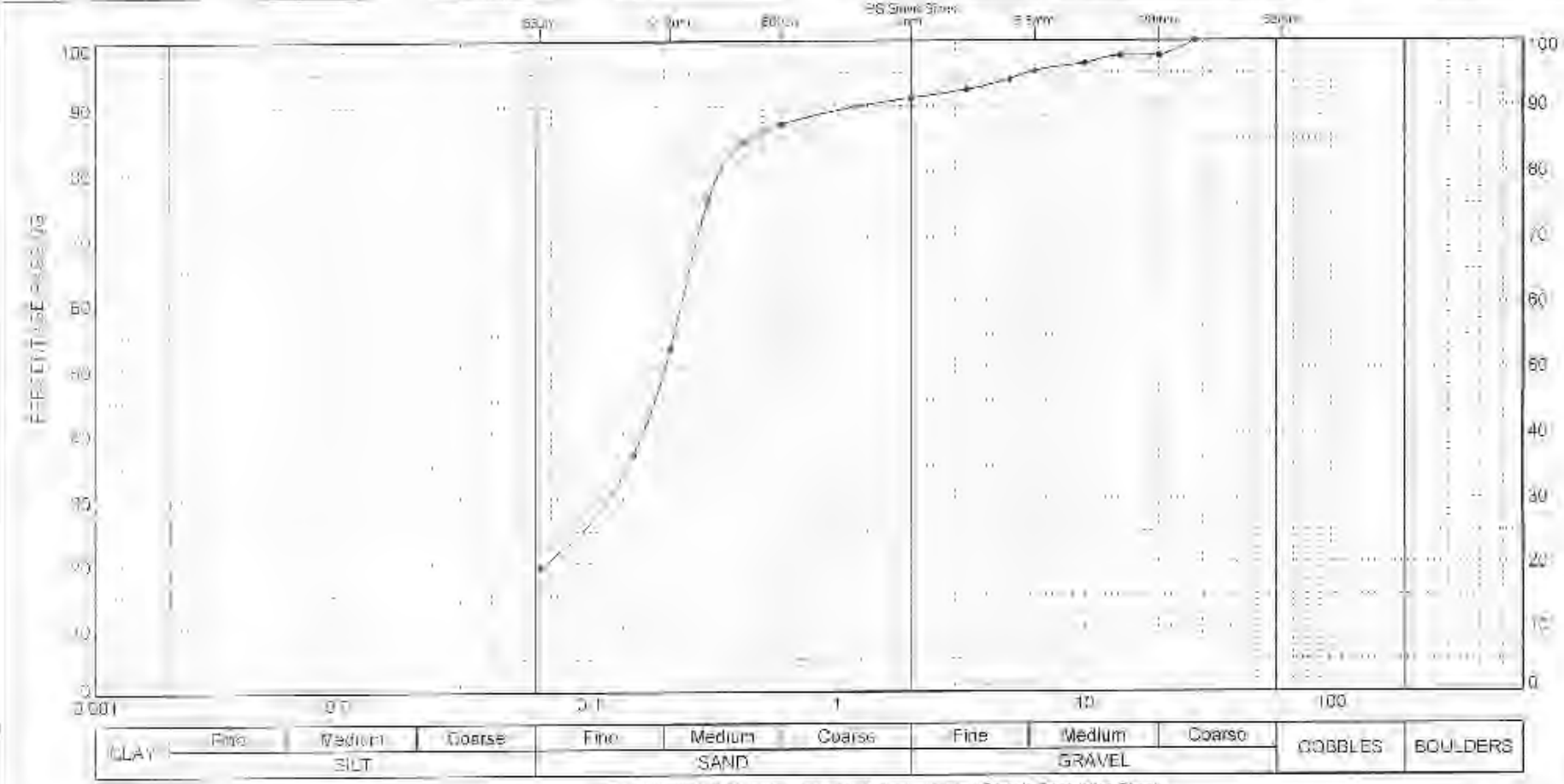
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- BH112 | Depth (m) :- 0.60 | Sample Type & No :- B3 | Specific Depth (m) :- 0.60 | Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	97.5
14	97.0
10	96.5
6.3	95.3
5	94.1
3.35	92.6
2	91.2
1.18	89.9
0.6	87.3
0.425	84.8
0.3	75.6
0.212	53.0
0.15	36.8
0.063	19.3

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 30/01/2019 | Certificate No :- PSD/NW/1580/BH112/B3/0.60 | Signed :- | Name :- | Page 1 of 1

Client :- Far East Consortium International Limited | Contract Title :- Northern Gateway | AEG Contract No :- NW1580

1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

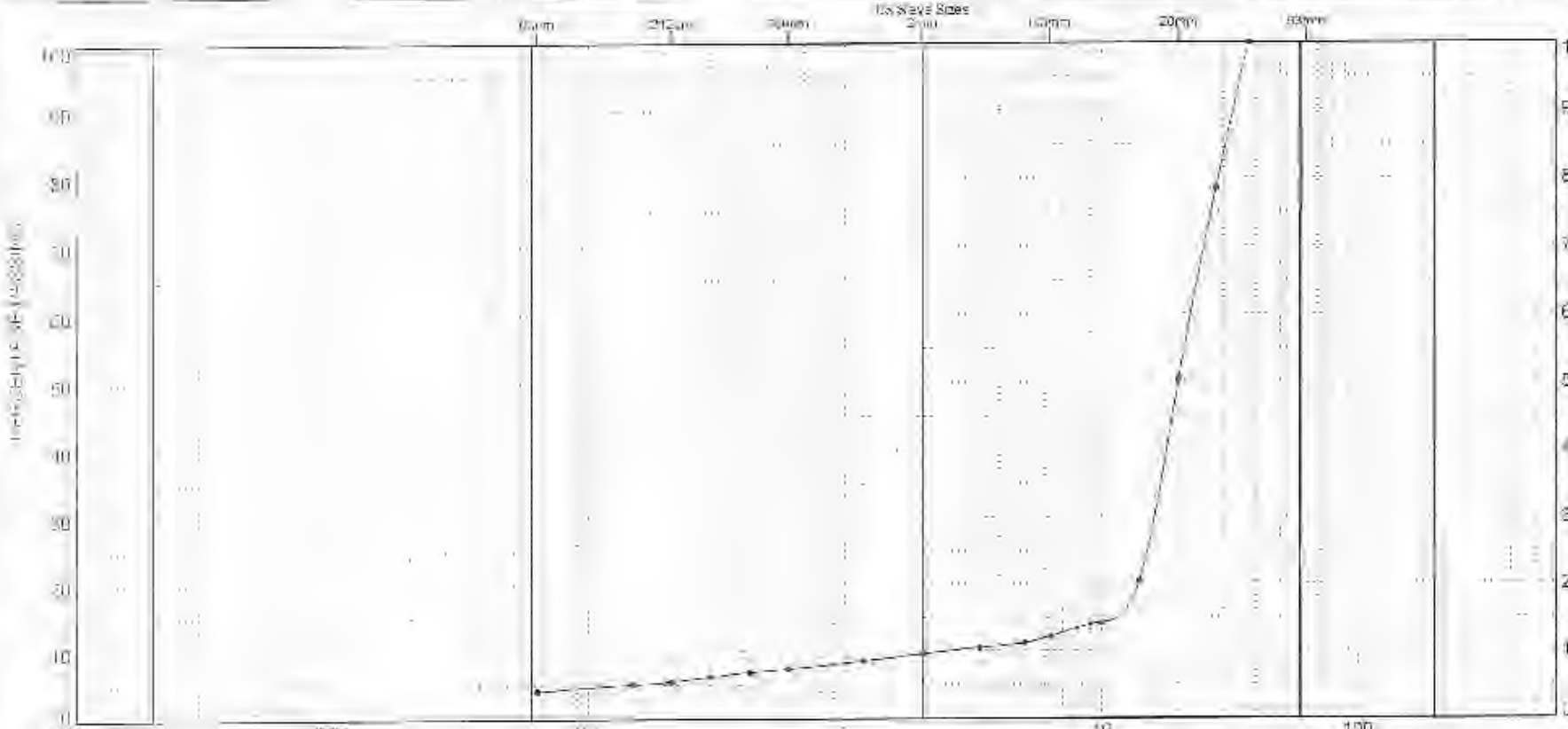
Head Office: Unit 20, Dukes Court, Duke Street, Preston, Lancashire, PR2 8ZQ. Tel: 01772 652400 Fax: 01772 652401
Registered Office: Unit 20, Dukes Court, Duke Street, Preston, Lancashire, PR2 8ZQ. Tel: 01772 652400 Fax: 01772 652401

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No: TP101	Depth (m) : 0.80	Sample Type & No : LB3	Specific Depth (m) : 0.80	Date Tested : 30/01/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	78.5
20	50.4
14	20.3
10	14.2
6.3	12.1
5	11.2
3.35	10.5
2	9.5
1.18	8.5
0.6	7.4
0.425	6.9
0.3	6.2
0.212	5.5
0.15	5.1
0.063	4.2

(Refer to description of sample presented on the Laboratory Sample Description Sheet)

Date of Issue : 18/02/2019	Certificate No : ES/NW1580/TP101/LB3/0.80	Signed :	Name :	Page 1 of 1
Client : Kier Eas, Consortium International Limited	Contract Title : Northern Gateway			AEG Contract No : NW1580

1367

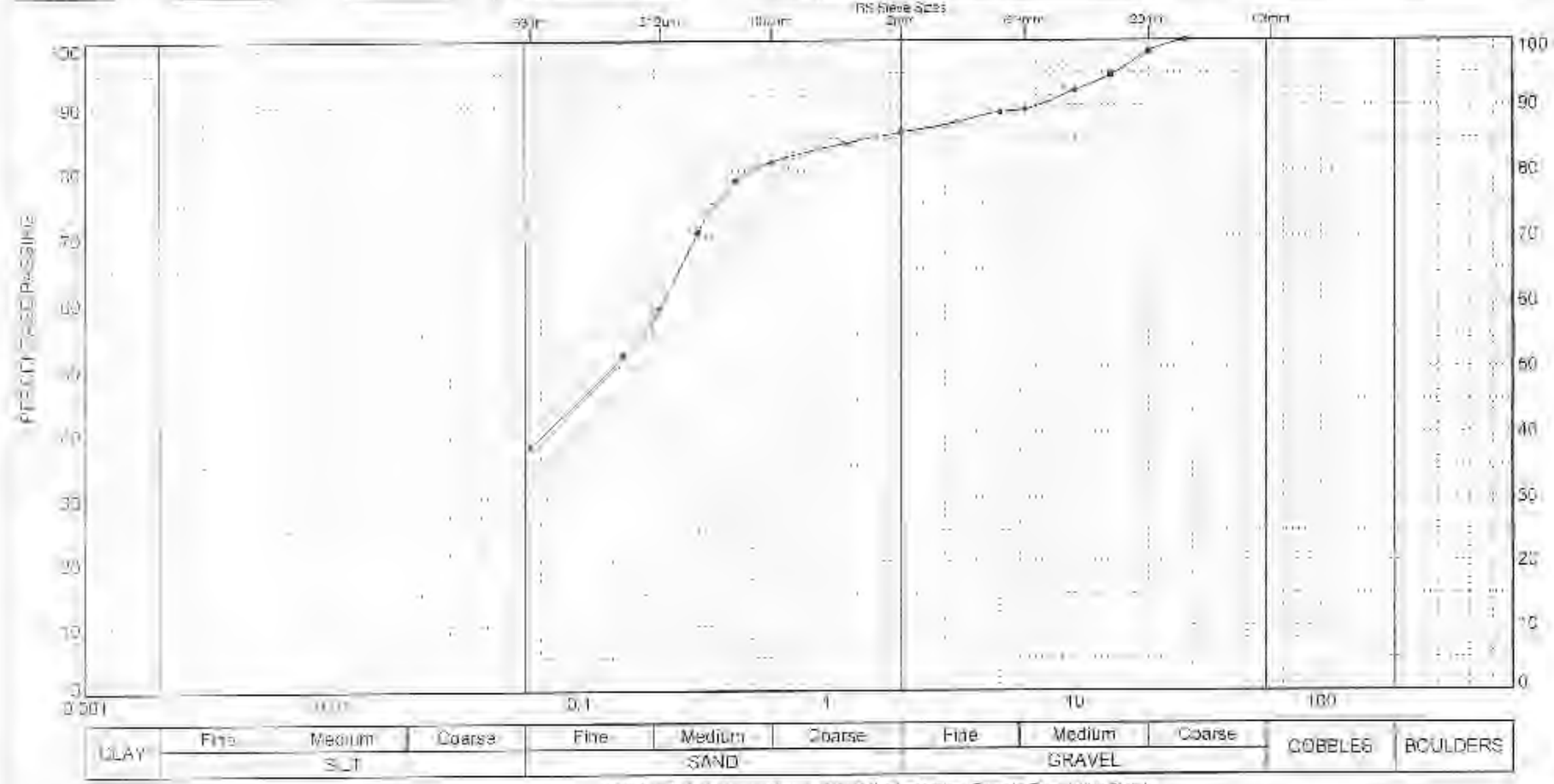
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Registered Office: Unit 2, Hermitage Industrial Estate, Penicuik, Midlothian, EH26 8PL. Tel: 01968 678000 Fax: 01968 678001

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 1990

Exploratory Hole No :- TP101	Depth (m) :- 1.80	Sample Type & No :- LB6	Specific Depth (m) :- 1.80	Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	98.2
14	94.5
10	92.3
6.3	89.4
5	88.0
3.35	87.0
2	85.9
1.18	84.2
0.6	81.4
0.425	78.8
0.3	76.6
0.212	69.1
0.15	51.7
0.063	37.9

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name	Page 1 of 1
29/01/2019	ISD/NW1580/TP101/LB6/1.80			

Client :-	Contract Title :-	AEG Contract No :-
Balfour Beatty Civil Engineering Limited	Northern Gateway	NW1580

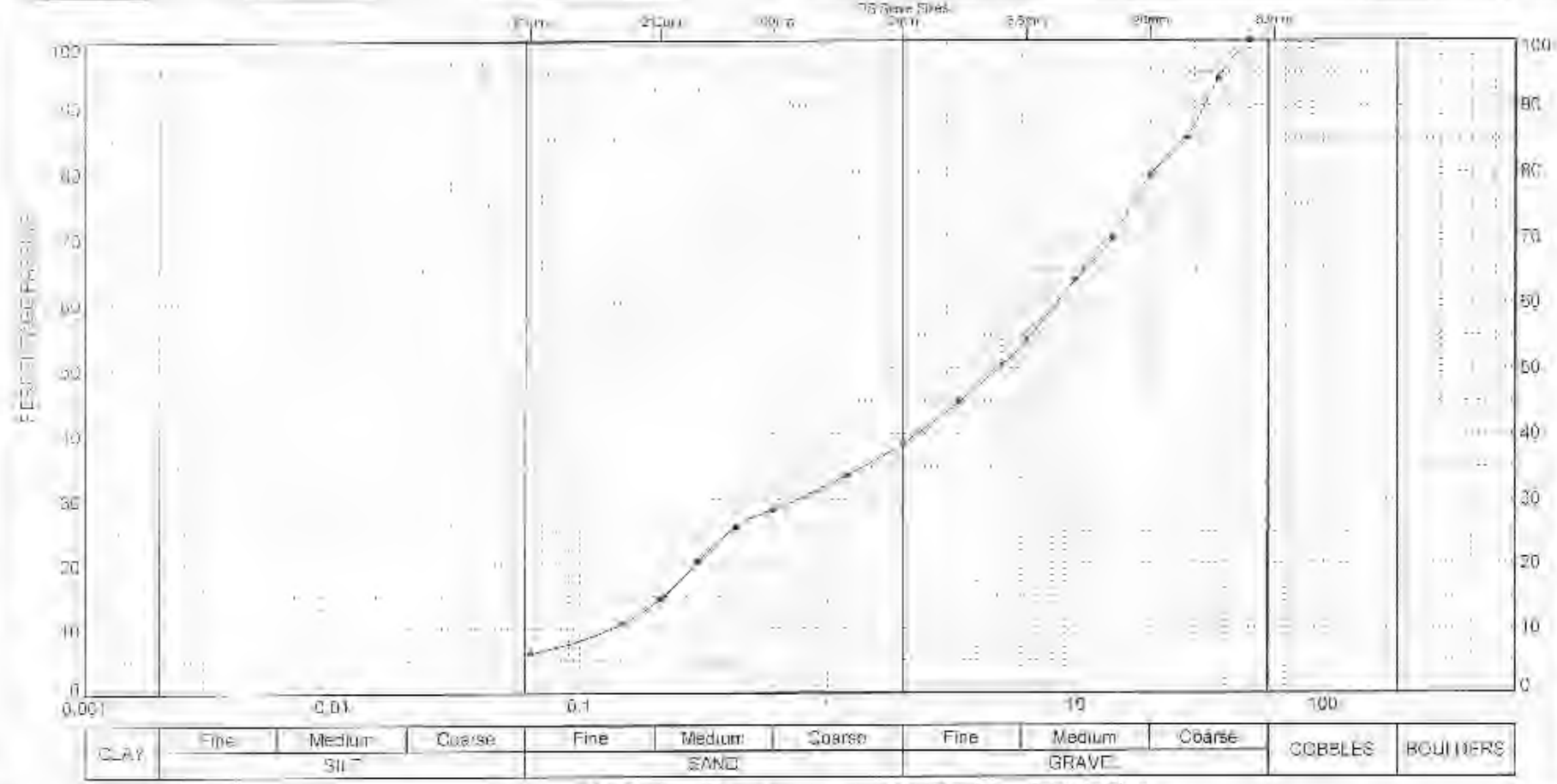
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. - TP104	Depth (m) - 0.80	Sample Type & No. - LB3	Specific Depth (m) - 0.80	Date Tested - 29/01/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	92
28	85
20	79.5
14	70.0
10	63.5
6.3	54.2
5	50.4
3.35	44.8
2	38.5
1.18	33.6
0.6	28.4
0.425	25.8
0.3	20.4
0.212	14.6
0.15	10.8
0.063	6.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue - 13/02/2019	Certificate No. - ISO/NW1580/TP104/LB3/0.80	Signed -	Name -	Page 1 of 1
Client - Far East Consortium International Limited	Contract Title - Northern Gateway			AEG Contract No. - NW1580

UKAS TESTING 1367

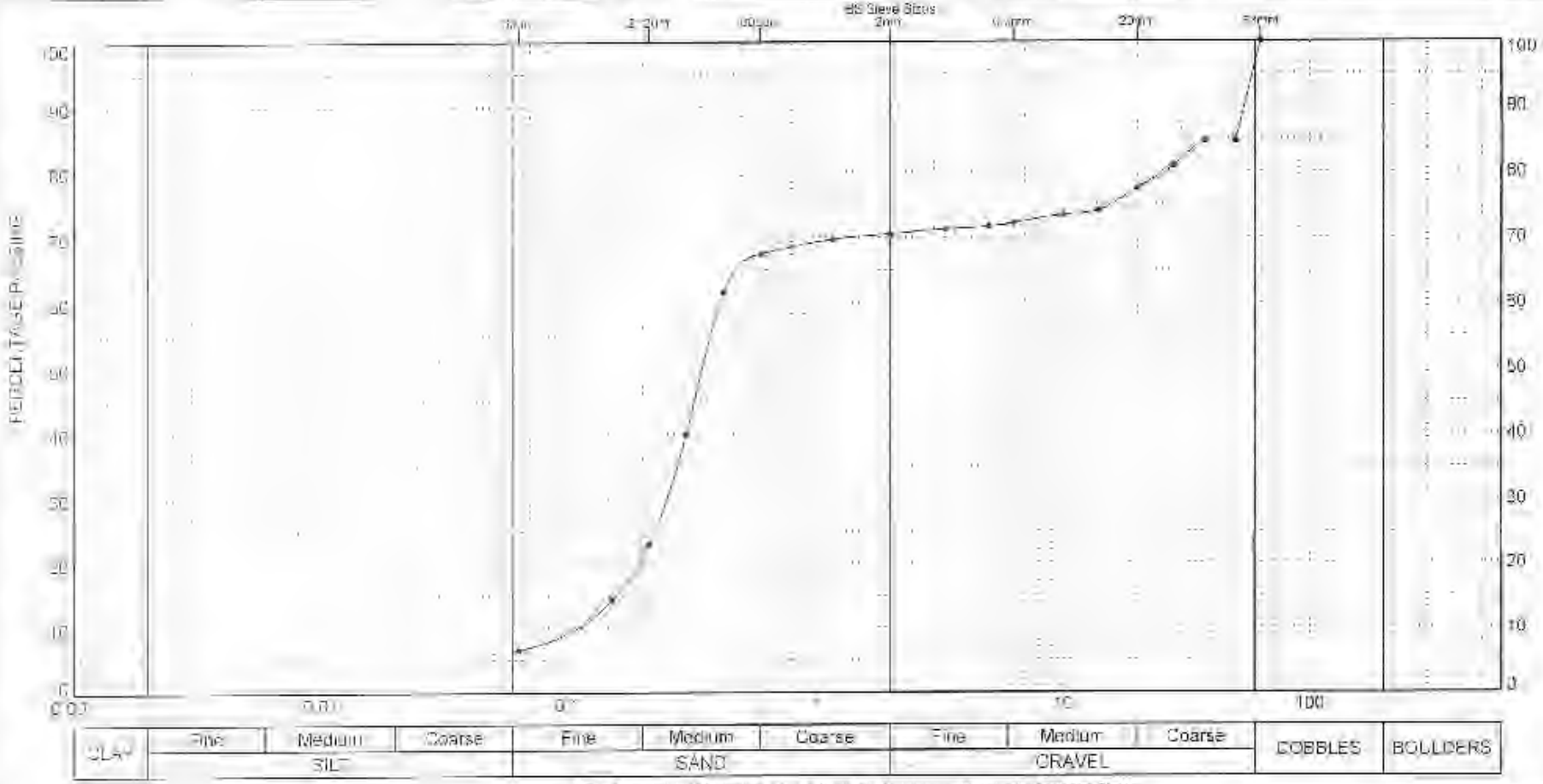
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Registered Office: Unit 3, Kingsway Enterprise Centre, Kingsway, Alfreton, Derbyshire, DE55 7BR. Tel: 01773 836 300 Fax: 01773 836 301

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Date Tested
TP104	1.80	LB6	1.80	29/01/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	84.7
37.5	84.7
28	80.9
20	77.5
14	74.1
10	73.4
6.3	72.1
5	71.5
3.35	71.2
2	70.5
1.18	69.7
0.6	67.5
0.425	61.7
0.3	39.9
0.212	23.0
0.15	14.2
0.063	8.5

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue	Certificate No.	Signed	Name	Page
19/02/2019	PSD/NW1580/TP104/LB6/1.80			Page 1 of 1

Client	Contract Title	AEG Contract No.
For Sustainable Aluminium International Limited	Northern Gateway	NW1580

UKAS TESTING 1367

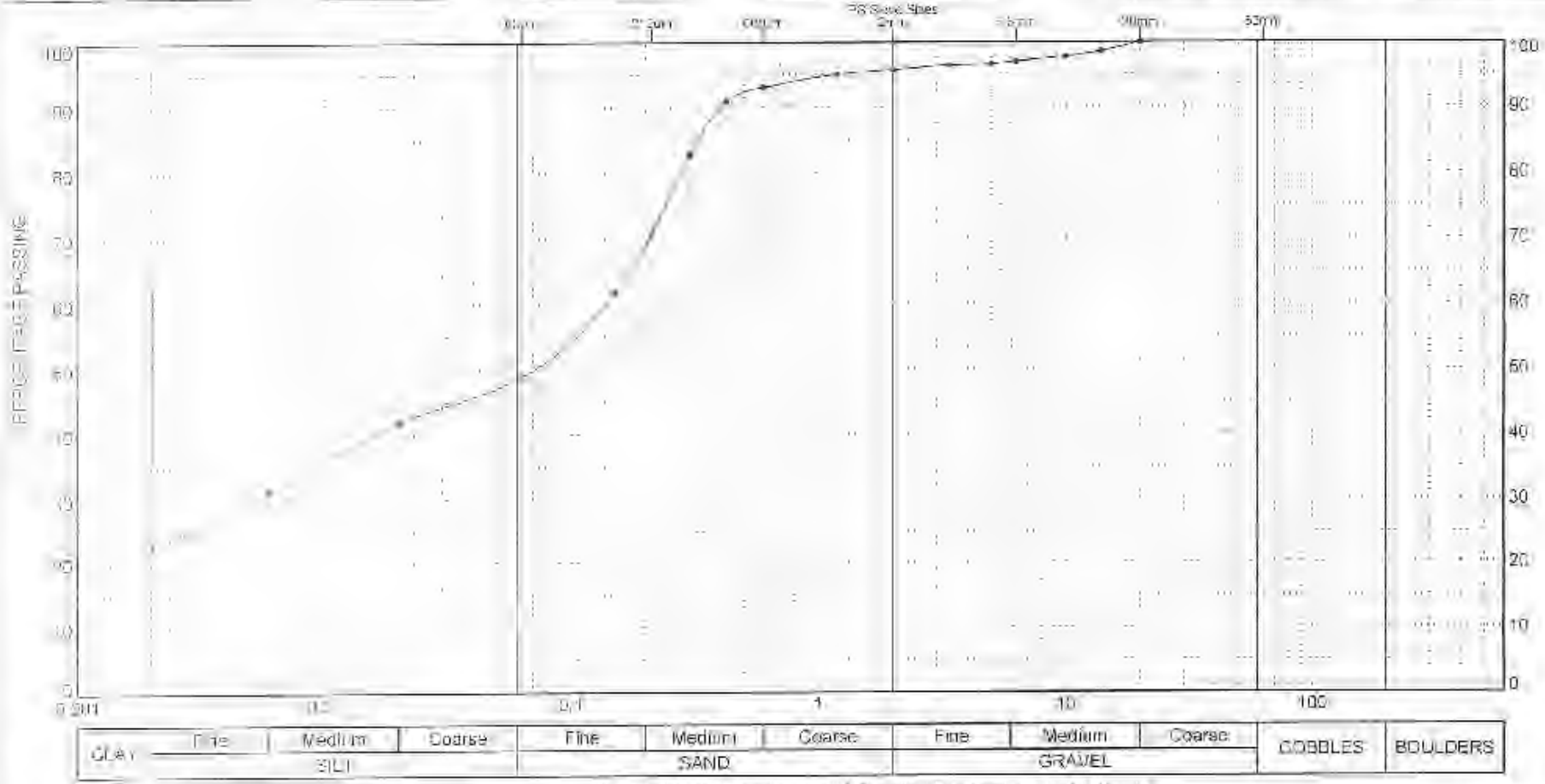
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2F Block C Industrial Estate, Hillhead Road, Kirkintilloch, Glasgow, G66 1RG. Tel: (0141) 777 4733 Fax: (0141) 777 4734
Regional Office: Unit 2, Business Development Centre, Bridge Street, Aberdeen, AB25 1JL. Tel: (01224) 735 000 Fax: (01224) 735 099

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Laboratory Hole No :- TP109	Depth (m) :- 1.60	Sample Type & No :- LB6	Specific Depth (m) :- 1.60	Date Tested :- 30/01/2019



Sieve Size (mm)	Passing (%)
20	100.0
14	98.5
10	97.7
6.3	97.0
5	96.6
3.35	96.4
2	95.7
1.18	95.0
0.6	93.1
0.425	90.9
0.3	82.8
0.212	70.9
0.15	61.7
0.063	46.9
0.02	41.9
0.006	31.2
0.002	22.7

For description of sample classification refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-		Name :-	Page 1 of 1
30/01/2019	PSD/NW1580/TP109/LB6/1.60	Signed :-		
Client :-	Contract Title :-		AEG Contract No :-	
Fen East Consortium International Limited	Northern Gateway		NW1580	

UKAS TESTING 1367

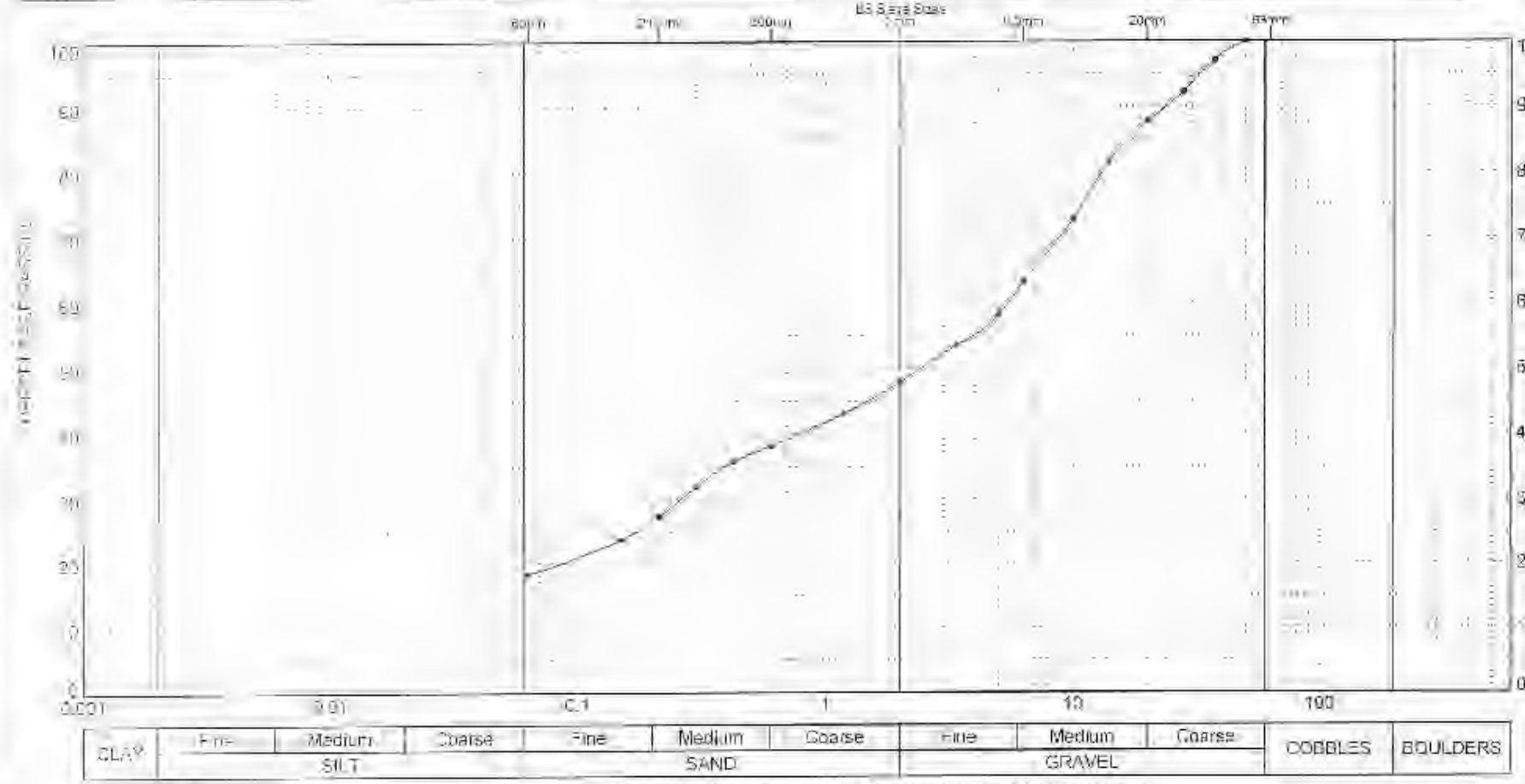
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2F Scott Industrial Estate, Paisley, PA1 1RL. Tel: 0141 887 4880. Fax: 0141 887 4710
Regional Office: Unit 2A Queensway, New Milton, Hampshire, BH25 5NN. Tel: 01425 638 300. Fax: 01425 638 399

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP109	Depth (m) :- 1.60	Sample Type & No :- B6	Specific Depth (m) :- 1.60	Date Tested :- 01/02/2019



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieve Size (mm)	Passing (%)
50	100.0
37.5	97.1
28	92.3
20	87.6
14	81.7
10	72.6
6.3	63.2
5	58.*
3.35	53.1
2	47.9
1.18	43.1
0.6	38.2
0.425	35.8
0.3	33.0
0.212	27.4
0.15	23.9
0.063	18.3

(Description of sample please refer to the Laboratory Sample Description Sheet)

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
13/02/2019	PSD/NW1580/TP109/B6/1.60			

Client :-	Contract Title :-	AEG Contract No :-
Far East Consortium International Limited	Northern Gateway	NW1580

UKAS TESTING 1367

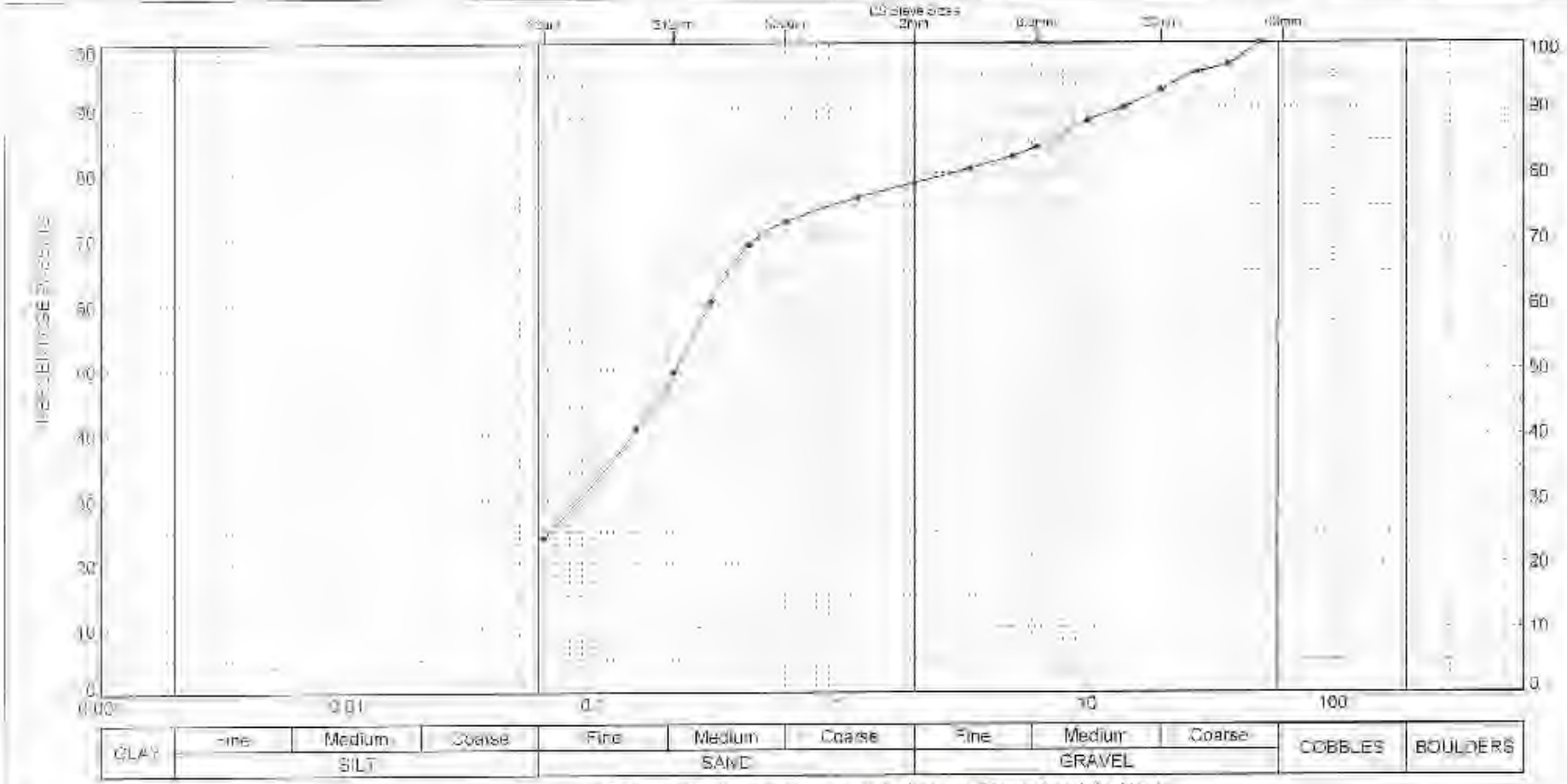
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2, Block 37, Acre 4, Hill 24 – Dublin Rd, Stonyford, Co. Kilkenny – Tel: 056 – 7724111 Fax: 056 – 7724112
Registered Office: Unit 1, Block A, Kilcoole Industrial Estate, Kilcoole, Co. Wicklow – Tel: 01 – 287 6155 Fax: 01 – 287 6156

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Laboratory Sample No :- TP112 | Depth (m) :- 0.60 | Sample Type & No :- LB3 | Specific Depth (m) :- 0.60 | Date Tested :- 30/01/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.7
28	95.4
20	92.7
14	90.0
10	87.9
6.3	84.0
5	82.6
3.35	80.7
2	78.5
1.18	76.3
0.6	72.6
0.425	69.1
0.3	66.4
0.212	63.5
0.15	60.8
0.063	54.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 04/02/2019 | Certificate No :- 580/NW/580/TP112/LB3/0.60 | Signed :- | Name :- | Page 1 of 1

Client :- Fox East Consortium International Limited | Contract Title :- Northern Gateway | AEG Contract No :- NW1580

UKAS TESTING 1367

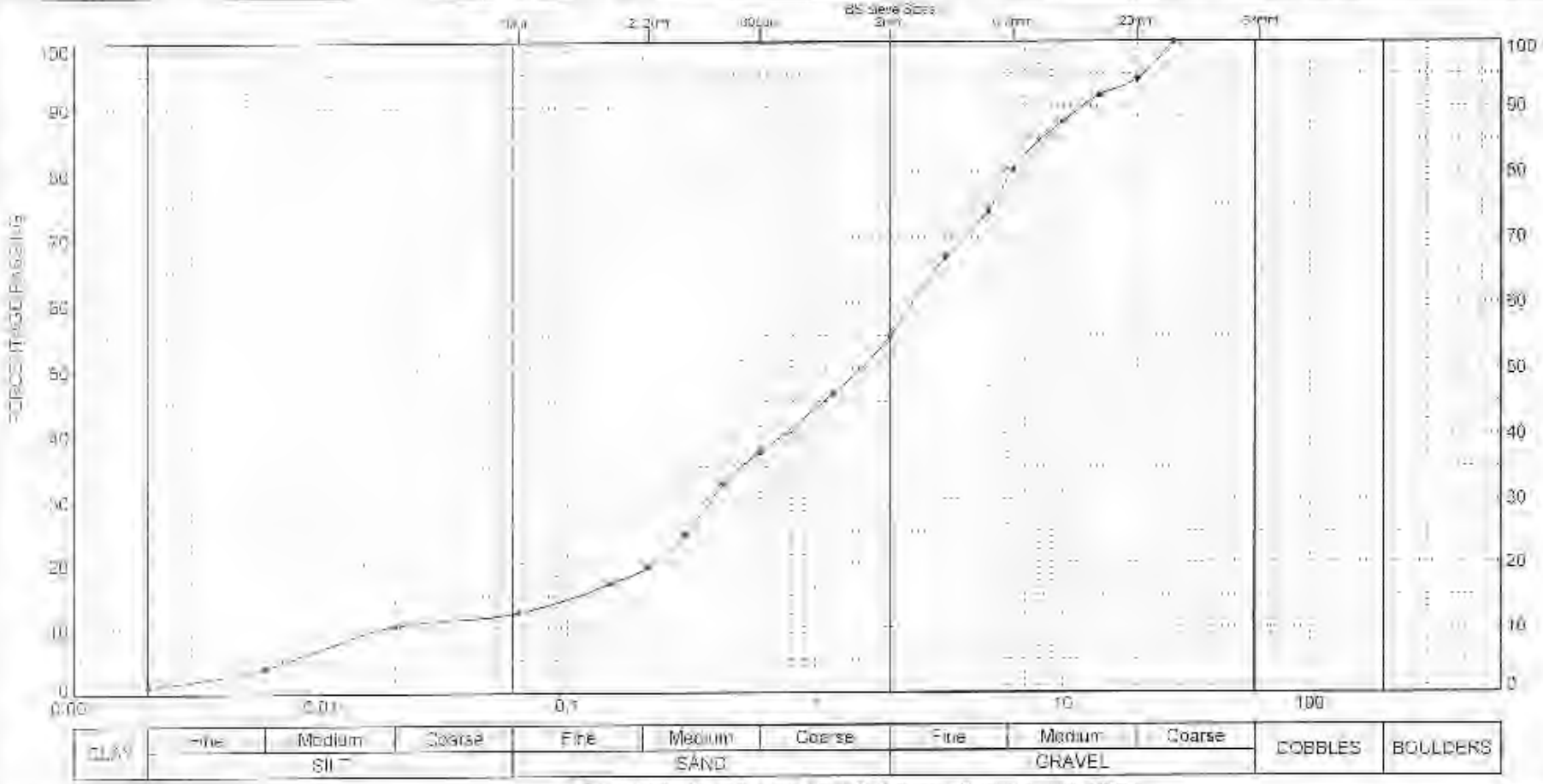
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Shire Hill, Saffron Walden, Essex CB11 3AQ, Tel: 01799 526 000 Fax: 01799 526 001
Registered Office: Unit 2 Swallow Court, Jubilee Road, Durham, DH1 5TS, Tel: 0191 375 0000 Fax: 0191 386 0101

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- TP116	Depth (m) :- 0.80	Sample Type & No :- LB3	Specific Depth (m) :- 0.80	Date Tested :- 30/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	94.2
14	91.7
10	87.7
6.3	80.5
5	74.1
3.35	67.0
2	55.0
1.18	46.2
0.6	37.3
0.425	32.2
0.3	24.7
0.212	19.4
0.15	16.6
0.063	12.3
0.02	10.3
0.006	4.0
0.002	1.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
08/02/2019	PSDNW1580/TP116/LB3/30			
Client :- For East Midlands International Limited	Contract Title :- Northern Gateway			AEG Contract No :- NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

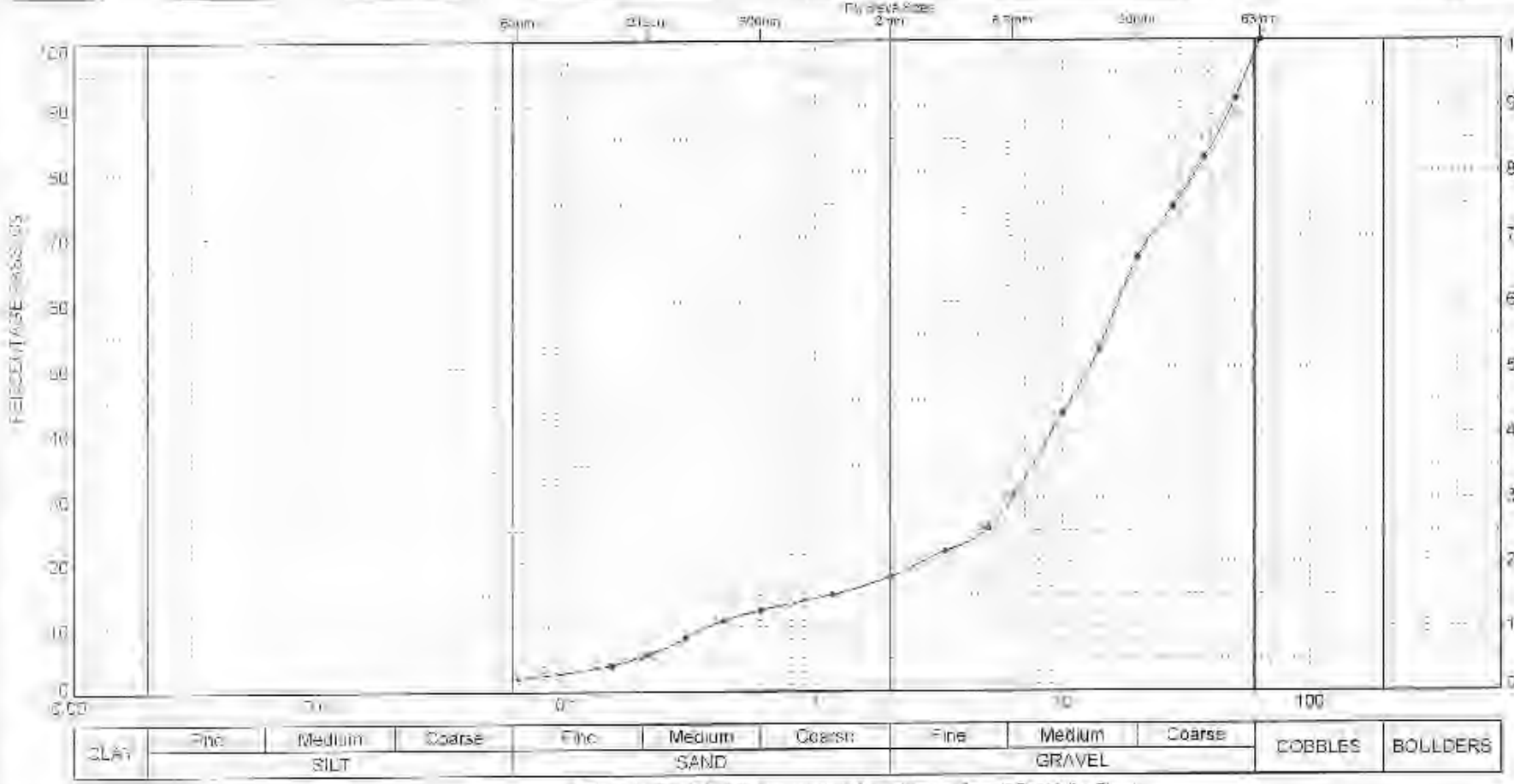
Head Office: Unit 20 Swift Ind. Centre, Eccles Road, Norton Fall, Preston, Lancs. PR6 0BZ. Tel: 01772 337744 Fax: 01772 337711
Regional Office: Unit 3 Bankhouse Road, Lancaster, Lancs. LA1 3BL. Tel: 01524 65766 Fax: 01772 880056

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Date Tested
TP119	0.40	B3	0.40	30/01/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	91.0
37.5	83.0
28	74.6
20	66.6
14	52.0
10	43.1
6.3	36.2
5	28.4
3.35	21.7
2	17.6
1.18	15.0
0.6	12.8
0.425	11.0
0.3	8.3
0.212	6.7
0.15	4.1
0.063	2.1

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue: 1/02/2019

Certificate No: PSD/NW1590/TP119/B3/0.40

Signed:

Name:

Page 1 of 1

Client: For East Consortium International Limited

Contract Title: Norcem Calleway

AEG Contract No: NW1590

UKAS TESTING 1367

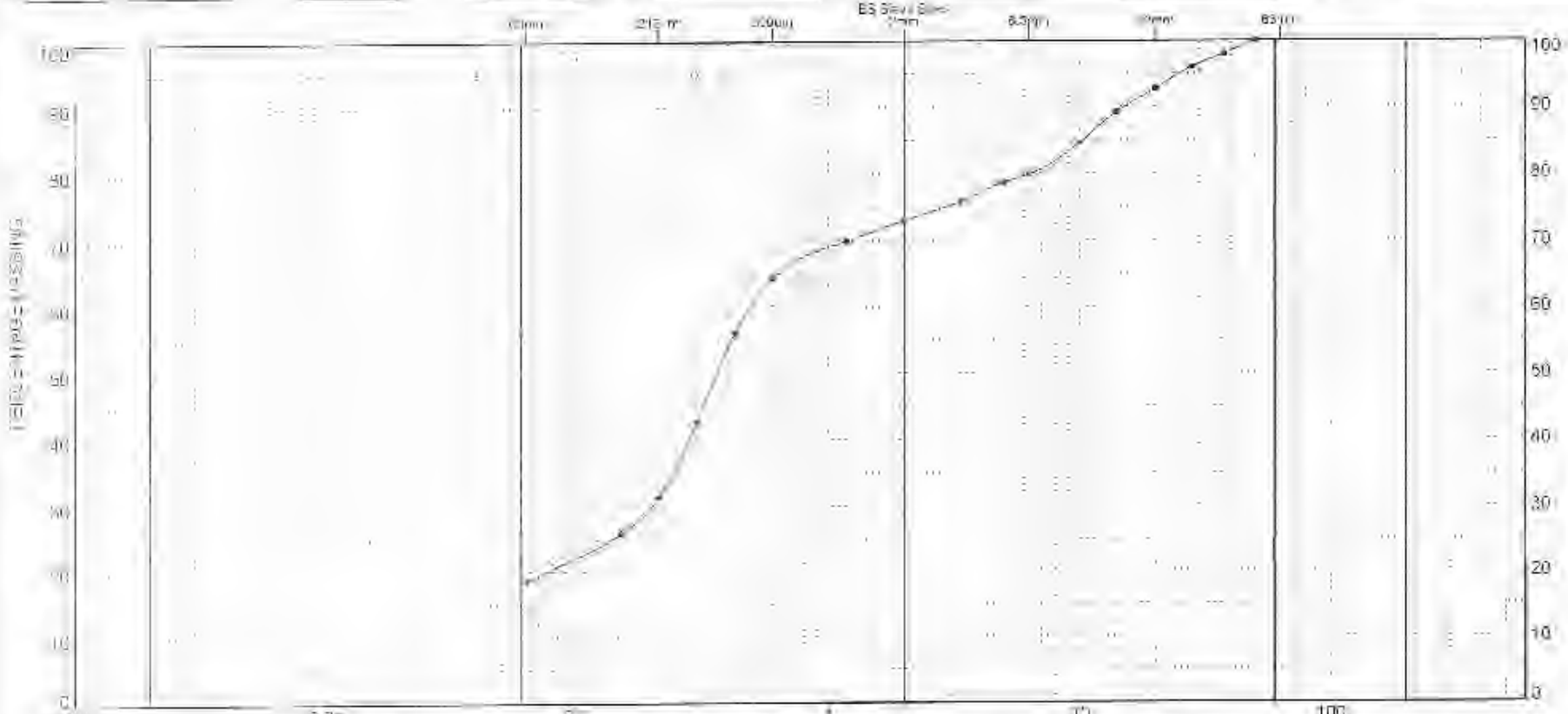
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 22 Eagle Star Industrial Estate, Suite 6D, Chester le Street, Co Durham DH3 3RG - Tel: 0191 387 1780 Fax: 0191 387 4713
Regional Office: Unit 2b Red Kite Development Centre, Eastern Way, Stadium Park, Bury, Lancashire BL9 0BL - Tel: 0161 762 1212 Fax: 01772 720 599

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No.: TP121	Depth (m) :- 0.80	Sample Type & No.: LB3	Specific Depth (m) :- 0.80	Date Tested :- 31/01/2019



Sieve Size (mm)	Passing (%)
50	100.0
37.5	97.9
28	96.0
20	92.7
14	89.2
10	84.8
6.3	79.9
5	78.7
3.35	75.8
2	73.0
1.18	69.9
0.6	64.4
0.425	56.2
0.3	42.8
0.212	31.4
0.15	26.0
0.063	16.6

For description of sample please refer to the accompany Sample Description Sheet

Date of issue :-	Certificate No :-		Name :-	Page 1 of 1
13/02/2019	PSD/NW1580/TP121/LB3/0.80	Signed :-		
Client :- Far East Consortium International Limited		Contract Title :- Northern Gateway		AEG Contract No :- NW1580

UKAS TESTING 1367

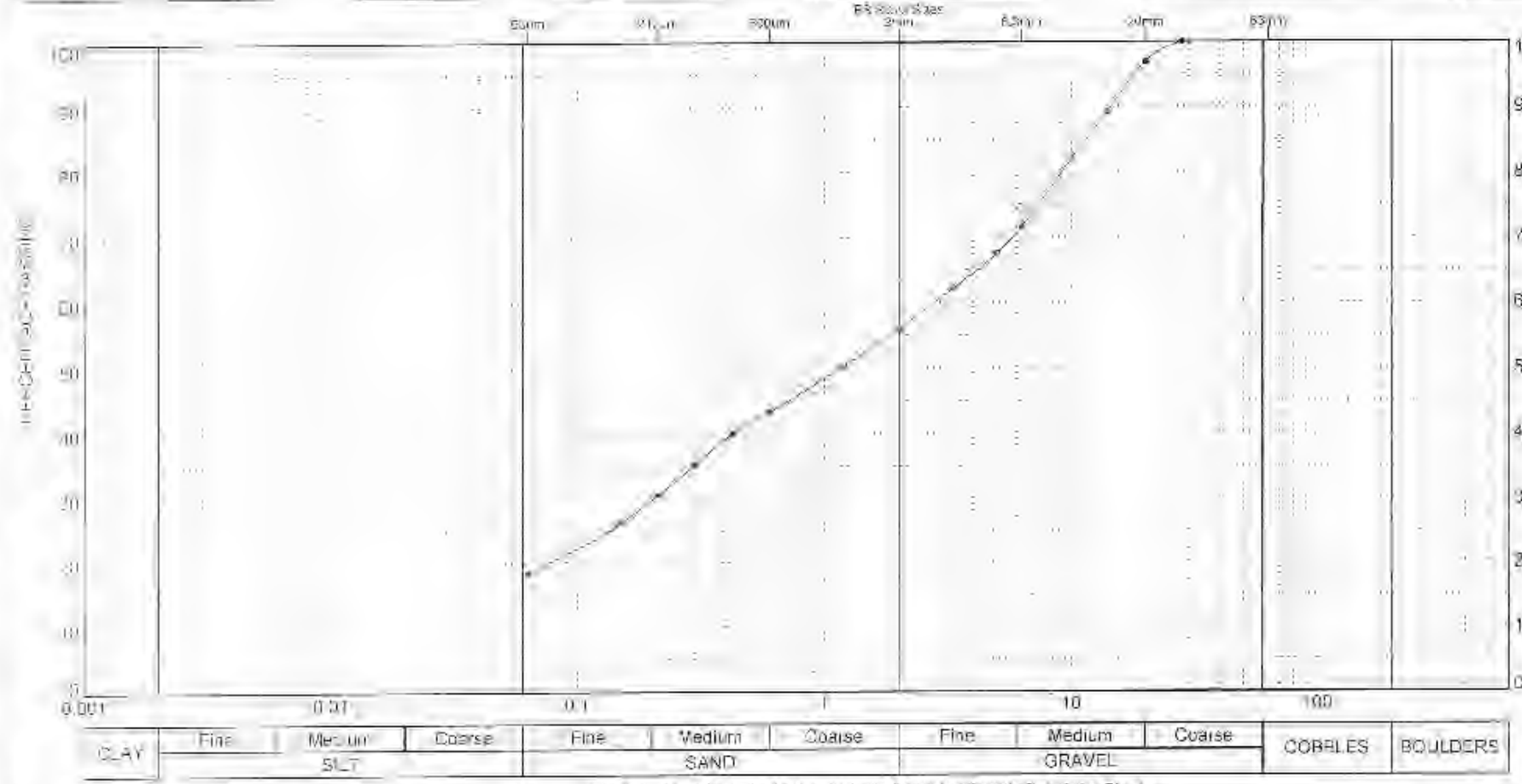
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2a Quarry Office Building, Station Road, Raphoe, Co. Donegal, Ireland. Tel: 074 45 48000 Fax: 074 45 48001
Regional Office: 6-7 Business Development Centre, Monaghan Road, Cavan. Tel: 049 433 7000 Fax: 049 433 7001

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Date Tested
TP124	0.80	LB4	0.80	29/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	96.9
14	89.3
10	82.1
6.3	71.7
5	67.6
3.35	63.3
2	56.0
1.18	50.2
0.6	43.4
0.425	40.1
0.3	35.3
0.212	30.6
0.15	26.3
0.063	18.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue	Certificate No.	Signed	Name	Page
31/02/2019	ISD/NW/1560/TP124/LB4/0.80			Page 1 of 1

Client	Contract Title	AEG Contract No.
Far East Consortium International Limited	Northern Galway	NW1560

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

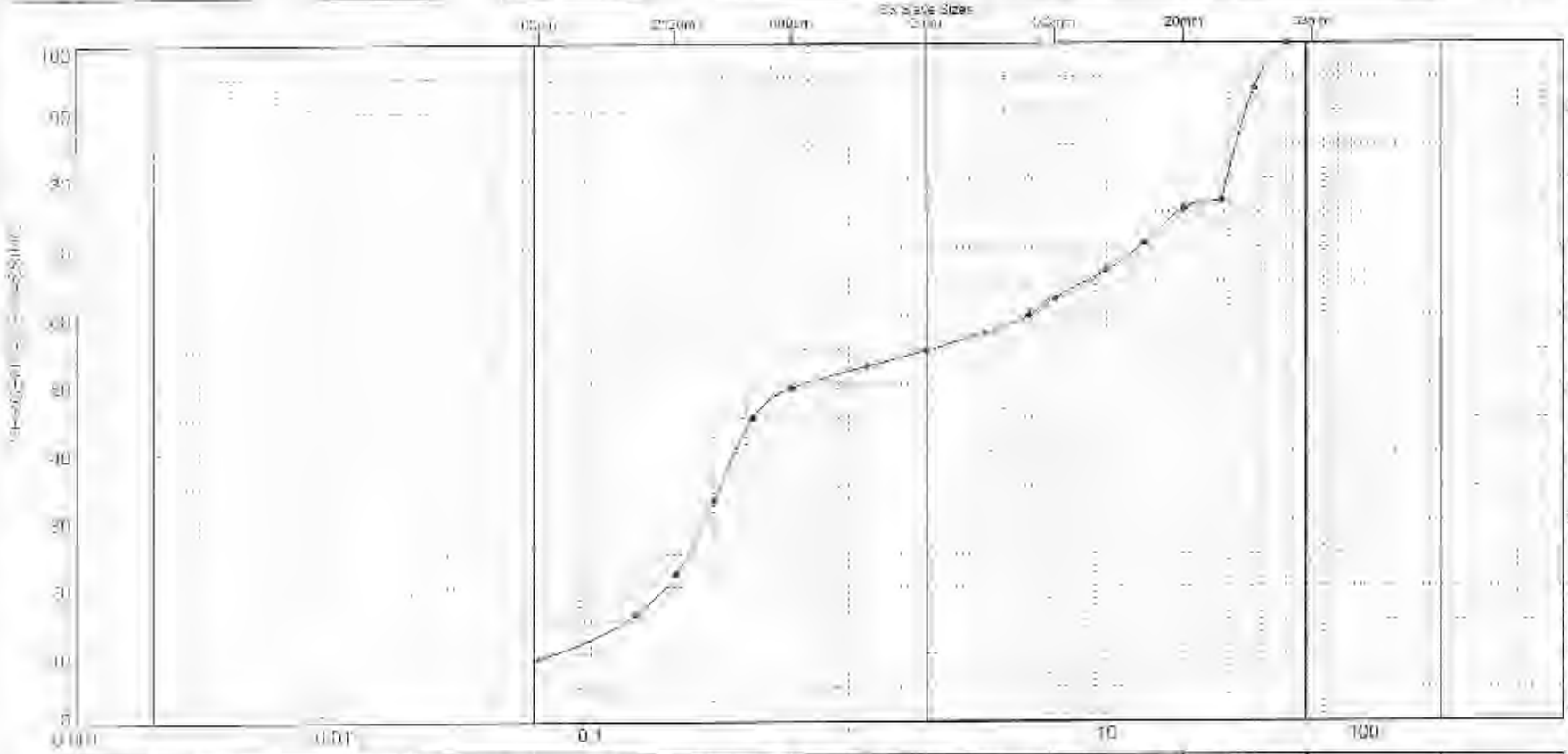
Head Office: Unit 7, Perth Oil Industrial Estate, 40 Dunsinane Avenue, Dundee, DD2 3QN. Tel: 01382 390 400 Fax: 01382 390 401
National Office: Unit 20, Inverness Business Park, Inverness, IV2 3QN. Tel: 01463 730 300 Fax: 01463 730 301

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- WS102	Depth (m) :- 1.20	Sample Type & No :- U7	Specific Depth (m) :- 1.20	Date Tested :- 30/01/2019



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieve Size (mm)	Passing (%)
50	100.0
37.5	98.3
28	78.7
20	76.8
14	76.8
10	66.6
6.3	62.5
5	60.0
3.35	57.4
2	54.9
1.18	52.6
0.6	49.4
0.425	46.1
0.3	33.0
0.212	21.9
0.15	16.0
0.063	9.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
13/02/2019	PSD/NW1580/WS102/U7/ SI			

Client :-	Contract Title :-	AEG Contract No :-
For East Consortium (Renewables) Limited	Northern Gateway	NW1580

UKAS TESTING 1367

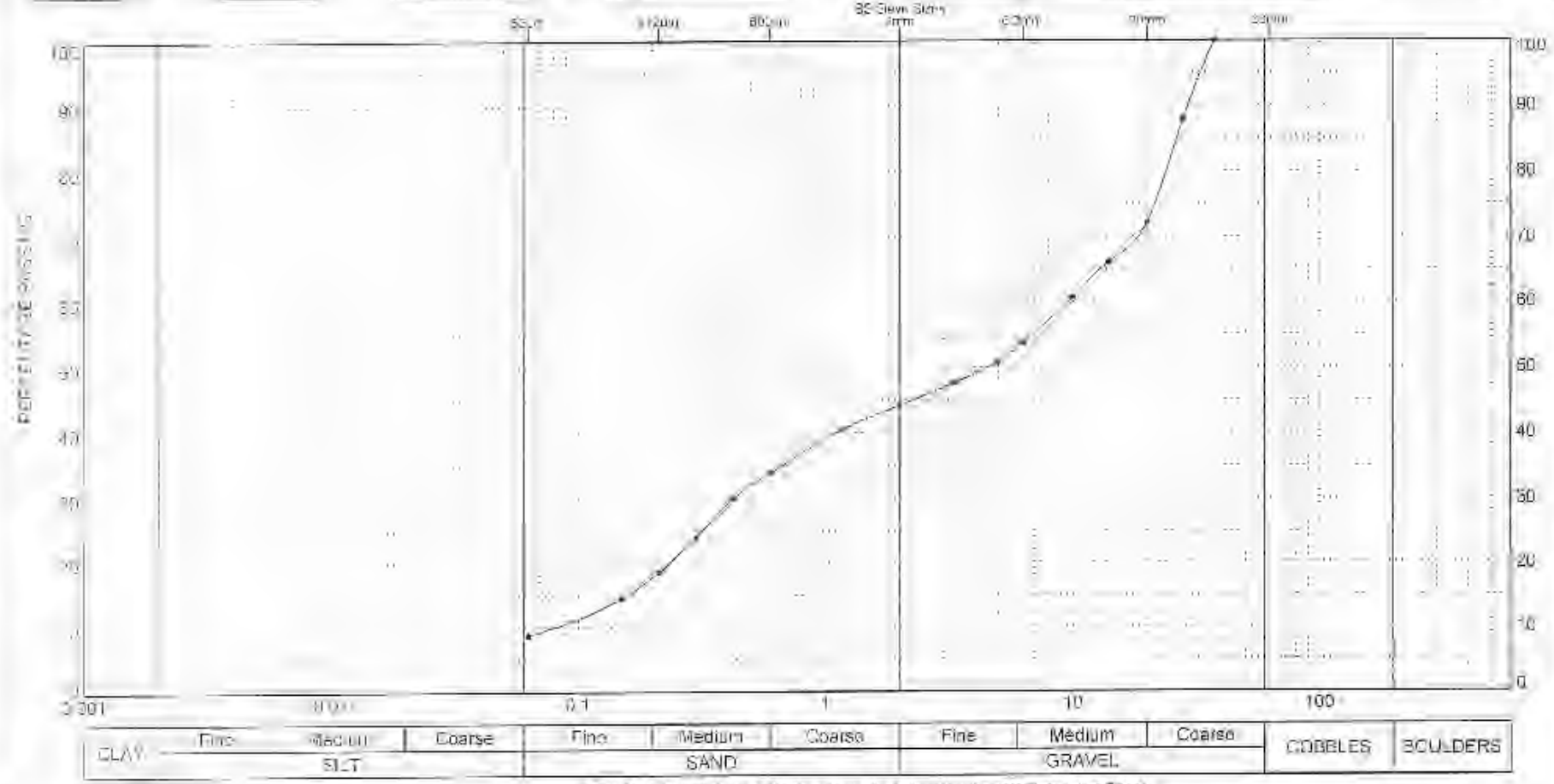
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 2 Caldera Park, Lancaster Road, Preston PR2 5RA - Tel: 01772 457 400 Fax: 01772 457 401
Regional Office: Unit 2, Kelvin Close, Birchwood Science Park North, Warrington, Cheshire, WA3 7PB - Tel: 01925 830 500 Fax: 01925 830 501

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No. : WS104	Depth (m) : 1.20	Sample Type & No. : U8	Specific Depth (m) : 1.20	Date Tested :- 30/01/2019



Sieve Size (mm)	Passing (%)
37.5	100.0
28	88.0
20	72.2
14	66.1
10	60.7
6.3	53.8
5	50.9
3.35	47.7
2	44.2
1.18	40.6
0.6	34.0
0.425	30.1
0.3	24.1
0.212	18.5
0.15	14.5
0.063	8.7

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue: 1/02/2019	Certificate No. :- PSD/NW1580/WS104/U8/1.20	Signed:	Name :-	Page 1 of 1
Client: Far East Consortium International Limited	Contract Title :- Northern Gateway			AES Contract No :- NW1580

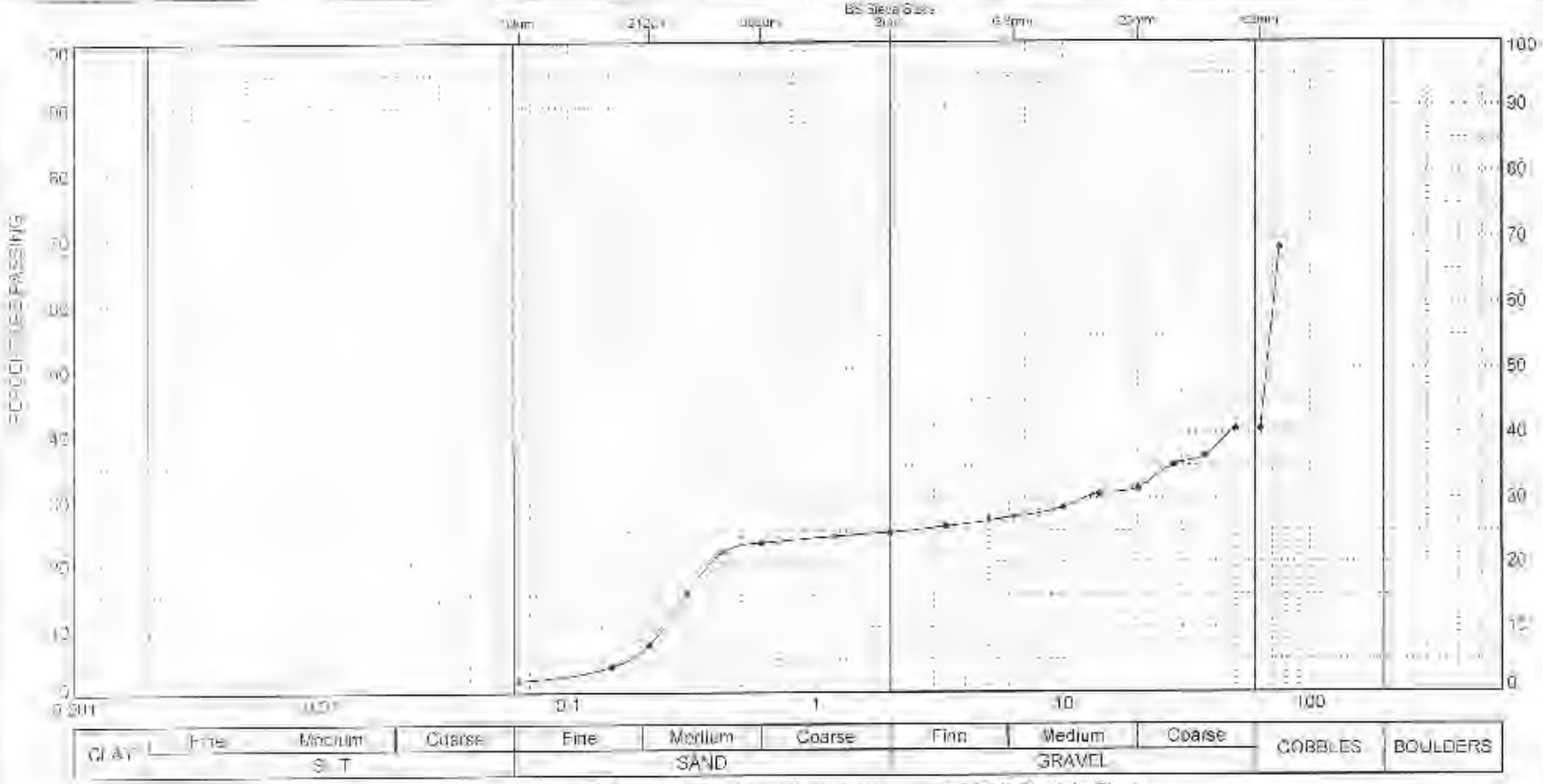
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory hole No :- WS105 | Depth (m) :- 0.50 | Sample Type & No :- B5 | Specific Depth (m) :- 0.50 | Date Tested :- 29/01/2019



Sieve Size (mm)	Passing (%)
75	68.3
63	40.5
50	40.6
37.5	36.5
28	35.1
20	31.5
14	30.7
10	28.6
5.2	27.1
5	26.5
3.35	25.7
2	24.8
1.18	24.2
0.6	23.2
0.425	21.7
0.3	19.2
0.212	14.3
0.15	4.0
0.063	1.7

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 30/01/2019	Certificate No :- PSD/NW1580/WS105/B5/0.50	Signed :-	Name :-
Client :- Far East Consulting International Limited	Contract Title :- Northern Gateway		AEG Contract No :- NW1580

Page 1 of 1

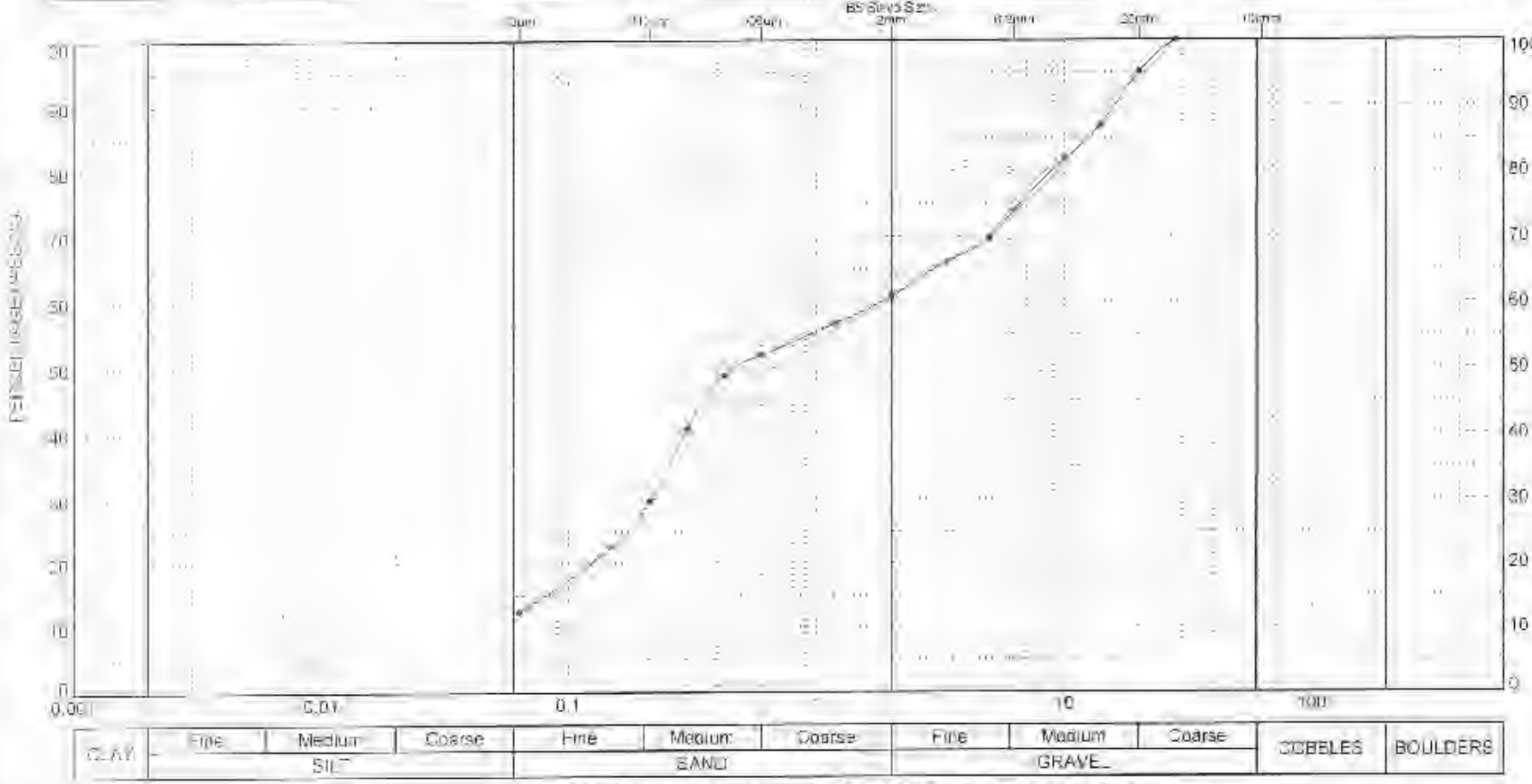
UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- WS105A	Depth (m) :- 2.20	Sample Type & No :- D11	Specific Depth (m) :- 2.20	Date Tested :- 30/01/2019



Sieve Size (mm)	Passing (%)
28	100.0
20	96.1
14	87.0
10	81.7
6.3	74.0
5	69.8
3.35	66.1
2	60.8
1.18	56.7
0.6	51.9
0.425	48.9
0.3	46.0
0.212	29.7
0.15	22.7
0.063	12.4

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 13/02/2019	Certificate No :- PSD/NW1580/WS105A/U11/P 20	Signed :-	Name	Page 1 of 1
Client :- Far East Consortium International Limited		Contract Title :- Northern Gateway		AEC Contract No :- NW1580

UKAS TESTING 1367

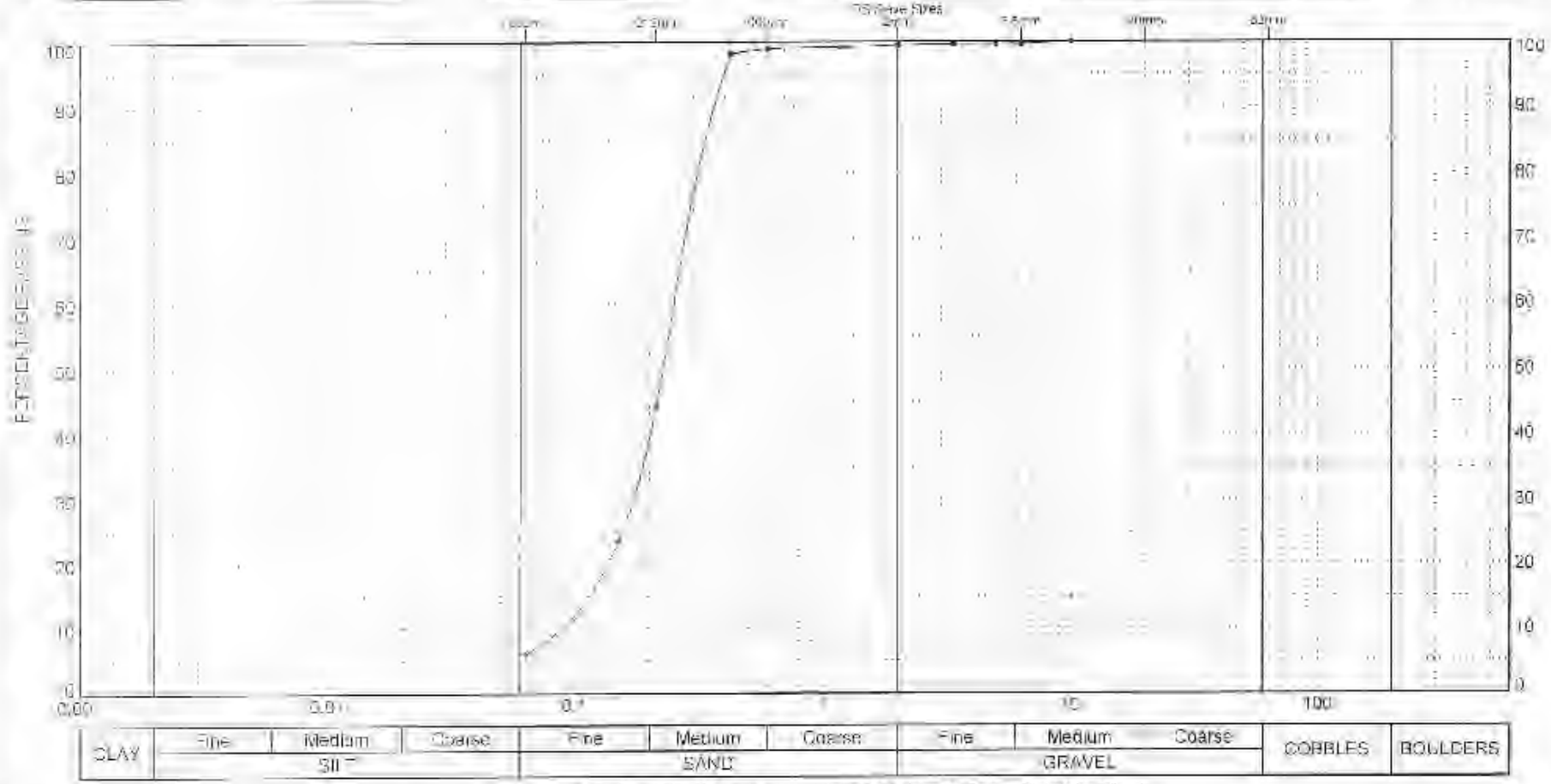
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 21 Seskinore Industrial Estate, Turnhill Road, Clogher, Co. Tyrone, BT76 0QG. Tel: (028) 3948 9700 Fax: (028) 3948 9712
Registered Office: Unit 19 Business Development Centre, Lower Dargan Road, Belfast, BT3 9LJ. Tel: (028) 9078 1500 Fax: (028) 9078 1501

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- WS105A	Depth (m) :- 4.20	Sample Type & No :- U15	Specific Depth (m) :- 4.20	Date Tested :- 30/01/2019



Sieve Size (mm)	Passing (%)
10	100.0
6.3	99.5
5	99.5
3.35	99.5
2	99.4
1.18	99.1
0.6	98.8
0.425	98.1
0.3	77.1
0.212	44.1
0.15	28.5
0.063	5.0

For description of sample please refer to the Laboratory Sample Description Sheet

Date of Issue :- 13/02/2019	Certificate No :- PSD/NW1580/WS105A/U15/4.20	Signed :-	Name :-	Page 1 of 1
Client :- Far East Consortium International Limited	Contract Title :- Northern Gateway			AEC Contract No :- NW1580

UKAS TESTING 1367

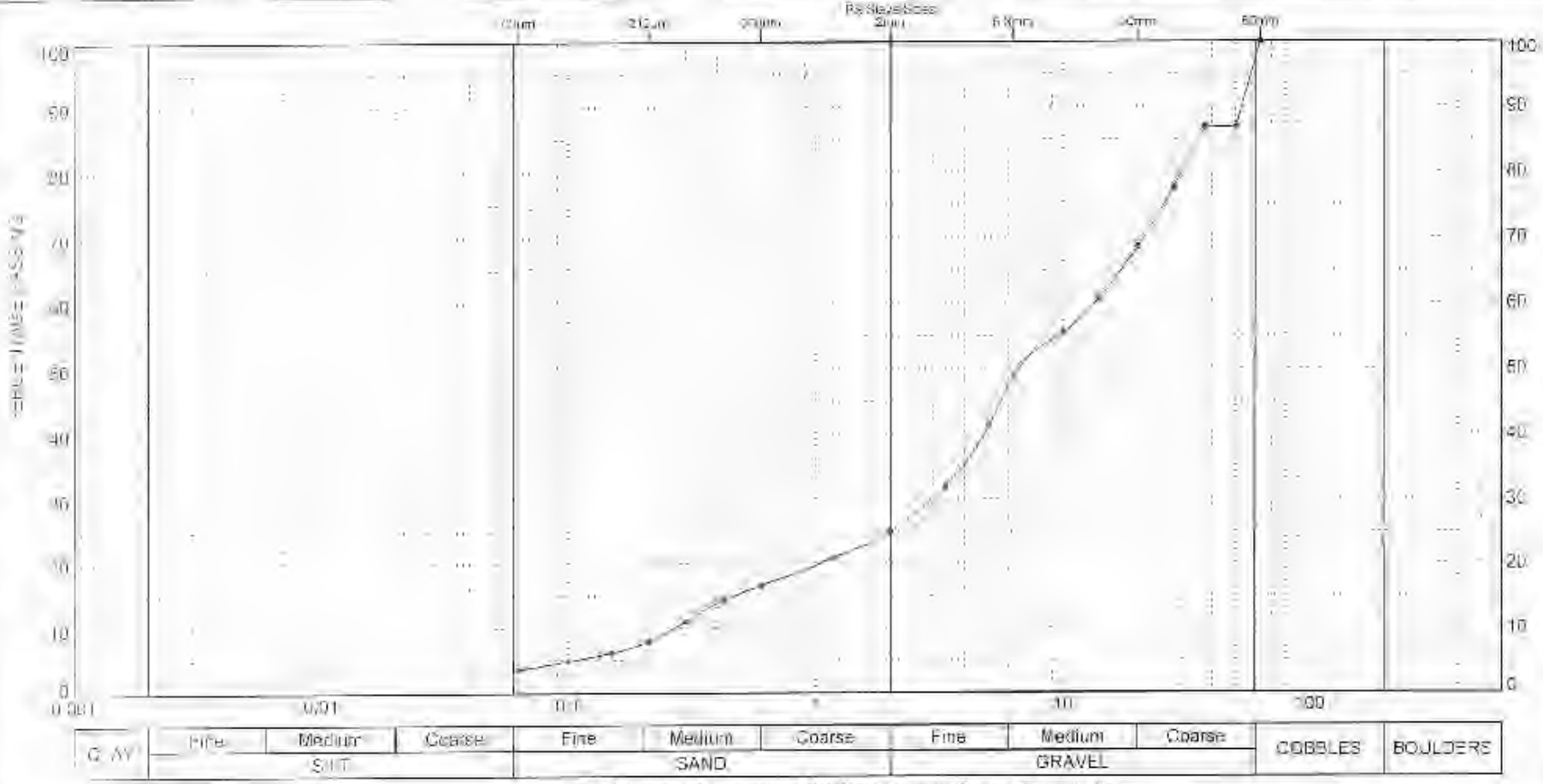
ALLIED EXPLORATION & GEOTECHNICS LIMITED

Hong Kong Office: ... Tel: ... Fax: ...
Kowloon Office: ... Tel: ... Fax: ...

PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No : WS105	Depth (m) : 1.20	Sample Type & No : U7	Specific Depth (m) : 1.20	Date Tested : 30/01/2019



Sieve Size (mm)	Passing (%)
63	100.0
50	88.8
37.5	88.8
28	77.6
20	68.6
14	60.8
10	55.5
6.3	49.8
5	41.2
3.35	32.1
2	25.1
1.18	20.8
0.6	16.5
0.425	14.3
0.3	11.1
0.212	8.0
0.15	6.2
0.063	3.7

For description of samples please refer to the Laboratory Sample Description Sheet

Date of Issue: 11/02/2019	Certificate No : PSD/NW1580/WS105/U7/1.20	Signed :	Name :	Page 1 of 1
Client: Far East Consortium International Limited	Contract Title : Northern Gateway			AEG Contract No : NW1580

UKAS TESTING 1367

LABORATORY TESTING ENCLOSURE 5

Determination of Loss on Ignition, Organic Content, Total Sulphur, Total Sulphur, Sulphate and pH (Tested Externally)

Certificate of Analysis

Certificate Number 19-01940 11-Feb-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-01940
Client Reference NW1580
Order No LA2130
Contract Title Northern Gateway
Description 38 Soil Samples
Date Received 01-Feb-19
Date Started 01-Feb-19
Date Completed 11-Feb-19
Test Procedures Identified by prefix DETSn (details on request)

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

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref: 19-01940
Client Ref: NW1580
Contract Title: Northern Gateway

	Lab No	1454160	1454161	1454162	1454163	1454164	1454165	1454166	1454167	1454168	1454169	1454170
	Sample ID	BH101	BH101	BH102	BH103	BH103	BH104	BH104	BH105	BH107	BH107	BH107
	Depth	1.00	4.00	2.00	0.50	3.00	1.50	4.50	0.60	0.20	1.50	3.10
	Other ID	5	17	6	3	23	8	16	2	5	7	13
	Sample Type	B	B	B	B	B	B	B	B	B	B	B
	Sampling Date	03/01/19	03/01/19	03/01/19	04/01/19	07/01/19	04/01/19	04/01/19	04/01/19	04/01/19	03/01/19	03/01/19
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**									
Inorganics												
Loss on Ignition at 440oC	CETSC 2003#	0.01	%				5.0					
pH	CETSC 2008#				8.3	8.2	7.9	8.4	7.2	8.2	8.3	7.9	8.6
Organic matter	CETSC 2003#	0.1	%	8.3		1.5						2.6	
Soluble Aqueous Extract SO4	CETSC 2076#	10	mg/l		22	47	530	38	590	72	86	210	36
Sulphur as S, Total	CETSC 2320	0.01	%					<0.01					<0.01
Sulphate as SO4, total	CETSC 2320	0.01	%					0.02					0.02

Summary of Chemical Analysis
Soil Samples

Our Ref 19 0190
Client Ref NW1580
Contact Info Northern Gateway

Test	Method	LOD	Units	Lab No	1454171	1454172	1454173	1454174	1454175	1454176	1454177	1454178	1454179	1454180	1454181
				Sample ID	BH109	BH110	BH110	BH112	TP102	TP102	TP102	TP104	TP105	TP109	TP111
				Depth	0.40	0.60	0.10	0.60	0.50	1.00	1.00	0.20	1.20	0.10	1.20
				Other ID	3	4	5	3	3	7	8	7	4	2	4
				Sample Type	B	J	B	B	LB		TB	J	-	J	-
				Sampling Date	09/01/19	09/01/19	10/01/19	10/01/19	08/01/19	08/01/19	08/01/19	08/01/19	08/01/19	04/01/19	07/01/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Inorganics															
Loss on Ignition at 440oC	DETSC 2003#	0.01	%												
pH	DETSC 2008#			11.1		8.9	8.4	8.5		8.4		8.0	11.7		
Organic matter	DETSC 2002#	0.1	%	2.9	3.9				0.6		1.7				0.3
Sulphate Aqueous Extract as SO4	DETSC 2075#	10	mg/l	240		150	70	31		20		54	51		
Sulphur as S Total	DETSC 2320	0.01	%												
sulphate as SO4, Total	DETSC 2321#	0.01	%												

Summary of Chemical Analysis
Soil Samples

Our Ref 19-01940
Client Ref NW1580
Contract Title Northern Gateway

	Lab No	1454182	1454183	1454184	1454185	1454186	1454187	1454188	1454189	1454190	1454191	1454192
	Sample ID	TP112	TP112	TP115	TP119	TP120	TP125	WS101	WS101	WS102	WS103	WS103
	Depth	1.10	2.10	1.10	1.50	1.20	0.50	0.50	1.30	1.20	1.20	3.70
	Other ID		7	4	6	6	3	2	6	7	3	9
	Sample Type	B	B	B	B	B	B	B	B	B	B	B
	Sampling Date	07/01/19	07/01/19	07/01/19	09/01/19	09/01/19	10/01/19	06/01/19	08/01/19	07/01/19	07/01/19	07/01/19
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units									
Inorganics												
Loss on ignition at 440oC	DETSC 2003#	0.01	%				14					
pH	DETSC 2008#			8.6		7.4	10.1	10.6	7.9		8.7	
Organic matter	DETSC 3002#	0.1	%		7.9	10	9.8		2.4	1.4	1.3	0.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	320		180	1700	1600	42		670	
Sulphur as S, Total	DETSC 2320	0.01	%									
Sulphate as SO4, Total	DETSC 2321#	0.01	%									

Summary of Chemical Analysis
Soil Samples

Our Ref 19 01940
Client Ref NW1550
Contract Title Northern Gateway

			Lab No	1454193	1454194	1454195	1454196	1454197
			Sample ID	WS104	WS104	WS105	WS105A	WS106
			Depth	0.20	1.20	0.30	1.20	2.20
			Other ID	2	8	5	9	9
			Sample Type	D	D	B	D	D
			Sampling Date	08/01/19	08/01/19	10/01/19	10/01/19	08/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units					
Inorganics								
Loss on Ignition at 440oC	DETSC 2003#	0.01	%					3.9
pH	DETSC 2008#			8.5	8.4	11.2	7.0	8.9
Organic matter	DETSC 2030	0.1	%		7.0		2.3	4.3
Sulphate Aqueous Extract as SO4	DETSC 2075#	10	mg/l	82	120	65	450	85
Sulphur as S, Total	DETSC 2320	0.01	%					
Sulphate as SO4, Total	DETSC 2321#	0.01	%					

(n/s = MCERTS accredited sample not received as per the MCERTS spec; n/a = not applicable)

Information in Support of the Analytical Results

Our Ref 19 01940
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1454180	TP101 0.00 SOIL	03/01/19	PT 500ml	Organic Matter (Manual) (28 days)	
1454181	TP101 0.50 SOIL	03/01/19	PT 500ml	pH + Conductivity (7 days)	
1454182	TP102 0.50 SOIL	03/01/19	PT 500ml	Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
1454183	BH101 0.50 SOIL	04/01/19	PT 500ml	pH + Conductivity (7 days)	
1454184	BH101 3.00 SOIL	04/01/19	PT 500ml	pH + Conductivity (7 days)	
1454185	BH101 4.50 SOIL	04/01/19	PT 1L	pH + Conductivity (7 days)	
1454186	BH104 0.50 SOIL	04/01/19	PT 500ml	pH + Conductivity (7 days)	
1454187	BH105 0.60 SOIL	04/01/19	PT 1L	pH + Conductivity (7 days)	
1454188	BH107 0.20 SOIL	04/01/19	PT 500ml	pH + Conductivity (7 days)	
1454189	BH107 1.50 SOIL	09/01/19	PT 1L		
1454190	BH107 3.10 SOIL	09/01/19	PT 500ml	pH + Conductivity (7 days)	
1454191	BH109 0.40 SOIL	09/01/19	PT 500ml	pH + Conductivity (7 days)	
1454192	BH110 1.60 SOIL	10/01/19	PT 500ml		
1454193	BH111 0.50 SOIL	10/01/19	PT 1L	pH + Conductivity (7 days)	
1454194	BH112 0.60 SOIL	10/01/19	PT 1L	pH + Conductivity (7 days)	
1454195	TP102 0.30 SOIL	03/01/19	PT 1L	pH + Conductivity (7 days)	
1454176	TP101 0.40 SOIL	03/01/19	PT 500ml	Organic Matter (Manual) (28 days)	
1454177	TP102 1.80 SOIL	03/01/19	PT 1L	pH + Conductivity (7 days)	
1454178	TP104 1.20 SOIL	03/01/19	PT 500ml	Organic Matter (Manual) (28 days)	
1454179	TP105 1.10 SOIL	03/01/19	PT 500ml	pH + Conductivity (7 days)	
1454180	TP109 1.10 SOIL	04/01/19	PT 500ml	pH + Conductivity (7 days)	
1454181	TP111 1.20 SOIL	07/01/19	PT 500ml		
1454182	TP112 1.10 SOIL	07/01/19	PT 500ml	pH + Conductivity (7 days)	
1454183	TP113 1.10 SOIL	07/01/19	PT 500ml		
1454184	TP114 1.10 SOIL	07/01/19	PT 500ml	pH + Conductivity (7 days)	
1454185	TP114 1.60 SOIL	09/01/19	PT 500ml	pH + Conductivity (7 days)	
1454186	TP115 1.20 SOIL	09/01/19	NC		
1454187	TP125 0.50 SOIL	10/01/19	PE	pH + Conductivity (7 days)	
1454188	WS101 0.50 SOIL	08/01/19	PT 500ml	pH + Conductivity (7 days)	
1454189	WS101 1.20 SOIL	08/01/19	PT 500ml		
1454190	WS102 1.20 SOIL	07/01/19	PT 500ml	pH + Conductivity (7 days)	
1454191	WS103 0.50 SOIL	07/01/19	PT 500ml		
1454192	WS103 3.20 SOIL	07/01/19	PT 500ml		
1454193	WS104 0.20 SOIL	08/01/19	PE	pH + Conductivity (7 days)	
1454194	WS104 1.20 SOIL	08/01/19	PT 500ml	pH + Conductivity (7 days)	
1454195	WS105 0.50 SOIL	07/01/19	PT 1L	pH + Conductivity (7 days)	
1454196	WS105 1.50 SOIL	10/01/19	PT 500ml	pH + Conductivity (7 days)	
1454197	WS106 1.20 SOIL	07/01/19	PT 1L	pH + Conductivity (7 days)	

Key: P=Plastic T=Tub G=Jar

All samples were received in accordance with the procedure detailed in our terms and conditions document unless detailed in the table above. Soil samples are scheduled for analysis based on BRE Special Digest 1 2005 and Environmental Guidance for Hazardous Waste Landfill Waste Acceptance Procedures and Criteria 2nd Edition August 2015. Where samples are received in containers not listed in the above table, the container is deemed suitable for the requested analysis. Where samples are received in containers that are not appropriate for the requested analysis, the results may be affected and will be reported with comments. Where samples are received in containers that have a specific holding time, this may be exceeded due to sampling to analysis requirements.

Information in Support of the Analytical Results

Our Ref 19-01940
Client Ref NW1580
Contract Northern Gateway

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 42mm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/- 2°C.

Disposal

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

Determination of Dry Density/Moisture Relationship

LABORATORY TESTING ENCLOSURE 6

ALLIED EXPLORATION & GEOTECHNICS LIMITED

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP
BS 1377 : Part 4 : 1990

Specimen Identification

Exploratory Hole No. : TP103 Depth (m) : 1.50 Sample Type & No : B10

Test Method 2.5kg Compaction Single Sample

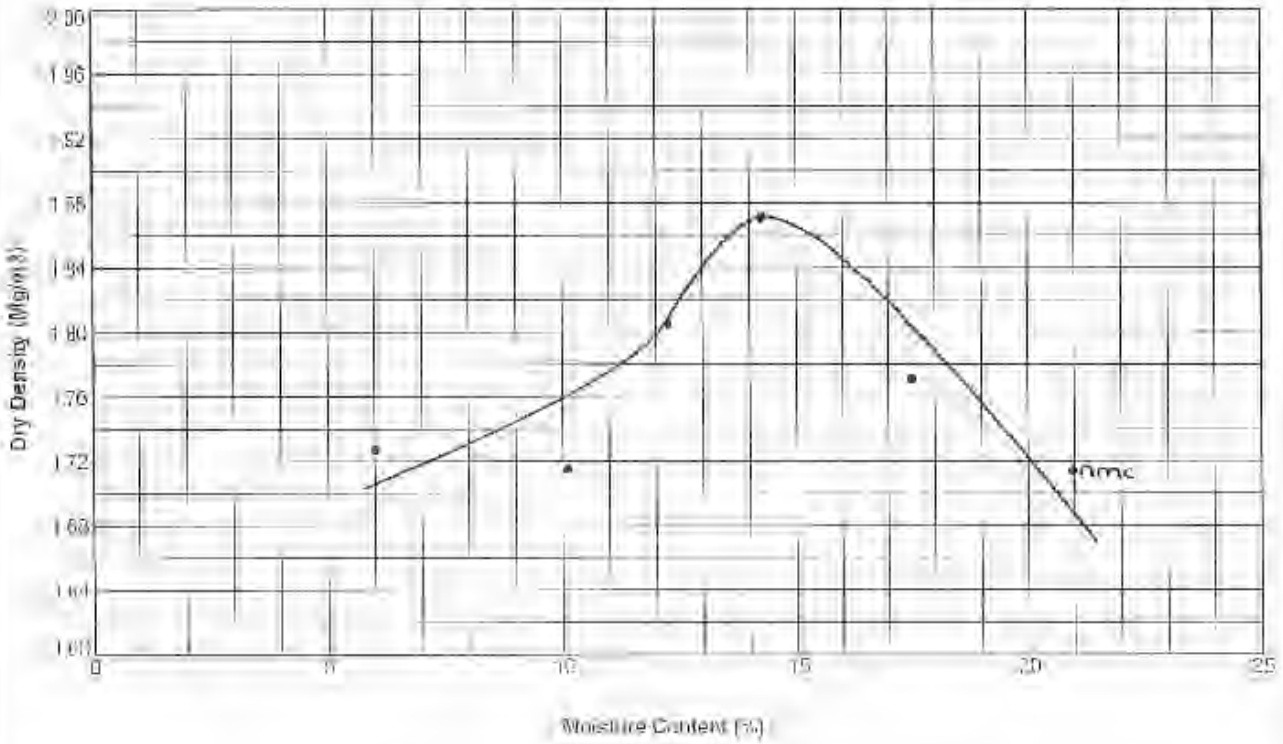
Test Results

Optimum Moisture Content (%) = 14.3 Particle Density (Assumed) = 2.70

Maximum Dry Density (Mg/m3) = 1.87 Retained on 20mm Sieve (%) = 0.8

Date Tested = 25/02/2019 Retained on 37.5mm Sieve (%) = 0.0

Remarks :



For description of samples please refer to the accompanying Sample Description Sheet

Client :
Northern Gateway

Client :
For Esel Consortium International Limited

Approved :

Date :

Checked :

Job No :
NW1580

UKAS TESTING
1397

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Registered Office: [illegible]

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 Part 4 : 1990

Specimen Identification

Exploratory Hole No :- TP111 Depth (m) = 0.80 Sample Type & No :- LB3

Test Method Vibro Hammer Compaction Separate Samples

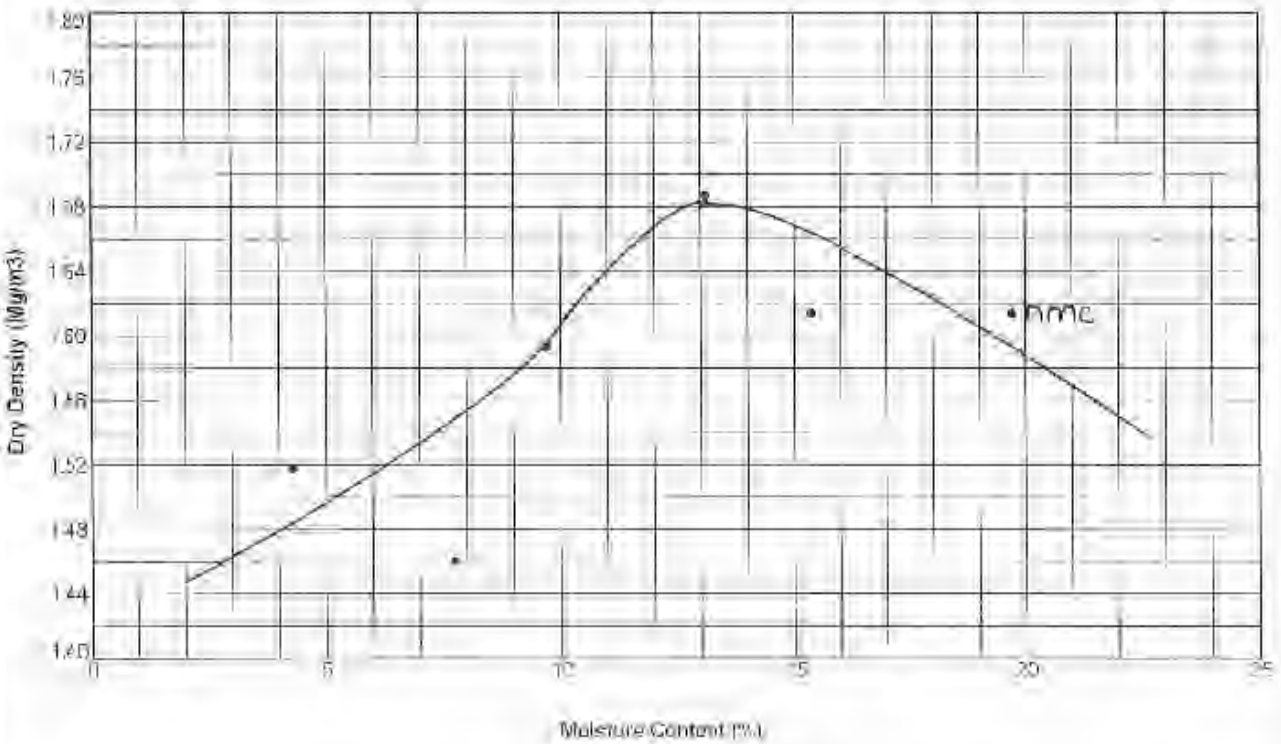
Test Results

Optimum Moisture Content (%) = 14.0 Particle Density (Assumed) = 2.50

Maximum Dry Density (Mg/m3) = 1.69 Retained on 20mm Sieve (%) = 17.0

Date Tested = 28/02/2019 Retained on 37.5mm Sieve (%) = 7.2

Remarks :



For description of sample please refer to accompanying Sample Description Sheet

Contract Title :- Northern Gateway

Client :- For East Consortium International Limited

Signed :- [signature]

Date :- 01/03/2019

Name :-

Checked by :- [illegible]

Reg No :-

Our Contract No :- NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 Part 4 1990

Specimen Identification

Exploratory Hole No – **TP121** Depth (m) :- **0.80** Sample Type & No – **LB3**

Test Method 2.5kg Compaction Single Sample

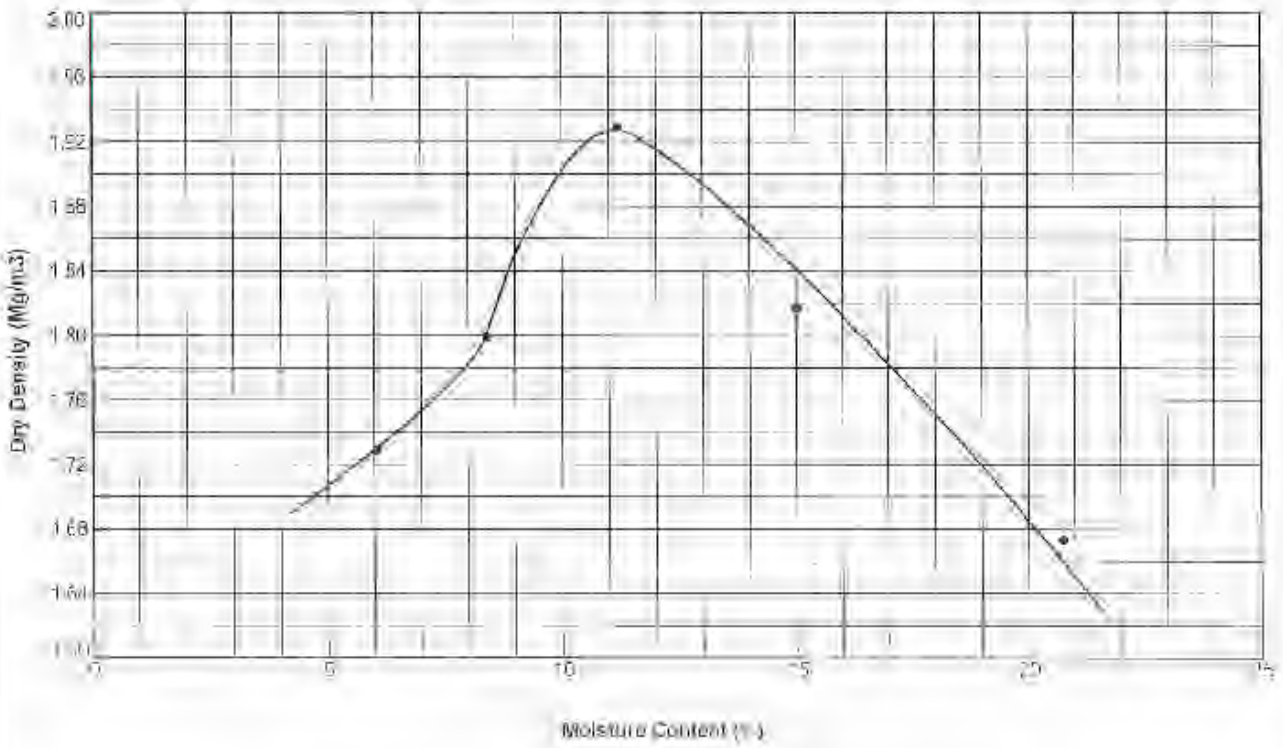
Test Results

Optimum Moisture Content (%) = **11.2** Particle Density (Assumed) = **2.65**

Maximum Dry Density (Mg/m3) = **1.93** Retained on 20mm Sieve (%) = **7.0**

Date Tested = **25/02/2019** Retained on 37.5mm Sieve (%) = **2.0**

Remarks :



For description of soil type please refer to the Exploratory Hole Record sheet

Contract Title :- Northern Gateway

Client :- For East Midlands International Limited

Date of Issue Certificate No NW1580

LABORATORY TESTING ENCLOSURE 7

Determination of MCV/Moisture Relationship

Certificate No:	NW1580 TP103 B10 1.50m	Sheet 1 of 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell
Chester-le-Street , Co Durham DH2 2RG
a UKAS Testing Laboratory No 1367

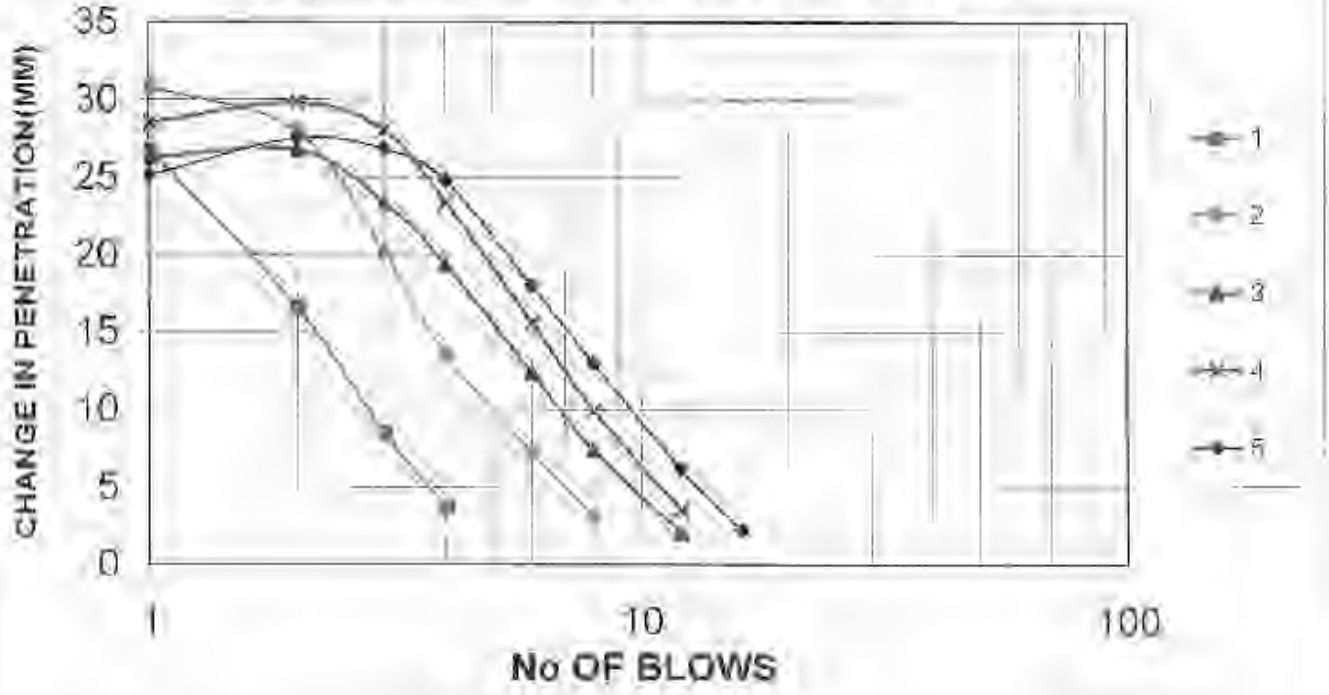
UKAS TESTING No. 1367

MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

SITE:	Northern Gateway	**JOB No:**	NW1580
CLIENT:	Far East Consortium International Limited	**Depth:**	1.50m
Sample No:	TP103 B10	**Specific Depth:**	N/A

For sample description please refer to sample description sheet.

CHANGE IN PENETRATION PLOT



Sample	1	2 (NAT)	3	4	5
MCV	5.7	8.4	9.8	10.4	11.2
M.C.(%)	22.5	21.0	18.6	17.6	16.8
MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION					

Remarks: 0.8% Retained on 20mm sieve

DATE TESTED:	31/01/2019	DATE OF ISSUE:	12/02/2019
APPROVED BY		NAME:	Michelle Selkirk

Certificate No:	NW1580 TP103 B10 1.50m	Sheet 2 of 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell
Chester-le-Street , Co Durham DH2 2RJ
a UKAS Testing Laboratory No 1367

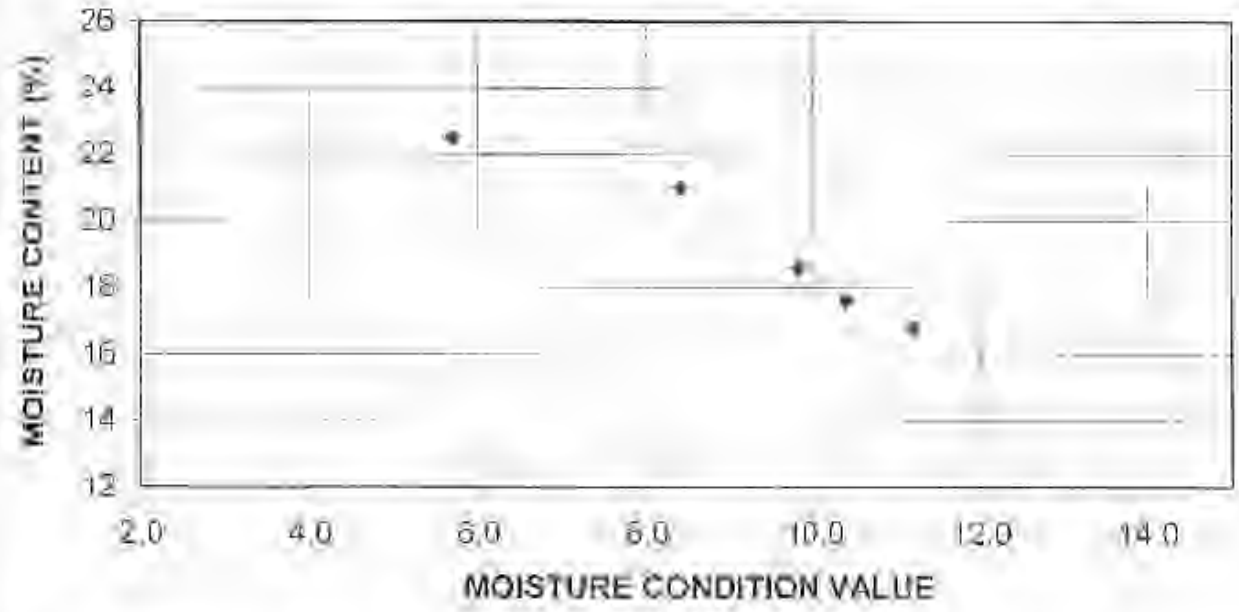
UKAS TESTING No. 1367

MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

SITE:	Northern Gateway	JOB No:	NW1580
CLIENT:	Far East Consortium International Limited	Depth:	1.50m
Sample No:	TP103 B10	Specific Depth:	N/A

For sample description please refer to sample description sheet.

CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	5.7	8.4	9.8	10.4	11.2
M.C.(%)	22.5	21	18.6	17.6	16.8

MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION

INTERCEPT (MC% AXIS)	28.9	REMARKS:
SLOPE	-1.060	
SENSITIVITY (1/SLOPE)	-0.661	

DATE TESTED: 11/02/2019 DATE OF ISSUE: 12/02/2019

APPROVED BY: MSand NAME: Michelle Selkirk

Certificate No:	NW1580 TP111/112 LB3 0.80m	Sheet 1 of 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell
Chester-le-Street , Co Durham DH2 2RG
a UKAS Testing Laboratory No.1367

MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

No. 1367

SITE:	Northern Gateway	JOB No:	NW/1580
CLIENT:	Far East Consortium International Limited	Depth:	0.80m
Sample No:	TP111/112 LB3	Specific Depth:	N/A

For sample description please refer to sample description sheet.

CHANGE IN PENETRATION PLOT



Sample	1	2	3	4	5 (NAT)
MCV	4.4	5.4	11.4	11.8	16.2
M.C.(%)	14.4	13.8	11.8	11.5	9.9
MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION					

Remarks: 8.5% Retained on 20mm sieve.

DATE TESTED: 06/02/2019 DATE OF ISSUE: 11/02/2019

APPROVED BY: NAME: Michelle Selkirk

Certificate No:	NW1550 TP111/112 LB3 0.80m	Sheet 2 of 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate Pelton Fell
Chester-le-Street , Co Durham DH2 2RJ
a UKAS Testing Laboratory No 1367

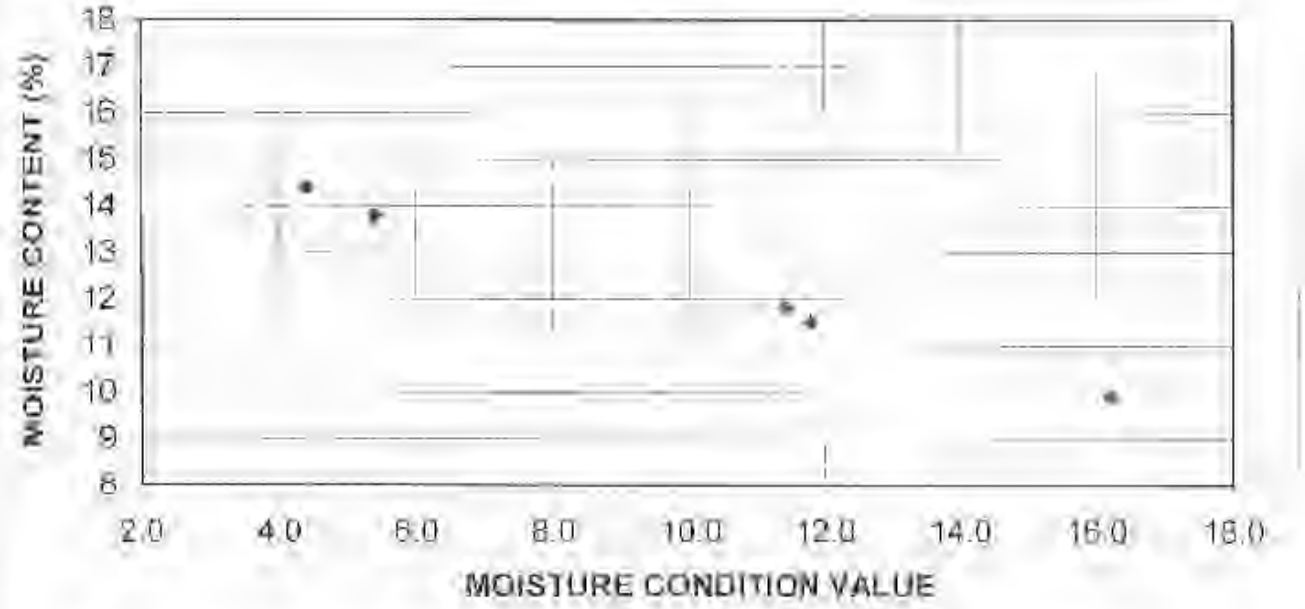
UKAS TESTING No. 1367

MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

SITE:	Northern Gateway	JOB No.	NW1550
CLIENT:	Far East Consortium International Limited	Depth:	0.80m
Sample No:	TP111/112 LB3	Specific Depth:	N/A

For sample description please refer to sample description sheet.

CALIBRATION LINE



Sample	1	2	3	4	5 (NAT)
MCV	4.4	5.4	11.4	11.8	16.2
M.C.(%)	14.4	13.8	11.6	11.5	9.9

MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION

INTERCEPT (MC% AXIS)	15.94	REMARKS:
SLOPE	-0.372	
SENSITIVITY (1/SLOPE)	-2.688	

DATE TESTED: 03/12/2019 DATE OF ISSUE: 10/12/2019

APPROVED BY: MSOW NAME: Michelle Selkirk

Certificate No:	NW1580 TP121/122 LB3 0.80m	Sheet 1 of 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell
Chester-le-Street Co Durham DH2 2RG
a UKAS Testing Laboratory No. 1367

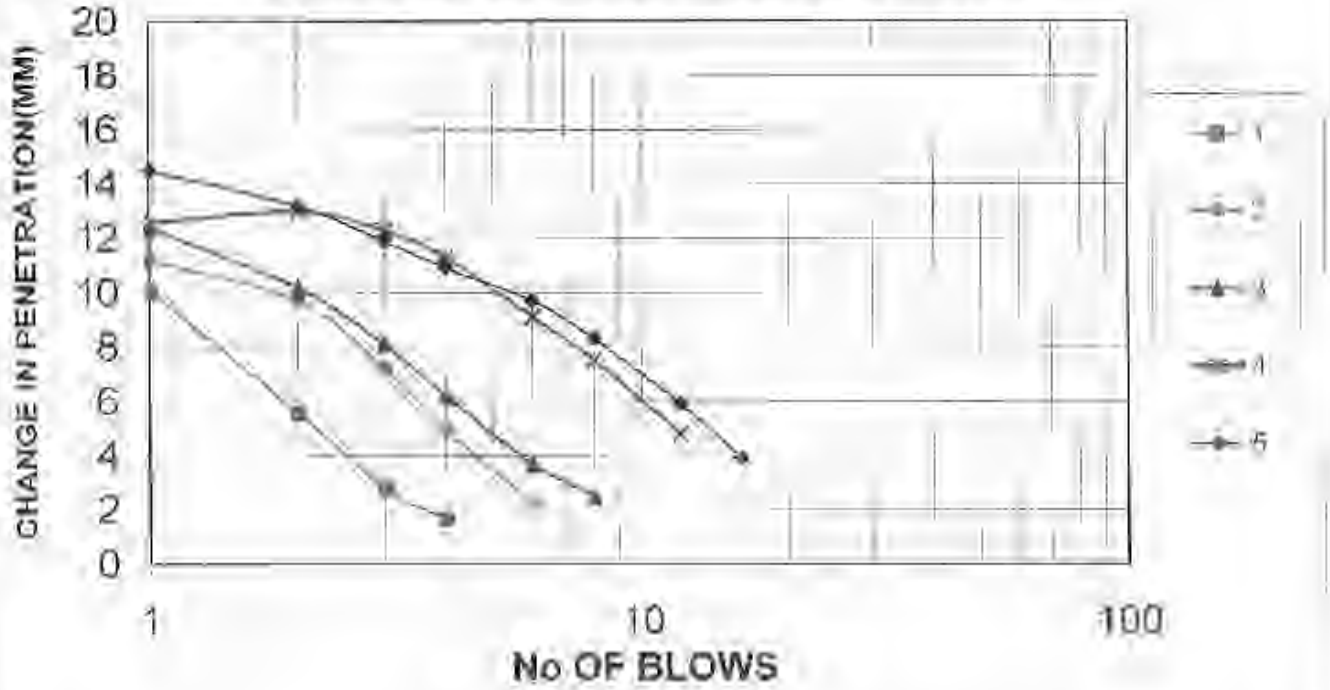
UKAS TESTING
No. 1367

MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

SITE:	Northern Gateway	JOB No:	NW1580
CLIENT:	Far East Consortium International Limited	Depth:	0.80m
Sample No:	TP121/122 LB3	Specific Depth:	N/A

For sample description please refer to sample description sheet.

CHANGE IN PENETRATION PLOT



Sample	1	2 (NAT)	3	4	5
MCV	3.5	5.9	6.8	10.7	11.1
M.C.(%)	21.6	20.1	17.0	16.0	15.7
MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION					

Remarks: 13.0% Retained on 20mm sieve.

DATE TESTED:	01/03/2019	DATE OF ISSUE:	12/03/2019
APPROVED BY:		NAME:	Michelle Selkirk

Certificate No:	NW1680 TP121/122 LB3 0.80m	Sheet 2 of 2

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate Pelton Fell
Chester-le-Street , Co Durham DH2 2RJ
a UKAS Testing Laboratory No 1367

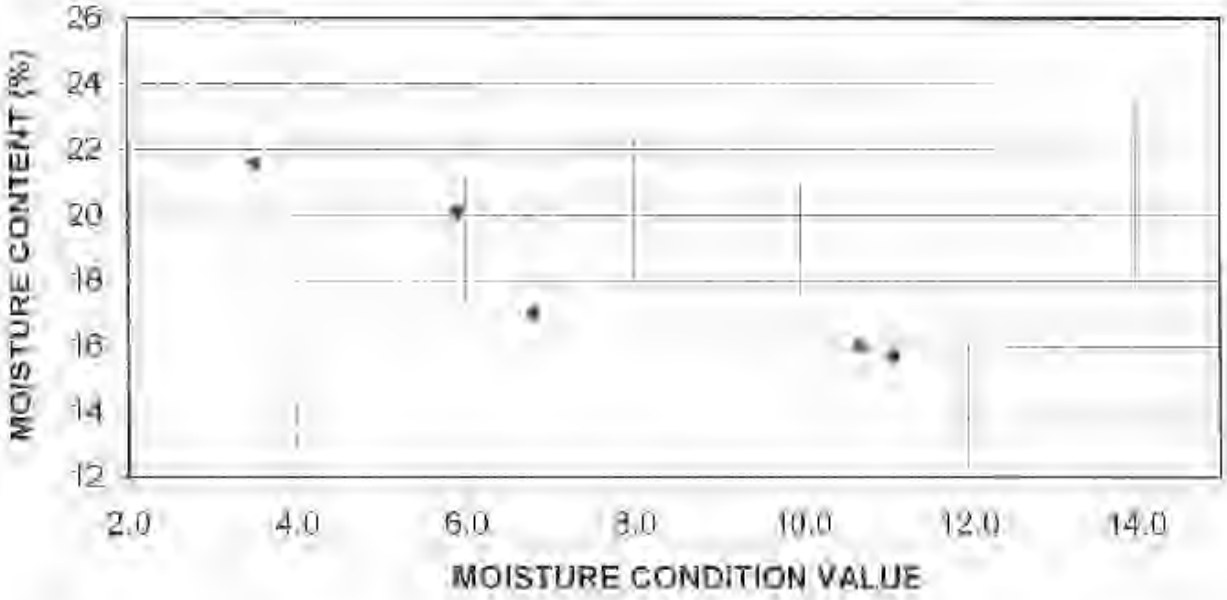
UKAS TESTING No. 1367

MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

SITE:	Northern Gateway	JOB No:	NW1680
CLIENT:	Far East Consortium International Limited	Depth:	0.80m
Sample No:	TP121/122 LB3	Specific Depth:	N/A

For sample description please refer to sample description sheet.

CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	3.5	5.9	6.8	10.7	11.1
M.C.(%)	21.6	20.1	17.0	16.0	15.7
MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION					
INTERCEPT (MC% AXIS)			23.80	REMARKS:	
SLOPE			-0.763		
SENSITIVITY (1/SLOPE)			-1.328		

DATE TESTED: 01/02/2019 DATE OF ISSUE: 13/02/2019

APPROVED BY: NAME: Michelle Selkirk

LABORATORY TESTING ENCLOSURE 8

Determination of California Bearing Ratio

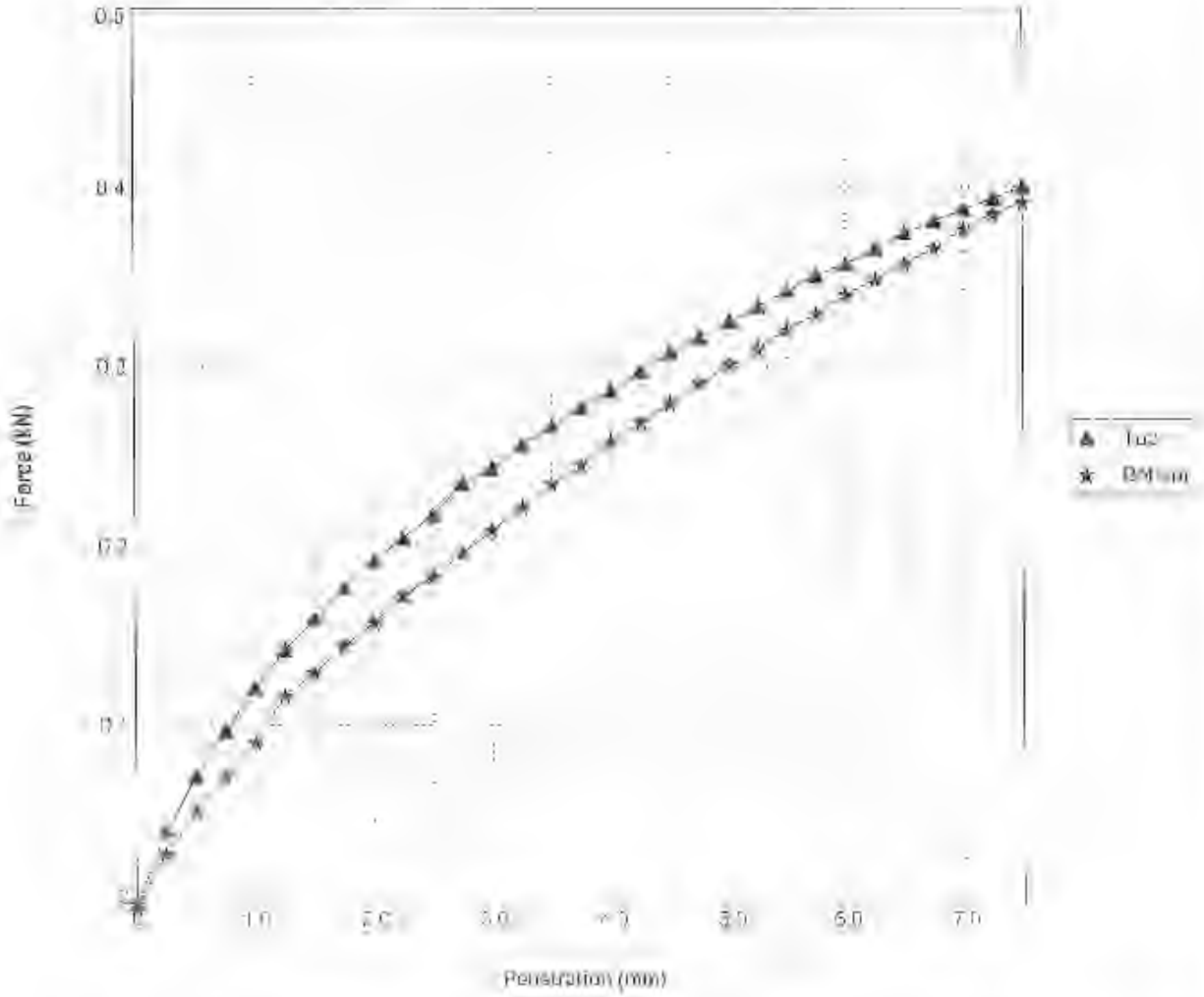
ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No - **TP103** Sample No - **B10** Depth (m) - **1.50**

"As Received" Moisture Content (%)	21.0	Surcharge (Kg)	6
Retained on 20mm (%)	0.8	Seating Load (N)	Top 10 / Bottom 10
Correction Needed	No	Test Moisture Content (%)	Top 21.2 / Bottom 20.7
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	2.08
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.72
Date Tested	30/01/2019	CBR Value (%)	Top 1.6 / Bottom 1.5
Preparation Method	2.5kg Compaction		
Remarks	Tested at "As Received" Moisture Content		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title : Northern Gateway

Client : Far East Consortium International Limited

Signed : Date :

Issue : 01

Checked by : CBR NW1680TP103B10 1.50

CBR Number : NW1680

UKAS TESTING 1387

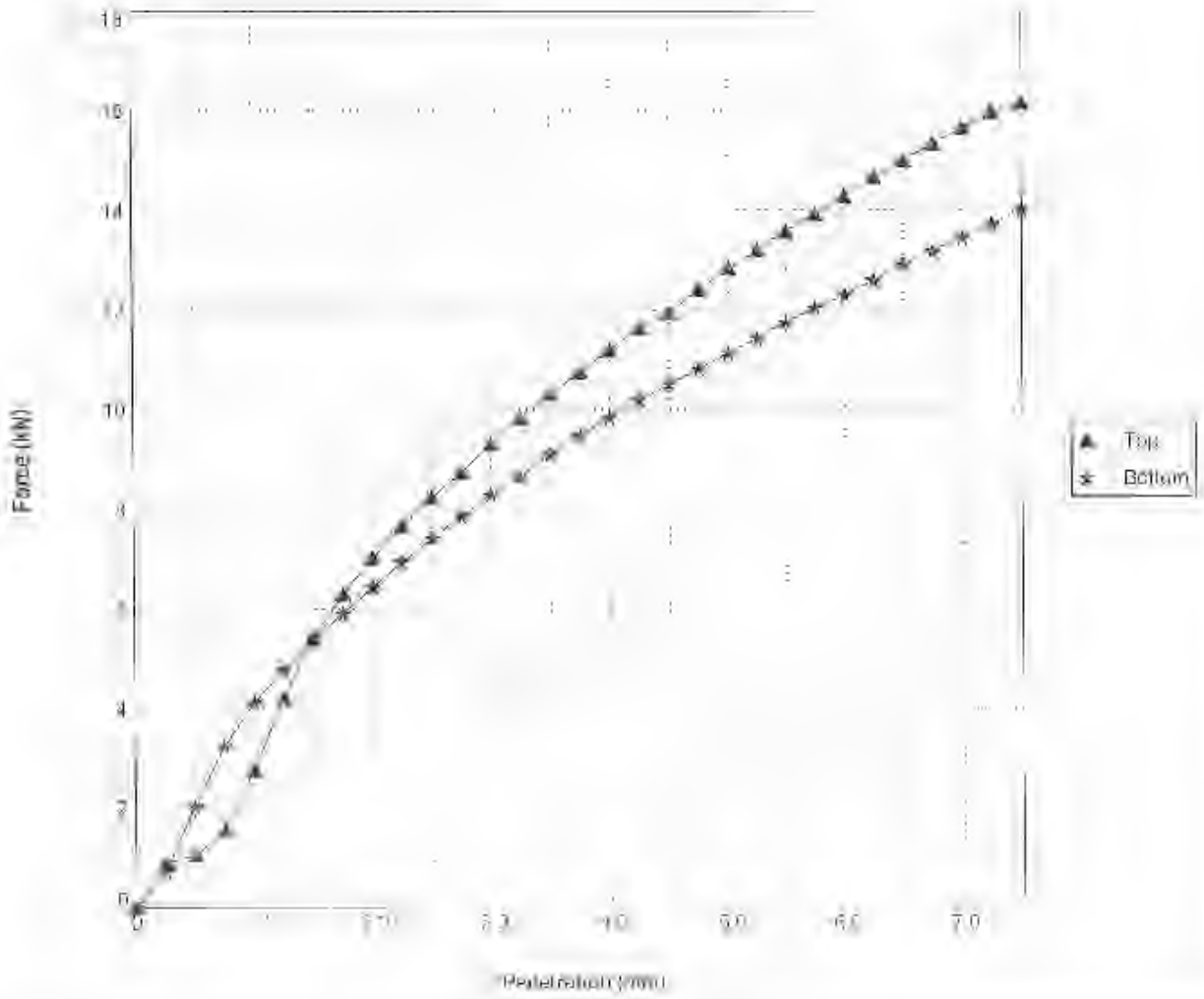
ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP103** Sample No.- **B10** Depth (m)- **1.50**

"As Received" Moisture Content (%)	21.0	Surcharge (Kg)	6
Retained on 20mm (%)	0.8	Seating Load (N)	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 5.5 / Bottom 5.8
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	1.91
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.81
Date Tested	14/02/2019	CBR Value (%)	Top 64.3 / Bottom 56.0
Preparation Method	2.5kg Compaction		
Remarks			



For description of sample please refer to the accompanying Descriptive Sheet

Contract Title :- Northern Gateway

Client :- For: East Consortium International Limited

Signed :-

Name :-

Date of Issue :- 14/02/2019

Page 1 of 1

Our Contract No. NW1680

UKAS TESTING 1387

ALLIED EXPLORATION & GEOTECHNICS LIMITED

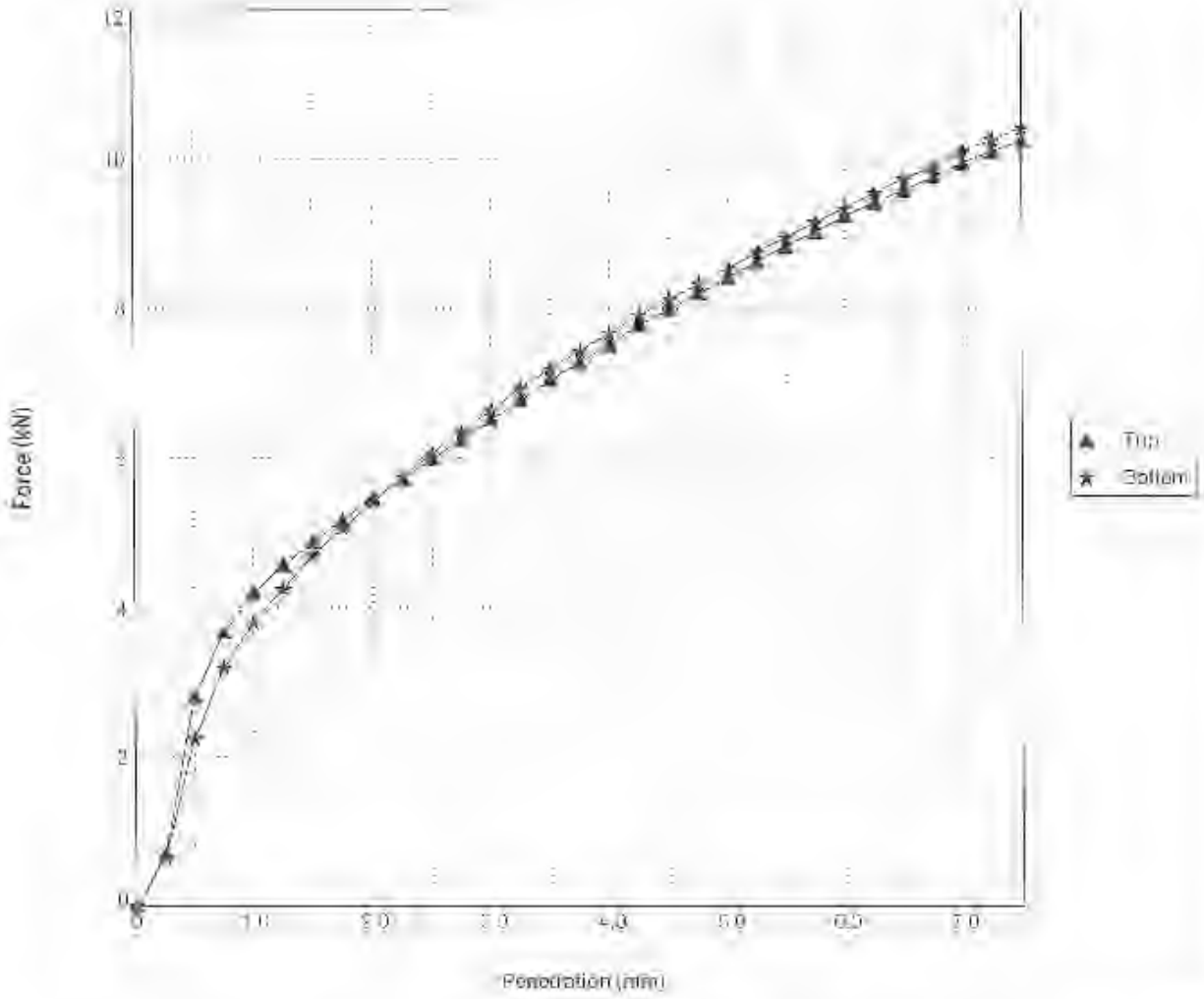
Head Office: Unit 1, Block 1, Industrial Estate, Tuen Mun, New Territories, Hong Kong. Tel: (852) 2463 4863 Fax: (852) 2463 4863
Regional Office: Unit 1201, Tower One, Grand Central Plaza, 138 Shatin Rural Committee Road, Shatin, New Territories, Hong Kong.

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 7.5 : 1990

Exploratory Hole No. - **TP103** Sample No - **B10** Depth (m) - **1.50**

"As Received" Moisture Content (%) :	21.0	Surcharge (Kg) :	6
Retained on 20mm (%)	0.8	Seating Load (N) :	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 8.7 / Bottom 8.7
Soaking Time (Days) :	N/A	Bulk Density (Mg/m³) :	1.95
Swelling (mm) :	N/A	Dry Density (Mg/m³)	1.79
Date Tested	14/02/2019	CBR Value (%)	Top 45.3 / Bottom 45.9
Preparation Method	2.5kg Compaction		
Remarks			



For description of sample please refer to the sheet showing Sample Description Sheet

Contract Title :
Northern Gateway

Client :
Far East Consortium International Limited

Signed :

Date of Issue

Certificate No.

AEL Contract No. :
NW1580

Page 1 of 1

UKAS TESTING
1887

ALLIED EXPLORATION & GEOTECHNICS LIMITED

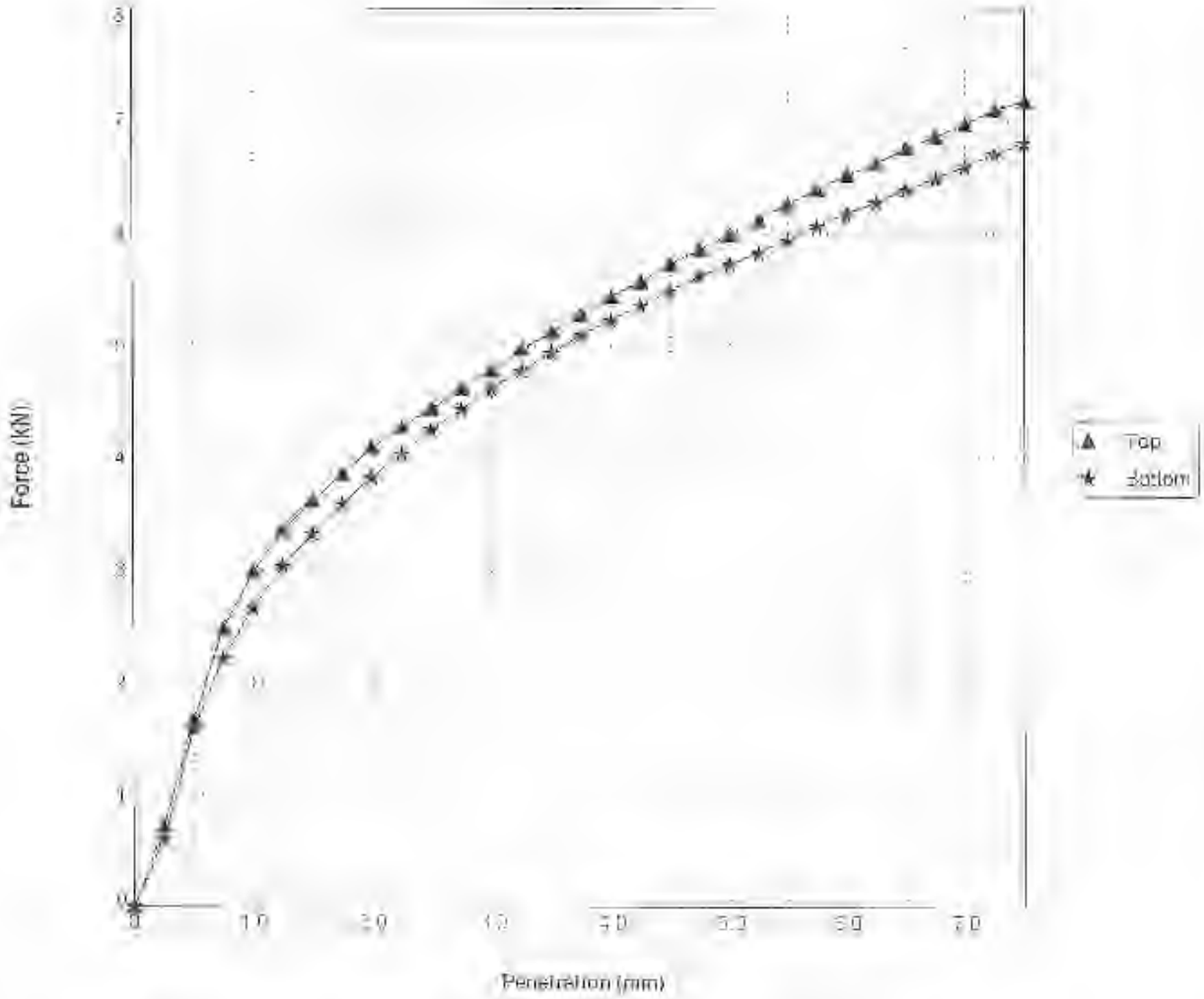
Head Office: [illegible]
Regional Office: [illegible]

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No - **TP103** Sample No.- **B10** Depth (m)- **1.50**

"As Received" Moisture Content (%) :	21.0	Surcharge (Kg) :	6
Retained on 20mm (%) :	0.8	Seating Load (N) :	Top 250 / Bottom 250
Correction Needed :	No	Test Moisture Content (%) :	Top 11.5 / Bottom 12.0
Soaking Time (Days)	N/A	Bulk Density (Mg/m^3)	2.08
Swelling (mm)	N/A	Dry Density (Mg/m^3) :	1.86
Date Tested	19/02/2019	CBR Value (%) :	Top 33.5 / Bottom 32.1
Preparation Method	2.5kg Compaction		
Remarks			



For description of sample preparation refer to the Laboratory Sample Description Sheet

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Signed: [signature]

Name:

Page 1 of 1

Date of Issue:

Checked by:

AEG Contract No: NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

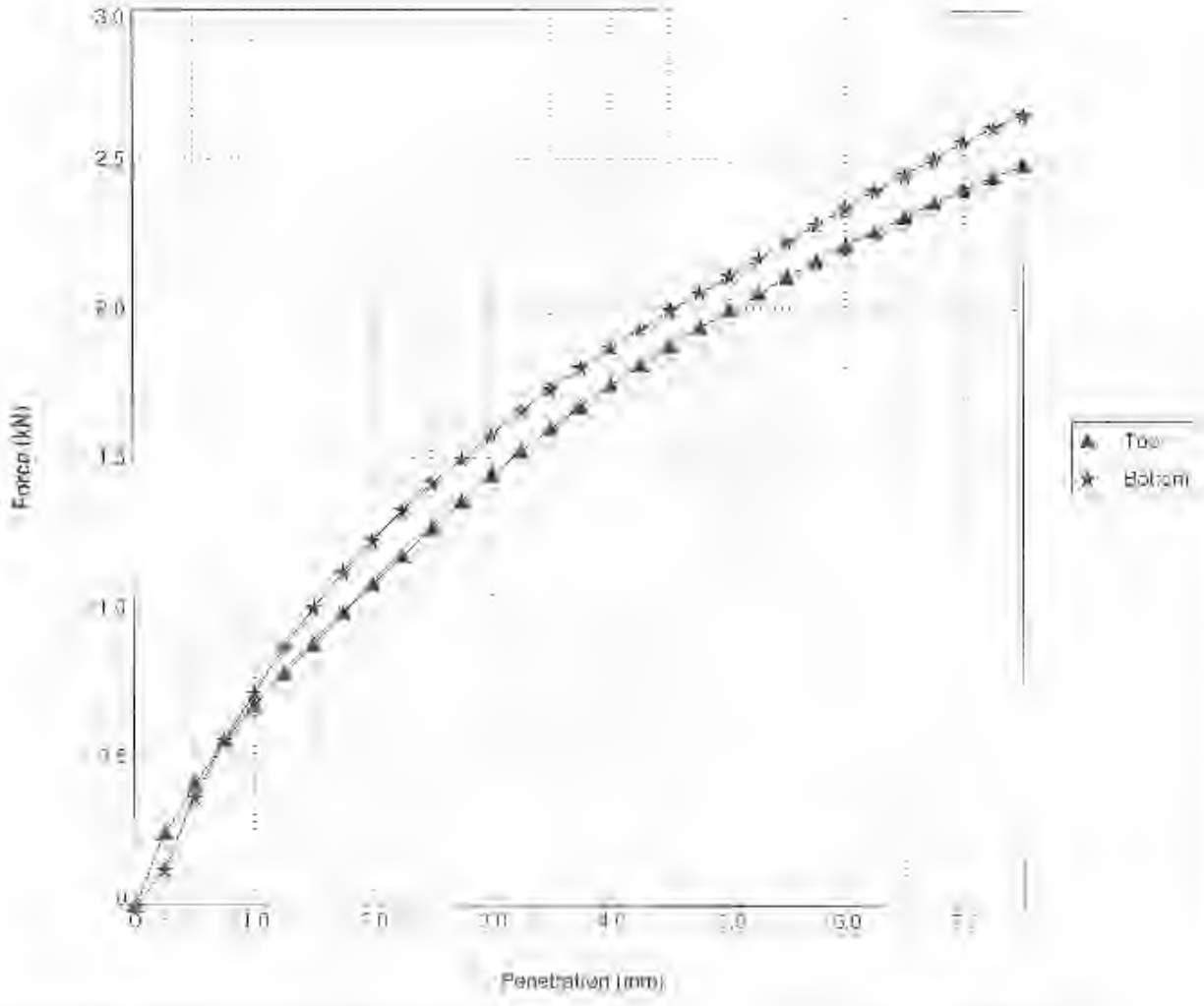
Registered Office: 1 ASC Business Centre, Kembrey Park, Swindon, Wiltshire SN2 8PA Tel: 01793 428 420 Fax: 01793 428 421

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377: Part 4: 1990 and Part 2: Clause 3.7: 1990

Exploratory Hole No.: **TP103** Sample No.: **B10** Depth (m): **1.50**

"As Received" Moisture Content (%)	21.0	Surcharge (Kg):	6
Retained on 20mm (%)	0.8	Seating Load (N):	Top 10 / Bottom 50
Correction Needed	No	Test Moisture Content (%)	Top 14.6 / Bottom 22.8
Soaking Time (Days)	N/A	Bulk Density (Mg/m³):	2.12
Swelling (mm):	N/A	Dry Density (Mg/m³):	1.76
Date Tested:	21/02/2019	CBR Value (%):	Top 10.0 / Bottom 10.7
Preparation Method:	2.5kg Compaction		
Remarks:			



For description of sample please refer to the associated Sample Description Sheet

Contract Title: Northern Gateway

Client: For East Consortium International Limited

Signed: Name: Page 1 of

Date of issue: Certificate No.: Test Certificate No.: NW1580

UKAS 1367

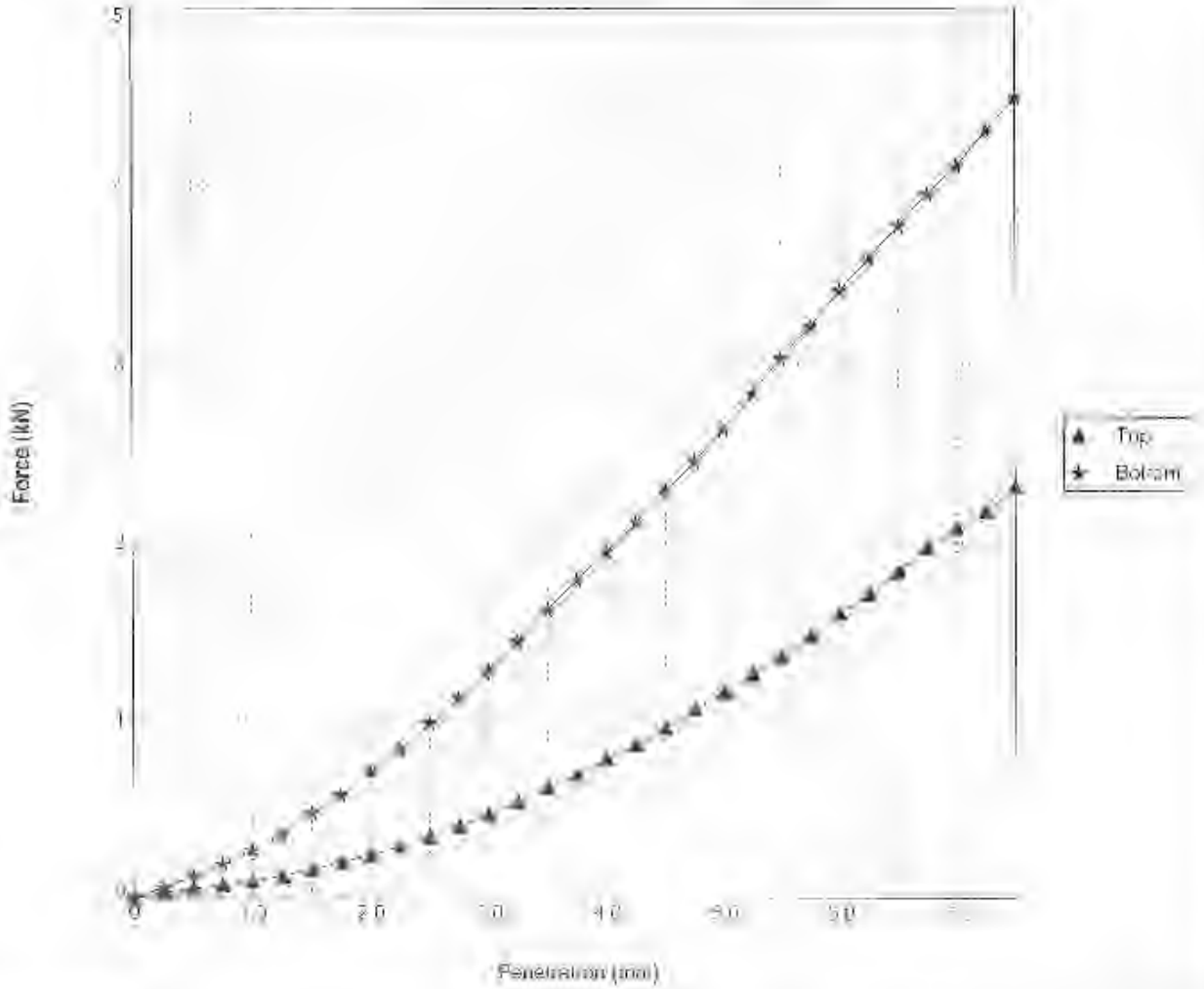
ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No - **TP111** Sample No - **LB3** Depth (m) - **0.80**

"As Received" Moisture Content (%) :	19.7	Surcharge (Kg) :	5
Retained on 20mm (%) :	17.0	Seating Load (N) :	Top 50 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 19.7 / Bottom 19.7
Soaking Time (Days)	N/A	Bulk Density (Mg/m^3) :	1.91
Swelling (mm)	N/A	Dry Density (Mg/m^3)	1.60
Date Tested :	21/02/2019	CBR Value (%) :	Top 5.8 / Bottom 13.2
Preparation Method	Vibrating Hammer Compaction		
Remarks	Tested at "As Received" Moisture Content		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :
Northern Gateway

Client :
For East Consortium International Limited

Signed :

Name :

Page 1 of 1

Date of Issue

Certificate No

NW1580

UKAS TESTING 1357

ALLIED EXPLORATION & GEOTECHNICS LIMITED

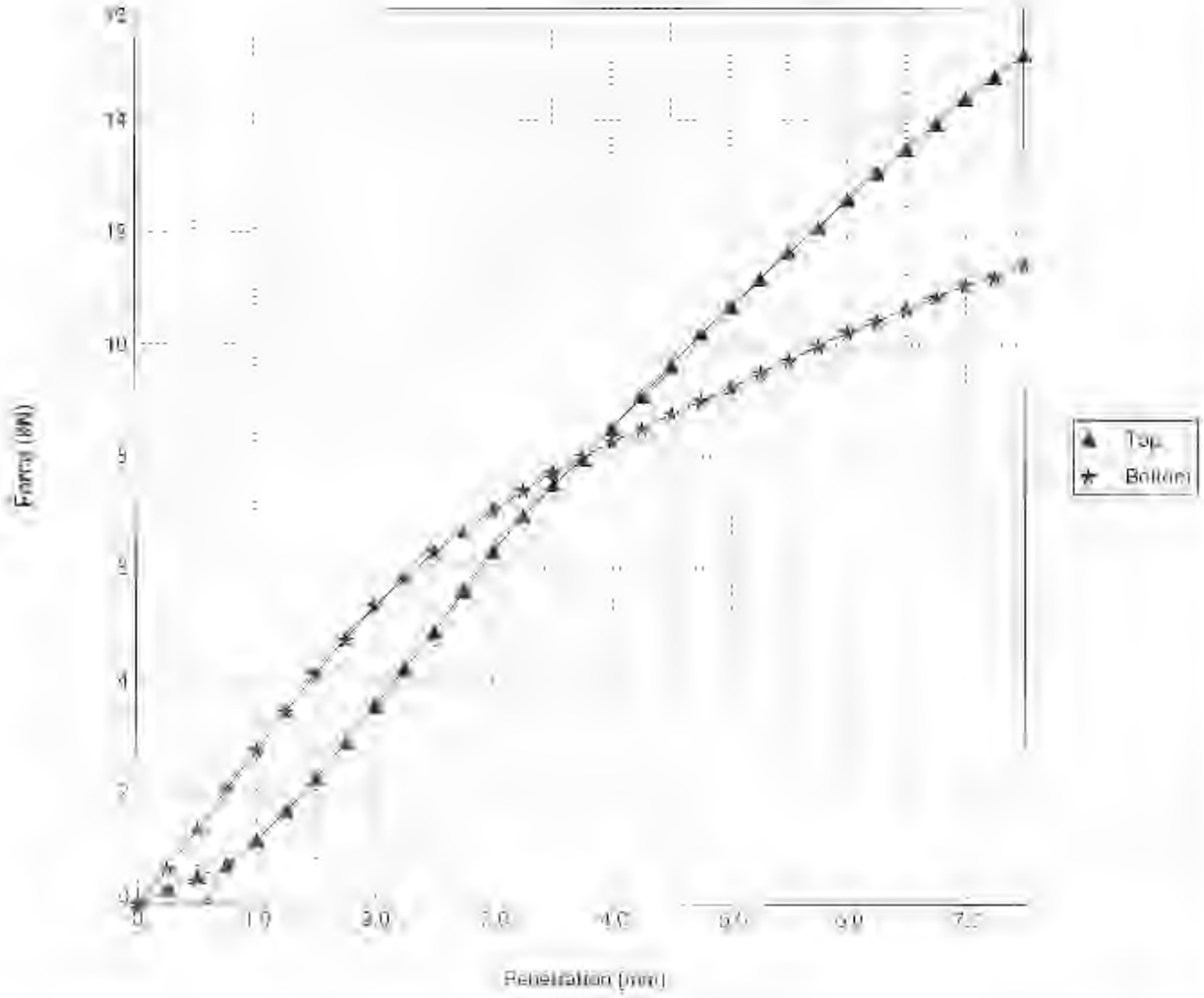
Head Office: [illegible]
Regional Office: [illegible]

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No : **TP111** Sample No. : **LB3** Depth (m) : **0.80**

"As Received" Moisture Content (%) :	19.7	Surcharge (Kg) :	6
Retained on 20mm (%) :	17.0	Seating Load (N) :	Top 250 / Bottom 250
Correction Needed :	Yes	Test Moisture Content (%) :	Top 4.6 / Bottom 4.0
Soaking Time (Days) :	N/A	Bulk Density (Mg/m^3) :	1.57
Swelling (mm) :	N/A	Dry Density (Mg/m^3) :	1.50
Date Tested :	26/02/2019	CBR Value (%) :	Top 60.5 / Bottom 47.5
Preparation Method :	Vibrating Hammer Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :
Northern Gateway

Client :
Far East Consortium International Limited

Signed :

Name :

Page 1 of 1

Date of Issue :

Certificate No. :

AES Contract No. :
NW1580

UKAS TESTING
1387

ALLIED EXPLORATION & GEOTECHNICS LIMITED

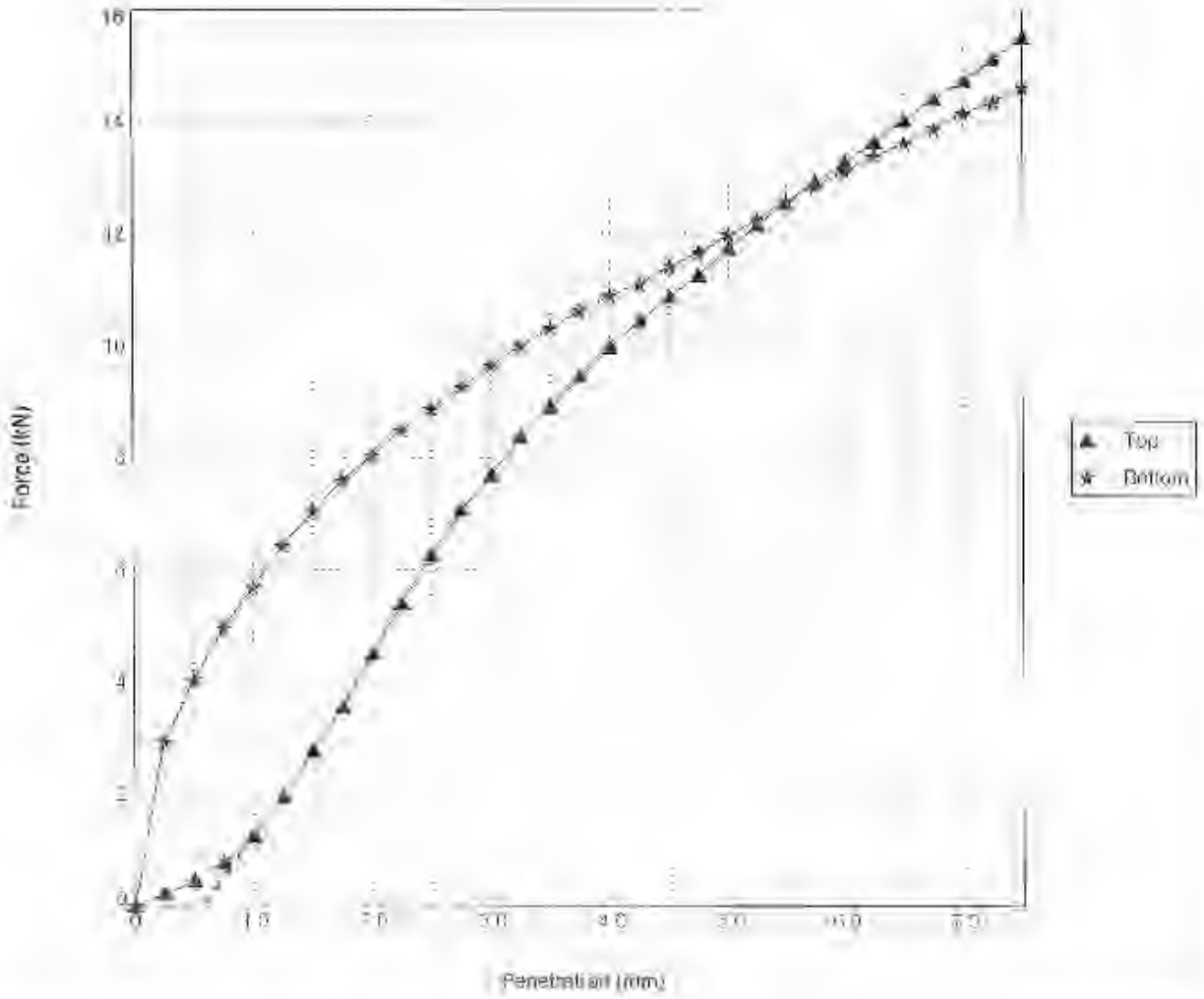
Unit 10 Block 1 (1st Floor) Kelvin Industrial Estate, Kelvin Rd, Thurlaston, Rugby, Warwickshire, CV23 9GT
Registered Office: Unit 1 Block 1 Kelvin Industrial Estate, Kelvin Rd, Thurlaston, Rugby, Warwickshire, CV23 9GT Tel: 01788 [illegible] Fax: 01788 [illegible]

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP111** Sample No - **LB3** Depth (m)- **0.80**

"As Received" Moisture Content (%)	19.7	Surcharge (Kg)	6
Retained on 20mm (%)	17.0	Seating Load (N)	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 7.7 / Bottom 7.8
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	1.56
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.45
Date Tested	26/02/2019	CBR Value (%)	Top 64.7 / Bottom 67.0
Preparation Method	Vibrating Hammer Compaction		
Remarks			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title: Northern Gateway

Client: Far East Consortium International Limited

Signed: MSerl

Name:

Position:

Date of Issue: 11/03/2019

Certificate No: GEOTECH/2019/LB3/0003

AEG Contract No: NW1580

UKAS TESTING 1387

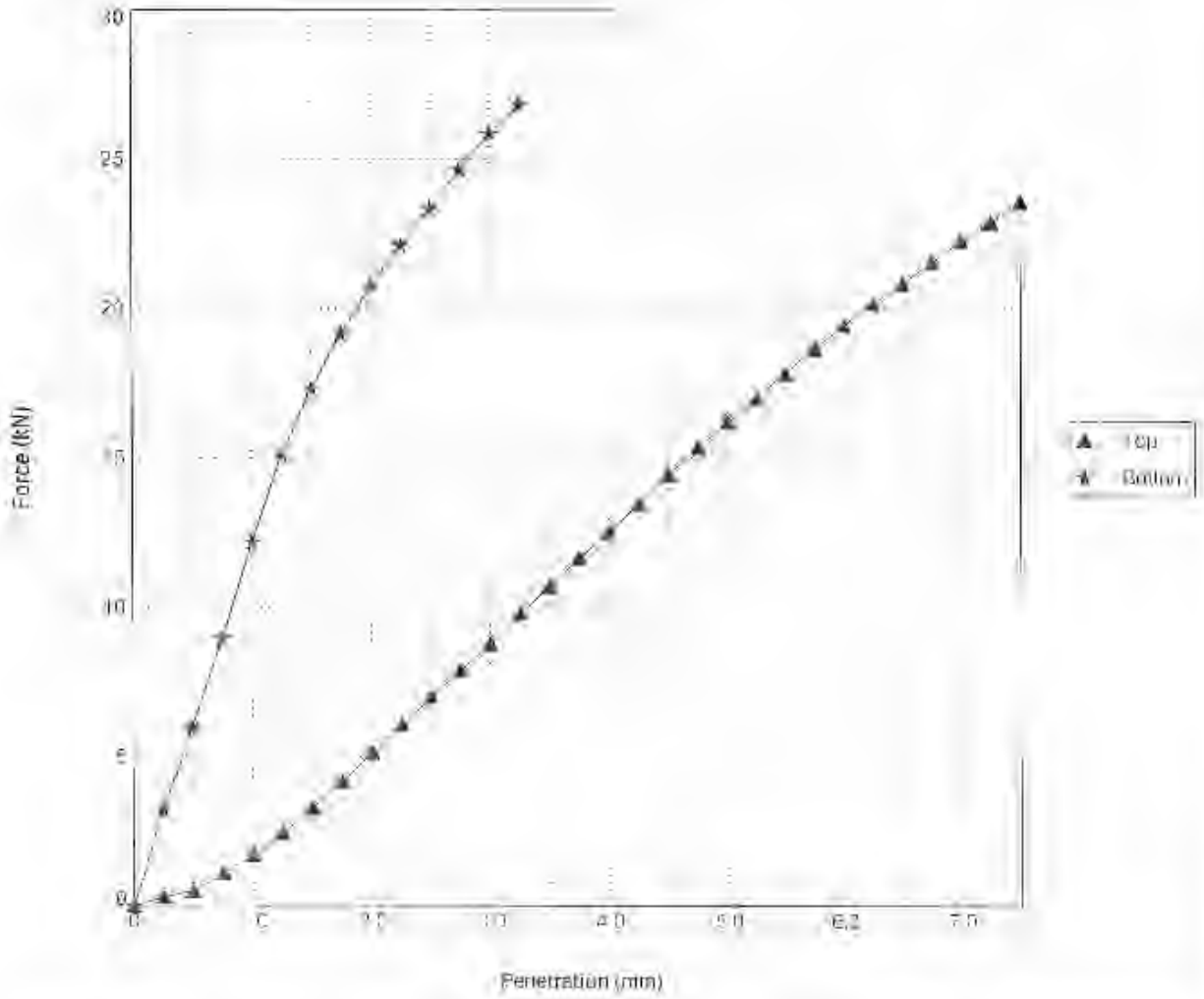
ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No - **TP111** Sample No - **LB3** Depth (m)- **0.80**

"As Received" Moisture Content (%)	19.7	Surcharge (Kg) :	6
Retained on 20mm (%)	17.0	Seating Load (N)	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 10.5 / Bottom 8.8
Soaking Time (Days) :	N/A	Bulk Density (Mg/m³)	1.74
Swelling (mm) :	N/A	Dry Density (Mg/m³)	1.58
Date Tested :	26/02/2019	CBR Value (%)	Top 81.2 / Bottom 176.5
Preparation Method	Vibrating Hammer Compaction		
Remarks	Test was stopped due to maximum load ring capacity being reached		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- Northern Gateway

Client :- Far East Consortium International Limited

Signed :- Date of Issue :- 26/02/2019

Page 1 of 1

Certificate No :-

AEL Contract No :- NW1580

UKAS TESTING 1987

ALLIED EXPLORATION & GEOTECHNICS LIMITED

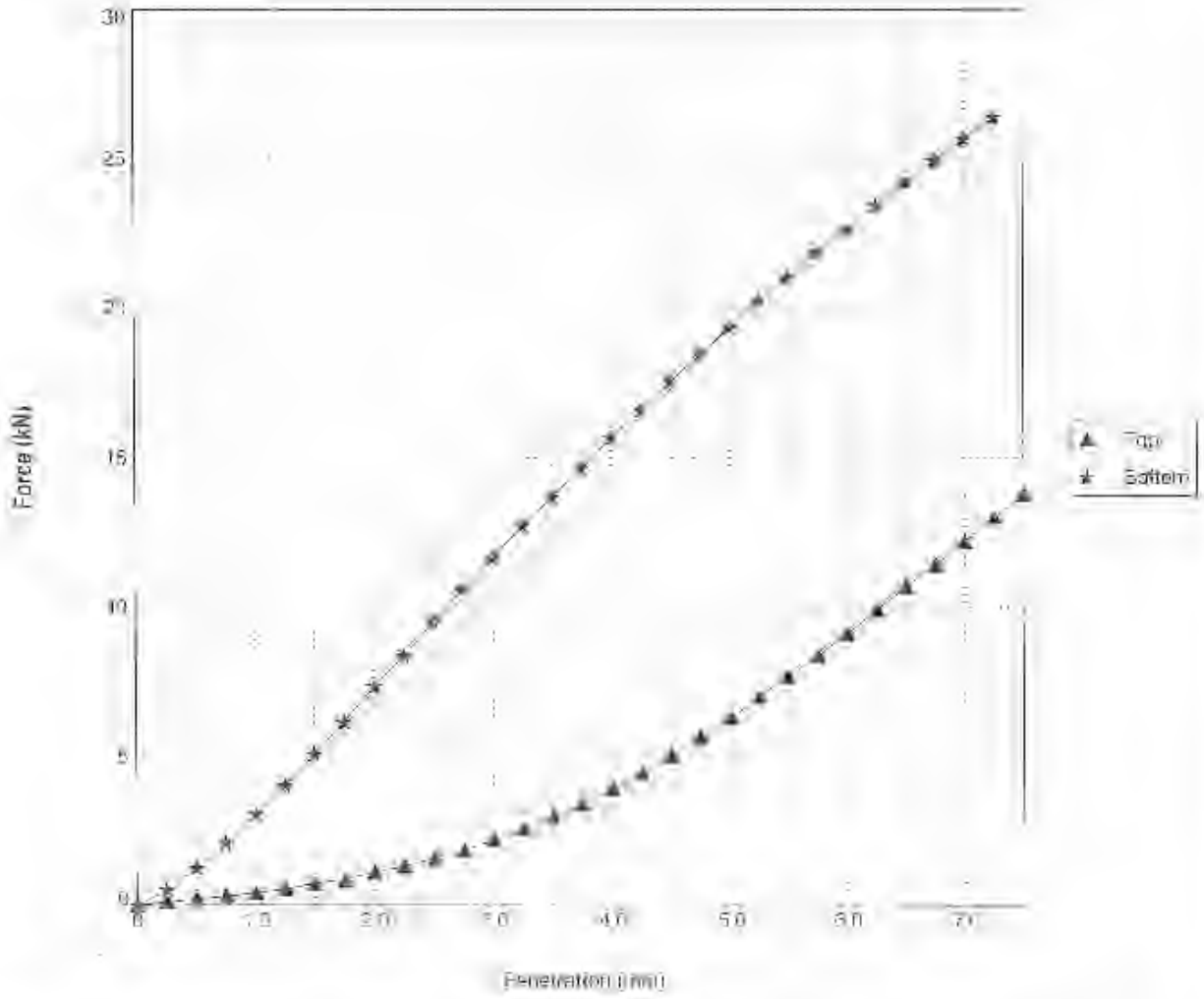
Head Office: [illegible] | Registered in [illegible] | Registered Number [illegible] | Registered Office: [illegible] | VAT Registration No: [illegible]
Suite 3 Office, [illegible] | Tel: [illegible] | Fax: [illegible]

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 7.2 : 1990

Exploratory Hole No. - **TP111** Sample No - **LB3** Depth (m) - **0.80**

"As Received" Moisture Content (%) :	19.7	Surcharge (Kg) :	6
Retained on 20mm (%)	17.0	Seating Load (N)	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 13.5 / Bottom 12.7
Soaking Time (Days) :	N/A	Bulk Density (Mg/m³) :	1.87
Swelling (mm)	N/A	Dry Density (Mg/m³) :	1.65
Date Tested :	26/02/2018	CBR Value (%) :	Top 31.5 / Bottom 97.0
Preparation Method :	Vibrating Hammer Compaction		
Remarks	Test was stopped due to maximum load ring capacity being reached.		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title: Northern Galloway

Client: For: Gael Consortium International Limited

Signed: MSone

Name:

Page 1 of 1

Date of Issue: [illegible]

Certificate No: [illegible]

NW1580

UKAS TESTING 1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

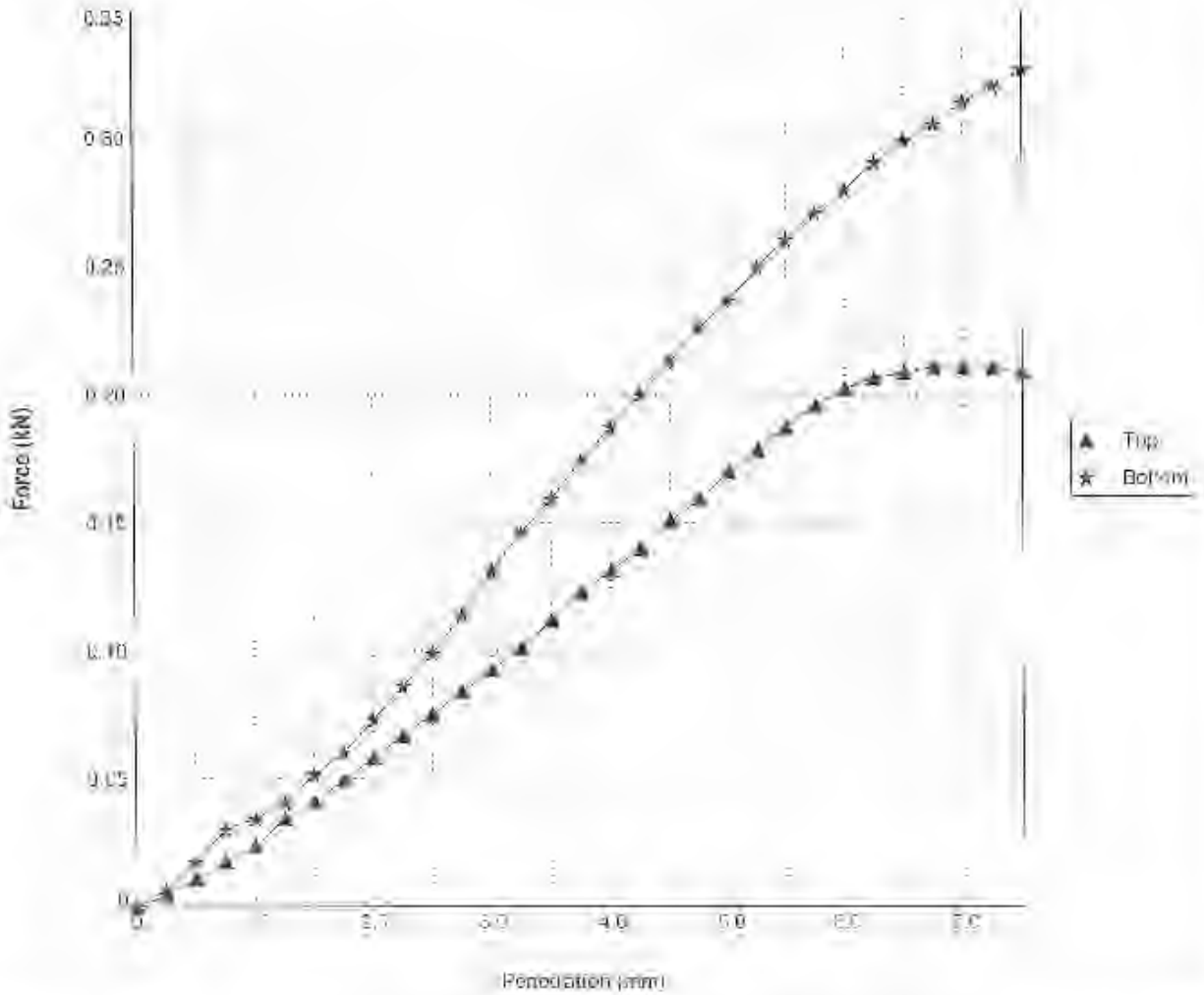
Head Office: [illegible]
Regional Office: [illegible]

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No - **TP121** Sample No - **LB3** Depth (m)- **0.80**

"As Received" Moisture Content (%)	20.8	Surcharge (Kg)	5
Retained on 20mm (%)	7.0	Seating Load (N)	Top 50 / Bottom 10
Correction Needed	No	Test Moisture Content (%)	Top 20.7 / Bottom 20.8
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	2.01
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.67
Date Tested	31/01/2019	CBR Value (%)	Top 0.9 / Bottom 1.2
Preparation Method	Vibrating Hammer Compaction		
Remarks	Tested at "As Received" Moisture Content		



For description of sample please refer to the accompanying Sample Description Sheet

Site / Job Title: Northern Gateway

Client: For East Consortium International Limited

Signed: Name: Page 1 of 1

Date of Issue: Certificate No: A&L Contract No: NW1580

UKAS TESTING 1987

ALLIED EXPLORATION & GEOTECHNICS LIMITED

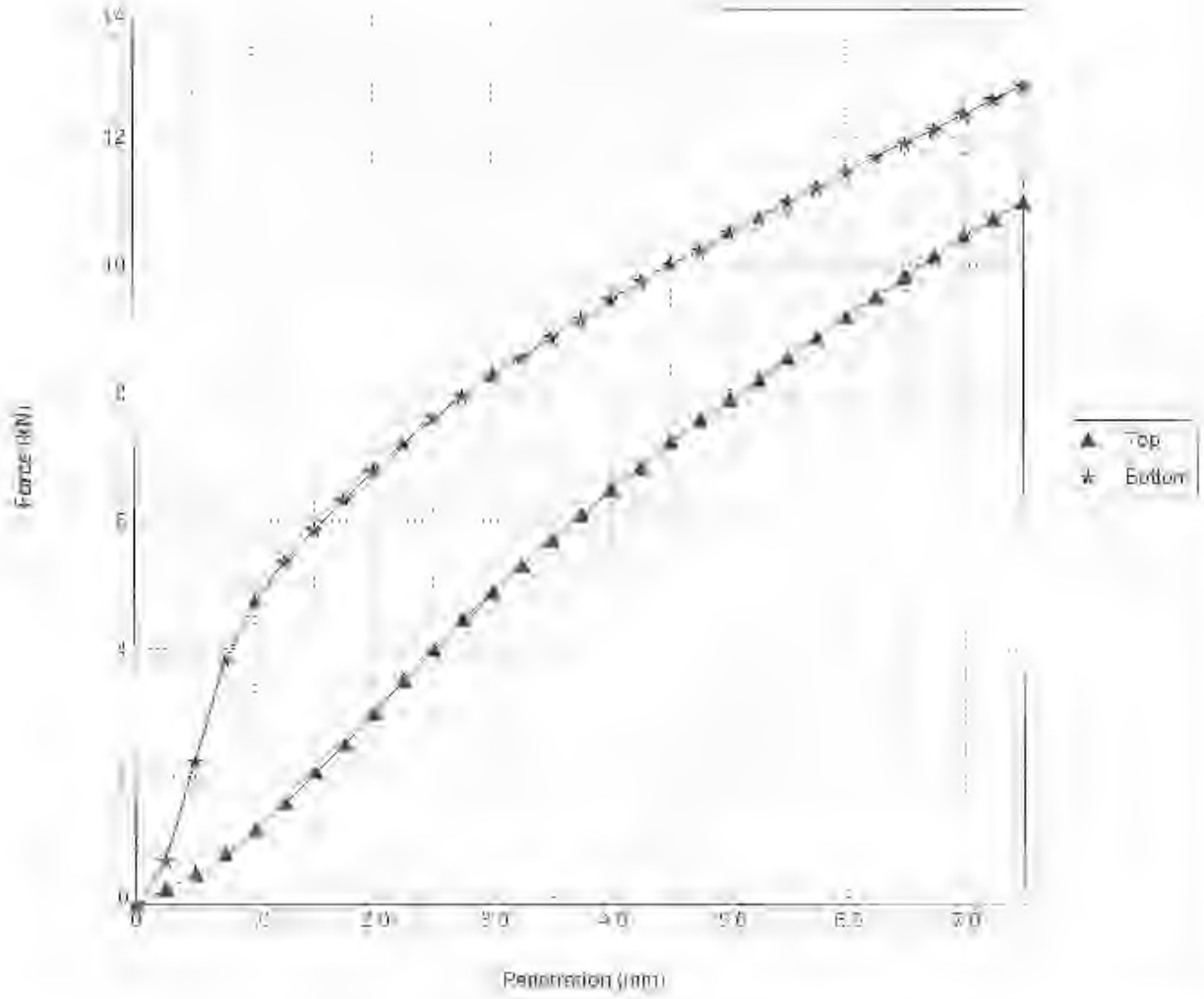
Hong Kong Office: [illegible]
Regional Office: [illegible]

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377: Part 4: 1990 and Part 2: Clause 3.2: 1990

Exploratory Hole No. - **TP121** Sample No - **LB3** Depth (m) - **0.80**

"As Received" Moisture Content (%)	20.8	Surcharge (Kg)	6
Retained on 20mm (%) :	7.0	Seating Load (N)	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 6.5 / Bottom 5.6
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	1.81
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.71
Date Tested :	19/02/2019	CBR Value (%) :	Top 39.6 / Bottom 57.4
Preparation Method	Vibrating Hammer Compaction		
Remarks			



For description of samples please refer to the Laboratory Sample Description Sheet

Contract Title :
Northern Gateway

Client :
Far East Consortium International Limited

Signed : Name :

Page 1 of 1

Date of Issue :

Certification :

GE Job No. :
NW1580

UKAS TESTING
1387

ALLIED EXPLORATION & GEOTECHNICS LIMITED

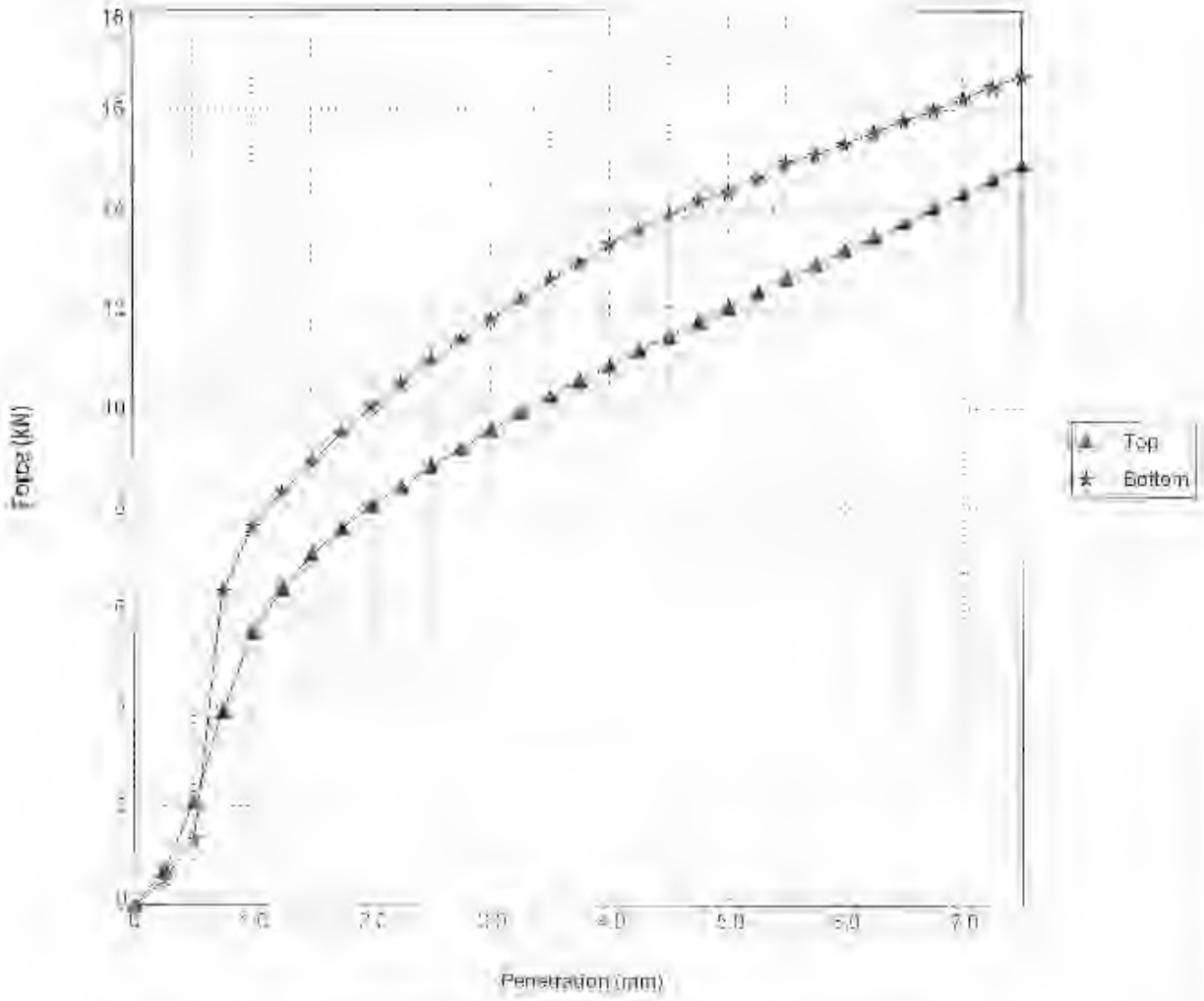
Registered Office: 9 Alba Campus, Livingston, EH54 6GR. Telephone: 01506 497000. Fax: 01506 497001

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377: Part 4: 1990 and Part 7: Clause 3.2: 1990

Exploratory Hole No - **TP121** Sample No.- **LB3** Depth (m)- **0.80**

"As Received" Moisture Content (%)	20.8	Surcharge (Kg) :	6
Retained on 20mm (%)	7.0	Seating Load (N)	Top 250 / Bottom 250
Correction Needed :	Yes	Test Moisture Content (%)	Top 8.1 / Bottom 8.7
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	1.94
Swelling (mm)	N/A	Dry Density (Mg/m³) :	1.79
Date Tested :	19/02/2019	CBR Value (%) :	Top 66.6 / Bottom 89.4
Preparation Method :	Vibrating Hammer Compaction		
Remarks			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- Northern Gateway

Client :- For: East Consortium International Limited

Signed: Name:

Date of Issue: Session No: -

AEG Control No. - NW1580

Page 1 of 1

UKAS TESTING 1357

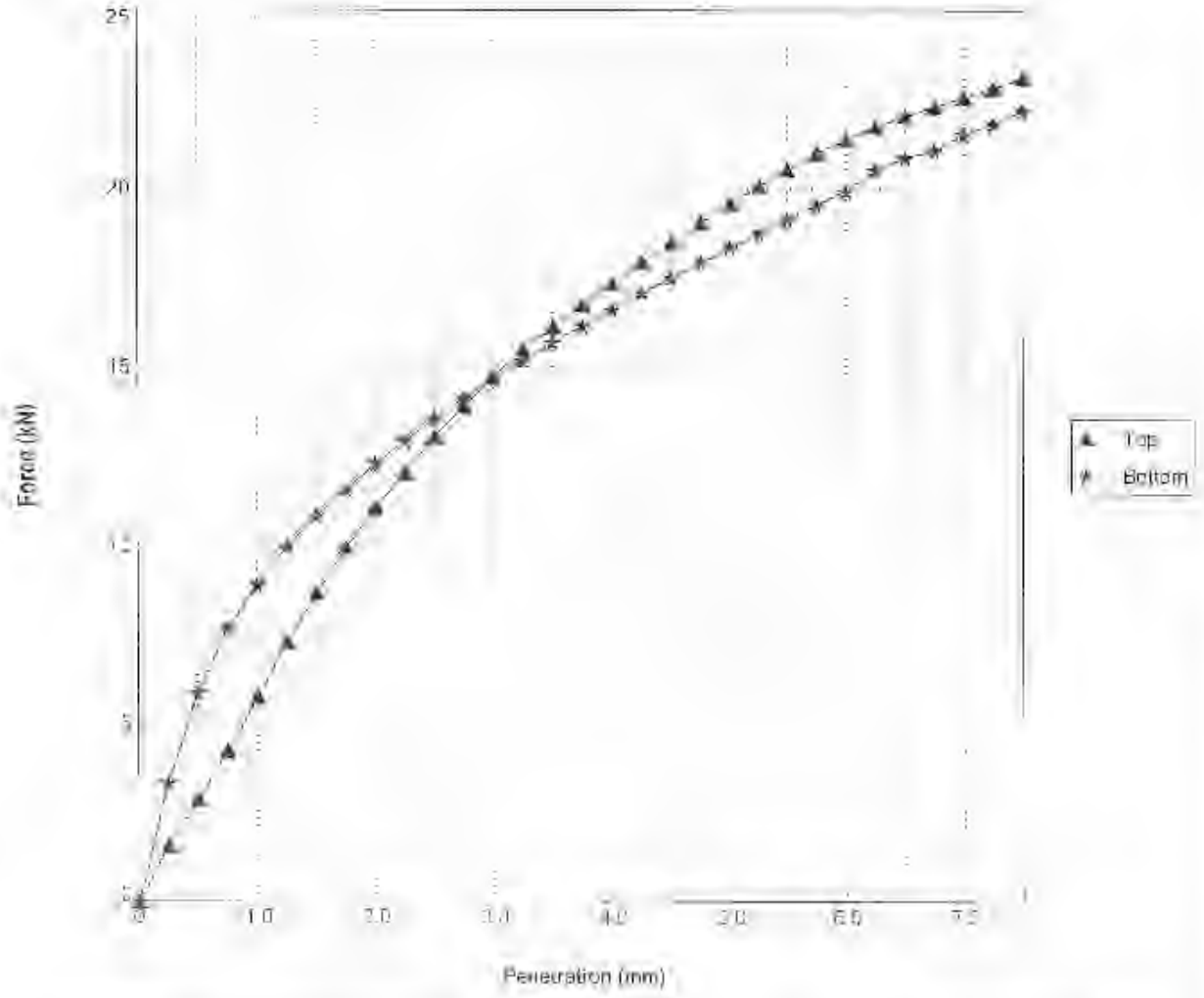
ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377: Part 4: 1990 and Part 2: Clause 3.2: 1990

Exploratory Hole No.- **TP121** Sample No.- **LB3** Depth (m)- **0.80**

"As Received" Moisture Content (%)	20.8	Surcharge (Kg)	6
Retained on 20mm (%)	7.0	Seating Load (N)	Top 250 / Bottom 250
Correction Needed	No	Test Moisture Content (%)	Top 11.2 / Bottom 11.2
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	2.09
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.88
Date Tested	20/02/2019	CBR Value (%)	Top 98.5 / Bottom 102.2
Preparation Method	Vibrating Hammer Compaction		
Remarks			



For description of sample please refer to the accompanying Sample Despatch sheet

Contract Title: Northern Gateway

Client: For East Consortium International Limited

Signed: MBOND

Name:

Page 1 of 1

Date of Issue:

Certificate No:

Test carried out on:

NW1580

UKAS TESTING 4361

ALLIED EXPLORATION & GEOTECHNICS LIMITED

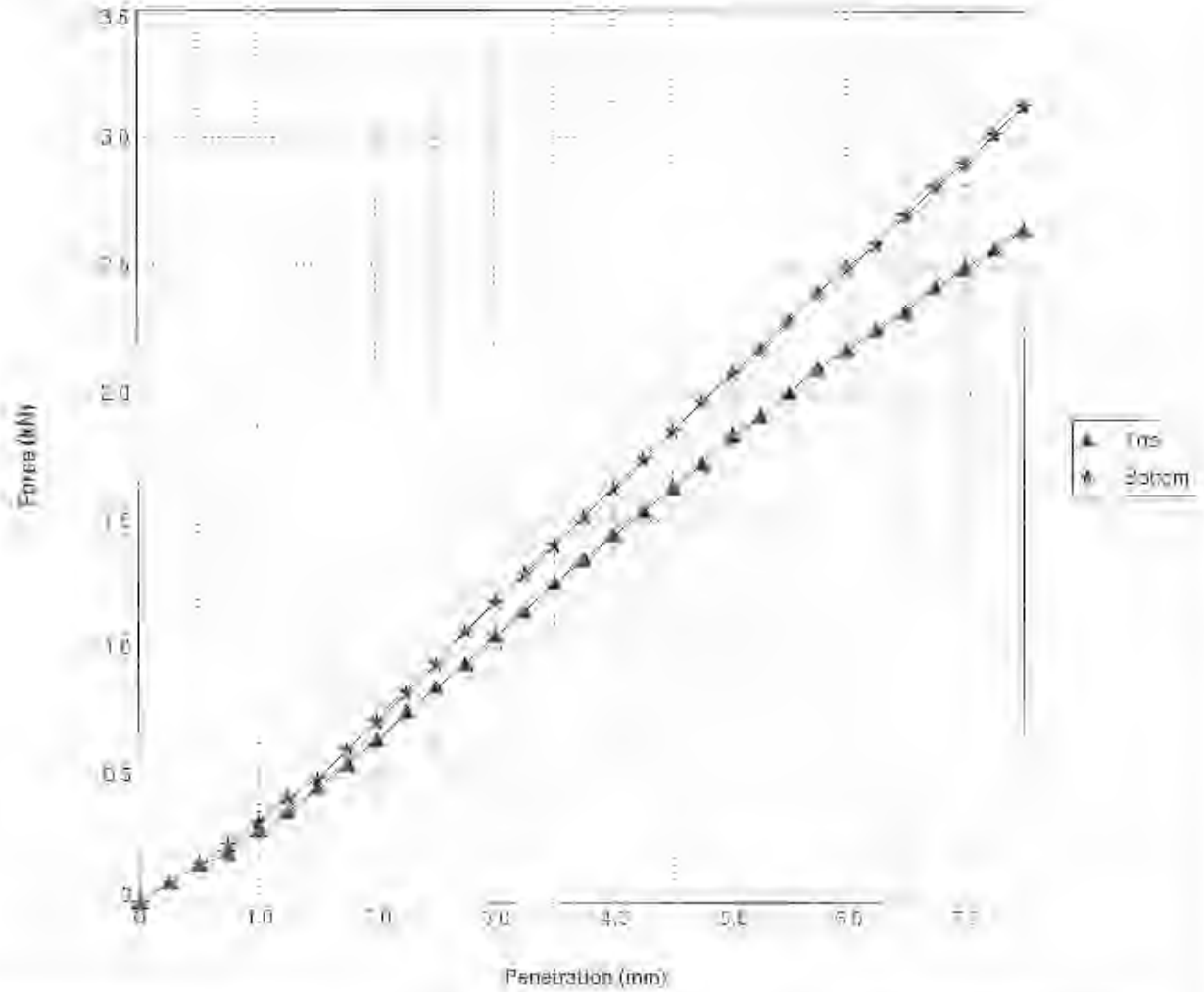
Registered Office: Unit 2, Hillhead Quarry, Fenton, Carlisle, Cumbria, CA6 6LJ. Tel: 01228 675799 Fax: 01228 674105
Regional Office: Unit 6, Bankside Trading Centre, Lockside Road, Preston, PR2 2YS. Tel: 01772 652401 Fax: 01772 652402

DETERMINATION OF THE CALIFORNIA BEARING RATIO

BS 1377: Part 4: 1990 and Part 2: Clause 3.2: 1990

Exploratory Hole No - **TP121** Sample No - **LB3** Depth (m) - **0.80**

"As Received" Moisture Content (%) :	20.8	Surcharge (Kg)	6
Retained on 20mm (%)	7.0	Seating Load (N) :	Top 250 / Bottom 250
Correction Needed :	No	Test Moisture Content (%)	Top 15.3 / Bottom 14.6
Soaking Time (Days)	N/A	Bulk Density (Mg/m³)	2.10
Swelling (mm)	N/A	Dry Density (Mg/m³)	1.83
Date Tested :	21/02/2019	CBR Value (%)	Top 9.2 / Bottom 10.4
Preparation Method :	Vibrating Hammer Compaction		
Remarks :			



For description of sample preparation and tests refer to Laboratory Sample Description sheet

Contract Title: Northern Gateway

Client: For East Consortium International Limited

Signed: [signature] Name: - Grade for

Date of Issue: 01/03/2019 Checked by: - Authorised by: -

GA/TP/1580/P 21/02/2019 NW1580

UKAS TESTING 1367

LABORATORY TESTING ENCLOSURE 9

Determination of One Dimensional Consolidation Properties

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	**BH101**	**Sample**	**B15**	**Depth**	**3.50m**
Specimen Type	**Compacted**	**Orientation**	**N/A**	**Specific Depth**	**N/A**

	INITIAL	FINAL			
Height	18.7	17.1	mm	Particle Density (Assumed)	2.70
Diameter	74.4	74.4	mm		
Moisture Content	21.0	17.6	%	Degree of Saturation (%)	98.8
Wet Density	2.08	2.20	Mg/m^3		
Dry Density	1.72	1.87	Mg/m^3	Test Duration (Days)	6
				Date Tested	30/01/2019

Square Root of Time Fitting Method

Pressure Range kN/m2	Mv m2/MN	Cv m2/yr	Temp C	Voids Ratio
Initial				0.574
0 - 50	0.660	-	18	0.522
50 - 100	0.259	3.38	17	0.502
100 - 200	0.192	4.50	17	0.473
200 - 400	0.113	2.96	17	0.440
400 - 100	0.018	Swelling	18	0.448
100 - 400	0.028	6.50	18	0.437

For sample description please refer to the Laboratory Sample Description Sheet

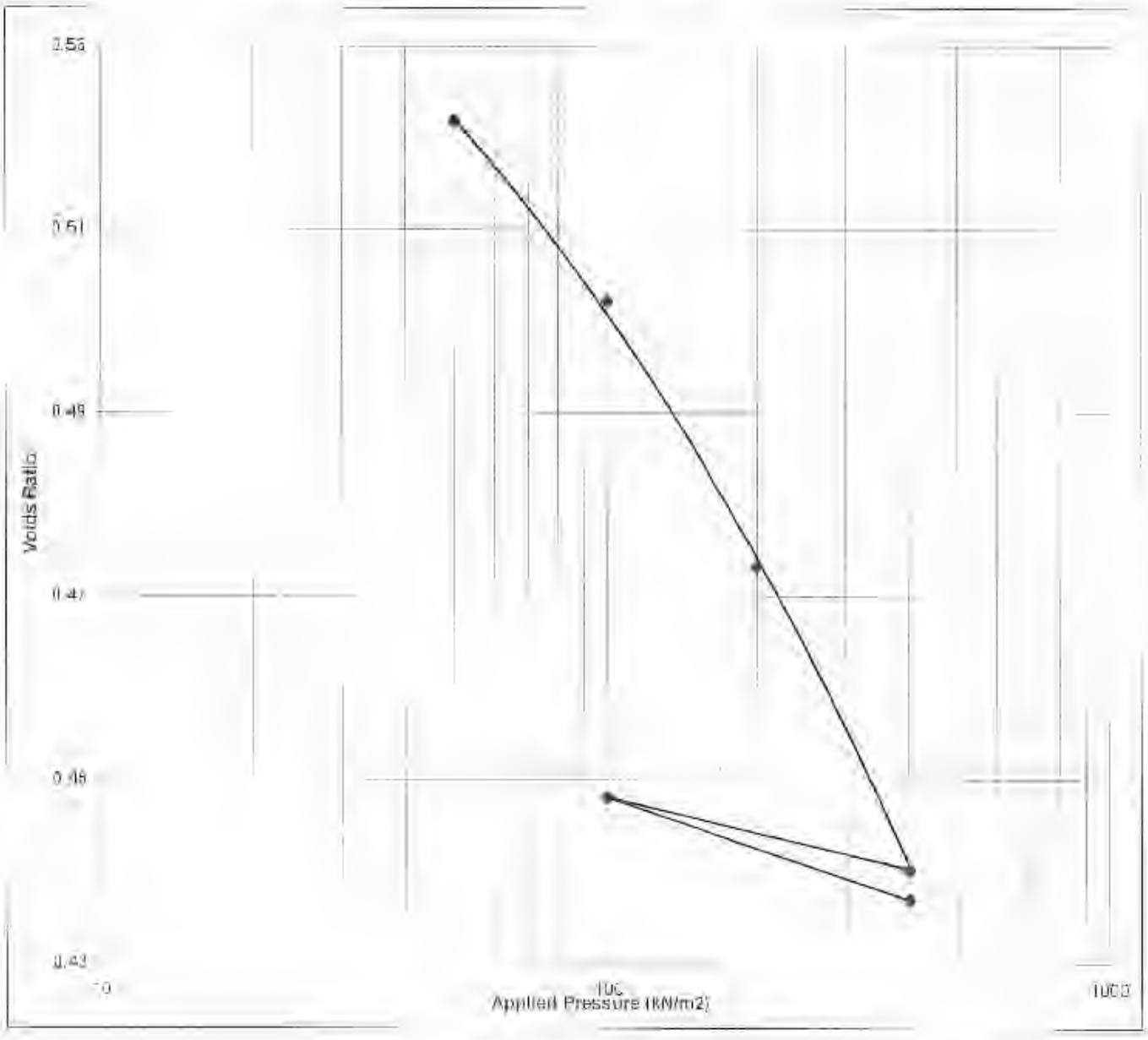
Contract Title	Client
Northern Gateway	Far East Consortium International Limited

AEG	Signed:	Name: M. SELKIRK	Page 1 of 2	UKAS TESTING 1387
	Date of Issue: 30/01/2019	Certificate No: NWI_550/A	AEG Contract No: NW1550	

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH101	Sample	B15	Depth	3.50m
Specimen Type	Compacted	Orientation	N/A	Specific Depth	N/A



Contract Title	Client
Northern Gateway	Far East Consortium International Limited

Signed	Name: M. SELKIRK	Page 2 of 2	
Issued Date: 18/02/20	Certificate No: NW/1550/A	AEG Contract No: NW/1550	UKAS TESTING 1357

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 , 1990 : CLAUSE 3

Exploratory Hole No	**BH102**	**Sample**	**B8**	**Depth**	**2.50m**
Specimen Type	**Compacted**	**Orientation**	**N/A**	**Specific Depth**	**N/A**

	INITIAL	FINAL			
Height	18.7	17.3	mm	Particle Density (Assumed)	2.70
Diameter	74.4	74.4	mm		
Moisture Content	21.5	19.5	%	Degree of Saturation (%)	98.2
Wet Density	2.05	2.17	Mg/m^3		
Dry Density	1.68	1.82	Mg/m^3	Test Duration (Days)	6
				Date Tested	30/01/2019

Square Root of Time Fitting Method

Pressure Range kN/m2	Mv m2/MN	Cv m2/yr	Temp C	Voids Ratio
Initial				0.603
0 - 25	1.065	-	16	0.561
25 - 50	0.409	3.64	17	0.545
50 - 100	0.330	7.30	17	0.519
100 - 200	0.211	7.88	17	0.487
200 - 50	0.024	Swelling	18	0.493
50 - 200	0.037	11.05	18	0.484

For sample description please refer to the Laboratory Sample Description Sheet

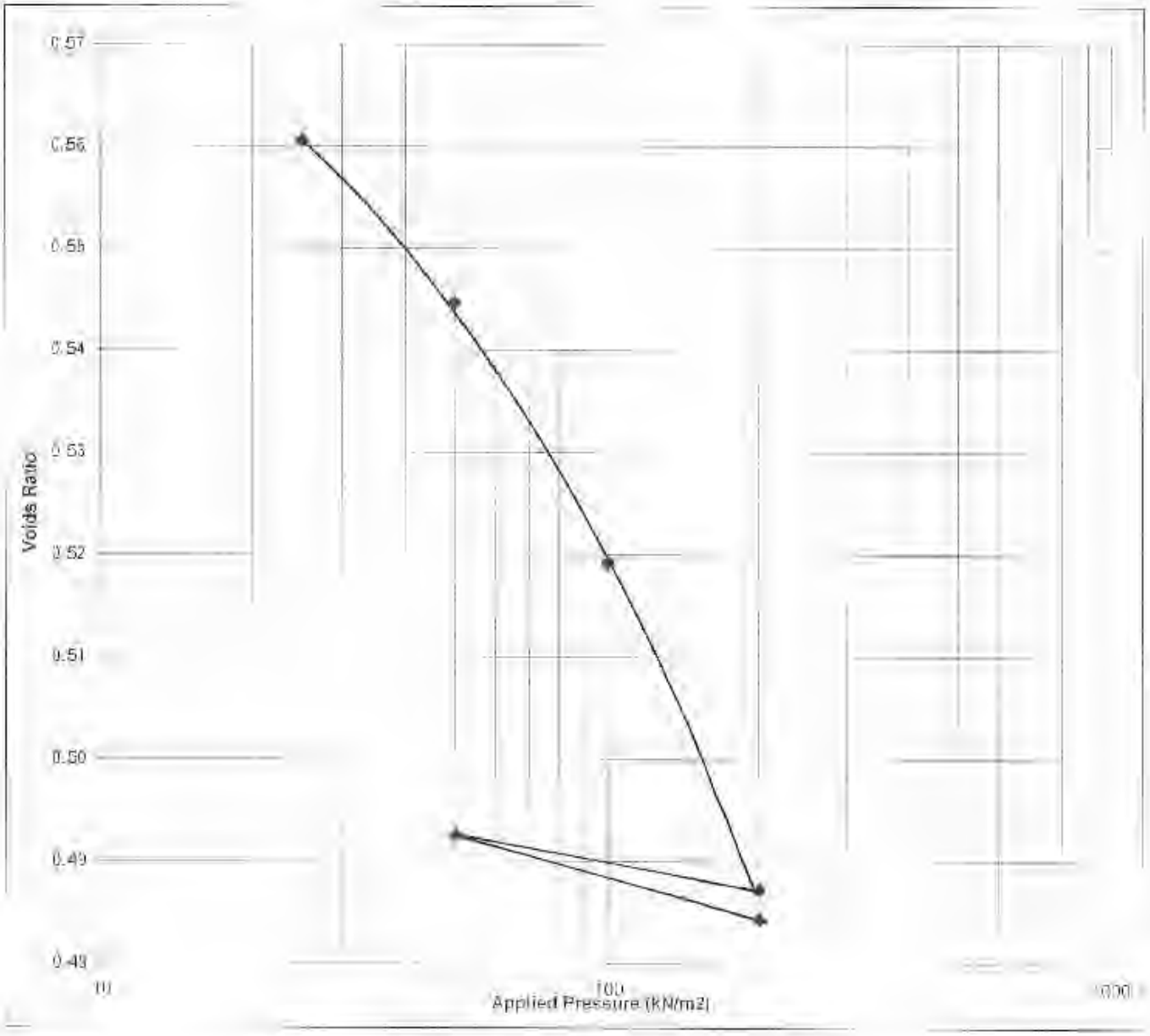
Contract Title	Client
Northern Gateway	Far East Consortium International Limited

AEG	Signed	Name: M. SELKIRK	Page 1 of 2	UKAS TESTING
	Date / Issue: 08/02/2019	Contract No: AW1550/C	AEG Contract No: AW1560	1357

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH102	Sample	B8	Depth	2.50m
Specimen Type	Compacted	Orientation	N/A	Specific Depth	N/A



Contract Title: Northern Gateway	Client: Far East Consortium International Limited

Signed:	Name: M SELKIRK	Page 2 of 3	UKAS TESTING 1267
Date of Issue:	Certificate No: NW1580/C	AEG Contract No: NW1580	

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	**BH104**	**Sample**	**B17**	**Depth**	**5.30m**
Specimen Type	**Compacted**	**Orientation**	**N/A**	**Specific Depth**	**N/A**

	INITIAL	FINAL			
Height	18.9	17.3	mm	Particle Density (Assumed)	2.70
Diameter	74.4	74.4	mm		
Moisture Content	26.1	24.6	%	Degree of Saturation (%)	99.0
Wet Density	1.96	2.08	Mg/m^3		
Dry Density	1.53	1.67	Mg/m^3	Test Duration (Days)	6
				Date Tested	30/01/2019

Square Root of Time Fitting Method

Pressure Range kN/m2	Mv m2/MN	Cv m2/yr	Temp C	Voids Ratio
Initial				0.766
0 - 25	0.934	-	18	0.723
25 - 50	0.679	2.56	17	0.698
50 - 100	0.479	2.02	17	0.662
100 - 200	0.253	1.28	17	0.620
200 - 50	0.060	Swelling	18	0.634
50 - 200	0.077	2.93	18	0.615

For sample description please refer to the Laboratory Sample Description Sheet

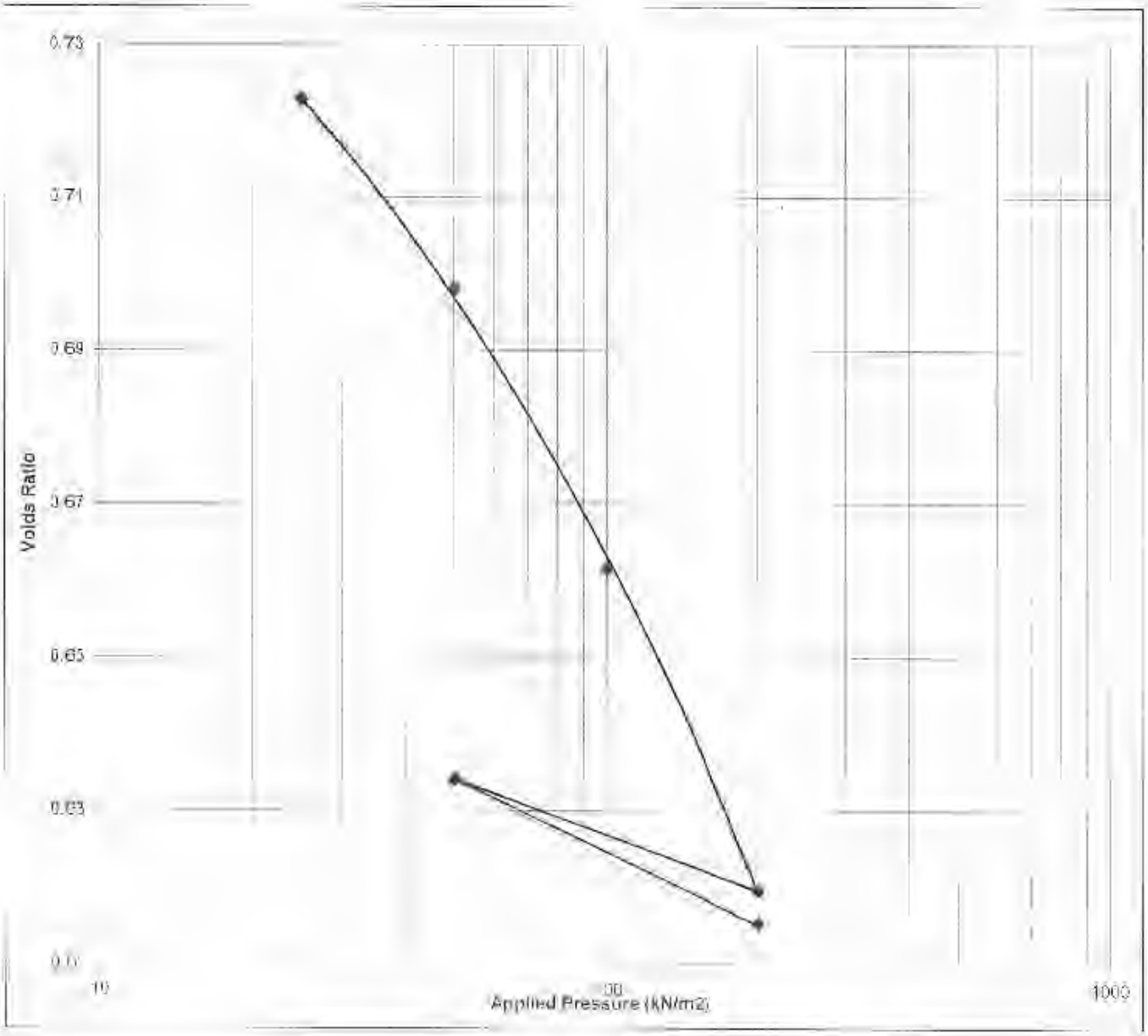
Contract Title	Client
Northern Gateway	Far East Consortium International Limited

	Signed	Name		
AEG		M. SELKIRK	Page 1 of 2	UKAS TESTING
	Date of Issue: 06/02/2019	Computation: NW1560/0	AEG Centre No: NW1520	1367

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH104	Sample	B17	Depth	5.30m
Specimen Type	Compacted	Orientation	N/A	Specific Depth	N/A



Contract Title: Northern Gateway	Client: Far East Consortium International Limited

Signed:	Name: M. SELWIRK	Page 2 of 2	
Date of Issue: 15/02/2019	Certificate No: AW15280D	AEG Contract No: AW1580	

1267

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	**BH110**	**Sample**	**B13**	**Depth**	**4.80m**
Specimen Type	**Compacted**	**Orientation**	**N/A**	**Specific Depth**	**N/A**

	INITIAL	FINAL			
Height	19.0	17.4	mm	Particle Density (Assumed)	2.70
Diameter	74.4	74.4	mm		
Moisture Content	18.0	14.3	%	Degree of Saturation (%)	95.6
Wet Density	2.11	2.24	Mg/m^3		
Dry Density	1.79	1.96	Mg/m^3	Test Duration (Days)	8
				Date Tested	30/01/2019

Square Root of Time Fitting Method

Pressure Range kN/m2	Mv m2/MN	Cv m2/yr	Temp C	Voids Ratio
Initial				0.539
0 - 50	1.054	.	16	0.425
50 - 100	0.159	9.71	17	0.417
100 - 200	0.117	9.52	17	0.400
200 - 400	0.063	13.66	17	0.383
400 - 100	0.001	Swelling	18	0.383
100 - 400	0.002	35.01	16	0.382

For sample description please refer to the Laboratory Sample Description Sheet

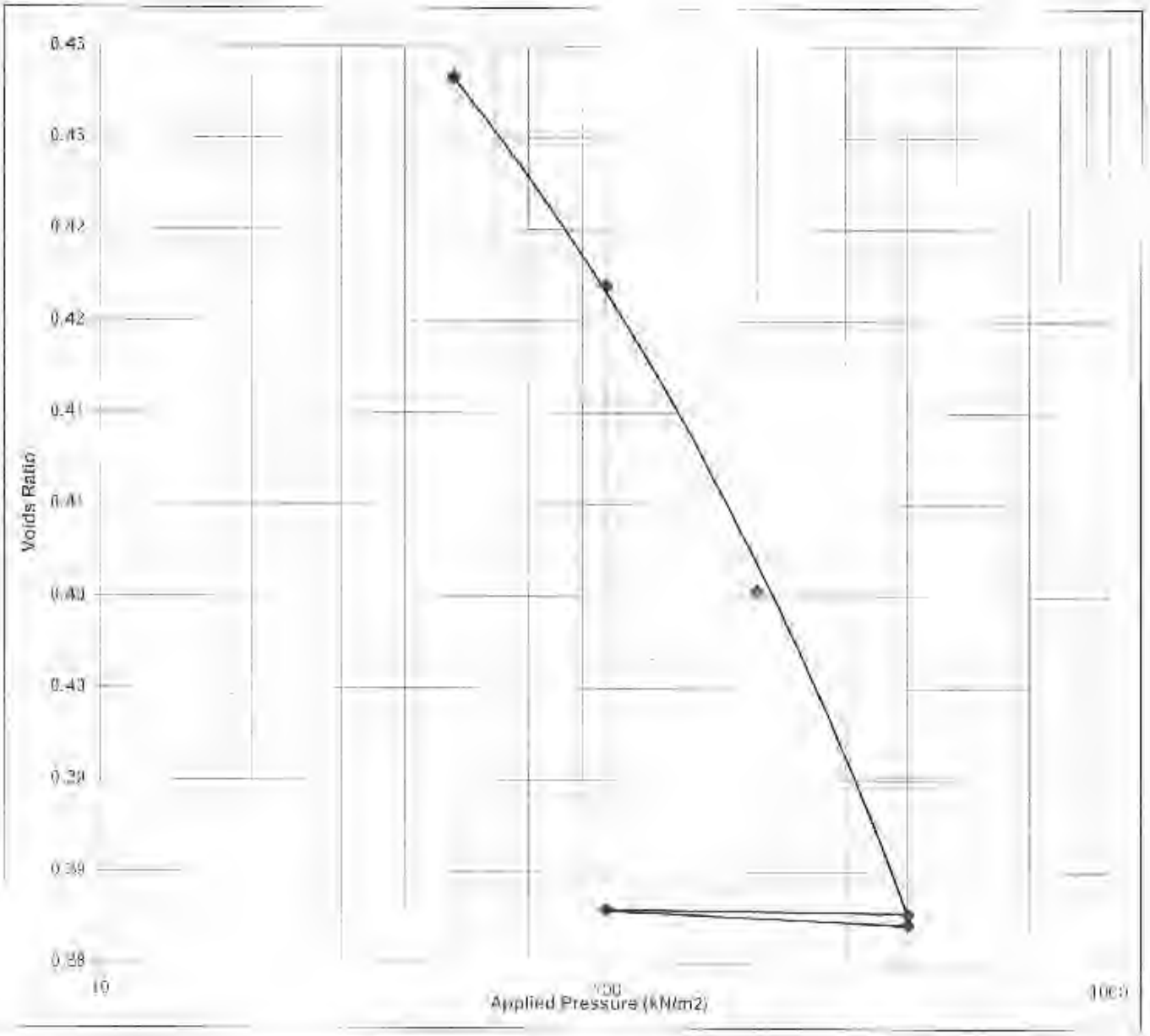
Contract Title	Client
Northern Gateway	Far East Consortium International Limited

AEG	Signed:	Name: M. SELKIRK	Page 1 of 2
Date of Issue: 06/02/2019	Certificate No: NW1268/E	AEG Contract No: NW1522	UKAS TESTING 0357

ALLIED EXPLORATION & GEOTECHNICS LIMITED

ONE DIMENSIONAL CONSOLIDATION PROPERTIES
BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH110	Sample	B13	Depth	4.80m
Specimen Type	Compacted	Orientation	N/A	Specific Depth	N/A



Contract Title: Northern Gateway	Client: Far East Consortium International Limited

Signed:	Name: M. SELKIRK	Page 2 of 2	
Date of Issue:	Certificate No: NW1580/2	AEG Contract No: NW1580	1387

Shear Strength by Hand Vane

LABORATORY TESTING ENCLOSURE 10

ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF SHEAR STRENGTH BY HAND VANE

For sample description please refer to Sample Description Sheet

Exploratory Hole No.	Depth (m BGL)	Sample Type & No.	Vane Shear Strength	Remarks*
TP103	1.50	B10	34kPa	MCV Nat Point
			31kPa	Point 1
			74kPa	Point 2
			96kPa	Point 3
			25kPa	Point 4
			58kPa	Point 5

All specified depths are approximate within the sample.

Contract Title:	Client:
Northern Gateway	Far East Consortium International Limited

Signed:		Name:	Page 1 of 1
Date of Issue: 19/12/2015		Certificate No: NW1580/HV/01	AEG Contract No: NW1580

ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF SHEAR STRENGTH BY HAND VANE

For sample description please refer to Sample Description Sheet

Exploratory Hole No.	Depth (m BGL)	Sample Type & No.	Vane Shear Strength	Remarks'
TP111/112	0.60	LB3	21kPa	MCV Point 1
			29kPa	MCV Point 2
			46kPa	MCV Point 3
			54kPa	MCV Point 4
			>130kPa	MCV Point 5 (NMC)

* All specific depths are approximate within the sample

Contract Title	Client
Northern Gateway	For: East Consortium International Limited

Signed: MBone	Name:	Page 1 of 1	
Date of Issue: [illegible] 2019	Certificate No: NW1503(V01	AEG Contract No: NW 503	

ALLIED EXPLORATION & GEOTECHNICS LIMITED

DETERMINATION OF SHEAR STRENGTH BY HAND VANE

For sample description please refer to Sample Description Sheet

Exploratory Hole No.	Depth (m BGL)	Sample Type & No.	Vane Shear Strength	Remarks*
TP121/122	0.80	LB3	20kPa	MCV Point 1
			35kPa	MCV Point 2 (NAT)
			38kPa	MCV Point 3
			43kPa	MCV Point 4
			51kPa	MCV Point 5

* All specific depths are approximate to the sample.

Contract Title:	Client:
Northern Gateway	For East Coast Bulk International Limited

Signed: MSand	Name:	Page 1 of 1	
Date of Issue: 14/02/2019	Certificate No.: Certificate No.rw1580/HV/1	AE&G Contract No: RW1580	

Undrained Shear Strength in Triaxial Cell without Pore Water Pressure Measurement

LABORATORY TESTING ENCLOSURE 11

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: [illegible]
Regional Office: [illegible]

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

BS 1377: Part 7: Clauses 8 & 9 : 1990 Part 2 Clause 3.2

Exploratory hole	Sample ID: Depth (m)	Sample ID: Type	Specific Depth (m)	Diameter (mm)	Length (mm)	Prep Method	Stage No.	Initial Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Membrane Thickness (mm)	Membrane Correction (kPa)	Cell Pressure (kPa)	Corrected Deviator Stress (kPa)	Failure Strain (%)	Mode of Failure	cu (kPa)	Date Tested
BH101	3.50	B15	3.50	104.7	192.4	REMOULDED		21.6	2.05	1.69	0.4	1.46	65	63	20.0	C	31	29/01/2019
BH101	5.00	B17	5.30	102.3	200.7	REMOULDED		25.7	2.03	1.62	0.4	1.49	100	54	20.0	C	27	30/01/2019
BH101	6.50	B20	6.80	99.3	200.9	REMOULDED		28.8	2.12	1.65	0.4	1.45	150	48	19.5	B	24	30/01/2019
BH101	8.00	B22	8.30	104.3	199.5	REMOULDED		29.5	2.07	1.60	0.5	1.32	100	22	20.0	B	12	30/01/2019

For description of samples please refer to the Laboratory Sample Description Sheet. Please note the rate of strain was 2% per minute and the orientation of the test specimen was vertical. Latex membrane used.

Date of Issue :- 13/02/2019

Certificate No :- TN/19/15801

Signed :-

Name :-

Page 1 of 1

Client :- Fay East Consortium International Limited

Contact Title :- Northern Gateway

AEG Contract No :- NW1680

UKAS TESTING 1367

APPENDIX I

Specialist Chemical Testing

(Tested Externally)

Certificate of Analysis

Certificate Number 19-01510

01-Feb-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-01510

Client Reference NW1580

Order No CH1500

Contract Title Northern Gateway

Description 1 Soil sample, 2 Water samples.

Date Received 28-Jan-19

Date Started 28-Jan-19

Date Completed 01-Feb-19

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

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

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-01510
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1450940
			Sample ID	BH102
			Depth	0.30
			Other ID	2
			Sample Type	ES
			Sampling Date	24/01/19
			Sampling Time	n/s
Test	**Method**	**LOD**	**Units**	
Metals				
Antimony	DETSC 2301*	1	mg/kg	7.6
Arsenic	DETSC 2301#	0.2	mg/kg	16
Beryllium	DETSC 2301#	0.2	mg/kg	1.1
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	1.0
Chromium	DETSC 2301#	0.15	mg/kg	23
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	140
Lead	DETSC 2301#	0.3	mg/kg	530
Mercury	DETSC 2325#	0.05	mg/kg	0.44
Nickel	DETSC 2301#	1	mg/kg	26
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	36
Zinc	DETSC 2301#	1	mg/kg	500
Inorganics				
pH	DETSC 2008#			10.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	7.1
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	2.4
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	9.3
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	22
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	120
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	160
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	11
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	52
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	250
Aromatic C5-C35	DETSC 3072*	10	mg/kg	320
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	470
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-01510
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1450940
			Sample ID	BH102
			Depth	0.30
			Other ID	2
			Sample Type	ES
			Sampling Date	24/01/19
			Sampling Time	n/s
Test	**Method**	**LOD**	**Units**	
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	0.22
Acenaphthylene	DETSC 3303#	0.03	mg/kg	0.06
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.65
Fluorene	DETSC 3303	0.03	mg/kg	0.43
Phenanthrene	DETSC 3303#	0.03	mg/kg	2.3
Anthracene	DETSC 3303	0.03	mg/kg	0.96
Fluoranthene	DETSC 3303#	0.03	mg/kg	6.4
Pyrene	DETSC 3303#	0.03	mg/kg	5.6
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	2.1
Chrysene	DETSC 3303	0.03	mg/kg	2.0
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	2.4
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	1.0
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	2.4
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.78
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.11
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.94
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	28
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

Summary of Chemical Analysis
Water Samples

Our Ref 19-01510
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1450941	1450942
			Sample ID	BH103	BH105
			Depth	0.90-3.50	4.52-9.00
			Other ID	1	1
			Sample Type	EW	EW
			Sampling Date	24/01/19	24/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Antimony, Dissolved	DETSC 2306	0.17	ug/l	11	8.4
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.8	0.57
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	0.1	< 0.1
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.10	0.13
Calcium, Dissolved	DETSC 2306	0.09	mg/l	110	120
Chromium, Dissolved	DETSC 2306	0.25	ug/l	7.8	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	3.0	2.7
Lead, Dissolved	DETSC 2306	0.09	ug/l	1.9	0.20
Manganese, Dissolved	DETSC 2306	0.22	ug/l	2800	820
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	6.4	3.4
Selenium, Dissolved	DETSC 2306	0.25	ug/l	5.0	1.2
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	3.5	1.1
Zinc, Dissolved	DETSC 2306	1.3	ug/l	13	19
Inorganics					
pH	DETSC 2008			7.4	7.3
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40
Dissolved Organic Carbon	*	2	mg/l	17	2.5
Hardness	DETSC 2303	0.1	mg/l	359	369
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	3.8	1.3
Chloride	DETSC 2055	0.1	mg/l	29	29
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0

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

Summary of Chemical Analysis
Water Samples

Our Ref 19-01510
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1450941	1450942
			Sample ID	BH103	BH105
			Depth	0.90-3.50	4.52-9.00
			Other ID	1	1
			Sample Type	EW	EW
			Sampling Date	24/01/19	24/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	0.81	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.41	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	0.18	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.17	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	0.11	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.06	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	0.05	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	0.05	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	1.9	< 0.20
Phenols					
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-01510
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1450940	BH102 2 0.30	SOIL	NAD	none	Michael Kay

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 19-01510
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1450940	BH102 0.30 SOIL	24/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1450941	BH103 0.90-3.50 WATER	24/01/19	GB 1L x2, PB 1L, PU		
1450942	BH105 4.52-9.00 WATER	24/01/19	GB 1L x2, PB 1L, PU		

Key: G-Glass P-Plastic J-Jar T-Tub B-Bottle U-Tube

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Certificate of Analysis

Certificate Number	19-00676-1
	21-Feb-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-00676-1
Client Reference	NW1580
Order No	CH1500
Contract Title	Northern Gateway
Description	15 Soil samples.
Date Received	15-Jan-19
Date Started	15-Jan-19
Date Completed	21-Feb-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-00676, amendments.**

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

Approved By



Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH107	8	2	1444842	21/02/2019	Brown sandy CLAY
BH109	4	1.2	1444843	21/02/2019	Dark brown gravelly, sandy CLAY (Made ground - brick)
BH110	2	0.3	1444844	21/02/2019	Very dark brown gravelly SAND (Possible made ground - brick)
BH110	7	3	1444845	21/02/2019	Brown gravelly, sandy CLAY
BH112	2	0.3	1444846	21/02/2019	Brown sandy GRAVEL (Made ground - brick) (sample matrix outside MCERTS scope of accreditation)
BH112	12	3.3	1444847	21/02/2019	Brown sandy CLAY
TP119	1	0.2	1444848	21/02/2019	Light brown gravelly, clayey SAND (Possible made ground - brick)
TP119	10	3	1444849	21/02/2019	Brown gravelly, clayey SAND
TP120	1	0.3	1444850	21/02/2019	Brown gravelly, sandy CLAY
TP120	5	1	1444851	21/02/2019	Very dark brown gravelly,, clayey SAND
TP125	1	0.3	1444852	21/02/2019	Brown gravelly, sandy CLAY
TP126	1	0.3	1444853	21/02/2019	Dark brown sandy CLAY
TP126	10	2.2	1444854	21/02/2019	Dark brown gravelly, sandy CLAY
TP127	1	0.3	1444855	21/02/2019	Dark brown gravelly, sandy CLAY
WS105	3	0.3	1444856	21/02/2019	Very dark brown sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

				Lab No	1444842	1444843	1444844	1444845	1444846	1444847
				Sample ID	BH107	BH109	BH110	BH110	BH112	BH112
				Depth	2.00	1.20	0.30	3.00	0.30	3.30
				Other ID	8	4	2	7	2	12
				Sample Type	ES	ES	ES	ES	ES	ES
				Sampling Date	09/01/19	09/01/19	11/01/19	11/01/19	11/01/19	11/01/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification	DETSC 1102	0				Y		Y	
Metals										
Antimony	DETSC 2301*	1	mg/kg	1.2	1.4	2.1	< 1.0	5.1	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	9.0	6.7	6.2	7.1	8.5	4.5
Beryllium	DETSC 2301#	0.2	mg/kg	0.8	0.4	0.4	0.5	0.4	0.4
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.1	1.5	1.2	1.2	1.1	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.5	0.3	0.2	0.3	0.1
Chromium	DETSC 2301#	0.15	mg/kg	24	17	22	13	15	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	25	19	46	22	40	8.9
Lead	DETSC 2301#	0.3	mg/kg	18	77	37	1900	300	66
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.15	< 0.05	0.10	0.16	< 0.05
Nickel	DETSC 2301#	1	mg/kg	28	11	25	11	12	12
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	30	21	38	20	22	19
Zinc	DETSC 2301#	1	mg/kg	57	74	91	74	95	36
Inorganics										
pH	DETSC 2008#			8.3	11.4	10.5	11.7	8.5	9.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg						
Cyanide, Complex	DETSC 2130*	0.2	mg/kg						
Thiocyanate	DETSC 2130#	0.6	mg/kg						
Total Organic Carbon	DETSC 2084#	0.5	%	1.1	1.6	3.3	1.7	1.8	0.5
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	2.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	5.8	4.1	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	8.3	14	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	35	120	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	52	140	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	2.9	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	5.5	27	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	71	350	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	76	380	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	130	520	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444842	1444843	1444844	1444845	1444846	1444847
			Sample ID	BH107	BH109	BH110	BH110	BH112	BH112
			Depth	2.00	1.20	0.30	3.00	0.30	3.30
			Other ID	8	4	2	7	2	12
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	09/01/19	09/01/19	11/01/19	11/01/19	11/01/19	11/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.23	0.17	0.43	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.24	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16	0.48	0.48	0.04	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.12	0.37	0.28	0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	1.0	3.1	1.6	0.41	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.23	1.1	0.37	0.10	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.94	6.7	1.5	0.89	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.92	6.1	1.2	0.89	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.30	2.8	0.42	0.35	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.38	3.0	0.47	0.41	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.29	4.5	0.50	0.54	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	1.5	0.16	0.17	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.24	3.9	0.36	0.44	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10	2.2	0.15	0.25	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.54	0.04	0.05	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	2.7	0.18	0.30	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	5.2	39	8.1	4.8	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444848	1444849	1444850	1444851	1444852	1444853
			Sample ID	TP119	TP119	TP120	TP120	TP125	TP126
			Depth	0.20	3.00	0.30	1.00	0.30	0.30
			Other ID	1	10	1	5	1	1
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	09/01/19	09/01/19	09/01/19	09/01/19	11/01/19	09/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0					Y	Y	Y
Metals									
Antimony	DETSC 2301*	1	mg/kg	1.3	1.3	2.7	3.7	4.9	2.6
Arsenic	DETSC 2301#	0.2	mg/kg	4.1	12	16	19	14	9.5
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	0.5	1.2	1.9	0.7	0.5
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.6	1.1	1.0	1.5	1.4	1.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.1	0.9	0.6	0.7	3.0
Chromium	DETSC 2301#	0.15	mg/kg	12	15	19	22	31	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	59	19	110	120	41	39
Lead	DETSC 2301#	0.3	mg/kg	47	18	2100	96	830	120
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.14	0.13	0.43	0.72
Nickel	DETSC 2301#	1	mg/kg	7.5	16	17	28	18	18
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	10	36	23	35	39	34
Zinc	DETSC 2301#	1	mg/kg	100	67	140	140	150	520
Inorganics									
pH	DETSC 2008#			11.6	7.4	10.1	8.3	10.2	10.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.4	0.3	0.2	0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg				< 0.1		
Cyanide, Complex	DETSC 2130*	0.2	mg/kg				0.3		
Thiocyanate	DETSC 2130#	0.6	mg/kg				0.8		
Total Organic Carbon	DETSC 2084#	0.5	%	0.9	0.7	4.5	16	3.1	2.2
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.8
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	3.7	< 1.2	< 1.2	< 1.2	< 1.2	8.7
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	25	< 1.5	< 1.5	< 1.5	< 1.5	19
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	91	< 3.4	< 3.4	< 3.4	< 3.4	86
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	120	< 10	< 10	< 10	< 10	120
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	9.2
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	97
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	110
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	120	< 10	< 10	< 10	< 10	220
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444848	1444849	1444850	1444851	1444852	1444853
			Sample ID	TP119	TP119	TP120	TP120	TP125	TP126
			Depth	0.20	3.00	0.30	1.00	0.30	0.30
			Other ID	1	10	1	5	1	1
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	09/01/19	09/01/19	09/01/19	09/01/19	11/01/19	09/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03		0.19	0.16
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03		< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03		0.29	0.23
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03		0.17	0.15
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.07	< 0.03	0.05		1.1	1.6
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03		0.26	0.37
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.24	< 0.03	0.08		1.3	1.9
Pyrene	DETSC 3303#	0.03	mg/kg	0.20	< 0.03	0.06		1.2	1.7
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	< 0.03		0.40	0.60
Chrysene	DETSC 3303	0.03	mg/kg	0.11	< 0.03	0.03		0.46	0.69
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.10	< 0.03	< 0.03		0.44	0.59
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03		0.16	0.24
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	< 0.03		0.31	0.44
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	< 0.03		0.15	0.19
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03		0.04	0.05
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.09	< 0.03	< 0.03		0.17	0.21
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.0	< 0.10	0.20		6.6	9.1
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444854	1444855	1444856
			Sample ID	TP126	TP127	WS105
			Depth	2.20	0.30	0.30
			Other ID	10	1	3
			Sample Type	ES	ES	ES
			Sampling Date	09/01/19	11/01/19	11/01/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Asbestos Quantification	DETSC 1102	0			Y	
Metals						
Antimony	DETSC 2301*	1	mg/kg	1.1	1.5	6.3
Arsenic	DETSC 2301#	0.2	mg/kg	6.6	17	12
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	0.7	0.4
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.9	1.4	1.0
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	0.4	4.7
Chromium	DETSC 2301#	0.15	mg/kg	19	19	38
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	16	37	190
Lead	DETSC 2301#	0.3	mg/kg	27	87	490
Mercury	DETSC 2325#	0.05	mg/kg	0.10	0.23	0.13
Nickel	DETSC 2301#	1	mg/kg	15	16	42
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.7
Vanadium	DETSC 2301#	0.8	mg/kg	26	26	27
Zinc	DETSC 2301#	1	mg/kg	53	100	1700
Inorganics						
pH	DETSC 2008#			8.7	9.8	8.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.8
Cyanide, Free	DETSC 2130#	0.1	mg/kg			
Cyanide, Complex	DETSC 2130*	0.2	mg/kg			
Thiocyanate	DETSC 2130#	0.6	mg/kg			
Total Organic Carbon	DETSC 2084#	0.5	%	0.7	2.7	2.2
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	4.2	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	12	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	53	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	69	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	69	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444854	1444855	1444856
			Sample ID	TP126	TP127	WS105
			Depth	2.20	0.30	0.30
			Other ID	10	1	3
			Sample Type	ES	ES	ES
			Sampling Date	09/01/19	11/01/19	11/01/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10	0.04
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16	0.05
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.09	0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.71	0.27
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.17	0.04
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	1.2	0.26
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	1.1	0.26
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.37	0.09
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.43	0.11
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.47	0.09
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.17	0.04
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.32	0.07
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.16	0.04
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.18	0.04
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	5.6	1.4
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

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

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	1444851
Sample ID	TP120
Depth	1.00
Other ID	5
Sample Type	ES
Sampling Date	09/01/19
Sampling Time	n/s

Test	Method	LOD	Units	
VOCs				
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01

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

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	1444851
Sample ID	TP120
Depth	1.00
Other ID	5
Sample Type	ES
Sampling Date	09/01/19
Sampling Time	n/s

Test	Method	LOD	Units	
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01
Naphthalene	DETSC 3431	0.01	mg/kg	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01
SVOCs				
Phenol	DETSC 3433	0.1	mg/kg	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1
Acenaphthylene	DETSC 3433	0.1	mg/kg	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1
Acenaphthene	DETSC 3433	0.1	mg/kg	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1
Fluorene	DETSC 3433	0.1	mg/kg	< 0.1

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

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	1444851
Sample ID	TP120
Depth	1.00
Other ID	5
Sample Type	ES
Sampling Date	09/01/19
Sampling Time	n/s

Test	Method	LOD	Units	
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Phenanthrene	DETSC 3433	0.1	mg/kg	0.1
Anthracene	DETSC 3433	0.1	mg/kg	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1
Fluoranthene	DETSC 3433	0.1	mg/kg	0.3
Pyrene	DETSC 3433	0.1	mg/kg	0.3
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1
Benzo(a)anthracene	DETSC 3433	0.1	mg/kg	0.2
Chrysene	DETSC 3433	0.1	mg/kg	0.2
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1
Benzo(b)fluoranthene	DETSC 3433	0.1	mg/kg	0.2
Benzo(k)fluoranthene	DETSC 3433	0.1	mg/kg	< 0.1
Benzo(a)pyrene	DETSC 3433	0.1	mg/kg	0.2
Indeno(123cd)pyrene	DETSC 3433	0.1	mg/kg	0.1
Dibenzo(ah)anthracene	DETSC 3433	0.1	mg/kg	< 0.1
Benzo(ghi)perylene	DETSC 3433	0.1	mg/kg	0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1444842	BH107 8 2.00	SOIL	NAD	none	Rebecca Burgess
1444843	BH109 4 1.20	SOIL	NAD	none	Rebecca Burgess
1444844	BH110 2 0.30	SOIL	Amosite	bundle of Amosite fibres	Rebecca Burgess
1444845	BH110 7 3.00	SOIL	NAD	none	Rebecca Burgess
1444846	BH112 2 0.30	SOIL	Amosite	bundles of Amosite fibres	Rebecca Burgess
1444847	BH112 12 3.30	SOIL	NAD	none	Rebecca Burgess
1444848	TP119 1 0.20	SOIL	NAD	none	Rebecca Burgess
1444849	TP119 10 3.00	SOIL	NAD	none	Rebecca Burgess
1444850	TP120 1 0.30	SOIL	NAD	none	Rebecca Burgess
1444851	TP120 5 1.00	SOIL	Chrysotile	Chrysotile in microscopic cement	Rebecca Burgess
1444852	TP125 1 0.30	SOIL	Chrysotile Amosite	Chrysotile in microscopic bitumen and bundles of Chrysotile and Amosite in soil	Rebecca Burgess
1444853	TP126 1 0.30	SOIL	Amosite Chrysotile	Amosite in loose fibrous asbestos debris and bundles of Chrysotile fibres in soil	Rebecca Burgess
1444854	TP126 10 2.20	SOIL	NAD	none	Rebecca Burgess
1444855	TP127 1 0.30	SOIL	Amosite Chrysotile	bundles of Chrysotile and Amosite fibres	Rebecca Burgess
1444856	WS105 3 0.30	SOIL	NAD	none	Rebecca Burgess

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.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

		Lab No	1444844	1444846	1444851	1444852
		Sample ID	BH110	BH112	TP120	TP125
		Depth	0.30	0.30	1.00	0.30
		Other ID	2	2	5	1
		Sample Type	SOIL	SOIL	SOIL	SOIL
		Sampling Date	11/01/19	11/01/19	09/01/19	11/01/19
		Sampling Time				
Test	**Method**	**Units**				
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**< 0.001**	**< 0.001**	**0.002**	**0.003**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na	na	0.002	0.002
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	<0.001	<0.001	na	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample		g	550.04	445.71	802.44	1253.67
ACMs present*		type			Cement	Bitumen
Mass of ACM in sample		g			0.10	0.33
% ACM by mass		%			0.01	0.03
% asbestos in ACM		%			15	8
% asbestos in sample		%			0.002	0.002
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample		Mass %	<0.001	<0.001	na	<0.001
% Chrysotile bundles in sample		Mass %	na	na	na	<0.001
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample		Mass %	na	na	na	na
% Chrysotile fibres in sample		Mass %	na	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres		Fibres/g	na	na	na	na
Chrysotile fibres		Fibres/g	na	na	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

Summary of Asbestos Quantification Analysi

Soil Samples

Our Ref 19-00676-1
Client Ref NW1580
Contract Title Northern Gateway

		Lab No	1444853	1444855
		Sample ID	TP126	TP127
		Depth	0.30	0.30
		Other ID	1	1
		Sample Type	SOIL	SOIL
		Sampling Date	09/01/19	11/01/19
		Sampling Time		
Test	**Method**	**Units**		
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.005**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %	0.004	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	0.001	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na
Breakdown of Gravimetric Analysis (a)				
Mass of Sample		g	800.26	770.41
ACMs present*		type	LFAD	
Mass of ACM in sample		g	0.04	
% ACM by mass		%	0.00	
% asbestos in ACM		%	85	
% asbestos in sample		%	0.004	
Breakdown of Detailed Gravimetric Analysis (b)				
% Amphibole bundles in sample		Mass %	na	<0.001
% Chrysotile bundles in sample		Mass %	0.001	<0.001
Breakdown of PCOM Analysis (c)				
% Amphibole fibres in sample		Mass %	na	na
% Chrysotile fibres in sample		Mass %	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)				
Amphibole fibres		Fibres/g	na	na
Chrysotile fibres		Fibres/g	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

Information in Support of the Analytical Results

Our Ref 19-00676-1
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1444842	BH107 2.00 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444843	BH109 1.20 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444844	BH110 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444845	BH110 3.00 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444846	BH112 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444847	BH112 3.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444848	TP119 0.20 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444849	TP119 3.00 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444850	TP120 0.30 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444851	TP120 1.00 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444852	TP125 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444853	TP126 0.30 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444854	TP126 2.20 SOIL	09/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444855	TP127 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444856	WS105 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number 19-00650-1

07-Feb-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-00650-1

Client Reference NW1580

Order No CH1500

Contract Title Northern Gateway

Description 3 Soil samples.

Date Received 15-Jan-19

Date Started 15-Jan-19

Date Completed 07-Feb-19

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

Notes **This report supersedes 19-00650, extra testing.**

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

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-00650-1
Client Ref NW1580
Contract Title Northern Gateway

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
TP121	2	0.3	1444752	21/01/2019	Very dark brown, gravelly, sandy CLAY
TP121	8	2.3	1444753	21/01/2019	Brown SAND
TP122	2	0.3	1444754	21/01/2019	Very dark brown gravelly, very sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00650-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444752	1444753	1444754
			Sample ID	TP121	TP121	TP122
			Depth	0.30	2.30	0.30
			Other ID	2	8	2
			Sample Type	ES	ES	ES
			Sampling Date	11/01/19	11/01/19	11/01/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Antimony	DETSC 2301*	1	mg/kg	6.6	< 1.0	59
Arsenic	DETSC 2301#	0.2	mg/kg	18	4.5	23
Beryllium	DETSC 2301#	0.2	mg/kg	1.0	< 0.2	1.3
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.2	0.8	1.1
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	< 0.1	0.4
Chromium	DETSC 2301#	0.15	mg/kg	15	6.8	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	350	10	280
Lead	DETSC 2301#	0.3	mg/kg	440	28	730
Mercury	DETSC 2325#	0.05	mg/kg	0.39	< 0.05	0.18
Nickel	DETSC 2301#	1	mg/kg	28	6.5	24
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	28	8.7	29
Zinc	DETSC 2301#	1	mg/kg	280	35	260
Inorganics						
pH	DETSC 2008#			8.1	8.0	8.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	4.3	0.7	3.7
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	55		49
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00650-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444752	1444753	1444754
			Sample ID	TP121	TP121	TP122
			Depth	0.30	2.30	0.30
			Other ID	2	8	2
			Sample Type	ES	ES	ES
			Sampling Date	11/01/19	11/01/19	11/01/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-00650-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1444752	TP121 2 0.30	SOIL	NAD	none	Rebecca Burgess
1444753	TP121 8 2.30	SOIL	NAD	none	Rebecca Burgess
1444754	TP122 2 0.30	SOIL	NAD	none	Rebecca Burgess

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 19-00650-1
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1444752	TP121 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444753	TP121 2.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444754	TP122 0.30 SOIL	11/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number 19-00541-1

24-Jan-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-00541-1

Client Reference NW1580

Order No CH1500

Contract Title Northern Gateway

Description 14 Soil samples, 4 Leachate samples.

Date Received 11-Jan-19

Date Started 11-Jan-19

Date Completed 24-Jan-19

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

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

Approved By



Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH104	4	0.7	1444062	21/01/2019	Very dark brown SAND
BH104	15	4.7	1444063	21/01/2019	Dark brown sandy CLAY
BH104	28	9.7	1444064	21/01/2019	Very dark grey sandy CLAY
BH105	14	3.3	1444065	21/01/2019	Brown gravelly, sandy CLAY
BH106	1	0.3	1444066	21/01/2019	Black gravelly SAND
BH106	7	3.3	1444067	21/01/2019	Very dark brown gravelly, clayey SAND
BH106	17	7.6	1444068	21/01/2019	Dark brown gravelly, sandy CLAY
TP124	3	0.3	1444069	21/01/2019	Very dark brown gravelly SAND
TP124	11	3.2	1444070	21/01/2019	Brown sandy CLAY
WS101	3	0.3	1444071	21/01/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
WS102	5	1	1444072	21/01/2019	Very dark brown gravelly, clayey SAND (Possible made ground - brick)
WS103	4	1	1444073	21/01/2019	Dark brown gravelly, very sandy CLAY (Possible made ground - brick)
WS104	6	1	1444074	21/01/2019	Very dark brown gravelly SAND
WS106	5	1	1444075	21/01/2019	Very dark brown sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

				Lab No	1444062	1444063	1444064	1444065	1444066	1444067
				Sample ID	BH104	BH104	BH104	BH105	BH106	BH106
				Depth	0.70	4.70	9.70	3.30	0.30	3.30
				Other ID	4	15	28	14	1	7
				Sample Type	ES	ES	ES	ES	ES	ES
				Sampling Date	04/01/19	07/01/19	07/01/19	08/01/19	08/01/19	08/01/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification	DETSC 1102	0								
Metals										
Antimony	DETSC 2301*	1	mg/kg	5.9	1.2	1.8	1.1	21	7.8
Arsenic	DETSC 2301#	0.2	mg/kg	23	8.2	19	10	40	28
Beryllium	DETSC 2301#	0.2	mg/kg	2.8	0.7	2.1	0.7	1.3	1.6
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.4	0.8	1.3	0.8	0.8	1.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.2	0.2	0.1	1.0	0.5
Chromium	DETSC 2301#	0.15	mg/kg	16	20	22	18	22	27
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	300	33	100	18	210	180
Lead	DETSC 2301#	0.3	mg/kg	180	42	75	12	370	210
Mercury	DETSC 2325#	0.05	mg/kg	0.45	< 0.05	0.38	< 0.05	0.38	0.37
Nickel	DETSC 2301#	1	mg/kg	48	24	53	18	38	34
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.7	< 0.5	1.0	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	66	26	34	26	52	46
Zinc	DETSC 2301#	1	mg/kg	150	79	120	54	340	160
Inorganics										
pH	DETSC 2008#			7.3	9.7	7.8	8.2	6.9	7.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	2.4	< 0.1	0.5	0.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg						
Cyanide, Complex	DETSC 2130*	0.2	mg/kg						
Thiocyanate	DETSC 2130#	0.6	mg/kg						
Total Organic Carbon	DETSC 2084#	0.5	%	29	2.2	13	0.6	24	21
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	0.7	< 0.5	1.4	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	4.3	< 0.6	3.9	6.1
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	9.0	17	14	13
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	15	17	19	19
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	15	17	19	19

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444062	1444063	1444064	1444065	1444066	1444067
			Sample ID	BH104	BH104	BH104	BH105	BH106	BH106
			Depth	0.70	4.70	9.70	3.30	0.30	3.30
			Other ID	4	15	28	14	1	7
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	04/01/19	07/01/19	07/01/19	08/01/19	08/01/19	08/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	0.10	< 0.03	0.04	0.09
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03	< 0.03	0.04
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.09	0.06	0.56	< 0.03	0.21	0.36
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.10	< 0.03	0.06	0.08
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.11	0.04	0.57	< 0.03	0.54	0.40
Pyrene	DETSC 3303#	0.03	mg/kg	0.12	0.04	0.64	< 0.03	0.54	0.38
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	0.24	< 0.03	0.28	0.16
Chrysene	DETSC 3303	0.03	mg/kg	0.07	< 0.03	0.25	< 0.03	0.35	0.15
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	0.24	< 0.03	0.43	0.16
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.10	< 0.03	0.15	0.05
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.21	< 0.03	0.25	0.11
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.09	< 0.03	0.13	0.05
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.11	< 0.03	0.16	0.05
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.48	0.14	3.4	< 0.10	3.2	2.1
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444068	1444069	1444070	1444071	1444072	1444073
			Sample ID	BH106	TP124	TP124	WS101	WS102	WS103
			Depth	7.60	0.30	3.20	0.30	1.00	1.00
			Other ID	17	3	11	3	5	4
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	08/01/19	08/01/19	08/01/19	08/01/19	07/01/19	07/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0							Y
Metals									
Antimony	DETSC 2301*	1	mg/kg	1.4	180	4.8	3.3	1.5	11
Arsenic	DETSC 2301#	0.2	mg/kg	11	61	7.1	12	12	14
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	1.8	0.9	0.8	0.6	0.6
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	2.3	1.6	1.0	1.1	1.3	1.5
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	1.6	< 0.1	0.3	0.5	0.3
Chromium	DETSC 2301#	0.15	mg/kg	18	33	20	13	12	16
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	26	4200	59	57	80	60
Lead	DETSC 2301#	0.3	mg/kg	45	12000	110	280	280	490
Mercury	DETSC 2325#	0.05	mg/kg	0.11	2.5	< 0.05	0.16	0.63	0.68
Nickel	DETSC 2301#	1	mg/kg	12	43	27	16	11	15
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	17	86	24	20	19	24
Zinc	DETSC 2301#	1	mg/kg	50	1300	73	97	140	220
Inorganics									
pH	DETSC 2008#			7.7	7.5	7.5	7.8	8.5	8.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	1.1	89	0.2	0.8	0.4	0.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg						
Cyanide, Complex	DETSC 2130*	0.2	mg/kg						
Thiocyanate	DETSC 2130#	0.6	mg/kg						
Total Organic Carbon	DETSC 2084#	0.5	%	2.6	41	0.7	1.8	2.1	3.4
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	1.2	< 0.9	< 0.9	< 0.9	8.6
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	28
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	6.4	< 0.6	< 0.6	< 0.6	75
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	15	< 1.4	< 1.4	< 1.4	88
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	23	< 10	< 10	< 10	200
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	23	< 10	< 10	< 10	200

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444068	1444069	1444070	1444071	1444072	1444073
			Sample ID	BH106	TP124	TP124	WS101	WS102	WS103
			Depth	7.60	0.30	3.20	0.30	1.00	1.00
			Other ID	17	3	11	3	5	4
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	08/01/19	08/01/19	08/01/19	08/01/19	07/01/19	07/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	18
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.11
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.11	0.04	6.1
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.07	< 0.03	4.0
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.35	0.08	0.58	0.42	20
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.08	< 0.03	0.11	0.08	3.7
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.54	0.09	0.59	0.68	13
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.55	0.08	0.53	0.70	13
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.21	0.04	0.18	0.30	3.7
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.23	0.04	0.21	0.32	4.4
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.24	0.04	0.14	0.36	2.9
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.08	< 0.03	0.08	0.13	1.2
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.18	< 0.03	0.10	0.28	2.7
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.08	< 0.03	0.06	0.12	0.75
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.23
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10	< 0.03	0.06	0.15	0.93
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	2.7	0.37	2.8	3.6	95
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	12

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444074	1444075
			Sample ID	WS104	WS106
			Depth	1.00	1.00
			Other ID	6	5
			Sample Type	ES	ES
			Sampling Date	08/01/19	08/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Asbestos Quantification	DETSC 1102	0		Y	Y
Metals					
Antimony	DETSC 2301*	1	mg/kg	3.4	2.5
Arsenic	DETSC 2301#	0.2	mg/kg	15	7.5
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	0.3
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.1	1.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.9
Chromium	DETSC 2301#	0.15	mg/kg	15	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	90	79
Lead	DETSC 2301#	0.3	mg/kg	290	140
Mercury	DETSC 2325#	0.05	mg/kg	0.11	0.41
Nickel	DETSC 2301#	1	mg/kg	15	14
Selenium	DETSC 2301#	0.5	mg/kg	0.9	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	23	17
Zinc	DETSC 2301#	1	mg/kg	310	120
Inorganics					
pH	DETSC 2008#			9.0	9.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	8.5	4.0
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.1
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	8.3	3.9
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	< 0.6
Total Organic Carbon	DETSC 2084#	0.5	%	6.1	4.5
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	15
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	7.2
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	170
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	190
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	1.0	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	4.3	2.4
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	22	17
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	47	240
Aromatic C5-C35	DETSC 3072*	10	mg/kg	74	260
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	74	450

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444074	1444075
			Sample ID	WS104	WS106
			Depth	1.00	1.00
			Other ID	6	5
			Sample Type	ES	ES
			Sampling Date	08/01/19	08/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Benzene	DETSC 3321#	0.01	mg/kg		
Ethylbenzene	DETSC 3321#	0.01	mg/kg		
Toluene	DETSC 3321#	0.01	mg/kg		
Xylene	DETSC 3321#	0.01	mg/kg		
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg		
Acenaphthylene	DETSC 3303#	0.03	mg/kg		
Acenaphthene	DETSC 3303#	0.03	mg/kg		
Fluorene	DETSC 3303	0.03	mg/kg		
Phenanthrene	DETSC 3303#	0.03	mg/kg		
Anthracene	DETSC 3303	0.03	mg/kg		
Fluoranthene	DETSC 3303#	0.03	mg/kg		
Pyrene	DETSC 3303#	0.03	mg/kg		
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		
Chrysene	DETSC 3303	0.03	mg/kg		
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg		
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.4

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444074	1444075
			Sample ID	WS104	WS106
			Depth	1.00	1.00
			Other ID	6	5
			Sample Type	ES	ES
			Sampling Date	08/01/19	08/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444074	1444075
			Sample ID	WS104	WS106
			Depth	1.00	1.00
			Other ID	6	5
			Sample Type	ES	ES
			Sampling Date	08/01/19	08/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Naphthalene	DETSC 3431	0.01	mg/kg	< 0.01	0.02
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
SVOCs					
Phenol	DETSC 3433	0.1	mg/kg	0.3	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	0.2	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	0.4	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	0.2	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	8.8	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3433	0.1	mg/kg	7.7	0.3
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3433	0.1	mg/kg	5.5	0.4
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	6.2	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	8.3	0.2
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3433	0.1	mg/kg	13	0.3

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

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1444074	1444075
			Sample ID	WS104	WS106
			Depth	1.00	1.00
			Other ID	6	5
			Sample Type	ES	ES
			Sampling Date	08/01/19	08/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3433	0.1	mg/kg	61	1.8
Anthracene	DETSC 3433	0.1	mg/kg	14	0.7
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3433	0.1	mg/kg	50	3.0
Pyrene	DETSC 3433	0.1	mg/kg	48	2.7
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3433	0.1	mg/kg	19	1.2
Chrysene	DETSC 3433	0.1	mg/kg	20	1.2
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3433	0.1	mg/kg	17	1.7
Benzo(k)fluoranthene	DETSC 3433	0.1	mg/kg	6.5	0.5
Benzo(a)pyrene	DETSC 3433	0.1	mg/kg	17	1.5
Indeno(123cd)pyrene	DETSC 3433	0.1	mg/kg	7.4	0.9
Dibenzo(ah)anthracene	DETSC 3433	0.1	mg/kg	2.4	0.2
Benzo(ghi)perylene	DETSC 3433	0.1	mg/kg	9.5	1.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	11	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	3.5	< 0.1

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

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id BH106 1 0.30

Sample Numbers 1444066 1444076 1444077
Date Analysed 17/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	24	3	5	6
DETSC 2003# Loss On Ignition	%	11	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	48	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	4.0	100	n/a	n/a
DETSC 2008# pH	pH Units	6.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	2.1	2	0.004	0.02	0.5	2	25
DETSC 2306 Barium as Ba	29	4.8	0.06	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.3	8.1	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	8	5.8	0.016	0.061	2	50	100
DETSC 2306 Mercury as Hg	0.02	0.02	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	5.7	3.8	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	1.3	0.6	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	11	5.8	0.02	0.065	0.5	10	50
DETSC 2306 Antimony as Sb	8.6	3.5	0.02	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.48	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	13	5.1	0.026	0.062	4	50	200
DETSC 2055 Chloride as Cl	4600	2900	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	300	200	0.6	2.14	10	150	500
DETSC 2055 Sulphate as SO4	14000	8800	28	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	82000	67000	164	691.3	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	9400	7300	18.8	76	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7	8.5
DETSC 2009 Conductivity uS/cm	117	96.3
* Temperature*	15	16

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.117

Stage 1

Volume of Leachant L2*	0.22
Volume of Eluate VE1*	0.166

Stage 2

Volume of Leachant L8*	0.934
Volume of Eluate VE2*	0.88

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id WS102 5 1.00

Sample Numbers 1444072 1444078 1444079
Date Analysed 17/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.1	3	5	6
DETSC 2003# Loss On Ignition	%	3.1	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	61	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	4.8	100	n/a	n/a
DETSC 2008# pH	pH Units	8.5	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	4.9	5.3	0.01	0.052	0.5	2	25
DETSC 2306 Barium as Ba	18	2.3	0.04	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.3	7.1	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	3.8	2.8	0.008	0.03	2	50	100
DETSC 2306 Mercury as Hg	0.04	0.03	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	3.9	3	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	5.6	3.9	0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	1.9	0.77	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	3.2	1.4	0.006	0.017	4	50	200
DETSC 2055 Chloride as Cl	2800	1600	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	530	190	1.06	2.42	10	150	500
DETSC 2055 Sulphate as SO4	10000	5400	20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	95000	57000	190	628.6	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	6500	4900	13	51.5	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.3	8.3
DETSC 2009 Conductivity uS/cm	135	81.8
* Temperature*	15	16

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.124

Stage 1

Volume of Leachant L2*	0.233
Volume of Eluate VE1*	0.192

Stage 2

Volume of Leachant L8*	0.995
Volume of Eluate VE2*	0.92

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1444062	BH104 4 0.70	SOIL	NAD	none	Lee Kerridge
1444063	BH104 15 4.70	SOIL	NAD	none	Lee Kerridge
1444064	BH104 28 9.70	SOIL	NAD	none	Lee Kerridge
1444065	BH105 14 3.30	SOIL	NAD	none	Lee Kerridge
1444066	BH106 1 0.30	SOIL	NAD	none	Lee Kerridge
1444067	BH106 7 3.30	SOIL	NAD	none	Lee Kerridge
1444068	BH106 17 7.60	SOIL	NAD	none	Lee Kerridge
1444069	TP124 3 0.30	SOIL	NAD	none	Lee Kerridge
1444070	TP124 11 3.20	SOIL	NAD	none	Lee Kerridge
1444071	WS101 3 0.30	SOIL	NAD	none	Lee Kerridge
1444072	WS102 5 1.00	SOIL	NAD	none	Lee Kerridge
1444073	WS103 4 1.00	SOIL	Amosite	Amosite present in small bundles	Lee Kerridge
1444074	WS104 6 1.00	SOIL	Amosite	Amosite present in small bundles	Lee Kerridge
1444075	WS106 5 1.00	SOIL	Amosite	Amosite present in small bundles	Lee Kerridge

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.

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 19-00541-1
Client Ref NW1580
Contract Title Northern Gateway

		Lab No	1444073	1444074	1444075
		Sample ID	WS103	WS104	WS106
		Depth	1.00	1.00	1.00
		Other ID	4	6	5
		Sample Type	SOIL	SOIL	SOIL
		Sampling Date	07/01/19	08/01/19	08/01/19
		Sampling Time			
Test	**Method**	**Units**			
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**< 0.001**	**< 0.001**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	<0.001	<0.001	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)					
Mass of Sample		g	863.88	176.22	683.69
ACMs present*		type			
Mass of ACM in sample		g			
% ACM by mass		%			
% asbestos in ACM		%			
% asbestos in sample		%			
Breakdown of Detailed Gravimetric Analysis (b)					
% Amphibole bundles in sample		Mass %	<0.001	<0.001	<0.001
% Chrysotile bundles in sample		Mass %	na	na	na
Breakdown of PCOM Analysis (c)					
% Amphibole fibres in sample		Mass %	na	na	na
% Chrysotile fibres in sample		Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)					
Amphibole fibres		Fibres/g	na	na	na
Chrysotile fibres		Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

Information in Support of the Analytical Results

Our Ref 19-00541-1
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1444062	BH104 0.70 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444063	BH104 4.70 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444064	BH104 9.70 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444065	BH105 3.30 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444066	BH106 0.30 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444067	BH106 3.30 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444068	BH106 7.60 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444069	TP124 0.30 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444070	TP124 3.20 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444071	WS101 0.30 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x3		
1444072	WS102 1.00 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444073	WS103 1.00 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444074	WS104 1.00 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x3		
1444075	WS106 1.00 SOIL	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x3		
1444076	BH106 0.30 LEACHATE	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444077	BH106 0.30 LEACHATE	08/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444078	WS102 1.00 LEACHATE	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1444079	WS102 1.00 LEACHATE	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number	19-00469
	18-Jan-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-00469
Client Reference	NW1580
Order No	CH1500
Contract Title	Northern Gateway
Description	5 Soil samples, 2 Leachate samples.
Date Received	11-Jan-19
Date Started	11-Jan-19
Date Completed	18-Jan-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-00469
Client Ref NW1580
Contract Title Northern Gateway

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH103	2	0.3	1443641	18/01/2019	Very dark brown sandy CLAY (Made ground - plastic)
BH103	4	1	1443642	18/01/2019	Very dark brown gravelly, sandy CLAY including some wood (Made ground - glass)
BH103	11	3.2	1443643	18/01/2019	Brown sandy CLAY
BH103	16	4.8	1443644	18/01/2019	Dark red sandy CLAY
BH105	5	0.7	1443645	18/01/2019	Dark brown sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00469
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1443641	1443642	1443643	1443644	1443645
			Sample ID	BH103	BH103	BH103	BH103	BH105
			Depth	0.30	1.00	3.20	4.80	0.70
			Other ID	2	4	11	16	5
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	04/01/19	04/01/19	04/01/19	04/01/19	04/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Metals								
Antimony	DETSC 2301*	1	mg/kg	5.0	4.8	1.3	1.3	1.5
Arsenic	DETSC 2301#	0.2	mg/kg	9.5	11	6.1	12	11
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	0.5	0.7	0.8	0.9
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	2.3	1.4	1.2	1.3	1.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.8	0.2	0.4	0.2
Chromium	DETSC 2301#	0.15	mg/kg	19	19	19	24	23
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	100	140	46	9.1	31
Lead	DETSC 2301#	0.3	mg/kg	230	210	28	13	26
Mercury	DETSC 2325#	0.05	mg/kg	0.29	0.26	< 0.05	< 0.05	0.11
Nickel	DETSC 2301#	1	mg/kg	17	20	22	29	27
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	21	24	22	28	27
Zinc	DETSC 2301#	1	mg/kg	300	250	99	69	97
Inorganics								
pH	DETSC 2008#			9.1	10.0	8.5	8.7	8.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.6	0.6	< 0.1	< 0.1	0.1
Total Organic Carbon	DETSC 2084#	0.5	%	7.1	6.8	1.2	< 0.5	1.6
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	13		< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	56		< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	65		< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	77		< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	210		< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	6.8		< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	37		< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	85		< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	120		< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	250		< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	460		< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00469
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1443641	1443642	1443643	1443644	1443645
			Sample ID	BH103	BH103	BH103	BH103	BH105
			Depth	0.30	1.00	3.20	4.80	0.70
			Other ID	2	4	11	16	5
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	04/01/19	04/01/19	04/01/19	04/01/19	04/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg	0.62		0.04	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	0.05		< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.30		0.04	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	0.52		0.04	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	1.4		0.20	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	0.44		0.05	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	1.1		0.17	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	1.0		0.16	< 0.03	0.04
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.29		0.06	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.35		0.06	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.29		0.06	< 0.03	0.04
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.12		< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.20		0.04	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.09		< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.03		< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.12		< 0.03	< 0.03	0.05
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	6.8		0.92	< 0.10	0.12
Phenols								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.4	0.4	0.4	< 0.3

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

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-00469
Client Ref NW1580
Contract Title Northern Gateway
Sample Id BH103 4 1.00

Sample Numbers 1443642 1443646 1443647
Date Analysed 17/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	6.8	3	5	6
DETSC 2003# Loss On Ignition	%	11	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	1700	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	22	100	n/a	n/a
DETSC 2008# pH	pH Units	10.0	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	1.8	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	2.1	0.97	0.004	0.011	0.5	2	25
DETSC 2306 Barium as Ba	590	20	1.18	0.86	20	100	300
DETSC 2306 Cadmium as Cd	0.2	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	3.9	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	5.4	0.6	0.011	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	0.03	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	33	9.6	0.07	0.12	0.5	10	30
DETSC 2306 Nickel as Ni	31	1	0.06	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	5.8	0.28	0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	3.8	4.7	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	4.1	< 0.25	0.008	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	320	< 1.3	0.64	0.368	4	50	200
DETSC 2055 Chloride as Cl	3200	3100	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	680	340	1.36	3.79	10	150	500
DETSC 2055 Sulphate as SO4	84000	25000	168	317.9	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	290000	130000	580	1484.1	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	16000	7700	32	86.5	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.3	7.1
DETSC 2009 Conductivity uS/cm	410	179
* Temperature*	15	16

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.101

Stage 1

Volume of Leachant L2*	0.162
Volume of Eluate VE1*	0.116

Stage 2

Volume of Leachant L8*	0.807
Volume of Eluate VE2*	0.75

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-00469
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1443641	BH103 2 0.30	SOIL	NAD	none	Lee Kerridge
1443643	BH103 11 3.20	SOIL	NAD	none	Lee Kerridge
1443644	BH103 16 4.80	SOIL	NAD	none	Lee Kerridge
1443645	BH105 5 0.70	SOIL	NAD	none	Lee Kerridge

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 19-00469
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1443641	BH103 0.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1443642	BH103 1.00 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1443643	BH103 3.20 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1443644	BH103 4.80 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1443645	BH105 0.70 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1443646	BH103 1.00 LEACHATE	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1443647	BH103 1.00 LEACHATE	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number	19-00333-1
	23-Jan-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-00333-1
Client Reference	NW1580
Order No	CH1500
Contract Title	Northern Gateway
Description	23 Soil samples, 10 Leachate samples.
Date Received	09-Jan-19
Date Started	09-Jan-19
Date Completed	23-Jan-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-00333, extra testing.** Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
TP101	2	0.3	1442777	17/01/2019	Dark grey sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP102	2	0.3	1442778	17/01/2019	Dark grey sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP102	6	1.2	1442779	17/01/2019	Brown slightly gravelly, sandy CLAY
TP103	7	1	1442780	17/01/2019	Brown gravelly, sandy CLAY
TP103	11	1.8	1442781	17/01/2019	Brown sandy CLAY
TP104	2	0.3	1442782	17/01/2019	Dark brown clayey, sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP105	2	0.3	1442783	17/01/2019	Dark brown gravelly, sandy CLAY
TP105	5	1.3	1442784	17/01/2019	Dark brown gravelly, sandy CLAY
TP106	3	0.4	1442785	17/01/2019	Dark brown sandy GRAVEL (Made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP106	10	2.8	1442786	17/01/2019	Brown gravelly, sandy CLAY
TP107	8	1.2	1442787	17/01/2019	Dark brown gravelly, sandy CLAY
TP108	2	0.3	1442788	17/01/2019	Dark brown clayey, sandy GRAVEL (Made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP109	2	0.3	1442789	17/01/2019	Dark brown clayey, sandy GRAVEL (Made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP109	5	1.3	1442790	17/01/2019	Dark brown clayey, sandy GRAVEL (Made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP109	11	3.3	1442791	17/01/2019	Dark brown clayey, sandy GRAVEL (Made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP110	5	1.3	1442792	17/01/2019	Dark brown gravelly, sandy CLAY including odd rootlets
TP111	2	0.3	1442793	17/01/2019	Dark brown clayey, sandy GRAVEL (Made ground - brick) (sample matrix outside MCERTS scope of accreditation)
TP111	8	2.5	1442794	17/01/2019	Brown gravelly, sandy CLAY
TP112	2	0.3	1442795	17/01/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
TP112	8	2.3	1442796	17/01/2019	Dark brown gravelly, sandy CLAY (Possible made ground - brick)
TP115	2	0.3	1442797	17/01/2019	Dark brown gravelly, sandy CLAY (Made ground - slag)
TP115	5	1.3	1442798	17/01/2019	Dark brown gravelly, sandy CLAY (Made ground - slag)
TP115	11	3.3	1442799	17/01/2019	Dark brown gravelly, sandy CLAY (Made ground - slag)

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442777	1442778	1442779	1442780	1442781	1442782
			Sample ID	TP101	TP102	TP102	TP103	TP103	TP104
			Depth	0.30	0.30	1.20	1.00	1.80	0.30
			Other ID	2	2	6	7	11	2
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	03/01/19	03/01/19	03/01/19	03/01/19	03/01/19	03/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0							
Metals									
Antimony	DETSC 2301*	1	mg/kg	1.3	< 1.0	1.2	< 1.0	< 1.0	3.8
Arsenic	DETSC 2301#	0.2	mg/kg	6.8	6.1	10	4.1	8.1	23
Beryllium	DETSC 2301#	0.2	mg/kg	1.0	< 0.2	1.0	0.6	0.8	1.5
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.0	0.6	0.7	0.6	0.5	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.4	0.3	0.2	0.2	0.7
Chromium	DETSC 2301#	0.15	mg/kg	21	16	29	8.7	22	48
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	71	21	46	35	27	150
Lead	DETSC 2301#	0.3	mg/kg	26	17	17	20	13	210
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	0.07	< 0.05	0.34
Nickel	DETSC 2301#	1	mg/kg	22	10	30	12	29	32
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	31	17	31	14	27	160
Zinc	DETSC 2301#	1	mg/kg	95	59	89	67	65	180
Inorganics									
pH	DETSC 2008#			8.9	8.7	8.5	8.3	8.1	7.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2
Total Organic Carbon	DETSC 2084#	0.5	%	2.9	3.9	1.6	2.8	2.0	18
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2	< 1.2	< 1.2	16
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	< 1.5	72
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4	< 3.4	< 3.4	230
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	320
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9	< 0.9	< 0.9	12
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5	< 0.5	< 0.5	25
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6	< 0.6	< 0.6	85
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4	< 1.4	< 1.4	200
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	320
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	650
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442777	1442778	1442779	1442780	1442781	1442782
			Sample ID	TP101	TP102	TP102	TP103	TP103	TP104
			Depth	0.30	0.30	1.20	1.00	1.80	0.30
			Other ID	2	2	6	7	11	2
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	03/01/19	03/01/19	03/01/19	03/01/19	03/01/19	03/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	0.04		< 0.03	< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.12		< 0.03	0.05	< 0.03	
Anthracene	DETSC 3303	0.03	mg/kg	0.20		< 0.03	< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.28		< 0.03	0.05	< 0.03	
Pyrene	DETSC 3303#	0.03	mg/kg	0.28		< 0.03	0.04	< 0.03	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.10		< 0.03	< 0.03	< 0.03	
Chrysene	DETSC 3303	0.03	mg/kg	0.12		< 0.03	< 0.03	< 0.03	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.13		< 0.03	< 0.03	< 0.03	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05		< 0.03	< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.08		< 0.03	< 0.03	< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.06		< 0.03	< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.06		< 0.03	< 0.03	< 0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.5		< 0.10	0.15	< 0.10	
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	< 0.3	< 0.3	0.4	< 0.3	0.8

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442783	1442784	1442785	1442786	1442787	1442788
			Sample ID	TP105	TP105	TP106	TP106	TP107	TP108
			Depth	0.30	1.30	0.40	2.80	1.20	0.30
			Other ID	2	5	3	10	8	2
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	04/01/19	04/01/19	04/01/19	04/01/19	03/01/19	04/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0		Y					
Metals									
Antimony	DETSC 2301*	1	mg/kg	2.2	1.0	2.3	< 1.0	1.2	7.9
Arsenic	DETSC 2301#	0.2	mg/kg	19	12	21	5.0	12	37
Beryllium	DETSC 2301#	0.2	mg/kg	1.3	0.6	2.1	0.6	0.9	1.0
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.5	0.2	< 0.2	< 0.2	1.2	0.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.2	0.2	< 0.1	0.2	0.4
Chromium	DETSC 2301#	0.15	mg/kg	22	23	38	11	23	36
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	94	39	130	17	43	130
Lead	DETSC 2301#	0.3	mg/kg	240	110	40	56	39	100
Mercury	DETSC 2325#	0.05	mg/kg	0.90	0.32	< 0.05	0.11	0.32	< 0.05
Nickel	DETSC 2301#	1	mg/kg	27	20	50	13	29	33
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	33	21	65	15	33	74
Zinc	DETSC 2301#	1	mg/kg	170	88	53	38	62	130
Inorganics									
pH	DETSC 2008#			8.4	8.3	8.6	8.3	7.2	7.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	8.1	5.1	0.5	0.2	0.2	0.1
Total Organic Carbon	DETSC 2084#	0.5	%	5.3	4.7	35	1.5	4.7	12
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.10	< 0.01	< 0.01		< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.10	< 0.01	< 0.01		< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	4.3	< 0.01	< 0.01		< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	1.5		< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	7.1		< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	110		< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	110		< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 76.3	< 10	220		< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.10	< 0.01	< 0.01		< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.10	< 0.01	< 0.01		< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.10	< 0.01	< 0.01		< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	27	11	11		< 0.9	13
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	41	19	19		< 0.5	19
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	40	24	42		< 0.6	39
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	160	98	84		< 1.4	68
Aromatic C5-C35	DETSC 3072*	10	mg/kg	260	150	160		< 10	140
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	340	150	380		< 10	140
Benzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01		< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01		< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01		< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01		< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

	Lab No	1442783	1442784	1442785	1442786	1442787	1442788
	Sample ID	TP105	TP105	TP106	TP106	TP107	TP108
	Depth	0.30	1.30	0.40	2.80	1.20	0.30
	Other ID	2	5	3	10	8	2
	Sample Type	ES	ES	ES	ES	ES	ES
	Sampling Date	04/01/19	04/01/19	04/01/19	04/01/19	03/01/19	04/01/19
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg		0.04	0.07		< 0.03	0.28
Acenaphthylene	DETSC 3303#	0.03	mg/kg		0.70	0.14		< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg		< 0.03	0.04		< 0.03	0.59
Fluorene	DETSC 3303	0.03	mg/kg		0.10	0.04		< 0.03	0.48
Phenanthrene	DETSC 3303#	0.03	mg/kg		0.14	0.56		< 0.03	2.5
Anthracene	DETSC 3303	0.03	mg/kg		0.51	0.18		< 0.03	0.61
Fluoranthene	DETSC 3303#	0.03	mg/kg		0.20	0.96		0.03	2.5
Pyrene	DETSC 3303#	0.03	mg/kg		0.51	2.4		0.03	2.5
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		0.20	0.80		< 0.03	0.70
Chrysene	DETSC 3303	0.03	mg/kg		0.22	1.1		< 0.03	0.78
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		0.37	1.1		< 0.03	0.50
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		0.37	0.30		< 0.03	0.17
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		0.24	0.99		< 0.03	0.38
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		0.52	0.55		< 0.03	0.10
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		0.07	0.15		< 0.03	0.04
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		2.3	1.0		< 0.03	0.15
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg		6.4	10		< 0.10	12
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.7	0.4	0.6	0.4	0.4	0.5

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

				Lab No	1442789	1442790	1442791	1442792	1442793	1442794
				Sample ID	TP109	TP109	TP109	TP110	TP111	TP111
				Depth	0.30	1.30	3.30	1.30	0.30	2.50
				Other ID	2	5	11	5	2	8
				Sample Type	ES	ES	ES	ES	ES	ES
				Sampling Date	04/01/19	04/01/19	04/01/19	07/01/19	07/01/19	07/01/19
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification	DETSC 1102	0								
Metals										
Antimony	DETSC 2301*	1	mg/kg	4.1	3.0	4.8	11	4.3	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	28	71	19	34	18	4.5
Beryllium	DETSC 2301#	0.2	mg/kg	2.6	2.1	2.0	1.9	0.9	0.6
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.7	1.0	0.7	0.7	0.7	0.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.4	0.2	0.6	0.6	0.1
Chromium	DETSC 2301#	0.15	mg/kg	19	15	18	21	26	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	300	110	150	300	86	14
Lead	DETSC 2301#	0.3	mg/kg	1300	180	330	520	71	12
Mercury	DETSC 2325#	0.05	mg/kg	18	1.1	1.2	1.6	0.25	< 0.05
Nickel	DETSC 2301#	1	mg/kg	39	29	38	38	28	15
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	53	40	43	59	74	16
Zinc	DETSC 2301#	1	mg/kg	310	93	99	240	180	28
Inorganics										
pH	DETSC 2008#			7.6	8.2	7.6	7.3	7.8	7.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.8	0.2	0.2	0.5	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	27	17	13	28	12	0.5
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

	Lab No	1442789	1442790	1442791	1442792	1442793	1442794
	Sample ID	TP109	TP109	TP109	TP110	TP111	TP111
	Depth	0.30	1.30	3.30	1.30	0.30	2.50
	Other ID	2	5	11	5	2	8
	Sample Type	ES	ES	ES	ES	ES	ES
	Sampling Date	04/01/19	04/01/19	04/01/19	07/01/19	07/01/19	07/01/19
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03		0.03	0.19	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.04		< 0.03	0.20	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	0.20	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.26		0.22	1.5	0.16	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	0.04		0.05	0.35	0.09	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.35		0.27	1.2	0.35	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.39		0.30	1.2	0.40	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.15		0.12	0.36	0.16	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.20		0.14	0.40	0.20	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.16		0.13	0.32	0.17	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.06		0.05	0.13	0.08	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.13		0.11	0.24	0.10	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.08		0.07	0.11	0.07	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.11		0.10	0.13	0.07	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	2.0		1.6	6.5	1.8	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.5	0.5	0.6	< 0.3	< 0.3	0.4

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442795	1442796	1442797	1442798	1442799
			Sample ID	TP112	TP112	TP115	TP115	TP115
			Depth	0.30	2.30	0.30	1.30	3.30
			Other ID	2	8	2	5	11
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	07/01/19	07/01/19	07/01/19	07/01/19	07/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Asbestos Quantification	DETSC 1102	0						
Metals								
Antimony	DETSC 2301*	1	mg/kg	55	20	12	8.2	12
Arsenic	DETSC 2301#	0.2	mg/kg	19	44	40	25	40
Beryllium	DETSC 2301#	0.2	mg/kg	2.2	1.6	2.2	3.9	2.3
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.7	0.7	0.9	1.0	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3	0.4	0.3	0.5
Chromium	DETSC 2301#	0.15	mg/kg	18	18	25	27	17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0		< 1.0
Copper	DETSC 2301#	0.2	mg/kg	270	150	300	260	310
Lead	DETSC 2301#	0.3	mg/kg	290	210	460	190	520
Mercury	DETSC 2325#	0.05	mg/kg	0.45	0.29	0.63	0.44	1.0
Nickel	DETSC 2301#	1	mg/kg	38	35	45	50	40
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	54	46	76	58	61
Zinc	DETSC 2301#	1	mg/kg	120	91	130	88	180
Inorganics								
pH	DETSC 2008#			6.1	6.5	6.5	6.5	6.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.3	0.4	68
Total Organic Carbon	DETSC 2084#	0.5	%	13	11	27	17	32
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5		< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2		< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5		< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4		< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10		< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9		< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5		< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6		< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4		< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10		< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10		< 10		< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01		< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01		< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442795	1442796	1442797	1442798	1442799
			Sample ID	TP112	TP112	TP115	TP115	TP115
			Depth	0.30	2.30	0.30	1.30	3.30
			Other ID	2	8	2	5	11
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	07/01/19	07/01/19	07/01/19	07/01/19	07/01/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg	0.04		0.09		0.12
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03		0.04		0.06
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03		0.05		0.08
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		0.04		0.06
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.11		0.54		0.71
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03		0.26		0.33
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.12		1.0		1.2
Pyrene	DETSC 3303#	0.03	mg/kg	0.10		1.0		1.2
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04		0.45		0.53
Chrysene	DETSC 3303	0.03	mg/kg	0.06		0.49		0.58
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05		0.55		0.67
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		0.19		0.24
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		0.39		0.50
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		0.15		0.20
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		0.04		0.06
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03		0.18		0.23
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.52		5.5		6.7
Phenols								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	1.0	0.5	0.4	0.4

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

Summary of Chemical Analysis
Soil VOC Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442782	1442783
			Sample ID	TP104	TP105
			Depth	0.30	0.30
			Other ID	2	2
			Sample Type	ES	ES
			Sampling Date	03/01/19	04/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.10
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10

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

Summary of Chemical Analysis
Soil VOC Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442782	1442783
			Sample ID	TP104	TP105
			Depth	0.30	0.30
			Other ID	2	2
			Sample Type	ES	ES
			Sampling Date	03/01/19	04/01/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
Naphthalene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.10
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.10

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

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id TP102 2 0.30

Sample Numbers 1442778 1442800 1442801
Date Analysed 16/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	3.9
DETSC 2003# Loss On Ignition	%	1.3
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	0.03
DETSC 3311# TPH (C10 - C40)	mg/kg	79
DETSC 3301 PAHs	mg/kg	4.1
DETSC 2008# pH	pH Units	8.7
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.62	0.54	< 0.002	< 0.01
DETSC 2306 Barium as Ba	10	4.7	0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.45	0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	2.3	2.4	0.005	0.024
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1
DETSC 2306 Lead as Pb	1.2	0.75	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	0.31	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.36	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	4.1	3.2	0.008	0.034
DETSC 2055 Chloride as Cl	850	680	< 20	< 100
DETSC 2055* Fluoride as F	150	< 100	0.3	0.26
DETSC 2055 Sulphate as SO4	2100	1500	< 20	< 100
DETSC 2009* Total Dissolved Solids	44000	26000	88	291.6
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
* Dissolved Organic Carbon	3900	4800	< 10	< 50

WAC Limit Values Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.4	7.2
DETSC 2009 Conductivity uS/cm	62.3	36.4
* Temperature*	16	15

Mass of Sample Kg*	0.120
Mass of dry Sample Kg*	0.116

Stage 1

Volume of Leachant L2*	0.228
Volume of Eluate VE1*	0.204

Stage 2

Volume of Leachant L8*	0.928
Volume of Eluate VE2*	0.81

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id TP106 10 2.80

Sample Numbers 1442786 1442802 1442803
Date Analysed 16/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.5	3	5	6
DETSC 2003# Loss On Ignition	%	1.7	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	190	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	47	100	n/a	n/a
DETSC 2008# pH	pH Units	8.3	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.43	0.36	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	11	4.8	0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.52	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.9	0.8	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.5	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.27	0.25	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.33	0.27	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.3	< 1.3	0.005	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	1200	980	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	150	< 100	0.3	0.24	10	150	500
DETSC 2055 Sulphate as SO4	4800	2700	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	52000	23000	104	276.4	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	4500	4400	< 10	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.6	7.1
DETSC 2009 Conductivity uS/cm	74.3	32.1
* Temperature*	14	14

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.123

Stage 1

Volume of Leachant L2*	0.229
Volume of Eluate VE1*	0.197

Stage 2

Volume of Leachant L8*	0.985
Volume of Eluate VE2*	0.827

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id TP109 5 1.30

Sample Numbers 1442790 1442804 1442805
Date Analysed 16/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	17	3	5	6
DETSC 2003# Loss On Ignition	%	11	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	38	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	9.9	100	n/a	n/a
DETSC 2008# pH	pH Units	8.2	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.61	0.81	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	21	13	0.04	0.14	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.4	0.61	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.2	2.2	< 0.004	0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.5	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	0.6	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.17	0.46	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.48	0.26	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.94	0.32	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	3.5	5.4	0.007	0.051	4	50	200
DETSC 2055 Chloride as Cl	1400	1300	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	630	170	1.26	2.42	10	150	500
DETSC 2055 Sulphate as SO4	27000	7300	54	104	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	110000	46000	220	560.6	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	4500	5900	< 10	56.8	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.7	7
DETSC 2009 Conductivity uS/cm	161	65.6
* Temperature*	14	15

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.117

Stage 1

Volume of Leachant L2*	0.211
Volume of Eluate VE1*	0.184

Stage 2

Volume of Leachant L8*	0.937
Volume of Eluate VE2*	0.762

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id TP112 8 2.30

Sample Numbers 1442796 1442806 1442807
Date Analysed 16/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	11	3	5	6
DETSC 2003# Loss On Ignition	%	8.1	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	31	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	2.2	100	n/a	n/a
DETSC 2008# pH	pH Units	6.5	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	0.16	0.21	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	32	17	0.06	0.19	20	100	300
DETSC 2306 Cadmium as Cd	0.05	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	< 0.25	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1	0.8	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	2.9	1.2	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.09	0.1	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.53	0.39	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.36	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	15	7.1	0.03	0.084	4	50	200
DETSC 2055 Chloride as Cl	2800	1500	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	69000	29000	138	354.7	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	140000	63000	280	754.5	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	3400	4100	< 10	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.6	6.9
DETSC 2009 Conductivity uS/cm	202	89.9
* Temperature*	14	15

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.122

Stage 1

Volume of Leachant L2*	0.227
Volume of Eluate VE1*	0.198

Stage 2

Volume of Leachant L8*	0.979
Volume of Eluate VE2*	0.766

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway
Sample Id TP115 5 1.30

Sample Numbers 1442798 1442808 1442809
Date Analysed 16/01/2019

Test Results On Waste

Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	17
DETSC 2003# Loss On Ignition	%	6.6
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	210
DETSC 3301 PAHs	mg/kg	14
DETSC 2008# pH	pH Units	6.5
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	1.1	0.72	0.002	< 0.01
DETSC 2306 Barium as Ba	7.4	3.6	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.75	0.37	< 0.02	< 0.1
DETSC 2306 Copper as Cu	5.4	3.5	0.011	0.038
DETSC 2306 Mercury as Hg	0.05	0.03	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1
DETSC 2306 Lead as Pb	6.5	4.7	0.01	< 0.05
DETSC 2306 Antimony as Sb	7.2	4	0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	6.5	3.9	0.013	0.043
DETSC 2055 Chloride as Cl	2600	1100	< 20	< 100
DETSC 2055* Fluoride as F	250	< 100	0.5	0.42
DETSC 2055 Sulphate as SO4	16000	5400	32	< 100
DETSC 2009* Total Dissolved Solids	49000	17000	98	223.2
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
* Dissolved Organic Carbon	4800	5500	< 10	53.8

WAC Limit Values Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8	7.2
DETSC 2009 Conductivity uS/cm	69.5	24.4
* Temperature*	14	15

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.120

Stage 1

Volume of Leachant L2*	0.231
Volume of Eluate VE1*	0.2

Stage 2

Volume of Leachant L8*	0.963
Volume of Eluate VE2*	0.745

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1442777	TP101 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442778	TP102 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442779	TP102 6 1.20	SOIL	NAD	none	Rebecca Burgess
1442782	TP104 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442783	TP105 2 0.30	SOIL	Chrysotile	Chrysotile in microscopic board debris	Rebecca Burgess
1442784	TP105 5 1.30	SOIL	NAD	none	Rebecca Burgess
1442785	TP106 3 0.40	SOIL	NAD	none	Rebecca Burgess
1442788	TP108 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442789	TP109 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442791	TP109 11 3.30	SOIL	NAD	none	Rebecca Burgess
1442792	TP110 5 1.30	SOIL	NAD	none	Rebecca Burgess
1442793	TP111 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442795	TP112 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442796	TP112 8 2.30	SOIL	NAD	none	Rebecca Burgess
1442797	TP115 2 0.30	SOIL	NAD	none	Rebecca Burgess
1442799	TP115 11 3.30	SOIL	NAD	none	Rebecca Burgess

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.

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 19-00333-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	1442783
Sample ID	TP105
Depth	0.30
Other ID	2
Sample Type	SOIL
Sampling Date	04/01/19
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.006**
Gravimetric Quantification (a)	DETSC 1102	Mass %	0.006
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	na
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	785.25
ACMs present*		type	ASBD
Mass of ACM in sample		g	0.12
% ACM by mass		%	0.02
% asbestos in ACM		%	40.00
% asbestos in sample		%	0.01
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	na
% Chrysotile bundles in sample		Mass %	na
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample

Information in Support of the Analytical Results

Our Ref 19-00333-1
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1442777	TP101 0.30 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442778	TP102 0.30 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442779	TP102 1.20 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442780	TP103 1.00 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442781	TP103 1.80 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442782	TP104 0.30 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442783	TP105 0.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442784	TP105 1.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442785	TP106 0.40 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442786	TP106 2.80 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442787	TP107 1.20 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442788	TP108 0.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442789	TP109 0.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442790	TP109 1.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442791	TP109 3.30 SOIL	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442792	TP110 1.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442793	TP111 0.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442794	TP111 2.50 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442795	TP112 0.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442796	TP112 2.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442797	TP115 0.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Information in Support of the Analytical Results

Our Ref 19-00333-1
Client Ref NW1580
Contract Northern Gateway

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1442798	TP115 1.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442799	TP115 3.30 SOIL	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442800	TP102 0.30 LEACHATE		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Sample date not supplied	
1442801	TP102 0.30 LEACHATE		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Sample date not supplied	
1442802	TP106 2.80 LEACHATE	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442803	TP106 2.80 LEACHATE	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442804	TP109 1.30 LEACHATE	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442805	TP109 1.30 LEACHATE	04/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442806	TP112 2.30 LEACHATE	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442807	TP112 2.30 LEACHATE	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442808	TP115 1.30 LEACHATE	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442809	TP115 1.30 LEACHATE	07/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number	19-00312-1
	23-Jan-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	19-00312-1
Client Reference	NW1580
Order No	CH1500
Contract Title	Northern Gateway
Description	4 Soil samples.
Date Received	09-Jan-19
Date Started	09-Jan-19
Date Completed	23-Jan-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-00312, amendments.**

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

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-00312-1
Client Ref NW1580
Contract Title Northern Gateway

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH101	4	0.8	1442640	21/01/2019	Dark brown very gravelly SAND
TP102	2	0.3	1442641	21/01/2019	Very dark brown sandy, clayey GRAVEL (sample matrix outside MCERTS scope of accreditation)
BH102	10	3.5	1442642	21/01/2019	Dark brown gravelly, sandy CLAY
BH101	18	4.8	1445043	21/01/2019	Very dark brown gravelly, sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00312-1
Client Ref NW1580
Contract Title Northern Gateway

			Lab No	1442640	1442641	1442642	1445043
			Sample ID	BH101	TP102	BH102	BH101
			Depth	0.80	0.30	3.50	4.80
			Other ID	4	2	10	18
			Sample Type	ES	ES	ES	ES
			Sampling Date	03/01/19	03/01/19	03/01/19	03/01/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Antimony	DETSC 2301*	1	mg/kg	1.2	< 1.0	1.2	1.1
Arsenic	DETSC 2301#	0.2	mg/kg	5.2	7.5	9.3	9.5
Beryllium	DETSC 2301#	0.2	mg/kg	0.2	0.2	0.8	0.8
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.6	< 0.2	0.5	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.9	0.6	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	5.7	14	16	20
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	50	31	27	28
Lead	DETSC 2301#	0.3	mg/kg	38	21	91	53
Mercury	DETSC 2325#	0.05	mg/kg	0.16	< 0.05	0.17	0.11
Nickel	DETSC 2301#	1	mg/kg	7.9	12	19	25
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	12	15	22	26
Zinc	DETSC 2301#	1	mg/kg	46	72	88	61
Inorganics							
pH	DETSC 2008#			8.3	8.5	8.3	8.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Total Organic Carbon	DETSC 2084#	0.5	%	9.2	3.2	3.1	1.8
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	1.2	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	2.7	< 1.5	130	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	15	< 1.2	240	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	57	< 1.5	160	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	350	< 3.4	120	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	420	< 10	650	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	10	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	3.7	< 0.9	42	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	11	< 0.5	110	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	56	< 0.6	150	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	670	< 1.4	170	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	740	< 10	490	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	1200	< 10	1100	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	1.9	< 0.01

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-00312-1
Client Ref NW1580
Contract Title Northern Gateway

	Lab No	1442640	1442641	1442642	1445043
	Sample ID	BH101	TP102	BH102	BH101
	Depth	0.80	0.30	3.50	4.80
	Other ID	4	2	10	18
	Sample Type	ES	ES	ES	ES
	Sampling Date	03/01/19	03/01/19	03/01/19	03/01/19
	Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**		
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	0.17	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	0.04	0.05	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.17	< 0.03	0.11	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	0.13	< 0.03	0.13	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.72	0.11	0.28	0.06
Anthracene	DETSC 3303	0.03	mg/kg	2.2	0.22	0.08	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	3.3	0.46	0.17	0.04
Pyrene	DETSC 3303#	0.03	mg/kg	2.5	0.45	0.19	0.05
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.49	0.15	0.07	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.72	0.21	0.08	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.46	0.19	0.05	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.16	0.07	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.26	0.10	0.04	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.14	0.05	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.18	0.05	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	12	2.1	1.2	0.15
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.5	0.9	< 0.3

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-00312-1
Client Ref NW1580
Contract Title Northern Gateway

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1442640	BH101 4 0.80	SOIL	NAD	none	Keith Wilson
1442641	TP102 2 0.30	SOIL	NAD	none	Keith Wilson
1442642	BH102 10 3.50	SOIL	NAD	none	Keith Wilson
1445043	BH101 18 4.80	SOIL	NAD	none	A Christodoulou

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 19-00312-1
Client Ref NW1580
Contract Northern Gateway

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1442640	BH101 0.80 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442641	TP102 0.30 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1442642	BH102 3.50 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1445043	BH101 4.80 SOIL	03/01/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Quality Control

Quality Systems.

Derwentside Environmental Testing Services employs numerous measures to ensure high levels of confidence in the results produced. Our laboratory has been accredited by the United Kingdom Accreditation Service (UKAS) since its inception and operates in full compliance with the internationally recognised standard ISO17025 and the Environment Agency's MCERTS (Monitoring & Certification Scheme) standard for soils and waters, which provides greater assurance to all parties of the reliability of data from chemical analysis.

To obtain a copy of our full UKAS schedule visit the UKAS website at www.ukas.org and search for our laboratory number 2139.

2139

Proficiency Testing Schemes.

DETS participates in seven external proficiency testing schemes in order to monitor and ensure the continuing quality of analysis. These schemes are:

Aquacheck LGC Setting standards in analytical science Contest

RTC AIMS AIHS pt:a

Internal Quality Control.

DETS runs a strict internal quality control system. A minimum of 5% of all samples that undergo analysis in our laboratories are quality control samples. This way we can ensure a high level of confidence in all of the analytical data produced. In addition, MCERTS accredited tests must meet strict, ongoing limits for precision and bias in order to maintain their accreditation status.

SAMPLE HOLDING TIME INFORMATION

Soil

Analyte	Container type	Minimum sample required	Reference	Maximum holding time from sampling	
				pre drying/extraction[1]	post drying/extraction[2]
Ammonium	Glass or plastic	20g	BS ISO18512:2007	1 week	
Anions	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
BTEX	60ml glass jar	Full container	EPA 8260	2 weeks	N/A
Conductivity	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Cyanide	Glass or plastic	20g	EPA 9010B/9012	2 weeks	
Heavy metals	Glass or plastic	10g	BS ISO18512:2007	6 months	30 years
Hexavalent chromium	Glass or plastic	20g	BS ISO18512:2007	1 month	
Loss on ignition	Glass or plastic	10g	BS ISO18512:2007	1 month	
OCP	Glass	20g	BS ISO18512:2007	1 month	
Oil & grease	Glass	20g	EPA 9070/1	1 month	
Organic matter/TOC	Glass or plastic	20g	BS ISO18512:2007	1 month	
PAH	Glass	20g	EPA 8100/8270	2 weeks	6 weeks
PCB	Glass	20g	BS ISO18512:2007	1 month	
pH	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Phenols	Glass	20g	EPA 8270	2 weeks	6 weeks
PRO	60ml glass jar	Full container	EPA 8015	2 weeks	N/A
Sulphide	Glass or plastic	20g	BRE SD1	3 weeks	1 month
SVOC	Glass	20g	EPA 8270	2 weeks	6 weeks
TEM/CEM	Glass	20g	EPA 418.1	2 weeks	6 weeks
Thiocyanate	Glass or plastic	20g	EPA 9251	No special requirement	
Total sulphur	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
TPH (C10-C40)	Glass	20g	EPA 418.1	2 weeks	6 weeks
VOC	60ml glass jar	Full container	EPA 8260	2 weeks	N/A

Sample storage environment 5°C

1. From sampling to extraction
2. Once extracted

Waters

Analyte	Container type	Min sample required (ml)	Reference	Preservative required	Max holding time until extraction
Alkalinity	Glass or plastic	100	EPA 310.2	none	2 weeks
Ammonium	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	3 weeks
BOD	Glass or plastic	500	EPA 405.1 5120B	none	2 days
BTEX	Glass vial	Full container	Lab validation	none	2 weeks
Chloride	Glass or plastic	20	ISO 5667 3:2012	none	1 month
COD	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	1 month
Conductivity/TDS	Glass or plastic	100	EPA 160.1	none	1 week
Cyanide	Plastic	50	EPA 9012/335.3	Sodium hydroxide	2 weeks
Hexavalent chromium	Glass or plastic	20	ISO 5667 3:2012	none	4 days
Metals	Glass or plastic	20	ISO 5667 3:2012	Nitric acid	1 month
Nitrate	Glass or plastic	20	EPA 353.2	none	2 days
Nitrite	Glass or plastic	20	EPA 600/4 079-020	none	2 days
OCP	Glass	500	EPA 8081A/608	none	1 week
Oil & grease	Glass	500	ISO 5667 3:2012	Hydrochloric acid	1 month
PAH	Glass	500	ISO 5667 3:2012	none	1 week
pH	Glass or plastic	50	Lab validation	none	1 week
PCB	Glass	500	EPA 8082A	none	6 weeks
Phenols	Glass	500	ISO 5667 3:2012	Sulphuric acid	3 weeks
Phosphate	Glass or plastic	20	ISO 5667 3:2012	Sulphuric acid	1 month
PRO	Glass vial	Full container	EPA 8015	none	2 weeks
Sulphate	Glass or plastic	20	ISO 5667 3:2012	none	1 month
Sulphide	Plastic	50	ISO 5667 3:2012	NaOH/Zinc acetate	1 week
Suspended solids	Glass or plastic	100	EPA 160.2 2540D	none	1 week
SVOC	Glass	500	EPA 8270/625	none	1 week
TOC	Glass or plastic	20	ISO 5667 3:2012	Sulphuric/Phosphoric acid	1 week
TON	Glass or plastic	20	EPA 353.2	none	1 month
TPH/EPH	Glass	500	Lab validation	none	1 weeks
VOC	Glass vial	Full container	Lab validation	none	1 week

Sample storage environment 3°C ± 2°C

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETS 036	**Leachate Preparation** **(NRA Method and BS EN 12457 Parts 1-3)**	Leachates are prepared as per the NRA (1994) method and as per BS EN 12457 Parts 1 - 3 one and two stage leachate preparation.	Leaching Test Method for the Assessment of Contaminated Land, Interim Guidance, NRA(1994) BS EN 12457 Part 1,2 & 3	n/a	Not Accredited
DETS 073	**Acid Neutralisation Capacity of Soils and Other Solids**	ANC is a measure of the buffering capacity of soils and other waste materials. The analysis measures the amount of acid required to bring the sample to a fixed pH. The initial pH of the sample extract must be measured before analysis begins. Analysis is performed by the addition of acid in conjunction with pH measurement by pH meter until the specified pH has been reached as indicated by the meter. The result is expressed in mol/kg (dry wt).	Annex B (Preliminary determination of the acid/base consumption) – CEN/TC 292 – WI 292046 – Characterization of waste – Leaching behaviour tests – Acid and Base neutralization capacity test	1.0 mol/kg	Not Accredited
DETS 074	**Low Level PAH by HPLC Fluorescence**	PAH is extracted from one litre of filtered water sample by solid phase extraction. PAH is eluted from the SPE column with DCM evaporated to dryness under nitrogen and redissolved in acetonitrile. Analysis of samples is carried out by HPLC fluorescence.	EPA Method 550 The Analyst 2001, 126:1336-1331 Phenomonex Strata X Application Note for PAH by SPE	0.01ug/L each 5.0 ug/L Total	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1001	**Sample Pre-Treatment and Preparation of Solids**	Solid samples are classified and identified. Samples requiring analysis for unstable or volatile determinands are analysed as received. Samples requiring analysis for stable and non-volatile determinands are dried at <30◦C or 50◦C, depending on requirements, for a minimum of 16hrs (overnight). Dried samples are crushed in a jaw crusher, if necessary, and then ground using a mechanical mixer mill and sieved through a 250µm sieve to ensure they are homogenous.	BS1377:1990 – Soils for Civil Engineering Purposes The preparation and pre-treatment of potentially contaminated soils prior to chemical analysis – MEWAM – 2006 – Environment Agency (Updated procedure under preparation)	n/a	Not Accredited
DETSC 1002	**Description of Soil Sample Type**	This method outlines the procedure used to describe soil samples with respect to basic type, predominant colour and inclusions. The procedure is carried out during the sample preparation stage.	BS 5930:Section 6:1999	n/a	Not Accredited
DETSC 1003	**Stone and Glass / Metal / Plastic Content of Soil**	This method outlines the procedure used to determine the Stone and Glass/Metal/Plastic content of soil samples. The procedure is carried out during the sample preparation stage.	BS 3882:2007 BS 1377:1990	0.1%	Not Accredited
DETSC 1004	**Moisture Content/Loss on Drying of Soil**	Loss on drying is determined by loss of mass on drying in an oven set at 28ºC or 50ºC. Moisture content is determined by loss of mass on drying in an oven set at 105ºC. The procedure is carried out during the sample preparation stage.	Practical Environmental Analysis. Radojevic & Bashkin. RSC 1999 BS 1377: Part 2:1990 DETS drying time study	0.1%	Not Accredited
DETSC 1101	**Asbestos - Bulk Analysis**	Samples are examined visually for the presence of asbestos containing materials or asbestos fibres. Suspect fibres are removed from the sample and examined using polarised light microscopy to determine whether they are asbestos fibres. If no asbestos fibres are identified by the method after an adequate length of examination time, and after at least two small pinch samples have been examined, then the sample may be reported as 'NAD' (no asbestos detected).	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 McCrone W.C., Asbestos Identification (Second Edition), The McCrone Research Institute, 1987 LAB 30, Application of ISO/IEC17025 for Asbestos Sampling and Testing, UKAS, Edition 2, April 2008	n/a	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1102	**Quantification of asbestos in soils, loose aggregates and ballast**	The method of quantification is divided into three procedures: Gravimetric analysis, detailed gravimetric analysis and PCOM analysis. The analysis may be affected by the client's requirements as determined by contract review, and by the nature of the asbestos found in the sample, e.g. whether ACMs are present, and whether fibre bundles large enough to pick out using tweezers are have been found in the sample.	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 HSG264 Asbestos: The survey guide. HSE Books, 2010. Davies, L. S.T., Wetherill, G. Z., McIntosh, C., McGonagle, C., Addison, J. 1996. Development and validation of an analytical method to determine the amount of asbestos in soils and loose aggregates. HSE Contract Research Report N0. 83/1996. HSE Books	Gravimetric Analysis: 0.01% for 1kg sample Detailed Gravimetric Analysis: 0.001% for 50g sample PCOM Analysis: 0.001%	UKAS
DETSC 1103	**Asbestos Water Absorption Test**	This test involves a sample of the asbestos product being dried and weighed before being immersed in water for a period of time. The sample is then removed from the water and re-weighed. If the amount of water absorbed is <30% by weight, then the sample should be reported as 'Not Licensed'. If ≥30% water is absorbed then the sample should be reported as being 'Licensed', i.e. an asbestos material for which a licence is required to work on.	Work with Materials Containing Asbestos: Approved Code of Practice and Guidance. HSE Books, 2006.	n/a	UKAS
DETSC 2002	**Organic matter content of soil**	The procedure is based upon Walkley and Black's method. Organic matter in soil is oxidised with potassium dichromate in the presence of concentrated sulphuric acid. The excess dichromate is titrated with ferrous sulphate using diphenylamine as an external indicator. The organic matter content is calculated from the amount of dichromate used during the oxidation process based on an empirical relationship.	BS1377 : Part 3 : 1990 Method 3 BS1377 : Part 1 : 1990 BS 3882:2007	0.1%	UKAS MCERTS(Soils)

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

DETSC 2003	**Loss On Ignition**	Soil is ignited at 440C and the amount of sample lost on ignition is determined gravimetrically. Other specified temperatures may be used but are not accredited.	BS1377 : Part 3 : 1990 Method 4 BS1377 : Part 1 : 1990	0.01%	UKAS MCERTS(Soils)
Method Number	**Title**	**Description**	**Reference**	**LOD**	**Accreditation Status**
DETSC 2004	**Sulphate Content of Soil and Water**	The sulphate in the soil is dissolved in dilute hydrochloric acid, or in an aqueous extract having a water:soil ratio of 2:1 and the insoluble residue is removed by filtration. Waters are also filtered prior to analysis. The sulphate in the filtrate is precipitated as barium sulphate which is then filtered, ignited and weighed.	BS1377 : Part 3 : 1990 Method 5 BS1377 : Part 1 : 1990 BRE SD1: 2005 Concrete in Aggressive Ground	**Acid Soluble:** 0.01% **Water Soluble** 100mg/l **Waters** 10mg/l	UKAS MCERTS(Soils)
DETSC 2005	**Carbonate content of soil by Rapid Titration**	The carbonate present in the soil reacts with a known excess of hydrochloric acid liberating carbon dioxide. The acid remaining after the reaction is determined by titration against sodium hydroxide. The result is calculated in terms of the equivalent proportion of carbon dioxide.	BS 1377: Part 1: 1990. BS 1377: Part 3: 1990: Method 5	1%	UKAS
DETSC 2006	**Water Soluble Chloride Content of Soil & Chloride Content of Water**	The chloride in the soil is dissolved in water and the insoluble material is removed by filtration. Waters are filtered before analysis. The chloride is analysed by Mohr's method. The chloride in a neutral solution is titrated against standard silver nitrate using potassium chromate as an indicator. The colour change is from yellow to brick red.	BS1377 : Part 3 : 1990 Method 7.2 BS1377: Part 1: 1990	**Soil:** 0.01% **Water:** 10mg/l	UKAS MCERTS(Soils)
DETSC 2007	**Acid Soluble Chloride Content of Soil and Concrete**	The chloride in the sample is dissolved in nitric acid and the insoluble material is removed by filtration. The dissolved chloride is analysed by Volhard's method. The chloride in solution is precipitated with a known excess of standard silver nitrate. The excess silver nitrate is titrated against standard ammonium thiocyanate using ferric alum as an indicator. The colour change is white to red.	BS1377 : Part 3 : 1990 Method 7.3 BS1377: Part 1: 1990 BS 1881-124:1988	0.01%	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2008	**pH Value of Soil and Water**	The pH value of a soil suspension in water or a groundwater sample is determined electrometrically using a glass electrode.	BS1377: Part 3: 1990 – Soils for Civil Engineering Purposes – Chemical and Electrochemical Methods	n/a	UKAS (Soils + Waters) MCERTS (Soils + Waters-Trade Effluent only)
DETSC 2009	**Electrical Conductivity of Soil & Water**	The electrical conductance of a soil suspension in water or of a water sample is determined by voltammetry using a conductivity meter. In some cases, the soil may need to be extracted with an aqueous solution of an inorganic salt e.g. the conductivity of topsoil is determined by preparing a suspension of the soil in saturated calcium sulphate.	Standard Methods for the Examination of water and Wastewater Part 2510B 21st Edition 2005 APHA, AWWA, WEF BS3882:2007 Specification for Topsoil	1uS/cm	UKAS
DETSC 2019	**Loose Packed Dry Soil Density**	Dried, ground soil is transferred to a dry, tared measuring cylinder and the volume recorded. The cylinder and its contents are then weighed and the density of the soil calculated.	BS3882:2007 Specification for Topsoil	n/a	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2024	**Sulphide in Soil and Water by Iodometry**	Hydrogen sulphide is liberated by acidification of the sample with hydrochloric acid in a steam distillation unit. The hydrogen sulphide produced is carried over with the steam and is absorbed in alkaline zinc acetate. The zinc sulphide produced reacts with iodine formed when iodate-iodide is acidified and the excess iodine titrated with standard thiosulphate.	In House Method based on: Environment Agency The determination of easily liberated sulphide in soils and similar matrices (2010) - Blue Book 228 Method D - The determination of easily liberated sulphide in as received or air-dried samples following acid steam distillation with iodometric titration. Environment Agency The determination of sulphide in waters and associated materials (2007) Draft Method D - The determination of easily liberated sulphide in as received or air-dried samples following phosphoric acid steam distillation with iodometric titration.	**Soils:** 10mg/kg . **Waters:** 250ug/l	**Soils:** UKAS MCERTS(Soils) **Waters:** Not Accredited
DETSC 2030	**Alkalinity in Water**	Alkalinity of a water sample is determined by indicator end point titration with a strong acid from sample pH to pH8.3 (where applicable) and then to pH4.5. From the titres obtained the total alkalinity and concentrations and types of alkalinity present can be calculated.	SCA Method ISBN 0 11 751601 5 The Determination of Alkalinity and Acidity in Water 1981 Instruction Manual for Skalar SP50 Robotic Analyser	20mg/l as CaCO3	UKAS MCERTS(Waters) Trade Effluent only
DETSC 2031	**5 Day Biochemical Oxygen Demand**	The sample, either diluted or undiluted, is placed in a BOD bottle and the initial dissolved oxygen content of the sample is measured using a dissolved oxygen meter. The bottle is placed in an incubator at 20ºC in the dark for 5 days. After this time the bottle is removed and the residual dissolved oxygen content of the sample is measured. The BOD of the sample is calculated from the reduction in the concentration of dissolved oxygen over 5 days.	SCA Method ISBN 0 117522120 5 Day Biochemical Oxygen Demand (BOD5) Second Edition 1988	1 mg/l	UKAS MCERTS(Waters)- Trade Effluent only

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2032	**Chemical Oxygen Demand**	Oxidisable substances react with sulphuric acid – potassium dichromate solution in the presence of silver sulphate as a catalyst. Chloride is masked by mercury sulphate. The reduction in the yellow colouration of Cr6+ is evaluated using a spectrophotometer for the low range tubes (LCK 314) whilst the green colouration of Cr3+ is evaluated for the medium and high range tubes (LCK 014 and LCK 114).	Environment Agency The determination of chemical oxygen demand in waters and effluents (2007) Methods for the Examination of Waters and Associated Materials	10 mg/l	UKAS MCERTS(Waters)-Trade Effluent only
DETSC 2033	**Total and Dissolved Organic Carbon in Water**	The term TOC (Total Organic Carbon) is used to describe the total content of organically bound carbon in dissolved and undissolved compounds. The TOC content is expressed in mg/l. If DOC (Dissolved Organic Carbon) is required, samples are filtered through a 0.45µm filter paper prior to analysis. Inorganic carbon is expelled by acidification of the sample. TOC is then determined by digestion of the sample with sulphuric acid and peroxodisulphate. Carbon containing compounds are transformed into carbon dioxide. The carbon dioxide evolves and reacts with an indicator solution. The colour change is measured using a spectrophotometer.	Hach-Lange Technical Instructions: LCK 385, LCK 386, LCK 387	2 mg/l	UKAS
DETSC 2034	**Suspended and Settleable Solids in Water**	Suspended matter is removed from a measured volume of sample by filtration under reduced pressure through a pre-treated, pre-weighed glass fibre filter paper. The paper is washed with deionised water to remove dissolved salts and the total suspended matter is determined gravimetrically after drying at 105 ±5°C Settleable solids are determined by subtracting the solids left in suspension after settlement for 1 hour (or other agreed time) from the total suspended matter in the sample.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980	5 mg/l	**Suspended Solids:** UKAS MCERTS(Waters)-Trade Effluent only **Settleable Solids:** Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2035	**Total Dissolved Solids in Water**	Water samples are pre-filtered to remove any suspended solids and evaporated in an oven at 180°C. The amount of residual dissolved solids is determined gravimetrically. An estimate of the total dissolved solids can be obtained by measuring the conductivity of the sample. This method is not accredited.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980 BS1377: Part 3 : 1990 Section 8	5 mg/l	UKAS
DETSC 2047	**Formaldehyde in Water**	Formaldehyde in soil is extracted in water, with a water to soil ratio of 10:1. The insoluble residue is removed by filtration prior to analysis. Waters are filtered prior to analysis to remove any particulates in suspension. Formaldehyde in the extract or water sample reacts with chromatropic acid-sulphuric acid solution to form a purple coloured complex. The absorbance of the coloured solution is read at 580nm using a suitable visible spectrophotometer.	Formaldehyde by visible absorption spectrophotometry – Method 3500, Issue 2 – NIOSH Manual of Analytical Methods, Fourth edition, August 1994	**Soil:** 0.2mg/kg **Water:** 20µg/l	Not Accredited
DETSC 2048	**Dissolved Oxygen Content of Water**	The dissolved oxygen content of the sample is measured using a dissolved oxygen meter either electrochemically or by fluorescence, or by the titrimetric method developed by Winkler.	SCA Method ISBN 0.11 751442X Dissolved Oxygen in Natural and Waste Waters 1979	0.1 mg/l	Not Accredited
DETSC 2055	**Anions in Water and Aqueous Soil Extracts by Ion Chromatography**	Liquid samples and aqueous soil extracts are filtered through a 0.22µm syringe filter prior to analysis. The filtered samples are injected into an Ion Chromatograph. The anions of interest are separated on the basis of their affinity for the active sites of the column packing material. The separated anions are converted into their highly conductive acid forms and measured by conductivity. The anions are identified on the basis of retention time as compared to standards and quantisation is by measurement of peak area.	Standard Methods for the Examination of Water and Wastewater Section 4110 21st Edition 2005 APHA, AWWA, WEF	**Soil:** 1.0 mg/kg **Water:** 0.1 mg/L	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2076	**Sulphate and Magnesium Content of 2:1 Aqueous Extract of Soil by ICP-OES**	The sulphate and magnesium in the soil are extracted in an aqueous extract having water: soil ratio of 2:1 and the insoluble material is removed by filtration. The concentrations of sulphate and magnesium in the filtrate are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelengths used for identification and quantification are 181.972nm for sulphate and 285.213nm for magnesium.	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1: 1990 TRL 447 Sulphate Specification for Structural Backfills 2005 BRE SD1:2005 Concrete in Aggressive Ground 2005	10mg/L	**Sulphate:** UKAS MCERTS(Soils) **Magnesium:** Not Accredited
DETSC 2084	**Total Organic Carbon by PrimacATC Analyser**	Soil samples are treated with phosphoric acid to expel any inorganic carbonates. The samples are then heated at high temperature in a continuous flow of air so that any organic carbon is oxidised to carbon dioxide. The gas is then allowed to cool and analysed by an infra-red detector.	PrimacsATC Analyser – User Manual, Skalar	0.47%	MCERTS(Soils)
DETSC 2085	**Total and Dissolved Organic Carbon in Water**	**Direct TOC Analysis** The sample is acidified, stirred and purged to remove the IC before the sample is injected and handled as in the TC Analysis. The sample is filtered before acidification for DOC. **TC Analysis** The sample is injected by an automated septum less rotary port into a high temperature reactor. In the reactor, at a temperature of 750 - 950°C all organic and inorganic carbon is oxidized to the gaseous carbon dioxide (CO2). The catalyst that is present in the reactor catalysis the oxidation to completion. A flow of air transports these oxidation products to the detectors. The oxygen required for reaction is taken from the airflow. The products are led into the non-dispersive infrared detector where the carbon dioxide is determined. The carbon dioxide is measured at a wavelength of 4.2 µm by NDIR detection.	Standard Methods for the Examination of Water and Wastewater Section 5310 B 21st Edition 2005 APHA, AWWA, WEF HMSO Methods for the Examination of Waters and Associated Materials – The Instrumental Determination of Total Organic Carbon and Related Determinands 1995	lmg/l as C	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2119	**Exchangeable Ammonia in Soil**	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	MAFF/ADAS Reference Book 427 – the Analysis of Agricultural Materials – Method 53, Ammonium, Nitrate and Nitrite-Nitrogen, Potassium Chloride Extractable	0.5mg/kg	UKAS MCERTS(Soils)
DETSC 2120	**Ammonia in Water by Spectrophotometry**	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	Environment Agency Ammonia in Waters 1981 ISBN 0117516139 Methods for the Examination of Waters and Associated Materials	20µg/l	UKAS
DETSC 2121	**Total Kjeldahl Nitrogen Content of Soils and Waters**	The sample is digested with sulphuric acid and a mixture of catalysts to convert organic nitrogen to ammonia. The sample is then distilled under alkaline conditions, and the distilled ammonia is absorbed in sulphuric acid. The ammonia content of the distillate is then determined colorimetrically either using the UV/vis spectrophotometer or the Konelab 60i. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm	The Analysis of Agricultural Materials – MAFF/ADAS Reference Book 427 – HMSO BS 3882: 2007 Specification for topsoil Standard Methods for the Examination of Water and Wastewater Part 4500-N. 21st Edition 2005 APHA, WWA, WEF	**Soil:** 0.01% **Water:** 2mg/l	Not Accredited
DETSC 2123	**Water Soluble Boron in Soil & Boron in Water**	Boron in soil is extracted in boiling saline water. Waters are filtered prior to analysis to remove any particulates in suspension. The water soluble boron in the extract or filtrate reacts with azomethine–H to produce a yellow coloured complex. The resulting colour absorbance is measured at 420nm using a suitable visible spectrophotometer.	SecondSite Property (now National Grid Property Holdings) - Guidance for assessing and managing potential contamination on former gasworks and associated sites (Part I) (Version 3) Method 17.12 The analysis of Agricultural materials MAFF/ADAS – reference book 427	**Soil:** 0.2mg/kg **Water:** 100ug/L	UKAS MCERTS(Soils)

			HMSO		

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2130	**Cyanides & Monohydric Phenols by Skalar**	Water samples are filtered through a 0.45µm syringe filter and solid samples are extracted with 1M caustic soda prior to analysis on the automated flow analyser. The method determines total cyanide, easily liberated cyanide, complex cyanide, thiocyanate and monohydric phenols	Skalar methods: I295-001 w/r+P7 I295-002 w/r+P7 293-902 w/r+P7 497-001	**Soils mg/kg:** Total & Free CN=0.1, Thio=0.6, Phenol=0.3 **Waters ug/L:** Total CN=40, Free CN=20, Thio=20, Phenol=100	UKAS MCERTS(Soils)
DETSC 2140	**Sugar in Mixing Water for Cement**	Waters are filtered prior to analysis to remove any particulates in suspension. The sugar in the filtrate reacts with phenol and sulphuric acid to produce a yellow-orange coloured complex. The resulting colour absorbance is measured at 490nm using a suitable visible spectrophotometer.	Colorimetric Method for Determination of Sugars and Related Substances MICHEL DUBOIS, K. A. GILLES, J. K. HAMILTON, P. A. REBERS, and FRED SMITH - Division of Biochemistry, University of Minnesota, St. Paul, Minnesota.	10mg/l	Not Accredited
DETSC 2201	**Nitrite in Waters and Leachates by Konelab 60i**	Nitrite is determined colorimetrically using the Konelab60i autoanalyser. The nitrite colour reaction occurs at pH 2.0 to 2.5 by coupling diazotized Sulphanilamide with N-1-naphthyl-ethylenediamine. The absorbance of this compound is measured spectrophotometrically at 520nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B – 21st Edition 2005 APHA, AWWA, WEF Aquakem Method Nitrite in Waters Iss No 2 Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981.	0.04mg/l (as N)	UKAS

			EPA Method 354.1 Nitrite, spectrophotometric (Approved at 40 CFR Part 136, not approved at Part 141)		

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2202	**Total Oxidised Nitrogen in Waters and Leachates by Konelab 60i**	Nitrate is reduced to nitrite by hydrazine under alkaline conditions. The total nitrite ions are then reacted with sulphanilamide and N-1-naphthylethylenediamine dihydrochloride under acidic conditions to form a reddish purple azo-dye. The absorbance of this compound is measured spectrophotometrically at 540 nm using the Konelab 60i autoanalyser.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B and Part 4500-NO3 H – 21st Edition 2005 APHA, AWWA, WEF Aquakem Method Total Oxidised Nitrogen. Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981. EPA Method 353.1 Nitrate, Nitrite Colorimetric Automated Hydrazine Reduction (Approved at 40 CFR Part 136, Not approved at Part 141)	0.7mg/l (as N)	UKAS
DETSC 2203	**Hexavalent Chromium in Waters and Leachates by Konelab 60i**	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbizide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Standard Methods for the Examination of Water and Wastewater Part 3500-Cr – 21st Edition 2005 APHA, AWWA, WEF USEPA 7196-A Aquakem Method. Hexavalent Chromium	10µg/l	UKAS
DETSC 2204	**Hexavalent Chromium in Soil by Konelab 60i**	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbizide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Aquakem Method. Hexavalent Chromium	1mg/kg	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2205	**Reactive & Total Phosphorus in Waters and Leachates by Konelab 60i**	Phosphate is determined colorimetrically using the Konelab60i autoanalyser. The orthophosphate ion reacts with ammonium molybdate and antimony potassium tartrate under acidic conditions to form a 12-molybdophosphoric acid complex. The complex is then reduced with ascorbic acid to form a blue heteropoly compound. The absorbance of this compound is measured spectrophotometrically at wavelength 880nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-P E– 21st Edition 2005 APHA, AWWA, WEF Aquakem Method. Phosphate in Waters Issue 2	0.01mg/l	**Reactive Phosphorus:** UKAS MCERTS (Waters-Trade Effluent only) **Total Phosphorus:** Not Accredited
DETSC 2206	**High Level Ammonia in Waters and Leachates by Konelab 60i**	Ammonia is determined colorimetrically using the Konelab60i autoanalyser. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139. Aquakem Method. Ammonia in Waters Issue 2	0.8mg/l	UKAS
DETSC 2207	**Low Level Ammonia in Waters and Leachates by Konelab 60i**	Ammonia is determined colorimetrically using the Konelab60i autoanalyser. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139. Aquakem Method. Ammonia in Waters Issue 2	0.015mg/l	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2208	**Sulphide in Waters and Leachates by Konelab 60i**	Sulphide is determined colorimetrically using the Konelab60i autoanalyser. Potassium Dichromate converts N-N-Diethyl-p-phenylenediamine to the free radical which reacts rapidly with sulphide to produce the coloured 'DPD Blue' or 'Ethylene Blue'. The absorbance can then be measured at wavelength 660nm.	The determination of sulphide in waters and associated materials (2007) - SCA - Draft (March 2007) Aquakem Method. Sulphide SP001 Issue 2 Standard Methods for the Examination of Water and Wastewater, 21st Edition 2005, Part 4500. ISBN0-87553-223-3	10µg/l	UKAS
DETSC 2210	**Ferrous Iron in Waters and Leachates by Konelab 60i**	Three molecules of phenanthroline chelate with each atom of ferrous iron to form an orange/red complex. The intensity of the coloured solution is stable between pH3 to pH9. Rapid colour development occurs between pH2.9 and pH3.5 in the presence of excess phenanthroline. The resulting colour absorbance is measured at 510nm	Aquakem Method Ferrous Iron FIR001 Issue 2	0.1mg/l	Not Accredited
DETSC 2211	**Silicate in Waters and Leachates by Konelab 60i**	Reactive forms of silicon in acid solution, below pH2, react with ammonium molybdate ions to form a yellow silicomolybdate. Ascorbic acid reduces the yellow silicomolybdate to produce a blue silicomolybdate complex. Oxalic acid is added to destroy any molybdophosphoric acid formed.	ASTM D7126 - 10 Standard Test Method for On-Line Colorimetric Measurement of Silica Aquakem Method Silica SIL Issue 2	0.1mg/l	Not Accredited
DETSC 2301	**Metals in Soil by ICP-OES** As, Ba, Be, Cd, Cr, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, Zn	Metals in soil are extracted using aqua regia and their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Any metals not listed can be determined but are not accredited under UKAS or MCERTS for soils.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005, AWWA, WEF	**mg/kg:** As, Be Cu, Ni =0.2, Ba=1.5, Cd=0.1, Cr=0.15, Co=0.7, Mn=20, Mo=0.4, Pb=0.3, Fe=1200, Se=0.5, V=0.8, Zn=1.0	UKAS (all listed) MCERTS (All soils listed except Fe)

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2302	**Metals in Waters by ICP-OES** Al, As, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Any metals not listed can be determined but are not accredited under UKAS or MCERTS for waters	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	**µg/l:** Al=6.5, As= 7.1, Ca=100, Cd=0.3, Cr=0.75, Cu=0.75, Fe=70, K=20, Mg=5, Na=12, Ni=2.7, Pb=4, Se=11.3, Zn=3.8	**Dissolved:** UKAS (all listed) MCERTS(Waters)-Trade Effluent only (Al, Cd, Cr, Cu, Ni, Pb, Zn) **Total:** Not Accredited
DETSC 2303	**Total Hardness (By Calculation)**	The concentrations of calcium and magnesium are determined using the appropriate methodologies. The hardness is a measure of the sum of the calcium and magnesium concentration expressed as calcium carbonate.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	n/a	UKAS
DETSC 2304	**Zinc Equivalent in Soil (By Calculation)**	The concentrations of copper, nickel and zinc concentrations are determined using the appropriate methodologies. The zinc equivalent is a measure of the combined toxicity of the three metals, relative to the toxicity of zinc.	n/a	n/a	Not Accredited
DETSC 2306	**Metals in Waters by ICP-MS** Ag, Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Sn, V, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Any metals not listed can be determined but are not accredited under UKAS.	Standard Methods for the Examination of Water and Wastewater Part 3125 B – 21st Edition 2005 APHA, AWWA, WEF	**µg/l:** Ag=0.13, Al=10.0, As=0.16, Ba=0.26, Ca=90, Cd=0.03, Co=0.16, Cr=0.25, Cu=0.40, Fe=5.50, Hg=0.01, K=80, Mg=20, Mn=0.22, Mo=1.1, Na=70, Ni=0.50, P=18.0, Pb=0.09, Sb=0.17, Se=0.25, Sn=0.40, V=0.60, Zn=1.3	**Dissolved:** UKAS (all listed) **Total:** Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2320	**Total Sulphur in Soil by ICP**	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia.	TRL 447 Sulphate Specification for Structural Backfills 2005 BRE SD1 Concrete in Aggressive Ground 2005	0.01%	UKAS
DETSC 2321	**Total Sulphate content of Soil by ICP-OES**	The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1 : 1990	0.01%	UKAS MCERTS(Soils)
DETSC 2322	**Total Potential Sulfate and Total Oxidisable Sulphur (By Calculation)**	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The wavelength used for identification and quantification of sulphate is 181.972nm. The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelength used for identification and quantification of sulphate is 181.972nm. The two results obtained from the above tests may then be combined to calculate the Total Potential Sulphate and Total Oxidisable Sulphur content	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1 : 1990	0.01%	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2324	**Mercury in Waters by Atomic Fluorescence Spectroscopy**	Waters and aqueous samples are preserved by fixing with concentrated nitric acid. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	Standard Methods for the Examination of Water and Wastewater Part 3112 B – 21st Edition 2005 APHA, AWWA, WEF PSA Method – Millennium Merlin Method for Total Mercury in Drinking, Surface, Ground, Industrial and Domestic Wastewaters and Saline Waters	0.05µg/l	UKAS
DETSC 2325	**Mercury in Soil Atomic Fluorescence Spectroscopy**	The mercury is extracted from soil in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments	0.05 mg/kg	UKAS MCERTS(Soils)
DETSC 2332	**Inorganic and Methyl Mercury Speciation**	Soils are air-dried and crushed before being subjected to a two-stage microwave extraction procedure for Inorganic (Hg(II)) and Methyl (MeHg) mercury. Waters and aqueous samples are filtered to remove particulates. An aliquot is separated via HPLC before treatment with bromate-bromide and tin (II) chloride to generate mercury and the mercury is determined by atomic fluorescence spectroscopy.	USEPA Method 3200 – Mercury Species Fractionation and Quantification by Microwave Assisted Extraction. PSA Application Note 053 – Mercury Speciation Using The Millenium Merlin Speciation System	**Soil:** 100µg/kg **Water:** 1µg/l	Not Accredited
DETSC 2333	**Elemental Mercury Speciation**	Soils, waters and aqueous samples are tested on an as-received bases. A known quantity of sample is extracted using argon and the released elemental mercury is trapped. The trapped mercury is released upon heating in a scarifier module and determined by atomic fluorescence spectroscopy.		**Soil:** 0.6µg/kg **Water:** 1µg/l	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 2400	**Unified Barge Bioaccessible Metals in Soils**	The Unified BARGE Method (UBM) is a an in vitro method for simulating the human digestive system. Synthetic digestive fluids are used to simulate the fluids present in the body. Both inorganic solutions (Containing inorganic salts such as KCl, NaCletc), and organic solutions (Containing organic compounds such as Urea, Glucose etc) are mixed with enzymes to produce 4 Synthetic digestive fluids saliva (S), Gastric fluid (G), duodenal fluid (D) and bile (B). These solutions are then used to mimic the effect of a sample passing through a human gastro intestinal tract by shaking portions of the sample at 37^0C, human body temperature (17.4).	EPA 9200.2-86 April 2012- Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead in Soil BGS Chemical& Biological Hazards Programme Open Report OR/07/027 - Inter-laboratory Trial of a Unified Bioaccessibility Procedure	V = 1.0mg/kg Cr = 5.0mg/kg Co = 1.0mg/kg Ni = 5.0mg/kg As = 0.5mg/kg Se = 0.5mg/kg Cd = 0.5mg/kg Pb = 1.0mg/kg	Not Accredited
DETSC 3001	**Solvent Extractable Matter in Soil**	Soil samples are extracted with a water-immiscible solvent and filtered to remove the water. The solvent is evaporated and the amount of extractable matter in the sample is determined gravimetrically.	In-house method based on:- Problems Arising from the Redevelopment of Gas Works and Similar Sites - AERE Harwell Laboratory 1981. Environmental Agency The Determination of Material Extractable by Carbon Tetrachloride and of Certain Hydrocarbon Oil and Grease Components in sewage Sludge – 1978	40mg/kg	**Toluene & Cyclohexane:** UKAS **Other Solvents:** Not Accredited
DETSC 3002	**Oil & Grease/Solvent Extractable Matter in Waters**	A known volume of sample is acidified to pH<2 and extracted three times with an organic solvent, such as n-Hexane, in a separating funnel. The solvent is removed by evaporation and the amount of extractable matter in the sample is determined gravimetrically.	APHA 21st Edition, 2005 – Method 5520 B. Oil & Grease - Partition Gravimetric Method USEPA Method 1664, Revision A: n-Hexane Extractable Material (HEM: Oil & Grease) and Silica Treated N-Hexane Extractable Material (SGT-HEM; Non Polar Material) by Extraction and Gravimetry.	1mg/l for 500ml sample	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3049	**Elemental Sulphur in Soils and Waters by HPLC**	Soils are extracted in dichloromethane (DCM) by sonication. The elemental sulphur concentration is determined by high performance liquid chromatography (HPLC) with UV detection using a C_{18} (e.g. 250mm x 4.6mm) column and a mobile phase composed of 95% methanol and 5% water. Waters and aqueous extracts of soils are extracted using DCM in a separating funnel, filtered, and the concentration determined using HPLC.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Elemental Sulphur.	**Soil:** 0.75mg/kg **Waters:** 90ug/l	**Soil:** UKAS MCERTS(Soils) **Water:** UKAS
DETSC 3072	**Aliphatic / Aromatic TPH by GC-FID**	Aliphatic and aromatic petroleum hydrocarbons (C_{10}-C_{35}) are extracted from soil and water using n-Hexane. The fractions are separated by solid phase extraction using silica columns, whereby the aliphatic fraction is eluted first with n-Hexane and the aromatic portion is eluted second with dichloromethane. The total, aliphatic, and aromatic concentrations are determined by gas chromatography flame ionisation detection (GC-FID) using a capillary column and hydrogen as the carrier gas. The chromatographic data is further characterized by subdivision into approximate boiling point/carbon number ranges with respect to n-alkane retention time markers.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Draft TNRCC Method 1006	**Soil mg/kg:** AL10-12 =1.5 AL12-16 =1.2 AL16-21 =1.5 AL21-35 =3.4 AR10-12 =0.9 AR12-16 =0.5 AR16-21 =0.6 AR21-35 =1.4 **Water:** 1ug/l	**Soil:** UKAS MCERTS(Soils) (C10-C35 only) **Water:** Not Accredited
DETSC 3301	**PAH in Soil by GC-FID**	Soils and associated materials are extracted in dichloromethane (DCM) using sonication. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.5 mg/kg each 1.6 mg/kg Total PAH	UKAS (16 PAH's only)
DETSC 3302	**Hexane / Acetone Extracted PAH in Soil by GC-FID**	Soils are extracted into hexane: acetone by shaking. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.1 mg/kg each 1.6 mg/kg Total PAH	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3303	**Polyaromatic Hydrocarbons in Soils by GC-MS**	The PAHs in the soil sample are extracted into hexane: acetone by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision C, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	0.03 mg/kg each 0.10 mg/kg Total PAH	UKAS (All 16 PAH's) MCERTS (not Fluorene, Anthracene, Chrysene or Total)
DETSC 3304	**Polyaromatic Hydrocarbons in Waters by GC-MS**	The PAHs in the water sample are extracted into dichloromethane by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the Instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS) In-house method based on EPA Method 3510C- EPA Method 3510C, Revision 3, Separatory Funnel Liquid-Liquid Extraction	10 ng/l each	UKAS (16 PAH's only)
DETSC 3311	**Extractable Petroleum Hydrocarbons (EPH) in Soil, Ballast and Water**	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid and aqueous matrices. This method uses a dichloromethane (DCM) extraction followed by quantification using gas chromatography/flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10-C24), and "mineral oil range" (C24-C40).	USEPA Method 3550C – Ultrasonic Extraction USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	**Soil:** 10 mg/kg **Ballast:** 10mg/kg **Water:** 10µg/l	**Soil:** UKAS MCERTS(Soils) **Water:** UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3312	**Hexane Extractable Petroleum Hydrocarbons (HPH)**	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid matrices. This method uses a hexane: acetone (9.4) extraction followed by quantification using gas chromatography/flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10- C24) and "mineral oil range" (C24-C40).	USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	**Soil:** 5 mg/kg	Not Accredited
DETSC 3321	**BTEX, MTBE & PRO in Soils by Headspace GC-FID**	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	0.01 mg/kg	UKAS MCERTS(Soils) Not accredited for PRO range (C5-10)
DETSC 3322	**BTEX, MTBE & PRO in Waters & Leachates by Headspace GC-FID**	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	1 µg/l	UKAS
DETSC 3401	**PCBs in Soils by GC-MS**	An as-received soil sample is extracted in Hexane:Acetone (1:2) using sonication methodology. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the instrument software.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	**µg/kg** PCB 28=1.25 PCB 52=1.12 PCB 101=1.32 PCB 118=1.43 PCB 153=2.08 PCB 138=1.35 PCB 180=1.42	UKAS MCERTS(Soils)

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3402	**Polychlorinated Biphenols in Waters by GC/MS**	The water sample is extracted in DCM on a reciprocal shaker. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the GC-MS software using an internal standard.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	**ng/l** PCB 28=208 PCB 52=161 PCB 101=211 PCB 118+123=513 PCB 153=163 PCB 138=107 PCB 180=132 PCB 105=133 PCB 114=253 PCB 126=399 PCB 156=253 PCB 157=119 PCB 167=248 PCB 169=181 PCB 189=271 PCB 77=202 PCB 81=186	UKAS
DETSC 3432	**Volatile Organic Compounds in Waters by Headspace GC-MS**	The method covers the range of volatile organic compounds with boiling points up to 220°C. Water samples are heated and agitated in a crimp cap vial. This drives the volatile components in to the headspace. An aliquot of the headspace is taken and injected in to a gas chromatograph with mass selective detection (GC-MS).The detector operates in full scan mode and is calibrated with standards containing known concentrations of the compounds of interest.	USEPA Method 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996	1 ug/l except: DCM (27), 2,2-Dichloropropane (2), Bromochloromethane (4), Bromodichloromethane (4), m+p-Xylene (2), 1,3-Dichlorobenzene (2)	UKAS except: Trichlorofluoromethane, Methylene Chloride, 1,1,1-Trichloroethane,

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 3433	**Semi-Volatile Organic Compounds in Soils by GCMS**	The SVOCs in the soil sample are extracted into DCM: Acetone by shaking. The SVOCs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each SVOC is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semi volatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	Individual SVOCs 0.1 mg/kg	UKAS
DETSC 5001	**Ash Content of Coal**	The ash content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 750ºC ±10ºC where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	ASTM D3174-11 BS 1016-104.4 1998 ISO 1171: 2010	0.1%	UKAS
DETSC 5002	**Ash & LOI Content of Solid Biomass & Solid Recovered Fuels**	The ash and LOI content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 550ºC ±10ºC where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	BS EN 14775:2009 BS EN 15403:2011	0.1%	UKAS
DETSC 5003	**Volatile Matter Content of Solid Biomass, Solid Recovered Fuels and Coal**	A known weight of the sample produced for volatile matter determination is placed in a suitable crucible fitted with a lid. The crucible and sample is weighed and heated in a furnace with a limited air through put at a temperature of 900ºC ±10ºC for 7 minutes. The sample and crucible are re-weighed and the volatile matter content determined by difference.	BSEN15148:2009 – Solid Biofuels Determination of the Content of Volatile Matter BS EN 15402:2011 - Solid Recovered Fuels - Determination of the Content of Volatile Matter	0.1%	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5004	**Total Moisture / Dry Solids Content of Solid Biomass & Solid Recovered Fuels & Coal**	The sample produced for general analysis is placed into a suitable prepared and weighed tray and reweighed. The sample is dried at 105ºC to constant weight and the total moisture / dry solids content is calculated from the reduction in weight.	BSEN 14774 Parts 1 & 2 2009 DD CEN/TS 15414 Parts 1 & 2: 2010	0.1%	UKAS
DETSC 5005	**Analysis Moisture Content of Solid Biomass, Solid Recovered Fuels & Coal**	The sample produced for total moisture determination in accordance with DETSC 5009 or DETSC 5010 is placed in a suitable pre-weighed tray and reweighed. The sample is then dried at 105°C ±2°C to constant weight and then weighed again. The analysis moisture content is calculated from the reduction in weight.	BS EN 14774-3 2009 BS EN 15414-3 2011 BS 1016-104.1 -1999 ISO 11722 – 1999	n/a	UKAS
DETSC 5007	**Calorific Value of Solid Biomass, Solid Recovered Fuels & Coal**	Calorific value of a material is determined in an Isoperbol calorimeter by burning it in pure oxygen in a combustion bomb. A known amount of sample is placed in a combustion bomb which is then pressurised to 30bar with oxygen. A calorimeter bucket is filled with a known amount of deionised water which is placed in the calorimeter and the bomb placed in the bucket. The system is allowed to equilibrate and the bomb fired by electrical connection. The difference in temperature of the water in the calorimeter bucket caused by the ignition of the material in the bomb is measured and the calorific value calculated	BS EN 14918: Solid biofuels – Determination of calorific value BS EN 15400: Solid recovered fuels - Determination of calorific value	1MJ/kg	UKAS
DETSC 5008	**Calorific Value of Soil**	A known amount of sample material is burnt in a combustion bomb that is immersed in water in a calorimeter and the difference in the water temperature before and after ignition measured. The calorific value of the sample material is calculated making any necessary corrections for heat generation not associated with the combusting sample. A gelatine capsule will be required to assist combustion which is also corrected for in the final calculations.	BS 1016-105 1992 ISO 19208 ASTM 5865	1MJ/kg	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5009	**Sample Preparation of Solid Biomass & Solid Recovered Fuels**	If analysis is required on the original material (i.e. Bulk Density) a sub-sample will be taken after initial mixing after which the sample is then reduced by cutting/chopping oversized pieces of material. The material is then mixed and subdivided by manual means during which process representative samples are taken for analysis i.e. total moisture. The remainder of the sample is dried and then reduced to <1mm and again mixed and subdivided to produce the sample for laboratory analysis.	BS EN 14780:2011 BS EN 15413:2011	n/a	Not Accredited
DETSC 5010	**Sample Preparation of Coal**	If required the sample received is first mixed and a sample taken for bulk density or bulk density is carried out on the whole initial sample. The remaining sample or the whole sample used for bulk density is then reduced to <10mm preferably by jaw crushing. The material is then mixed and subdivided by mechanical or manual means during which process representative samples are taken for any analysis required at this stage i.e. total moisture, The remainder of the sample is again mixed and subdivided to produce the sample for laboratory analysis which may require drying prior to crushing to <212 microns. If there is excessive water content a pre- drying stage of the whole sample may have to be carried out before sample blending and subdivision commences.	BS ISO 13909-4: 2001	n/a	Not Accredited
DETSC 5011	**Calculation of Fixed Carbon Content of Coal, SRF and Solid Biomass Fuels**	The total moisture, analysis moisture, ash and volatile matter content are determined by approved methods. The values obtained are deducted from 100 and this gives the fixed carbon value of the fuel.	DD CENT/S 15296:2006 BS 1016.100:1994 BS ISO 17246:2005	0.1%	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5012	**Determination of Biomass Content of SRF**	Approximately 5g of the sample is dissolved in 150ml of 78% Sulphuric Acid for 16 hours ±2 hours after which 35ml of 30% Hydrogen Peroxide is added and the sample left for an additional 5 hours ±1 hour. At the end of this period 300ml of deionised water is added to the sample and the residue remaining filtered off using a glass fibre filter paper, washing the residue with an additional 300ml of deionised water. The filter paper and residue are placed in a pre-weighed crucible and dried at 1500C until completely dry. The filter paper is reweighed after drying and the non biomass residue determined. Corrections for carbonates content is made by determining the ash content of the original sample and the non biomass residue remaining. The result can also be expressed by percentage calorific value by performing a calorific valve on the solid captured on the filter paper.	BS EN 15440 Solid recovered fuels - Methods for the determination of biomass content	n/a	UKAS
DETSC 5013	**Determination Of Carbon, Hydrogen, Nitrogen & Oxygen In Solid Biomass, Solid Recovered Fuels & Coal**	A known mass of fuel is weighed into tin capsules which are dropped sequentially into the combustion reactor prior to the arrival of oxygen. The sample and tin capsule react with oxygen and combust at temperatures of 1700-1800 °C and the sample is broken down into its elemental components N2, CO2, and H2O. High performance copper wires absorb the excess oxygen not used for sample combustion. The gases flow through the gas chromatographic (GC) separation column which is kept at a constant temperature. As they pass through the GC column, the gases are separated and are detected sequentially by the thermal conductivity detector (TCD). The TCD generates a signal, which is proportional to the amount of element in the sample. The instrument software compares the elemental peak to a known standard material (after calibration) and generates a report for each element on a weight basis. The oxygen is calculated by deducting these quantities from 100 along with the moisture, ash, sulphur & chlorine contents determined by other methods.	BS EN 15104:2011 Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen - Instrumental methods BS EN 15407:2011 Solid recovered fuels - Methods for the determination of carbon (C), hydrogen (H) and nitrogen(N) content BS EN 15296:2011 Solid biofuels - Conversion of analytical results from one basis to another	Carbon 0.10% Nitrogen 0.30% Hydrogen 0.30% Oxygen 3.55%	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5014	**Metals in Coal, SRF and Biomass by ICP**	Metals in coal, solid recovered fuel (SRF) and biomass samples are extracted by microwave using Hydrogen Peroxide (to oxidise and break down organic matter) and Aqua Regia (to dissolve the matrix and hold the metals in solution). Their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS EN 15410 - Solid recovered fuels - Methods for the determination of the content of major elements (Al, Ca, Fe, K, Mg, Na, P, Si, Ti) BS EN 15411 - Solid recovered fuels - Methods for the determination of the content of trace elements (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Tl, V and Zn) BS EN 15290 - Solid biofuels - Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti BS EN 15297 - Solid biofuels - Determination of minor elements - As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn	**0.1 mg/kg:** As, Be, Cd, Co, Mn, Ni, P, Pb, Sb, Se, Sn, Ti, V, Zn **0.2mg/kg:** Cr, Cu, Tl **0.5mg/kg:** Mo **1mg/kg:** Al, Fe, K, Mg **5mg/kg:** Ca **10mg/kg:** Ag, Ba, Rh, Sr, Te	UKAS: Al, As (SRF only), Ca, Cd, Co, Cr, Cu, K, Mg, Mn, Na (SRF only), Ni, P, Pb, Se, Sn, Tl, V, Zn All other metals not accredited
DETSC 5015	**Mercury in Coal, SRF and Biomass by Atomic Fluorescence Spectroscopy**	The mercury is extracted from coal, SRF and biomass in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment of the resulting solution with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is then quantitatively detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments.	0.055mg/kg	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5016	**Total Sulphur Content Of Coal, SRF And Biomass**	Sulphur compounds in SRF and biomass are extracted using aqua regia / hydrogen peroxide and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The use of hydrogen peroxide enhances the oxidation properties of nitric acid especially in the digestion of organics. Sulphur compounds in coal are determined by ICP-OES from the aqueous washings of the combustion products after firing in a bomb calorimeter.	TRL Report TRL447 (Updated) - Sulphate specification for structural backfills 2005	0.001mg/kg	UKAS
DETSC 5017	**Sulphur, Chlorine, Fluorine & Bromine Content of Solid Biomass, Solid Recovered Fuels and Coal by IC**	A known weight of fuel is burnt in a pressurised bomb in pure oxygen. After firing of the bomb, it is stood for a minimum of five minutes to allow the combustion products to settle then the oxygen is slowly released over a period of at least three minutes. The bomb is then taken apart and the bomb electrodes rinsed with deionised water into the inside of the bomb. These washings are then decanted into a 50ml volumetric flask. The inside of the bomb is rinsed with deionised water and the washings added to those in the volumetric flask. The contents of the volumetric flask are made up to volume with deionised water and stored for the analysis of sulphur, chloride, fluoride and bromide by ion chromatography.	Operating Instruction Manual No. 442M 6200 Parr Oxygen Bomb Calorimeter Operating Instruction Manual No. 205M 1108 Oxygen Combustion Bomb Operating Instruction Manual No. 454M 6510 Water Handling System	0.01% Chlorine 0.01% Fluorine 0.01% Bromine 0.04% Sulphur (Coal only)	UKAS

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5018	**XRF Analysis of Coal, Biomass, SRF and Cement**	When X-rays are targeted at a material they will cause electrons to be ejected from the component atoms (Ionisation). The ejection of electrons will cause the electronic structure of the component atoms to become unstable resulting in electrons from the higher energy outer orbitals "falling" into the inner orbitals to compensate. This causes a release of energy in the form of a photon equal to the energy difference between the two orbitals involved. Thus the material emits radiation which has energy characteristics of the atoms present. In energy dispersive X-ray fluorescence the fluorescent X-rays emitted are directed to a detector from which the data is processed by a multichannel analyser, producing a digital spectrum which is processed to obtain analytical data. The instrument analytical parameters are set up for the matrix type. A sample cell is prepared by placing a piece of prolene film over the outer cell and then inserting the inner cell. This gives a complete cell with a clear prolene base. A portion of the sample is placed into the cell and then analysed.	Rigaku NEX CG EDXRF instruction manual	**Cement:** 0.01% BaO, Cr_2O_3, CuO, PbO, Rb_2O, SrO, ZnO 0.02% Cl, V_2O_5 0.05% TiO_2 0.1% Mn_2O_3, P_2O_5, SO_3 0.5% K_2O 1% Al_2O_3, CaO, CdO, Co_2O_3, Fe_2O_3, MgO, Na_2O, NiO, SiO_2, Y_2O_3 **Fuel:** 0.01% Co, Cr, Cu, I, Li, Mn, Ni, P, Pb, Sn, Ti, V, Zn 0.02% Al, Ba, S, Si 0.1% Mg 0.2% Ca 0.5% As, Cd, Hg, Mo, Na, Sb, Se, Th, Tl 1% Ag	UKAS Al, As, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Sb, Si, Sn, Tl, Ti, V, Zn Al2O3, BaO, CaO, Cl, Cr2O3, CuO, Fe2O3, K2O, MgO, Mn2O3, Na2O, P2O5, PbO, Rb2O, SiO2, SO3, SrO, TiO2, V2O5, ZnO All other testing not accredited
DETSC 5019	**Determination of Biodegradable Municipal Waste Content (Compositional Analysis)**	The method is based on handpicking the BMW fraction from the municipal waste sample, and then weighing the amount of BMW sorted and expressing this as a percentage on a wet weight basis of the weight of the whole municipal waste sample.	ENVIRONMENT AGENCY: Guidance on monitoring of MBT and other treatment processes for the landfill allowances schemes (LATS and LAS) for England and Wales	n/a	Not Accredited
DETSC 5020	**Determination of Bulk Density in Solid Biomass and Solid Recovered Fuels**	The test portion is filled into a standard container of a given size and shape and weighed afterwards. Bulk density is calculated from the net weight per standard volume and reported for the moisture content.	BS EN 15103:2009 Solid Biofuels- Determination of bulk density BS EN 15401:2010 Solid Recovered Fuels- Determination of bulk density	0.5kg/m^3	Not Accredited

DETS INFO 001 – ANALYTICAL METHOD SUMMARY

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 5021	**Auto Ignition Temperature**	A quantity of the sample is placed into a metal tray or crucible and placed into an oven or furnace. The temperature of the oven / furnace is increased in predefined increments and the temperature in which the sample ignites is noted.	None	25°C	Not Accredited

Appendix C

Soil Screening

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Hole Ref	BH101	TP110	WS105	WS104	TP109	BH112	BH112	BH107	TP111	TP105
Easting	384796.682	384638.835	384294.085	384569.278	384661.431	384401.713	384401.713	384824.812	384592.029	384843.779
Northing	399802.989	399640.942	399279.174	399463.63	399650.774	399486.259	399486.259	399485.537	399655.215	399726.261
Sample Top (m)	0.80	1.30	0.30	1.00	1.30	3.30	0.30	2.00	0.30	1.30
Sample Date	03/01/2019	07/01/2019	10/01/2019	08/01/2019	04/01/2019	10/01/2019	10/01/2019	09/01/2019	07/01/2019	03/01/2019
Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
Geology	MG	MG	MG	MG	MG	CHES	MG	MG	MG	MG

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max										
Asbestos Analysts Comments	#N/A	#N/A	#N/A	0 of 56	7	0.0	0.0		na	na	na	present in small bundles		na	es of Amosite	na	na	na
Asbestos (Presence of)	Presence	#N/A		7 of 56	7	0.0	0.0		NAD	NAD	NAD	Amosite		NAD	Amosite	NAD	NAD	NAD
pH	None	-		64 of 64	0	6.1	11.7		8.3	7.3	8.7	9.0	8.2	9.3	8.5	8.3	7.8	8.3
Cyanide	800	mg/kg	#N/A	36 of 64	0	0.1	89.0		< 0.1	0.5	0.8	8.5	0.2	< 0.1	< 0.1	< 0.1	< 0.1	5.1
Sulphate as SO4	#N/A	mg/l	#N/A	2 of 2	0	49.0	55.0											
Mercury	13.6	mg/kg	#N/A	46 of 64	1	0.1	18.0		0.2	1.6	0.1	0.1	1.1	< 0.05	0.2	< 0.05	0.3	0.3
Cadmium	85	mg/kg	#N/A	60 of 64	0	0.1	4.7		0.9	0.6	4.7	0.6	0.4	0.1	0.3	0.2	0.6	0.2
Chromium	907	mg/kg	#N/A	64 of 64	0	5.7	48.0		5.7	21.0	38.0	15.0	15.0	11.0	15.0	24.0	26.0	23.0
Arsenic	39.9	mg/kg	#N/A	64 of 64	6	4.1	71.0		5.2	34.0	12.0	15.0	71.0	4.5	8.5	9.0	18.0	12.0
Beryllium	1.72	mg/kg	#N/A	62 of 64	13	0.2	3.9		0.2	1.9	0.4	0.5	2.1	0.4	0.4	0.8	0.9	0.6
Copper	7130	mg/kg	#N/A	64 of 64	0	8.9	4200.0		50.0	300.0	190.0	90.0	110.0	8.9	40.0	25.0	86.0	39.0
Lead	310	mg/kg	#N/A	64 of 64	15	12.0	12000.0		38.0	520.0	490.0	290.0	180.0	66.0	300.0	18.0	71.0	110.0
Selenium	430	mg/kg	#N/A	5 of 64	0	0.5	1.0		< 0.5	< 0.5	0.7	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	651	mg/kg	#N/A	64 of 64	0	8.7	160.0		12.0	59.0	27.0	23.0	40.0	19.0	22.0	30.0	74.0	21.0
Antimony	618	mg/kg	#N/A	56 of 64	0	1.0	180.0		1.2	11.0	6.3	3.4	3.0	< 1.0	5.1	1.2	4.3	1.0
Chromium - Hexavalent	21	mg/kg	#N/A	0 of 61	0	0.0	0.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	181	mg/kg	#N/A	64 of 64	0	6.5	53.0		7.9	38.0	42.0	15.0	29.0	12.0	12.0	28.0	28.0	20.0
Zinc	40400	mg/kg	#N/A	64 of 64	0	28.0	1700.0		46.0	240.0	1700.0	310.0	93.0	36.0	95.0	57.0	180.0	88.0
m,p xylenes	427.6926186	mg/kg	p-Xylene	0 of 5	0	0.0	0.0					< 0.01						
4-Isopropyltoluene	1240	mg/kg	Aromatic >EC1	0 of 5	0	0.0	0.0					< 0.01						
Isopropylbenzene	95.4	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Tert-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0					< 0.01						
1,2,3-Trichloropropane	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0					< 0.01						
1,2-Dibromo-3-Chloropropane	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,2,4-Trimethylbenzene	3.31	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Ethylbenzene	439.7179703	mg/kg		0 of 64	0	0.0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	3927.6251	mg/kg		0 of 64	0	0.0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	427.6926186	mg/kg	p-Xylene	1 of 59	0	1.9	1.9		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	1.42187881	mg/kg		0 of 64	0	0.0	0.0		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	133	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
2-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0					< 0.01						
O-Xylene	475.7207618	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Hexachlorobutadiene (HCBD)	1.79	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,2,3 Trichlorobenzene	8.81	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Trichloroethene	0.0797	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,1,2-Trichloroethane	5.53	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,2-Dichloropropane	0.121	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,1-Dichloroethene	1.17	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,1-Dichloroethane	10.9	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Bromodichloromethane	0.096	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Tribromomethane	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Chloroethene	0.00153	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Bromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Dibromomethane	0.096	mg/kg	hodichlorometl	0 of 5	0	0.0	0.0					< 0.01						
1,1,1-Trichloroethane	40.4	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Chloroform	4.22	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,1,1,2-Tetrachloroethane	8.2	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
2,2-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,1-Dichloropropene	3.3	mg/kg	Benzene	0 of 5	0	0.0	0.0					< 0.01						
trachloromethane (Carbon Tetra Chlorid	0.128	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
cis1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,3-Dichlorobenzene	2.45	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Methyl tert-butyl ether (MTBE)	319	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
trans-1,2-Dichloroethene	1.02	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
cis-1,2-Dichloroethene	0.559	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,3-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Sec-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0					< 0.01						
Tetrachloroethene	0.92	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Dibromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,2,4-Trichlorobenzene	15.3	mg/kg		0 of 5	0	0.0	0.0					< 0.01						

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max											
Hole Ref									BH101	TP110	WS105	WS104	TP109	BH112	BH112	BH107	TP111	TP105
Easting									384796.682	384638.835	384294.085	384569.278	384661.431	384401.713	384401.713	384824.812	384592.029	384843.779
Northing									399802.989	399640.942	399279.174	399463.63	399650.774	399486.259	399486.259	399485.537	399655.215	399726.261
Sample Top (m)									0.80	1.30	0.30	1.00	1.30	3.30	0.30	2.00	0.30	1.30
Sample Date									03/01/2019	07/01/2019	10/01/2019	08/01/2019	04/01/2019	10/01/2019	10/01/2019	09/01/2019	07/01/2019	03/01/2019
Investigation									AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
Geology									MG	MG	MG	MG	MG	CHES	MG	MG	MG	MG
Chlorobenzene	2.41	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Bromobenzene	6.96	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,3,5-Trimethylbenzene	3.31	mg/kg	l-Trimethylben	0 of 5	0	0.0	0.0					< 0.01						
1,2-Dibromoethane	0.096	mg/kg	nodichlorometl	0 of 5	0	0.0	0.0					< 0.01						
1,4-Dichlorobenzene	332	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
4-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0					< 0.01						
n-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0					< 0.01						
n-propylbenzene	323	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
trans-1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Styrene	236	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
1,2-Dichloroethane	0.0227	mg/kg		0 of 5	0	0.0	0.0					< 0.01						
Acenaphthylene	5970	#N/A	#N/A	13 of 57	0	0.0	7.7		0.0	< 0.03	< 0.03	7.7		< 0.03	< 0.03	< 0.03	< 0.03	0.7
Dibenz-a-h-anthracene	0.32	#N/A	#N/A	18 of 57	2	0.0	2.4		0.0	< 0.03	< 0.03	2.4		< 0.03	0.1	< 0.03	< 0.03	0.1
Acenaphthene	6040	#N/A	#N/A	26 of 57	0	0.0	6.1		0.2	0.2	0.1	5.5		< 0.03	0.0	< 0.03	< 0.03	< 0.03
Total BTEX	None	mg/kg		0 of 8	0	0.0	0.0						< 0.04					
4-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
4-Nitrophenol	None	mg/kg		1 of 3	0	6.2	6.2					6.2						
Dimethylphthalate	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
P-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Benzyl Alcohol	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
4-Bromophenyl Phenyl Ether	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0					< 0.1						
Azobenzene	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,4-Dimethylphenol	1040	mg/kg		1 of 3	0	0.2	0.2					0.2						
Phenol	1200	mg/kg		1 of 3	0	0.3	0.3					0.3						
Bis(2-chloroethoxy)methane	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Bis(2-ethylhexyl)phthalate	4090	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Di-N-Octyl Phthalate	4920	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Hexachlorobenzene (HCB)	6.38	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,4-Dichlorophenol	186	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,4-Dinitrotoluene	254	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Diphenylamine	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Bis(2-chloroisopropyl)ether	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
O-Dinitrobenzene	None	mg/kg		1 of 3	0	11.0	11.0					11.0						
2-Methyl-4,6-Dinitrophenol	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,3,4,6-Tetrachlorophenol	229	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
4-Chloro-3-Methylphenol	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,6-Dinitrotoluene	125	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Aniline	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0					< 0.1						
4-Chlorophenyl Phenyl Ether	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Hexachlorocyclopentadiene	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Diethylphthalate	8970	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Di-N-Butyl Phthalate	645	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Butylbenzylphthalate	63800	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
Carbazole	None	mg/kg		1 of 3	0	3.5	3.5					3.5						
Pentachlorophenol (PCP)	30.6	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,4,6-Trichlorophenol	231	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2-Methylnaphthalene	13.2	mg/kg	naphthalene	1 of 3	0	8.8	8.8					8.8						
2-Chloronaphthalene	31.6	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,3,5,6-Tetrachlorophenol	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2-Methylphenol	9930	mg/kg		1 of 3	0	0.2	0.2					0.2						
2-Chlorophenol	207	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
2,4,5-Trichlorophenol	231	mg/kg	6-Trichlorophe	0 of 3	0	0.0	0.0					< 0.1						
3-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
M-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0					< 0.1						
3/4 Methylphenol	10000	mg/kg		1 of 3	0	0.4	0.4					0.4						
Phenol (Monohydric)	1200	#N/A	#N/A	23 of 64	0	0.4	12.0		< 0.3	< 0.3	< 0.3	< 0.3	0.5	< 0.3	< 0.3	< 0.3	< 0.3	0.4
Loss on ignition	None	%		8 of 8	0	1.3	11.0						11.0					
Total Organic Carbon	None	%		63 of 64	0	0.5	41.0		9.2	28.0	2.2	6.1	17.0	0.5	1.8	1.1	12.0	4.7
Napthalene	13.2	mg/kg		25 of 59	1	0.0	18.0		0.2	0.2	0.0	< 0.01		< 0.03	< 0.03	< 0.03	< 0.03	0.0

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max		Hole Ref	BH101	TP110	WS105	WS104	TP109	BH112	BH112	BH107	TP111	TP105
									Easting	384796.682	384638.835	384294.085	384569.278	384661.431	384401.713	384401.713	384824.812	384592.029	384843.779
									Northing	399802.989	399640.942	399279.174	399463.63	399650.774	399486.259	399486.259	399485.537	399655.215	399726.261
									Sample Top (m)	0.80	1.30	0.30	1.00	1.30	3.30	0.30	2.00	0.30	1.30
									Sample Date	03/01/2019	07/01/2019	10/01/2019	08/01/2019	04/01/2019	10/01/2019	10/01/2019	09/01/2019	07/01/2019	03/01/2019
									Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
									Geology	MG	MG	MG	MG	MG	CHES	MG	MG	MG	MG
Anthracene	**36600**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**14.0**			2.2	0.4	0.0	14.0		< 0.03	0.1	< 0.03	0.1	0.5
Benzo(k)fluoranthene	**107**	**#N/A**	**#N/A**	**32 of 57**	**0**	**0.0**	**6.5**			0.2	0.1	0.0	6.5		< 0.03	0.2	< 0.03	0.1	0.4
Chrysene	**31.9**	**#N/A**	**#N/A**	**39 of 57**	**0**	**0.0**	**20.0**			0.7	0.4	0.1	20.0		< 0.03	0.4	< 0.03	0.2	0.2
Pyrene	**3790**	**#N/A**	**#N/A**	**44 of 57**	**0**	**0.0**	**48.0**			2.5	1.2	0.3	48.0		< 0.03	0.9	< 0.03	0.4	0.5
Benzo (g,h,i) perylene	**359**	**#N/A**	**#N/A**	**34 of 57**	**0**	**0.0**	**9.5**			0.2	0.1	0.0	9.5		< 0.03	0.3	< 0.03	0.1	2.3
Indeno(1,2,3-cd)pyrene	**46**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**7.4**			0.1	0.1	0.0	7.4		< 0.03	0.3	< 0.03	0.1	0.5
Benzo(b)fluoranthene	**4.06**	**#N/A**	**#N/A**	**39 of 57**	**2**	**0.0**	**17.0**			0.5	0.3	0.1	17.0		< 0.03	0.5	< 0.03	0.2	0.4
Fluoranthene	**1580**	**#N/A**	**#N/A**	**43 of 57**	**0**	**0.0**	**50.0**			3.3	1.2	0.3	50.0		< 0.03	0.9	< 0.03	0.4	0.2
Benzo(a)pyrene	**3.23**	**#N/A**	**#N/A**	**35 of 57**	**2**	**0.0**	**17.0**			0.3	0.2	0.1	17.0		< 0.03	0.4	< 0.03	0.1	0.2
Benzo(a)anthracene	**15**	**#N/A**	**#N/A**	**38 of 57**	**1**	**0.0**	**19.0**			0.5	0.4	0.1	19.0		< 0.03	0.4	< 0.03	0.2	0.2
Phenanthrene	**1520**	**#N/A**	**#N/A**	**42 of 57**	**0**	**0.1**	**61.0**			0.7	1.5	0.3	61.0		< 0.03	0.4	< 0.03	0.2	0.1
Fluorene	**4460**	**#N/A**	**#N/A**	**24 of 57**	**0**	**0.0**	**13.0**			0.1	0.2	0.0	13.0		< 0.03	0.0	< 0.03	< 0.03	0.1
Pah,Total	**None**	**mg/kg**		**45 of 59**	**0**	**0.1**	**95.0**			12.0	6.5	1.4		9.9	< 0.10	4.8	< 0.10	1.8	6.4
Dibenzofuran	**3.23**	**mg/kg**	**benzo(a)pyrene**	**2 of 3**	**1**	**0.2**	**8.3**						8.3						
Aliphatics >C8-10	**155**	**mg/kg**		**1 of 59**	**0**	**4.3**	**4.3**			< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C7-8	**3928**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**			< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C8-10	**269**	**mg/kg**		**1 of 59**	**0**	**10.0**	**10.0**			< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C5-6	**161**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**			< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C6-8	**529**	**mg/kg**		**1 of 59**	**0**	**1.2**	**1.2**			< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C5-7	**1.4**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**			< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C12-16	**2480**	**#N/A**	**#N/A**	**16 of 59**	**0**	**0.7**	**110.0**			11.0	< 0.5	< 0.5	4.3		< 0.5	< 0.5	< 0.5	< 0.5	19.0
Aromatics >C16-21	**1817**	**#N/A**	**#N/A**	**20 of 59**	**0**	**3.9**	**150.0**			56.0	< 0.6	< 0.6	22.0		< 0.6	< 0.6	< 0.6	< 0.6	24.0
Aromatics >C10-12	**1240**	**#N/A**	**#N/A**	**11 of 59**	**0**	**1.0**	**42.0**			3.7	< 0.9	< 0.9	1.0		< 0.9	< 0.9	< 0.9	< 0.9	11.0
Aliphatics >C12-16	**4370**	**#N/A**	**#N/A**	**11 of 59**	**0**	**3.7**	**240.0**			15.0	< 1.2	< 1.2	< 1.2		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aromatics >C21-35	**1930**	**#N/A**	**#N/A**	**21 of 59**	**0**	**9.0**	**670.0**			670.0	< 1.4	< 1.4	47.0		< 1.4	< 1.4	< 1.4	< 1.4	98.0
Aliphatics >C16-21	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**7.2**	**160.0**			57.0	< 1.5	< 1.5	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatics >C10-12	**767**	**#N/A**	**#N/A**	**7 of 59**	**0**	**1.5**	**130.0**			2.7	< 1.5	< 1.5	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatics >C21-35	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**35.0**	**350.0**			350.0	< 3.4	< 3.4	< 3.4		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatics >C5-35	**None**	**#N/A**	**#N/A**	**11 of 59**	**0**	**52.0**	**650.0**			420.0	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 10
TPH >C10-40	**None**	**mg/kg**		**8 of 8**	**0**	**31.0**	**1700.0**							38.0					

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP105	TP109	BH103	BH105	WS103	WS102	BH103	TP104	TP111	TP112	BH105	BH106
								384843.779	384661.431	384689.014	384463.735	384813.849	384761.314	384689.014	384780.328	384592.029	384552.675	384463.735	384459.989
								399726.261	399650.774	399695.588	399571.588	399611.16	399589.102	399695.588	399749.164	399655.215	399614.062	399571.588	399509.165
								0.30	0.30	3.20	0.70	1.00	1.00	4.80	0.30	2.50	0.30	3.30	0.30
								03/01/2019	04/01/2019	04/01/2019	04/01/2019	07/01/2019	07/01/2019	04/01/2019	03/01/2019	07/01/2019	07/01/2019	08/01/2019	07/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	MG	MG	MM	MG	CHES	MG	ALV	MG
Asbestos Analysts Comments	#N/A	#N/A	#N/A	0 of 56	7	0.0	0.0	microscopic b	na	na	na	resent in smal	na	na	na		na	na	na
Asbestos (Presence of)	Presence	#N/A		7 of 56	7	0.0	0.0	Chrysotile	NAD	NAD	NAD	Amosite	NAD	NAD	NAD		NAD	NAD	NAD
pH	None	-		64 of 64	0	6.1	11.7	8.4	7.6	8.5	8.3	8.5	8.5	8.7	7.7	7.7	6.1	8.2	6.9
Cyanide	800	mg/kg	#N/A	36 of 64	0	0.1	89.0	8.1	0.8	< 0.1	0.1	0.4	0.4	< 0.1	0.2	< 0.1	< 0.1	< 0.1	0.5
Sulphate as SO4	#N/A	mg/l	#N/A	2 of 2	0	49.0	55.0												
Mercury	13.6	mg/kg	#N/A	46 of 64	1	0.1	18.0	0.9	18.0	< 0.05	0.1	0.7	0.6	< 0.05	0.3	< 0.05	0.5	< 0.05	0.4
Cadmium	85	mg/kg	#N/A	60 of 64	0	0.1	4.7	0.5	0.5	0.2	0.2	0.3	0.5	0.4	0.7	0.1	0.3	0.1	1.0
Chromium	907	mg/kg	#N/A	64 of 64	0	5.7	48.0	22.0	19.0	19.0	23.0	16.0	12.0	24.0	48.0	13.0	18.0	18.0	22.0
Arsenic	39.9	mg/kg	#N/A	64 of 64	6	4.1	71.0	19.0	28.0	6.1	11.0	14.0	12.0	12.0	23.0	4.5	19.0	10.0	40.0
Beryllium	1.72	mg/kg	#N/A	62 of 64	13	0.2	3.9	1.3	2.6	0.7	0.9	0.6	0.6	0.8	1.5	0.6	2.2	0.7	1.3
Copper	7130	mg/kg	#N/A	64 of 64	0	8.9	4200.0	94.0	300.0	46.0	31.0	60.0	80.0	9.1	150.0	14.0	270.0	18.0	210.0
Lead	310	mg/kg	#N/A	64 of 64	15	12.0	12000.0	240.0	1300.0	28.0	26.0	490.0	280.0	13.0	210.0	12.0	290.0	12.0	370.0
Selenium	430	mg/kg	#N/A	5 of 64	0	0.5	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0
Vanadium	651	mg/kg	#N/A	64 of 64	0	8.7	160.0	33.0	53.0	22.0	27.0	24.0	19.0	28.0	160.0	16.0	54.0	26.0	52.0
Antimony	618	mg/kg	#N/A	56 of 64	0	1.0	180.0	2.2	4.1	1.3	1.5	11.0	1.5	1.3	3.8	< 1.0	55.0	1.1	21.0
Chromium - Hexavalent	21	mg/kg	#N/A	0 of 61	0	0.0	0.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0
Nickel	181	mg/kg	#N/A	64 of 64	0	6.5	53.0	27.0	39.0	22.0	27.0	15.0	11.0	29.0	32.0	15.0	38.0	18.0	38.0
Zinc	40400	mg/kg	#N/A	64 of 64	0	28.0	1700.0	170.0	310.0	99.0	97.0	220.0	140.0	69.0	180.0	28.0	120.0	54.0	340.0
m,p xylenes	427.6926186	mg/kg	p-Xylene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
4-Isopropyltoluene	1240	mg/kg	Aromatic >EC1	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Isopropylbenzene	95.4	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Tert-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2,3-Trichloropropane	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2-Dibromo-3-Chloropropane	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2,4-Trimethylbenzene	3.31	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Ethylbenzene	439.7179703	mg/kg		0 of 64	0	0.0	0.0	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	3927.6251	mg/kg		0 of 64	0	0.0	0.0	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	427.6926186	mg/kg	p-Xylene	1 of 59	0	1.9	1.9		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Benzene	1.42187881	mg/kg		0 of 64	0	0.0	0.0	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	133	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
2-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
O-Xylene	475.7207618	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Hexachlorobutadiene (HCBD)	1.79	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2,3 Trichlorobenzene	8.81	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Trichloroethene	0.0797	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,1,2-Trichloroethane	5.53	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2-Dichloropropane	0.121	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,1-Dichloroethene	1.17	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,1-Dichloroethane	10.9	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Bromodichloromethane	0.096	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Tribromomethane	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Chloroethene	0.00153	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Bromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Dibromomethane	0.096	mg/kg	hodichloromet	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,1,1-Trichloroethane	40.4	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Chloroform	4.22	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,1,1,2-Tetrachloroethane	8.2	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
2,2-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,1-Dichloropropene	3.3	mg/kg	Benzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
trachloromethane (Carbon Tetra Chlorid	0.128	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
cis1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,3-Dichlorobenzene	2.45	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Methyl tert-butyl ether (MTBE)	319	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
trans-1,2-Dichloroethene	1.02	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
cis-1,2-Dichloroethene	0.559	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,3-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Sec-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Tetrachloroethene	0.92	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Dibromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2,4-Trichlorobenzene	15.3	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP105	TP109	BH103	BH105	WS103	WS102	BH103	TP104	TP111	TP112	BH105	BH106
								384843.779	384661.431	384689.014	384463.735	384813.849	384761.314	384689.014	384780.328	384592.029	384552.675	384463.735	384459.989
								399726.261	399650.774	399695.588	399571.588	399611.16	399589.102	399695.588	399749.164	399655.215	399614.062	399571.588	399509.165
								0.30	0.30	3.20	0.70	1.00	1.00	4.80	0.30	2.50	0.30	3.30	0.30
								03/01/2019	04/01/2019	04/01/2019	04/01/2019	07/01/2019	07/01/2019	04/01/2019	03/01/2019	07/01/2019	07/01/2019	08/01/2019	07/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	MG	MG	MM	MG	CHES	MG	ALV	MG
Chlorobenzene	2.41	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Bromobenzene	6.96	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,3,5-Trimethylbenzene	3.31	mg/kg	-Trimethylben	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2-Dibromoethane	0.096	mg/kg	nodichlorometl	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,4-Dichlorobenzene	332	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
4-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
n-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0	< 0.10							< 0.01				
n-propylbenzene	323	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
trans-1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Styrene	236	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
1,2-Dichloroethane	0.0227	mg/kg		0 of 5	0	0.0	0.0	< 0.10							< 0.01				
Acenaphthylene	5970	#N/A	#N/A	13 of 57	0	0.0	7.7		< 0.03	< 0.03	< 0.03	0.1	< 0.03	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03
Dibenz-a-h-anthracene	0.32	#N/A	#N/A	18 of 57	2	0.0	2.4		< 0.03	< 0.03	< 0.03	0.2	< 0.03	< 0.03		< 0.03	< 0.03	< 0.03	0.0
Acenaphthene	6040	#N/A	#N/A	26 of 57	0	0.0	6.1		0.0	0.0	< 0.03	6.1	0.0	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03
Total BTEX	None	mg/kg		0 of 8	0	0.0	0.0						< 0.04						< 0.04
4-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
4-Nitrophenol	None	mg/kg		1 of 3	0	6.2	6.2												
Dimethylphthalate	None	mg/kg		0 of 3	0	0.0	0.0												
P-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
Benzyl Alcohol	None	mg/kg		0 of 3	0	0.0	0.0												
4-Bromophenyl Phenyl Ether	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0												
Azobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dimethylphenol	1040	mg/kg		1 of 3	0	0.2	0.2												
Phenol	1200	mg/kg		1 of 3	0	0.3	0.3												
Bis(2-chloroethoxy)methane	None	mg/kg		0 of 3	0	0.0	0.0												
Bis(2-ethylhexyl)phthalate	4090	mg/kg		0 of 3	0	0.0	0.0												
Di-N-Octyl Phthalate	4920	mg/kg		0 of 3	0	0.0	0.0												
Hexachlorobenzene (HCB)	6.38	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dichlorophenol	186	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dinitrotoluene	254	mg/kg		0 of 3	0	0.0	0.0												
Diphenylamine	None	mg/kg		0 of 3	0	0.0	0.0												
Bis(2-chloroisopropyl)ether	None	mg/kg		0 of 3	0	0.0	0.0												
O-Dinitrobenzene	None	mg/kg		1 of 3	0	11.0	11.0												
2-Methyl-4,6-Dinitrophenol	None	mg/kg		0 of 3	0	0.0	0.0												
2,3,4,6-Tetrachlorophenol	229	mg/kg		0 of 3	0	0.0	0.0												
4-Chloro-3-Methylphenol	None	mg/kg		0 of 3	0	0.0	0.0												
2,6-Dinitrotoluene	125	mg/kg		0 of 3	0	0.0	0.0												
Aniline	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0												
4-Chlorophenyl Phenyl Ether	None	mg/kg		0 of 3	0	0.0	0.0												
Hexachlorocyclopentadiene	None	mg/kg		0 of 3	0	0.0	0.0												
Diethylphthalate	8970	mg/kg		0 of 3	0	0.0	0.0												
Di-N-Butyl Phthalate	645	mg/kg		0 of 3	0	0.0	0.0												
Butylbenzylphthalate	63800	mg/kg		0 of 3	0	0.0	0.0												
Carbazole	None	mg/kg		1 of 3	0	3.5	3.5												
Pentachlorophenol (PCP)	30.6	mg/kg		0 of 3	0	0.0	0.0												
2,4,6-Trichlorophenol	231	mg/kg		0 of 3	0	0.0	0.0												
2-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
2-Methylnaphthalene	13.2	mg/kg	naphthalene	1 of 3	0	8.8	8.8												
2-Chloronaphthalene	31.6	mg/kg		0 of 3	0	0.0	0.0												
2,3,5,6-Tetrachlorophenol	None	mg/kg		0 of 3	0	0.0	0.0												
2-Methylphenol	9930	mg/kg		1 of 3	0	0.2	0.2												
2-Chlorophenol	207	mg/kg		0 of 3	0	0.0	0.0												
2,4,5-Trichlorophenol	231	mg/kg	6-Trichlorophe	0 of 3	0	0.0	0.0												
3-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
M-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
3/4 Methylphenol	10000	mg/kg		1 of 3	0	0.4	0.4												
Phenol (Monohydric)	1200	#N/A	#N/A	23 of 64	0	0.4	12.0	0.7	0.5	0.4	< 0.3	12.0	< 0.3	0.4	0.8	0.4	< 0.3	< 0.3	< 0.3
Loss on ignition	None	%		8 of 8	0	1.3	11.0						3.1						11.0
Total Organic Carbon	None	%		63 of 64	0	0.5	41.0	5.3	27.0	1.2	1.6	3.4	2.1	< 0.5	18.0	0.5	13.0	0.6	24.0
Napthalene	13.2	mg/kg		25 of 59	1	0.0	18.0	< 0.10	< 0.03	0.0	< 0.03	18.0	< 0.03	< 0.03	< 0.01	< 0.03	0.0	< 0.03	0.0

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP105	TP109	BH103	BH105	WS103	WS102	BH103	TP104	TP111	TP112	BH105	BH106
								384843.779	384661.431	384689.014	384463.735	384813.849	384761.314	384689.014	384780.328	384592.029	384552.675	384463.735	384459.989
								399726.261	399650.774	399695.588	399571.588	399611.16	399589.102	399695.588	399749.164	399655.215	399614.062	399571.588	399509.165
								0.30	0.30	3.20	0.70	1.00	1.00	4.80	0.30	2.50	0.30	3.30	0.30
								03/01/2019	04/01/2019	04/01/2019	04/01/2019	07/01/2019	07/01/2019	04/01/2019	03/01/2019	07/01/2019	07/01/2019	08/01/2019	07/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	MG	MG	MM	MG	CHES	MG	ALV	MG
Anthracene	**36600**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**14.0**		0.0	0.1	< 0.03	3.7	0.1	< 0.03		< 0.03	< 0.03	< 0.03	0.1
Benzo(k)fluoranthene	**107**	**#N/A**	**#N/A**	**32 of 57**	**0**	**0.0**	**6.5**		0.1	< 0.03	< 0.03	1.2	0.1	< 0.03		< 0.03	< 0.03	< 0.03	0.2
Chrysene	**31.9**	**#N/A**	**#N/A**	**39 of 57**	**0**	**0.0**	**20.0**		0.2	0.1	< 0.03	4.4	0.3	< 0.03		< 0.03	0.1	< 0.03	0.4
Pyrene	**3790**	**#N/A**	**#N/A**	**44 of 57**	**0**	**0.0**	**48.0**		0.4	0.2	0.0	13.0	0.7	< 0.03		< 0.03	0.1	< 0.03	0.5
Benzo (g,h,i) perylene	**359**	**#N/A**	**#N/A**	**34 of 57**	**0**	**0.0**	**9.5**		0.1	< 0.03	0.1	0.9	0.2	< 0.03		< 0.03	< 0.03	< 0.03	0.2
Indeno(1,2,3-cd)pyrene	**46**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**7.4**		0.1	< 0.03	< 0.03	0.8	0.1	< 0.03		< 0.03	< 0.03	< 0.03	0.1
Benzo(b)fluoranthene	**4.06**	**#N/A**	**#N/A**	**39 of 57**	**2**	**0.0**	**17.0**		0.2	0.1	0.0	2.9	0.4	< 0.03		< 0.03	0.1	< 0.03	0.4
Fluoranthene	**1580**	**#N/A**	**#N/A**	**43 of 57**	**0**	**0.0**	**50.0**		0.4	0.2	< 0.03	13.0	0.7	< 0.03		< 0.03	0.1	< 0.03	0.5
Benzo(a)pyrene	**3.23**	**#N/A**	**#N/A**	**35 of 57**	**2**	**0.0**	**17.0**		0.1	0.0	< 0.03	2.7	0.3	< 0.03		< 0.03	< 0.03	< 0.03	0.3
Benzo(a)anthracene	**15**	**#N/A**	**#N/A**	**38 of 57**	**1**	**0.0**	**19.0**		0.2	0.1	< 0.03	3.7	0.3	< 0.03		< 0.03	0.0	< 0.03	0.3
Phenanthrene	**1520**	**#N/A**	**#N/A**	**42 of 57**	**0**	**0.1**	**61.0**		0.3	0.2	< 0.03	20.0	0.4	< 0.03		< 0.03	0.1	< 0.03	0.2
Fluorene	**4460**	**#N/A**	**#N/A**	**24 of 57**	**0**	**0.0**	**13.0**		< 0.03	0.0	< 0.03	4.0	< 0.03	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03
Pah,Total	**None**	**mg/kg**		**45 of 59**	**0**	**0.1**	**95.0**		2.0	0.9	0.1	95.0	3.6	< 0.10		< 0.10	0.5	< 0.10	3.2
Dibenzofuran	**3.23**	**mg/kg**	**benzo(a)pyrene**	**2 of 3**	**1**	**0.2**	**8.3**												
Aliphatics >C8-10	**155**	**mg/kg**		**1 of 59**	**0**	**4.3**	**4.3**	4.3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C7-8	**3928**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C8-10	**269**	**mg/kg**		**1 of 59**	**0**	**10.0**	**10.0**	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C5-6	**161**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C6-8	**529**	**mg/kg**		**1 of 59**	**0**	**1.2**	**1.2**	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C5-7	**1.4**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C12-16	**2480**	**#N/A**	**#N/A**	**16 of 59**	**0**	**0.7**	**110.0**	41.0	< 0.5	< 0.5	< 0.5	28.0	< 0.5	< 0.5	25.0	< 0.5	< 0.5	< 0.5	1.4
Aromatics >C16-21	**1817**	**#N/A**	**#N/A**	**20 of 59**	**0**	**3.9**	**150.0**	40.0	< 0.6	< 0.6	< 0.6	75.0	< 0.6	< 0.6	85.0	< 0.6	< 0.6	< 0.6	3.9
Aromatics >C10-12	**1240**	**#N/A**	**#N/A**	**11 of 59**	**0**	**1.0**	**42.0**	27.0	< 0.9	< 0.9	< 0.9	8.6	< 0.9	< 0.9	12.0	< 0.9	< 0.9	< 0.9	< 0.9
Aliphatics >C12-16	**4370**	**#N/A**	**#N/A**	**11 of 59**	**0**	**3.7**	**240.0**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	16.0	< 1.2	< 1.2	< 1.2	< 1.2
Aromatics >C21-35	**1930**	**#N/A**	**#N/A**	**21 of 59**	**0**	**9.0**	**670.0**	160.0	< 1.4	< 1.4	< 1.4	88.0	< 1.4	< 1.4	200.0	< 1.4	< 1.4	17.0	14.0
Aliphatics >C16-21	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**7.2**	**160.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	72.0	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatics >C10-12	**767**	**#N/A**	**#N/A**	**7 of 59**	**0**	**1.5**	**130.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatics >C21-35	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**35.0**	**350.0**	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	230.0	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatics >C5-35	**None**	**#N/A**	**#N/A**	**11 of 59**	**0**	**52.0**	**650.0**	< 76.3	< 10	< 10	< 10	< 10	< 10	< 10	320.0	< 10	< 10	< 10	< 10
TPH >C10-40	**None**	**mg/kg**		**8 of 8**	**0**	**31.0**	**1700.0**						61.0						48.0

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP103	TP122	TP108	BH106	TP107	BH102	BH106	BH109	BH104	BH103	BH104	BH101
								384772.82	384423.36	384655.011	384459.989	384737.823	384763.18	384459.989	384562.256	384607.46	384689.014	384607.46	384796.682
								399769.313	399438.117	399693.93	399509.165	399704.019	399691.375	399509.165	399392.535	399631.24	399695.588	399631.24	399802.989
								1.80	0.30	0.30	3.30	1.20	3.50	7.60	1.20	4.70	0.30	9.70	4.80
								03/01/2019	11/01/2019	04/01/2019	08/01/2019	03/01/2019	03/01/2019	08/01/2019	09/01/2019	04/01/2019	04/01/2019	07/01/2019	03/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								GTD	MG	MG	MG	MG	MG	GTD	MG	MG	MG	MG	MG
Asbestos Analysts Comments	#N/A	#N/A	#N/A	0 of 56	7	0.0	0.0		na	na	na		na	na	na	na	na	na	na
Asbestos (Presence of)	Presence	#N/A		7 of 56	7	0.0	0.0		NAD	NAD	NAD		NAD	NAD	NAD	NAD	NAD	NAD	NAD
pH	None	-		64 of 64	0	6.1	11.7	8.1	8.1	7.6	7.9	7.2	8.3	7.7	11.4	9.7	9.1	7.8	8.3
Cyanide	800	mg/kg	#N/A	36 of 64	0	0.1	89.0	< 0.1	< 0.1	0.1	0.2	0.2	< 0.1	1.1	< 0.1	< 0.1	0.6	2.4	0.1
Sulphate as SO4	#N/A	mg/l	#N/A	2 of 2	0	49.0	55.0		49.0										
Mercury	13.6	mg/kg	#N/A	46 of 64	1	0.1	18.0	< 0.05	0.2	< 0.05	0.4	0.3	0.2	0.1	0.2	< 0.05	0.3	0.4	0.1
Cadmium	85	mg/kg	#N/A	60 of 64	0	0.1	4.7	0.2	0.4	0.4	0.5	0.2	0.2	< 0.1	0.5	0.2	0.6	0.2	0.2
Chromium	907	mg/kg	#N/A	64 of 64	0	5.7	48.0	22.0	15.0	36.0	27.0	23.0	16.0	18.0	17.0	20.0	19.0	22.0	20.0
Arsenic	39.9	mg/kg	#N/A	64 of 64	6	4.1	71.0	8.1	23.0	37.0	28.0	12.0	9.3	11.0	6.7	8.2	9.5	19.0	9.5
Beryllium	1.72	mg/kg	#N/A	62 of 64	13	0.2	3.9	0.8	1.3	1.0	1.6	0.9	0.8	0.5	0.4	0.7	0.5	2.1	0.8
Copper	7130	mg/kg	#N/A	64 of 64	0	8.9	4200.0	27.0	280.0	130.0	180.0	43.0	27.0	26.0	19.0	33.0	100.0	100.0	28.0
Lead	310	mg/kg	#N/A	64 of 64	15	12.0	12000.0	13.0	730.0	100.0	210.0	39.0	91.0	45.0	77.0	42.0	230.0	75.0	53.0
Selenium	430	mg/kg	#N/A	5 of 64	0	0.5	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5
Vanadium	651	mg/kg	#N/A	64 of 64	0	8.7	160.0	27.0	29.0	74.0	46.0	33.0	22.0	17.0	21.0	26.0	21.0	34.0	26.0
Antimony	618	mg/kg	#N/A	56 of 64	0	1.0	180.0	< 1.0	59.0	7.9	7.8	1.2	1.2	1.4	1.4	1.2	5.0	1.8	1.1
Chromium - Hexavalent	21	mg/kg	#N/A	0 of 61	0	0.0	0.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	181	mg/kg	#N/A	64 of 64	0	6.5	53.0	29.0	24.0	33.0	34.0	29.0	19.0	12.0	11.0	24.0	17.0	53.0	25.0
Zinc	40400	mg/kg	#N/A	64 of 64	0	28.0	1700.0	65.0	260.0	130.0	160.0	62.0	88.0	50.0	74.0	79.0	300.0	120.0	61.0
m,p xylenes	427.6926186	mg/kg	p-Xylene	0 of 5	0	0.0	0.0												
4-Isopropyltoluene	1240	mg/kg	Aromatic >EC1	0 of 5	0	0.0	0.0												
Isopropylbenzene	95.4	mg/kg		0 of 5	0	0.0	0.0												
Tert-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0												
1,2,3-Trichloropropane	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0												
1,2-Dibromo-3-Chloropropane	None	mg/kg		0 of 5	0	0.0	0.0												
1,2,4-Trimethylbenzene	3.31	mg/kg		0 of 5	0	0.0	0.0												
Ethylbenzene	439.7179703	mg/kg		0 of 64	0	0.0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	3927.6251	mg/kg		0 of 64	0	0.0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	427.6926186	mg/kg	p-Xylene	1 of 59	0	1.9	1.9	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	1.9	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	1.42187881	mg/kg		0 of 64	0	0.0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	133	mg/kg		0 of 5	0	0.0	0.0												
2-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0												
O-Xylene	475.7207618	mg/kg		0 of 5	0	0.0	0.0												
Hexachlorobutadiene (HCBD)	1.79	mg/kg		0 of 5	0	0.0	0.0												
1,2,3 Trichlorobenzene	8.81	mg/kg		0 of 5	0	0.0	0.0												
Trichloroethene	0.0797	mg/kg		0 of 5	0	0.0	0.0												
1,1,2-Trichloroethane	5.53	mg/kg		0 of 5	0	0.0	0.0												
1,2-Dichloropropane	0.121	mg/kg		0 of 5	0	0.0	0.0												
1,1-Dichloroethene	1.17	mg/kg		0 of 5	0	0.0	0.0												
1,1-Dichloroethane	10.9	mg/kg		0 of 5	0	0.0	0.0												
Bromodichloromethane	0.096	mg/kg		0 of 5	0	0.0	0.0												
Tribromomethane	None	mg/kg		0 of 5	0	0.0	0.0												
Chloroethene	0.00153	mg/kg		0 of 5	0	0.0	0.0												
Bromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0												
Dibromomethane	0.096	mg/kg	hodichlorometl	0 of 5	0	0.0	0.0												
1,1,1-Trichloroethane	40.4	mg/kg		0 of 5	0	0.0	0.0												
Chloroform	4.22	mg/kg		0 of 5	0	0.0	0.0												
1,1,1,2-Tetrachloroethane	8.2	mg/kg		0 of 5	0	0.0	0.0												
2,2-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0												
1,1-Dichloropropene	3.3	mg/kg	Benzene	0 of 5	0	0.0	0.0												
trachloromethane (Carbon Tetra Chlorid	0.128	mg/kg		0 of 5	0	0.0	0.0												
cis1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0												
1,3-Dichlorobenzene	2.45	mg/kg		0 of 5	0	0.0	0.0												
Methyl tert-butyl ether (MTBE)	319	mg/kg		0 of 5	0	0.0	0.0												
trans-1,2-Dichloroethene	1.02	mg/kg		0 of 5	0	0.0	0.0												
cis-1,2-Dichloroethene	0.559	mg/kg		0 of 5	0	0.0	0.0												
1,3-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0												
Sec-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0												
Tetrachloroethene	0.92	mg/kg		0 of 5	0	0.0	0.0												
Dibromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0												
1,2,4-Trichlorobenzene	15.3	mg/kg		0 of 5	0	0.0	0.0												

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP103	TP122	TP108	BH106	TP107	BH102	BH106	BH109	BH104	BH103	BH104	BH101
								384772.82	384423.36	384655.011	384459.989	384737.823	384763.18	384459.989	384562.256	384607.46	384689.014	384607.46	384796.682
								399769.313	399438.117	399693.93	399509.165	399704.019	399691.375	399509.165	399392.535	399631.24	399695.588	399631.24	399802.989
								1.80	0.30	0.30	3.30	1.20	3.50	7.60	1.20	4.70	0.30	9.70	4.80
								03/01/2019	11/01/2019	04/01/2019	08/01/2019	03/01/2019	03/01/2019	08/01/2019	09/01/2019	04/01/2019	04/01/2019	07/01/2019	03/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								GTD	MG	MG	MG	MG	MG	GTD	MG	MG	MG	MG	MG
Chlorobenzene	2.41	mg/kg		0 of 5	0	0.0	0.0												
Bromobenzene	6.96	mg/kg		0 of 5	0	0.0	0.0												
1,3,5-Trimethylbenzene	3.31	mg/kg	-Trimethylben	0 of 5	0	0.0	0.0												
1,2-Dibromoethane	0.096	mg/kg	nodichlorometl	0 of 5	0	0.0	0.0												
1,4-Dichlorobenzene	332	mg/kg		0 of 5	0	0.0	0.0												
4-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0												
n-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0												
n-propylbenzene	323	mg/kg		0 of 5	0	0.0	0.0												
trans-1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0												
Styrene	236	mg/kg		0 of 5	0	0.0	0.0												
1,2-Dichloroethane	0.0227	mg/kg		0 of 5	0	0.0	0.0												
Acenaphthylene	5970	#N/A	#N/A	13 of 57	0	0.0	7.7	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.1	< 0.03	< 0.03
Dibenz-a-h-anthracene	0.32	#N/A	#N/A	18 of 57	2	0.0	2.4	< 0.03	< 0.03	0.0	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.0	< 0.03	< 0.03
Acenaphthene	6040	#N/A	#N/A	26 of 57	0	0.0	6.1	< 0.03	< 0.03	0.6	0.0	< 0.03	0.1	< 0.03	0.2	< 0.03	0.3	0.1	< 0.03
Total BTEX	None	mg/kg		0 of 8	0	0.0	0.0												
4-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
4-Nitrophenol	None	mg/kg		1 of 3	0	6.2	6.2												
Dimethylphthalate	None	mg/kg		0 of 3	0	0.0	0.0												
P-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
Benzyl Alcohol	None	mg/kg		0 of 3	0	0.0	0.0												
4-Bromophenyl Phenyl Ether	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0												
Azobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dimethylphenol	1040	mg/kg		1 of 3	0	0.2	0.2												
Phenol	1200	mg/kg		1 of 3	0	0.3	0.3												
Bis(2-chloroethoxy)methane	None	mg/kg		0 of 3	0	0.0	0.0												
Bis(2-ethylhexyl)phthalate	4090	mg/kg		0 of 3	0	0.0	0.0												
Di-N-Octyl Phthalate	4920	mg/kg		0 of 3	0	0.0	0.0												
Hexachlorobenzene (HCB)	6.38	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dichlorophenol	186	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dinitrotoluene	254	mg/kg		0 of 3	0	0.0	0.0												
Diphenylamine	None	mg/kg		0 of 3	0	0.0	0.0												
Bis(2-chloroisopropyl)ether	None	mg/kg		0 of 3	0	0.0	0.0												
O-Dinitrobenzene	None	mg/kg		1 of 3	0	11.0	11.0												
2-Methyl-4,6-Dinitrophenol	None	mg/kg		0 of 3	0	0.0	0.0												
2,3,4,6-Tetrachlorophenol	229	mg/kg		0 of 3	0	0.0	0.0												
4-Chloro-3-Methylphenol	None	mg/kg		0 of 3	0	0.0	0.0												
2,6-Dinitrotoluene	125	mg/kg		0 of 3	0	0.0	0.0												
Aniline	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0												
4-Chlorophenyl Phenyl Ether	None	mg/kg		0 of 3	0	0.0	0.0												
Hexachlorocyclopentadiene	None	mg/kg		0 of 3	0	0.0	0.0												
Diethylphthalate	8970	mg/kg		0 of 3	0	0.0	0.0												
Di-N-Butyl Phthalate	645	mg/kg		0 of 3	0	0.0	0.0												
Butylbenzylphthalate	63800	mg/kg		0 of 3	0	0.0	0.0												
Carbazole	None	mg/kg		1 of 3	0	3.5	3.5												
Pentachlorophenol (PCP)	30.6	mg/kg		0 of 3	0	0.0	0.0												
2,4,6-Trichlorophenol	231	mg/kg		0 of 3	0	0.0	0.0												
2-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
2-Methylnaphthalene	13.2	mg/kg	naphthalene	1 of 3	0	8.8	8.8												
2-Chloronaphthalene	31.6	mg/kg		0 of 3	0	0.0	0.0												
2,3,5,6-Tetrachlorophenol	None	mg/kg		0 of 3	0	0.0	0.0												
2-Methylphenol	9930	mg/kg		1 of 3	0	0.2	0.2												
2-Chlorophenol	207	mg/kg		0 of 3	0	0.0	0.0												
2,4,5-Trichlorophenol	231	mg/kg	6-Trichlorophe	0 of 3	0	0.0	0.0												
3-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
M-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
3/4 Methylphenol	10000	mg/kg		1 of 3	0	0.4	0.4												
Phenol (Monohydric)	1200	#N/A	#N/A	23 of 64	0	0.4	12.0	< 0.3	< 0.3	0.5	< 0.3	0.4	0.9	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Loss on ignition	None	%		8 of 8	0	1.3	11.0												
Total Organic Carbon	None	%		63 of 64	0	0.5	41.0	2.0	3.7	12.0	21.0	4.7	3.1	2.6	1.6	2.2	7.1	13.0	1.8
Napthalene	13.2	mg/kg		25 of 59	1	0.0	18.0	< 0.03	< 0.03	0.3	0.1	< 0.03	< 0.03	< 0.03	0.2	< 0.03	0.6	0.1	< 0.03

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP103	TP122	TP108	BH106	TP107	BH102	BH106	BH109	BH104	BH103	BH104	BH101
								384772.82	384423.36	384655.011	384459.989	384737.823	384763.18	384459.989	384562.256	384607.46	384689.014	384607.46	384796.682
								399769.313	399438.117	399693.93	399509.165	399704.019	399691.375	399509.165	399392.535	399631.24	399695.588	399631.24	399802.989
								1.80	0.30	0.30	3.30	1.20	3.50	7.60	1.20	4.70	0.30	9.70	4.80
								03/01/2019	11/01/2019	04/01/2019	08/01/2019	03/01/2019	03/01/2019	08/01/2019	09/01/2019	04/01/2019	04/01/2019	07/01/2019	03/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								GTD	MG	MG	MG	MG	MG	GTD	MG	MG	MG	MG	MG
Anthracene	**36600**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**14.0**	< 0.03	< 0.03	0.6	0.1	< 0.03	0.1	< 0.03	0.2	< 0.03	0.4	0.1	< 0.03
Benzo(k)fluoranthene	**107**	**#N/A**	**#N/A**	**32 of 57**	**0**	**0.0**	**6.5**	< 0.03	< 0.03	0.2	0.1	< 0.03	< 0.03	< 0.03	0.1	< 0.03	0.1	0.1	< 0.03
Chrysene	**31.9**	**#N/A**	**#N/A**	**39 of 57**	**0**	**0.0**	**20.0**	< 0.03	< 0.03	0.8	0.2	< 0.03	0.1	< 0.03	0.4	< 0.03	0.4	0.3	< 0.03
Pyrene	**3790**	**#N/A**	**#N/A**	**44 of 57**	**0**	**0.0**	**48.0**	< 0.03	< 0.03	2.5	0.4	0.0	0.2	< 0.03	0.9	0.0	1.0	0.6	0.1
Benzo (g,h,i) perylene	**359**	**#N/A**	**#N/A**	**34 of 57**	**0**	**0.0**	**9.5**	< 0.03	< 0.03	0.2	0.1	< 0.03	< 0.03	< 0.03	0.1	< 0.03	0.1	0.1	< 0.03
Indeno(1,2,3-cd)pyrene	**46**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**7.4**	< 0.03	< 0.03	0.1	0.1	< 0.03	< 0.03	< 0.03	0.1	< 0.03	0.1	0.1	< 0.03
Benzo(b)fluoranthene	**4.06**	**#N/A**	**#N/A**	**39 of 57**	**2**	**0.0**	**17.0**	< 0.03	< 0.03	0.5	0.2	< 0.03	0.1	< 0.03	0.3	< 0.03	0.3	0.2	< 0.03
Fluoranthene	**1580**	**#N/A**	**#N/A**	**43 of 57**	**0**	**0.0**	**50.0**	< 0.03	< 0.03	2.5	0.4	0.0	0.2	< 0.03	0.9	0.0	1.1	0.6	0.0
Benzo(a)pyrene	**3.23**	**#N/A**	**#N/A**	**35 of 57**	**2**	**0.0**	**17.0**	< 0.03	< 0.03	0.4	0.1	< 0.03	0.0	< 0.03	0.2	< 0.03	0.2	0.2	< 0.03
Benzo(a)anthracene	**15**	**#N/A**	**#N/A**	**38 of 57**	**1**	**0.0**	**19.0**	< 0.03	< 0.03	0.7	0.2	< 0.03	0.1	< 0.03	0.3	< 0.03	0.3	0.2	< 0.03
Phenanthrene	**1520**	**#N/A**	**#N/A**	**42 of 57**	**0**	**0.1**	**61.0**	< 0.03	< 0.03	2.5	0.4	< 0.03	0.3	< 0.03	1.0	0.1	1.4	0.6	0.1
Fluorene	**4460**	**#N/A**	**#N/A**	**24 of 57**	**0**	**0.0**	**13.0**	< 0.03	< 0.03	0.5	< 0.03	< 0.03	0.1	< 0.03	0.1	< 0.03	0.5	0.1	< 0.03
Pah,Total	**None**	**mg/kg**		**45 of 59**	**0**	**0.1**	**95.0**	< 0.10	< 0.10	12.0	2.1	< 0.10	1.2	< 0.10	5.2	0.1	6.8	3.4	0.2
Dibenzofuran	**3.23**	**mg/kg**	**benzo(a)pyrene**	**2 of 3**	**1**	**0.2**	**8.3**												
Aliphatics >C8-10	**155**	**mg/kg**		**1 of 59**	**0**	**4.3**	**4.3**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C7-8	**3928**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C8-10	**269**	**mg/kg**		**1 of 59**	**0**	**10.0**	**10.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	10.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C5-6	**161**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C6-8	**529**	**mg/kg**		**1 of 59**	**0**	**1.2**	**1.2**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	1.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C5-7	**1.4**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C12-16	**2480**	**#N/A**	**#N/A**	**16 of 59**	**0**	**0.7**	**110.0**	< 0.5	< 0.5	19.0	< 0.5	< 0.5	110.0	< 0.5	< 0.5	< 0.5	37.0	0.7	< 0.5
Aromatics >C16-21	**1817**	**#N/A**	**#N/A**	**20 of 59**	**0**	**3.9**	**150.0**	< 0.6	< 0.6	39.0	6.1	< 0.6	150.0	< 0.6	5.5	< 0.6	85.0	4.3	< 0.6
Aromatics >C10-12	**1240**	**#N/A**	**#N/A**	**11 of 59**	**0**	**1.0**	**42.0**	< 0.9	< 0.9	13.0	< 0.9	< 0.9	42.0	< 0.9	< 0.9	< 0.9	6.8	< 0.9	< 0.9
Aliphatics >C12-16	**4370**	**#N/A**	**#N/A**	**11 of 59**	**0**	**3.7**	**240.0**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	240.0	< 1.2	5.8	< 1.2	56.0	< 1.2	< 1.2
Aromatics >C21-35	**1930**	**#N/A**	**#N/A**	**21 of 59**	**0**	**9.0**	**670.0**	< 1.4	< 1.4	68.0	13.0	< 1.4	170.0	< 1.4	71.0	< 1.4	120.0	9.0	< 1.4
Aliphatics >C16-21	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**7.2**	**160.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	160.0	< 1.5	8.3	< 1.5	65.0	< 1.5	< 1.5
Aliphatics >C10-12	**767**	**#N/A**	**#N/A**	**7 of 59**	**0**	**1.5**	**130.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	130.0	< 1.5	2.5	< 1.5	13.0	< 1.5	< 1.5
Aliphatics >C21-35	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**35.0**	**350.0**	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	120.0	< 3.4	35.0	< 3.4	77.0	< 3.4	< 3.4
Aliphatics >C5-35	**None**	**#N/A**	**#N/A**	**11 of 59**	**0**	**52.0**	**650.0**	< 10	< 10	< 10	< 10	< 10	650.0	< 10	52.0	< 10	210.0	< 10	< 10
TPH >C10-40	**None**	**mg/kg**		**8 of 8**	**0**	**31.0**	**1700.0**												

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	BH110	TP121	TP120	TP120	TP103	TP112	TP121	TP126	WS106	BH110	TP124	TP124
								384353.882	384442.251	384451.844	384451.844	384772.82	384552.675	384442.251	384574.85	384611.937	384353.882	384763.554	384763.554
								399440.903	399393.368	399460.069	399460.069	399769.313	399614.062	399393.368	399411.048	399505.689	399440.903	399485.198	399485.198
								0.30	0.30	1.00	0.30	1.00	2.30	2.30	0.30	1.00	3.00	3.20	0.30
								10/01/2019	11/01/2019	09/01/2019	09/01/2019	03/01/2019	07/01/2019	11/01/2019	09/01/2019	08/01/2019	10/01/2019	11/01/2019	11/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	ALV	MG	MG	MG	MG	MG	GTD	MG
Asbestos Analysts Comments	#N/A	#N/A	#N/A	0 of 56	7	0.0	0.0	le of Amosite f	na	e in microscopi	na		na	na	s debris and b	present in sma	na	na	na
Asbestos (Presence of)	Presence	#N/A		7 of 56	7	0.0	0.0	Amosite	NAD	Chrysotile	NAD		NAD	NAD	mosite Chrysoti	Amosite	NAD	NAD	NAD
pH	None	-		64 of 64	0	6.1	11.7	10.5	8.1	8.3	10.1	8.3	6.5	8.0	10.2	9.9	11.7	7.5	7.5
Cyanide	800	mg/kg	#N/A	36 of 64	0	0.1	89.0	0.1	0.2	0.3	0.4	< 0.1	< 0.1	< 0.1	0.1	4.0	< 0.1	0.2	89.0
Sulphate as SO4	#N/A	mg/l	#N/A	2 of 2	0	49.0	55.0		55.0										
Mercury	13.6	mg/kg	#N/A	46 of 64	1	0.1	18.0	< 0.05	0.4	0.1	0.1	0.1	0.3	< 0.05	0.7	0.4	0.1	< 0.05	2.5
Cadmium	85	mg/kg	#N/A	60 of 64	0	0.1	4.7	0.3	0.4	0.6	0.9	0.2	0.3	< 0.1	3.0	0.9	0.2	< 0.1	1.6
Chromium	907	mg/kg	#N/A	64 of 64	0	5.7	48.0	22.0	15.0	22.0	19.0	8.7	18.0	6.8	18.0	11.0	13.0	20.0	33.0
Arsenic	39.9	mg/kg	#N/A	64 of 64	6	4.1	71.0	6.2	18.0	19.0	16.0	4.1	44.0	4.5	9.5	7.5	7.1	7.1	61.0
Beryllium	1.72	mg/kg	#N/A	62 of 64	13	0.2	3.9	0.4	1.0	1.9	1.2	0.6	1.6	< 0.2	0.5	0.3	0.5	0.9	1.8
Copper	7130	mg/kg	#N/A	64 of 64	0	8.9	4200.0	46.0	350.0	120.0	110.0	35.0	150.0	10.0	39.0	79.0	22.0	59.0	4200.0
Lead	310	mg/kg	#N/A	64 of 64	15	12.0	12000.0	37.0	440.0	96.0	2100.0	20.0	210.0	28.0	120.0	140.0	1900.0	110.0	12000.0
Selenium	430	mg/kg	#N/A	5 of 64	0	0.5	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	651	mg/kg	#N/A	64 of 64	0	8.7	160.0	38.0	28.0	35.0	23.0	14.0	46.0	8.7	34.0	17.0	20.0	24.0	86.0
Antimony	618	mg/kg	#N/A	56 of 64	0	1.0	180.0	2.1	6.6	3.7	2.7	< 1.0	20.0	< 1.0	2.6	2.5	< 1.0	4.8	180.0
Chromium - Hexavalent	21	mg/kg	#N/A	0 of 61	0	0.0	0.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	181	mg/kg	#N/A	64 of 64	0	6.5	53.0	25.0	28.0	28.0	17.0	12.0	35.0	6.5	18.0	14.0	11.0	27.0	43.0
Zinc	40400	mg/kg	#N/A	64 of 64	0	28.0	1700.0	91.0	280.0	140.0	140.0	67.0	91.0	35.0	520.0	120.0	74.0	73.0	1300.0
m,p xylenes	427.6926186	mg/kg	p-Xylene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
4-Isopropyltoluene	1240	mg/kg	Aromatic >EC1	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Isopropylbenzene	95.4	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Tert-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2,3-Trichloropropane	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2-Dibromo-3-Chloropropane	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2,4-Trimethylbenzene	3.31	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Ethylbenzene	439.7179703	mg/kg		0 of 64	0	0.0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	3927.6251	mg/kg		0 of 64	0	0.0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	427.6926186	mg/kg	p-Xylene	1 of 59	0	1.9	1.9	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01
Benzene	1.42187881	mg/kg		0 of 64	0	0.0	0.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	133	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
2-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
O-Xylene	475.7207618	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Hexachlorobutadiene (HCBD)	1.79	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2,3 Trichlorobenzene	8.81	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Trichloroethene	0.0797	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,1,2-Trichloroethane	5.53	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2-Dichloropropane	0.121	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,1-Dichloroethene	1.17	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,1-Dichloroethane	10.9	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Bromodichloromethane	0.096	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Tribromomethane	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Chloroethene	0.00153	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Bromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Dibromomethane	0.096	mg/kg	hodichlorometl	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,1,1-Trichloroethane	40.4	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Chloroform	4.22	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,1,1,2-Tetrachloroethane	8.2	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
2,2-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,1-Dichloropropene	3.3	mg/kg	Benzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
trachloromethane (Carbon Tetra Chlorid	0.128	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
cis1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,3-Dichlorobenzene	2.45	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Methyl tert-butyl ether (MTBE)	319	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
trans-1,2-Dichloroethene	1.02	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
cis-1,2-Dichloroethene	0.559	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,3-Dichloropropane	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Sec-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Tetrachloroethene	0.92	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Dibromochloromethane	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2,4-Trichlorobenzene	15.3	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	BH110	TP121	TP120	TP120	TP103	TP112	TP121	TP126	WS106	BH110	TP124	TP124
								384353.882	384442.251	384451.844	384451.844	384772.82	384552.675	384442.251	384574.85	384611.937	384353.882	384763.554	384763.554
								399440.903	399393.368	399460.069	399460.069	399769.313	399614.062	399393.368	399411.048	399505.689	399440.903	399485.198	399485.198
								0.30	0.30	1.00	0.30	1.00	2.30	2.30	0.30	1.00	3.00	3.20	0.30
								10/01/2019	11/01/2019	09/01/2019	09/01/2019	03/01/2019	07/01/2019	11/01/2019	09/01/2019	08/01/2019	10/01/2019	11/01/2019	11/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	ALV	MG	MG	MG	MG	MG	GTD	MG
Chlorobenzene	2.41	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Bromobenzene	6.96	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,3,5-Trimethylbenzene	3.31	mg/kg	-Trimethylben	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2-Dibromoethane	0.096	mg/kg	nodichlorometl	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,4-Dichlorobenzene	332	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
4-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
n-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0			< 0.01						< 0.01			
n-propylbenzene	323	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
trans-1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Styrene	236	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
1,2-Dichloroethane	0.0227	mg/kg		0 of 5	0	0.0	0.0			< 0.01						< 0.01			
Acenaphthylene	5970	#N/A	#N/A	13 of 57	0	0.0	7.7	0.2	< 0.03	< 0.1	< 0.03	< 0.03		< 0.03	< 0.03	0.3	< 0.03	< 0.03	< 0.03
Dibenz-a-h-anthracene	0.32	#N/A	#N/A	18 of 57	2	0.0	2.4	0.5	< 0.03	< 0.1	< 0.03	< 0.03		< 0.03	0.1	0.2	0.0	< 0.03	< 0.03
Acenaphthene	6040	#N/A	#N/A	26 of 57	0	0.0	6.1	0.5	< 0.03	< 0.1	< 0.03	< 0.03		< 0.03	0.2	0.4	0.5	< 0.03	< 0.03
Total BTEX	None	mg/kg		0 of 8	0	0.0	0.0						< 0.04						
4-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
4-Nitrophenol	None	mg/kg		1 of 3	0	6.2	6.2			< 0.1						< 0.1			
Dimethylphthalate	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
P-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Benzyl Alcohol	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
4-Bromophenyl Phenyl Ether	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Azobenzene	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,4-Dimethylphenol	1040	mg/kg		1 of 3	0	0.2	0.2			< 0.1						< 0.1			
Phenol	1200	mg/kg		1 of 3	0	0.3	0.3			< 0.1						< 0.1			
Bis(2-chloroethoxy)methane	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Bis(2-ethylhexyl)phthalate	4090	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Di-N-Octyl Phthalate	4920	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Hexachlorobenzene (HCB)	6.38	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,4-Dichlorophenol	186	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,4-Dinitrotoluene	254	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Diphenylamine	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Bis(2-chloroisopropyl)ether	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
O-Dinitrobenzene	None	mg/kg		1 of 3	0	11.0	11.0			< 0.1						< 0.1			
2-Methyl-4,6-Dinitrophenol	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,3,4,6-Tetrachlorophenol	229	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
4-Chloro-3-Methylphenol	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,6-Dinitrotoluene	125	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Aniline	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0			< 0.1						< 0.1			
4-Chlorophenyl Phenyl Ether	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Hexachlorocyclopentadiene	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Diethylphthalate	8970	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Di-N-Butyl Phthalate	645	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Butylbenzylphthalate	63800	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
Carbazole	None	mg/kg		1 of 3	0	3.5	3.5			< 0.1						< 0.1			
Pentachlorophenol (PCP)	30.6	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,4,6-Trichlorophenol	231	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2-Methylnaphthalene	13.2	mg/kg	naphthalene	1 of 3	0	8.8	8.8			< 0.1						< 0.1			
2-Chloronaphthalene	31.6	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,3,5,6-Tetrachlorophenol	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2-Methylphenol	9930	mg/kg		1 of 3	0	0.2	0.2			< 0.1						< 0.1			
2-Chlorophenol	207	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
2,4,5-Trichlorophenol	231	mg/kg	6-Trichlorophe	0 of 3	0	0.0	0.0			< 0.1						< 0.1			
3-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
M-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0			< 0.1						< 0.1			
3/4 Methylphenol	10000	mg/kg		1 of 3	0	0.4	0.4			< 0.1						< 0.1			
Phenol (Monohydric)	1200	#N/A	#N/A	23 of 64	0	0.4	12.0	< 0.3	< 0.3	< 0.3	< 0.3	0.4	1.0	< 0.3	< 0.3	0.4	< 0.3	< 0.3	< 0.3
Loss on ignition	None	%		8 of 8	0	1.3	11.0						8.1						
Total Organic Carbon	None	%		63 of 64	0	0.5	41.0	3.3	4.3	16.0	4.5	2.8	11.0	0.7	2.2	4.5	1.7	0.7	41.0
Napthalene	13.2	mg/kg		25 of 59	1	0.0	18.0	0.2	< 0.03	< 0.01	< 0.03	< 0.03		< 0.03	0.2	0.0	0.4	< 0.03	< 0.03

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	BH110	TP121	TP120	TP120	TP103	TP112	TP121	TP126	WS106	BH110	TP124	TP124
								384353.882	384442.251	384451.844	384451.844	384772.82	384552.675	384442.251	384574.85	384611.937	384353.882	384763.554	384763.554
								399440.903	399393.368	399460.069	399460.069	399769.313	399614.062	399393.368	399411.048	399505.689	399440.903	399485.198	399485.198
								0.30	0.30	1.00	0.30	1.00	2.30	2.30	0.30	1.00	3.00	3.20	0.30
								10/01/2019	11/01/2019	09/01/2019	09/01/2019	03/01/2019	07/01/2019	11/01/2019	09/01/2019	08/01/2019	10/01/2019	11/01/2019	11/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	ALV	MG	MG	MG	MG	MG	GTD	MG
Anthracene	**36600**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**14.0**	1.1	< 0.03	< 0.1	< 0.03	< 0.03		< 0.03	0.4	0.7	0.4	< 0.03	0.1
Benzo(k)fluoranthene	**107**	**#N/A**	**#N/A**	**32 of 57**	**0**	**0.0**	**6.5**	1.5	< 0.03	< 0.1	< 0.03	< 0.03		< 0.03	0.2	0.5	0.2	< 0.03	0.1
Chrysene	**31.9**	**#N/A**	**#N/A**	**39 of 57**	**0**	**0.0**	**20.0**	3.0	< 0.03	0.2	0.0	< 0.03		< 0.03	0.7	1.2	0.5	0.0	0.2
Pyrene	**3790**	**#N/A**	**#N/A**	**44 of 57**	**0**	**0.0**	**48.0**	6.1	< 0.03	0.3	0.1	0.0		< 0.03	1.7	2.7	1.2	0.1	0.6
Benzo (g,h,i) perylene	**359**	**#N/A**	**#N/A**	**34 of 57**	**0**	**0.0**	**9.5**	2.7	< 0.03	0.1	< 0.03	< 0.03		< 0.03	0.2	1.1	0.2	< 0.03	0.1
Indeno(1,2,3-cd)pyrene	**46**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**7.4**	2.2	< 0.03	0.1	< 0.03	< 0.03		< 0.03	0.2	0.9	0.2	< 0.03	0.1
Benzo(b)fluoranthene	**4.06**	**#N/A**	**#N/A**	**39 of 57**	**2**	**0.0**	**17.0**	4.5	< 0.03	0.2	< 0.03	< 0.03		< 0.03	0.6	1.7	0.5	0.0	0.2
Fluoranthene	**1580**	**#N/A**	**#N/A**	**43 of 57**	**0**	**0.0**	**50.0**	6.7	< 0.03	0.3	0.1	0.1		< 0.03	1.9	3.0	1.5	0.1	0.5
Benzo(a)pyrene	**3.23**	**#N/A**	**#N/A**	**35 of 57**	**2**	**0.0**	**17.0**	3.9	< 0.03	0.2	< 0.03	< 0.03		< 0.03	0.4	1.5	0.4	< 0.03	0.2
Benzo(a)anthracene	**15**	**#N/A**	**#N/A**	**38 of 57**	**1**	**0.0**	**19.0**	2.8	< 0.03	0.2	< 0.03	< 0.03		< 0.03	0.6	1.2	0.4	0.0	0.2
Phenanthrene	**1520**	**#N/A**	**#N/A**	**42 of 57**	**0**	**0.1**	**61.0**	3.1	< 0.03	0.1	0.1	0.1		< 0.03	1.6	1.8	1.6	0.1	0.4
Fluorene	**4460**	**#N/A**	**#N/A**	**24 of 57**	**0**	**0.0**	**13.0**	0.4	< 0.03	< 0.1	< 0.03	< 0.03		< 0.03	0.2	0.3	0.3	< 0.03	< 0.03
Pah,Total	**None**	**mg/kg**		**45 of 59**	**0**	**0.1**	**95.0**	39.0	< 0.10		0.2	0.2	2.2	< 0.10	9.1		8.1	0.4	2.7
Dibenzofuran	**3.23**	**mg/kg**	**benzo(a)pyrene**	**2 of 3**	**1**	**0.2**	**8.3**			< 0.1						0.2			
Aliphatics >C8-10	**155**	**mg/kg**		**1 of 59**	**0**	**4.3**	**4.3**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C7-8	**3928**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C8-10	**269**	**mg/kg**		**1 of 59**	**0**	**10.0**	**10.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C5-6	**161**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatics >C6-8	**529**	**mg/kg**		**1 of 59**	**0**	**1.2**	**1.2**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C5-7	**1.4**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatics >C12-16	**2480**	**#N/A**	**#N/A**	**16 of 59**	**0**	**0.7**	**110.0**	2.9	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	2.4	< 0.5	< 0.5	< 0.5
Aromatics >C16-21	**1817**	**#N/A**	**#N/A**	**20 of 59**	**0**	**3.9**	**150.0**	27.0	< 0.6	< 0.6	< 0.6	< 0.6		< 0.6	9.2	17.0	< 0.6	< 0.6	6.4
Aromatics >C10-12	**1240**	**#N/A**	**#N/A**	**11 of 59**	**0**	**1.0**	**42.0**	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9		< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	1.2
Aliphatics >C12-16	**4370**	**#N/A**	**#N/A**	**11 of 59**	**0**	**3.7**	**240.0**	4.1	< 1.2	< 1.2	< 1.2	< 1.2		< 1.2	8.7	15.0	< 1.2	< 1.2	< 1.2
Aromatics >C21-35	**1930**	**#N/A**	**#N/A**	**21 of 59**	**0**	**9.0**	**670.0**	350.0	< 1.4	< 1.4	< 1.4	< 1.4		< 1.4	97.0	240.0	< 1.4	< 1.4	15.0
Aliphatics >C16-21	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**7.2**	**160.0**	14.0	< 1.5	< 1.5	< 1.5	< 1.5		< 1.5	19.0	7.2	< 1.5	< 1.5	< 1.5
Aliphatics >C10-12	**767**	**#N/A**	**#N/A**	**7 of 59**	**0**	**1.5**	**130.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5		< 1.5	2.8	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatics >C21-35	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**35.0**	**350.0**	120.0	< 3.4	< 3.4	< 3.4	< 3.4		< 3.4	86.0	170.0	< 3.4	< 3.4	< 3.4
Aliphatics >C5-35	**None**	**#N/A**	**#N/A**	**11 of 59**	**0**	**52.0**	**650.0**	140.0	< 10	< 10	< 10	< 10		< 10	120.0	190.0	< 10	< 10	< 10
TPH >C10-40	**None**	**mg/kg**		**8 of 8**	**0**	**31.0**	**1700.0**						31.0						

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP125	TP115	TP102	TP127	BH104	TP126	TP115	TP102	TP115	BH102	TP119	BH103
								384525.517	384456.531	384698.516	384520.567	384607.46	384574.85	384456.531	384698.516	384456.531	384763.18	384483.283	384689.014
								399388.873	399526.838	399742.661	399360.521	399631.24	399411.048	399526.838	399742.661	399526.838	399691.375	399475.961	399695.588
								0.30	0.30	1.20	0.30	0.70	2.20	1.30	0.30	3.30	0.30	0.20	1.00
								10/01/2019	07/01/2019	03/01/2019	10/01/2019	04/01/2019	09/01/2019	07/01/2019	03/01/2019	07/01/2019	24/01/2019	09/01/2019	04/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	GTD	MG	MG	MG	MG	MG	MG	MG	MG	MG
Asbestos Analysts Comments	**#N/A**	**#N/A**	**#N/A**	**0 of 56**	**7**	**0.0**	**0.0**	n and bundles	na	na	hrysotile and A	na	na		na	na	na	na	
Asbestos (Presence of)	**Presence**	**#N/A**		**7 of 56**	**7**	**0.0**	**0.0**	hrysotile Amosit	NAD	NAD	mosite Chrysoti	NAD	NAD		NAD	NAD	NAD	NAD	
pH	**None**	**-**		**64 of 64**	**0**	**6.1**	**11.7**	10.2	6.5	8.5	9.8	7.3	8.7	6.5	8.7	6.9	10.6	11.6	10.0
Cyanide	**800**	**mg/kg**	**#N/A**	**36 of 64**	**0**	**0.1**	**89.0**	0.2	0.3	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	68.0	< 0.1	< 0.1	0.6
Sulphate as SO4	**#N/A**	**mg/l**	**#N/A**	**2 of 2**	**0**	**49.0**	**55.0**												
Mercury	**13.6**	**mg/kg**	**#N/A**	**46 of 64**	**1**	**0.1**	**18.0**	0.4	0.6	< 0.05	0.2	0.5	0.1	0.4	< 0.05	1.0	0.4	< 0.05	0.3
Cadmium	**85**	**mg/kg**	**#N/A**	**60 of 64**	**0**	**0.1**	**4.7**	0.7	0.4	0.3	0.4	0.6	0.1	0.3	0.6	0.5	1.0	0.6	0.8
Chromium	**907**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**5.7**	**48.0**	31.0	25.0	29.0	19.0	16.0	19.0	27.0	14.0	17.0	23.0	12.0	19.0
Arsenic	**39.9**	**mg/kg**	**#N/A**	**64 of 64**	**6**	**4.1**	**71.0**	14.0	40.0	10.0	17.0	23.0	6.6	25.0	7.5	40.0	16.0	4.1	11.0
Beryllium	**1.72**	**mg/kg**	**#N/A**	**62 of 64**	**13**	**0.2**	**3.9**	0.7	2.2	1.0	0.7	2.8	0.6	3.9	0.2	2.3	1.1	< 0.2	0.5
Copper	**7130**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**8.9**	**4200.0**	41.0	300.0	46.0	37.0	300.0	16.0	260.0	31.0	310.0	140.0	59.0	140.0
Lead	**310**	**mg/kg**	**#N/A**	**64 of 64**	**15**	**12.0**	**12000.0**	830.0	460.0	17.0	87.0	180.0	27.0	190.0	17.0	520.0	530.0	47.0	210.0
Selenium	**430**	**mg/kg**	**#N/A**	**5 of 64**	**0**	**0.5**	**1.0**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	**651**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**8.7**	**160.0**	39.0	76.0	31.0	26.0	66.0	26.0	58.0	17.0	61.0	36.0	10.0	24.0
Antimony	**618**	**mg/kg**	**#N/A**	**56 of 64**	**0**	**1.0**	**180.0**	4.9	12.0	1.2	1.5	5.9	1.1	8.2	< 1.0	12.0	7.6	1.3	4.8
Chromium - Hexavalent	**21**	**mg/kg**	**#N/A**	**0 of 61**	**0**	**0.0**	**0.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	
Nickel	**181**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**6.5**	**53.0**	18.0	45.0	30.0	16.0	48.0	15.0	50.0	12.0	40.0	26.0	7.5	20.0
Zinc	**40400**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**28.0**	**1700.0**	150.0	130.0	89.0	100.0	150.0	53.0	88.0	72.0	180.0	500.0	100.0	250.0
m,p xylenes	**427.6926186**	**mg/kg**	**p-Xylene**	**0 of 5**	**0**	**0.0**	**0.0**												
4-Isopropyltoluene	**1240**	**mg/kg**	**Aromatic >EC1**	**0 of 5**	**0**	**0.0**	**0.0**												
Isopropylbenzene	**95.4**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Tert-Butylbenzene	**1.42187881**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**												
1,2,3-Trichloropropane	**1.42187881**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**												
1,2-Dibromo-3-Chloropropane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,2,4-Trimethylbenzene	**3.31**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Ethylbenzene	**439.7179703**	**mg/kg**		**0 of 64**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	**3927.6251**	**mg/kg**		**0 of 64**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	**427.6926186**	**mg/kg**	**p-Xylene**	**1 of 59**	**0**	**1.9**	**1.9**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	**1.42187881**	**mg/kg**		**0 of 64**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	**133**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
2-Chlorotoluene	**2.41**	**mg/kg**	**chlorobenzene**	**0 of 5**	**0**	**0.0**	**0.0**												
O-Xylene	**475.7207618**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Hexachlorobutadiene (HCBD)	**1.79**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,2,3 Trichlorobenzene	**8.81**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Trichloroethene	**0.0797**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,1,2-Trichloroethane	**5.53**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,2-Dichloropropane	**0.121**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,1-Dichloroethene	**1.17**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,1-Dichloroethane	**10.9**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Bromodichloromethane	**0.096**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Tribromomethane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Chloroethene	**0.00153**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Bromochloromethane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Dibromomethane	**0.096**	**mg/kg**	**hodichlorometl**	**0 of 5**	**0**	**0.0**	**0.0**												
1,1,1-Trichloroethane	**40.4**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Chloroform	**4.22**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,1,1,2-Tetrachloroethane	**8.2**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
2,2-Dichloropropane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,1-Dichloropropene	**3.3**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**												
trachloromethane (Carbon Tetra Chlorid	**0.128**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
cis1,3-Dichloropropene	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,3-Dichlorobenzene	**2.45**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Methyl tert-butyl ether (MTBE)	**319**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
trans-1,2-Dichloroethene	**1.02**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
cis-1,2-Dichloroethene	**0.559**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,3-Dichloropropane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Sec-Butylbenzene	**1.42187881**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**												
Tetrachloroethene	**0.92**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
Dibromochloromethane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												
1,2,4-Trichlorobenzene	**15.3**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**												

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP125	TP115	TP102	TP127	BH104	TP126	TP115	TP102	TP115	BH102	TP119	BH103
								384525.517	384456.531	384698.516	384520.567	384607.46	384574.85	384456.531	384698.516	384456.531	384763.18	384483.283	384689.014
								399388.873	399526.838	399742.661	399360.521	399631.24	399411.048	399526.838	399742.661	399526.838	399691.375	399475.961	399695.588
								0.30	0.30	1.20	0.30	0.70	2.20	1.30	0.30	3.30	0.30	0.20	1.00
								10/01/2019	07/01/2019	03/01/2019	10/01/2019	04/01/2019	09/01/2019	07/01/2019	03/01/2019	07/01/2019	24/01/2019	09/01/2019	04/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	GTD	MG	MG	MG	MG	MG	MG	MG	MG	MG
Chlorobenzene	2.41	mg/kg		0 of 5	0	0.0	0.0												
Bromobenzene	6.96	mg/kg		0 of 5	0	0.0	0.0												
1,3,5-Trimethylbenzene	3.31	mg/kg	-Trimethylben	0 of 5	0	0.0	0.0												
1,2-Dibromoethane	0.096	mg/kg	nodichlorometl	0 of 5	0	0.0	0.0												
1,4-Dichlorobenzene	332	mg/kg		0 of 5	0	0.0	0.0												
4-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0												
n-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0												
n-propylbenzene	323	mg/kg		0 of 5	0	0.0	0.0												
trans-1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0												
Styrene	236	mg/kg		0 of 5	0	0.0	0.0												
1,2-Dichloroethane	0.0227	mg/kg		0 of 5	0	0.0	0.0												
Acenaphthylene	5970	#N/A	#N/A	13 of 57	0	0.0	7.7	< 0.03	0.0	< 0.03	< 0.03	< 0.03	< 0.03		0.1	0.1	0.1	< 0.03	
Dibenz-a-h-anthracene	0.32	#N/A	#N/A	18 of 57	2	0.0	2.4	0.0	0.0	< 0.03	0.0	< 0.03	< 0.03		< 0.03	0.1	0.1	< 0.03	
Acenaphthene	6040	#N/A	#N/A	26 of 57	0	0.0	6.1	0.3	0.1	< 0.03	0.2	< 0.03	< 0.03		< 0.03	0.1	0.7	< 0.03	
Total BTEX	None	mg/kg		0 of 8	0	0.0	0.0							< 0.04	< 0.04				< 0.04
4-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
4-Nitrophenol	None	mg/kg		1 of 3	0	6.2	6.2												
Dimethylphthalate	None	mg/kg		0 of 3	0	0.0	0.0												
P-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
Benzyl Alcohol	None	mg/kg		0 of 3	0	0.0	0.0												
4-Bromophenyl Phenyl Ether	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0												
Azobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dimethylphenol	1040	mg/kg		1 of 3	0	0.2	0.2												
Phenol	1200	mg/kg		1 of 3	0	0.3	0.3												
Bis(2-chloroethoxy)methane	None	mg/kg		0 of 3	0	0.0	0.0												
Bis(2-ethylhexyl)phthalate	4090	mg/kg		0 of 3	0	0.0	0.0												
Di-N-Octyl Phthalate	4920	mg/kg		0 of 3	0	0.0	0.0												
Hexachlorobenzene (HCB)	6.38	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dichlorophenol	186	mg/kg		0 of 3	0	0.0	0.0												
2,4-Dinitrotoluene	254	mg/kg		0 of 3	0	0.0	0.0												
Diphenylamine	None	mg/kg		0 of 3	0	0.0	0.0												
Bis(2-chloroisopropyl)ether	None	mg/kg		0 of 3	0	0.0	0.0												
O-Dinitrobenzene	None	mg/kg		1 of 3	0	11.0	11.0												
2-Methyl-4,6-Dinitrophenol	None	mg/kg		0 of 3	0	0.0	0.0												
2,3,4,6-Tetrachlorophenol	229	mg/kg		0 of 3	0	0.0	0.0												
4-Chloro-3-Methylphenol	None	mg/kg		0 of 3	0	0.0	0.0												
2,6-Dinitrotoluene	125	mg/kg		0 of 3	0	0.0	0.0												
Aniline	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0												
4-Chlorophenyl Phenyl Ether	None	mg/kg		0 of 3	0	0.0	0.0												
Hexachlorocyclopentadiene	None	mg/kg		0 of 3	0	0.0	0.0												
Diethylphthalate	8970	mg/kg		0 of 3	0	0.0	0.0												
Di-N-Butyl Phthalate	645	mg/kg		0 of 3	0	0.0	0.0												
Butylbenzylphthalate	63800	mg/kg		0 of 3	0	0.0	0.0												
Carbazole	None	mg/kg		1 of 3	0	3.5	3.5												
Pentachlorophenol (PCP)	30.6	mg/kg		0 of 3	0	0.0	0.0												
2,4,6-Trichlorophenol	231	mg/kg		0 of 3	0	0.0	0.0												
2-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
2-Methylnaphthalene	13.2	mg/kg	naphthalene	1 of 3	0	8.8	8.8												
2-Chloronaphthalene	31.6	mg/kg		0 of 3	0	0.0	0.0												
2,3,5,6-Tetrachlorophenol	None	mg/kg		0 of 3	0	0.0	0.0												
2-Methylphenol	9930	mg/kg		1 of 3	0	0.2	0.2												
2-Chlorophenol	207	mg/kg		0 of 3	0	0.0	0.0												
2,4,5-Trichlorophenol	231	mg/kg	6-Trichlorophe	0 of 3	0	0.0	0.0												
3-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0												
M-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0												
3/4 Methylphenol	10000	mg/kg		1 of 3	0	0.4	0.4												
Phenol (Monohydric)	1200	#N/A	#N/A	23 of 64	0	0.4	12.0	< 0.3	0.5	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3	0.4	< 0.3	< 0.3	0.4
Loss on ignition	None	%		8 of 8	0	1.3	11.0							6.6	1.3				11.0
Total Organic Carbon	None	%		63 of 64	0	0.5	41.0	3.1	27.0	1.6	2.7	29.0	0.7	17.0	3.9	32.0	7.1	0.9	6.8
Napthalene	13.2	mg/kg		25 of 59	1	0.0	18.0	0.2	0.1	< 0.03	0.1	0.0	< 0.03		< 0.03	0.1	0.2	< 0.03	

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP125	TP115	TP102	TP127	BH104	TP126	TP115	TP102	TP115	BH102	TP119	BH103
								384525.517	384456.531	384698.516	384520.567	384607.46	384574.85	384456.531	384698.516	384456.531	384763.18	384483.283	384689.014
								399388.873	399526.838	399742.661	399360.521	399631.24	399411.048	399526.838	399742.661	399526.838	399691.375	399475.961	399695.588
								0.30	0.30	1.20	0.30	0.70	2.20	1.30	0.30	3.30	0.30	0.20	1.00
								10/01/2019	07/01/2019	03/01/2019	10/01/2019	04/01/2019	09/01/2019	07/01/2019	03/01/2019	07/01/2019	24/01/2019	09/01/2019	04/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	GTD	MG	MG	MG	MG	MG	MG	MG	MG	MG
Anthracene	**36600**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**14.0**	0.3	0.3	< 0.03	0.2	< 0.03	< 0.03		0.2	0.3	1.0	< 0.03	
Benzo(k)fluoranthene	**107**	**#N/A**	**#N/A**	**32 of 57**	**0**	**0.0**	**6.5**	0.2	0.2	< 0.03	0.2	< 0.03	< 0.03		0.1	0.2	1.0	0.1	
Chrysene	**31.9**	**#N/A**	**#N/A**	**39 of 57**	**0**	**0.0**	**20.0**	0.5	0.5	< 0.03	0.4	0.1	< 0.03		0.2	0.6	2.0	0.1	
Pyrene	**3790**	**#N/A**	**#N/A**	**44 of 57**	**0**	**0.0**	**48.0**	1.2	1.0	< 0.03	1.1	0.1	< 0.03		0.5	1.2	5.6	0.2	
Benzo (g,h,i) perylene	**359**	**#N/A**	**#N/A**	**34 of 57**	**0**	**0.0**	**9.5**	0.2	0.2	< 0.03	0.2	< 0.03	< 0.03		0.1	0.2	0.9	0.1	
Indeno(1,2,3-cd)pyrene	**46**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**7.4**	0.2	0.2	< 0.03	0.2	< 0.03	< 0.03		0.1	0.2	0.8	0.1	
Benzo(b)fluoranthene	**4.06**	**#N/A**	**#N/A**	**39 of 57**	**2**	**0.0**	**17.0**	0.4	0.6	< 0.03	0.5	0.1	< 0.03		0.2	0.7	2.4	0.1	
Fluoranthene	**1580**	**#N/A**	**#N/A**	**43 of 57**	**0**	**0.0**	**50.0**	1.3	1.0	< 0.03	1.2	0.1	< 0.03		0.5	1.2	6.4	0.2	
Benzo(a)pyrene	**3.23**	**#N/A**	**#N/A**	**35 of 57**	**2**	**0.0**	**17.0**	0.3	0.4	< 0.03	0.3	< 0.03	< 0.03		0.1	0.5	2.4	0.1	
Benzo(a)anthracene	**15**	**#N/A**	**#N/A**	**38 of 57**	**1**	**0.0**	**19.0**	0.4	0.5	< 0.03	0.4	0.1	< 0.03		0.2	0.5	2.1	0.1	
Phenanthrene	**1520**	**#N/A**	**#N/A**	**42 of 57**	**0**	**0.1**	**61.0**	1.1	0.5	< 0.03	0.7	0.1	< 0.03		0.1	0.7	2.3	0.1	
Fluorene	**4460**	**#N/A**	**#N/A**	**24 of 57**	**0**	**0.0**	**13.0**	0.2	0.0	< 0.03	0.1	< 0.03	< 0.03		< 0.03	0.1	0.4	< 0.03	
Pah,Total	**None**	**mg/kg**		**45 of 59**	**0**	**0.1**	**95.0**	6.6	5.5	< 0.10	5.6	0.5	< 0.10	14.0	2.1	6.7	28.0	1.0	22.0
Dibenzofuran	**3.23**	**mg/kg**	**benzo(a)pyrene**	**2 of 3**	**1**	**0.2**	**8.3**												
Aliphatics >C8-10	**155**	**mg/kg**		**1 of 59**	**0**	**4.3**	**4.3**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	
Aromatics >C7-8	**3928**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	
Aromatics >C8-10	**269**	**mg/kg**		**1 of 59**	**0**	**10.0**	**10.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatics >C5-6	**161**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatics >C6-8	**529**	**mg/kg**		**1 of 59**	**0**	**1.2**	**1.2**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	
Aromatics >C5-7	**1.4**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	
Aromatics >C12-16	**2480**	**#N/A**	**#N/A**	**16 of 59**	**0**	**0.7**	**110.0**	< 0.5	< 0.5	< 0.5	4.2	< 0.5	< 0.5		< 0.5	< 0.5	11.0	< 0.5	
Aromatics >C16-21	**1817**	**#N/A**	**#N/A**	**20 of 59**	**0**	**3.9**	**150.0**	< 0.6	< 0.6	< 0.6	12.0	< 0.6	< 0.6		< 0.6	< 0.6	52.0	< 0.6	
Aromatics >C10-12	**1240**	**#N/A**	**#N/A**	**11 of 59**	**0**	**1.0**	**42.0**	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9		< 0.9	< 0.9	< 0.9	< 0.9	
Aliphatics >C12-16	**4370**	**#N/A**	**#N/A**	**11 of 59**	**0**	**3.7**	**240.0**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2		< 1.2	< 1.2	9.3	3.7	
Aromatics >C21-35	**1930**	**#N/A**	**#N/A**	**21 of 59**	**0**	**9.0**	**670.0**	< 1.4	< 1.4	< 1.4	53.0	< 1.4	< 1.4		< 1.4	< 1.4	250.0	< 1.4	
Aliphatics >C16-21	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**7.2**	**160.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5		< 1.5	< 1.5	22.0	25.0	
Aliphatics >C10-12	**767**	**#N/A**	**#N/A**	**7 of 59**	**0**	**1.5**	**130.0**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5		< 1.5	< 1.5	2.4	< 1.5	
Aliphatics >C21-35	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**35.0**	**350.0**	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4		< 3.4	< 3.4	120.0	91.0	
Aliphatics >C5-35	**None**	**#N/A**	**#N/A**	**11 of 59**	**0**	**52.0**	**650.0**	< 10	< 10	< 10	< 10	< 10	< 10		< 10	< 10	160.0	120.0	
TPH >C10-40	**None**	**mg/kg**		**8 of 8**	**0**	**31.0**	**1700.0**							210.0	79.0				1700.0

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP101	WS101	TP109	TP106	TP106	TP119
								384759.647	384734.621	384661.431	384830.717	384830.717	384483.283
								399818.495	399613.694	399650.774	399695.601	399695.601	399475.961
								0.30	0.30	3.30	2.80	0.40	3.00
								03/01/2019	08/01/2019	04/01/2019	03/01/2019	03/01/2019	09/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	MG	CHES
Asbestos Analysts Comments	**#N/A**	**#N/A**	**#N/A**	**0 of 56**	**7**	**0.0**	**0.0**	na	na	na		na	na
Asbestos (Presence of)	**Presence**	**#N/A**		**7 of 56**	**7**	**0.0**	**0.0**	NAD	NAD	NAD		NAD	NAD
pH	**None**	**-**		**64 of 64**	**0**	**6.1**	**11.7**	8.9	7.8	7.6	8.3	8.6	7.4
Cyanide	**800**	**mg/kg**	**#N/A**	**36 of 64**	**0**	**0.1**	**89.0**	< 0.1	0.8	0.2	0.2	0.5	< 0.1
Sulphate as SO4	**#N/A**	**mg/l**	**#N/A**	**2 of 2**	**0**	**49.0**	**55.0**						
Mercury	**13.6**	**mg/kg**	**#N/A**	**46 of 64**	**1**	**0.1**	**18.0**	< 0.05	0.2	1.2	0.1	< 0.05	< 0.05
Cadmium	**85**	**mg/kg**	**#N/A**	**60 of 64**	**0**	**0.1**	**4.7**	0.4	0.3	0.2	< 0.1	0.2	0.1
Chromium	**907**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**5.7**	**48.0**	21.0	13.0	18.0	11.0	38.0	15.0
Arsenic	**39.9**	**mg/kg**	**#N/A**	**64 of 64**	**6**	**4.1**	**71.0**	6.8	12.0	19.0	5.0	21.0	12.0
Beryllium	**1.72**	**mg/kg**	**#N/A**	**62 of 64**	**13**	**0.2**	**3.9**	1.0	0.8	2.0	0.6	2.1	0.5
Copper	**7130**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**8.9**	**4200.0**	71.0	57.0	150.0	17.0	130.0	19.0
Lead	**310**	**mg/kg**	**#N/A**	**64 of 64**	**15**	**12.0**	**12000.0**	26.0	280.0	330.0	56.0	40.0	18.0
Selenium	**430**	**mg/kg**	**#N/A**	**5 of 64**	**0**	**0.5**	**1.0**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	**651**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**8.7**	**160.0**	31.0	20.0	43.0	15.0	65.0	36.0
Antimony	**618**	**mg/kg**	**#N/A**	**56 of 64**	**0**	**1.0**	**180.0**	1.3	3.3	4.8	< 1.0	2.3	1.3
Chromium - Hexavalent	**21**	**mg/kg**	**#N/A**	**0 of 61**	**0**	**0.0**	**0.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	**181**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**6.5**	**53.0**	22.0	16.0	38.0	13.0	50.0	16.0
Zinc	**40400**	**mg/kg**	**#N/A**	**64 of 64**	**0**	**28.0**	**1700.0**	95.0	97.0	99.0	38.0	53.0	67.0
m,p xylenes	**427.6926186**	**mg/kg**	**p-Xylene**	**0 of 5**	**0**	**0.0**	**0.0**						
4-Isopropyltoluene	**1240**	**mg/kg**	**Aromatic >EC1**	**0 of 5**	**0**	**0.0**	**0.0**						
Isopropylbenzene	**95.4**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Tert-Butylbenzene	**1.42187881**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**						
1,2,3-Trichloropropane	**1.42187881**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**						
1,2-Dibromo-3-Chloropropane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,2,4-Trimethylbenzene	**3.31**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Ethylbenzene	**439.7179703**	**mg/kg**		**0 of 64**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	**3927.6251**	**mg/kg**		**0 of 64**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	**427.6926186**	**mg/kg**	**p-Xylene**	**1 of 59**	**0**	**1.9**	**1.9**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	**1.42187881**	**mg/kg**		**0 of 64**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	**133**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
2-Chlorotoluene	**2.41**	**mg/kg**	**chlorobenzene**	**0 of 5**	**0**	**0.0**	**0.0**						
O-Xylene	**475.7207618**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Hexachlorobutadiene (HCBD)	**1.79**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,2,3 Trichlorobenzene	**8.81**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Trichloroethene	**0.0797**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,1,2-Trichloroethane	**5.53**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,2-Dichloropropane	**0.121**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,1-Dichloroethene	**1.17**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,1-Dichloroethane	**10.9**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Bromodichloromethane	**0.096**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Tribromomethane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Chloroethene	**0.00153**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Bromochloromethane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Dibromomethane	**0.096**	**mg/kg**	**hodichlorometh**	**0 of 5**	**0**	**0.0**	**0.0**						
1,1,1-Trichloroethane	**40.4**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Chloroform	**4.22**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,1,1,2-Tetrachloroethane	**8.2**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
2,2-Dichloropropane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,1-Dichloropropene	**3.3**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**						
trachloromethane (Carbon Tetra Chlorid	**0.128**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
cis1,3-Dichloropropene	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,3-Dichlorobenzene	**2.45**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Methyl tert-butyl ether (MTBE)	**319**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
trans-1,2-Dichloroethene	**1.02**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
cis-1,2-Dichloroethene	**0.559**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,3-Dichloropropane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Sec-Butylbenzene	**1.42187881**	**mg/kg**	**Benzene**	**0 of 5**	**0**	**0.0**	**0.0**						
Tetrachloroethene	**0.92**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
Dibromochloromethane	**None**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						
1,2,4-Trichlorobenzene	**15.3**	**mg/kg**		**0 of 5**	**0**	**0.0**	**0.0**						

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	Units	Surrogate?	Total > LOD	Total > GAC	Min	Max	TP101	WS101	TP109	TP106	TP106	TP119
								384759.647	384734.621	384661.431	384830.717	384830.717	384483.283
								399818.495	399613.694	399650.774	399695.601	399695.601	399475.961
								0.30	0.30	3.30	2.80	0.40	3.00
								03/01/2019	08/01/2019	04/01/2019	03/01/2019	03/01/2019	09/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	MG	CHES
Chlorobenzene	2.41	mg/kg		0 of 5	0	0.0	0.0						
Bromobenzene	6.96	mg/kg		0 of 5	0	0.0	0.0						
1,3,5-Trimethylbenzene	3.31	mg/kg	-Trimethylben	0 of 5	0	0.0	0.0						
1,2-Dibromoethane	0.096	mg/kg	nodichloromet	0 of 5	0	0.0	0.0						
1,4-Dichlorobenzene	332	mg/kg		0 of 5	0	0.0	0.0						
4-Chlorotoluene	2.41	mg/kg	chlorobenzene	0 of 5	0	0.0	0.0						
n-Butylbenzene	1.42187881	mg/kg	Benzene	0 of 5	0	0.0	0.0						
n-propylbenzene	323	mg/kg		0 of 5	0	0.0	0.0						
trans-1,3-Dichloropropene	None	mg/kg		0 of 5	0	0.0	0.0						
Styrene	236	mg/kg		0 of 5	0	0.0	0.0						
1,2-Dichloroethane	0.0227	mg/kg		0 of 5	0	0.0	0.0						
Acenaphthylene	5970	#N/A	#N/A	13 of 57	0	0.0	7.7	0.0	< 0.03	< 0.03		0.1	< 0.03
Dibenz-a-h-anthracene	0.32	#N/A	#N/A	18 of 57	2	0.0	2.4	< 0.03	< 0.03	< 0.03		0.2	< 0.03
Acenaphthene	6040	#N/A	#N/A	26 of 57	0	0.0	6.1	< 0.03	0.1	< 0.03		0.0	< 0.03
Total BTEX	None	mg/kg		0 of 8	0	0.0	0.0				< 0.04		
4-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0						
4-Nitrophenol	None	mg/kg		1 of 3	0	6.2	6.2						
Dimethylphthalate	None	mg/kg		0 of 3	0	0.0	0.0						
P-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0						
Benzyl Alcohol	None	mg/kg		0 of 3	0	0.0	0.0						
4-Bromophenyl Phenyl Ether	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0						
Azobenzene	None	mg/kg		0 of 3	0	0.0	0.0						
2,4-Dimethylphenol	1040	mg/kg		1 of 3	0	0.2	0.2						
Phenol	1200	mg/kg		1 of 3	0	0.3	0.3						
Bis(2-chloroethoxy)methane	None	mg/kg		0 of 3	0	0.0	0.0						
Bis(2-ethylhexyl)phthalate	4090	mg/kg		0 of 3	0	0.0	0.0						
Di-N-Octyl Phthalate	4920	mg/kg		0 of 3	0	0.0	0.0						
Hexachlorobenzene (HCB)	6.38	mg/kg		0 of 3	0	0.0	0.0						
2,4-Dichlorophenol	186	mg/kg		0 of 3	0	0.0	0.0						
2,4-Dinitrotoluene	254	mg/kg		0 of 3	0	0.0	0.0						
Diphenylamine	None	mg/kg		0 of 3	0	0.0	0.0						
Bis(2-chloroisopropyl)ether	None	mg/kg		0 of 3	0	0.0	0.0						
O-Dinitrobenzene	None	mg/kg		1 of 3	0	11.0	11.0						
2-Methyl-4,6-Dinitrophenol	None	mg/kg		0 of 3	0	0.0	0.0						
2,3,4,6-Tetrachlorophenol	229	mg/kg		0 of 3	0	0.0	0.0						
4-Chloro-3-Methylphenol	None	mg/kg		0 of 3	0	0.0	0.0						
2,6-Dinitrotoluene	125	mg/kg		0 of 3	0	0.0	0.0						
Aniline	1.42187881	mg/kg	Benzene	0 of 3	0	0.0	0.0						
4-Chlorophenyl Phenyl Ether	None	mg/kg		0 of 3	0	0.0	0.0						
Hexachlorocyclopentadiene	None	mg/kg		0 of 3	0	0.0	0.0						
Diethylphthalate	8970	mg/kg		0 of 3	0	0.0	0.0						
Di-N-Butyl Phthalate	645	mg/kg		0 of 3	0	0.0	0.0						
Butylbenzylphthalate	63800	mg/kg		0 of 3	0	0.0	0.0						
Carbazole	None	mg/kg		1 of 3	0	3.5	3.5						
Pentachlorophenol (PCP)	30.6	mg/kg		0 of 3	0	0.0	0.0						
2,4,6-Trichlorophenol	231	mg/kg		0 of 3	0	0.0	0.0						
2-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0						
2-Methylnaphthalene	13.2	mg/kg	naphthalene	1 of 3	0	8.8	8.8						
2-Chloronaphthalene	31.6	mg/kg		0 of 3	0	0.0	0.0						
2,3,5,6-Tetrachlorophenol	None	mg/kg		0 of 3	0	0.0	0.0						
2-Methylphenol	9930	mg/kg		1 of 3	0	0.2	0.2						
2-Chlorophenol	207	mg/kg		0 of 3	0	0.0	0.0						
2,4,5-Trichlorophenol	231	mg/kg	6-Trichlorophe	0 of 3	0	0.0	0.0						
3-Nitroaniline	None	mg/kg		0 of 3	0	0.0	0.0						
M-Dinitrobenzene	None	mg/kg		0 of 3	0	0.0	0.0						
3/4 Methylphenol	10000	mg/kg		1 of 3	0	0.4	0.4						
Phenol (Monohydric)	1200	#N/A	#N/A	23 of 64	0	0.4	12.0	0.4	< 0.3	0.6	0.4	0.6	< 0.3
Loss on ignition	None	%		8 of 8	0	1.3	11.0				1.7		
Total Organic Carbon	None	%		63 of 64	0	0.5	41.0	2.9	1.8	13.0	1.5	35.0	0.7
Napthalene	13.2	mg/kg		25 of 59	1	0.0	18.0	< 0.03	< 0.03	0.0		0.1	< 0.03

Screened against Residential (no plant uptake) - 6% SOM

Soil Concentration exceeds GAC 100

								TP101	WS101	TP109	TP106	TP106	TP119
								384759.647	384734.621	384661.431	384830.717	384830.717	384483.283
								399818.495	399613.694	399650.774	399695.601	399695.601	399475.961
								0.30	0.30	3.30	2.80	0.40	3.00
								03/01/2019	08/01/2019	04/01/2019	03/01/2019	03/01/2019	09/01/2019
								AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								MG	MG	MG	MG	MG	CHES
Contaminant Name	**GAC**	**Units**	**Surrogate?**	**Total > LOD**	**Total > GAC**	**Min**	**Max**						
Anthracene	**36600**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**14.0**	0.2	0.1	0.1		0.2	< 0.03
Benzo(k)fluoranthene	**107**	**#N/A**	**#N/A**	**32 of 57**	**0**	**0.0**	**6.5**	0.1	0.1	0.1		0.3	< 0.03
Chrysene	**31.9**	**#N/A**	**#N/A**	**39 of 57**	**0**	**0.0**	**20.0**	0.1	0.2	0.1		1.1	< 0.03
Pyrene	**3790**	**#N/A**	**#N/A**	**44 of 57**	**0**	**0.0**	**48.0**	0.3	0.5	0.3		2.4	< 0.03
Benzo (g,h,i) perylene	**359**	**#N/A**	**#N/A**	**34 of 57**	**0**	**0.0**	**9.5**	0.1	0.1	0.1		1.0	< 0.03
Indeno(1,2,3-cd)pyrene	**46**	**#N/A**	**#N/A**	**33 of 57**	**0**	**0.0**	**7.4**	0.1	0.1	0.1		0.6	< 0.03
Benzo(b)fluoranthene	**4.06**	**#N/A**	**#N/A**	**39 of 57**	**2**	**0.0**	**17.0**	0.1	0.1	0.1		1.1	< 0.03
Fluoranthene	**1580**	**#N/A**	**#N/A**	**43 of 57**	**0**	**0.0**	**50.0**	0.3	0.6	0.3		1.0	< 0.03
Benzo(a)pyrene	**3.23**	**#N/A**	**#N/A**	**35 of 57**	**2**	**0.0**	**17.0**	0.1	0.1	0.1		1.0	< 0.03
Benzo(a)anthracene	**15**	**#N/A**	**#N/A**	**38 of 57**	**1**	**0.0**	**19.0**	0.1	0.2	0.1		0.8	< 0.03
Phenanthrene	**1520**	**#N/A**	**#N/A**	**42 of 57**	**0**	**0.1**	**61.0**	0.1	0.6	0.2		0.6	< 0.03
Fluorene	**4460**	**#N/A**	**#N/A**	**24 of 57**	**0**	**0.0**	**13.0**	< 0.03	0.1	< 0.03		0.0	< 0.03
Pah,Total	**None**	**mg/kg**		**45 of 59**	**0**	**0.1**	**95.0**	1.5	2.8	1.6	47.0	10.0	< 0.10
Dibenzofuran	**3.23**	**mg/kg**	**benzo(a)pyrene**	**2 of 3**	**1**	**0.2**	**8.3**						
Aliphatics >C8-10	**155**	**mg/kg**		**1 of 59**	**0**	**4.3**	**4.3**	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Aromatics >C7-8	**3928**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Aromatics >C8-10	**269**	**mg/kg**		**1 of 59**	**0**	**10.0**	**10.0**	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Aliphatics >C5-6	**161**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Aliphatics >C6-8	**529**	**mg/kg**		**1 of 59**	**0**	**1.2**	**1.2**	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Aromatics >C5-7	**1.4**	**mg/kg**		**0 of 59**	**0**	**0.0**	**0.0**	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Aromatics >C12-16	**2480**	**#N/A**	**#N/A**	**16 of 59**	**0**	**0.7**	**110.0**	< 0.5	< 0.5	< 0.5		19.0	< 0.5
Aromatics >C16-21	**1817**	**#N/A**	**#N/A**	**20 of 59**	**0**	**3.9**	**150.0**	< 0.6	< 0.6	< 0.6		42.0	< 0.6
Aromatics >C10-12	**1240**	**#N/A**	**#N/A**	**11 of 59**	**0**	**1.0**	**42.0**	< 0.9	< 0.9	< 0.9		11.0	< 0.9
Aliphatics >C12-16	**4370**	**#N/A**	**#N/A**	**11 of 59**	**0**	**3.7**	**240.0**	< 1.2	< 1.2	< 1.2		7.1	< 1.2
Aromatics >C21-35	**1930**	**#N/A**	**#N/A**	**21 of 59**	**0**	**9.0**	**670.0**	< 1.4	< 1.4	< 1.4		84.0	< 1.4
Aliphatics >C16-21	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**7.2**	**160.0**	< 1.5	< 1.5	< 1.5		110.0	< 1.5
Aliphatics >C10-12	**767**	**#N/A**	**#N/A**	**7 of 59**	**0**	**1.5**	**130.0**	< 1.5	< 1.5	< 1.5		1.5	< 1.5
Aliphatics >C21-35	**48900**	**#N/A**	**#N/A**	**11 of 59**	**0**	**35.0**	**350.0**	< 3.4	< 3.4	< 3.4		110.0	< 3.4
Aliphatics >C5-35	**None**	**#N/A**	**#N/A**	**11 of 59**	**0**	**52.0**	**650.0**	< 10	< 10	< 10		220.0	< 10
TPH >C10-40	**None**	**mg/kg**		**8 of 8**	**0**	**31.0**	**1700.0**				190.0		

Appendix D

Phytotoxic Screening

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	GAC Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	BH101	TP110	WS105	WS104	TP109	BH112	BH112	BH107	TP111	TP105	TP105	TP109	BH103	BH105
								Easting	384796.682	384638.835	384294.085	384569.278	384661.431	384401.713	384401.713	384824.812	384592.029	384843.779	384843.779	384661.431	384689.014	384463.735
								Northing	399802.989	399640.942	399279.174	399463.63	399650.774	399486.259	399486.259	399485.537	399655.215	399726.261	399726.261	399650.774	399695.588	399571.588
								Sample Top (m)	0.80	1.30	0.30	1.00	1.30	3.30	0.30	2.00	0.30	1.30	0.30	0.30	3.20	0.70
								Sample Date	03/01/2019	07/01/2019	10/01/2019	08/01/2019	04/01/2019	10/01/2019	10/01/2019	09/01/2019	07/01/2019	03/01/2019	03/01/2019	04/01/2019	04/01/2019	04/01/2019
								Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								Geology	MG	MG	MG	MG	MG	CHES	MG	MG	MG	MG	MG	MG	MG	MG
Arsenic	**50**	**mg/kg**	**64 of 64**	**2**	**4.1**	**71**			5.2	34.0	12.0	15.0	71.0	4.5	8.5	9.0	18.0	12.0	19.0	28.0	6.1	11.0
Cadmium	**3**	**mg/kg**	**60 of 64**	**1**	**0.1**	**4.7**			0.9	0.6	4.7	0.6	0.4	0.1	0.3	0.2	0.6	0.2	0.5	0.5	0.2	0.2
Chromium	**400**	**mg/kg**	**64 of 64**	**0**	**5.7**	**48**			5.7	21.0	38.0	15.0	15.0	11.0	15.0	24.0	26.0	23.0	22.0	19.0	19.0	23.0
Copper	**200**	**mg/kg**	**64 of 64**	**11**	**8.9**	**4200**			50.0	300.0	190.0	90.0	110.0	8.9	40.0	25.0	86.0	39.0	94.0	300.0	46.0	31.0
Lead	**300**	**mg/kg**	**64 of 64**	**15**	**12.0**	**12000**			38.0	520.0	490.0	290.0	180.0	66.0	300.0	18.0	71.0	110.0	240.0	1300.0	28.0	26.0
Mercury	**1**	**mg/kg**	**46 of 64**	**5**	**0.1**	**18**			0.2	1.6	0.1	0.1	1.1	< 0.05	0.2	< 0.05	0.3	0.3	0.9	18.0	< 0.05	0.1
Nickel	**110**	**mg/kg**	**64 of 64**	**0**	**6.5**	**53**			7.9	38.0	42.0	15.0	29.0	12.0	12.0	28.0	28.0	20.0	27.0	39.0	22.0	27.0
Selenium	**2**	**mg/kg**	**5 of 64**	**0**	**0.5**	**1**			< 0.5	< 0.5	0.7	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	**300**	**mg/kg**	**64 of 64**	**7**	**28.0**	**1700**			46.0	240.0	1700.0	310.0	93.0	36.0	95.0	57.0	180.0	88.0	170.0	310.0	99.0	97.0
pH	**-**	**-**	**64 of 64**	**0**	**6.1**	**11.7**			8.3	7.3	8.7	9.0	8.2	9.3	8.5	8.3	7.8	8.3	8.4	7.6	8.5	8.3

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	GAC Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	WS103	WS102	BH103	TP104	TP111	TP112	BH105	BH106	TP103	TP122	TP108	BH106	TP107	BH102
								Easting	384813.849	384761.314	384689.014	384780.328	384592.029	384552.675	384463.735	384459.989	384772.82	384423.36	384655.011	384459.989	384737.823	384763.18
								Northing	399611.16	399589.102	399695.588	399749.164	399655.215	399614.062	399571.588	399509.165	399769.313	399438.117	399693.93	399509.165	399704.019	399691.375
								Sample Top (m)	1.00	1.00	4.80	0.30	2.50	0.30	3.30	0.30	1.80	0.30	0.30	3.30	1.20	3.50
								Sample Date	07/01/2019	07/01/2019	04/01/2019	03/01/2019	07/01/2019	07/01/2019	08/01/2019	07/01/2019	03/01/2019	11/01/2019	04/01/2019	08/01/2019	03/01/2019	03/01/2019
								Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								Geology	MG	MG	MM	MG	CHES	MG	ALV	MG	GTD	MG	MG	MG	MG	MG
Arsenic	**50**	**mg/kg**	**64 of 64**	**2**	**4.1**	**71**			14.0	12.0	12.0	23.0	4.5	19.0	10.0	40.0	8.1	23.0	37.0	28.0	12.0	9.3
Cadmium	**3**	**mg/kg**	**60 of 64**	**1**	**0.1**	**4.7**			0.3	0.5	0.4	0.7	0.1	0.3	0.1	1.0	0.2	0.4	0.4	0.5	0.2	0.2
Chromium	**400**	**mg/kg**	**64 of 64**	**0**	**5.7**	**48**			16.0	12.0	24.0	48.0	13.0	18.0	18.0	22.0	22.0	15.0	36.0	27.0	23.0	16.0
Copper	**200**	**mg/kg**	**64 of 64**	**11**	**8.9**	**4200**			60.0	80.0	9.1	150.0	14.0	270.0	18.0	210.0	27.0	280.0	130.0	180.0	43.0	27.0
Lead	**300**	**mg/kg**	**64 of 64**	**15**	**12.0**	**12000**			490.0	280.0	13.0	210.0	12.0	290.0	12.0	370.0	13.0	730.0	100.0	210.0	39.0	91.0
Mercury	**1**	**mg/kg**	**46 of 64**	**5**	**0.1**	**18**			0.7	0.6	< 0.05	0.3	< 0.05	0.5	< 0.05	0.4	< 0.05	0.2	< 0.05	0.4	0.3	0.2
Nickel	**110**	**mg/kg**	**64 of 64**	**0**	**6.5**	**53**			15.0	11.0	29.0	32.0	15.0	38.0	18.0	38.0	29.0	24.0	33.0	34.0	29.0	19.0
Selenium	**2**	**mg/kg**	**5 of 64**	**0**	**0.5**	**1**			< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	**300**	**mg/kg**	**64 of 64**	**7**	**28.0**	**1700**			220.0	140.0	69.0	180.0	28.0	120.0	54.0	340.0	65.0	260.0	130.0	160.0	62.0	88.0
pH	**-**	**-**	**64 of 64**	**0**	**6.1**	**11.7**			8.5	8.5	8.7	7.7	7.7	6.1	8.2	6.9	8.1	8.1	7.6	7.9	7.2	8.3

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	GAC Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	BH106	BH109	BH104	BH103	BH104	BH101	BH110	TP121	TP120	TP120	TP103	TP112	TP121	TP126
								Easting	384459.989	384562.256	384607.46	384689.014	384607.46	384796.682	384353.882	384442.251	384451.844	384451.844	384772.82	384552.675	384442.251	384574.85
								Northing	399509.165	399392.535	399631.24	399695.588	399631.24	399802.989	399440.903	399393.368	399460.069	399460.069	399769.313	399614.062	399393.368	399411.048
								Sample Top (m)	7.60	1.20	4.70	0.30	9.70	4.80	0.30	0.30	1.00	0.30	1.00	2.30	2.30	0.30
								Sample Date	08/01/2019	09/01/2019	04/01/2019	04/01/2019	07/01/2019	03/01/2019	10/01/2019	11/01/2019	09/01/2019	09/01/2019	03/01/2019	07/01/2019	11/01/2019	09/01/2019
								Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								Geology	GTD	MG	MG	MG	MG	MG	MG	MG	MG	MG	ALV	MG	MG	MG
Arsenic	**50**	**mg/kg**	**64 of 64**	**2**	**4.1**	**71**			11.0	6.7	8.2	9.5	19.0	9.5	6.2	18.0	19.0	16.0	4.1	44.0	4.5	9.5
Cadmium	**3**	**mg/kg**	**60 of 64**	**1**	**0.1**	**4.7**			< 0.1	0.5	0.2	0.6	0.2	0.2	0.3	0.4	0.6	0.9	0.2	0.3	< 0.1	3.0
Chromium	**400**	**mg/kg**	**64 of 64**	**0**	**5.7**	**48**			18.0	17.0	20.0	19.0	22.0	20.0	22.0	15.0	22.0	19.0	8.7	18.0	6.8	18.0
Copper	**200**	**mg/kg**	**64 of 64**	**11**	**8.9**	**4200**			26.0	19.0	33.0	100.0	100.0	28.0	46.0	350.0	120.0	110.0	35.0	150.0	10.0	39.0
Lead	**300**	**mg/kg**	**64 of 64**	**15**	**12.0**	**12000**			45.0	77.0	42.0	230.0	75.0	53.0	37.0	440.0	96.0	2100.0	20.0	210.0	28.0	120.0
Mercury	**1**	**mg/kg**	**46 of 64**	**5**	**0.1**	**18**			0.1	0.2	< 0.05	0.3	0.4	0.1	< 0.05	0.4	0.1	0.1	0.1	0.3	< 0.05	0.7
Nickel	**110**	**mg/kg**	**64 of 64**	**0**	**6.5**	**53**			12.0	11.0	24.0	17.0	53.0	25.0	25.0	28.0	28.0	17.0	12.0	35.0	6.5	18.0
Selenium	**2**	**mg/kg**	**5 of 64**	**0**	**0.5**	**1**			< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	**300**	**mg/kg**	**64 of 64**	**7**	**28.0**	**1700**			50.0	74.0	79.0	300.0	120.0	61.0	91.0	280.0	140.0	140.0	67.0	91.0	35.0	520.0
pH	**-**	**-**	**64 of 64**	**0**	**6.1**	**11.7**			7.7	11.4	9.7	9.1	7.8	8.3	10.5	8.1	8.3	10.1	8.3	6.5	8.0	10.2

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	GAC Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	WS106	BH110	TP124	TP124	TP125	TP115	TP102	TP127	BH104	TP126	TP115	TP102	TP115	BH102
								Easting	384611.937	384353.882	384763.554	384763.554	384525.517	384456.531	384698.516	384520.567	384607.46	384574.85	384456.531	384698.516	384456.531	384763.18
								Northing	399505.689	399440.903	399485.198	399485.198	399388.873	399526.838	399742.661	399360.521	399631.24	399411.048	399526.838	399742.661	399526.838	399691.375
								Sample Top (m)	1.00	3.00	3.20	0.30	0.30	0.30	1.20	0.30	0.70	2.20	1.30	0.30	3.30	0.30
								Sample Date	08/01/2019	10/01/2019	11/01/2019	11/01/2019	10/01/2019	07/01/2019	03/01/2019	10/01/2019	04/01/2019	09/01/2019	07/01/2019	03/01/2019	07/01/2019	24/01/2019
								Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								Geology	MG	MG	GTD	MG	MG	MG	GTD	MG	MG	MG	MG	MG	MG	MG
Arsenic	**50**	**mg/kg**	**64 of 64**	**2**	**4.1**	**71**			7.5	7.1	7.1	61.0	14.0	40.0	10.0	17.0	23.0	6.6	25.0	7.5	40.0	16.0
Cadmium	**3**	**mg/kg**	**60 of 64**	**1**	**0.1**	**4.7**			0.9	0.2	< 0.1	1.6	0.7	0.4	0.3	0.4	0.6	0.1	0.3	0.6	0.5	1.0
Chromium	**400**	**mg/kg**	**64 of 64**	**0**	**5.7**	**48**			11.0	13.0	20.0	33.0	31.0	25.0	29.0	19.0	16.0	19.0	27.0	14.0	17.0	23.0
Copper	**200**	**mg/kg**	**64 of 64**	**11**	**8.9**	**4200**			79.0	22.0	59.0	4200.0	41.0	300.0	46.0	37.0	300.0	16.0	260.0	31.0	310.0	140.0
Lead	**300**	**mg/kg**	**64 of 64**	**15**	**12.0**	**12000**			140.0	1900.0	110.0	12000.0	830.0	460.0	17.0	87.0	180.0	27.0	190.0	17.0	520.0	530.0
Mercury	**1**	**mg/kg**	**46 of 64**	**5**	**0.1**	**18**			0.4	0.1	< 0.05	2.5	0.4	0.6	< 0.05	0.2	0.5	0.1	0.4	< 0.05	1.0	0.4
Nickel	**110**	**mg/kg**	**64 of 64**	**0**	**6.5**	**53**			14.0	11.0	27.0	43.0	18.0	45.0	30.0	16.0	48.0	15.0	50.0	12.0	40.0	26.0
Selenium	**2**	**mg/kg**	**5 of 64**	**0**	**0.5**	**1**			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	**300**	**mg/kg**	**64 of 64**	**7**	**28.0**	**1700**			120.0	74.0	73.0	1300.0	150.0	130.0	89.0	100.0	150.0	53.0	88.0	72.0	180.0	500.0
pH	**-**	**-**	**64 of 64**	**0**	**6.1**	**11.7**			9.9	11.7	7.5	7.5	10.2	6.5	8.5	9.8	7.3	8.7	6.5	8.7	6.9	10.6

Soil Concentration exceeds GAC 100

Contaminant Name	GAC	GAC Units	Total > LOD	Total > GAC	Min	Max		Hole Ref	TP119	BH103	TP101	WS101	TP109	TP106	TP106	TP119
								Easting	384483.283	384689.014	384759.647	384734.621	384661.431	384830.717	384830.717	384483.283
								Northing	399475.961	399695.588	399818.495	399613.694	399650.774	399695.601	399695.601	399475.961
								Sample Top (m)	0.20	1.00	0.30	0.30	3.30	2.80	0.40	3.00
								Sample Date	09/01/2019	04/01/2019	03/01/2019	08/01/2019	04/01/2019	03/01/2019	03/01/2019	09/01/2019
								Investigation	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019	AEG 2019
								Geology	MG	MG	MG	MG	MG	MG	MG	CHES
Arsenic	**50**	**mg/kg**	**64 of 64**	**2**	**4.1**	**71**			4.1	11.0	6.8	12.0	19.0	5.0	21.0	12.0
Cadmium	**3**	**mg/kg**	**60 of 64**	**1**	**0.1**	**4.7**			0.6	0.8	0.4	0.3	0.2	< 0.1	0.2	0.1
Chromium	**400**	**mg/kg**	**64 of 64**	**0**	**5.7**	**48**			12.0	19.0	21.0	13.0	18.0	11.0	38.0	15.0
Copper	**200**	**mg/kg**	**64 of 64**	**11**	**8.9**	**4200**			59.0	140.0	71.0	57.0	150.0	17.0	130.0	19.0
Lead	**300**	**mg/kg**	**64 of 64**	**15**	**12.0**	**12000**			47.0	210.0	26.0	280.0	330.0	56.0	40.0	18.0
Mercury	**1**	**mg/kg**	**46 of 64**	**5**	**0.1**	**18**			< 0.05	0.3	< 0.05	0.2	1.2	0.1	< 0.05	< 0.05
Nickel	**110**	**mg/kg**	**64 of 64**	**0**	**6.5**	**53**			7.5	20.0	22.0	16.0	38.0	13.0	50.0	16.0
Selenium	**2**	**mg/kg**	**5 of 64**	**0**	**0.5**	**1**			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	**300**	**mg/kg**	**64 of 64**	**7**	**28.0**	**1700**			100.0	250.0	95.0	97.0	99.0	38.0	53.0	67.0
pH	**-**	**-**	**64 of 64**	**0**	**6.1**	**11.7**			11.6	10.0	8.9	7.8	7.6	8.3	8.6	7.4