GEOENVIRONMENTAL GROUND INVESTIGATION

Wentworth Way
Tankersley
South Yorkshire

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KPP Architects. November 2015. Tankersley Park, Barnsley. Site Plan. Project 1979. Drawing 201 Rev P6.

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CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

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This report has been prepared for the sole use and reliance of the above named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of JPG (Leeds) Limited. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

VERSION	PURPOSE/DESCRIPTION	DATE
1	Final – For Issue to Client	August 2016

EXECUTIVE SUMMARY

Site Address	**Wentworth Way, Tankersley, South Yorkshire**
Current Site Use	The site is currently disused and comprises three roughly rectangular shaped development platforms.
Proposals	It is proposed to redevelop the site for a commercial end use with four units.
Previous Report	A desk study report for the site has been prepared by JPG, which should be read with this report. A report is also available containing chemical test results on samples of stockpile materials present on site.
Fieldwork	The fieldwork comprised the excavation of trial pits, drilling of cable percussive boreholes with in situ testing and rotary open hole boreholes. 18 gas and groundwater monitoring wells were installed. Samples of soil and groundwater were obtained and submitted for chemical and geotechnical analysis. The installations have been monitored for gas/groundwater on eight occasions.
Ground and Groundwater Conditions	**Unit 4 (Higher Level)** - Made ground was encountered at every exploratory location to depths of between 0.05m and 1.50m, being deeper beneath the eastern part of the building. The made ground typically comprised soft and firm brown and grey gravelly sandy silty clay. A localised deeper area of made ground was identified in TP345 to 2.30m. The underlying natural strata comprise variably weathered siltstone and sandstone with occasional bands of coal and typically comprise firm and stiff gravelly clay, clayey gravel and beneath the western part of Unit 4. The sandstone is described as strong. **Unit 3 (Higher Level)** - The southern half of Unit 3 is underlain by a backfilled opencast from which the Fenton coal seam was extracted. The base of the opencast was confirmed in BH309 and BH310 to depths of 9.50m and 7.00m respectively. The opencast backfill comprises firm and stiff sandy silty clay with gravel and clayey sandy gravel and cobbles of mudstone, sandstone and coal. Outside the footprint of the opencast, similar made ground was encountered at every exploratory location to depths of between 0.05m to 2.40m with the exception of the location of TP329. The underlying natural strata again comprises variably weathered siltstone and sandstone with occasional bands of coal. **Unit 2 (Intermediate Level)** - Made ground was encountered at all exploratory locations to depths of between 0.30m and 5.50m, being deeper beneath the south east part of the building. The made ground typically comprised firm and stiff dark brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders. In TP320 from 4.30m to 5.10m, a dark grey and brown sandy organic silty clay with frequent roots and a tree trunk was encountered. Frequent roots were also encountered from 2.70m to 3.40m in TP321 and in TP324, from 1.20m to 2.20m. The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically include firm and stiff gravelly sandy silty clay, sandy gravel of sandstone and strong brown sandstone. **Unit 1 (Lower Level)** - The north east part of Unit 1 is underlain by a backfilled quarry. In this area, made ground was confirmed to depths of between 12.30m and 13.60m. The made ground in the backfilled quarry typically comprises firm and stiff brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders. The gravel, cobbles and boulders comprise mudstone, carbonaceous mudstone, sandstone and coal. Soft and very soft materials were also identified at shallow depth within the backfill, in BH301 (2.30m to 3.80m), BH305 (0.75m to 2.00m, 5.50m to 7.50m and 8.80m to 12.00m), BH306 (0.80m to 1.30m) and TP301 (2.40m to 3.80m). Outside the footprint of the backfilled quarry the made ground was typically found to comprise firm gravelly sandy silty clay and clayey sandy gravel, cobbles and boulders. The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically include firm orange brown and brown and grey gravelly sandy silty clay, sandy silty gravel, cobbles and boulders and very weak and weak mudstone. During the investigation, groundwater was encountered in four of the cable percussive boreholes and seven of the trial pits. Groundwater monitoring has been carried out on nine occasions. In Area 1, groundwater levels in BH309, R305 and R307 remained consistent throughout the monitoring period. Groundwater levels in BH310 and R304 were also consistent, until visit seven, when rises in groundwater level were recorded. Groundwater levels in R306 were variable throughout the monitoring period. Typically, groundwater levels in this area were greater than 4m bgl. In Area 2, groundwater levels in BH308 and R302 fell steadily during the monitoring period, until visits seven and eight when rises in groundwater level were recorded. Levels in BH307 initially fell, and then remained consistent until visit five. The well was dry on visit six, before rising and falling on visits seven and eight respectively. The groundwater level in R303 was variable until visit five, and was dry on visit six, a sharp rise was recorded on visit seven before falling on visit eight. The shallowest groundwater levels were recorded in BH308, ranging between 0.57m and 1.79m. In Area 3, groundwater levels both inside and outside the fill within the backfilled quarry were consistent throughout the monitoring period. Within the backfilled quarry, groundwater levels in BH301, BH302 and BH303 were typically below 11.50m and in BH305 groundwater levels ranged between 5.50m and 5.58m. Outside the backfilled pond/quarry, in BH306 and R301, groundwater was recorded at typical depths of 3.00m and 7.50m respectively. It should be noted that the groundwater conditions recorded are based on observations made at the time that site work was carried out. Groundwater levels will vary owing to seasonal and weather related effects.
Geotechnical and Engineering Assessment	**Mining** – The eastern part of the site is underlain by the Fenton coal seam and the western part of the site is underlain by the Parkgate coal seam. Stabilisation of shallow mine workings was carried out across the site on a plot specific basis in 2008. Both the Fenton Seam and the Parkgate Seam were stabilised.

Additional stabilisation works will be required for the revised proposed layout. Further mining investigations were not part of this survey.

Foundations – The selection of foundation type for each unit will be largely governed by the thickness of any made ground and the nature of the underlying natural strata. The made ground in its current condition is unsuitable for the support of structural loads due to variations in material properties. If shallow spread foundations were to be used, these materials would become over stressed, leading to significant settlements. It is therefore recommended that foundation loads are transferred to deeper natural strata of suitable bearing capacity. Alternatively, the made ground and natural ground beneath the footprint of each unit could be subject to some form of earthworks and ground improvement.

Unit 4 (Higher Level) - Made ground was encountered at every exploratory location to depths of between 0.05m and 1.50m, being deeper beneath the eastern part of the building. The made ground typically comprised soft and firm brown and grey gravelly sandy silty clay. A localised deeper area of made ground was identified in TP345 to 2.30m.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises firm and stiff gravelly clay, clayey gravel and beneath the western part of Unit 4, the sandstone is described as strong.

Where the natural strata comprises firm to stiff cohesive deposits, an allowable bearing capacity of 150 kN/m² for total settlements of less than 25mm will be available for these materials.

Where the natural strata comprises strong sandstone, an allowable bearing capacity of 400 kN/m² for total settlements of less than 25mm will be available.

If foundations were to be sited partly in the firm and stiff clay and in the very weak/strong bedrock, then this could lead to differential settlements, which could affect the serviceability of the buildings.

In order to reduce the potential for differential settlements, where possible uniform formations should be constructed. It is recommended that foundations extend into the underlying weathered bedrock, i.e. very weak siltstone and strong sandstone. This may require some localised over deepening of excavations. Where required, foundations should be reinforced to reduce the potential for differential settlement.

Unit 3 (Higher Level) - The southern half of Unit 3 is underlain by a backfilled former opencast excavation from which the Fenton Seam was extracted. Abandonment plans show the highwall of the opencast to be orientated approximately east to west and extend under the approximate centre of the unit.

The base of the opencast was confirmed in BH309 and BH310 to depths of 9.50m and 7.00m respectively. The opencast backfill comprises firm and stiff sandy silty clay with gravel and clayey sandy gravel and cobbles of mudstone, sandstone and coal.

Outside the footprint of the opencast, similar made ground was encountered at every exploratory location except TP329, to depths of between 0.05m to 2.40m.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal (e.g. TP329, encountered coal from 0.70m to 1.70m).

Due to the variable thickness of the made ground beneath the unit, some form of ground improvement works will be required in order to reduce the potential for differential settlement. The ground improvement works will include some excavation and re-compaction of both the made ground and natural ground. This will be required in order to achieve uniformity across the building footprint.

An allowance should be made for breaking out and processing of some of the arisings, i.e. sandstone bedrock (this material was difficult to excavate using the site investigation plant).

The placed material will then be subject to vibro replacement to provide a more uniform formation level across the building. These works should be extended beyond the footprint of Unit 3 to provide a highwall treatment across external areas, particularly areas of hardstanding and where services, e.g. drainage, is to be installed. The remedial works may also include the use of geogrids in the pavement construction to minimise differential settlement.

Unit 2 (Intermediate Level) - Made ground was encountered at all exploratory locations to depth of between 0.30m and 5.50m, being deeper beneath the south east part of the building. The made ground typically comprised firm and stiff dark brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders. The underlying natural strata comprise variably weathered siltstone and sandstone with occasional bands of coal and typically include firm and stiff gravelly sandy silty clay, sandy gravel of sandstone and strong brown sandstone.

Due to the variable thickness of made ground beneath the unit, some form of ground improvement works will be required in order to reduce the potential for differential settlement due to variable ground. The ground improvement works will include some excavation and re-compaction of both the made ground and natural ground. This will be required in order to achieve uniformity across the building footprint.

An allowance should be made for breaking out and processing of some arisings, i.e. sandstone bedrock (this material was difficult to excavate using the site investigation plant).

The placed material will then be subject to vibro replacement to provide a more uniform formation level across the building. The remedial works may also include the use of geogrids in the pavement construction to minimise differential settlement.

Unit 1 (Lower Level) - The north east part of Unit 1 is underlain by a backfilled quarry. In this area, made ground was confirmed to depths of between 12.30m and 13.60m. Previous investigations indicate that the depth of the former quarry increases to the east, away from the footprint of Unit 1.

The made ground in the backfilled quarry comprises firm and stiff brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders. The gravel, cobbles and boulders comprise mudstone, carbonaceous mudstone, sandstone and coal.

Soft and very soft materials were also identified, some at shallow depth within the backfill. Outside the

area of the backfilled quarry the made ground was typically found to comprise firm gravelly sandy silty clay and clayey sandy gravel, cobbles and boulders.
The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises firm orange brown and brown and grey gravelly sandy silty clay, sandy silty gravel, cobbles and boulders and very weak and weak mudstone.
Due to the significant difference in thickness of the made ground beneath the north east corner and the remainder of the unit, consideration should be given to the utilisation of different ground improvement techniques/foundation solutions.
All proposed methods should give due consideration to the potential for differential settlement across the unit and measures should be implemented to reduce this.
Due to the presence of soft and very soft materials beneath the north east corner of the unit, it will not be possible to utilise vibro stone columns, as the soft and very soft materials will not provide sufficient lateral support.
Beneath this part of the unit, consideration could be given to the following methods:

- Vibro concrete columns, installed to the base of the backfilled quarry/pond. Further support could be provided by the installation of reinforcing bars.
- A piled foundation solution could also be considered. Due to the site location, consideration could be given to the use of driven piles. However, care should be taken to ensure that piles found on bedrock and not on boulders within the backfill.
- Consideration could be given to in situ soil mixing with the introduction of cement slurry into the fill. This would create stiff columns within the backfill.

Across the reminder of the unit, the proposed ground improvement works will include some excavation and re-compaction of both the made ground and natural ground. This will be required in order to achieve uniformity across the building footprint.
An allowance should be made for breaking out and processing of some arisings, i.e. sandstone bedrock (this material was difficult to excavate using the site investigation plant).
The placed material will then be subject to vibro replacement to provide a more uniform formation level across the building. The remedial works may also include the use of geogrids in the pavement construction to minimise differential settlement.
Consideration should also be given to the service yard on the east side of Unit 1, as the depth of the former quarry increased in this area.
Any soft materials in this area should be excavated to a predetermined depth and either treated, e.g. with lime, cement and/or other additives and reused or removed offsite and replaced with suitable site won or imported materials. Consideration should also be given to the use of geogrids to provide a mechanically stabilised layer and minimise differential settlement.
Ground Floor Construction - For Unit 4, due to the strength and consistency of the underlying natural ground, it is considered likely that a ground bearing floor slab could be founded on this material. The formation level should be proof rolled and inspected. Any soft or loose spots should be removed and replaced with suitably compacted granular materials.
For Units 1, 2 and 3, it is proposed to carry out ground improvement works in order to achieve consistency across the formation. Any earthworks or ground improvement should be designed in order to achieve the specified allowable bearing capacity and limits on settlement for a ground bearing floor slab.
The advice of a specialist contractor will be required to confirm that ground conditions are suitable for these techniques and that adequate bearing values and tolerable settlements can be achieved. In particular the stability of any proposed column should be assessed with respect to the risk of loss of lateral support from softer material, particularly within the footprint of the backfilled quarry.
Earthworks - Earthworks and ground improvement will be required within the footprint of Units 1, 2 & 3 in order to achieve a consistent formation and allow a ground bearing floor slab to be utilised. Any earthworks should be carried out in accordance with the Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600 Earthworks. Based on the results of the compaction testing, both the made ground and natural ground could achieve >95% of the maximum dry density and <5% air voids.
Potentially Combustible Materials - The materials from shallow depth (i.e. <1.00m) in Areas 1, 2 and 3 are considered to be potentially combustible or have the potential for smouldering due to the presence of coal. The actual potential for combustion will also depend on other properties such as moisture content. It would be prudent to carry out a visual inspection of the made ground materials during any earthworks. Where significant deposits of suspect materials are encountered, i.e. coal, then this should be removed from the works or encapsulated at depth (i.e. >1.00m), to minimise risk. The risk of combustion can be reduced by the construction process where the organic materials are encapsulated. Compaction of the made ground and sealing by new hardstanding will reduce the oxygen supply and further reduce the risk of combustion. Where this is not provided as part of the scheme proposals, there may be a requirement to provide an inert cover system of sufficient thickness, in order to reduce the ingress of oxygen and reduce the potential for combustion.
Roads, Pavements and Hardstanding Surfaces – For the natural granular material, a CBR value of >15% is recommended for the design of road pavements and parking areas where this material is exposed at formation level. A CBR value of 3% should be adopted where weathered Coal Measures materials are exposed at formation.
Due to the variability in material properties of the made ground, most of which comprises gravelly sandy silty clay of variable strength. It is recommended that a CBR value of 2% should be adopted for this material.
It is likely that earthworks will be carried out as part of the redevelopment works. This may result in

	changes to the subgrade materials and the CBR of the materials exposed at formation level will require assessment. Prior to roads and hardstanding being formed, the formation should be proof rolled and any soft spots removed and replaced with well compacted suitable granular fill. Any substructure remains should be "grubbed out" to a minimum depth of 500mm below the underside of formation to prevent hard spots from forming. **Excavations** - The stability of most of the trial pits was generally good. However, it is considered likely that if excavations were left unsupported then over time, some collapse would occur. Perched groundwater is likely to be encountered in excavations as water has been monitored at relatively shallow depths. It is recommended excavations are sufficiently supported in these areas to enable excavation works to progress. **Obstructions** - No significant obstructions were noted in the trial pits or the boreholes. The presence of obstructions within the made ground, i.e. boulders of mudstone, siltstone and sandstone should be expected. In addition, strong sandstone bedrock, which was difficult to excavate, has been encountered at shallow depth across the site. It is recommended that an allowance should be made for the removal of obstructions and where required, breaking out of shallow bedrock. **Chemical Attack on Buried Concrete** - It is recommended that concrete should be designed to ACEC Design Sulphate Class DS-3 and ACEC Class AC-4z.
Environmental Risk Assessment	Based on the results of the analysis carried out, the following potential sources of contamination are considered to be present on the site: • Potentially airborne asbestos fibres with the made ground (TP304). • Slightly elevated concentrations of potentially leachable nickel and flouranthene in the made ground and slightly elevated concentrations of nickel and sulphate in the perched groundwater within the made ground. • Hazardous gases have been recorded across the site. Relatively low concentrations were recorded in Areas 1 & 2. Higher concentrations and flows were recorded in Area 3. Based on the above sources and the available pathways and receptors. Potential linkages to development and maintenance workers, future site end users and buildings and services have been identified. In order to mitigate the risks to these receptors, consideration should be given to the following mitigation measures. **Development and Maintenance Workers** • Site workers involved in groundworks should take the necessary measures to ensure that all works in excavations and confined spaces are carried out in accordance with best practice. • Site workers involved in groundworks should use appropriate PPE and employ appropriate health and safety measures. • In order to protect against the inhalation of asbestos fibres, the contractor should provide a soils risk assessment. Employees should also receive asbestos awareness training in order to avoid exposure. • In order to inform the soils risk assessment, air monitoring for asbestos fibres may be required. • Any monitoring and analysis of asbestos in air should be carried out in accordance with the Control of Asbestos Regulations (CAR) 2012 and by a suitably accredited organisation (ISO/IEC 17025:2005). • If air monitoring is to be carried out, then some monitoring should be carried out during dry weather. • Likely protection measures will include the use of appropriate facemasks (P3 protection) and wetting of dry surfaces to minimise the generation of airborne dust. • In most cases it is likely that the risk assessment will need to be completed by a suitably qualified specialist. During development of the site, all workers should remain vigilant to the possible risk of encountering areas of potentially contaminated material. Should potentially contaminated material be encountered, site management should be informed. **Future Site Users** It is likely that the proposed development will comprise hardstanding and areas of landscaping. It is recommended that a sufficient thickness of clean cover is placed in landscape areas in order isolate potential contaminants in the underlying made ground. Mitigation measures against the ingress of hazardous gases into buildings are provided below. **Buildings and Services** Recommendations with respect to the chemical attack on buried concrete provided above. It is considered unlikely that there will be a requirement for upgrading any proposed new water service pipes. Confirmation should be sought from the utilities provider. **Plants in Landscape and Garden Areas** There is not considered to be a significant risk to plants on the site. However, provision of a suitable thickness of clean growing medium will be required in order to promote plant growth.
Hazardous Gas	The results of the gas monitoring have been assessed in accordance with CIRIA Report C665 and BS8485:2015. It is recommended that gas protective measures are installed in accordance with Characteristic Situation 4 for Unit 1 and Characteristic Situation 2 for Units 2, 3 & 4. No protection measures are required to mitigate against the ingress of radon gas.
This sheet is intended as a summary only of the assessment of the site in relation to ground condition. It does not provide a definitive engineering analysis.	

1.0 INTRODUCTION

1.1 Introduction

JPG (Leeds) Limited has been instructed by Barmston Developments Limited to carry out a geoenvironmental ground investigation for a proposed commercial development on a site off Wentworth Way, Tankersley, South Yorkshire.

1.2 Objectives

The main objective of the geoenvironmental ground investigation was to identify potential geotechnical and environmental issues that may represent constraints to the proposed redevelopment of the site.

1.3 Scope of Works

The scope of the investigation included the following works:

- A description of the ground investigation works carried out, i.e. factual reporting.

Interpretative reporting, including:

- Assessment of potential contaminants using generic assessment criteria specific to the proposed end use.
- A qualitative (Tier 1) screening assessment using source-pathway-receptor linkages.
- An assessment of the classification of ground materials for disposal offsite (not including WAC testing). (WAC tests were completed for an assessment of stockpiles and was reported separate)
- Engineering assessment to include recommendations with respect to foundations, ground floor and pavement design.
- Comments on the likely requirements for remedial measures on the site, to address potential contamination or ground gas issues.
- Recommendations for further work where appropriate; and
- Presentation of the findings in a tabular non-technical summary.

1.4 Location

The site is located off Wentworth Way in Tankersley, with the approximate centre of the site being at NGR 433303, 399790. A site location plan is shown as Figure 1 in Appendix A.

1.5 Site Description and Topography

The site has a roughly rectangular shape and covers an area of approximately 9.6ha.

Access to the site is made from Wentworth Way and the A61 to the south of the site.

The site is comprised mostly by three roughly rectangular shaped plateau areas.

The higher level (Area 1) is located in the western part of the site. This is an area of rough open ground which contains two large spoil mounds. The northern boundary is formed in part by a gabion wall.

The intermediate level (Area 2) is located in the central area of the site. This is an area of rough open, ground. The northern boundary is formed in part by a gabion wall. The eastern boundary margin contains a large spoil mound. In situ Coal Measures bedrock strata is exposed along the western margin of this area where earthworks have been carried out to form a near level area.

The lower level (Area 3) is located in the eastern part of the site. This is an area of rough open ground which extends to the south towards the entrance of the site.

An aerial photograph of the site is presented as Figure 2.

1.6 Development Proposals

It is proposed to redevelop the site with four large commercial units.

A proposed site layout plan has been provided. This is referenced below and a copy is presented in Appendix A.

- KPP Architects. November 2015. Tankersley Park, Barnsley. Site Plan. Project 1979. Drawing 201 Rev P6.

The scope of the site works was based on this layout plan. Should development proposals change, then additional site investigation works may be recommended.

1.7 Previous Reports

A desk study report for the site has been prepared by JPG, which is referenced below:

- JPG (Leeds) Limited. Geoenvironmental Desk Study Report. Wentworth Park Estate, Tankersley, S75 3BG. Ref. MT/DS/4776.v2. Dated February 2016 for Barmston Developments Limited.

This provides a summary of previous investigative works which have been completed on the site.

A report was also prepared which contains chemical test results for stockpile materials which are present on site. The report is referenced as follows:

- JPG (Leeds) Limited. March 2016. Investigation of Stockpile Materials. Wentworth Park Estate, Junction 36, M1, Barnsley. Reference APN/ERA/4776.v2.

1.8 Limitations

The general limitations to the nature of the investigation are outlined in Appendix F.

2.0 FIELDWORK

The intrusive investigation was designed to provide information on the general ground, groundwater and hazardous gas conditions across the site.

Selected trial pits and cable percussive boreholes were targeted at the proposed buildings footprints.

Gas and groundwater monitoring wells were installed in the cable percussive boreholes in order to assess the gas regime in the made ground and shallow natural strata.

Eight rotary open hole boreholes were drilled in order to enable the installation gas and groundwater monitoring wells to assess the gas and groundwater regime in the shallow bedrock.

The rationale behind each exploratory location is summarised in Table 2.0 below:

Table 2.0 – Targeted Exploratory Holes

Potential Issue	Exploratory Holes
Area 1 – Footprint of Unit 4	TP343 to TP357
Area 1 – Footprint of Unit 3	TP228 & TP328A, TP329, TP330, TP332, TP335 to TP339. BH309 & BH310
Area 2 – Footprint of Unit 2	TP317 to TP325, TP358, TP359, BH307 & BH308
Area 3 - Footprint of Unit 1	TP301 to TP313, BH301, BH304 to BH306 and R301
Area 3 - Backfilled Quarry	TP301, TP305, TP310, TP315 and TP316. BH301 to BH303 and BH305.

2.1 Fieldwork

The fieldwork was carried out between the 11 and 27 April 2016. The works undertaken are summarised in Table 2.1 below:

Table 2.1 – Summary of Ground Investigation Works

Investigation Method	No of Positions	Maximum Depth (m bgl)	Monitoring Wells	Monitoring
Trial Pits	59 (TP301 to TP359)	6.10	-	-
Cable Percussion Boreholes	10 (BH301 to BH310)	14.11	10 x 50mm	GG, WL
Rotary Open Hole Boreholes	8 (R301 to R308)	8.50	8 x 50mm	GG, WL

bgl – below ground level

GG – ground gas monitoring (methane, carbon dioxide, oxygen, hydrogen sulphide, gas flow and atmospheric pressure using a portable gas meter).
WL – standing groundwater level using an electric contact dip meter.

The ground investigation has been undertaken in general accordance with the techniques outlined in BS5930: 2015 Code of Practice for Site Investigations at the positions shown on the Exploratory Hole Location Plan, which is contained as Figure 3 in Appendix A. The exploratory hole records are contained in Appendix B. The investigation was carried out under the full time supervision of an engineer from JPG.

2.2 Surveying

Exploratory locations were surveyed using a GPS unit and then transferred onto the survey drawing.

3.0 LABORATORY TESTING

3.1 Chemical Analysis

The chemical analysis suite was designed to:

- Characterise near surface contamination levels to provide an assessment of the risks associated with direct contact with soils on site in its current state.
- Provide information on the general contamination concentrations in the various strata across the site.
- Provide information on the solubility of contaminants and therefore the potential for impact on controlled waters; and
- Provide information on the quality of shallow groundwater beneath the site.

In addition, selected samples of potential waste materials were submitted for analysis for preliminary classification for disposal offsite.

Chemical testing was carried out for the following determinands by Derwentside Environmental Testing Services Limited (DETS) in County Durham. Chemical analysis certificates are presented in Appendix D.

Soils – General
Selected samples of soil were tested for the following contaminants on a total concentration basis:

Arsenic	Mercury	Copper
Cadmium	Lead	Nickel
Chromium	Zinc	Selenium
Cyanide (free)	Phenol	

Speciated Poly Aromatic Hydrocarbons (PAH)
Soil Organic Matter
Sulphate (water soluble) and pH
Asbestos Screen

In addition, selected samples were submitted for the following analysis:

- Hexavalent chromium, total chloride, total sulphate, total sulphide, ammoniacal nitrogen and asbestos quantification analysis.

Selected samples of soil leachate and groundwater were tested for the following contaminants:

Arsenic	Mercury	Copper
Cadmium	Lead	Nickel
Chromium	Zinc	Selenium
Cyanide (free)	Phenol	

Speciated Poly Aromatic Hydrocarbons (PAH)
Sulphate and pH
Speciated Total Petroleum Hydrocarbon (TPHCWG)

3.2 Geotechnical Testing

In situ standard penetration tests (SPT) were performed within the cable percussive boreholes. The results are presented on the exploratory hole logs provided in Appendix C.

Laboratory geotechnical testing was carried out by Professional Soils Laboratory in Doncaster, in order to determine the physical characteristics of the substrata and comprised the following:

- Moisture content and Atterberg Limits tests to classify the materials.
- Particle size distributions (PSD)/sedimentations to confirm the field descriptions of the soils encountered.
- Compaction testing (2.5kg and 4.5kg) and particle density to determine the compaction properties of the soils.
- Calorific Value.
- Organic Content.
- pH, 2:1 water extract soluble sulphate, acid soluble sulphate, total sulphur and chloride.

The geotechnical testing was carried out in accordance with BS 1377:1990, "Methods of Test for Soils for Civil Engineering Purposes". The results of the geotechnical testing are contained in Appendix D.

4.0 GROUND AND GROUNDWATER CONDITIONS

4.1 Introduction

The ground conditions encountered during the investigation were generally consistent with the anticipated sequence of strata indicated by the Desk Study information.

4.2 Ground Conditions

Earthworks have been carried out on the site resulting in the creation of three roughly rectangular shaped development platforms.

The higher level, Area 1, is located in the western part of the site, the intermediate level, Area 2, is located in the centre of the site and a lower level, Area 3 is located in the eastern part of the site.

There are three large stockpiles on the site, two in Area 1 and one in Area 2.

Mine stabilisation works, i.e. drilling and grouting, has been carried out across most of the site. These works were targeted at the locations of previously proposed structures. The works are recorded in a report which is referenced as follows:

Hydrock. January 2009. Validation Report for Stabilisation of Abandoned Mineworkings at Plot B, Wentworth Park, Tankersley.

A summary of ground conditions in each area is provided below. Geological subsurface sections beneath units 1, 2 and 3 are presented in Appendix A.

Area 1 - Higher Level
Descriptions of ground conditions specific to Units 3 and 4 are provided below.

Unit 4
Made ground was encountered at every exploratory location to depth of between 0.05m and 1.50m, being deeper beneath the eastern part of the building.

Typically the made ground comprised:

- Brown sandy gravel, cobbles and boulders of sandstone.
- Soft and firm brown and grey gravelly sandy silty clay, the gravel comprising siltstone and sandstone.
- Firm grey gravelly sandy silty clay, the gravel comprising mudstone, carbonaceous mudstone and coal.
- Soft dark brown sandy silty clay occasionally with frequent rootlets.

A localised deeper area of made ground was identified in TP345 to 2.30m. A sub-surface obstruction comprising a wall was found to 1.80m with a 200mm diameter clay pipe at 2.10m.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises the following:

- Firm and stiff orange brown sandy silty clay.
- Firm brown mottled grey sandy gravelly silty clay, the gravel comprises siltstone and sandstone.
- Firm dark grey very thinly laminated gravelly sandy silty clay, the gravel comprises carbonaceous mudstone and coal.
- Brown and dark grey sandy clayey gravel of siltstone and sandstone.
- Dark grey clayey silty gravel of carbonaceous mudstone and coal.
- Brown sandy clayey gravel, cobbles and occasional boulders of siltstone and sandstone.
- Very weak brown siltstone, recovered as gravel and cobbles.
- Strong brown siltstone and sandstone.

The granular material and bedrock becomes difficult to excavate with increasing depth.

Four rotary open holes were drilled to a maximum depth of 7.00m in this area. These confirmed the bedrock to comprise interbedded sandstone and mudstone.

Unit 3
The south east part of Area 1 includes a backfilled opencast from which the Fenton seam was extracted. The opencast underlies the southern half of Unit 3.

The depth to the base of the opencast was confirmed in BH309 and BH310 to depths of 9.50m and 7.00m respectively.

The opencast backfill comprises the following:

- Firm orange brown mottled grey sandy silty clay.
- Firm becoming stiff orange brown, grey and dark grey gravelly sandy silty clay, the gravel comprises mudstone, carbonaceous mudstone, coal, siltstone and sandstone.
- Dark grey sandy gravel, the gravel comprises mudstone and coal with rare ironstone.
- Brown and orange brown clayey sandy gravel and cobbles of mudstone and sandstone.
- Brown and orange brown clayey sandy gravel with cobbles and boulders of mudstone, sandstone and coal.

Outside the footprint of the opencast, made ground was encountered at every exploratory location except TP329, to depths of between 0.05m to 2.40m and comprised the following:

- Light brown sandy gravel of limestone.
- Brown sandy gravel, cobbles and boulders of sandstone.
- Brown clayey sandy gravel and cobbles of sandstone and rare ironstone.
- Dark grey sandy clayey gravel of mudstone and coal.
- Brown gravelly sandy silty clay with occasional cobbles and boulders, the gravel comprises sandstone.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises the following:

- Firm brown sandy silty clay.
- Firm grey brown very thinly laminated silty clay.
- Stiff dark grey very thinly laminated gravelly silty clay.
- Brown sandy gravel with occasional cobbles and boulders, gravel comprises siltstone and ironstone.
- Dark grey and black coal.
- Strong brown sandstone, recovered as angular tabular gravel and cobbles.

The granular material and bedrock becomes more difficult to excavate with increasing depth.

One rotary open hole was drilled to a maximum depth of 8.50m in this area. This confirmed the bedrock to comprise interbedded sandstone and mudstone, a coal seam was encountered from 5.50m to 6.60m.

Area 2 - Intermediate Level
A description of ground conditions specific to Unit 2 is provided below.

Unit 2
Made ground was encountered at all exploratory location to depth of between 0.30m and 5.50m, being deeper beneath the south east part of the building.

Typically the made ground comprised:

- Firm and stiff dark brown and dark grey gravelly sandy silty clay occasionally with cobbles and boulders, gravel comprises mudstone, carbonaceous mudstone, sandstone, coal and rare brick.
- Brown gravelly sandy silty clay, gravel comprises sandstone.
- Light brown sandy gravel of limestone.
- Brown sandy gravel, cobbles and boulders of sandstone.

In TP320 from 4.30m to 5.10m, a dark grey and brown sandy organic silty clay with frequent roots and a tree trunk was encountered. Frequent roots were also encountered from 2.70m to 3.40m in TP321. In TP324, from 1.20m to 2.20m, a soft sandy silty clay with organic material comprising grass, roots and twigs was encountered.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises the following:

- Firm grey blueish brown sandy silty clay.
- Stiff orange brown mottled grey sandy silty clay.
- Stiff grey and brown gravelly sandy silty clay, gravel comprises mudstone.
- Stiff orange brown mottled grey gravelly sandy silty clay, gravel comprises sandstone.
- Brown, orange brown and grey sandy gravel of sandstone.
- Strong brown sandstone, recovered as angular tabular gravel and cobbles.

The granular material and bedrock becomes difficult to excavate with increasing depth.

Two rotary open holes were drilled to a maximum depth of 7.00m in this area. These confirmed the bedrock to comprise interbedded sandstone and mudstone.

Area 3 – Lower Level
A description of ground conditions specific to Unit 1 is provided below.

Unit 1
The north east part of Unit 1 is underlain by a backfilled quarry. In this area, made ground was confirmed to depths of between 12.30m and 13.60m. The depth to the base of the made ground was not confirmed in several trial pits in this area.

The composition of the made ground in the backfilled pond typically comprised firm and stiff brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders. The gravel, cobbles and boulders comprise mudstone, carbonaceous mudstone, sandstone and coal.

The following were also identified:

- Dark grey clayey sand (sand is coal, approx. 50% of mass).
- Dark greyish brown sandy clayey silt, sand comprises coal and mudstone.
- Dark grey and red clayey sandy gravel of burnt red shale and mudstone with occasional concrete, terram, rubber and metal.
- Greyish brown ashy sandy gravel and cobbles of mudstone and coal.
- Dark grey mottled brown and red ashy sandy silty gravel, the gravel comprises mudstone, carbonaceous mudstone, coal, brick and pottery.

Soft and very soft materials were identified in the backfill. The occurrence of the soft material is summarised in Table 4.2 below:

Table 4.2 – Unit 1 - Summary of Soft Material Encountered in the Made Ground

Exp. Loc.	Depth (m bgl)		Material
	Top	Base	
BH301	2.3	3.8	Very soft dark grey silty clay with rare gravel. Gravel is fine to coarse angular of mudstone and coal.
BH302	7.4	8.8	Soft brown slightly sandy silty clay. Sand occurs in thin bands (2-3mm thick), the sand comprises coal.
BH302	8.8	10.3	Very soft dark grey and brown slightly sandy clayey silt. Sand comprises coal (approx. 20% coal).
BH302	12.5	12.8	Soft brown and grey slightly sandy silty clay with a trace of gravel. Gravel comprises coal.
BH303	10.5	11.3	Soft grey, dark grey and brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and brick.
BH305	0.75	2.0	Soft dark grey gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, coal (20%-30%) and occasional sandstone.
BH305	5.5	7.5	Very soft grey silty clay with occasional gravel. Gravel is fine to coarse angular of mudstone.
BH305	8.8	12.0	Soft dark brownish grey silty clay.
BH306	0.8	1.3	Soft dark brown slightly sandy slightly gravelly silty clay with many roots. Gravel is fine to coarse angular of mudstone, sandstone and coal (Buried Topsoil).
TP301	2.4	3.8	Very soft dark grey silty clay.
TP316	4.9	5.9+	Soft and very soft dark grey slightly sandy silty clay with occasional gravel. Sand and gravel is coal.

bgl – below ground level

Outside the footprint of the backfilled quarry the made ground was found to comprise the following:

- Firm dark grey gravelly sandy silty clay, gravel comprises mudstone, carbonaceous mudstone, coal and brick with occasional burnt red shale.
- Light brown sandy gravel of limestone.
- Dark grey clayey silty sandy gravel, cobbles and boulders, gravel comprises mudstone, carbonaceous mudstone and coal.
- Dark grey sandy clayey gravel, gravel comprises mudstone, coal and brick.
- Brown sandy gravel, cobbles and boulders of siltstone and sandstone.

Dark brown sandy silty clay with frequent roots, probable buried topsoil, was identified in TP307 from 1.30m to 1.40m.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises the following:

- Firm and stiff orange brown and brown and grey sandy silty clay.
- Brown slightly sandy gravel of siltstone and sandstone.
- Stiff orange brown and grey sandy gravelly silty clay, gravel comprises sandstone.
- Grey stained orange brown clayey gravel and cobbles of mudstone.
- Stiff grey gravelly silty clay of mudstone.
- Brown and grey sandy silty gravel, gravel comprises mudstone and siltstone.

- Brown sandy gravel, cobbles and boulders of mostly siltstone and sandstone.
- Very weak and weak grey very thinly laminated mudstone.

The granular material and bedrock becomes difficult to excavate with increasing depth.

One rotary open hole was drilled to 7.00m depth in this area. This confirmed the bedrock to comprise interbedded sandstone and mudstone.

The results of the in situ penetration testing, which was carried out in the cable percussive boreholes, have been plotted against depth (m bgl). The results have been corrected in accordance with the energy ratio of the testing equipment. The plot is presented as Figure 4 in Appendix A and the SPT data (uncorrected) is included on the exploratory hole logs contained in Appendix C.

There is no correlation of increasing strength/density with depth in the made ground. In the natural ground, there is a correlation of increasing strength/density with depth.

The lowest SPT N values were recorded in BH301, BH302 and BH305, which were located within the backfilled pond.

4.3 Laboratory Testing

Four samples of cohesive natural ground, three of granular natural ground and seven samples of made ground, both cohesive and granular, were submitted for geotechnical testing.

All 14 samples were submitted for moisture content testing and ten of these were submitted for Atterberg Limit testing. The results are summarised in Table 4.3.1 below:

Table 4.3.1 – Summary of Moisture Content and Atterberg Limit Testing

Material	Moisture Content (%)		Atterberg Limits Modified Plasticity Index (%)	
	No of samples	Range	No of samples	Range
Natural Ground – Cohesive	4	15 to 27	4	13 to 37
Natural Ground - Granular	3	10 and 11	-	-
Made Ground - Cohesive	6	13 to 33	6	8 to 19
Made Ground – Granular	1	8.8	-	-

The Plasticity Indices reported have been modified based on the percentage of particles smaller than 425µm. These results indicate that the natural cohesive material can be classified as being of intermediate and high plasticity, which indicates a low to medium potential for volume change. The results for the made ground cohesive materials classify the material as intermediate plasticity indicating a low potential for volume change.

Particle size distribution/sedimentation testing was carried out on ten samples in order to confirm the field descriptions of the materials.

12 samples, comprising various materials, were submitted for dry density/moisture content relationship testing.

The compaction tests were carried out using a 2.5kg hammer, with selected samples also tested using the 4.5kg hammer. The results are summarised in Table 4.3.2 below:

Table 4.3.2 - Summary of Compaction Test Results

Exp. Hole	Depth (m bgl)	Material	Weight of Rammer	Natural Moisture Content (NMC)	Max. Dry Density (Mg/m3)	Optimum Moisture Content (OMC)	Suitability for Compaction and Range of Acceptable Moisture Contents*
TP304	1.40	Natural Cohesive	2.5kg	27	1.59	24	Ok, 23% - 28%
TP332	0.90	Natural Granular	2.5kg	10	1.92	12	Too dry, 11%-16%
TP337	1.00	Natural Granular	2.5kg	10	1.93	13	Too dry, 12%-17%
			4.5kg	10	2.04	10	Ok, 9%-13%
TP307	0.20	Made Ground - Cohesive	2.5kg	15	1.61	15	Ok, 14% - 20%
			4.5kg	15	1.72	12	Ok, 11% - 16%
TP319	0.60	Made Ground - Cohesive	2.5kg	19	1.67	16	Ok, 15% - 20%
TP344	1.00	Made Ground - Cohesive	2.5kg	22	1.69	19	Ok, 18% - 24%
TP324	2.00	Made Ground – Cohesive (probable buried topsoil)	2.5kg	33	1.43	27	Too wet, 26% - 32%
TP331	1.00	Made Ground – Cohesive & Granular	2.5kg	13	1.86	13	Ok, 12% - 16%
TP359	1.80	Made Ground _ Cohesive & Granular	2.5kg	17	1.71	14	Ok, 13% - 18%
TP303	0.60	Made Ground - Granular	2.5kg	8.8	2.00	11	Too dry,10% - 14%

* To achieve >95% of Maximum Dry Density and <5% Air Voids

Based on the results of the compaction testing using the 2.5kg rammer, both the granular made ground and granular natural ground were too dry to achieve >95% of the maximum dry density and <5% air voids. However, when subjected to a greater compactive effort, i.e. the 4.5kg rammer, the natural granular material achieved suitable compaction.

Some materials, e.g. cohesive made ground comprising buried topsoil, contains too much organic matter and is too wet, will not be suitable for compaction.

The natural cohesive material, made ground cohesive material and cohesive material containing granular material, all achieved suitable compaction.

California Bearing Ratio (CBR) tests were carried out on one sample natural granular material. CBR values of 28% and 27.7% were achieved for top and base of the sample respectively.

4.4 Hydrocarbon Odours

No hydrocarbon odours were encountered at any of the exploratory locations.

4.5 Groundwater

During the investigation, groundwater was encountered in four of the cable percussive boreholes and seven of the trial pits. A summary is provided in Table 4.5.1 below:

Table 4.5.1 – Summary of Groundwater Levels Encountered during the Site Investigation

Exp. Loc.	Nature of Groundwater	Material
BH302	Water Strike at 5.00m, did not rise in 20 minutes	Made Ground – Within the Backfilled Pond
	Water strike at 12.80m, rose to 12.00m after 20 minutes	Made Ground – Base of the Backfilled Pond
BH303	Water strike at 12.80m, rose to 12.00m after 20 minutes	Made Ground – Within the Backfilled Pond
	Water strike at 11.30m, rose to 10.50m after 20 minutes	Made Ground – Within the Backfilled Pond
BH307	Water strike at 5.50m, rose to 5.00m after 20 minutes	Made Ground – Base of the Made Ground
BH310	Water strike at 4.80m, rose to 4.50m after 20 minutes	Made Ground – Within the Made Ground
TP305	Inflow at 6.00m	Made Ground – Within the Made Ground
TP324	Seepages between 1.20m and 2.20m	Made Ground – Within and at the base of the Made Ground (Probable Buried Topsoil)
TP328	Inflow at 4.90m	Made Ground – Within the Made Ground
TP346	Seepage at 1.00m	Made Ground – Within the Made Ground
TP347	Seepage at 1.30m	Natural Ground – Stiff sandy silty clay
TP348	Seepage at 0.25m	Natural Ground – Stiff gravelly sandy silty clay
TP359	Seepage at 2.10m	Made Ground – Base of the Made Ground

Monitoring wells were installed in all ten cable percussive boreholes and all eight rotary boreholes. A summary of the monitored groundwater levels are presented in Table 4.5.2 below:

Table 4.5.2 – Summary of Monitored Groundwater Levels

Location	Water level during monitoring (m bgl)								
	Preliminary	06/05	11/05	18/05	23/05	02/06	10/06	14/06	20/06
BH301	11.48	11.58	11.60	11.62	11.64	11.67	11.67	11.68	11.62
BH302	11.67	11.97	11.98	12.05	Dry	Dry	Dry	11.84	Dry
BH303	11.25	11.57	11.58	11.66	11.77	11.89	11.91	Dry	11.41
BH304	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
BH305	5.58	5.55	5.55	5.55	5.57	5.56	5.56	5.50	5.52
BH306	3.17	3.17	3.13	3.05	3.02	3.07	3.05	2.91	2.93
BH307	4.66	4.95	4.99	4.99	4.98	4.99	Dry	3.99	4.45
BH308	1.18	1.22	1.29	1.40	1.47	1.65	1.79	1.29	0.57
BH309	Dry	Dry	9.97	9.99	10.01	10.00	9.97	9.97	9.96
BH310	Dry	4.52	4.69	4.59	4.60	4.95	5.02	3.88	3.48
R301	Dry	7.55	Dry	7.56	Dry	Dry	Dry	7.47	7.46
R302	2.27	2.71	2.92	2.95	3.10	3.22	3.45	3.06	2.44
R303	4.85	4.97	4.42	5.23	4.27	5.53	Dry	1.56	2.87
R304	7.28	7.44	7.16	7.40	7.55	7.96	8.27	6.83	6.79
R305	5.11	5.11	5.09	5.11	4.90	5.10	5.10	5.08	5.09
R306	Dry	6.70	4.78	6.13	5.75	Dry	7.01	5.07	3.93
R307	Dry	6.39	Dry	Dry	6.39	6.47	6.39	6.33	6.39
R308	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	7.28

The monitoring wells in BH301 to BH305 and BH307 to BH310 were installed in the made ground. BH306 was installed within the natural ground.

The monitoring wells in the rotary boreholes were all installed within the natural ground.

Groundwater monitoring has been carried out on nine occasions. A plot showing the monitored groundwater levels for Areas 1, 2 & 3 during the monitoring period is presented as Figure 5.

In Area 1, groundwater levels in BH309, R305 and R307 remained consistent throughout the monitoring period. Groundwater levels in BH310 and R304 were also consistent, until visit seven, when rises in groundwater level were recorded. Groundwater levels in R306 were variable throughout the monitoring period. Typically, groundwater levels in this area were greater than 4m bgl.

In Area 2, groundwater levels in BH308 and R302 fell steadily during the monitoring period, until visits seven and eight when rises in groundwater level were recorded. Levels in BH307 initially fell, and then remained consistent until visit five. The well was dry on visit six, before rising and falling on visits seven and eight respectively. The groundwater level in R303 was variable until visit five, and was dry on visit six. A sharp rise was recorded on visit seven before falling on visit eight. The shallowest groundwater levels were recorded in BH308, ranging between 0.57m and 1.79m.

In Area 3, groundwater levels both inside and outside the fill within the backfilled quarry were consistent throughout the monitoring period. Within the backfilled quarry, groundwater levels in BH301, BH302 and BH303 were typically below 11.50m and in BH305 groundwater levels ranged between 5.50m and 5.58m. Outside the backfilled pond/quarry, in BH306 and R301, groundwater was recorded at typical depths of 3.00m and 7.50m respectively.

It should be noted that the groundwater conditions recorded are based on observations made at the time that site work was carried out. Groundwater levels will vary owing to seasonal and weather related effects.

4.6 Ground Gas

Ground gas monitoring has been undertaken on eight occasions. The works were carried out using a portable gas meter in accordance with the standard JPG methodology and included measurements of methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, gas flows and atmospheric pressure. The results of the gas monitoring are presented in Appendix E and discussed in Section 7 of this report.

5.0 GEOTECHNICHAL AND ENGINEERING ASSESSMENT

5.1 Development Proposals

It is proposed to redevelop the site with four large commercial units.

A proposed site layout plan has been provided. This is referenced below and a copy is presented in Appendix A.

- KPP Architects. November 2015. Tankersley Park, Barnsley. Site Plan. Project 1979. Drawing 201 Rev P6.

5.2 Mining

No further investigative works were carried out to assess the risks to the site with respect to instability due to shallow coal workings.

The eastern part of the site is underlain by the Fenton Seam and the western part of the site is underlain by the Parkgate Seam.

Stabilisation of shallow mine workings was carried out across the site on all four plots during 2008. Both the Fenton Seam and the Parkgate Seam were stabilised below the building footprints proposed at the time.

The development layout has now changed and additional stabilisation works will be required for areas not previously included.

5.3 Foundations

The selection of foundation type for each unit will be largely governed by the thickness of any made ground and the nature of the underlying natural strata. The made ground in its current condition is unsuitable for the support of structural loads due to variations in material properties. If shallow spread foundations were to be used, these materials would become over-stressed, leading to significant settlements. It is therefore recommended that foundation loads are transferred to deeper natural strata of suitable bearing capacity. Alternatively, the made ground and natural ground beneath the footprint of each unit could be subject to some form of earthworks and ground improvement.

A detailed description of ground conditions for each unit is provided in Section 4.2, and a brief summary for each unit and foundation recommendations are provided below:

Unit 4 (Higher Level)
Made ground was encountered at every exploratory location to depths of between 0.05m and 1.50m, being deeper beneath the eastern part of the building. The made ground typically comprised soft and firm brown and grey gravelly sandy silty clay. A localised deeper area of made ground was identified in TP345 to 2.30m.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises firm and stiff gravelly clay, clayey gravel and beneath the western part of Unit 4, the sandstone is described as strong.

Where the natural strata comprises firm to stiff cohesive deposits, an allowable bearing capacity of 150 kN/m² for total settlements of less than 25mm will be available for these materials.

Where the natural strata comprises strong sandstone, an allowable bearing capacity of 400 kN/m² for total settlements of less than 25mm will be available.

Based on the location of competent natural strata, a shallow foundation solution, i.e. pads, are likely to be suitable for this unit.

If foundations were to be sited partly in the firm and stiff clay and in the very weak/strong bedrock, then this could lead to differential settlements, which could affect the serviceability of the buildings.

In order to reduce the potential for differential settlements, where possible uniform formations should be constructed. It is recommended that foundations extend into the underlying weathered bedrock, i.e. very weak siltstone and strong sandstone. This may require some localised over deepening of excavations. Where required, foundations should be reinforced to reduce the potential for differential settlement.

All excavations for foundations should be inspected by a suitably qualified engineer to confirm the uniformity and competence of the formation.

Unit 3 (Higher Level)
The southern half of Unit 3 is underlain by a backfilled former opencast excavation from which the Fenton Seam was extracted. Abandonment plans show the highwall of the opencast to be orientated approximately east to west and extend under the approximate centre of the unit.

The base of the opencast was confirmed in BH309 and BH310 to depths of 9.50m and 7.00m respectively. The opencast backfill comprises firm and stiff sandy silty clay with gravel and clayey sandy gravel and cobbles of mudstone, sandstone and coal. As can be seen on Figure 4, the strength/density of the backfill increases with increasing depth, becoming stiff at approximately 6.50m.

Outside the footprint of the opencast, similar made ground was encountered at every exploratory location except TP329, to depths of between 0.05m to 2.40m.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal (e.g. TP329, encountered coal from 0.70m to 1.70m).

Due to the variable thickness of the made ground beneath the unit, some form of ground improvement works will be required in order to reduce the potential for differential settlement. The ground improvement works will include some excavation and re-compaction of both the made ground and natural ground. This will be required in order to achieve uniformity across the building footprint.

An allowance should be made for breaking out and processing of some of the arisings, i.e. sandstone bedrock (this material was difficult to excavate using the site investigation plant).

The placed material will then be subject to vibro replacement to provide a more uniform formation level across the building. These works should be extended beyond the footprint of Unit 3 to provide a highwall treatment across external areas, particularly areas of hardstanding and where services, e.g. drainage, is to be installed. The remedial works may also include the use of geogrids in the pavement construction to minimise differential settlement.

The advice of a specialist contractor will be required to confirm that ground conditions are suitable for these techniques and that adequate bearing values and tolerable settlements can be achieved.

Unit 2 (Intermediate Level)
Made ground was encountered at all exploratory locations to depth of between 0.30m and 5.50m, being deeper beneath the south east part of the building. The made ground typically comprised firm and stiff dark brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders.

In TP320 from 4.30m to 5.10m, a dark grey and brown sandy organic silty clay with frequent roots and a tree trunk was encountered. Frequent roots were also encountered from 2.70m to 3.40m in TP321 and in TP324, from 1.20m to 2.20m.

The underlying natural strata comprise variably weathered siltstone and sandstone with occasional bands of coal and typically include firm and stiff gravelly sandy silty clay, sandy gravel of sandstone and strong brown sandstone.

Due to the variable thickness of made ground beneath the unit, some form of ground improvement works will be required in order to reduce the potential for differential settlement due to variable ground. The ground improvement works will include some excavation and re-compaction of both the made ground and natural ground. This will be required in order to achieve uniformity across the building footprint.

An allowance should be made for breaking out and processing of some arisings, i.e. sandstone bedrock (this material was difficult to excavate using the site investigation plant).

The placed material will then be subject to vibro replacement to provide a more uniform formation level across the building. The remedial works may also include the use of geogrids in the pavement construction to minimise differential settlement.

The advice of a specialist contractor will be required to confirm that ground conditions are suitable for these techniques and that adequate bearing values and tolerable settlements can be achieved.

Unit 1 (Lower Level)
The north east part of Unit 1 is underlain by a backfilled quarry. In this area, made ground was confirmed to depths of between 12.30m and 13.60m. Previous investigations indicate that the depth of the former quarry increases to the east, away from the footprint of Unit 1.

The made ground in the backfilled quarry comprises firm and stiff brown and dark grey gravelly sandy silty clay with occasional cobbles and boulders. The gravel, cobbles and boulders comprise mudstone, carbonaceous mudstone, sandstone and coal.

Soft and very soft materials were also identified, some at shallow depth within the backfill, i.e. BH301 (2.30m to 3.80m), BH305 (0.75m to 2.00m, 5.50m to 7.50m and 8.80m to 12.00m), BH306 (0.80m to 1.30m) and TP301 (2.30m to 3.80m).

Outside the area of the backfilled quarry the made ground was typically found to comprise firm gravelly sandy silty clay and clayey sandy gravel, cobbles and boulders.

The underlying natural strata comprises variably weathered siltstone and sandstone with occasional bands of coal and typically comprises firm orange brown and brown and grey gravelly sandy silty clay, sandy silty gravel, cobbles and boulders and very weak and weak mudstone.

Due to the significant difference in thickness of the made ground beneath the north east corner and the remainder of the unit, consideration should be given to the utilisation of different ground improvement techniques/foundation solutions.

All proposed methods should give due consideration to the potential for differential settlement across the unit and measures should be implemented to reduce this.

Due to the presence of soft and very soft materials beneath the north east corner of the unit, it will not be possible to utilise vibro stone columns, as the soft and very soft materials will not provide sufficient lateral support.

Beneath this part of the unit, consideration could be given to the following methods:

- Vibro concrete columns, installed to the base of the backfilled quarry/pond. Further support could be provided by the installation of reinforcing bars.
- A piled foundation solution could also be considered. Due to the site location, consideration could be given to the use of driven piles. However, care should be taken to ensure that piles found on bedrock and not on boulders within the backfill.
- Consideration could be given to in situ soil mixing with the introduction of cement slurry into the fill. This would create stiff columns within the backfill.

With all these techniques, the advice of specialist contractors will be required to confirm that ground conditions are suitable for these techniques and that adequate bearing values and tolerable settlements can be achieved.

Across the reminder of the unit, the proposed ground improvement works will include some excavation and re-compaction of both the made ground and natural ground. This will be required in order to achieve uniformity across the building footprint.

An allowance should be made for breaking out and processing of some arisings, i.e. sandstone bedrock (this material was difficult to excavate using the site investigation plant).

The placed material will then be subject to vibro replacement to provide a more uniform formation level across the building. The remedial works may also include the use of geogrids in the pavement construction to minimise differential settlement.

The advice of a specialist contractor will be required to confirm that ground conditions are suitable for these techniques and that adequate bearing values and tolerable settlements can be achieved.

Consideration should also be given to the service yard on the east side of Unit 1, as the depth of the former quarry increased in this area.

Any soft materials in this area should be excavated to a predetermined depth and either treated, e.g. with lime, cement and/or other additives and reused or removed offsite and replaced with suitable site won or imported materials. Consideration should also be given to the use of geogrids to provide a mechanically stabilised layer and minimise differential settlement.

5.4 Ground Floor Construction

For Unit 4, due to the strength and consistency of the underlying natural ground, it is considered likely that a ground bearing floor slab could be founded on this material.

The formation level should be proof rolled and inspected. Any soft or loose spots should be removed and replaced with suitably compacted granular materials.

For Units 1, 2 and 3, it is proposed to carry out ground improvement works in order to achieve consistency across the formation.

Any earthworks or ground improvement should be designed in order to achieve the specified allowable bearing capacity and limits on settlement for a ground bearing floor slab.

The advice of a specialist contractor will be required to confirm that ground conditions are suitable for these techniques and that adequate bearing values and tolerable settlements can be achieved. In particular the stability of any proposed column should be assessed with respect to the risk of loss of lateral support from softer material, particularly within the footprint of the backfilled quarry.

5.5 Earthworks

Earthworks and ground improvement will be required within the footprint of Units 1, 2 and 3 in order to achieve a consistent formation and allow a ground bearing floor slab to be utilised.

Any earthworks should be carried out in accordance with the Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600 Earthworks.

Based on the results of the compaction testing, both the made ground and natural ground could achieve >95% of the maximum dry density and <5% air voids.

However, some materials, e.g. probable buried topsoil, as well as containing too much organic matter, was too wet to achieve adequate compaction.

5.6 Potentially Combustible Materials

As stated in Section 6.3 of this report, the materials from shallow depth (i.e. <1.00m) in Areas 1, 2 and 3 are considered to be potentially combustible or have the potential for smouldering due to the presence of coal. The actual potential for combustion will also depend on other properties such as moisture content.

It would be prudent to carry out a visual inspection of the made ground materials during any earthworks. Where significant deposits of suspect materials are encountered, i.e. coal, this should be removed from the works or encapsulated at depth (i.e. >1.00m), to minimise risk.

The risk of combustion can be reduced by the construction process when the organic materials are encapsulated. Compaction of the made ground and sealing by new hardstanding will reduce the oxygen supply and further reduce the risk of combustion. Where this is not provided as part of the scheme proposals, there may be a requirement to provide an inert cover system of sufficient thickness, in order to reduce the ingress of oxygen and reduce the potential for combustion.

5.7 Roads, Pavements and Hardstanding Surfaces

CBR testing was carried out on one sample of natural granular material, this resulted in CBR values of 28% and 27.7%. For this material a CBR value of >15% is recommended for the design of road pavements and parking areas where this material is exposed at formation level. A CBR value of 3% should be adopted where weathered Coal Measures materials are exposed at formation.

Due to the variability in material properties of the made ground, most of which comprises gravelly sandy silty clay of variable strength. It is recommended that a CBR value of 2% should be adopted for this material.

It is likely that earthworks will be carried out as part of the redevelopment works. This may result in changes to the sub-grade materials. The works should therefore be designed to achieve a suitable CBR value for the proposed development.

Prior to roads and hardstanding being formed, the formation should be proof rolled and any soft spots removed and replaced with well compacted suitable granular fill. Any substructure remains should be "grubbed out" to a minimum depth of 500mm below the underside of formation to prevent hard spots from forming.

5.8 Excavations

The stability of most of the trial pits was generally good. However, it is considered likely that if excavations were left unsupported then over time, some collapse would occur.

Perched groundwater is likely to be encountered in excavations as water has been monitored at relatively shallow depths.

It is recommended excavations are sufficiently supported in these areas to enable excavation works to progress.

Good working practice with respect to drainage of excavations and formations will be required to protect materials. Any excavation for structural foundations must be covered without delay with blinding concrete to prevent softening by water.

The requirement for temporary support of excavations should be assessed on an individual basis and in any case, excavations of greater than 1.2m depth requiring man entry will require temporary support in accordance with HSE guidance. Alternatively, the sides of the excavation will need to be battered back for the safety of operatives. Guidance on safe batter slopes can be obtained from CIRIA Report 97 Trenching Practice.

5.9 Obstructions

No significant obstructions were noted in the trial pits or the boreholes. The presence of obstructions within the made ground, i.e. boulders of mudstone, siltstone and sandstone should be expected.

In addition, strong sandstone bedrock, which was difficult to excavate, has been encountered at shallow depth across the site.

It is recommended that an allowance should be made for the removal of obstructions and where required, breaking out of shallow bedrock.

5.10 Chemical Attack on Buried Concrete

Laboratory testing has been undertaken on samples of the made ground, natural ground and groundwater to determine the sulphate content (water soluble for soils), total sulphur content and acidity. These results have been used to assess the concrete class required for buried concrete.

Laboratory testing in the made ground recorded water soluble sulphate contents ranging between 13mg/l and 1,900mg/l and pH values between 4.3 and 10.6.

In the natural ground, recorded water soluble sulphate contents ranged between 13mg/l and 1,100mg/l and pH values ranged between 6.2 and 8.8.

The groundwater samples recorded sulphate contents of between 270mg/l and 1,200mg/l and a pH values of between 6.6 and 7.0.

Samples of both the made ground and natural ground recorded elevated concentrations of oxidisable sulphates, indicating the possible presence of pyrite. Total potential sulphate concentrations were therefore included in this assessment.

Foundations are likely to come into contact with made ground, natural ground and the underlying groundwater.

On this basis it is recommended that concrete should be designed to Aggressive Chemical Environment for Concrete (ACEC) Design Sulphate Class DS-3 and ACEC Class AC-4.

This assessment has been made in accordance with BRE Special Digest 1: 2005, entitled 'Concrete in Aggressive Ground'.

6.0 ENVIRONMENTAL RISK ASSESSMENT

6.1 Introduction

Legislation and guidance on the assessment of contaminated sites acknowledges the need for a tiered risk based approach comprising:

Tier 1 Assessment	Comparison of site contaminant concentrations against generic assessment criteria (GAC), i.e. a generic quantitative risk assessment (GQRA). Including an assessment of risk using the source-pathway-receptor model.
Tier 2 Assessment	Derivation of site specific risk assessment criteria and calculation of site specific clean up goals, i.e. a detailed quantitative risk assessment (DQRA).

A Tier 1 Assessment has been completed; however a Tier 2 Assessment has not been undertaken as part of this report.

The statutory definition of contaminated land is given in the Environmental Protection Act, Part IIA, Section 78, 1990, which was introduced by the Environment Act, Section 57, Department of Environment, 1995 and is defined as:

Land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that:

- Significant harm is being caused or there is a significant possibility of such harm being caused (where harm is defined as harm to health of living organisms or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property); and/or
- Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused (by the land).

The presence of contaminated materials on a site is generally only of concern if an actual or potentially unacceptable risk exists. The potential for harm to occur requires three conditions to be satisfied:

- Sources – The presence of substances (potential contaminants/pollutants), in or under the ground, that may cause harm or pollution.
- Receptors - The presence of a receptor which may be harmed, e.g. the water environment or humans, buildings, fauna and flora; and
- Pathway - The existence of a linkage between the Source and the Receptor.

In order to assess the contamination risk at the site, the above rationale has been applied and is discussed in the context of Contamination Sources and Potential Pollutant Linkages.

In summary, the presence of measurable concentrations of contaminants within the ground and subsurface environment does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and an unacceptable risk of harm to available receptors.

The nature and importance of both pathways and receptors, which are relevant to a particular site, will vary according to the sensitivity of the intended end use of the site and the sites characteristics and environmental setting.

6.2 Assessment Approach

The results of the chemical analysis for each determinand will be assessed against their respective GAC.

These include the LQM/CIEH Suitable 4 Use Levels (S4UL) and Category 4 Screening Levels (C4SL) which were developed using the UK Contaminated Land Exposure Assessment (CLEA) Framework Documents and Software.

The CLEA model uses generic assumptions about the fate and transport of chemicals in the environment and a generic conceptual model (referred to as generic land use scenarios) for site conditions and human behaviour, to estimate child and adult exposures to soil contaminants for those living, working and/or playing on contaminated sites over long time periods.

The S4UL and C4SL screening levels have been derived for a variety of land uses including residential, allotments, commercial and public open space.

In the absence of S4UL and C4SL for potential contaminants, appropriate alternative GAC will be used.

Controlled Waters
No standards currently exist in the UK which provides threshold values for potential contamination in groundwater. Alternative guidance is therefore used, against which the significance of potential contaminants can be assessed.

The results of the leachate analyses will be compared to the same standards as for groundwater.

6.3 Evaluation of Soils Analysis

Initially, the results of the chemical analysis for each potential contaminant will be compared directly with their respective GAC. Based on the current development proposals for the site, i.e. commercial, the results of the chemical analysis for the soil samples have been assessed against GAC for a commercial end use.

If any significant exceedances of the GAC are noted, then the results will be subject to statistical analysis. An outline of the methodology of the statistical analysis is presented in Appendix D.

15 samples of made ground were submitted for total soil analysis and an asbestos screen; six of these were also submitted for leachability analysis. Three samples of groundwater were submitted for analysis.

The results of the chemical analysis is summarised below.

Human Health

The results have been compared directly with their respective GAC and are summarised in Table 6.3.1 below:

Table 6.3.1 – Summary of Chemical Analysis for Samples of Made Ground

Determinand	GAC for Commercial End Use (mg/kg)	Sample Mean (mg/kg)	Range of Results (mg/kg)	Do any samples exceed the GAC?
Arsenic	640(1)	34.82	6.7 – 150	No
Cadmium	190(1)	0.19	<0.1 – 0.7	No
Chromium	8600(1)	34.99	9.8 – 190	No
Hexavalent Chromium	33 (1)	1	All <1	No
Copper	68000(1)	60.80	15 – 320	No
Lead	2330(2)	32.13	13 – 90	No
Mercury (Inorganic)	1,100(1)	2.88	<0.05 – 0.16	No
Nickel	980(1)	25.87	18 – 35	No
Selenium	12000(1)	0.58	<0.5 – 1.2	No
Zinc	730000(1)	79.87	47 – 150	No
Cyanide (free)	20(3)	0.17	<0.1 – 0.5	No
Total Phenols	440*(1)	0.31	<0.3 – 0.5	No
Naphthalene	190*(1)	0.12	<0.1 – 0.4	No
Acenaphthylene	83000*(1)	0.15	<0.1 – 0.8	No
Acenaphthene	84000*(1)	0.13	<0.1 – 0.6	No
Flourene	63000*(1)	0.17	<0.1 – 1.1	No
Phenanthrene	22000*(1)	0.68	<0.1 – 7.7	No
Anthracene	520000*(1)	0.29	<0.1 – 2.7	No
Flouranthene	23000*(1)	0.74	<0.1 – 7.8	No
Pyrene	54000*(1)	0.67	<0.1 – 7.1	No
Benzo(a)anthracene	170*(1)	0.40	<0.1 – 4.1	No
Chrysene	350*(1)	0.35	<0.1 – 3.4	No
Benzo(b)fluoranthene	44*(1)	0.26	<0.1 – 2.2	No
Benzo(k)fluoranthene	1200*(1)	0.19	<0.1 – 1.3	No
Benzo(a)pyrene	35*(1)	0.31	<0.1 – 2.6	No
Indeno(123-cd)pyrene	500*(1)	0.27	<0.1 – 2.6	No
Dibenzo(ah)anthracene	3.5*(1)	0.12	<0.1 – 0.4	No
Benzo(ghi)perylene	3900*(1)	0.23	<0.1 – 2.1	No

(1) S4UL * BASED ON 1% SOM (2) C4SL (3) DUTCH

None of the above determinands were detected at concentrations in excess of their respective GAC.

All 15 samples of made ground were submitted for an asbestos screen.

Bundles of chrysotile were detected in the sample from TP304 (0.50m). This comprised gravelly sandy silty clay, the gravel comprising coal, brick and burnt red shale.

In order to more accurately assess the percentage of asbestos by mass, the samples were submitted for gravimetric analysis in order to calculate the total mass (%) of asbestos.

The Control of Asbestos at Work Regulations (2006) state the following with respect to working with asbestos: 'worker exposure must be below the airborne exposure limit (control limit) of 0.1 fibres per cm³. A control limit is a maximum concentration of asbestos fibres in the air (averaged over any continuous four hour period) that must not be exceeded'. In addition, 'short term exposure must not exceed 0.6 fibres per cm³ over any continuous ten minute period'.

The total mass of asbestos in the sample from TP304 was 0.002%. Based on this result and the nature of the asbestos encountered, i.e. bundles, there is the potential for the airborne exposure limit to be exceeded.

A large proportion of potentially combustible materials, i.e. coal, was present in the made ground.

In BH302, from 8.80m to 10.30m, up to 20% coal was encountered within the made ground, with approximately 50% coal from 10.30m to 11.50m. In BH305, 20% to 30% coal was encountered from 0.75m to 2.00m, with 30% to 40% coal from 2.00m to 5.50m. BH302 and BH305 are located within the backfilled quarry in Area 3.

13 samples of made ground containing coal, mostly from shallow depth, i.e. <1.00m, were submitted for calorific value testing. The results are summarised in Table 6.3.2 below:

Table 6.3.2 – Summary of Calorific Value Testing Results

Area	Exploratory Location	Depth (m bgl)	Material	Calorific Value (MJ/kg)
Area 1	TP328	0.70	MADE GROUND: Dark grey slightly sandy gravel. Gravel is mudstone and coal	10.5
	TP331	1.00	MADE GROUND: Brown and grey gravelly sandy silty clay with cobbles and boulders. Gravel is sandstone	<1
	TP336	1.20	MADE GROUND: Orange brown and grey sandy clayey gravel with cobbles and boulders. Gravel is mudstone, sandstone and coal	4.4
	TP344	0.55	MADE GROUND: Dark grey gravelly sandy silty clay. Gravel is mudstone and coal	14.0
	TP344	1.00	MADE GROUND: Brown mottled grey gravelly sandy silty clay. Gravel is siltstone and sandstone	<1
	TP345	0.85	MADE GROUIND: Dark grey and brown gravelly sandy silty clay. Gravel is mudstone, coal and brick	1.8
Area 2	TP319	0.60	MADE GROUND: Dark grey gravelly sandy silty clay. Gravel is mudstone with rare coal and brick	7.4
	TP322	1.20	MADE GROUND: Dark grey gravelly sandy silty clay with cobbles and boulders. Gravel is mudstone, sandstone and coal	2.1
	TP359	1.80	MADE GROUND: Dark grey sandy gravelly silty clay. Gravel is sandstone, mudstone, brick, coal and burnt red shale	3.9
Area 3	TP304	0.50	MADE GROUND: Dark grey gravelly sandy silty clay. Gravel is mudstone, coal and brick with burnt red shale	<1
	TP306	2.00	MADE GROUND: Dark grey clayey silty sandy gravel, cobbles and boulders. Gravel is mudstone with frequent coal	<1
	TP307	0.20	MADE GROUND: Dark grey gravelly sandy silty clay. Gravel is mudstone with occasional coal	3.7
	TP308	0.50	MADE GROUND: Dark grey and brown sandy gravelly silty clay. Gravel is mudstone and sandstone with occasional brick and coal	3.8

In addition to Table 6.3.2, made ground containing a larger proportion of coal at shallow depth was present in the following:

- Area 1 - TP341 (0.20m to 0.60m).
- Area 2 - TP317 (0.50m to 1.00m) and TP321 (ground level to 2.70m).
- Area 3 - TP301 (ground level to 1.20m), TP302 (boulder of coal at 1.00m), TP315 (ground level to 2.60m), TP316 (ground level to 1.30m) and BH301 (ground level to 2.30m).

The results of the calorific value testing ranged between <1 MJ/kg and 14 MJ/kg. Although not submitted for testing, elevated results would be expected in the materials containing coal which were encountered in BH302 and BH305.

In the absence of more up to date guidance, reference has been made to the Interdepartmental Committee on the Redevelopment of Contaminated Land document, 'Notes on the Fire Hazards of Contaminated Land', ICRCL 61/84, Second Edition July 1986.

This states that materials with a calorific value exceeding 10,000kJ/kg are almost certainly combustible, while those with a value below 2,000kJ/kg are unlikely to burn. Between these values materials may be potentially combustible. However, some authors have suggested that there is a risk of smouldering, if the calorific value exceeds 7,000kJ/kg.

Based on the testing results and observations of the made ground, materials from shallow depth (i.e. <1.00m) in Areas 1, 2 and 3 are considered to be combustible or have the potential for smouldering due to the presence of coal. The actual potential for combustion will also depend on other properties such as moisture content.

6.4 Evaluation of Controlled Waters Analysis

Six samples of made ground were submitted for leachability analysis. The results for each determinand were compared directly against their respective GAC, the results are summarised in Table 6.4.1 below:

Table 6.4.1 – Summary of Leachability Analysis

Determinand	GAC (µg/l)	TP301, 0.80m	TP302, 4.20m	TP306, 0.40m	TP308, 0.50m	TP345, 0.85m	TP347, 0.15m
Arsenic	50(1)	< 0.16	0.23	< 0.16	< 0.16	0.82	4.3
Cadmium	5(1)	0.27	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Chromium	50(1)	0.25	0.26	0.52	0.28	0.36	1.2
Copper	2000(1)	0.5	0.5	< 0.4	0.5	1.6	3.2
Lead	10(1)	< 0.09	< 0.09	< 0.09	< 0.09	0.43	2.3
Mercury	1(1)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel	20(1)	35	< 0.5	< 0.5	< 0.5	0.6	1.3
Selenium	10(1)	< 0.25	0.73	< 0.25	< 0.25	0.66	0.53
Zinc	5000(1)*	120	3.0	54	20	1.3	4.5
pH	6.5-9.5(1)	6.1	7.7	8.2	7.9	5.7	6.1
Cyanide Free	50(1)	< 20	< 20	< 20	< 20	< 20	< 20
Sulphate as SO4	250000(1)	140	23	9.8	66	13	6.0
Naphthalene	4.24(2)	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.02
Acenaphthylene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	0.193(2)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Flouranthene	0.0122(2)	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
Pyrene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sum of benzo(b)fluoranthene, benzo(k) fluoranthene, indeno(1,2,3-c,d) pyrene and benzo(g,h,i)perylene	0.1(1)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.01(1)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenol	14.9(2)	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

(1) Water Supply (Water Quality) Regulations 2000.
*Historical 1989 Threshold Value.
(2) Water Framework Directive 2015, Surface Water, Maximum Threshold Value.

Slightly elevated concentrations potentially leachable nickel and flouranthene were detected in the samples from TP301 (0.80m) and TP345 (0.85m) respectively. Slightly acidic pH values were also detected in three samples.

At the time of sampling only three wells contained sufficient water to obtain a sample; these are summarised below:

- Area 1 - BH310, sample obtained from within the made ground in the backfilled opencast.

- Area 2 - R302, natural ground.
- Area 3 - BH305, sample obtained from within the made ground in the backfilled pond/quarry.

The results for each determinand were compared directly with their respective GAC and are summarised in Table 6.4.2 below:

Table 6.4.2 – Summary of Groundwater Analysis

Determinand	GAC (µg/l)	BH310, 5.90m	R302, 3.97m	BH305, 7.47m
Arsenic	50(1)	0.28	1.4	3.7
Cadmium	5(1)	0.22	0.12	0.43
Chromium	50(1)	< 0.25	0.54	< 0.25
Copper	2000(1)	< 0.4	0.9	1.1
Lead	10(1)	< 0.09	0.16	0.17
Mercury	1(1)	< 0.01	< 0.01	< 0.01
Nickel	20(1)	240	11	290
Selenium	10(1)	0.98	1.0	1.3
Zinc	5000(1)*	73	4.2	84
pH	6.5-9.5(1)	6.6	7.0	6.8
Cyanide Free	50(1)	< 20	< 20	< 20
Sulphate as SO4	250000(1)	780,000	270,000	1,200,000
Naphthalene	4.24(2)	< 0.01	< 0.01	< 0.01
Acenaphthylene	NA	< 0.01	< 0.01	< 0.01
Acenaphthene	NA	< 0.01	< 0.01	< 0.01
Fluorene	NA	< 0.01	< 0.01	< 0.01
Phenanthrene	NA	< 0.01	0.06	< 0.01
Anthracene	0.193(2)	< 0.01	0.01	< 0.01
Flouranthene	0.0122(2)	< 0.01	0.03	< 0.01
Pyrene	NA	< 0.01	0.03	< 0.01
Benzo(a)anthracene	NA	< 0.01	0.01	< 0.01
Chrysene	NA	< 0.01	0.02	< 0.01
Sum of benzo(b)fluoranthene, benzo(k) fluoranthene, indeno(1,2,3-c,d) pyrene and benzo(g,h,i)perylene	0.1(1)	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	0.01(1)	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	NA	< 0.01	< 0.01	< 0.01
Phenol	14.9(2)	9.7	< 0.50	< 0.50

(1) Water Supply (Water Quality) Regulations 2000
*Historical 1989 Threshold Value
(2) Water Framework Directive 2015, Surface Water, Maximum Threshold Value

Slightly elevated concentrations nickel and sulphate were detected in the samples from BH310 and BH305, which were installed within the made ground.

Very slightly elevated concentrations of sulphate and flouranthene were detected in the sample from the natural ground.

The Water Supply (Water Quality) Regulations from which most of the GAC for leachate and groundwater have been derived, is considered to be conservative when applied to an assessment of risks to controlled waters.

An assessment of risk to controlled waters should also consider the environmental setting of the site, which is summarised below:

- The nearest surface watercourse is an unnamed secondary river located approximately 130m to the north of the site.
- The underlying bedrock is classified as a Secondary A Aquifer, this comprises variably weathered mudstone, siltstone and sandstone. The weathered horizons typically comprise slightly sandy silty clay. This material is relatively impermeable and will reduce the potential for the downward migration of potential contaminants.
- There are no active groundwater abstraction licences within 250m of the site and the site does not lie within 500m of an Environment Agency Groundwater Source Protection Zone.

Based on the recorded slightly elevated concentrations of potentially contaminants, the distance to surface water receptors and the presence of impermeable cover over the underlying bedrock, there are not considered to be any plausible linkages to controlled water receptors.

6.5 Summary of Sources, Pathways and Receptors

Sources
Based on the results of the analysis carried out, the following potential sources of contamination are considered to be present on the site:

- Potentially airborne asbestos fibres with the made ground (TP304).
- Slightly elevated concentrations of potentially leachable nickel and flouranthene in the made ground and slightly elevated concentrations of nickel and sulphate in the perched groundwater within the made ground.
- Hazardous gases have been recorded across the site. Relatively low concentrations were recorded in Areas 1 & 2. Higher concentrations and flows were recorded in Area 3.

Pathways
Based on the available information and the proposed redevelopment of the site for a commercial end use, the following potential exposure pathways will require consideration, both during the redevelopment works and on completion of the construction:

- Ingestion and dermal contact with contaminated soil and groundwater.
- Inhalation of hazardous gases/asbestos fibres.

- Leaching/migration of contaminants into groundwater and surface water via groundwater and surface water flow.
- Permeation of water supply pipes and other services by organic and aggressive contaminants; and
- Uptake of contaminants by planting.

Receptors
The potential receptors considered are:

- Development workers and future maintenance workers involved in excavations, e.g. foundations or where services are being installed or repaired following development.
- Future end users of the site, e.g. employees.
- Groundwater in the underlying Secondary A Aquifer.
- Surface Watercourses.
- Buildings and services; and
- Plants in landscape areas.

6.6 Source – Pathway – Receptor Linkages

Based on the above sources, pathways and receptors, the following linkage assessments have been considered. A conceptual site model illustrating the potential pollutant linkages at the site is presented as Figure 6 in Appendix A.

This assessment is based on current site conditions (unless stated) and does not consider exposure pathways following any remediation of the site.

Development and Maintenance Workers
Based on the sources of potential contamination which have been identified on the site, there is a risk to development and maintenance workers involved in groundworks at the site. There is the potential for exposure to the following:

- Potentially airborne asbestos fibres with the made ground (TP304).
- Hazardous gases within the ground.

Future Site End Users
It is unlikely that future site end users will come into contact with the site in its current condition. However, based on the site in its current condition, there is potential for exposure to the following:

- Potentially airborne asbestos fibres with the made ground (TP304).
- Hazardous gases from within the ground.

Groundwater in the Underlying Secondary A Aquifer and Surface Watercourses
As stated previously, based on the conservative nature of the GAC for controlled waters and the absence of plausible linkages to receptors. It is concluded that there is no significant risk with respect to controlled waters.

Buildings and Services
Based on the potential sources of contamination which have been identified on the site, there may be a risk to buildings and services, such as underground water services, buried concrete and steel.

Plants in Landscape and Garden Areas
Based on the potential source of contamination and nature of the made ground, there is not considered to be a significant risk to plants on the site.

6.7 Mitigation Measures

In order to mitigate the risks posed by the potential contaminants which are present on the site, consideration should be given to the following mitigation measures.

Development and Maintenance Workers

- Site workers involved in groundworks should take the necessary measures to ensure that all works in excavations and confined spaces are carried out in accordance with best practice in order to prevent exposure to potentially hazardous gases.
- Site workers involved in groundworks should use appropriate PPE, i.e. overalls and gloves and where appropriate masks. Appropriate health and safety measures, e.g. washing hands prior to eating or drinking, should also be enforced.
- In order to protect against the inhalation of asbestos fibres during the construction and maintenance periods the contractor should provide a soils risk assessment. Employees should also receive asbestos awareness training in order to avoid exposure.
- In order to inform the soils risk assessment, air monitoring for asbestos fibres may be required.
- Any monitoring and analysis of asbestos in air should be carried out in accordance with the Control of Asbestos Regulations (CAR) 2012 and by a suitably accredited organisation (ISO/IEC 17025:2005).
- If air monitoring is to be carried out as the main source of air concentration data for exposure estimation, then some monitoring should be carried out during periods of dry weather, i.e. when dust is being generated.
- Likely protection measures will include the use of appropriate facemasks (P3 protection) and during periods of dry weather, dry surfaces and dry arisings should be damped down to minimise the generation of airborne dust.
- In most cases it is likely that the risk assessment will need to be completed by a suitably qualified specialist.

During development of the site, all workers should remain vigilant to the possible risk of encountering areas of potentially contaminated material. Should potentially contaminated material be encountered, site management should be informed. Further testing may then be required to assess the risk to health and safety of the site workers and the environment.

All employers involved in works at the site should produce an appropriate method statement and risk assessment, to which all employees should comply.

Reference should also be made to appropriate HSE and other guidance for working on contaminated and potentially contaminated sites.

Future Site Users
It is likely that the proposed development will comprise hardstanding and areas of landscaping. It is recommended that a sufficient thickness of clean cover is placed in landscape areas in order isolate potential contaminants in the underlying made ground.

Mitigation measures against the ingress of hazardous gases into buildings are presented in Section 7 of this report.

Buildings and Services
Recommendations with respect to the chemical attack on buried concrete are given section 5.9.

Based on the concentrations of potential contaminants within the made ground, it is considered unlikely that there will be a requirement for upgrading any proposed new water service pipes. Confirmation should be sought from the utilities provider.

Plants in Landscape Areas
Based on the nature of the made ground and the potential contaminants present, there is not considered to be a significant risk to plants on the site. However, provision of a suitable thickness of clean growing medium will be required in order to promote plant growth.

6.8 Classification of Materials for Disposal Offsite

15 samples of made ground were assessed using HazWasteOnline^{tm} in order to determine the classification of the materials for disposal offsite.

Based on the results of the chemical analysis, all 14 samples can be classified as non-hazardous. Details of the classification generated by HazWasteOnline^{tm}, is presented in Appendix C.

The results of the chemical analysis and the waste classification should be forwarded to the landfill operator to confirm this assessment and provide a price for disposal.

WAC testing of the made ground samples from this investigation was not carried out. Section 1.7 references a separate report which includes WAC tests which were carried out for an assessment of stockpile materials on site.

7.0 HAZARDOUS GAS MONITORING

7.1 Potential Gas Sources

Based on the desk study information and ground conditions encountered, it is considered that there is the potential for the presence of hazardous gases on the site.

7.2 Ground Gas Monitoring

In order to assess the potential risks posed to the proposed development from hazardous gases, monitoring wells were installed in all ten cable percussive boreholes and eight rotary boreholes.

The monitoring wells in BH301 to BH305 and BH307 to BH310 were installed in the made ground. Instruments in boreholes BH306 and R301 to R308 were installed within the natural ground.

Ground gas monitoring has been undertaken on eight occasions. The works were carried out using a portable infrared gas meter in accordance with the standard JPG methodology and included the measurement of methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, gas flows and atmospheric pressure.

7.3 Summary of Results

It is apparent from the results, that there are two different gas regimes present over the site area. The gas monitoring results in Area 3, particularly within the backfilled quarry, differ from the results obtained from Areas 1 and 2. As a result, Area 3 and Areas 1 & 2 will therefore be assessed separately as follows:

Areas 1 & 2

- Peak methane concentrations of 0.60% v/v and 0.80% v/v were recorded in BH309 and BH308 during the second and seventh visits respectively. No steady concentrations of methane were recorded.
- Carbon dioxide was recorded in all 11 installations. Maximum steady concentrations ranged between 1.7% v/v and 10.7% v/v. Concentrations in excess of 5% v/v were recorded in BH308 (Visit six), BH309 (Visit five), BH310 (Visits five and seven), R305 (Visit six) and R307 (Visits three, six and eight).
- Reduced oxygen concentrations (i.e. <16% v/v) were recorded in all installations and were recorded in BH307 and BH310 during all six monitoring visits. Zero oxygen was recorded in three boreholes and concentration of less than 5% v/v were recorded in a further three monitoring wells.
- An instantaneous short lived peak flow of 0.2 l/hr was recorded in R307 during the final monitoring visit. No steady flows were recorded.

Area 3

- Peak, short lived, relatively low concentrations of methane ranging between 1.2% and >5% were recorded in BH305. Steady concentrations of methane ranging between 3.8% v/v and 14.4% v/v were recorded in BH302. No other steady concentrations of methane were recorded. Both BH302 and BH305 are located within the backfilled pond/quarry.
- Carbon dioxide was recorded in all seven installations. Maximum steady concentrations ranged between 0.4% v/v and 12.1% v/v. Concentrations in excess of 5% v/v were recorded in BH301 (Visits one to five and eight), BH304 (Visits two and five to seven), BH305 (all eight visits) and R301 (Visit one).
- Reduced oxygen concentrations (i.e. <16% v/v) were recorded BH301, BH303 and BH305 during all six monitoring visits. Zero oxygen was recorded in BH305 during all eight monitoring visits. Reduced oxygen concentrations were also detected in BH302 (six visits), BH304 (four visits) and R301 (four visits). Reduced oxygen concentrations were not recorded in BH306.
- In R301, an instantaneous short lived peak flow of 0.3 l/hr was recorded during the sixth monitoring visit. Steady flows were recorded in BH302 during seven of the monitoring visits, these ranged between 4.2 l/hr and 33.7 l/hr. During five of the visits, flows in excess of 27.3 l/hr were recorded. Steady flows of 1.0 l/hr and 7.8 l/hr were recorded in BH303 during the second and seventh monitoring visits.

Six of the monitoring visits were carried out during periods of falling atmospheric pressure and two visits were carried out during steady and rising atmospheric pressure.

Barometric pressures during the monitoring period ranged between 972mB and 1006mB.

7.4 Requirements for Gas Protection Measures

The results of the gas monitoring have been assessed in accordance with CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings' and BS 8485:2015, 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

CIRIA C665
The risk to the site has been assessed in accordance with Situation A, i.e. office, commercial, industrial development.

Areas 1 & 2
No steady concentrations of methane or steady flows were recorded. Steady concentrations of carbon dioxide in excess of 5% v/v were recorded in five of the monitoring wells. Reduced concentrations of oxygen were recorded in all of the monitoring wells.

It is therefore recommended that gas protective measures, in accordance with Characteristic Situation 2, are installed in the proposed development in Areas 1 & 2 and should comprise the following:

- Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200g/reinforced gas proof membrane.
- Beam and block or precast concrete slab with minimum 2000g damp proof membrane/reinforced gas membrane.
- All joints and penetrations sealed.
- Passively ventilated or positively pressurised underfloor sub-space.

Area 3

Steady concentrations of methane ranging between 3.8% v/v and 14.4% v/v were recorded in BH302 which was installed within the backfilled quarry. Steady concentrations of carbon dioxide in excess of 5% v/v were recorded in four monitoring wells, to a maximum concentration of 12.1% v/v. Three of these wells were located within the backfilled quarry.

Reduced concentrations of oxygen were recorded across Area 3 and steady gas flows, typically between 27.3 l/hr and 33.7 l/hr were recorded in BH302.

Based on the above, gas screening values for methane and carbon dioxide of 4.85 and 1.52 respectively can be calculated for BH302. Taking the whole data set, the worst case gas screening value for methane in Area 3 is 4.85, and for carbon dioxide is 4.08.

It is recommended that gas protective measures, in accordance with Characteristic Situation 4, are installed in the proposed development in this part of the site and should comprise the following:

- Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200g damp proof membrane.
- Beam and block or pre-cast concrete slab with minimum 2000g damp proof membrane/reinforced gas membrane.
- All joints and penetrations sealed.
- Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility.
- In ground venting or well barriers.

BS 8485:2015

The results of the gas monitoring have also been assessed in accordance with BS8485:2015, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. This takes into account the gas characteristic situation and the nature of the proposed development.

Four building types are prescribed, ranging from small buildings, e.g. houses (Type A), through to large well ventilated buildings, e.g. warehouses (Type D). A gas protection score is then determined, based on the characteristic situation and building type.

This assessment will be carried out based on the proposed development comprising Type D buildings with the following assumptions:

- The proposed development will comprise industrial style buildings with large volume well ventilated internal spaces.
- There will be building management controls on alterations to the ground floor and any basement areas.
- Ground gas protective measures will be maintained for the life of the building.

Where there are small rooms within the large industrial buildings, these should be assessed individually as Type B or Type C buildings.

Areas 1 & 2
Gas characteristic situation 2 has been determined for Areas 1 & 2. Therefore, for building type D, a gas protection score of 1.5 will be required. For any internal offices, gas protection scores of 3.5 or 2.5 will apply for building types B or C respectively.

Area 3
Gas characteristic situation 4 has been determined for Area 3. Therefore, for building type D, a gas protection score of 3.5 will be required. For any internal offices, gas protection scores of 5.5 or 4.5 will apply for building types B or C respectively.

Based on the gas protection score, an element or combination of elements should be selected based on the following:

- Structural Barrier – Floor and Substructure Design.
- Ventilation Protection Measures.
- Gas Resistant Membrane.

In most cases, the installation of the protective measures will require verification in accordance with CIRIA C735 (Good practice on the testing and verification of protection systems for buildings against hazardous ground gases) with the preparation of an implementation and verification report.

Consideration could be given to carrying out a quantitative risk assessment with respect to ground gas, to evaluate the scope of protective measures required.

It is also recommended that further advice be sought from a gas protection specialist to assess whether alternative measures may offer the same level of protection.

7.5 Radon Risks

The site is not located in an area for which radon protective measures are required.



R Mew
BSc MSc FGS CGeol
For and on behalf of JPG (Leeds) Limited

August 2016

Appendix A Figures/Drawings

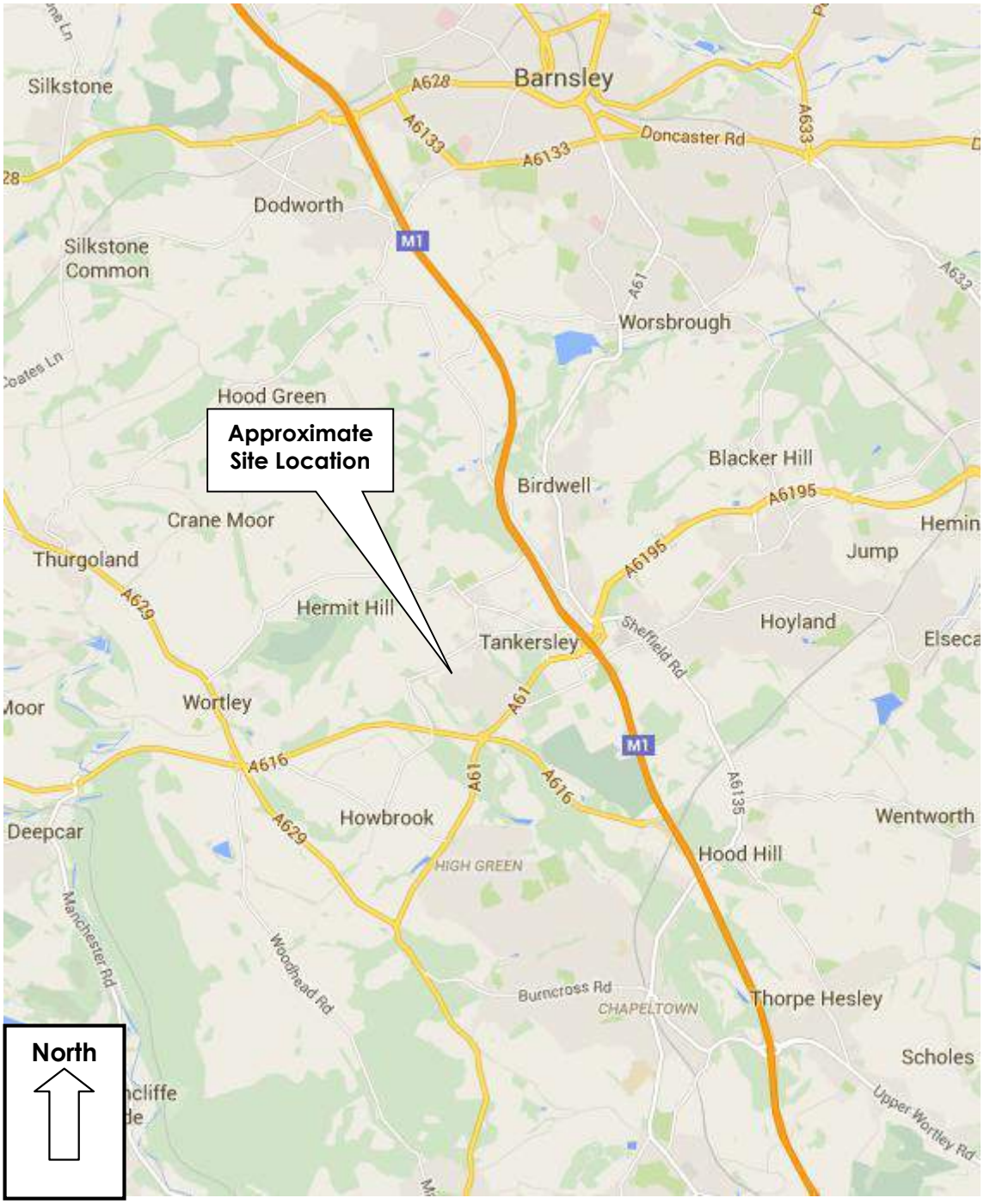


Figure 1 – Site Location Plan	
Site	**Wentworth Way, Tankersley, South Yorkshire**
Client	**Barmston Developments Ltd**
Job Number	**4776**
Scale	**NTS**

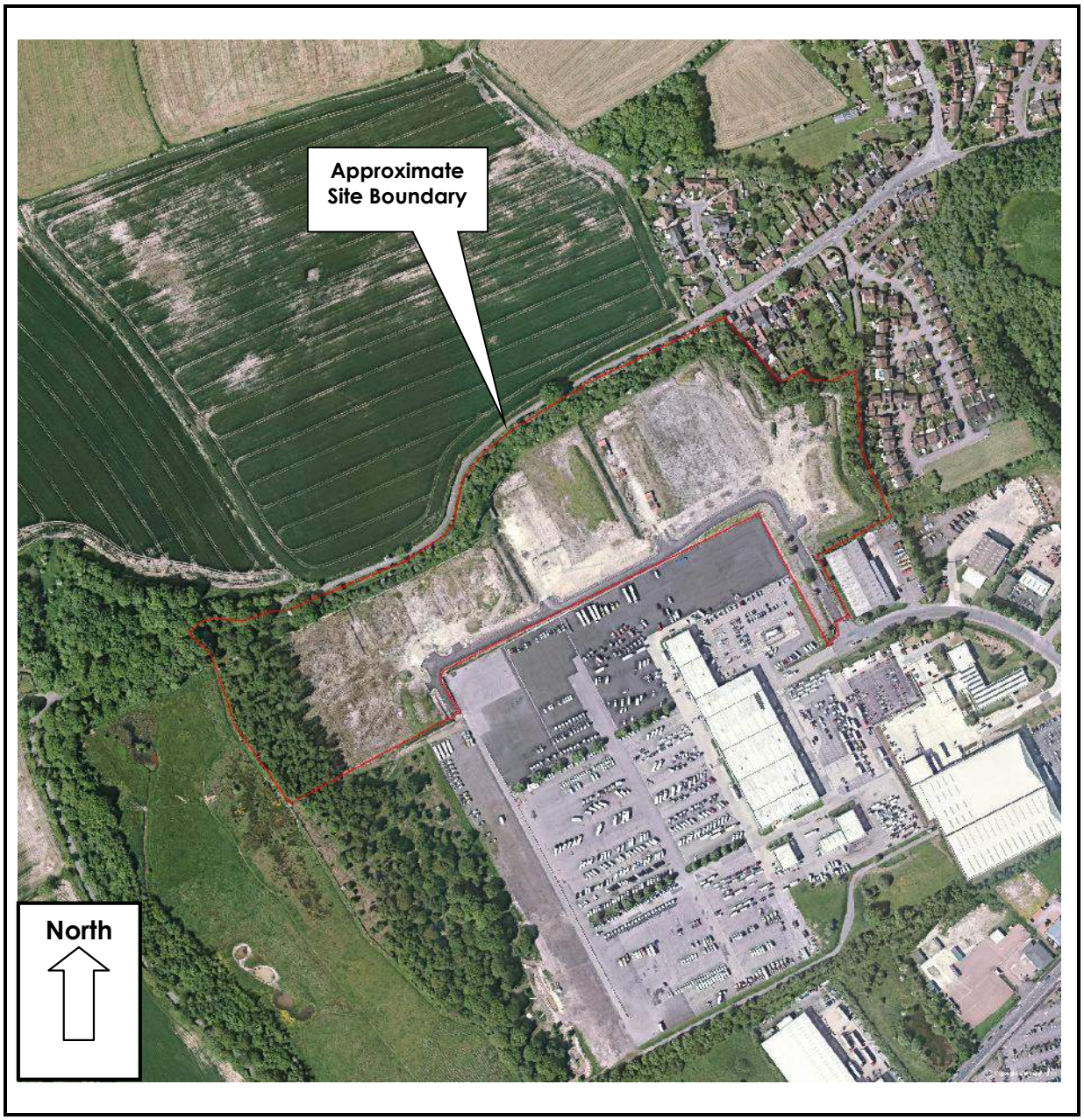


Figure 2 – Aerial Photograph	
Site	**Wentworth Way, Tankersley, South Yorkshire**
Client	**Barmston Developments Ltd**
Job Number	**4776**
Scale	**NTS**

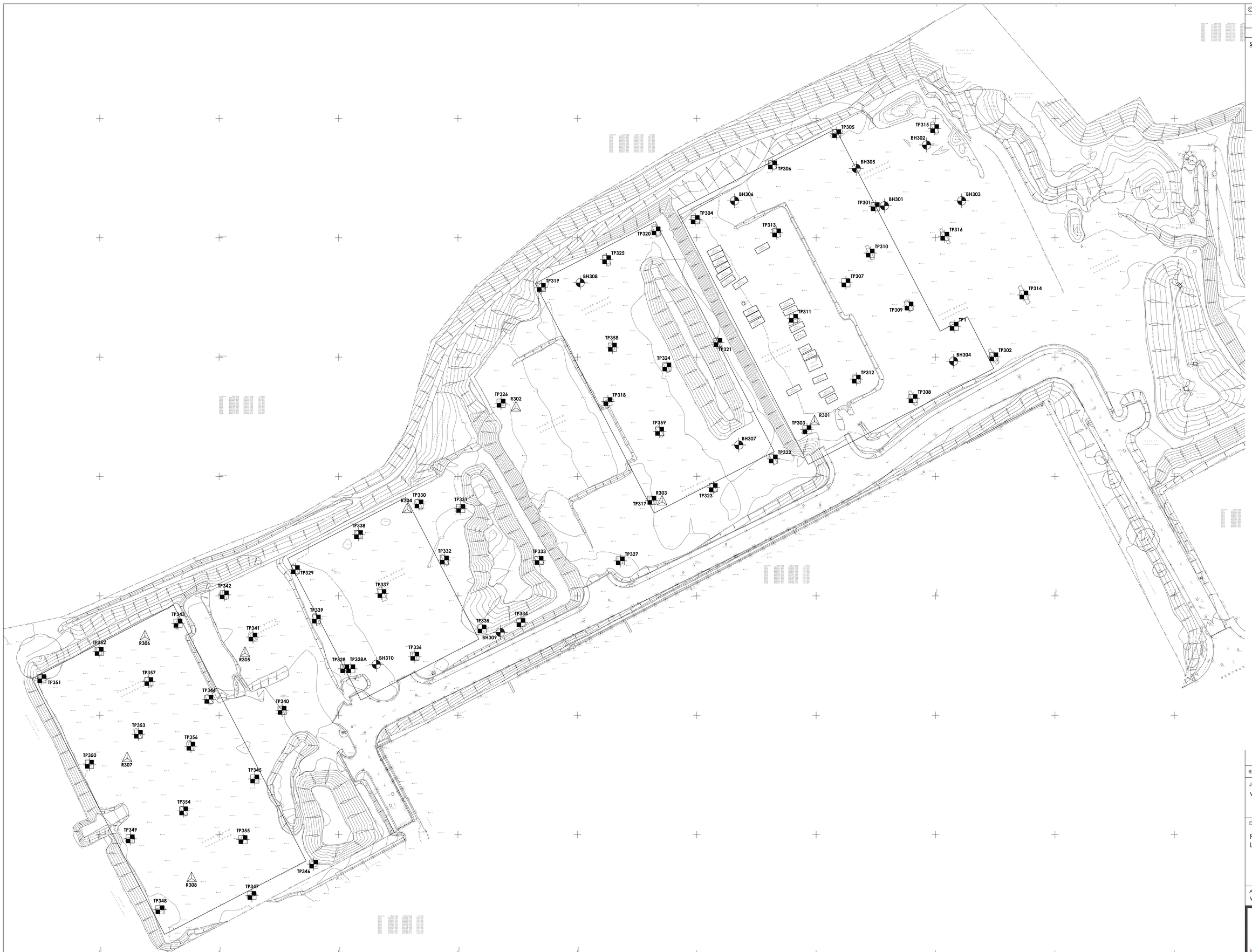
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DO NOT SCALE

NOTES

SITE INVESTIGATION KEY

- **BH301** — CABLE PERCUSSIVE BOREHOLES CARRIED OUT BY JPG IN APRIL 2016
- **TP301** — TRIAL PITS CARRIED OUT BY JPG IN APRIL 2016
- **R301** — ROTARY OPEN HOLES CARRIED OUT BY JPG IN APRIL2016



REV	DESCRIPTION	DATE	BY

Job Title

WENTWORTH WAY, TANKERSLEY

Drawing Title

FIGURE 3: EXPLORATORY HOLE LOCATION PLAN

Architect

WILTON DEVELOPMENTS LIMITED

JPG
www.jpggroup.global
Leeds: +44 (0)113 263 1155 | Also: London & Muscat

Checked	Date	Scale		Drawn
	14.06.2016	1:500 @ A0	A0	RM

Drawing No 4469 - FIG 3

Figure 4: SPT N Value vs Depth (m bgl)

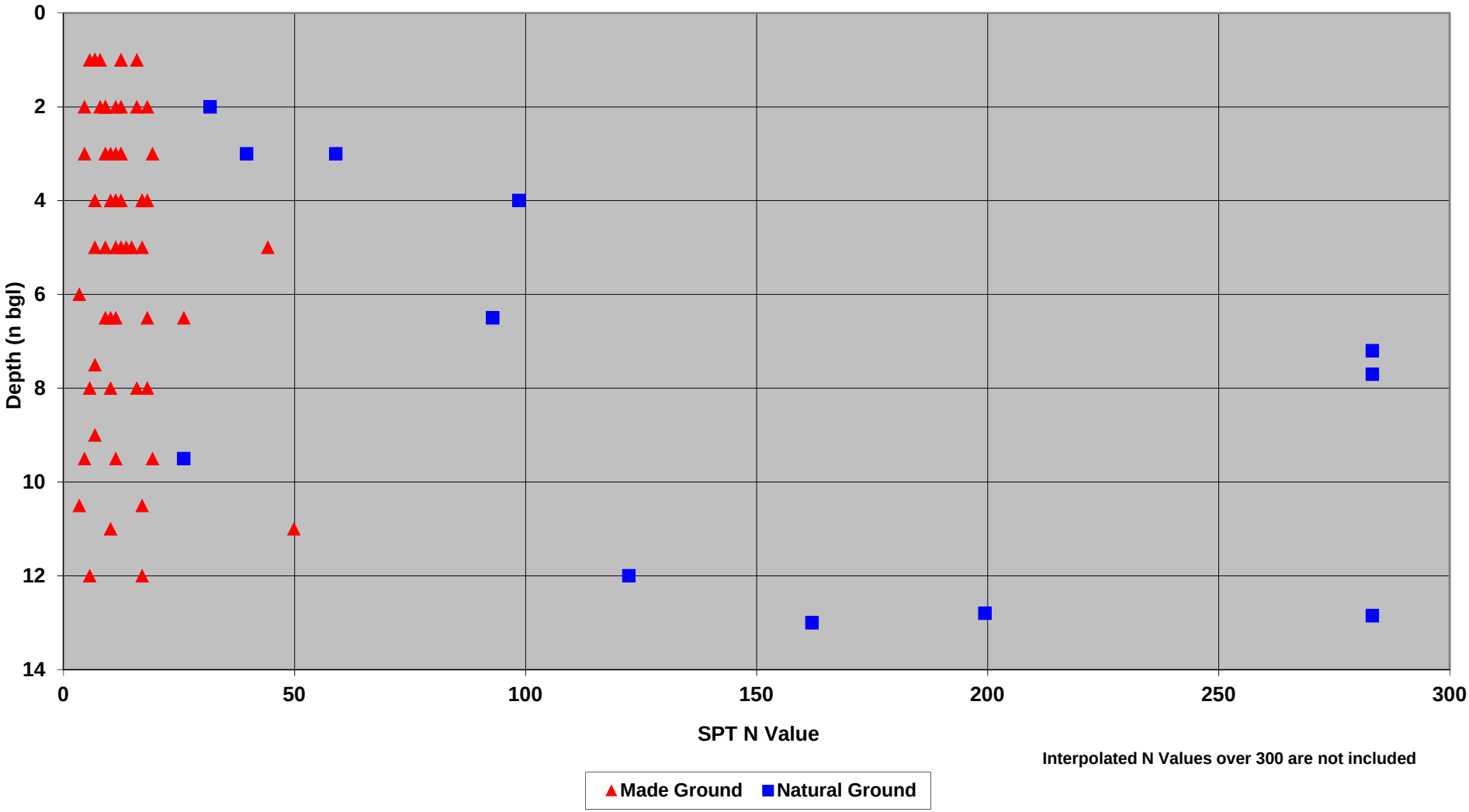
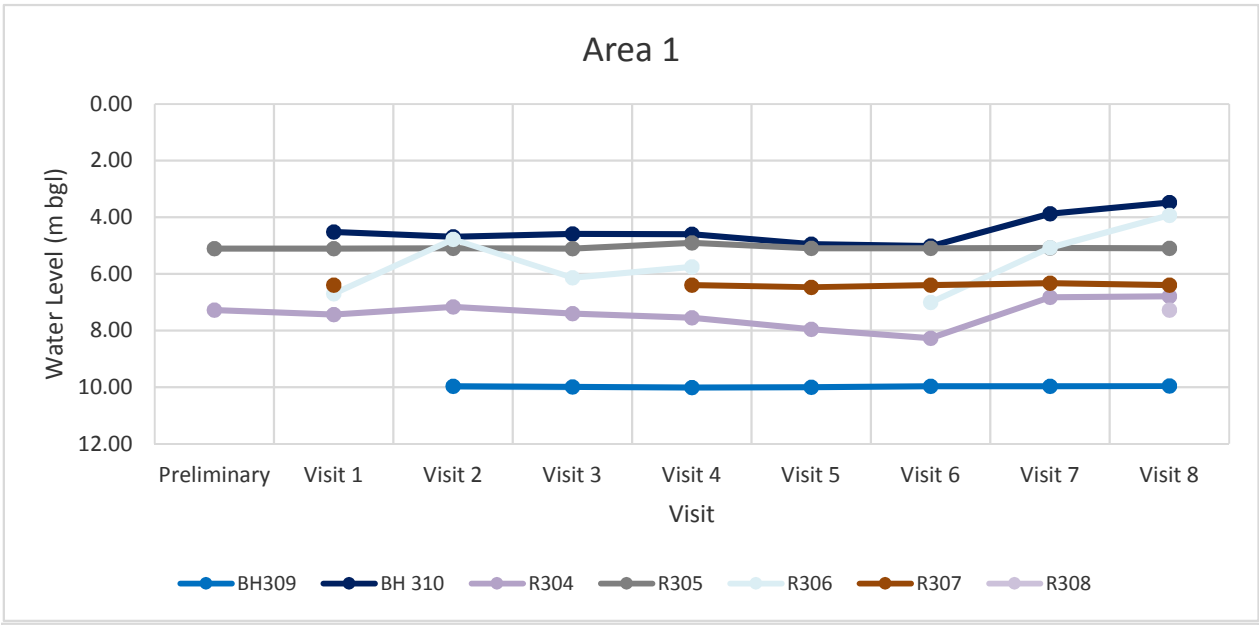
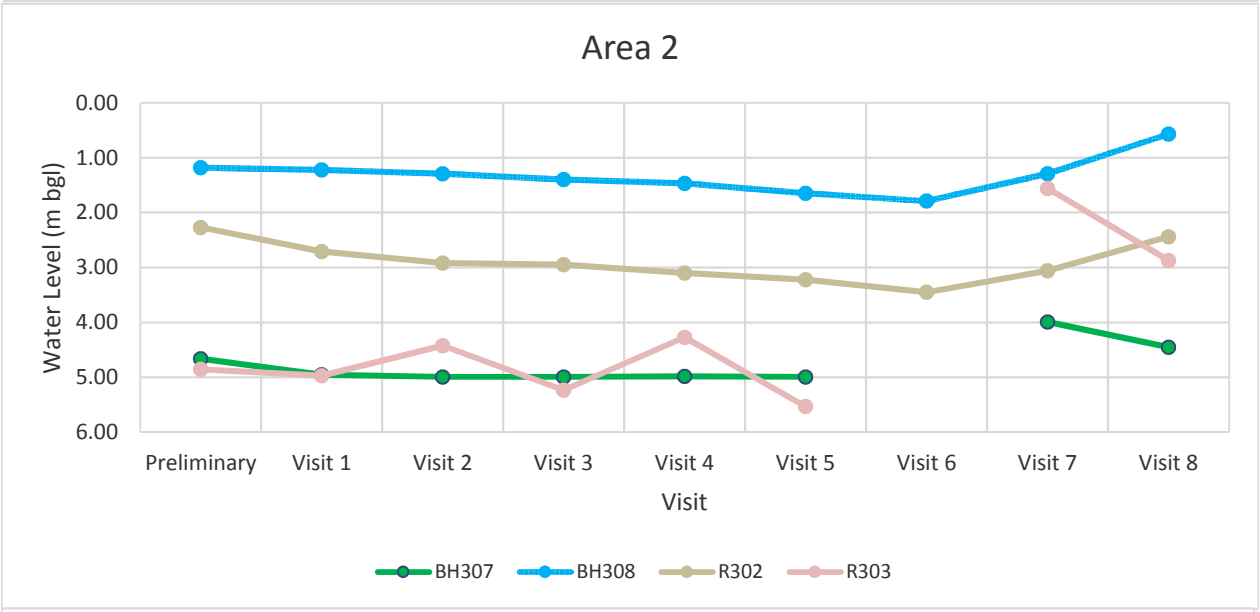
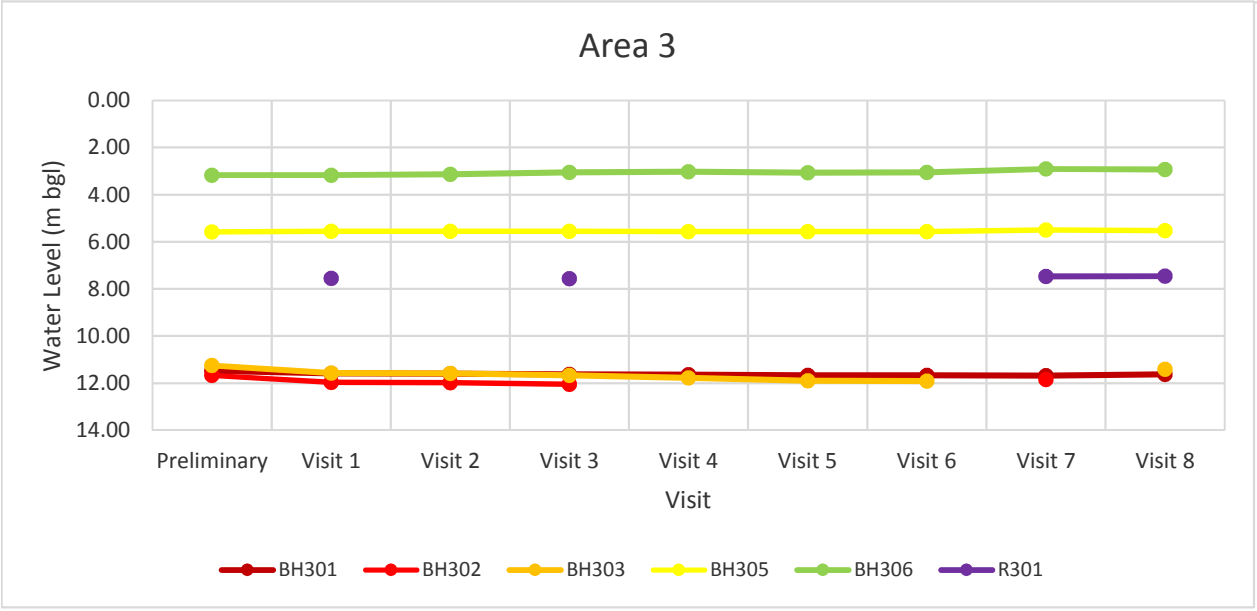


Figure 5: Monitored Groundwater Levels by Area







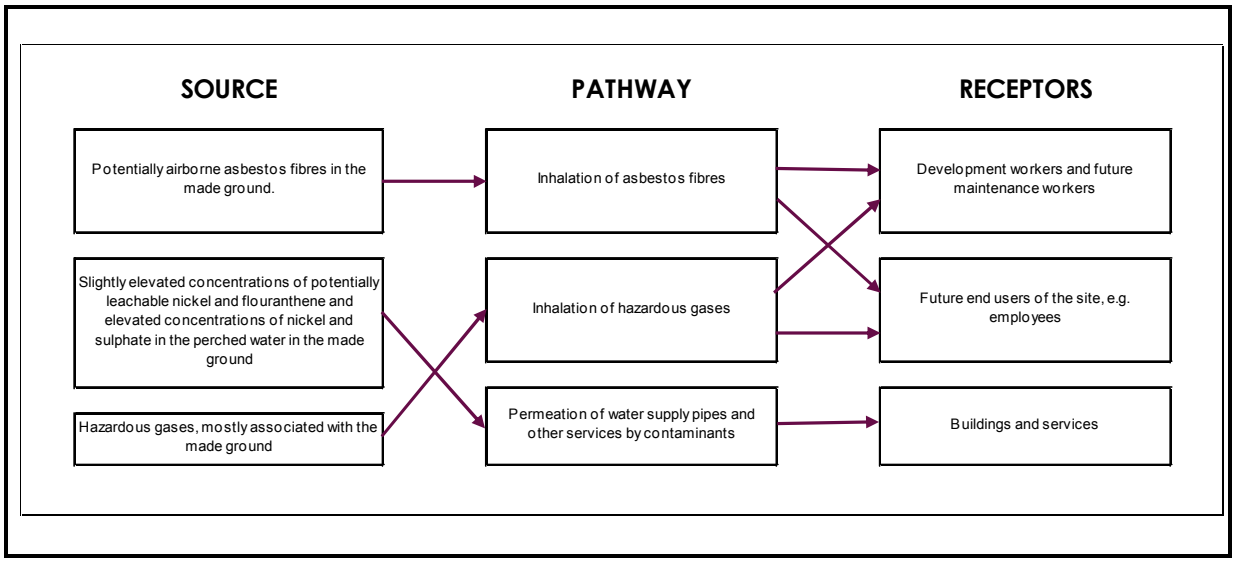


Figure 6 – Conceptual Site Model	
Site	**Wentworth Way, Tankersley, South Yorkshire**
Client	**Barmston Developments Ltd**
Job Number	**4776**
Scale	**NTS**

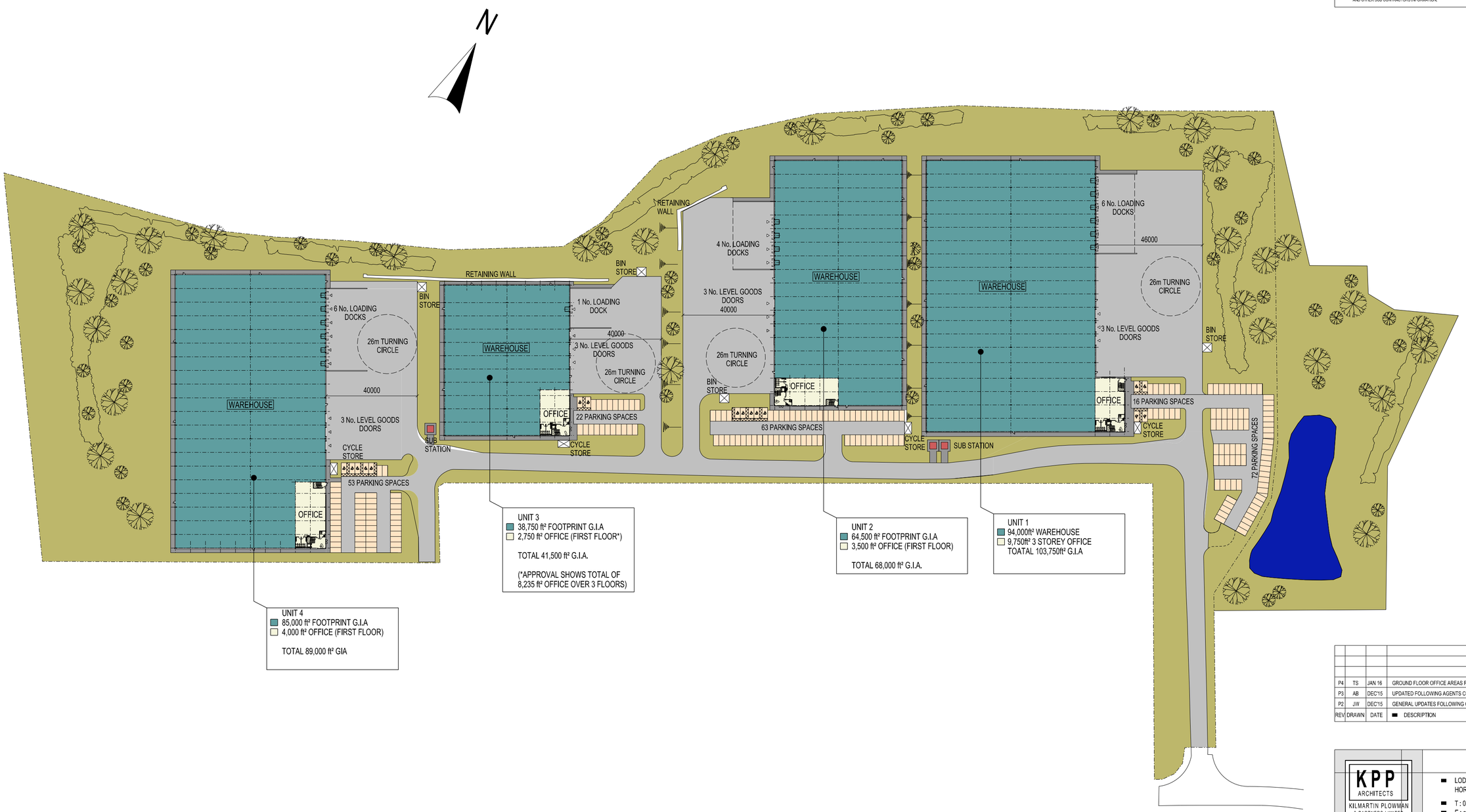
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WORK AND MATERIALS MUST COMPLY WITH THE CURRENT BUILDING REGULATIONS AND CODES OF PRACTICE AND BE READ IN CONJUNCTION WITH BUILDING SPECIFICATIONS AND OTHER SUB CONTRACTORS INFORMATION.

KPP ARCHITECTS
KILMARTIN PLOWMAN & PARTNERS LIMITED



UNIT 4
- 85,000 ft² FOOTPRINT G.I.A
- 4,000 ft² OFFICE (FIRST FLOOR)

TOTAL 89,000 ft² GIA

UNIT 3
- 38,750 ft² FOOTPRINT G.I.A
- 2,750 ft² OFFICE (FIRST FLOOR*)

TOTAL 41,500 ft² G.I.A.

(*APPROVAL SHOWS TOTAL OF 8,235 ft² OFFICE OVER 3 FLOORS)

UNIT 2
- 64,500 ft² FOOTPRINT G.I.A
- 3,500 ft² OFFICE (FIRST FLOOR)

TOTAL 68,000 ft² G.I.A.

UNIT 1
- 94,000ft² WAREHOUSE
- 9,750ft² 3 STOREY OFFICE

TOATAL 103,750ft² G.I.A

REV	DRAWN	DATE	DESCRIPTION
P4	TS	JAN 16	GROUND FLOOR OFFICE AREAS REMOVED
P3	AB	DEC'15	UPDATED FOLLOWING AGENTS COMMENTS
P2	JW	DEC'15	GENERAL UPDATES FOLLOWING CLIENT MEETING

KPP ARCHITECTS
KILMARTIN PLOWMAN & PARTNERS LIMITED

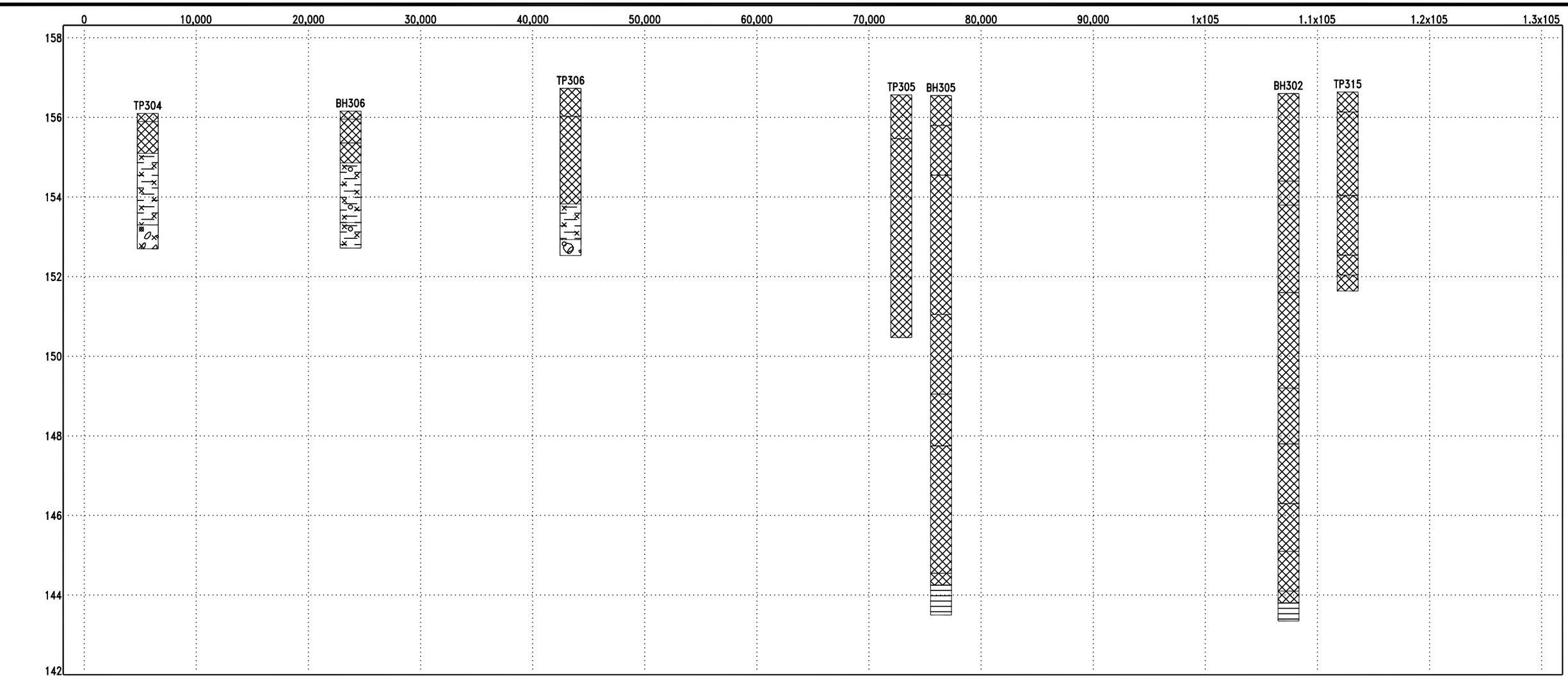
LODGE HOUSE 12 TOWN STREET
HORSFORTH LEEDS LS18 4RJ

T : 0113 239 0460 F : 0113 239 0475
E : architects@kpp-leeds.co.uk
W : www.kpp-leeds.co.uk

PROJECT TITLE: TANKERSLEY PARK BARNSLEY

TITLE: SITE PLAN

STATUS	PLANNING	SCALE	1:1250 @A2
DRAWN	AS		
FILE	P:\PROJECTS2\ -	DATE	NOV'15
PROJECT	1979	DRAWING	201
REVISION	P6		





LITHOLOGY GRAPHICS

MADE GROUND

MUDSTONE

Silty sandy gravelly CLAY

Silty sandy CLAY

Silty sandy GRAVEL

Cobbly GRAVEL

JPG (Leeds) Ltd

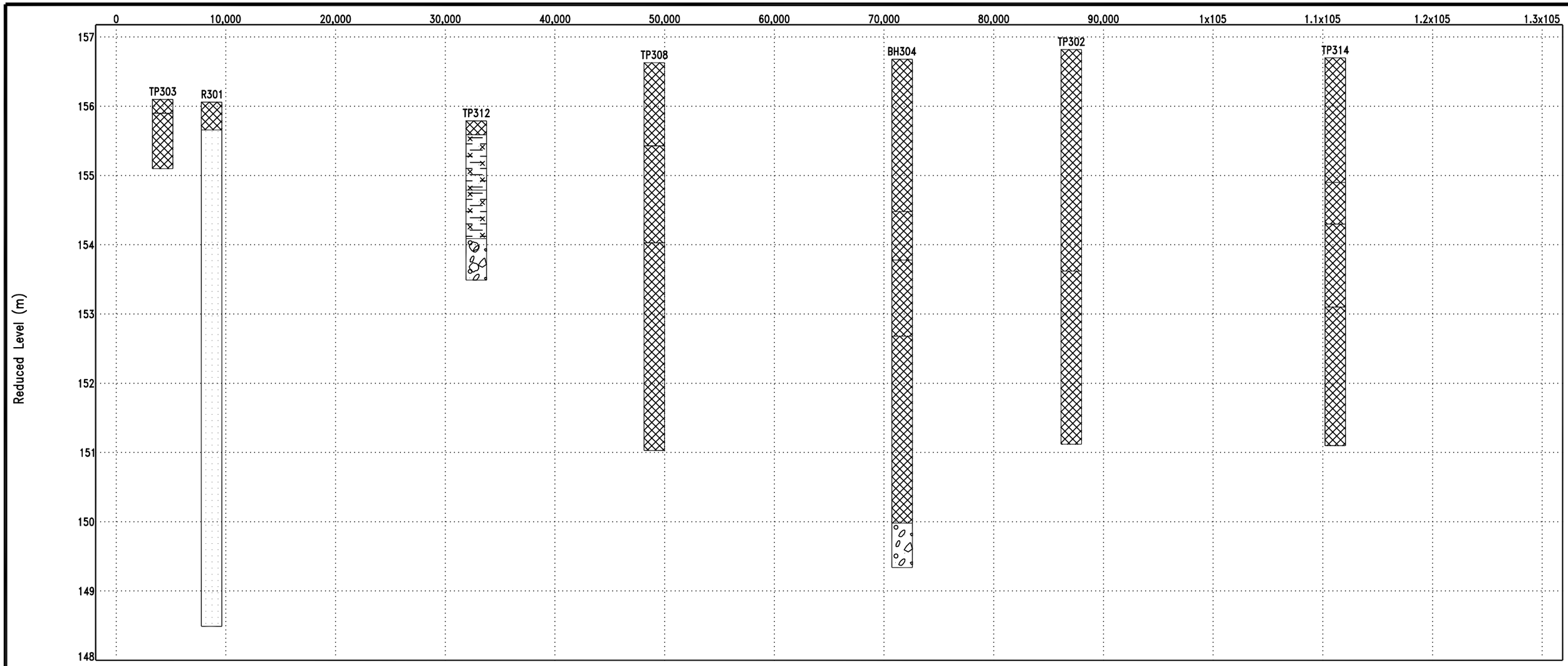
SUBSURFACE SECTION Unit 1 – Section 1

Client: Barmston Developments Limited

Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP – A3 4776 – TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16







LITHOLOGY GRAPHICS

MADE GROUND | Sandy GRAVEL | SANDSTONE | Silty sandy CLAY | Sandy cobbly GRAVEL

JPG (Leeds) Ltd

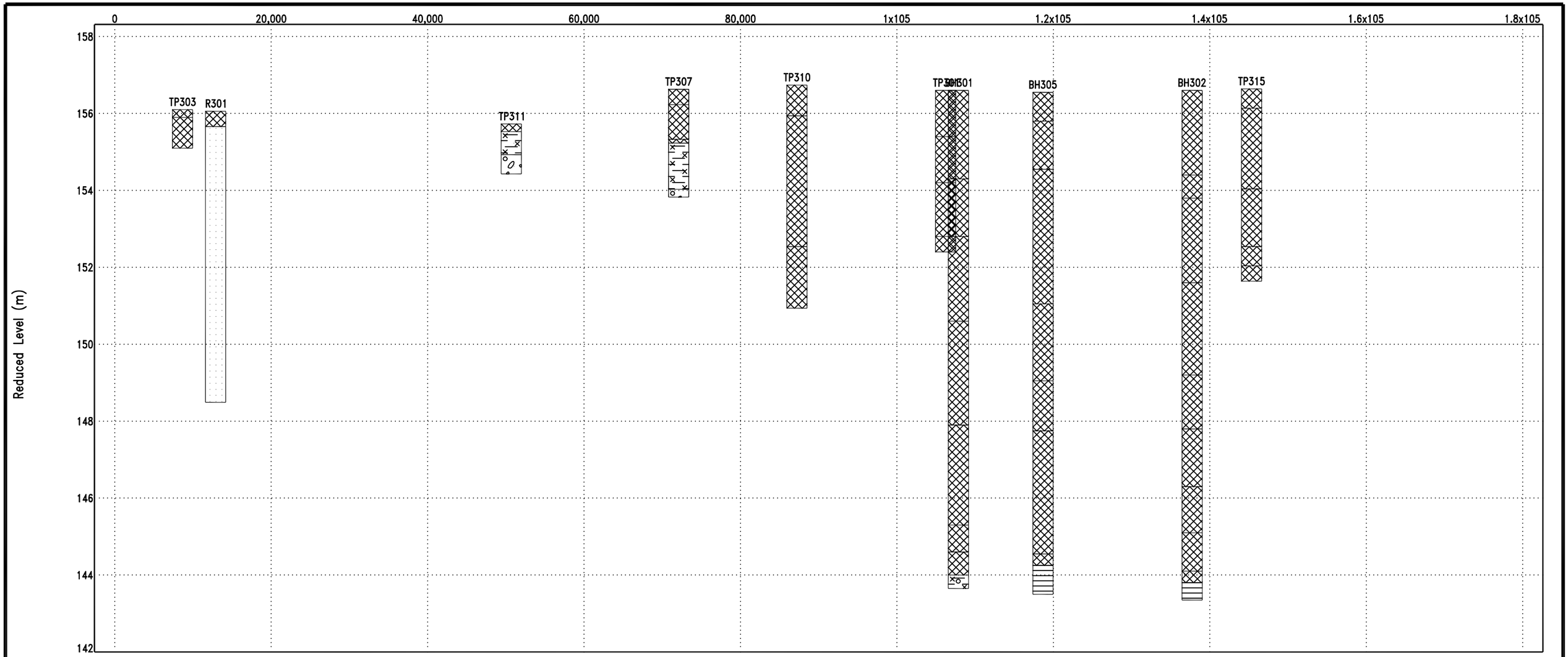
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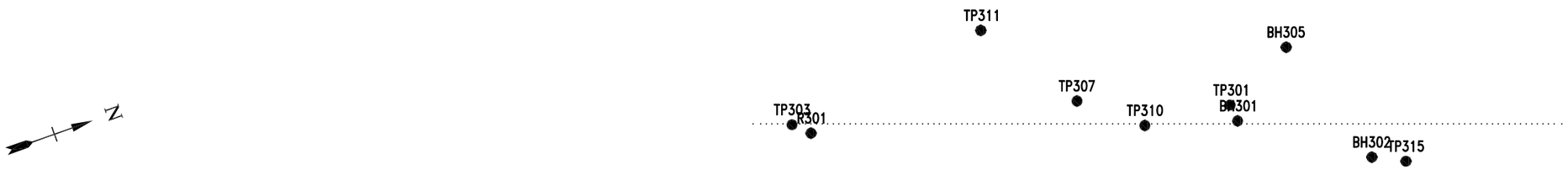
Client: Barmston Developments Limited

Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP - A3 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16





LITHOLOGY GRAPHICS

MADE GROUND

Silty gravelly CLAY

MUDSTONE

SANDSTONE

Silty sandy CLAY

Sandy GRAVEL

JPG (Leeds) Ltd

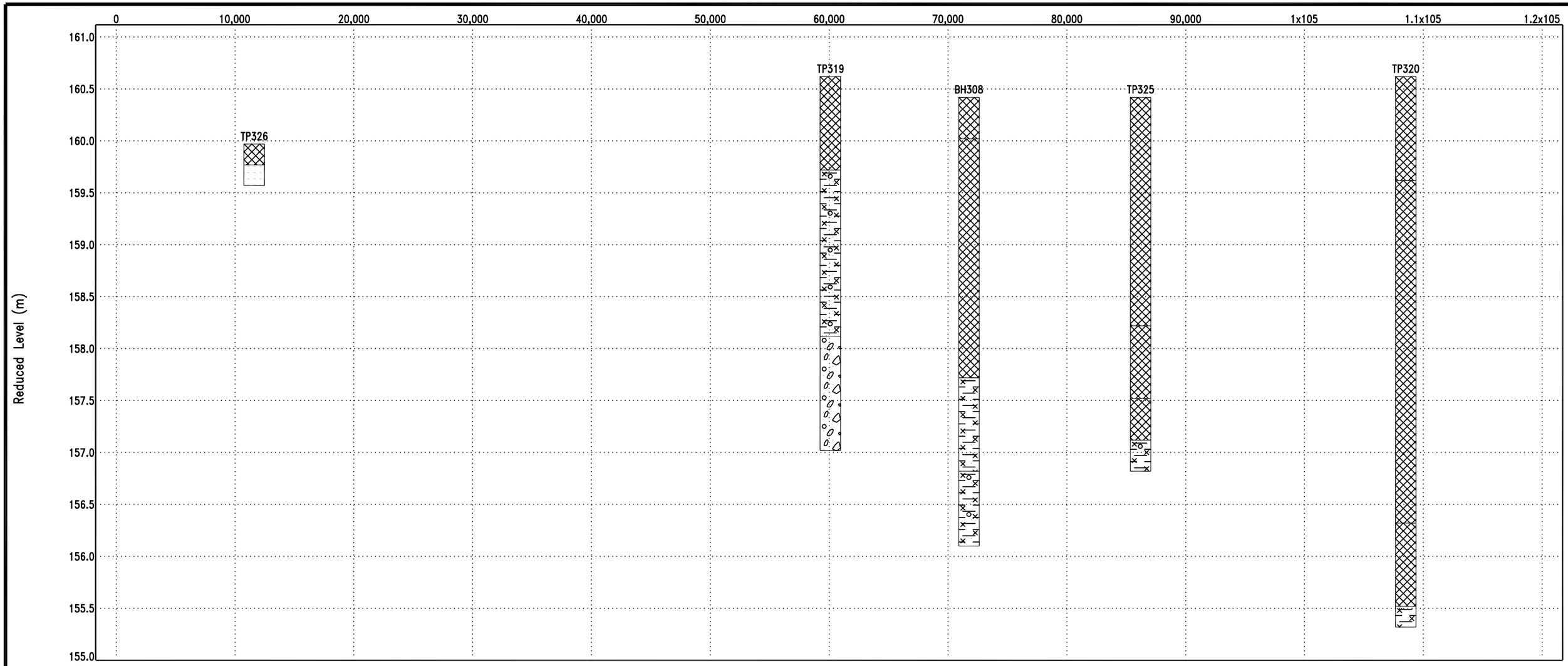
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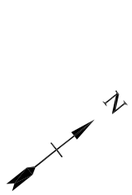
Client: Barmston Developments Limited

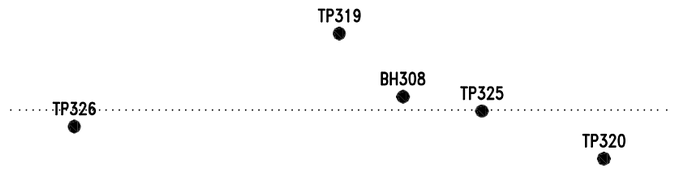
Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP – A3 4776 – TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16







LITHOLOGY GRAPHICS

MADE GROUND | Silty sandy CLAY | Silty sandy gravelly CLAY | Sandy GRAVEL | SANDSTONE

JPG (Leeds) Ltd

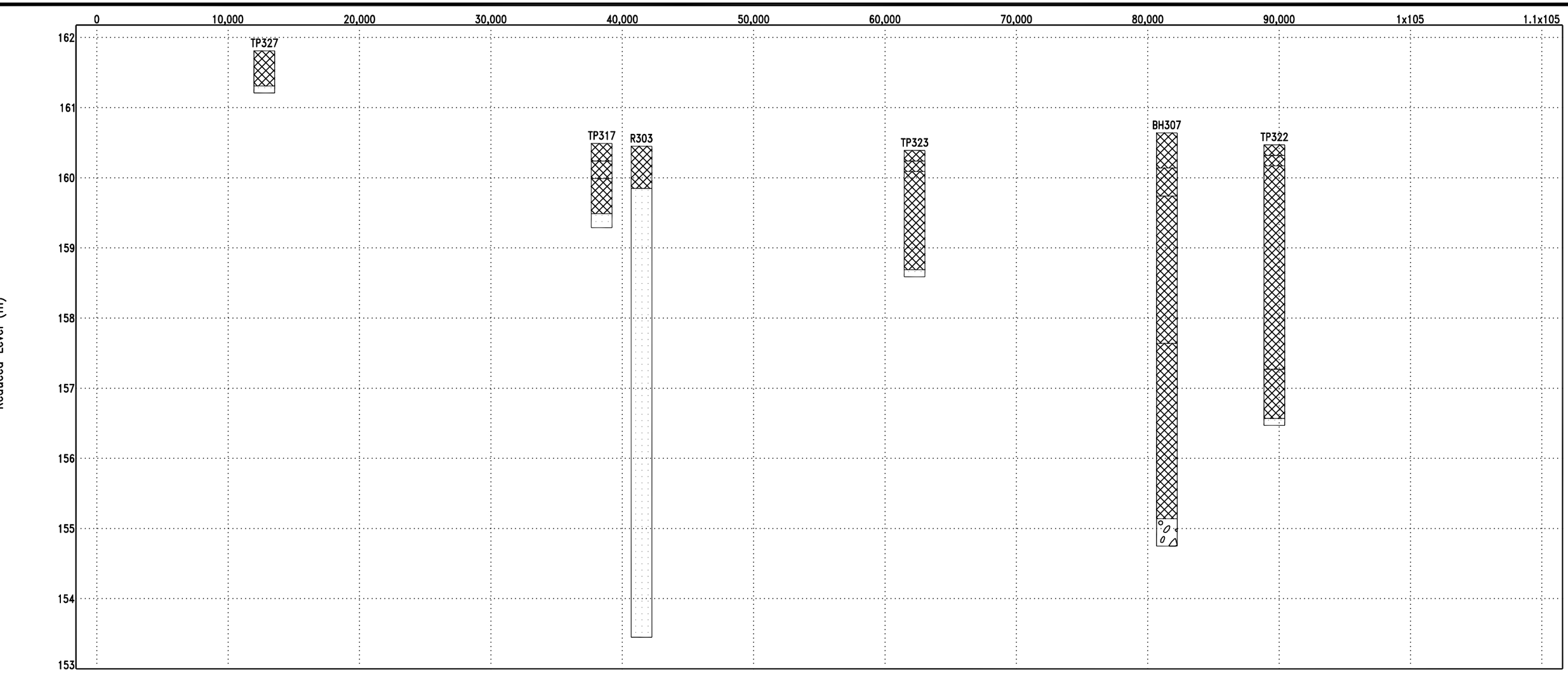
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Client: Barmston Developments Limited

Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP – A3 4776 – TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16





LITHOLOGY GRAPHICS

MADE GROUND

Sandy GRAVEL

SANDSTONE

JPG (Leeds) Ltd

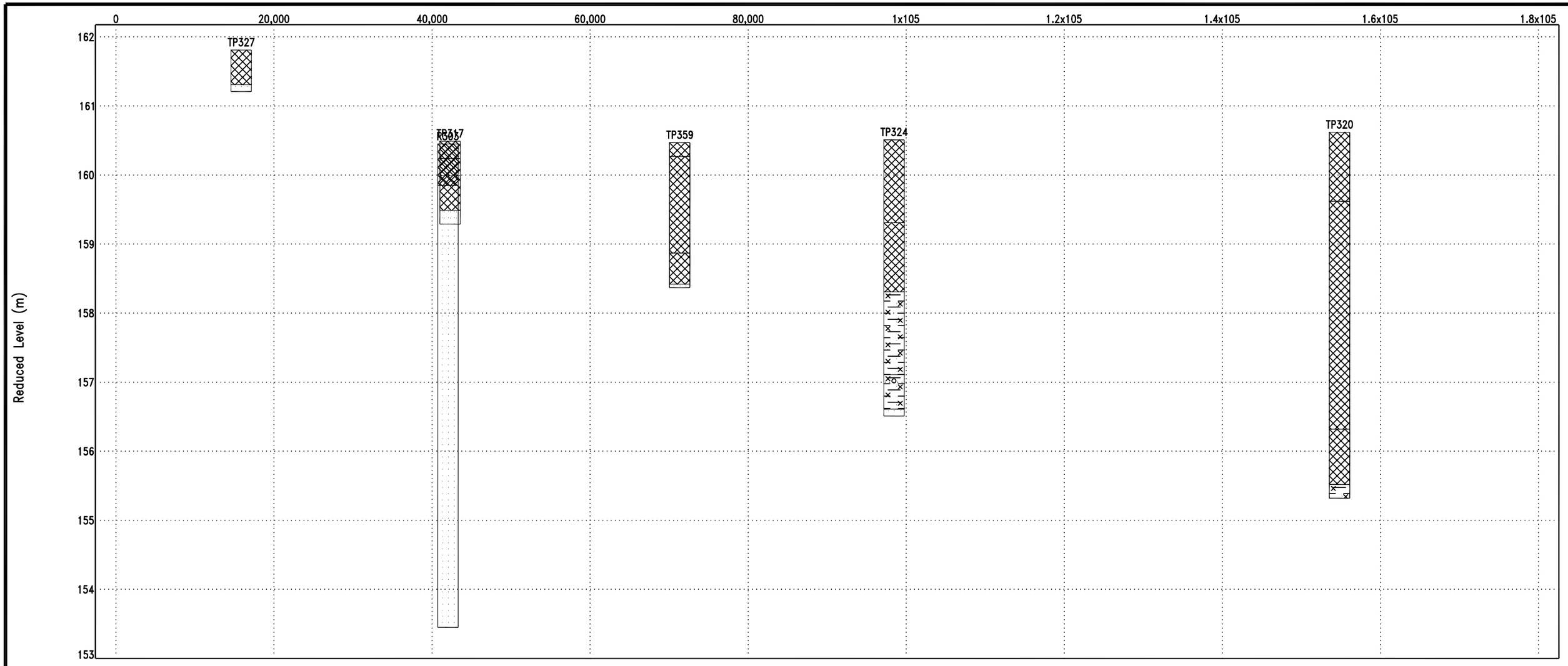
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Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP - A3 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16





LITHOLOGY GRAPHICS

MADE GROUND

SANDSTONE

Silty sandy CLAY

Silty sandy gravelly CLAY

JPG (Leeds) Ltd

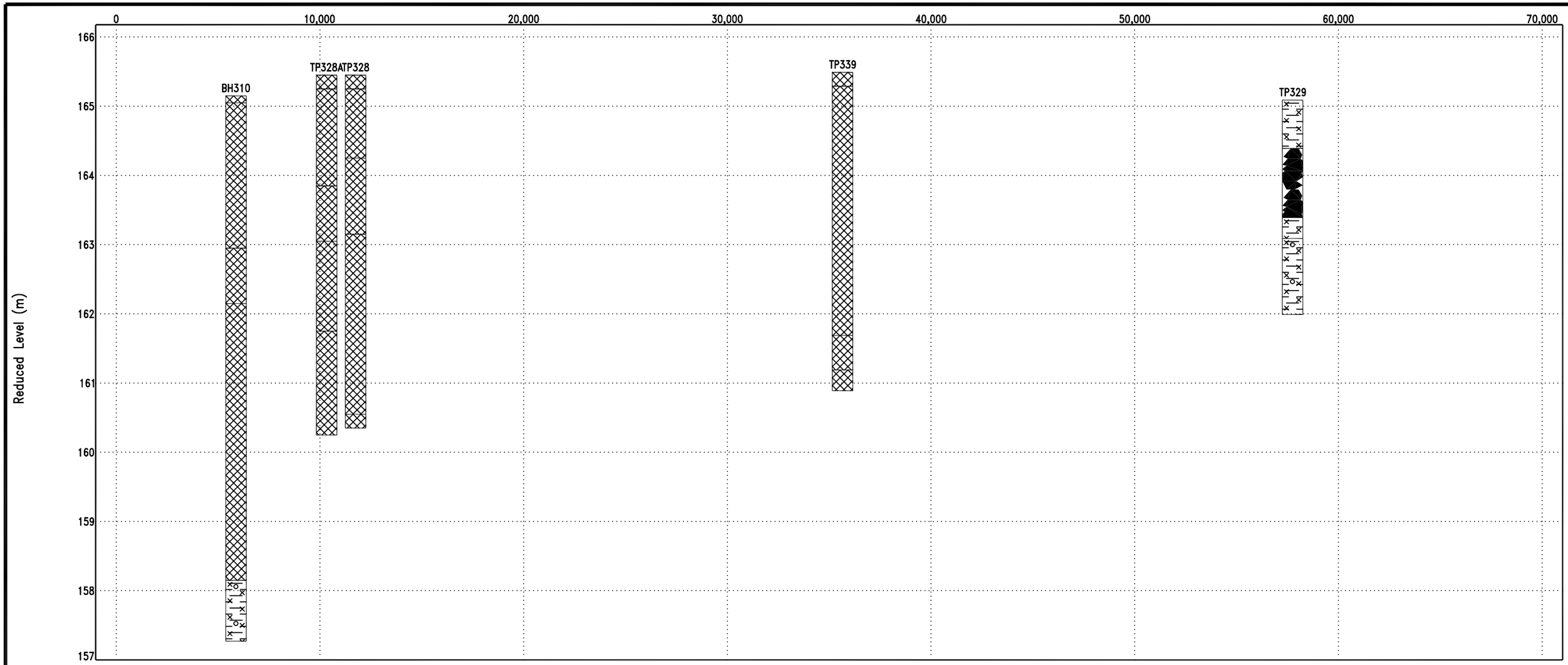
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Client: Barmston Developments Limited

Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP - A3 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16





LITHOLOGY GRAPHICS

MADE GROUND | Silty gravelly CLAY | Silty sandy CLAY | COAL | Silty CLAY

JPG (Leeds) Ltd

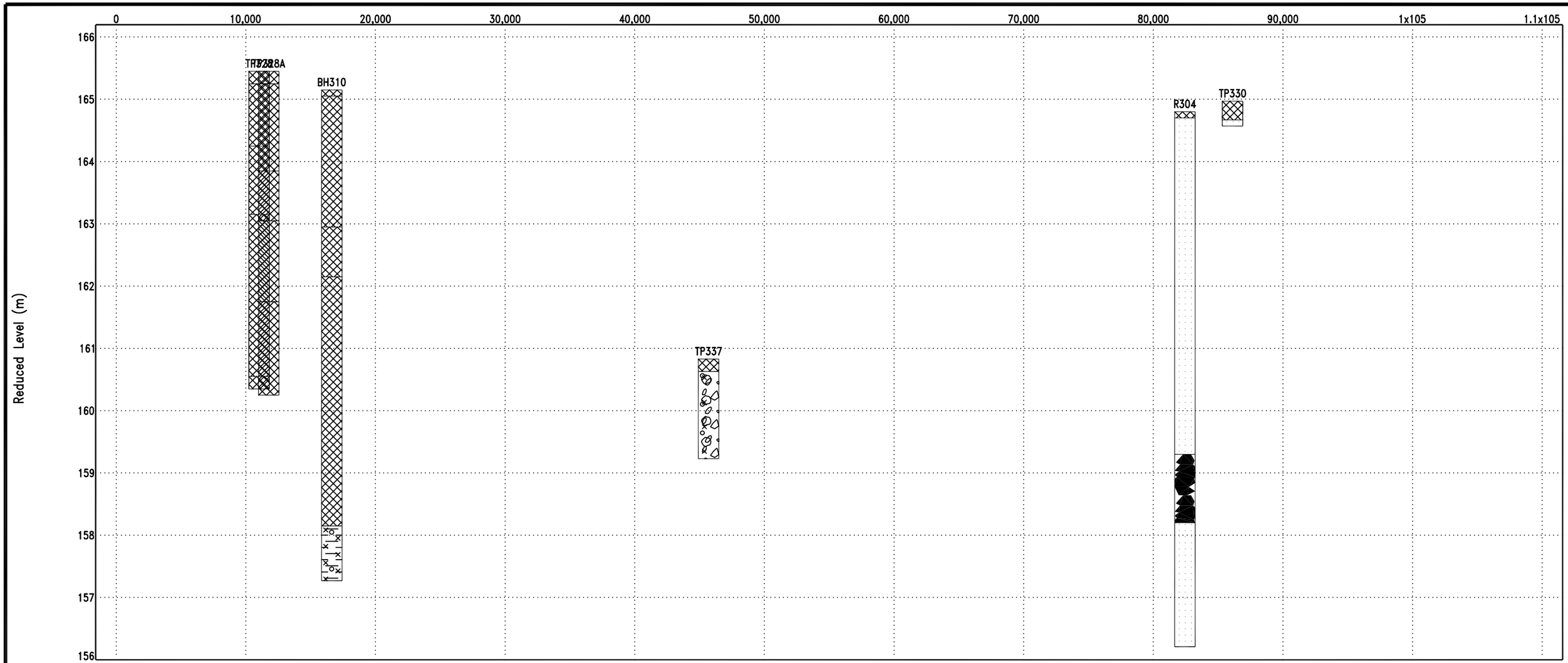
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Project: Wentworth Way, Tankersley

Number: 4776

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LITHOLOGY GRAPHICS

MADE GROUND | Silty gravelly CLAY | SANDSTONE | COAL | Silty cobbly GRAVEL

JPG (Leeds) Ltd

SUBSURFACE SECTION Unit 3 – Section 2

Client: Barmston Developments Limited

Project: Wentworth Way, Tankersley

Number: 4776

AGS3 LITHOLOGY SITEMAP – A3 4776 – TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 30/6/16

Appendix B Exploratory Hole Logs

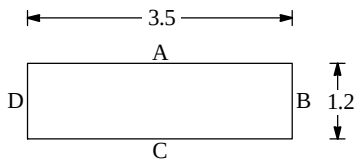
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP301
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.60	E 433,424,734.0 N 399,913,023.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.80	D			155.40		(1.20) 1.20	MADE GROUND: Firm occasionally soft dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and coal.		
				154.20		(1.20) 2.40	MADE GROUND: Dark grey slightly clayey sandy gravel, cobbles and boulders. Gravel is fine to coarse angular of mostly mudstone and ironstone with rare concrete, terram, rubber and metal.		
				152.80		(1.40) 3.80	MADE GROUND: Very soft dark grey silty clay.		
				152.40		(0.40) 4.20	MADE GROUND: Firm grey slightly sandy silty gravelly clay. Gravel is fine to coarse angular tabular of mostly mudstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

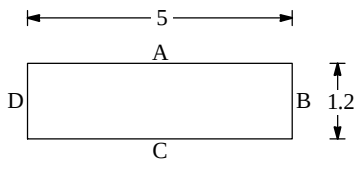
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP302
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.82	E 433,474,402.0 N 399,850,133.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
1.20	DB			153.62		(3.20) 3.20	MADE GROUND: Firm dark grey slightly sandy gravelly silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular tabular of mostly mudstone and carbonaceous mudstone with occasional sandstone and coal. Isolated boulder of coal at 1.00m.		
4.20	DB			151.12		(2.50) 5.70	MADE GROUND: Dark grey slightly clayey sandy gravel. Gravel is fine to coarse angular tabular of mostly mudstone with occasional sandstone and ironstone. Tarmac with roots.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

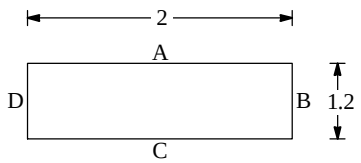
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP303**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.10	E 433,396,149.0 N 399,819,654.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.90		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
0.60	DB			155.10		(0.80) 1.00	MADE GROUND: Brown slightly clayey slightly sandy gravel, cobbles and boulders. Gravel is fine to coarse angular tabular of siltstone and fine sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

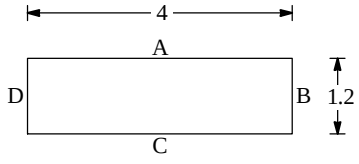
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP304**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.10	E 433,349,362.0 N 399,907,613.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.90		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
0.50	D			155.10		(0.80) 1.00	MADE GROUND: Firm dark grey slightly gravelly sandy silty clay. Gravel is fine to coarse angular of mostly mudstone, coal and brick with occasional burnt red shale. Land drain severed at 1.00m.		
1.40	DB			153.30		(1.80) 2.80	Firm brown and grey slightly sandy silty CLAY.		
3.00	D			152.70		(0.60) 3.40	Brown and grey slightly sandy slightly silty GRAVEL. Gravel is fine to coarse angular tabular of mudstone and siltstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

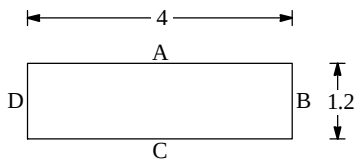
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP305**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.57	E 433,408,548.0 N 399,943,617.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(1.10)	MADE GROUND: Firm dark grey slightly sandy gravelly silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mostly mudstone and carbonaceous mudstone.		
				155.47		1.10			
						(5.00)	MADE GROUND: Dark grey occasionally stained orange brown slightly sandy clayey silty gravel, cobbles and boulders. Gravel is fine to coarse angular of mostly mudstone and carbonaceous mudstone with occasional coal and ironstone. Becoming damp at 1.50m, inflow at 6.00m.		
				150.47		6.10			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Inflow at 6.00m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

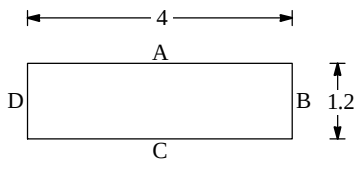
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP306**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.73	E 433,381,720.0 N 399,930,532.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.40	D			156.03		(0.70) 0.70	MADE GROUND: Firm dark grey slightly sandy gravelly silty clay. Gravel is fine to coarse angular of mudstone and carbonaceous mudstone.		
2.00	D			153.83		(2.20) 2.90	MADE GROUND: Dark grey slightly clayey silty sandy gravel, cobbles and boulders. Gravel is fine to coarse angular of mostly mudstone and carbonaceous mudstone with frequent coal.		
3.50	D			152.93		(0.90) 3.80	Firm brown mottled grey slightly sandy silty CLAY.		
				152.53		(0.40) 4.20	Brown sandy cobbly GRAVEL with numerous boulders. Gravel is fine to coarse angular of mostly siltstone and fine sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

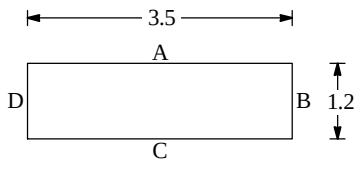
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP307
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.63	E 433,412,448.0 N 399,881,182.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	DB			156.23		(0.40) 0.40	MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly mudstone and carbonaceous mudstone with occasional coal.		
						(0.90)	MADE GROUND: Brown and red sandy gravelly clay with medium cobble content. Gravel is fine to coarse angular of mostly sandstone and brick.		
				155.33		1.30			
				155.23		1.40	MADE GROUND: Dark brown slightly sandy silty clay with frequent rootlets (possible buried topsoil).		
1.60	D					(1.20)	Firm light orange brown and grey slightly sandy silty CLAY.		
				154.03		2.60			
				153.83		2.80	Brown slightly sandy GRAVEL. Gravel is fine to coarse angular tabular of siltstone and fine sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

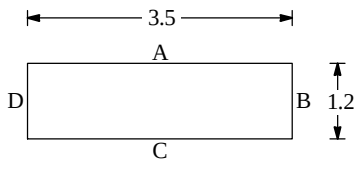
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP308**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.63	E 433,440,580.0 N 399,832,623.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	D			155.43		(1.20) 1.20	MADE GROUND: Stiff dark grey and brown slightly sandy gravelly silty clay. Gravel is fine to coarse angular of mostly mudstone and sandstone with occasional brick and coal.		
2.00	DB			154.03		(1.40) 2.60	MADE GROUND: Dark grey slightly clayey slightly sandy gravel. Gravel is fine to coarse angular of mudstone.		
				151.03		(3.00) 5.60	MADE GROUND: Dark grey stained yellow and brown slightly clayey slightly sandy slightly silty gravel, cobbles and boulders. Gravel is fine to coarse angular of mudstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

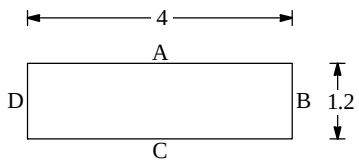
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP309**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.80	E 433,438,876.0 N 399,871,414.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.00		(1.80) 1.80	MADE GROUND: Dark grey (damp) slightly clayey slightly sandy gravel, cobbles and rare boulders. Gravel is fine to coarse angular of mudstone with rare coal.		
2.50	DB			151.90		(3.10) 4.90	MADE GROUND: Dark grey (damp) slightly sandy clayey gravel. Gravel is fine to coarse angular of mudstone with rare coal and whole brick.		
5.00	D			151.70		5.10	Stiff orange brown and grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular of fine sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

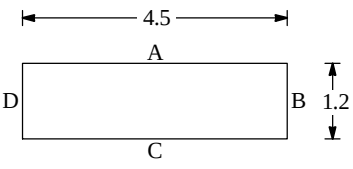
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP310**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	156.74	E 433,422,641.0 N 399,893,605.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.40	D			155.94		(0.80) 0.80	MADE GROUND: Grey stained yellow and brown slightly clayey slightly sandy silty gravel. Gravel is fine to coarse angular of mudstone.		
1.50	DB			152.54		(3.40) 4.20	MADE GROUND: Dark grey sandy silty very clayey gravel with medium cobble content, low boulder content and rare rubber matting. Gravel is fine to coarse of mostly mudstone and sandstone.		
4.50	D			150.94		(1.60) 5.80	MADE GROUND: Dark grey and red ashy slightly clayey very sandy gravel with medium cobble content. Gravel is fine to coarse angular of mudstone, coal and burnt red shale.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

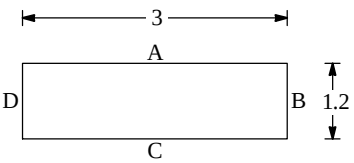
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP311
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	155.73	E 433,390,491.0 N 399,866,281.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.53		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
						(0.60)	Stiff orange brown mottled grey slightly sandy silty CLAY.		
				154.93		0.80			
						(0.50)	Brown stained orange brown slightly sandy GRAVEL. Gravel is fine to coarse angular tabular of siltstone and fine sandstone.		
				154.43		1.30			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

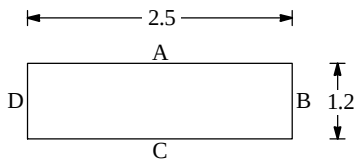
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP312**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	155.79	E 433,416,828.0 N 399,840,809.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.59		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
						(0.80)	Firm orange brown and grey slightly sandy silty CLAY.		
				154.79		1.00			
						(0.70)	Stiff orange brown and grey slightly sandy silty CLAY.		
				154.09		1.70			
						(0.60)	Brown and grey slightly sandy GRAVEL and cobbles. Gravel is fine to coarse angular tabular of siltstone and fine sandstone.		
				153.49		2.30			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

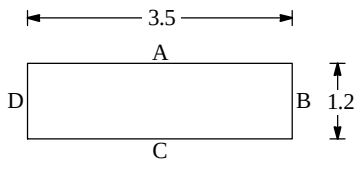
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP313**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 11-04-16	155.64	E 433,383,464.0 N 399,902,051.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.44		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
						(1.10)	Stiff orange brown mottled grey silty CLAY.		
				154.34		1.30			
						(1.20)	Grey stained orange brown very clayey cobbly GRAVEL. Gravel is fine to coarse angular of mudstone.		
				153.14		2.50			
						(1.10)	Grey and brown slightly sandy cobbly GRAVEL. Gravel is fine to coarse angular tabular of siltstone.		
				152.04		3.60			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

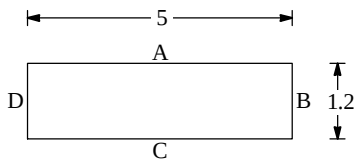
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP314**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	156.70	E 433,486,982.0 N 399,876,048.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				154.90		(1.80) 1.80	MADE GROUND: Firm brown and grey slightly gravelly slightly sandy silty clay with medium cobble content and low boundler content. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and ironstone. Timber sleeper at 1.60m with creosote odour.		
1.00	DB			154.30		(0.60) 2.40	MADE GROUND: Firm brown slightly sandy gravelly silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of sandstone, brick and coal. Occasional cobbles of coal.		
2.00	DB			153.10		(1.20) 3.60	MADE GROUND: Firm dark grey and brown gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone, sandstone and coal. Occasional cobbles of coal.		
				151.10		(2.00) 5.60	MADE GROUND: Dark greyish brown ashy sandy gravel and cobbles. Gravel is fine to coarse angular of mudstone and coal.		
4.00	D								

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

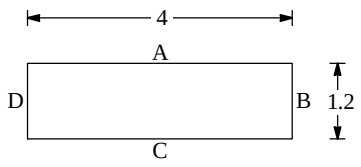
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP315
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	156.64	E 433,449,602.0 N 399,945,700.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				156.14		(0.50) 0.50	MADE GROUND: Brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly mudstone and coal.		
1.50	D			154.04		(2.10) 2.60	MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, coal and ironstone. Seepage at 1.00m.		
				152.54		(1.50) 4.10	MADE GROUND: Firm brown and greyish brown slightly gravelly slightly sandy silty clay with frequent cobbles and occasional boulders. Gravel is fine to coarse angualr of mostly sandstone. 2No boulders 0.50m x 0.40m x 0.20m.		
				152.04		(0.50) 4.60	MADE GROUND: Firm dark grey and brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, sandstone and brick.		
				151.64		(0.40) 5.00	MADE GROUND: Dark grey and reddish brown ashy slightly clayey sandy gravel. Gravel is fine to coarse angular of mudstone and sandstone with a trace of pottery and glass bottle.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

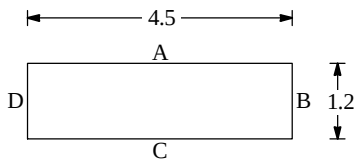
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP316**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	156.67	E 433,453,858.0 N 399,900,642.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.80	DB			155.37		(1.30) 1.30	MADE GROUND: Firm dark grey gravelly slightly sandy silty clay with occasional cobbles. Gravel is fine to coarse angular of mudstone and coal.		
1.50	DB			154.77		(0.60) 1.90	MADE GROUND: Firm brown gravelly slightly sandy silty clay with medium cobble content. Gravel is fine to coarse angular od sandstone with a trace of brick and coal.		
				154.07		(0.70) 2.60	MADE GROUND: Brown sandy gravel, cobbles and boulders. Gravel is fine to coarse angular of fine sandstone.		
3.00	DB			151.77		(2.30) 4.90	MADE GROUND: Dark grey slightly clayey sandy gravel. Gravel is fine to coarse angular of mostly mudstone with rare coal.		
5.10	D			150.77		(1.00) 5.90	MADE GROUND: Soft and very soft dark grey slightly sandy silty clay with occasional gravel. Sand and gravel is coal.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

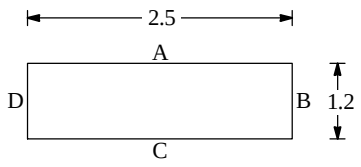
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP317
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.49	E 433,331,230.0 N 399,790,039.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.24		0.25	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
0.35	D			159.99		0.50	MADE GROUND: Stiff brown speckled white slightly sandy silty clay.		
				159.49		(0.50) 1.00	MADE GROUND: Firm dark brown slightly sandy gravelly silty clay. Gravel is fine to coarse angular of mostly mudstone, carbonaceous mudstone and coal.		
				159.29		1.20	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

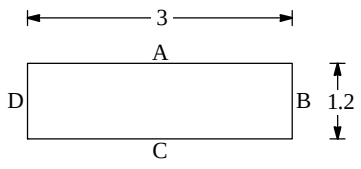
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP318**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.40	E 433,312,774.0 N 399,831,391.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.75)	MADE GROUND: Brown sandy gravel, cobbles and boulders. Gravel is fine to coarse angular tabular of sandstone.		
				159.65		0.75			
				159.60		0.80	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

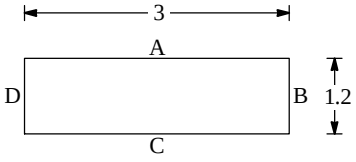
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP319**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.62	E 433,284,909.0 N 399,879,239.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.60	DB			159.72		(0.90) 0.90	MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly mudstone and carbonaceous mudstone with rare ocal and brick.		
1.30	DB			158.12		(1.60) 2.50	Stiff orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular tabular of sandstone.		
3.00	DB			157.02		(1.10) 3.60	Orange brown and grey slightly sandy GRAVEL. Gravel is fine to coarse angular of sandstone. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

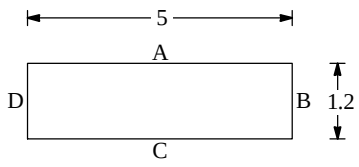
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP320
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.62	E 433,332,969.0 N 399,902,877.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				159.62		(1.00) 1.00	MADE GROUND: Brown gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
2.00	DB			156.32		(3.30) 4.30	MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel comprises mudstone, sandstone and trace of brick. Reinforced concrete post at 2.00m.		
				155.52		(0.80) 5.10	MADE GROUND: Firm dark grey and brown slightly sandy silty clay with numerous roots and organic material (tree trunk and grass) and rare gravel of brick (probable buried topsoil).		
5.20	D			155.32		5.30	Firm grey and blueish brown slightly sandy silty CLAY with occasional rootlets.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

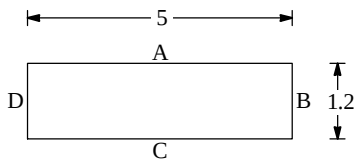
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP321
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.49	E 433,358,856.0 N 399,856,129.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				157.79		(2.70) 2.70	MADE GROUND: Firm dark grey gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone and coal.		
				157.09		(0.70) 3.40	MADE GROUND: Dark grey slightly gravelly slightly sandy silty clay with frequent roots (probable buried topsoil).		
				156.49		(0.60) 4.00	Stiff orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular tabular of sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

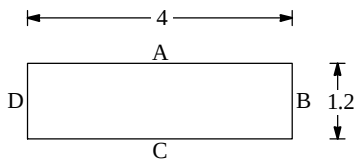
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP322
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.47	E 433,382,040.0 N 399,807,375.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.32		0.15	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
				160.17		0.30	MADE GROUND: Orange brown sandy gravel. Gravel is fine to coarse angular of limestone.		
1.20	DB					(2.90)	MADE GROUND: Firm and stiff dark grey gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and coal.		
				157.27		3.20			
						(0.70)	MADE GROUND: Brown slightly clayey sandy gravel with medium cobble content and low boulder content and rare plastic. Gravel is fine to coarse angular of sandstone.		
				156.57		3.90			
				156.47		4.00	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

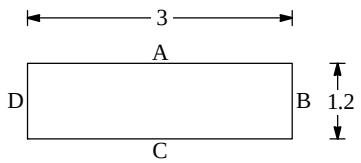
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP323
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.39	E 433,356,889.0 N 399,795,353.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.24		0.15	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
				160.09		0.30	MADE GROUND: Orange brown sandy gravel. Gravel is fine to coarse angular of limestone.		
						(1.40)	MADE GROUND: Firm and stiff dark grey gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and carbonaceous mudstone.		
				158.69		1.70			
				158.59		1.80	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

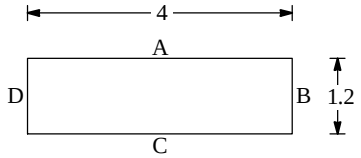
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP324
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.51	E 433,337,490.0 N 399,845,879.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				159.31		(1.20) 1.20	MADE GROUND: Dark grey gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and siltstone with rare coal.		
2.00	DB			158.31		(1.00) 2.20	MADE GROUND: Soft (wet) brown slightly sandy gravelly silty clay with numerous dark grey organic material (grass, roots and twigs) (probable buried topsoil)		
3.20	DB			157.11		(1.20) 3.40	Stiff orange brown mottled grey slightly sandy silty CLAY.		
				156.61		(0.50) 3.90	Stiff orange brown and grey gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular tabular of siltstone and sandstone.		
				156.51		4.00	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good, but poor from 1.20m to 2.20m



GENERAL REMARKS

Seepages of perched groundwater between 1.20m and 2.20m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

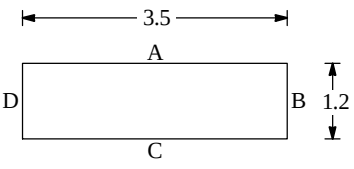
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP325**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	160.42	E 433,312,258.0 N 399,890,836.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(2.20)	MADE GROUND: Firm and stiff dark grey and brown gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone, cabonaceous mudstone, sandstone, brick and rare coal.		
				158.22		2.20			
						(0.70)	MADE GROUND: Stiff brown and grey very gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and sandstone.		
				157.52		2.90			
						(0.40)	MADE GROUND: Stiff dark grey gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone.		
				157.12		3.30			
				156.82		3.60	Firm and stiff orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular tabular of sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

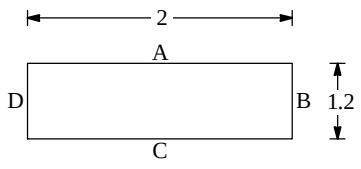
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP326**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	159.97	E 433,268,046.0 N 399,830,700.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				159.77		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
				159.57		0.40	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

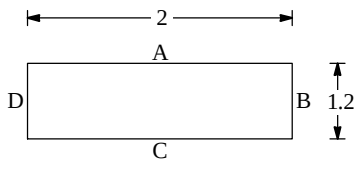
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP327
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	12-04-16 12-04-16	161.81	E 433,317,991.0 N 399,764,696.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.50)	MADE GROUND: Brown slightly clayey sandy gravel and cobbles. Gravel is fine to coarse angular of limestone, sandstone and rare coal.		
				161.31		0.50			
				161.21		0.60	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

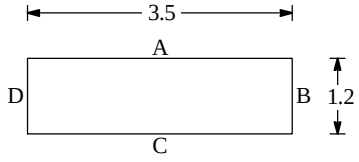
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP328**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.45	E 433,202,590.0 N 399,719,482.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.25		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
0.70	D					(1.00)	MADE GROUND: Dark grey slightly sandy gravel. Gravel is fine to coarse angular of mudstone and coal.		
				164.25		1.20			
1.90	DB			163.15		(1.10) 2.30	MADE GROUND: Dark grey slightly clayey sandy gravel. Gravel is fien to coarse angular of mudstone with rare coal and ironstone.		
2.60	DB			160.55		(2.60) 4.90	MADE GROUND: Firm orange brown mottled grey slightly sandy silty clay.		
				160.35		5.10	MADE GROUND: Dark grey gravel. Gravel is fine to coarse angular of coal. Inflow at 5.10m.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Inflow at 4.90m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

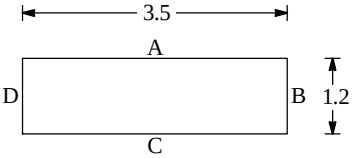
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP328A**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.45	E 433,205,132.0 N 399,719,482.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.25		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
0.80	D					(1.40)	MADE GROUND: Dark grey slightly gravelly sandy gravel. Gravel is fine to coarse angular of mudstone and coal.		
				163.85		1.60			
				163.05		(0.80) 2.40	MADE GROUND: Firm orange brown mottled grey slightly sandy silty clay.		
2.60	D					(1.30)	MADE GROUND: Dark grey slightly clayey sandy gravel. Gravel is fine to coarse angular of mudstone and coal.		
				161.75		3.70			
				160.25		(1.50) 5.20	MADE GROUND: Firm orange brown and grey slightly sandy silty clay. Land drain severed at 4.30m.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

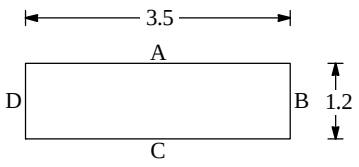
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP329**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.09	E 433,181,908.0 N 399,761,010.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.39		(0.70) 0.70	Firm brown slightly sandy silty CLAY.		
				163.39		(1.00) 1.70	Dark grey and black COAL. Recovered as sandy fine to coarse angular gravel and cobbles.		
				163.09		2.00	Firm grey brown very thinly laminated silty CLAY.		
				161.99		(1.10) 3.10	Stiff dark grey very thinly laminated gravelly silty CLAY. Gravel is fine to coarse mudstone with rare coal and ironstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

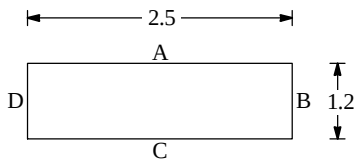
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP330**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	164.97	E 433,233,673.0 N 399,788,494.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.67		0.30	MADE GROUND: Brown sandy gravel, cobbles and boulders. Gravel is fine to coarse angular of sandstone.		
				164.57		0.40	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

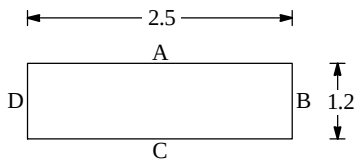
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP331
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.08	E 433,251,158.0 N 399,786,626.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.15	D			164.78		0.30	MADE GROUND: Brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly sandstone.		
1.00	DB					(1.70)	MADE GROUND: Frim brown and grey gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of sandstone.		
				163.08		2.00			
				162.98		2.10	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

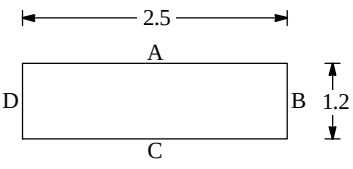
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP332
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	164.82	E 433,244,339.0 N 399,765,035.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.62		0.20	MADE GROUND: Brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly sandstone.		
				164.42		0.40	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		
0.90	DB			163.62		(0.80) 1.20	Brown sandy silty clayey GRAVEL. Gravel is fine to coarse angular tabular of siltstone.		
				163.52		1.30	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

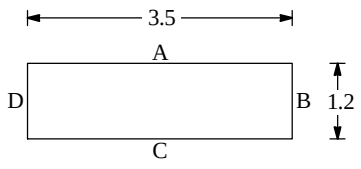
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP333
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	164.89	E 433,283,969.0 N 399,764,873.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.69		0.20	MADE GROUND: Brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly sandstone.		
1.00	DB					(2.10)	MADE GROUND: Brown very clayey sandy gravel with medium cobble content. Gravel is fine to coarse angular of sandstone.		
				162.59		2.30			
				162.49		2.40	Strong brown SANDSTONE. Recovered as angular tabular gravel and cobbles. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

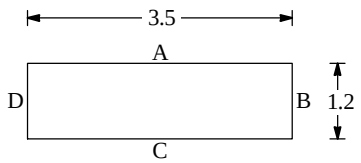
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP334
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	164.79	E 433,276,402.0 N 399,738,870.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.74		0.05	MADE GROUND: Brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly sandstone.		
				164.59		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
						(1.70)	MADE GROUND: Firm orange brown and grey slightly sandy very gravelly clay. Gravel is fine to coarse angular of sandstone with rare coal.		
				162.89		1.90			
						(3.60)	MADE GROUND: Firm grey mottled brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and carbonaceous mudstone.		
				159.29		5.50			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

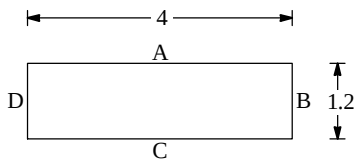
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP335
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.10	E 433,260,092.0 N 399,736,157.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.05		0.05	MADE GROUND: Grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
							MADE GROUND: Brown slightly clayey slightly sandy gravel with medium cobble and low boulder content. Gravel is fine to coarse angular of sandstone.		
1.90	DB					(5.35)			
				159.70		5.40			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

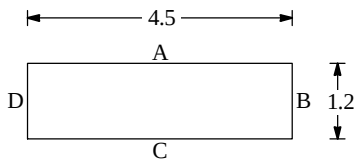
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP336
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	164.73	E 433,231,951.0 N 399,724,713.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.53		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
							MADE GROUND: Orange brown and grey sandy clayey gravel with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone, sandstone and coal. Becoming damp at 3.00m.		
1.20	DB								
						(5.30)			
3.50	DB								
				159.23		5.50			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

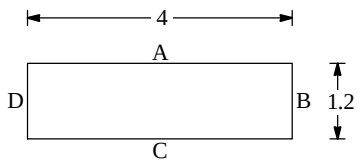
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP337
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	160.83	E 433,218,174.0 N 399,750,970.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.63		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
1.00	DB					(1.40)	Brown sandy silty clayey GRAVEL with medium cobble content. Gravel is fine to coarse angular of siltstone and rare ironstone. Difficult to excavate.		
				159.23		1.60			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

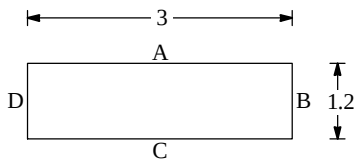
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP338**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	164.75	E 433,208,336.0 N 399,775,669.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.70		0.05	MADE GROUND: Grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
						(0.95)	Brown and grey slightly clayey sandy GRAVEL with medium cobble content and low boulder content. Gravel is fine to coarse angular of siltstone. Difficult to excavate.		
				163.75		1.00			

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

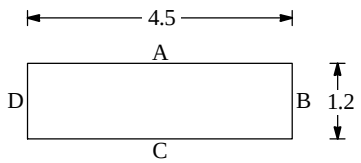
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP339
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.49	E 433,190,731.0 N 399,740,315.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.29		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
1.60	DB					(3.60)	MADE GROUND: Firm brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and ironstone. Timber sleeper at 1.60m with		
				161.69		3.80			
				161.19		(0.50) 4.30	MADE GROUND: Stiff grey and dark grey slightly gravelly silty clay. Gravel is fine to coarse angular of sandstone, coal and rare brick.		
				160.89		4.60	MADE GROUND: Dark grey sandy gravel. Gravel is fine to coarse angular of carbonaceous mudstone and coal.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

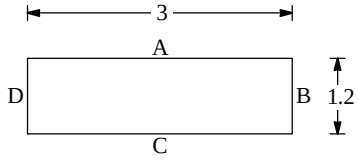
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP340**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	166.37	E 433,176,367.0 N 399,702,086.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.97		(0.40) 0.40	MADE GROUND: Firm brown and grey slightly gravelly slightly sandy silty clay.		
				165.27		(0.70) 1.10	MADE GROUND: Stiff orange brown mottled grey slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
1.30	D			164.37		(0.90) 2.00	MADE GROUND: Dark grey slightly sandy very clayey gravel. Gravel is fine to coarse angular of mudstone and occasional coal.		
				163.47		(0.90) 2.90	Firm orange brown mottled grey slightly sandy silty CLAY.		
				162.77		(0.70) 3.60	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				162.47		3.90	Firm grey slightly sandy silty CLAY.		
				162.27		4.10	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				161.97		4.40	Brown sandy GRAVEL. Gravel is fine to coarse angular of siltstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

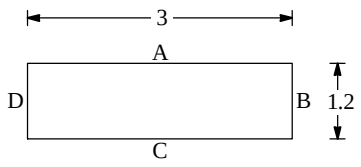
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP341**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.71	E 433,164,181.0 N 399,732,750.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.51		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
				165.11		(0.40) 0.60	MADE GROUND: Dark grey and brown (damp) slightly clayey sandy gravel. Gravel is fine to coarse angular of limestone and coal.		
				165.01		0.70	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				164.51		(0.50) 1.20	Firm grey very thinly laminated silty CLAY.		
				163.71		(0.80) 2.00	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				163.51		2.20	Firm grey very thinly laminated silty CLAY.		
				163.31		2.40	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				162.71		(0.60) 3.00	Firm grey slightly gravelly slightly sandy silty CLAY. Gravel is lithorelics of mudstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

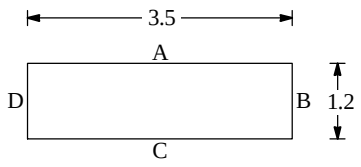
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP342**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 13-04-16	165.92	E 433,152,183.0 N 399,750,428.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.72		0.20	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
				165.12		(0.60) 0.80	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				164.72		(0.40) 1.20	Firm grey very thinly laminated silty CLAY.		
				163.72		(1.00) 2.20	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				163.32		(0.40) 2.60	Firm grey very thinly laminated silty CLAY.		
				163.22		2.70	Dark grey COAL. Recovered as fine to coarse angular gravel.		
				162.62		(0.60) 3.30	Stiff grey very thinly laminated slightly gravelly silty CLAY. Gravel is lithorelics of mudstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

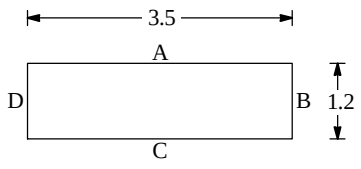
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP343**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.96	E 433,132,770.0 N 399,738,507.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.15	D			166.66		0.30	MADE GROUND: Brown (wet) clayey sandy gravel with medium cobble content. Gravel is fine to coarse angular of sandstone.		
				166.06		(0.60) 0.90	Firm dark grey very thinly laminated slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of carbonaceous mudstone (weathered organic rich mudstone, almost coal).		
1.00	D			165.76		1.20	Stiff brown and dark grey very thinly laminated slightly sandy silty CLAY.		
1.40	D			165.06		(0.70) 1.90	Brown and dark grey slightly sandy slightly clayey GRAVEL. Gravel is fine to coarse angular of siltstone. Difficult to excavate.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

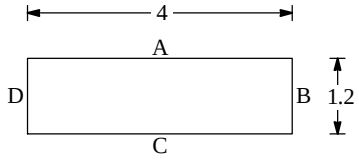
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP344
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.73	E 433,145,708.0 N 399,706,676.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.50)	MADE GROUND: Brown slightly sandy slightly clayey gravel with medium cobble content. Gravel is fine to coarse angular of sandstone.		
				166.23		0.50			
0.55	D			166.13		0.60	MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone and coal.		
1.00	DB					(0.90)	MADE GROUND: Firm brown mottled grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular tabular of siltstone and sandstone.		
				165.23		1.50			
1.70	D					(1.00)	Stiff orange brown slightly sandy silty CLAY.		
				164.23		2.50			
				164.03		2.70	Brown slightly sandy GRAVEL with medium cobble content. Gravel is fine to coarse angular tabular of siltstone and sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

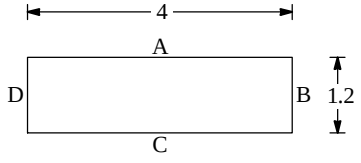
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP345**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.94	E 433,164,903.0 N 399,673,316.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.79		0.15	MADE GROUND: Soft dark brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
				166.24		(0.55) 0.70	MADE GROUND: Brown clayey sandy gravel, cobbles and boulders. Gravel is fine to coarse angular of sandstone.		
0.85	D			164.64		(1.60) 2.30	MADE GROUND: Firm dark grey and brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, coal and brick. Wall in east side of pit to 1.80m. 200mm diameter clay pipe at 2.10m.		
				163.84		(0.80) 3.10	Brown and grey slightly sandy slightly clayey GRAVEL. Gravel is fine to coarse angular tabular of siltstone and sandstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

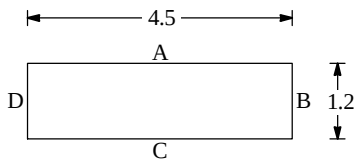
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP346**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.85	E 433,189,597.0 N 399,637,671.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.55		0.30	MADE GROUND: Soft dark greyish brown slightly sandy gravelly silty clay. Gravel is fine to coarse angular of sandstone.		
				165.65		(0.90) 1.20	MADE GROUND: Brown sandy clayey silty gravel with medium cobble content. Gravel is fine to coarse angular of sandstone.		
				164.95		(0.70) 1.90	Firm brown mottled grey slightly sandy gravelly silty CLAY. Gravel is fine to coarse angular tabular of siltstone and fine sandstone.		
				164.55		(0.40) 2.30	Firm orange brown mottled grey slightly sandy silty CLAY.		
				164.15		(0.40) 2.70	Stiff grey mottled brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of coal.		
				164.05		2.80	Dark grey clayey silty GRAVEL. Gravel is fine to coarse angular of carbonaceous mudstone and coal.		
				163.85		3.00	Firm orange brown mottled grey slightly sandy silty CLAY.		
				163.35		(0.50) 3.50	Orange brown and brown slightly sandy GRAVEL. Gravel is fine to coarse angular tabular of siltstone.		
				163.25		3.60	Very weak brown very thinly laminated SILTSTONE. Recovered as fine to coarse angular gravel and cobbles.		

Shoring/Support: None
Stability: Poor to 1.20m, good 1.20m to 3.60m



GENERAL REMARKS

Seepage of perched groundwater at 1.00m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

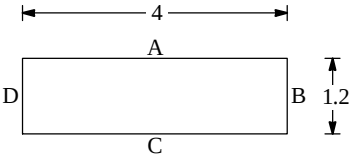
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP347
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.93	E 433,163,717.0 N 399,624,521.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.15	D			166.63		0.30	MADE GROUND: Soft dark brown and dark grey gravelly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone and sandstone.		
				166.03		(0.60) 0.90	MADE GROUND: Firm orange brown mottled grey slightly sandy gravelly silty clay. Gravel is angular tabular of siltstone and sandstone.		
1.20	D			165.23		(0.80) 1.70	Stiff brown and grey slightly sandy silty CLAY.		
				164.93		2.00	Orange brown and grey slightly sandy slightly clayey GRAVEL and COBBLES. Gravel is fine to coarse angular tabular of siltstone and fine sandstone.		
				164.83		2.10	Strong brown SILTSTONE and SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Seepage of perched groundwater at 1.30m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

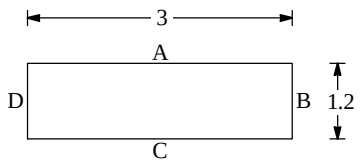
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP348**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	167.23	E 433,125,208.0 N 399,618,544.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				167.18		0.05	MADE GROUND: Soft dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
						(0.65)	Stiff orange brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of siltstone and sandstone.		
				166.53		0.70			
				166.38		0.85	Brown slightly sandy GRAVEL with high cobble content and medium boulder content. Gravel is fine to coarse angular of sandstone.		
				166.33		0.90	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Seepage of perched groundwater at 0.25m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

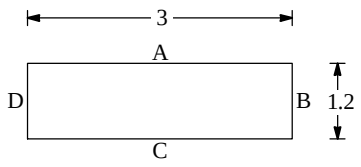
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP349**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.88	E 433,112,766.0 N 399,648,250.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.78		0.10	MADE GROUND: Soft dark brown slightly sandy silty clay with frequent rootlets.		
				166.43		(0.35) 0.45	Brown sandy clayey GRAVEL with high cobble content and medium boulder content. Gravel is fine to coarse angular of sandstone.		
				166.38		0.50	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

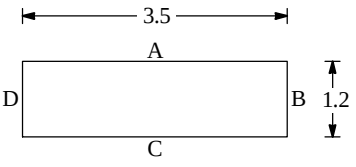
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP350
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	167.02	E 433,095,697.0 N 399,679,493.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.82		0.20	MADE GROUND: Soft dark brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
				166.52		0.50	Stiff brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of siltstone and sandstone.		
						(0.65)	Grey stained orange brown slightly sandy GRAVEL. Gravel is fine to coarse angular tabular of siltstone and sandstone.		
				165.87		1.15			
				165.82		1.20	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

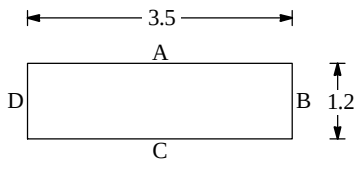
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP351
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.90	E 433,075,735.0 N 399,715,331.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10	D			166.70		0.20	MADE GROUND: Soft dark grey slightly gravelly slightly sandy silty clay with frequent roots. Gravel is fine to coarse angular of sandstone.		
				166.40		0.50	Stiff orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of sandstone.		
				166.25		0.65	Orange brown slightly clayey slightly sandy GRAVEL with high cobble content. Gravel is fine to coarse angular of sandstone.		
				166.20		0.70	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

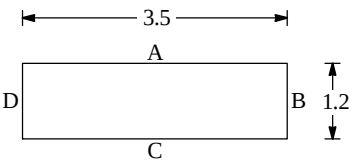
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP352**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.91	E 433,099,755.0 N 399,726,740.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.71		0.20	MADE GROUND: Soft dark grey slightly gravelly slightly sandy silty clay with frequent roots. Gravel is fine to coarse angular of sandstone.		
				166.31		(0.40) 0.60	Stiff brown and grey slightly sandy silty CLAY.		
				166.16		0.75	Brown and grey stained orange brown slightly sandy GRAVEL. Gravel is fine to coarse angular of sandstone.		
				166.11		0.80	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

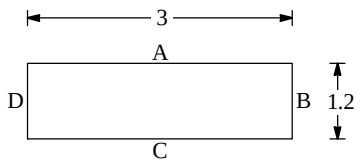
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP353
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.89	E 433,116,185.0 N 399,692,080.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10	D			166.69		0.20	MADE GROUND: Soft dark brown slightly gravelly sandy clay.		
				166.59		0.30	Stiff orange brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of sandstone.		
				166.54		0.35	Orange brown slightly sandy GRAVEL with high cobble content. Gravel is fine to coarse angular of sandstone.		
				166.49		0.40	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

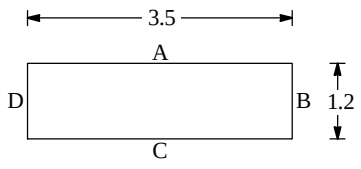
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP354
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.81	E 433,135,158.0 N 399,659,972.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.76		0.05	MADE GROUND: Soft dark brown slightly gravelly sandy clay.		
				166.46		0.35	Stiff orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of sandstone.		
				166.41		0.40	Orange brown slightly sandy GRAVEL with high cobble content. Gravel is fine to coarse angular of sandstone.		
				166.36		0.45	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

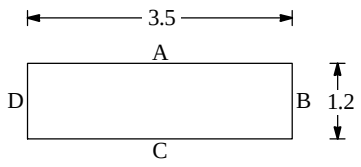
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP355**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.91	E 433,159,997.0 N 399,647,934.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.61		0.30	MADE GROUND: Soft dark brown slightly gravelly sandy clay.		
				165.91		(0.70) 1.00	MADE GROUND: Orange brown slightly clayey sandy gravel. Gravel is fine to coarse angular of sandstone.		
				165.41		(0.50) 1.50	Stiff orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of sandstone.		
				165.16		1.75	Stiff dark orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of siltstone and sandstone.		
				165.11		1.80	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

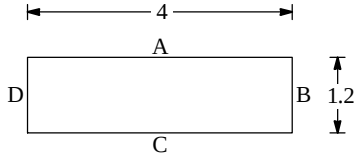
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP356
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.87	E 433,138,168.0 N 399,687,040.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.67		0.20	MADE GROUND: Soft dark brown slightly gravelly sandy clay.		
0.40	DB			166.17		(0.50) 0.70	Firm brown and grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of sandstone and mudstone.		
0.90	DB			165.67		(0.50) 1.20	Stiff orange brown mottled grey slightly sandy silty CLAY.		
				165.32		(0.35) 1.55	Brown slightly sandy GRAVEL with high cobble content. Gravel is fine to coarse angular of sandstone.		
				165.27		1.60	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

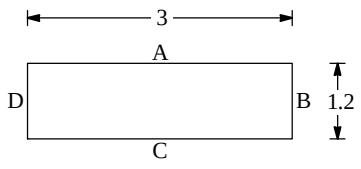
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP357
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	166.93	E 433,120,550.0 N 399,714,105.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				166.88		0.05	MADE GROUND: Soft dark brown slightly gravelly sandy clay.		
				166.73		0.20	Dark grey clayey GRAVEL. Gravel is fine to coarse angular of coal.		
						(0.50)	Stiff orange brown mottled grey slightly sandy silty CLAY.		
				166.23		0.70			
						(0.65)	Stiff orange brown mottled grey slightly gravelly slighty sandy silty CLAY. Gravel is fine to coarse angular tabular of siltstone and sandstone.		
				165.58		1.35			
				165.53		1.40	Strong brown SILTSTONE and SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

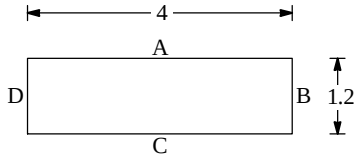
JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				**TP358**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	160.44	E 433,314,686.0 N 399,854,165.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.24		0.20	MADE GROUND: Dark brown sandy silty clay.		
				159.34		(0.90) 1.10	MADE GROUND: Firm dark brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, sandstone and brick.		
				158.74		(0.60) 1.70	Firm orange brown mottled grey slightly sandy silty CLAY.		
				158.04		(0.70) 2.40	Stiff orange brown and grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of mudstone and siltstone.		
				157.24		(0.80) 3.20	Grey and brown slightly sandy GRAVEL with high cobble content. Gravel is fine to coarse angular tabular of siltstone and mudstone.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

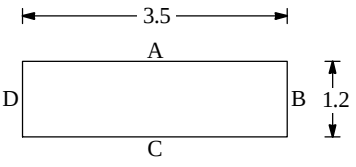
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CIVIL & STRUCTURAL ENGINEERING

TRIAL PIT LOG

Project				TP No
Wentworth Way, Tankersley				TP359
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	14-04-16 14-04-16	160.47	E 433,334,420.0 N 399,818,916.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result kPa		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.27		0.20	MADE GROUND: Brown sandy gravel with high cobble content. Gravel is fine to coarse angular of sandstone.		
						(1.40)	MADE GROUND: Dark grey slightly sandy slightly clayey gravel with medium cobble content and low boulder content. Gravel is fine to coarse angular of sandstone with occasional mudstone, coal and brick. Sandstone boulder 1.20m x 0.60m x 0.20m at 1.50m.		
				158.87		1.60			
1.80	DB					(0.45)	MADE GROUND: Firm dark grey slightly sandy gravelly silty clay. Gravel is fine to coarse angular of sandstone, mudstone, brick, coal and burnt red shale.		
				158.42		2.05			
				158.37		2.10	Strong brown SANDSTONE. No further penetration possible.		

Shoring/Support: None
Stability: Good



GENERAL REMARKS

Seepage of perched groundwater at 2.10m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:43.75	Client Barmston Developments Limited	Method/ Plant Used Tracked Excavator with a 1.20m wide toothed bucket	Logged By RM

TP VOG V9 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 8/7/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH301**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 12-04-16	156.60	E 433,428,605.0 N 399,913,392.0	
Contractor				Sheet
				1 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	D						MADE GROUND: Firm brown and dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and coal.		
1.00-1.45 1.00	DB	N11				(2.30)			
2.00-2.45 2.00	DB	N4		154.30		2.30			
							MADE GROUND: Very soft dark grey silty clay with rare gravel. Gravel is fine to coarse angular of mudstone and coal.		
3.00-3.45 3.00	DB	N4				(1.50)			
				152.80		3.80			
4.00-4.45 4.00	DB	N6					MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone and coal.		
5.00-5.45 5.00	DB	N6				(2.20)			
				150.60		6.00			
							MADE GROUND: Firm brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone.		
6.50-6.95 6.50	DB	N10				(2.70)			
8.00-8.45 8.00	DB	N14							
				147.90		8.70			
							MADE GROUND: Stiff brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, siltstone and fine sandstone. Boulder from 11.00m to 11.30m.		
9.50-9.95 9.50	DB	N17							

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH301**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	11-04-16 12-04-16	156.60	E 433,428,605.0 N 399,913,392.0	
Contractor				Sheet
				2 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				145.30		(2.60) 11.30	MADE GROUND: Stiff brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, siltstone and fine sandstone. Boulder from 11.00m to 11.30m. *(continued)*		
11.00- 11.45 11.00	DB	N44		144.60		(0.70) 12.00	MADE GROUND: Pink and red slightly sandy gravel. Gravel is fine to coarse angular of burnt red shale.		
				144.00		(0.60) 12.60	MADE GROUND: Stiff brown and grey slightly gravelly slightly sandy silty clay with medium cobble content and low boulder content. Gravel is fine to coarse angular of mudstone, siltstone and fine sandstone.		
12.85- 12.95 12.85	D	N50/ 60 mm		143.65		12.95	Stiff grey slightly gravelly silty CLAY. Gravel is fine to coarse angular of mudstone.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
11	11.3	0130		
12.3	12.6	0100		
12.6	12.85	0100		

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd

CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH302**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 14-04-16	156.60	E 433,446,206.0 N 399,938,850.0	
Contractor				Sheet
				1 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	D						MADE GROUND: Firm dark grey and brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and coal.		
1.00-1.45 1.00	DB	N6				(2.20)			
2.00-2.45 2.00	DB	N14		154.40		2.20			
				153.80		(0.60) 2.80	MADE GROUND: Firm brown mottled grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
3.00-3.45 3.00	DB	N8					MADE GROUND: Firm brown and grey slightly ashy slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, siltstone, sandstone rare brick and burnt red shale.		
4.00-4.45 4.00	DB	N16				(2.20)			
			1.1	151.60		5.00			
5.00-5.45 5.00	DB	N15					MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mostly mudstone, carbonaceous mudstone and coal.		
6.50-6.95 6.50	DB	N8				(2.40)			
				149.20		7.40			
8.00-8.45 8.00	DB	N5					MADE GROUND: Soft brown slightly sandy silty clay. Sand occurs in thin bands (2-3mm thick), the sand comprises coal.		
				147.80		(1.40) 8.80			
9.50-9.95 9.50	DB	N4				(1.50)	MADE GROUND: Very soft dark grey and brown slightly sandy clayey silt. Sand comprises coal (approx 20% coal).		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
2.6	2.8	0030		

GENERAL REMARKS

Perched groundwater encountered at 5.50m and 12.80m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

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CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH302**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	13-04-16 14-04-16	156.60	E 433,446,206.0 N 399,938,850.0	
Contractor				Sheet
				2 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				146.30		10.30			
10.50-10.95 10.50	DB	N15				(1.20)	MADE GROUND: Dark grey slightly clayey sand. Sand is coal (approx 50% coal).		
				145.10		11.50			
			2			(1.00)	MADE GROUND: Dark greyish brown slightly sandy clayey silt. Sand comprises coal and mudstone.		
12.00-12.45 12.00	DB	N5		144.10		12.50			
12.50 12.50	D		2	143.80		12.80	MADE GROUND: Soft brown and grey slightly sandy silty clay with a trace of gravel. Gravel comprises coal.		
13.00-13.25 13.00	D	N50/ 105 mm		143.35		13.25	Weak grey very thinly laminated MUDSTONE.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						12.8	13	0060			Perched groundwater encountered at 5.50m and 12.80m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

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CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH303**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	15-04-16 18-04-16	156.55	E 433,460,914.0 N 399,915,480.0	
Contractor				Sheet
				1 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				156.15		0.40	MADE GROUND: Brown gravelly clay. Gravel is fine to coarse angular of sandstone.		
				155.55		(0.60) 1.00	MADE GROUND: Brown sandy cobbly boulders of sandstone.		
1.00-1.45 1.00	DB	N14		154.55		(1.00) 2.00	MADE GROUND: Firm brown slightly gravelly slightly sandy silty clay with occasional cobbles.		
2.00-2.45 2.00	DB	N16		153.55		(1.00) 3.00	MADE GROUND: Firm orange brown mottled grey slightly sandy silty clay.		
3.00-3.45 3.00	DB	N11					MADE GROUND: Firm brown and dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and coal with rare brick.		
4.00-4.45 4.00	DB	N15							
						(3.50)			
5.00-5.45 5.00	DB	N12							
				150.05		6.50			
6.50-6.95 6.50	DB	N9	1			(1.00)	MADE GROUND: Firm (damp) brown and dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, sandstone and coal with rare brick.		
				149.05		7.50			
							MADE GROUND: Firm brownish grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone.		
8.00-8.45 8.00	DB	N9	1						
						(3.00)			
9.50-9.95 9.50	DB	N10							

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
0.4	1	0130		

GENERAL REMARKS

Perched groundwater encountered at 8.00m and 11.30m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH303**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	15-04-16 18-04-16	156.55	E 433,460,914.0 N 399,915,480.0	
Contractor				Sheet
				2 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
			▽2	146.05		10.50	MADE GROUND: Firm brownish grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone. *(continued)*		
11.00- 11.45 11.00	DB	N9	▽2	145.25		(0.80) 11.30	MADE GROUND: Soft grey. dark grey and brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and brick.		
12.00- 12.45 12.00	DB	N15		143.75		(1.50) 12.80	MADE GROUND: Firm (wet) grey. dark grey and brown slightly gravelly slightly sandy silty clay with occasional cobbles and boulders. Gravel is fine to coarse angular of mudstone.		
13.00- 13.45 13.00	DB	N33/ 105 mm		142.95		(0.80) 13.60	MADE GROUND: Stiff brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone.		
14.00- 14.11 14.00	D	N50/ 50 mm		142.44		(0.51) 14.11	Very weak grey very thinly laminated MUDSTONE. Recovered as slightly sandy silty gravel.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
12.6	12.8	0030		
13.7	14	0060		

GENERAL REMARKS

Perched groundwater encountered at 8.00m and 11.30m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH304**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	19-04-16 19-04-16	156.68	E 433,457,545.0 N 399,848,308.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	D						MADE GROUND: Firm dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone and a trace of coal.		
1.00-1.45 1.00	DB	N6				(2.20)			
2.00-2.45 2.00	DB	N8		154.48		2.20 (0.70)	MADE GROUND: Dark grey and red clayey sandy silty gravel. Gravel is fine to coarse angular of burnt red shale and mudstone.		
3.00-3.45 3.00	DB	N10		153.78		2.90 (1.10)	MADE GROUND: Dark grey mottled brown and red ashy slightly sandy slightly silty gravel. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, coal, brick and rare pottery.		
4.00-4.45 4.00	DB	N11		152.68		4.00	MADE GROUND: Dark grey slightly sandy slightly silty slightly clayey gravel. Gravel is fine to coarse of mudstone, coal and a trace of brick.		
5.00-5.45 5.00	DB	N13				(2.70)			
6.50-6.95 6.50	DB	N50/ 182 mm		149.98		6.70 (0.64)	Dense brown and orange brown slightly sandy GRAVEL. Gravel is fine to coarse angular tabular of siltstone and sandstone.		
7.20-7.34 7.20	D	N50/ 60 mm		149.34		7.34			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
6.95	7.2	0060		

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH305**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	20-04-16 21-04-16	156.55	E 433,416,790.0 N 399,929,079.0	
Contractor				Sheet
				1 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	D			155.80		(0.75) 0.75	MADE GROUND: Stiff dark brownish grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone and occasional coal.		
1.00-1.45 1.00	DB	N6		154.55		(1.25) 2.00	MADE GROUND: Soft dark grey gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, coal (20%-30%) and occasional sandstone.		
2.00-2.45 2.00	DB	N8					MADE GROUND: Firm dark grey gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, carbonaceous mudstone, coal (30%-40%) and occasional sandstone.		
3.00-3.45 3.00	DB	N11							
4.00-4.45 4.00	DB	N10				(3.50)			
5.00-5.45 5.00	DB	N8		151.05		5.50			
6.00-6.45 6.00	DB	N3				(2.00)	MADE GROUND: Very soft grey silty clay with occasional gravel. Gravel is fine to coarse angular of mudstone.		
7.50-7.95 7.50	DB	N6		149.05		7.50	MADE GROUND: Firm dark grey slightly gravelly silty clay. Gravel is fine to coarse angular of mudstone.		
9.00-9.45 9.00	DB	N6		147.75		(1.30) 8.80	MADE GROUND: Soft dark brownish grey silty clay.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH305**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	20-04-16 21-04-16	156.55	E 433,416,790.0 N 399,929,079.0	
Contractor				Sheet
				2 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(3.20)	MADE GROUND: Soft dark brownish grey silty clay. *(continued)*		
10.50- 10.95 10.50	DB	N3							
				144.55		12.00			
12.00- 12.40 12.00	DB	N50/ 139 mm		144.25		12.30	MADE GROUND: Stiff grey gravelly slightly sandy silty clay. Gravel comprises mudstone.		
						(0.75)	Very weak grey MUDSTONE. Recovered as fine to coarse angular gravel.		
12.80- 13.03 12.80	D	N50/ 85 mm		143.50		13.05			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
12.5	12.8	0060		

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

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CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH306**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	21-04-16 21-04-16	156.16	E 433,365,858.0 N 399,915,498.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				155.96		0.20	MADE GROUND: Grey and brown sandy gravel. Gravel comprises concrete and sandstone.		
				155.36		(0.60) 0.80	MADE GROUND: Firm grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone.		
0.90 1.00-1.45 1.00	D DB	N5		154.86		(0.50) 1.30	MADE GROUND: Soft dark brown slightly sandy slightly gravelly silty clay with many roots. Gravel is fine to coarse angular of mudstone, sandstone and coal (Buried Topsoil).		
2.00-2.45 2.00	DB	N28		153.36		(1.50) 2.80	Stiff dark orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angualr of mudstone, siltstone and sandstone.		
3.00-3.44 3.00	DB	N50/ 287 mm		152.72		(0.64) 3.44	Stiff grey and brown gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of mudstone.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH307**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	22-04-16 22-04-16	160.64	E 433,367,604.0 N 399,813,197.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.14		(0.50) 0.50	MADE GROUND: Brown sandy gravel. Gravel is fine to coarse angular of sandstone.		
0.50	D			159.74		0.90	MADE GROUND: Firm brownish grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone		
1.00-1.45 1.00	DB	N11				(2.10)	MADE GROUND: Firm brown and dark grey slightly sandy gravelly silty clay. Gravel is fine to coarse angular of mudstone and carbonaceous mudstone with a trace of brick and coal.		
2.00-2.45 2.00	DB	N10		157.64		3.00			
3.00-3.45 3.00	DB	N17				(2.50)	MADE GROUND: Stiff brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone and mudstone with a trace of brick.		
4.00-4.45 4.00	DB	N15	1						
5.00-5.45 5.00	DB	N39	1	155.14		5.50			
5.80-5.89 5.80	D	N50/ 50 mm		154.75		5.89	Brown slightly sandy GRAVEL. Gravel is fine to coarse angular of sandstone.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						3.6 5.5	4 5.8	0060 0060			Perched groundwater encountered at 5.50m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

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CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH308**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	25-04-16 25-04-16	160.42	E 433,301,221.0 N 399,881,179.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				160.02		0.40	MADE GROUND: Brown clayey gravel. Gravel is fine to coarse angular of sandstone.		
0.50	D						MADE GROUND: Firm brown mottled ornage brown and black slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and carbonacous mudstone with occasional brick and coal.		
1.00-1.45 1.00	DB	N6				(2.30)			
2.00-2.45 2.00	DB	N11		157.72		2.70			
3.00-3.45 3.00	DB	N35		156.82		(0.90) 3.60	Stiff orange brown mottled grey very sandy silty CLAY.		
4.00-4.32 4.00	D	N50/ 172 mm		156.10		(0.72) 4.32	Stiff grey and brown gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular of mudstone.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
3.6	4	0060		

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH309**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	164.80	E 433,267,740.0 N 399,734,730.0	
Contractor				Sheet
				1 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				164.40		0.40	MADE GROUND: Brown clayey gravel. Gravel is fine to coarse angular of sandstone.		
0.50	D					(0.80)	MADE GROUND: Orange brown slightly clayey sandy gravel and cobbles. Gravel is fine to coarse angular of sandstone.		
1.00-1.45	DB			163.60		1.20			
1.00		N6				(0.80)	MADE GROUND: Dark grey and brown slightly silty slightly clayey sandy gravel. Gravel is fine to coarse angular of mudstone and sandstone.		
2.00-2.45	DB			162.80		2.00			
2.00		N8				(0.80)	MADE GROUND: Firm orange brown slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone.		
3.00-3.45	DB			162.00		2.80			
3.00		N8					MADE GROUND: Firm brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of sandstone and mudstone. Becoming stiff at 6.50m.		
4.00-4.45	DB								
4.00		N10							
5.00-5.45	DB								
5.00		N11				(6.70)			
6.50-6.95	DB								
6.50		N16							
8.00-8.45	DB								
8.00		N16							
				155.30		9.50			
9.50-9.95	DB								
9.50		N23				(0.80)			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
0.6	1	0060		
10	10.3	0060		

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH309**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	164.80	E 433,267,740.0 N 399,734,730.0	
Contractor				Sheet
				2 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				154.50		10.30	MADE GROUND: Stiff grey and dark grey slightly gravelly silty clay. Gravel comprises fine to coarse angular gravel of mudstone and carbonaceous mudstone. *(continued)*		
10.30- 10.42 10.30	D	N50/ 50 mm		154.38		10.42	Dark grey sandy GRAVEL. Gravel is fine to coarse angular of coal.		

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To

GENERAL REMARKS

Groundwater not encountered. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

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CIVIL & STRUCTURAL ENGINEERING

BOREHOLE LOG

Project				BOREHOLE No
Wentworth Way, Tankersley				**BH310**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	27-04-16 27-04-16	165.15	E 433,215,798.0 N 399,721,307.0	
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
				165.05		0.10	MADE GROUND: Light brown sandy gravel. Gravel is fine to coarse angular of limestone.		
0.50	D						MADE GROUND: Firm grey and dark grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone and carbonaceous mudstone.		
1.00-1.45 1.00	DB	N7				(2.10)			
2.00-2.45 2.00	DB	N7		162.95		2.20			
						(0.80)	MADE GROUND: Firm orange brown mottled dark grey slightly sandy silty clay. Gravel is fine to coarse angular of coal, mudstone and carbonaceous mudstone.		
3.00-3.45 3.00	DB	N9		162.15		3.00	MADE GROUND: Firm orange brown and grey slightly gravelly slightly sandy silty clay. Gravel is fine to coarse angular of mudstone, siltstone and sandstone.		
4.00-4.45 4.00	DB	N9	1						
			1			(4.00)			
5.00-5.45 5.00	DB	N10							
6.50-6.95 6.50	DB	N23							
				158.15		7.00			
						(0.88)	Stiff grey very thinly laminated slightly gravelly silty CLAY. Gravel is fine to coarse angular of mudsotne.		
7.70-7.88 7.70	D	N50/ 60 mm		157.27		7.88			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
7.4	7.7	0060		

GENERAL REMARKS

Perched groundwater encountered at 4.80m. No visual or olfactory evidence of hydrocarbon contamination.

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Cable Percussive Rig	Logged By RM

AGS3 UK BH 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd

CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R301
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	156.06	E 433,399,338.0 N 399,823,016.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
			155.66		0.40	MADE GROUND: Overburden.			
					(7.17)	Interbedded SANDSTONE and MUDSTONE.			
			148.49		7.57				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R302
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	159.97	E 433,274,276.0 N 399,828,754.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
			159.77		0.20	MADE GROUND: Overburden.			
					(6.80)	Interbedded SANDSTONE and MUDSTONE.			
			152.97		7.00				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd

CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R303
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	160.45	E 433,335,481.0 N 399,789,382.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
			159.85		(0.60) 0.60	MADE GROUND: Overburden.			
					(6.40)	Interbedded SANDSTONE and MUDSTONE.			
			153.45		7.00				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

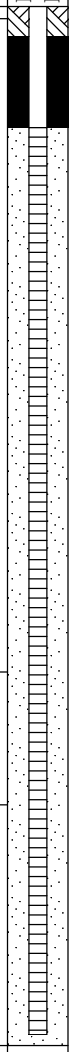
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CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				**R304**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	164.80	E 433,228,743.0 N 399,786,171.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
			164.70		0.10	MADE GROUND: Overburden.			
					(5.40)	Interbedded SANDSTONE and MUDSTONE.			
			159.30		5.50				
					(1.10)	COAL.			
			158.20		6.60				
					(1.99)	Interbedded MUDSTONE and SANDSTONE.			
			156.21		8.59				



Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd

CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R305
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	165.54	E 433,160,805.0 N 399,725,989.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
			165.34		0.20	MADE GROUND: Overburden.			
					(1.10)	COAL.			
			164.24		1.30				
					(4.20)	Interbedded MUDSTONE and SANDSTONE.			
			160.04		5.50				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd

CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R306
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	166.87	E 433,118,929.0 N 399,732,869.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
					(1.10)	MADE GROUND: Overburden.			
			165.77		1.10				
						Interbedded SANDSTONE and MUDSTONE.			
					(5.90)				
			159.87		7.00				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd

CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R307
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	166.82	E 433,111,479.0 N 399,681,921.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
					(1.20)	MADE GROUND: Overburden.			
			165.62		1.20				
					(5.80)	Interbedded SANDSTONE and MUDSTONE.			
			159.82		7.00				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

JPG (Leeds) Ltd
CIVIL & STRUCTURAL ENGINEERING

DRILLHOLE LOG

Project				DRILLHOLE No
Wentworth Way, Tankersley				R308
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4776	26-04-16 26-04-16	166.82	E 433,138,486.0 N 399,631,642.0	
Contractor				Sheet 1 of 1

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Main/Detail	Discontinuities	Geology	Instrument/ Backfill
					(1.20)	MADE GROUND: Overburden.			
			165.62		1.20				
					(6.08)	Interbedded SANDSTONE and MUDSTONE.			
			159.54		7.28				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	

All dimensions in metres Scale 1:62.5	Client Barmston Developments Limited	Method/ Plant Used Rotary Drilling Rig	Logged By RM

AGS3 UK DH - JPG 4776 - TANKERSLEY SI.GPJ GINT STD AGS 3_1.GDT 29/6/16

Appendix C Chemical Analysis Certificates and HazWasteOnline™ Waste Classification

STATISTICAL ASSESSMENT OF CHEMICAL ANALYSIS

The results of the chemical analysis have been assessed in accordance with CL:AIRE (Contaminated Land: Applications in Real Environments) 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' published by the CIEH, May 2008.

This guidance provides a statistical approach to objectively evaluate the evidence for and against particular propositions/hypothesis and has the useful attribute of enabling decision makers to reach conclusions about the available evidence, with at least some understanding of the validity of the results.

The guidance approaches this in the context of assessing the results from two different perspectives, the Planning Scenario and Part 2A.

When assessing in terms of the Planning Scenario, the key question would be 'can we confidently say that the level of contamination on this land is low relative to some appropriate measure of risk?' Under Part 2A, the question would be 'can we confidently say that the level of contamination is high relative to some appropriate measure of risk?'

These questions are addressed through the use of formal hypothesis – the "Null Hypothesis" and the "Alternative Hypothesis".

This assessment will be carried out in accordance with the Planning Scenario, where the aim is to demonstrate 'suitability for use'. The Null Hypothesis is that the level of contamination is the same as, or higher than the critical concentration/GAC. The Alternative Hypothesis is that the level of contamination is lower than the critical concentration/GAC. Under Part 2A the opposite set of propositions are applicable.

By convention, the Null Hypothesis is the starting proposition against which the key question, as expressed by the Alternative Hypothesis, can be tested.

The assessment of the results relies on there being a normal distribution of results for a particular contaminant and that the data set under consideration is representative of the particular material which is being assessed. If more than one dataset is present, then the hypothesis should be applied individually for each data set.

Under the Planning Scenario, the statistical test is used to demonstrate that there is a 95% probability that the true population mean falls below the critical concentration/GAC.

Appropriate data sets must be created to enable the statistical testing to be carried out and three key elements must be considered prior to statistical analysis. These are as follows:

- Dealing with non-detects;
- Understanding the statistical distribution of data; and
- Dealing with outliers.

The results can then be assessed and the results will be compared against the following:

- Sample Mean – if the sample mean of the data set is in excess of the GAC then the Upper Confidence Limit of the true population mean will be higher than the critical concentration.
- 95% of the Upper Confidence Limit.
- One Sample T Test (parametric test) carried out at the 95% confidence level.

On the basis of these tests, the validity of the Null Hypothesis can be assessed.

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 16-63569-2

14-Jun-16

Client Jordan Pritchard Gorman
Civil & Structural Engineers
5 John Charles Way
Leeds
LS12 6QD

Our Reference 16-63569-2

Client Reference 4776

Order No (not supplied)

Contract Title Tankersley

Description 8 Soil samples, 4 Leachate samples.

Date Received 14-Apr-16

Date Started 14-Apr-16

Date Completed 14-Jun-16

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

Notes **This report supersedes 16-63569-1. Extra testing.**
Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 16-63569-2
Client Ref 4776
Contract Title Tankersley

			Lab No	972208	972209	972210	972211	972212	972213
			Sample ID	TP301	TP302	TP304	TP306	TP308	TP310
			Depth	0.80	4.20	0.50	0.40	0.50	0.40
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	11/04/16	11/04/16	11/04/16	11/04/16	11/04/16	11/04/16
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification OHR	DETSC 1102	0				Y			
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	76	150	24	49	29	57
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.1	0.7	0.1	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	13	9.8	23	13	15	13
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	58	45	81	52	47	56
Lead	DETSC 2301#	0.3	mg/kg	34	27	90	37	27	26
Mercury	DETSC 2325#	0.05	mg/kg	0.15	0.13	42	0.14	0.09	0.16
Nickel	DETSC 2301#	1	mg/kg	29	23	24	33	23	35
Selenium	DETSC 2301#	0.5	mg/kg	0.5	0.8	< 0.5	< 0.5	< 0.5	0.7
Zinc	DETSC 2301#	1	mg/kg	83	47	130	74	76	64
Inorganics									
pH	DETSC 2008#			4.5	7.9	7.9	7.2	7.5	4.3
Calorific Value	DETSC 5008	1	MJ/kg			I/S		3.8	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.5	0.2	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	8.2	8.9	11	11	8.1	10
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	14	18	170	21	14	14
Chloride	DETSC 2055	1	mg/kg	7.1	31.8	42.3	9.9	17.0	6.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1900	430	150	740	1500	100
Sulphide	DETSC 2024#	10	mg/kg	< 10	< 10	< 10	< 10	12	16
Sulphate as SO4, Total	DETSC 2321#	0.01	%	2.6	0.23	0.17	0.50	0.94	0.45
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.4	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.8	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.6	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	1.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	7.7	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.7	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	7.8	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	7.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	4.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	3.4	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.2	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	1.3	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.6	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.6	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.4	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	47	< 1.6	< 1.6	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	0.5	< 0.3	< 0.3	< 0.3

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

Summary of Chemical Analysis
Soil Samples

Our Ref 16-63569-2
Client Ref 4776
Contract Title Tankersley

			Lab No	972214	972215
			Sample ID	TP310	TP319
			Depth	4.50	0.60
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	12/04/16	12/04/16
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Asbestos Quantification OHR	DETSC 1102	0			
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	31	20
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	17	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	320	34
Lead	DETSC 2301#	0.3	mg/kg	23	31
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.07
Nickel	DETSC 2301#	1	mg/kg	33	26
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	70	84
Inorganics					
pH	DETSC 2008#			5.6	7.2
Calorific Value	DETSC 5008	1	MJ/kg		
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	0.2
Organic matter	DETSC 2002#	0.1	%	6.2	5.2
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	9.7	29
Chloride	DETSC 2055	1	mg/kg	11.4	6.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1100	81
Sulphide	DETSC 2024#	10	mg/kg	12	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	2.5	0.13
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	0.8
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.2
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	1.4
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	1.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.6
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	0.5
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.4
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.2
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.7
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	6.0
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

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

Summary of Chemical Analysis
Leachate Samples

Our Ref 16-63569-2
Client Ref 4776
Contract Title Tankersley

			Lab No	972216	972217	972218	972219
			Sample ID	TP301	TP302	TP306	TP308
			Depth	0.80	4.20	0.40	0.50
			Other ID				
			Sample Type	LEACHATE	LEACHATE	LEACHATE	LEACHATE
			Sampling Date	11/04/16	11/04/16	11/04/16	11/04/16
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Preparation							
NRA Leachate Preparation	DETS 036*			Y	Y	Y	Y
Metals							
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	< 0.16	0.23	< 0.16	< 0.16
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.27	< 0.03	< 0.03	0.04
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.25	0.26	0.52	0.28
Copper, Dissolved	DETSC 2306	0.4	ug/l	0.5	0.5	< 0.4	0.5
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09	< 0.09	< 0.09	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	35	< 0.5	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	0.73	< 0.25	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	120	3.0	54	20
Inorganics							
pH	DETSC 2008			6.1	7.7	8.2	7.9
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	< 20	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	140	23	9.8	66
PAHs							
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETS 074*	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20
Phenols							
Phenol	*	0.5	ug/l	< 0.50	< 0.50	< 0.50	< 0.50

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 16-63569-2
Client Ref 4776
Contract Title Tankersley

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
972208	TP301 0.80	SOIL	NAD	none	J Woodmansey
972209	TP302 4.20	SOIL	NAD	none	J Woodmansey
972210	TP304 0.50	SOIL	Chrysotile	bundles of Chrysotile	J Woodmansey
972211	TP306 0.40	SOIL	NAD	none	J Woodmansey
972212	TP308 0.50	SOIL	NAD	none	J Woodmansey
972213	TP310 0.40	SOIL	NAD	none	J Woodmansey
972214	TP310 4.50	SOIL	NAD	none	J Woodmansey
972215	TP319 0.60	SOIL	NAD	none	J Woodmansey

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 16-63569-2
Client Ref 4776
Contract Title Tankersley

Lab No	972210
Sample ID	TP304
Depth	0.50
Other ID	
Sample Type	SOIL
Sampling Date	11/04/16
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	**0.002**
Gravimetric Quantification (a)	DETSC 1102	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	0.002
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	534.13
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 %	na
% Serpentine bundles in sample		Mass %	0.002
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Serpentine 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 16-63569-2
Client Ref 4776
Contract Tankersley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
972208	TP301 0.80 SOIL	11/04/16	GJ 250ml, PT 1L		
972209	TP302 4.20 SOIL	11/04/16	GJ 250ml, PT 1L		
972210	TP304 0.50 SOIL	11/04/16	GJ 250ml, PT 1L		
972211	TP306 0.40 SOIL	11/04/16	GJ 250ml, PT 1L		
972212	TP308 0.50 SOIL	11/04/16	GJ 250ml, PT 1L		
972213	TP310 0.40 SOIL	11/04/16	GJ 250ml, PT 1L		
972214	TP310 4.50 SOIL	12/04/16	GJ 250ml, PT 1L		
972215	TP319 0.60 SOIL	12/04/16	GJ 250ml, PT 1L		
972216	TP301 0.80 LEACHATE	11/04/16	GJ 250ml, PT 1L		
972217	TP302 4.20 LEACHATE	11/04/16	GJ 250ml, PT 1L		
972218	TP306 0.40 LEACHATE	11/04/16	GJ 250ml, PT 1L		
972219	TP308 0.50 LEACHATE	11/04/16	GJ 250ml, PT 1L		

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

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 16-63985-1

14-Jun-16

Client Jordan Pritchard Gorman
Civil & Structural Engineers
5 John Charles Way
Leeds
LS12 6QD

Our Reference 16-63985-1

Client Reference 4776

Order No (not supplied)

Contract Title Tankersley

Description 7 Soil samples, 2 Leachate samples.

Date Received 19-Apr-16

Date Started 19-Apr-16

Date Completed 14-Jun-16

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

Notes **This report supersedes 16-63985. Extra testing.**
Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 16-63985-1
Client Ref 4776
Contract Title Tankersley

			Lab No	974297	974298	974299	974300	974301	974302	974303
			Sample ID	TP328A	TP331	TP333	TP343	TP344	TP345	TP347
			Depth	0.80	0.15	1.00	0.15	0.55	0.85	0.15
			Other ID							
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/04/16	13/04/16	13/04/16	14/04/16	14/04/16	14/04/16	14/04/16
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	21	9.2	9.4	6.7	13	15	12
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.1	< 0.1	< 0.1	0.1	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	19	16	190	13	25	120	20
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0	< 1.0		< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	68	29	24	15	30	25	28
Lead	DETSC 2301#	0.3	mg/kg	40	23	21	13	26	47	17
Mercury	DETSC 2325#	0.05	mg/kg	0.06	< 0.05	< 0.05	< 0.05	0.11	0.06	< 0.05
Nickel	DETSC 2301#	1	mg/kg	32	30	21	18	22	18	21
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	< 0.5
Zinc	DETSC 2301#	1	mg/kg	150	90	65	98	53	66	48
Inorganics										
pH	DETSC 2008#			8.5	8.3	10.6	7.1	5.8	7.3	6.4
Calorific Value	DETSC 5008	1	MJ/kg					14.0	1.8	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	0.4	0.3	0.1
Organic matter	DETSC 2002#	0.1	%	12	2.8	2.5	1.6	15	6.9	6.3
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg		8.3	5.6		14	43	9.3
Chloride	DETSC 2055	1	mg/kg		4.2	4.9		7.2	8.1	3.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	870	34	88	13	27	38	31
Sulphide	DETSC 2024#	10	mg/kg		16	24		36	40	36
Sulphate as SO4, Total	DETSC 2321#	0.01	%		0.04	0.08		0.05	0.08	0.03
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	0.4	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	0.5	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	0.4	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 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
Leachate Samples

Our Ref 16-63985-1
Client Ref 4776
Contract Title Tankersley

			Lab No	974304	974305
			Sample ID	TP345	TP347
			Depth	0.85	0.15
			Other ID		
			Sample Type	LEACHATE	LEACHATE
			Sampling Date	14/04/16	14/04/16
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Preparation					
NRA Leachate Preparation	DETS 036*			Y	Y
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.82	4.3
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.36	1.2
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.6	3.2
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.43	2.3
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.6	1.3
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.66	0.53
Zinc, Dissolved	DETSC 2306	1.3	ug/l	1.3	4.5
Inorganics					
pH	DETSC 2008			5.7	6.1
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	13	6.0
PAHs					
Naphthalene	DETS 074*	0.01	ug/l	0.03	0.02
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	0.02	< 0.01
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
PAH Total	DETS 074*	0.2	ug/l	< 0.20	< 0.20
Phenols					
Phenol	*	0.5	ug/l	< 0.50	< 0.50

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

Summary of Asbestos Analysis
Soil Samples

Our Ref 16-63985-1
Client Ref 4776
Contract Title Tankersley

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
974297	TP328A 0.80	SOIL	NAD	none	Keith Wilson
974298	TP331 0.15	SOIL	NAD	none	Keith Wilson
974299	TP333 1.00	SOIL	NAD	none	Keith Wilson
974300	TP343 0.15	SOIL	NAD	none	Keith Wilson
974301	TP344 0.55	SOIL	NAD	none	Keith Wilson
974302	TP345 0.85	SOIL	NAD	none	Keith Wilson
974303	TP347 0.15	SOIL	NAD	none	Keith Wilson

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 16-63985-1
Client Ref 4776
Contract Tankersley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
974297	TP328A 0.80 SOIL	13/04/16	GJ 250ml, PT 1L		
974298	TP331 0.15 SOIL	13/04/16	GJ 250ml, PT 1L		
974299	TP333 1.00 SOIL	13/04/16	GJ 250ml, PT 1L		
974300	TP343 0.15 SOIL	14/04/16	GJ 250ml, PT 1L		
974301	TP344 0.55 SOIL	14/04/16	GJ 250ml, PT 1L		
974302	TP345 0.85 SOIL	14/04/16	GJ 250ml, PT 1L		
974303	TP347 0.15 SOIL	14/04/16	GJ 250ml, PT 1L		
974304	TP345 0.85 LEACHATE	14/04/16	GJ 250ml, PT 1L		
974305	TP347 0.15 LEACHATE	14/04/16	GJ 250ml, PT 1L		

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

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 16-68990

14-Jun-16

Client Jordan Pritchard Gorman
Civil & Structural Engineers
5 John Charles Way
Leeds
LS12 6QD

Our Reference 16-68990

Client Reference 4776

Order No (not supplied)

Contract Title Tankersley

Description 3 Water samples.

Date Received 08-Jun-16

Date Started 08-Jun-16

Date Completed 14-Jun-16

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

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

Approved By



Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 16-68990
Client Ref 4776
Contract Title Tankersley

	Lab No	1001347	1001348	1001349
	Sample ID	BH305	BH310	R302
	Depth	7.47	5.90	3.97
	Other ID			
	Sample Type	WATER	WATER	WATER
	Sampling Date	06/06/16	06/06/16	06/06/16
	Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	3.7	0.28	1.4
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.43	0.22	0.12
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25	0.54
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.1	< 0.4	0.9
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.17	< 0.09	0.16
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	290	240	11
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.3	0.98	1.0
Zinc, Dissolved	DETSC 2306	1.3	ug/l	84	73	4.2
Inorganics						
pH	DETSC 2008			6.8	6.6	7.0
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	< 20
Sulphate as SO4	DETSC 2055	0.1	mg/l	1200	780	270
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	11	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	9.2	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	20	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	5.2	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	8.4	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	14	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	34	< 10

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

Summary of Chemical Analysis
Water Samples

Our Ref 16-68990
Client Ref 4776
Contract Title Tankersley

			Lab No	1001347	1001348	1001349
			Sample ID	BH305	BH310	R302
			Depth	7.47	5.90	3.97
			Other ID			
			Sample Type	WATER	WATER	WATER
			Sampling Date	06/06/16	06/06/16	06/06/16
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	0.06
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	0.01
Fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	0.03
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	0.03
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	0.02
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01
PAH Total	DETS 074*	0.2	ug/l	< 0.20	< 0.20	< 0.20
Phenols						
Phenol	*	0.5	ug/l	< 0.50	9.7	< 0.50

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

Information in Support of the Analytical Results

Our Ref 16-68990
Client Ref 4776
Contract Tankersley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1001347	BH305 7.47 WATER	06/06/16	GB 1L x2, GV x2		
1001348	BH310 5.90 WATER	06/06/16	GB 1L x2, GV x2		
1001349	R302 3.97 WATER	06/06/16	GB 1L x2, GV x2		

Key: G-Glass B-Bottle V-Vial

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

Disposal

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

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

Appendix D Geotechnical Testing Results

LABORATORY REPORT

4043

Contract Number: PSL16/2130

Report Date: 15 June 2016

Client's Reference: 4776

Client Name: JPG Leeds
5 John Charles Way
Leeds
West Yorkshire
LS12 6QD

For the attention of: Reuben Mew

Contract Title: Tankersley

Date Received: 12/5/2016
Date Commenced: 12/5/2016
Date Completed: 15/6/2016

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
D Lambe (Senior Technician)	S Royle (Senior Technician)	W Allen (Senior Technician)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP303		DB	0.60		MADE GROUND brown slightly sandy slightly clayey gravel.
TP304		DB	1.40		Grey mottled brown slightly sandy CLAY.
TP307		DB	0.20		MADE GROUND grey very gravelly sandy clay.
TP319		DB	0.60		MADE GROUND dark brown very gravelly sandy clay.
TP324		DB	2.00		Dark brown very gravelly sandy CLAY with some organic material.
TP359		DB	1.80		MADE GROUND dark grey very gravelly sandy clay.
TP331		DB	1.00		MADE GROUND brown sandy very clayey gravel.
TP332		DB	0.90		Brown sandy clayey silty GRAVEL.
TP337		DB	1.00		MADE GROUND brown very gravelly sandy clay.
TP343		DB	1.00		Brown highly weathered MUDSTONE.
TP343		DB	1.40		Brown highly weathered MUDSTONE.
TP344		DB	1.00		Brown mottled grey gravelly sandy CLAY.
TP344		DB	1.70		Brown mottled grey slightly sandy CLAY.
TP347		DB	1.20		Brown mottled grey highly weathered MUDSTONE.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved	Date 15/06/16	Contract No: PSL16/2130
		Tankersley		Client Ref: 4776

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP303		DB	0.60		8.8		2.65					
TP304		DB	1.40		27		2.65	52	24	28	100	High plasticity CH.
TP307		DB	0.20		15		2.24	42	21	21	55	Intermediate plasticity CI.
TP319		DB	0.60		19		2.35	45	22	23	56	Intermediate plasticity CI.
TP324		DB	2.00		33		2.44	67	32	35	53	High plasticity CH.
TP359		DB	1.80		17		2.35	39	20	19	45	Intermediate plasticity CI.
TP331		DB	1.00		13		2.55	40	20	20	41	Intermediate plasticity CI.
TP332		DB	0.90		10		2.58					
TP337		DB	1.00		10		2.66					
TP343		DB	1.00		15			42	23	19	71	Intermediate plasticity CI.
TP343		DB	1.40		11							
TP344		DB	1.00		22		2.61	47	23	24	76	Intermediate plasticity CI.
TP344		DB	1.70		27			64	27	37	100	High plasticity CH.
TP347		DB	1.20		16			38	20	18	83	Intermediate plasticity CI.

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

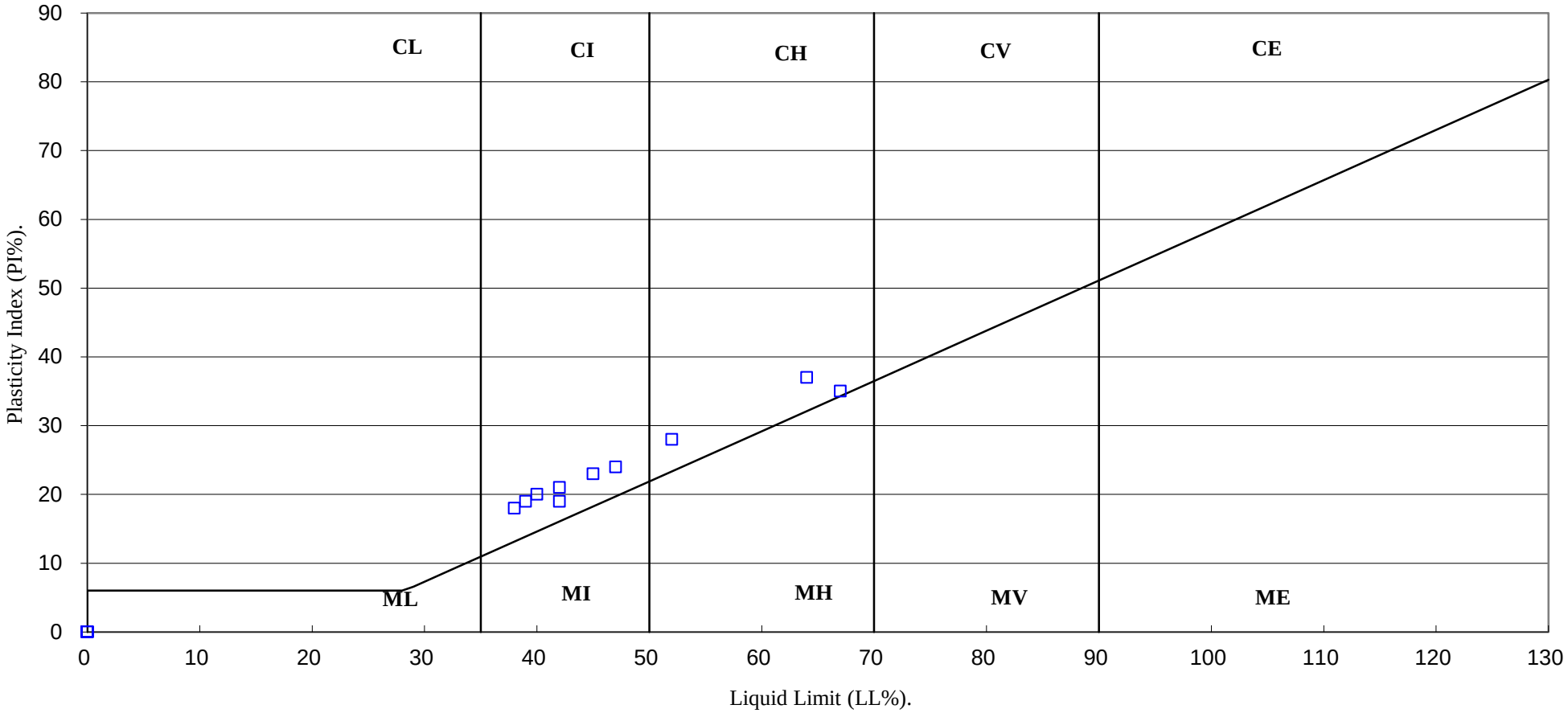
UKAS TESTING 4043

PSL Professional Soils Laboratory

Checked / Approved		Date	15/06/16	Contract No:
Tankersley				PSL16/2130
				Client Ref:
				4776

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



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		Tankersley				**PSL16/2130**
						Client Ref:
						4776

PARTICLE SIZE DISTRIBUTION TEST

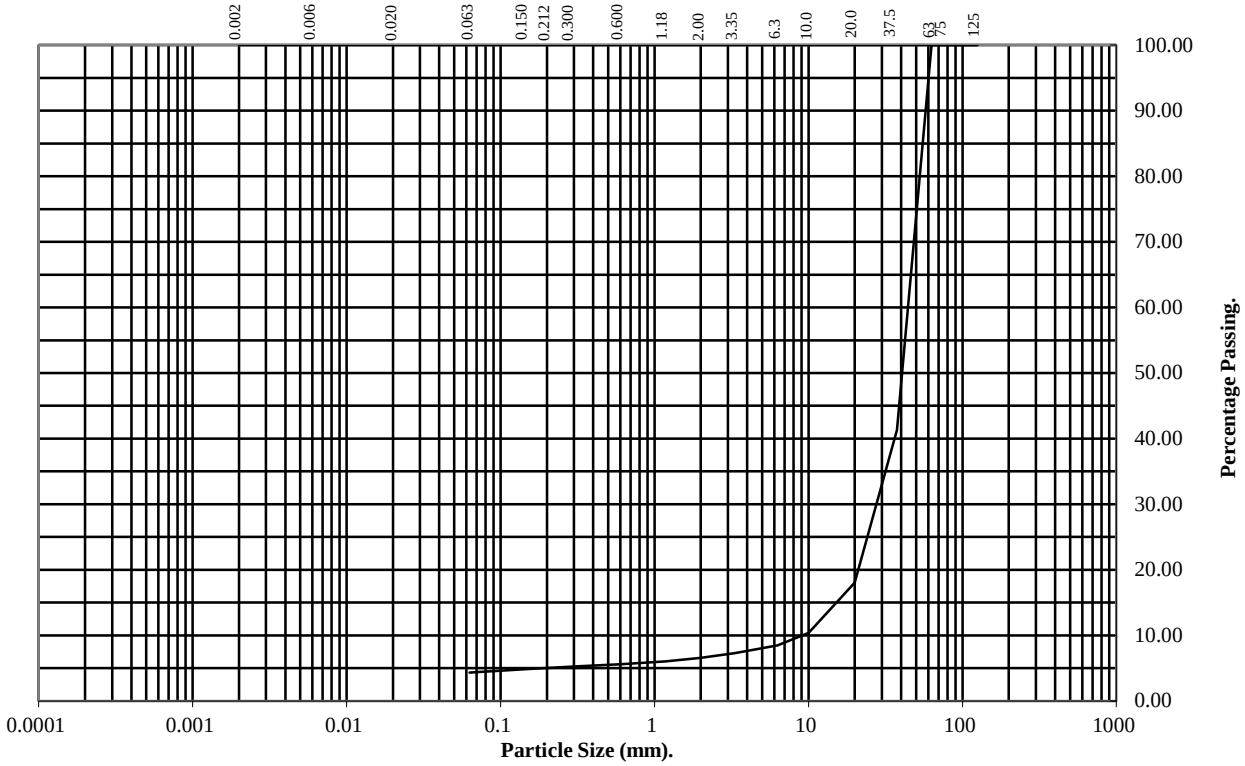
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP303** **Top Depth (m):** **0.60**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	41
20	18
10	10
6.3	8
3.35	7
2	7
1.18	6
0.6	6
0.3	5
0.212	5
0.15	5
0.063	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	93
Sand	3
Silt/Clay	4

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **14/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

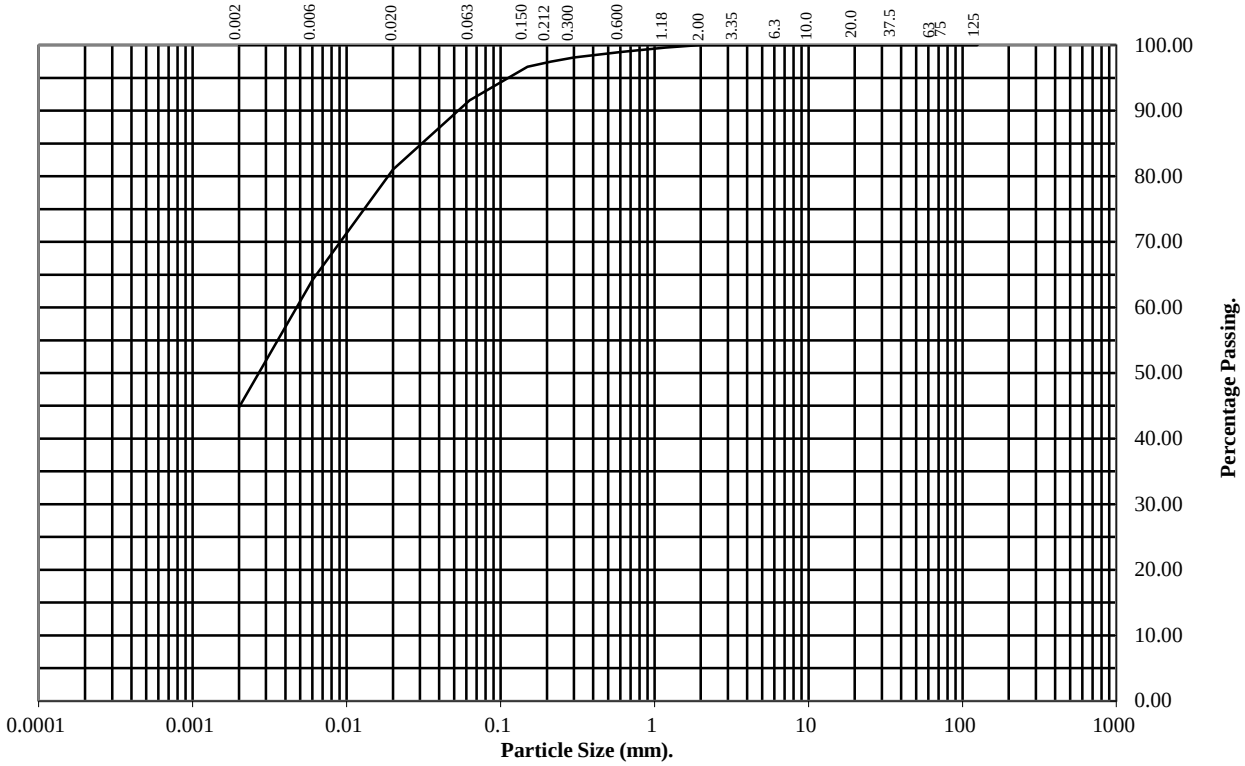
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP304** **Top Depth (m):** **1.40**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	98
0.212	98
0.15	97
0.063	92

Particle Diameter	Percentage Passing
0.02	81
0.006	64
0.002	45

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	8
Silt	47
Clay	45

Remarks:
See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **14/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

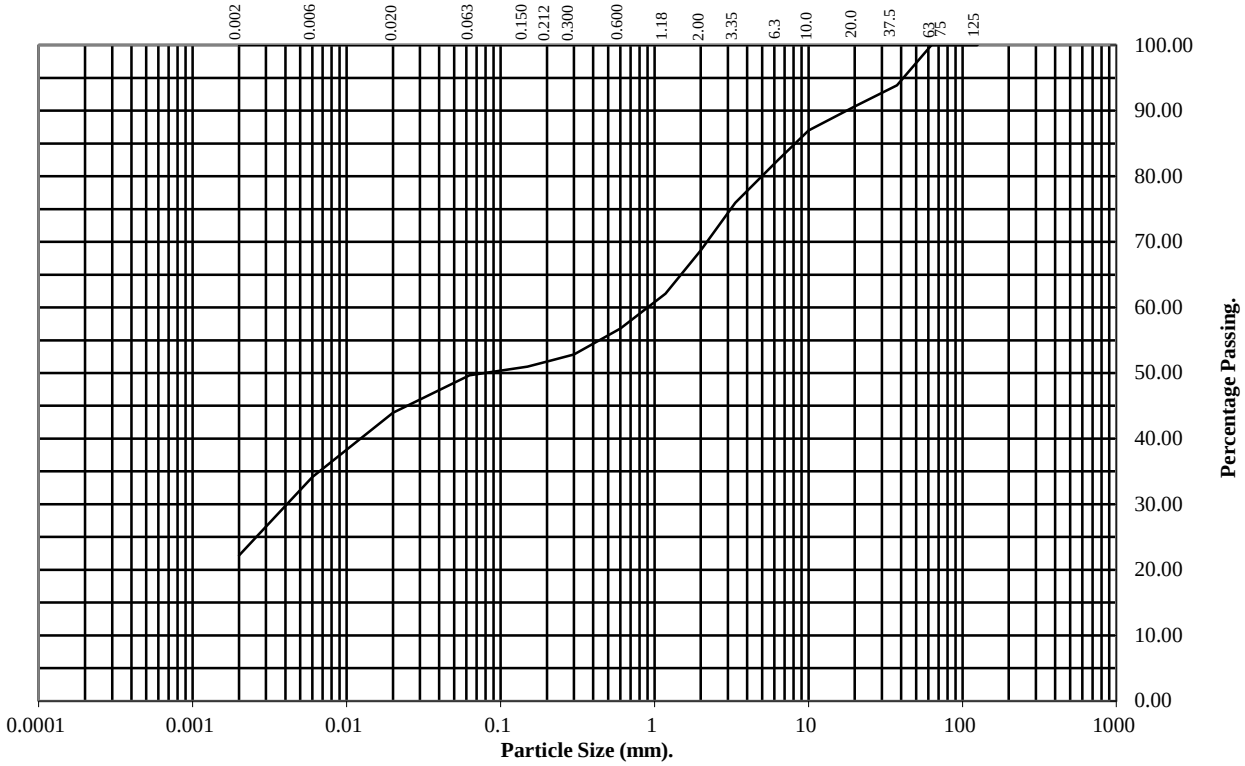
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP307** **Top Depth (m):** **0.20**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	94
20	91
10	87
6.3	82
3.35	76
2	69
1.18	62
0.6	57
0.3	53
0.212	52
0.15	51
0.063	50

Particle Diameter	Percentage Passing
0.02	44
0.006	34
0.002	22

Soil Fraction	Total Percentage
Cobbles	0
Gravel	31
Sand	19
Silt	28
Clay	22

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **14/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

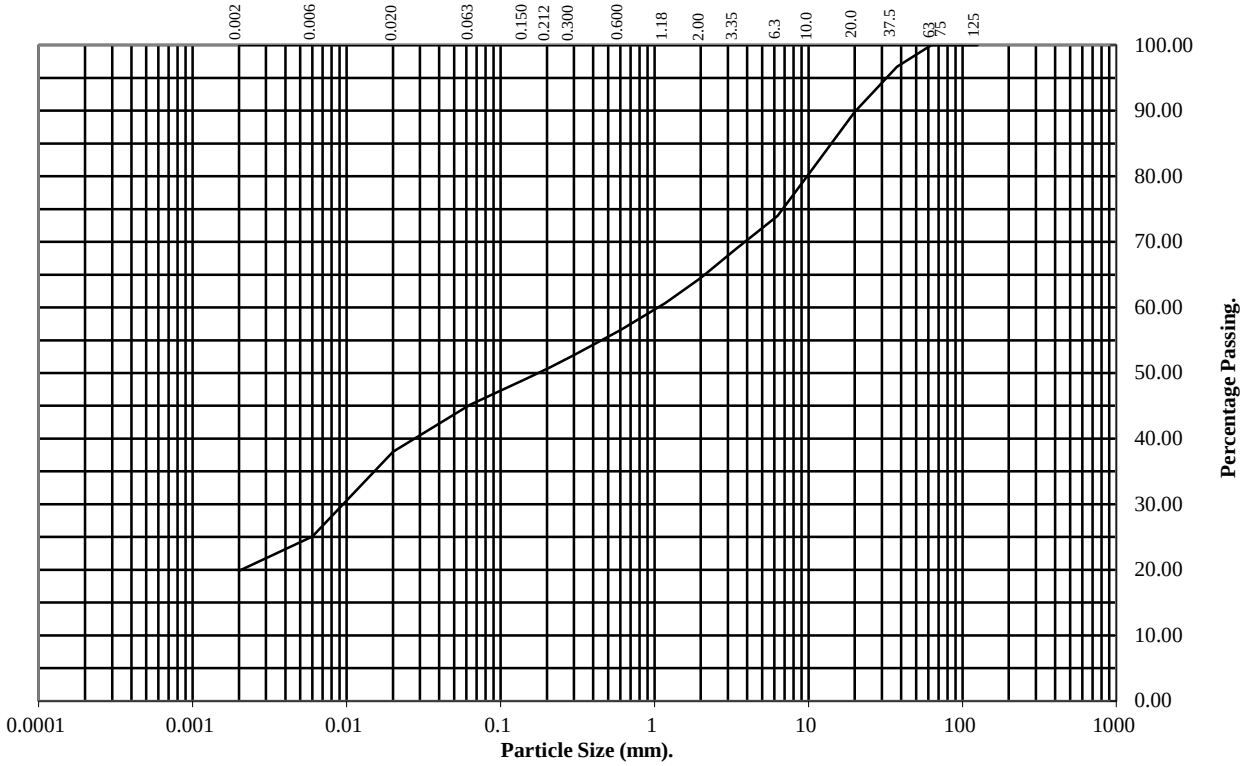
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP319** **Top Depth (m):** **0.60**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	97
20	90
10	80
6.3	74
3.35	69
2	64
1.18	61
0.6	57
0.3	53
0.212	51
0.15	49
0.063	45

Particle Diameter	Percentage Passing
0.02	38
0.006	25
0.002	20

Soil Fraction	Total Percentage
Cobbles	0
Gravel	36
Sand	19
Silt	25
Clay	20

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **14/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

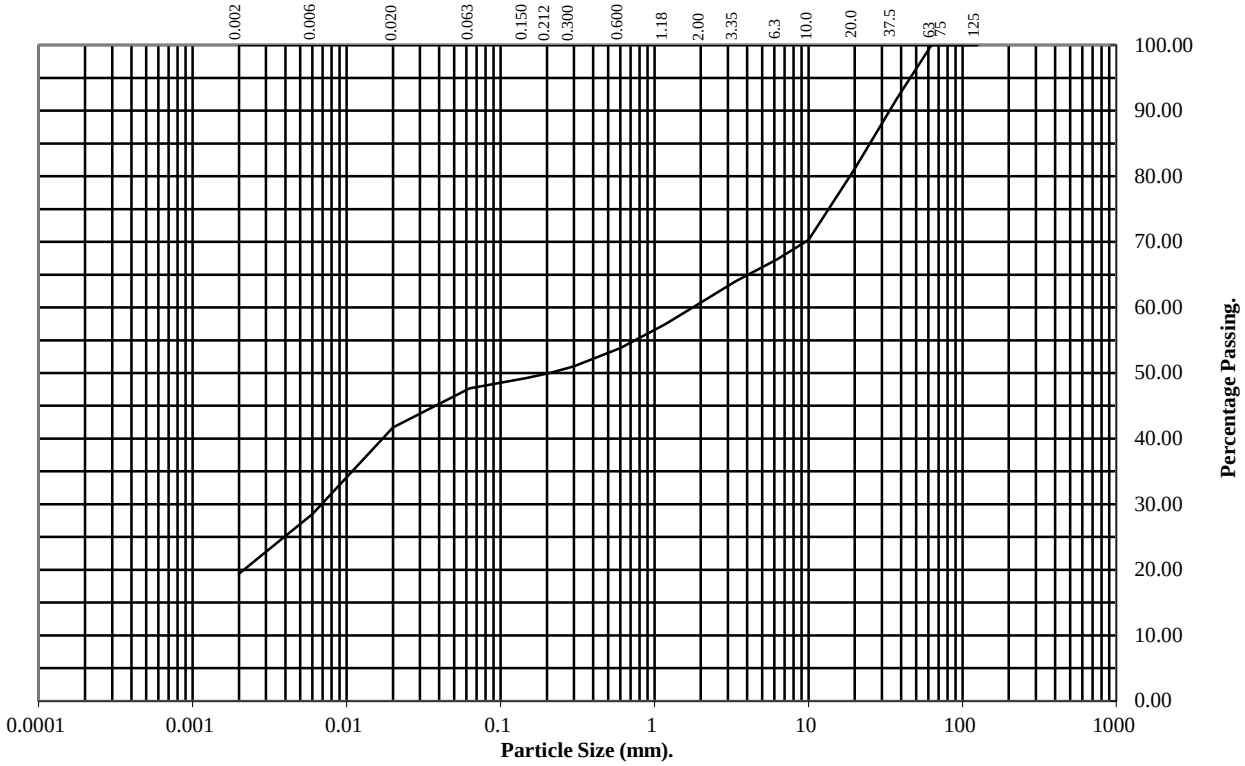
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP324** **Top Depth (m):** **2.00**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	92
20	81
10	70
6.3	67
3.35	64
2	61
1.18	57
0.6	54
0.3	51
0.212	50
0.15	49
0.063	48

Particle Diameter	Percentage Passing
0.02	42
0.006	29
0.002	19

Soil Fraction	Total Percentage
Cobbles	0
Gravel	39
Sand	13
Silt	29
Clay	19

Remarks:
See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **14/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

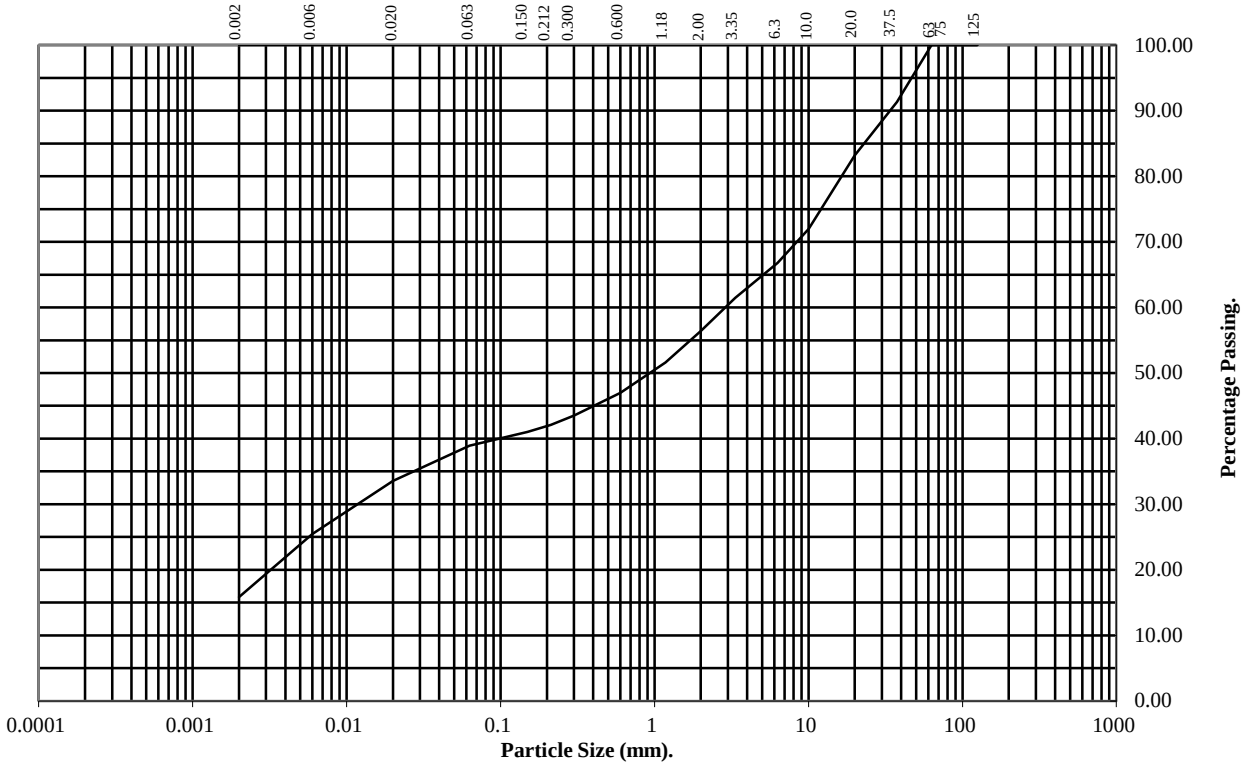
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP359** **Top Depth (m):** **1.80**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	91
20	83
10	72
6.3	67
3.35	61
2	56
1.18	52
0.6	47
0.3	44
0.212	42
0.15	41
0.063	39

Particle Diameter	Percentage Passing
0.02	34
0.006	25
0.002	16

Soil Fraction	Total Percentage
Cobbles	0
Gravel	44
Sand	17
Silt	23
Clay	16

Remarks:
See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **15/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

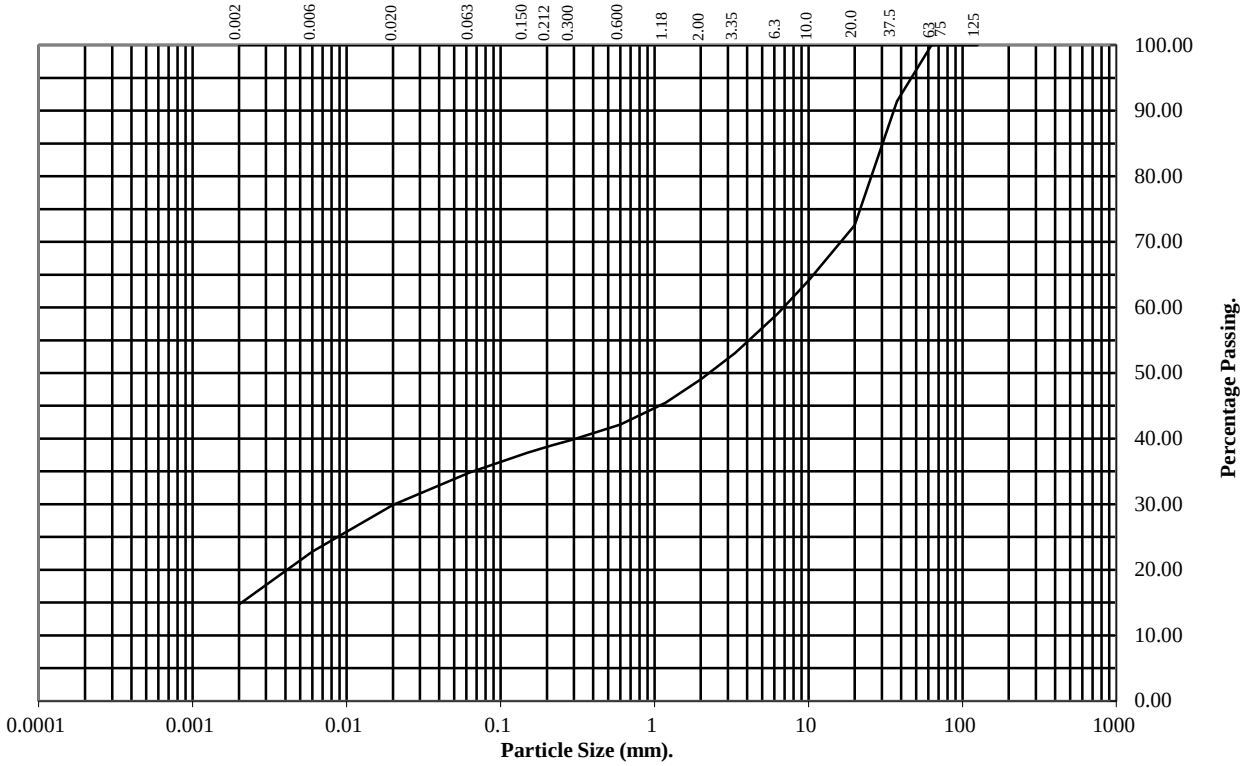
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP331** **Top Depth (m):** **1.00**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	91
20	73
10	64
6.3	59
3.35	53
2	49
1.18	45
0.6	42
0.3	40
0.212	39
0.15	38
0.063	35

Particle Diameter	Percentage Passing
0.02	30
0.006	23
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	51
Sand	14
Silt	20
Clay	15

Remarks:
See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **15/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

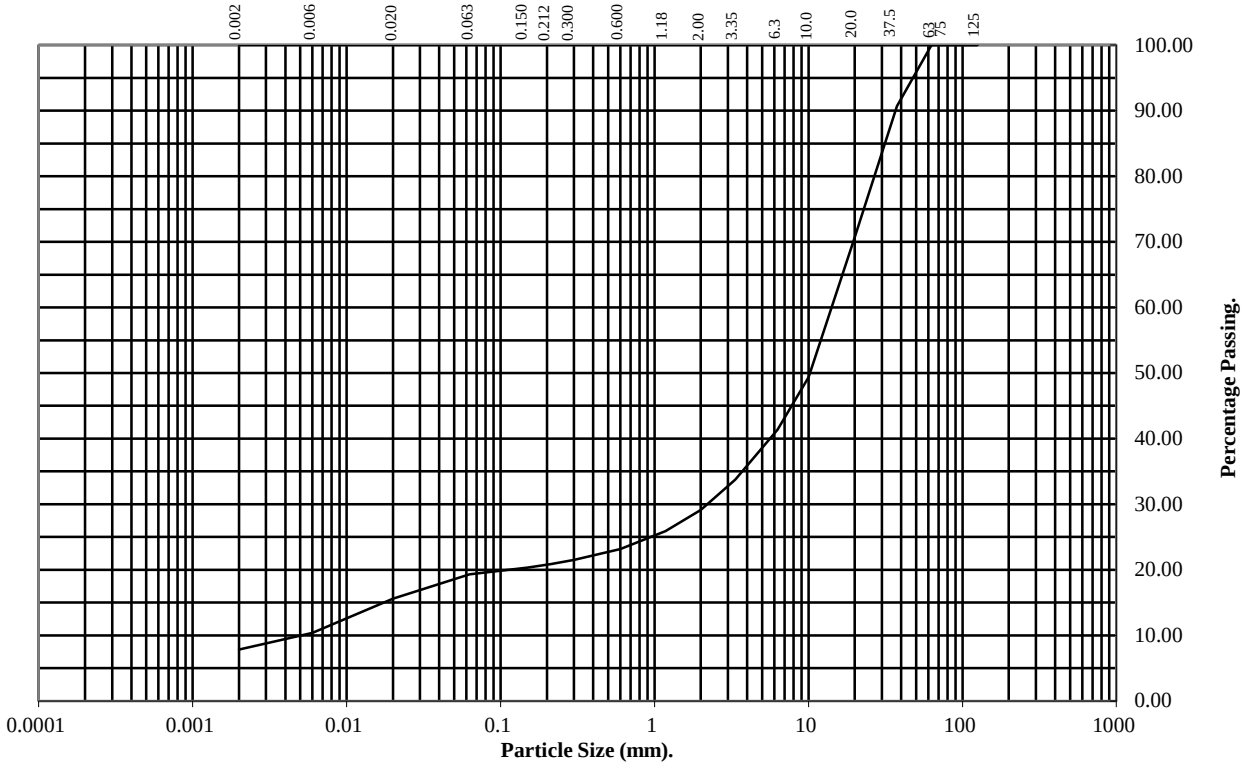
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP332** **Top Depth (m):** **0.90**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	91
20	71
10	49
6.3	41
3.35	34
2	29
1.18	26
0.6	23
0.3	22
0.212	21
0.15	20
0.063	19

Particle Diameter	Percentage Passing
0.02	16
0.006	10
0.002	8

Soil Fraction	Total Percentage
Cobbles	0
Gravel	71
Sand	10
Silt	11
Clay	8

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **15/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

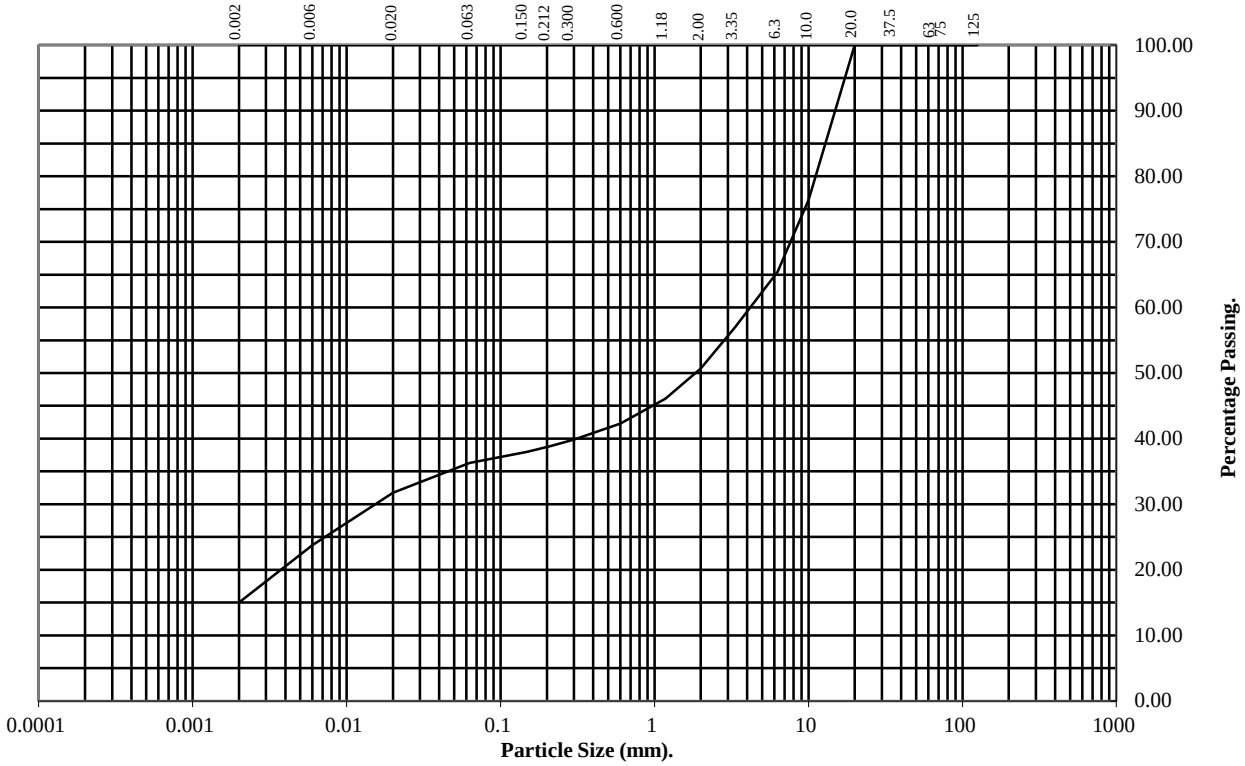
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP337** **Top Depth (m):** **1.00**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	76
6.3	65
3.35	57
2	51
1.18	46
0.6	42
0.3	40
0.212	39
0.15	38
0.063	36

Particle Diameter	Percentage Passing
0.02	32
0.006	24
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	49
Sand	15
Silt	21
Clay	15

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **15/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

PARTICLE SIZE DISTRIBUTION TEST

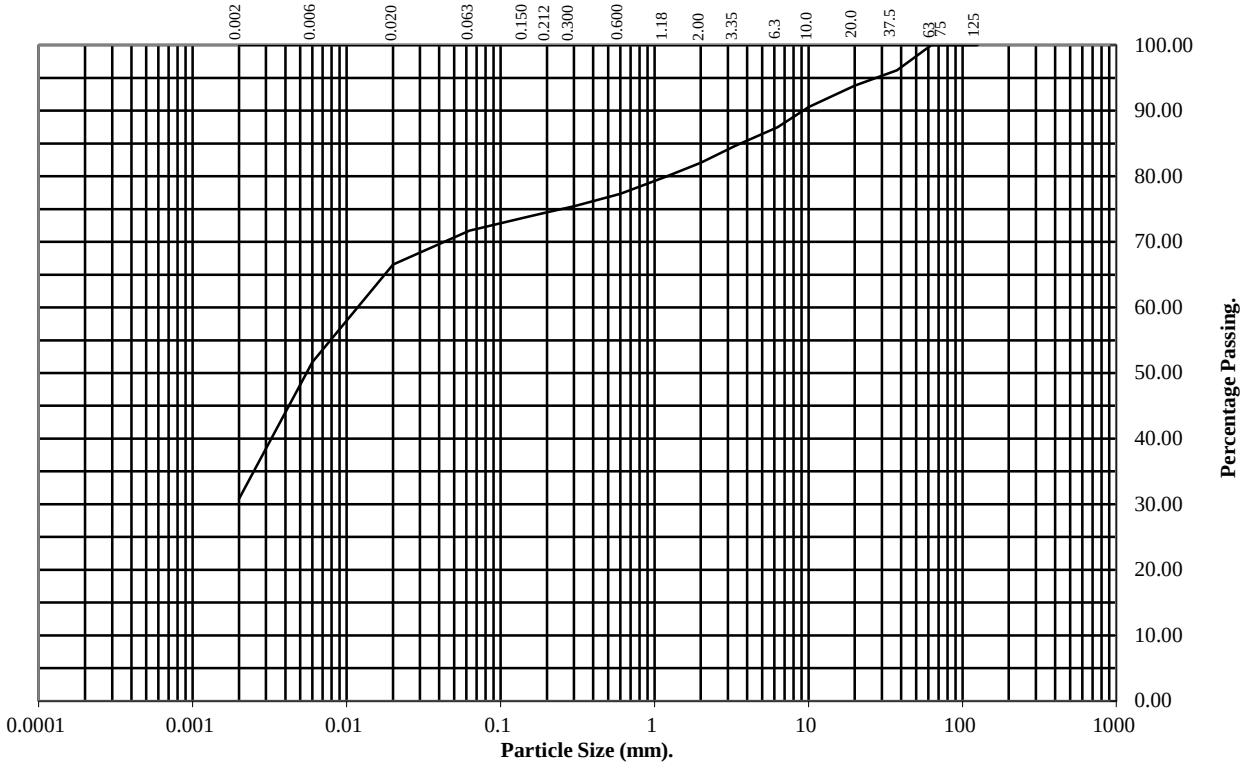
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP344** **Top Depth (m):** **1.00**

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

Sample Type: **DB**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	96
20	94
10	91
6.3	87
3.35	85
2	82
1.18	80
0.6	77
0.3	75
0.212	75
0.15	74
0.063	72

Particle Diameter	Percentage Passing
0.02	67
0.006	52
0.002	31

Soil Fraction	Total Percentage
Cobbles	0
Gravel	18
Sand	10
Silt	41
Clay	31

Remarks:
See summary of soil descriptions.

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked / Approved**		**Date** **15/06/16**	**Contract No:** **PSL16/2130**
		Tankersley			**Client Ref:** **4776**

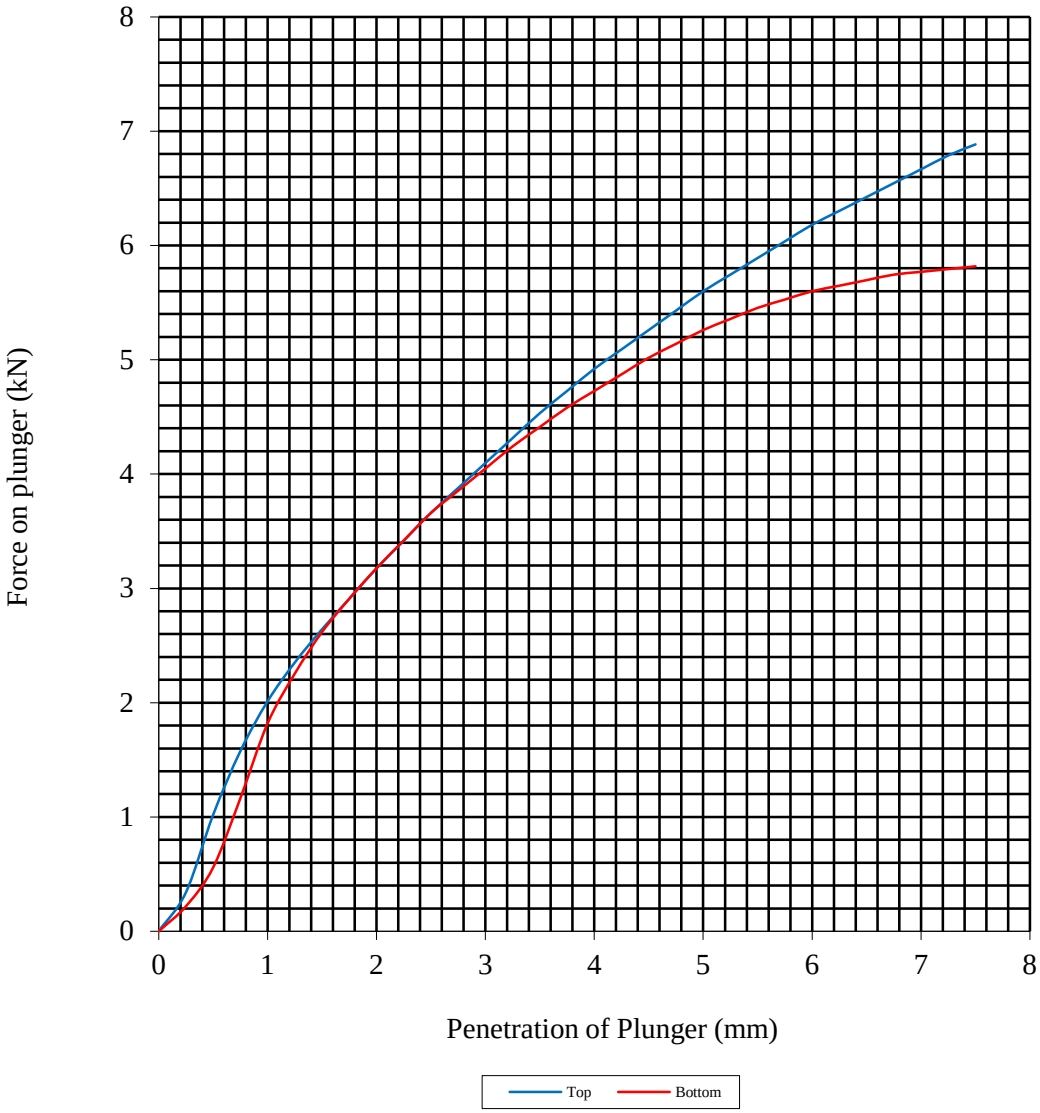
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: TP337 **Top Depth (m):** 1.00

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

Sample Type: DB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	10	Surcharge Kg:	4.20	Sample Top	10	Sample Top	28.0
Bulk Density Mg/m3:	2.08	Soaking Time hrs	0	Sample Bottom	10	Sample Bottom	27.7
Dry Density Mg/m3:	1.89	Swelling mm:	0	Remarks: See summary of soil descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg Rammer					

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					Client Ref:
					4776

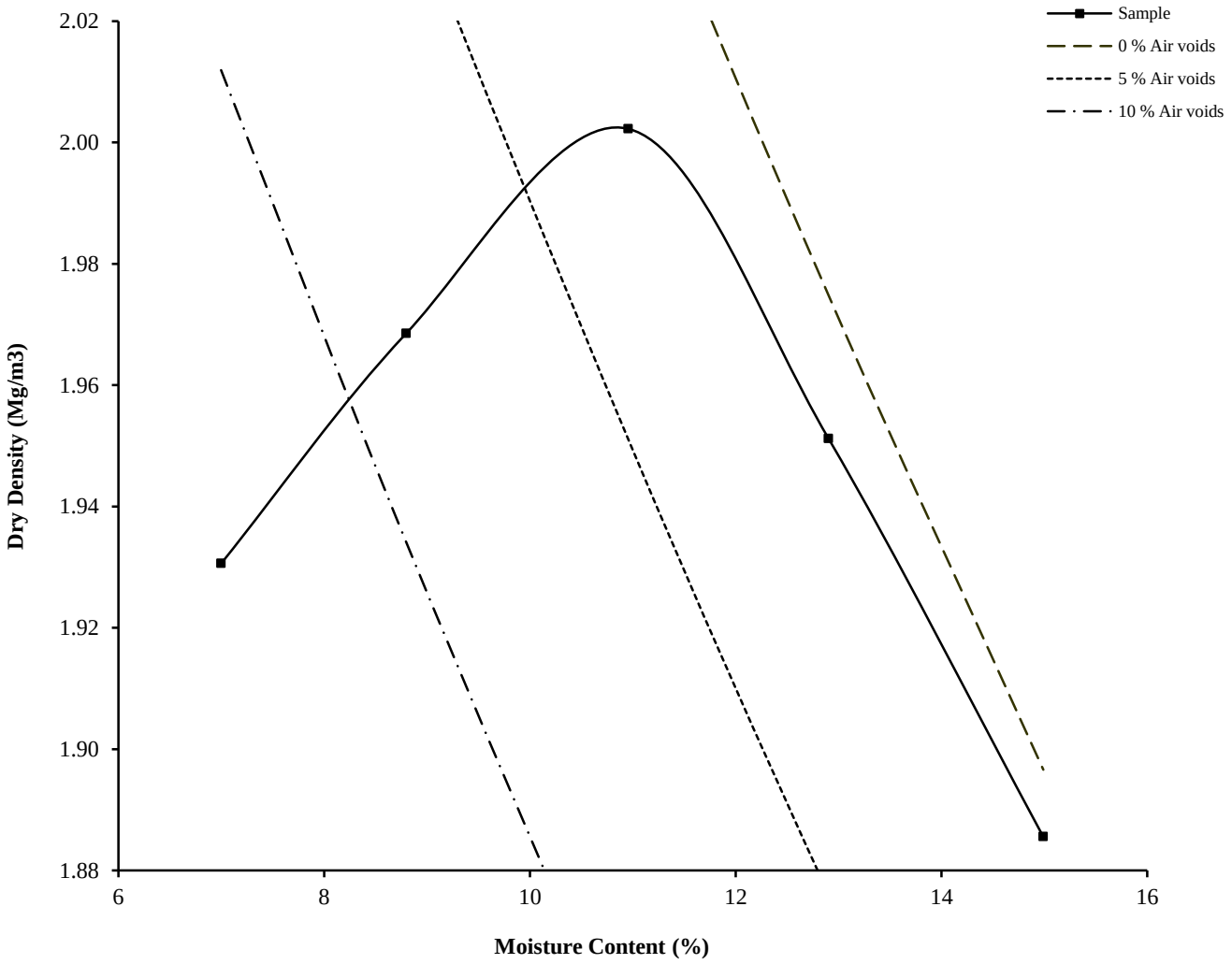
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : 1990

Hole Number: TP303 **Top Depth (m) :** 0.60

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

Sample Type: DB



Initial Moisture Content:		8.8	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Actual	Material Retained on 37.5 mm Test Sieve (%):		59
Maximum Dry Density (Mg/m3):		2.00	Material Retained on 20.0 mm Test Sieve (%):		23
Optimum Moisture Content (%):		11			
Remarks See summary of soil descriptions					

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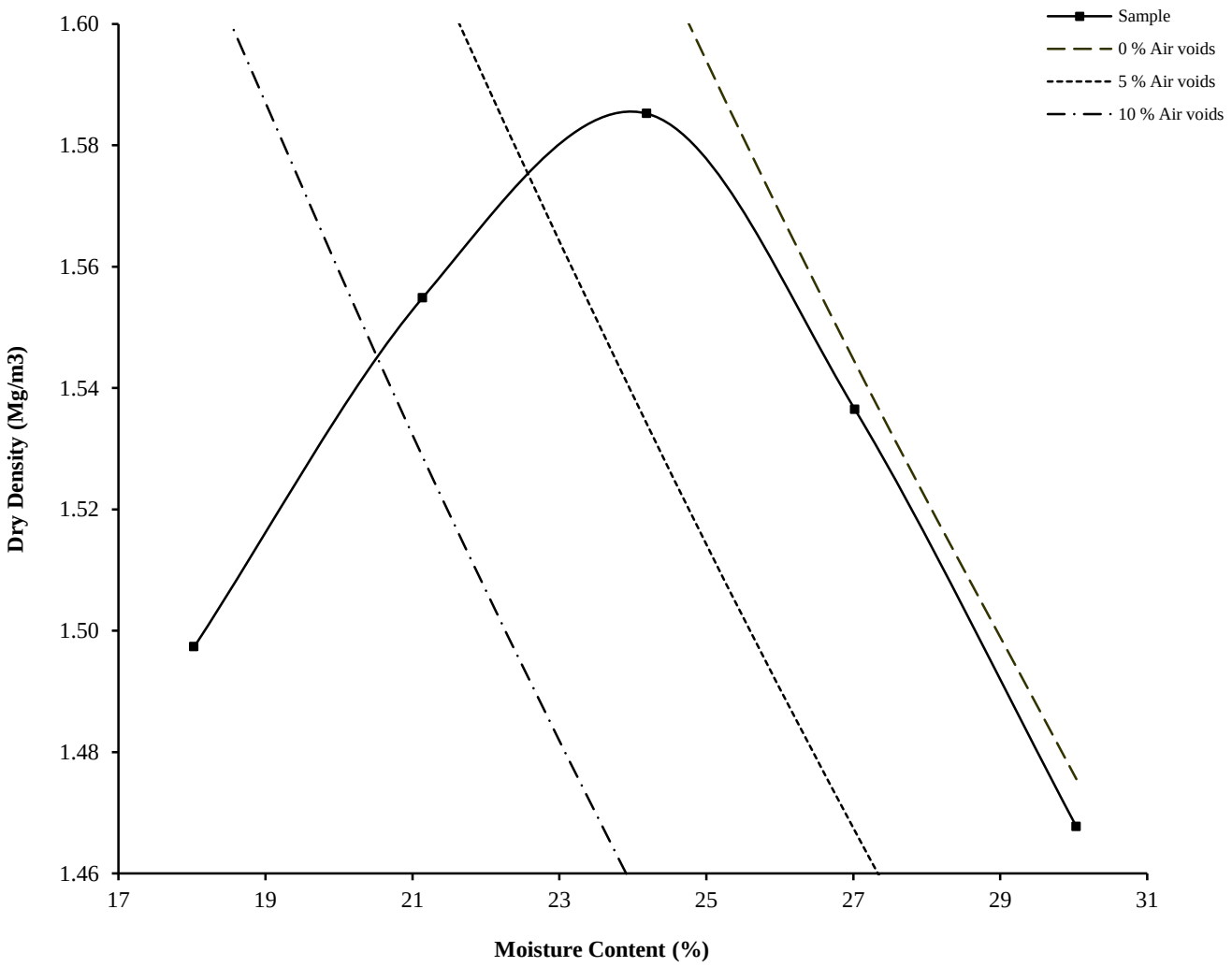
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP304 **Top Depth (m) :** 1.40

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

Sample Type: DB



Initial Moisture Content:		27	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Actual	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.59	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		24			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved		Date 14/06/16	Contract No. PSL16/2130
		Tankersley			Client Ref 4776

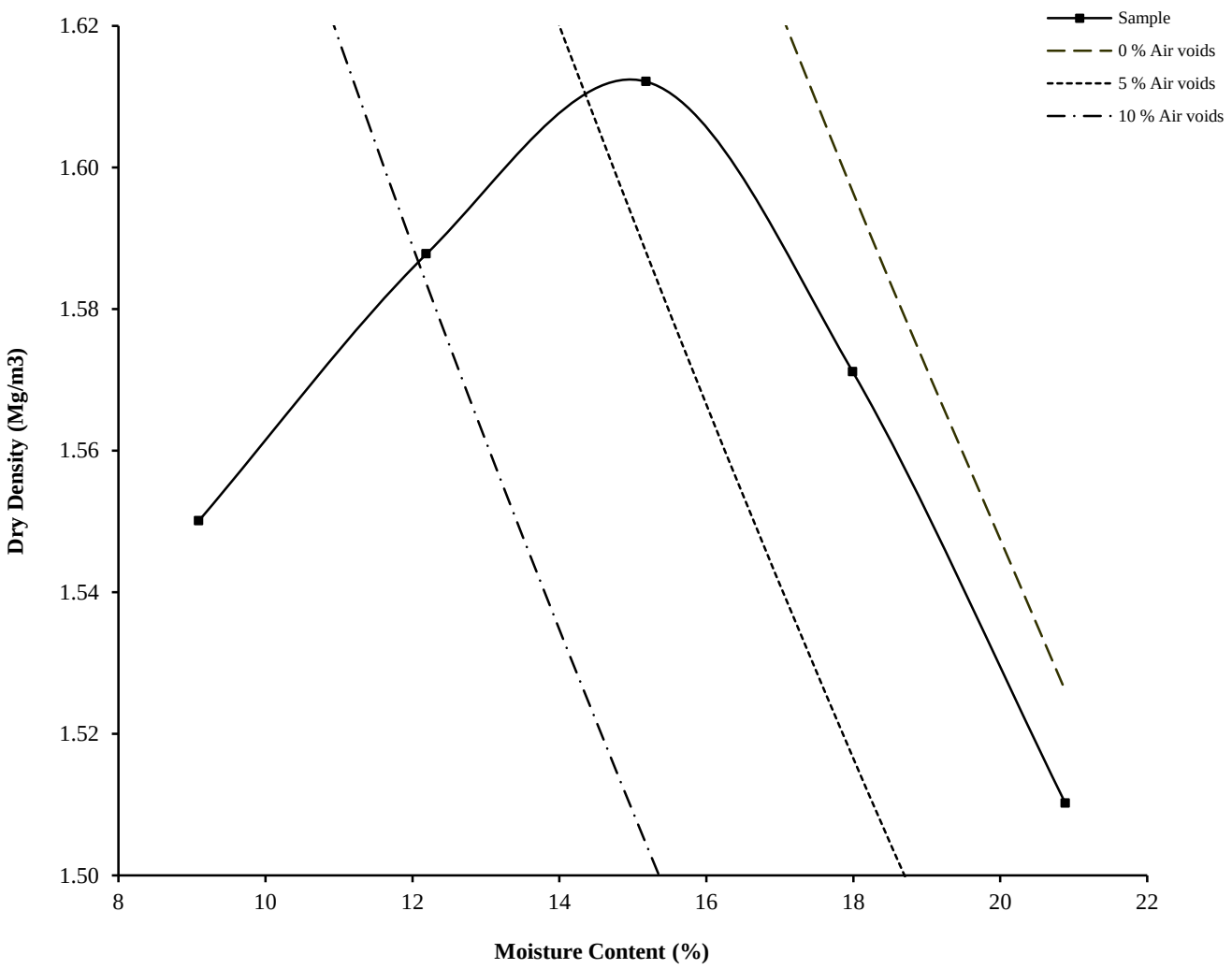
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP307 **Top Depth (m) :** 0.20

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

Sample Type: DB



Initial Moisture Content:		15	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.24	Actual	Material Retained on 37.5 mm Test Sieve (%):		6
Maximum Dry Density (Mg/m3):		1.61	Material Retained on 20.0 mm Test Sieve (%):		3
Optimum Moisture Content (%):		15			
Remarks See summary of soil descriptions					

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		Tankersley		Client Ref 4776

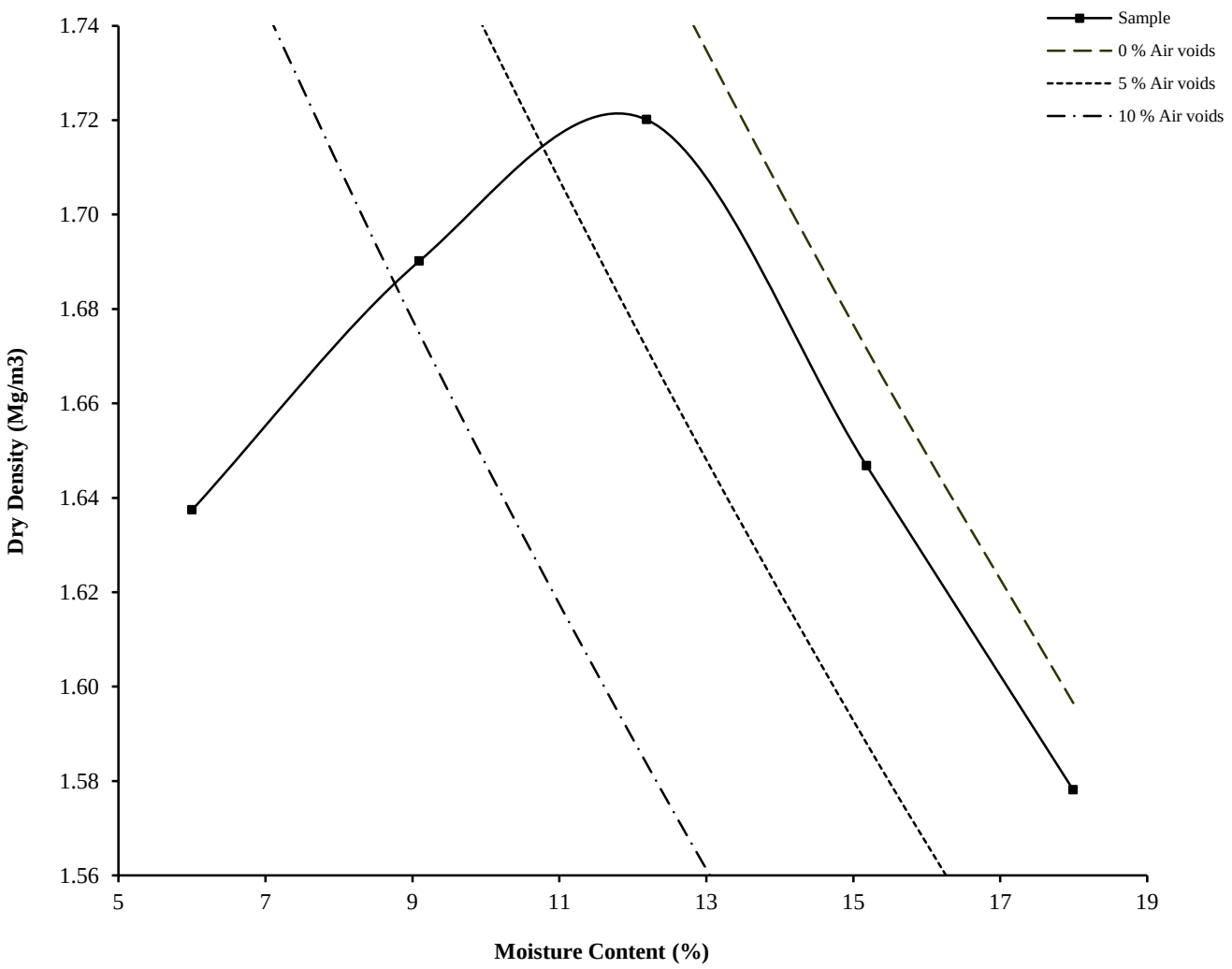
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP307 **Top Depth (m) :** 0.20

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

Sample Type: DB



Initial Moisture Content:		15	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.24	Actual	Material Retained on 37.5 mm Test Sieve (%):		6
Maximum Dry Density (Mg/m3):		1.72	Material Retained on 20.0 mm Test Sieve (%):		3
Optimum Moisture Content (%):		12			
Remarks See summary of soil descriptions					

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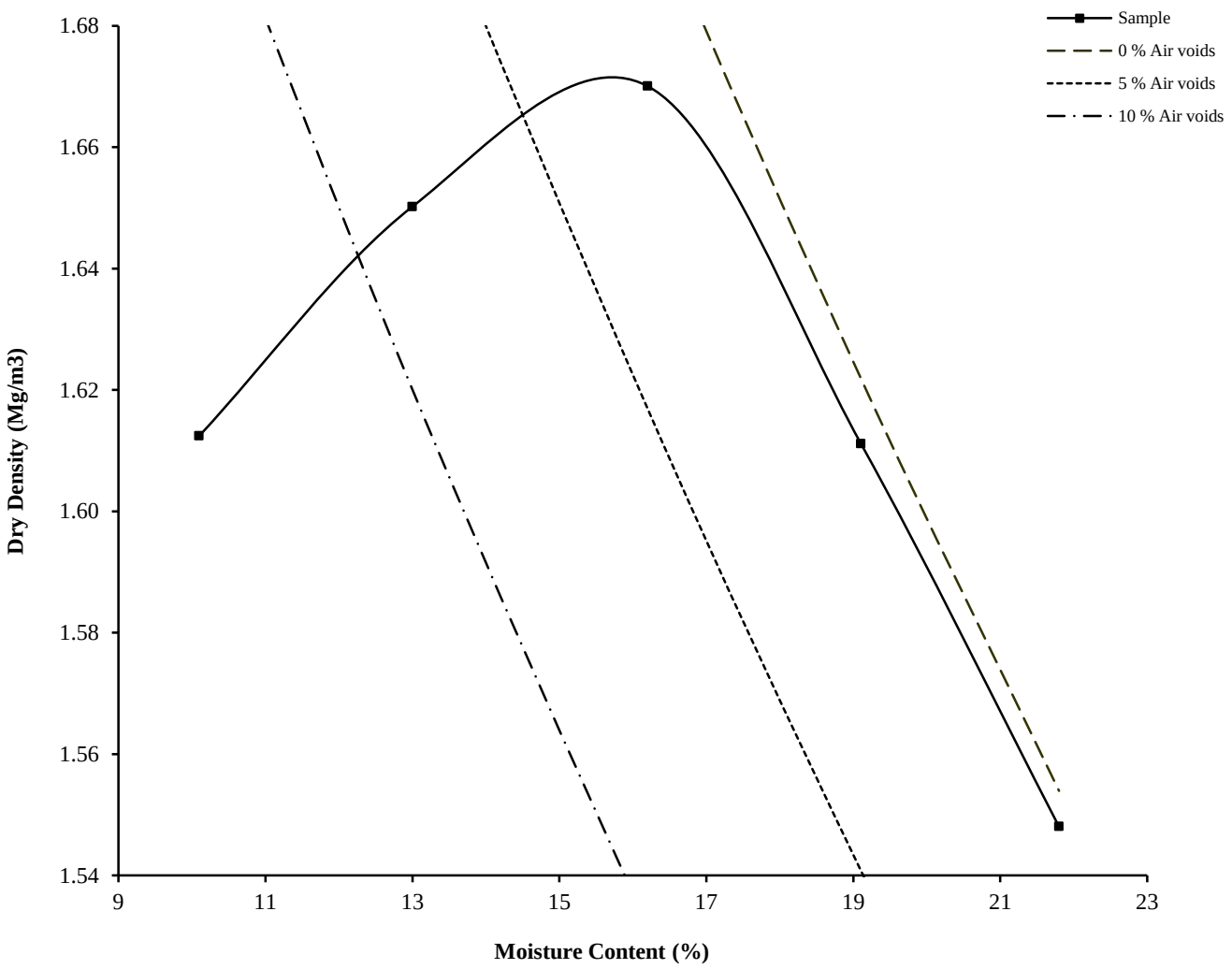
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP319 **Top Depth (m) :** 0.60

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

Sample Type: DB



Initial Moisture Content:		19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.35	Actual	Material Retained on 37.5 mm Test Sieve (%):		3
Maximum Dry Density (Mg/m3):		1.67	Material Retained on 20.0 mm Test Sieve (%):		7
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved		Date 14/06/16	Contract No. PSL16/2130
		Tankersley			Client Ref 4776

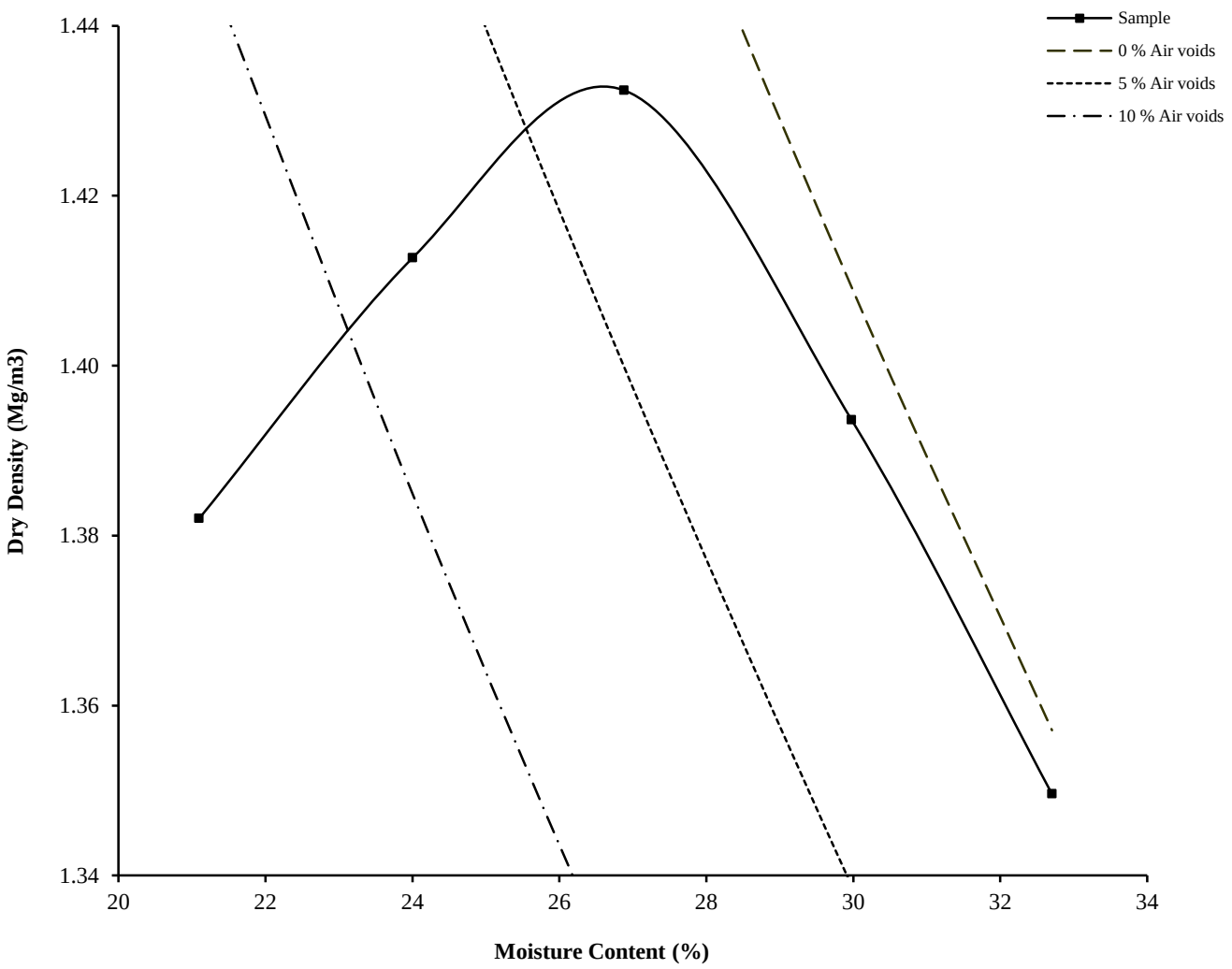
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP324 **Top Depth (m) :** 2.00

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

Sample Type: DB



Initial Moisture Content:		33	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.44	Actual	Material Retained on 37.5 mm Test Sieve (%):		8
Maximum Dry Density (Mg/m3):		1.43	Material Retained on 20.0 mm Test Sieve (%):		11
Optimum Moisture Content (%):		27			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved		Date 14/06/16	Contract No. PSL16/2130
		Tankersley			Client Ref 4776

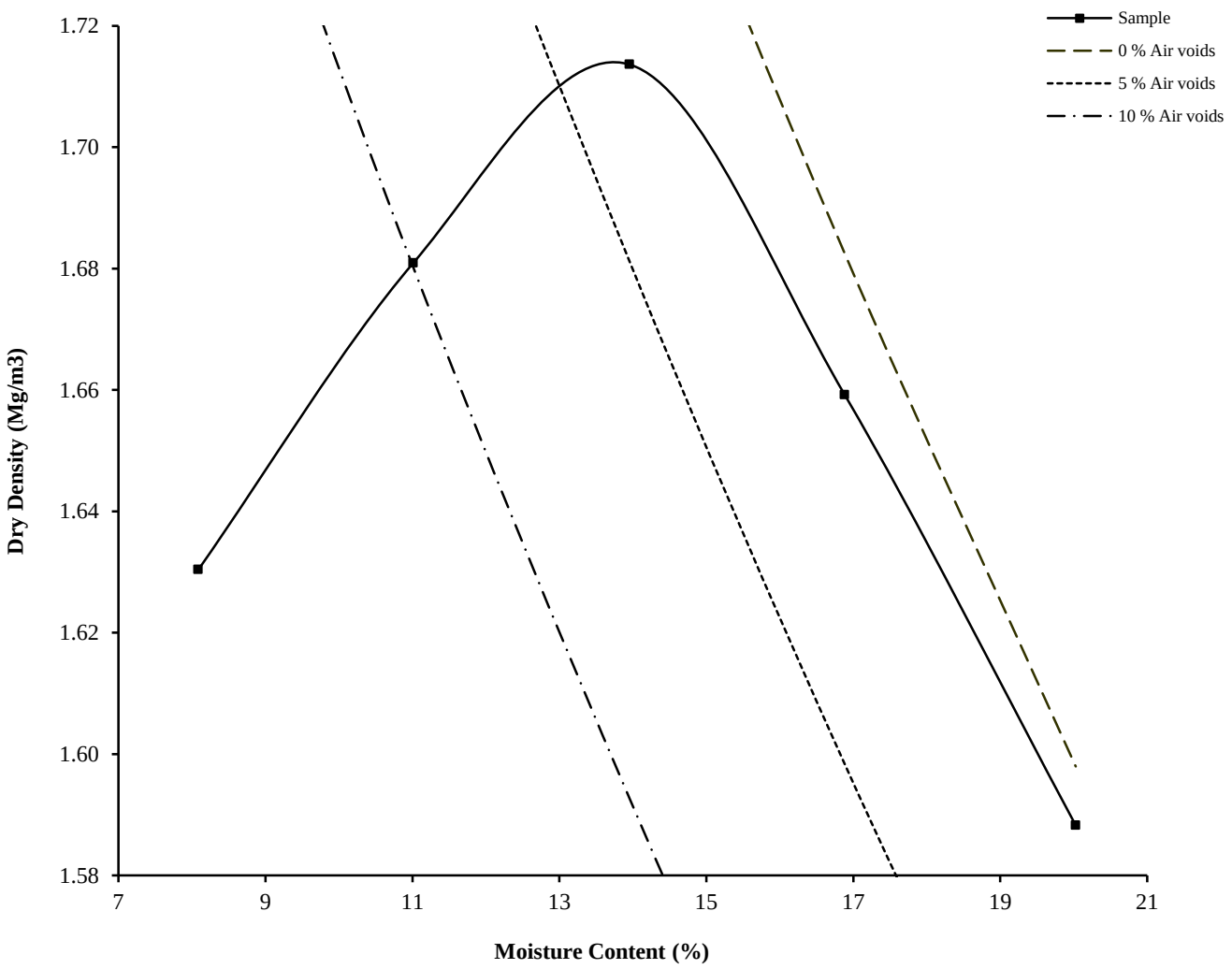
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP359 **Top Depth (m) :** 1.80

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

Sample Type: DB



Initial Moisture Content:		17	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.35	Actual	Material Retained on 37.5 mm Test Sieve (%):		9
Maximum Dry Density (Mg/m3):		1.71	Material Retained on 20.0 mm Test Sieve (%):		8
Optimum Moisture Content (%):		14			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved		Date 15/06/16	Contract No. PSL16/2130
		Tankersley			Client Ref 4776

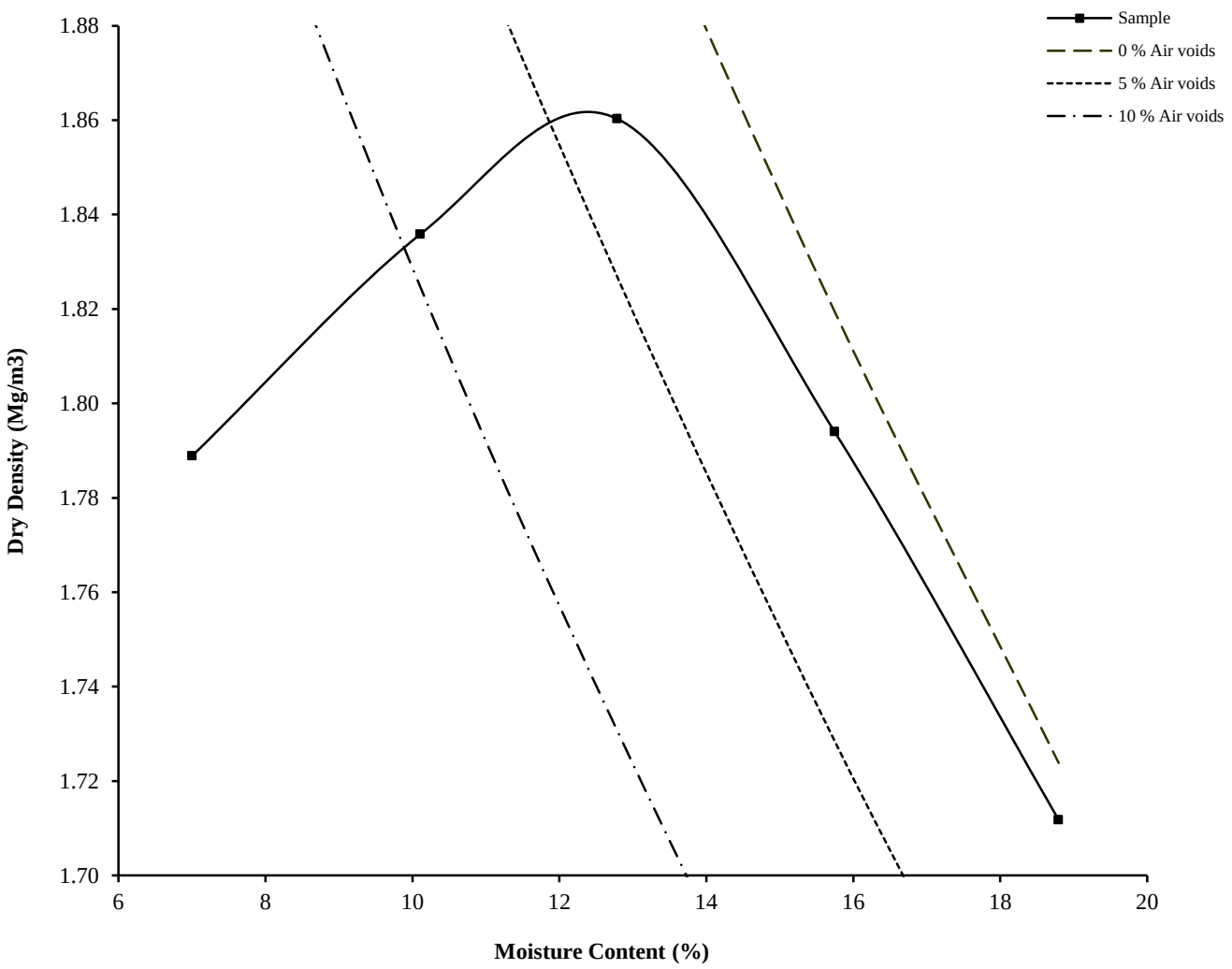
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP331 **Top Depth (m) :** 1.00

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

Sample Type: DB



Initial Moisture Content:		13	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.55	Actual	Material Retained on 37.5 mm Test Sieve (%):		9
Maximum Dry Density (Mg/m3):		1.86	Material Retained on 20.0 mm Test Sieve (%):		18
Optimum Moisture Content (%):		13			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved	Date 15/06/16	Contract No. PSL16/2130
		Tankersley		Client Ref 4776

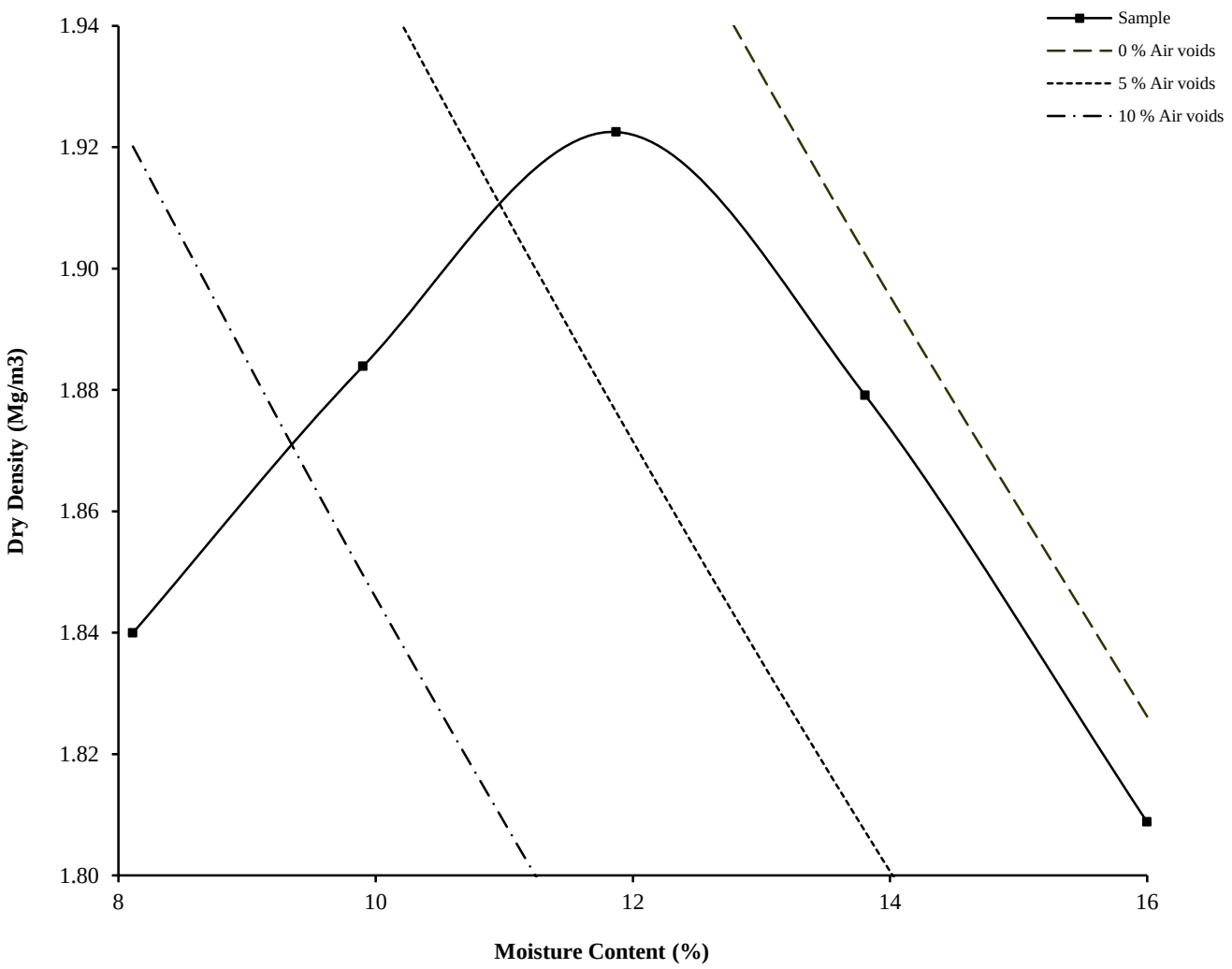
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP332 **Top Depth (m) :** 0.90

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

Sample Type: DB



Initial Moisture Content:		10	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.58	Actual	Material Retained on 37.5 mm Test Sieve (%):		9
Maximum Dry Density (Mg/m3):		1.92	Material Retained on 20.0 mm Test Sieve (%):		20
Optimum Moisture Content (%):		12			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved	Date 15/06/16	Contract No. PSL16/2130
		Tankersley		Client Ref 4776

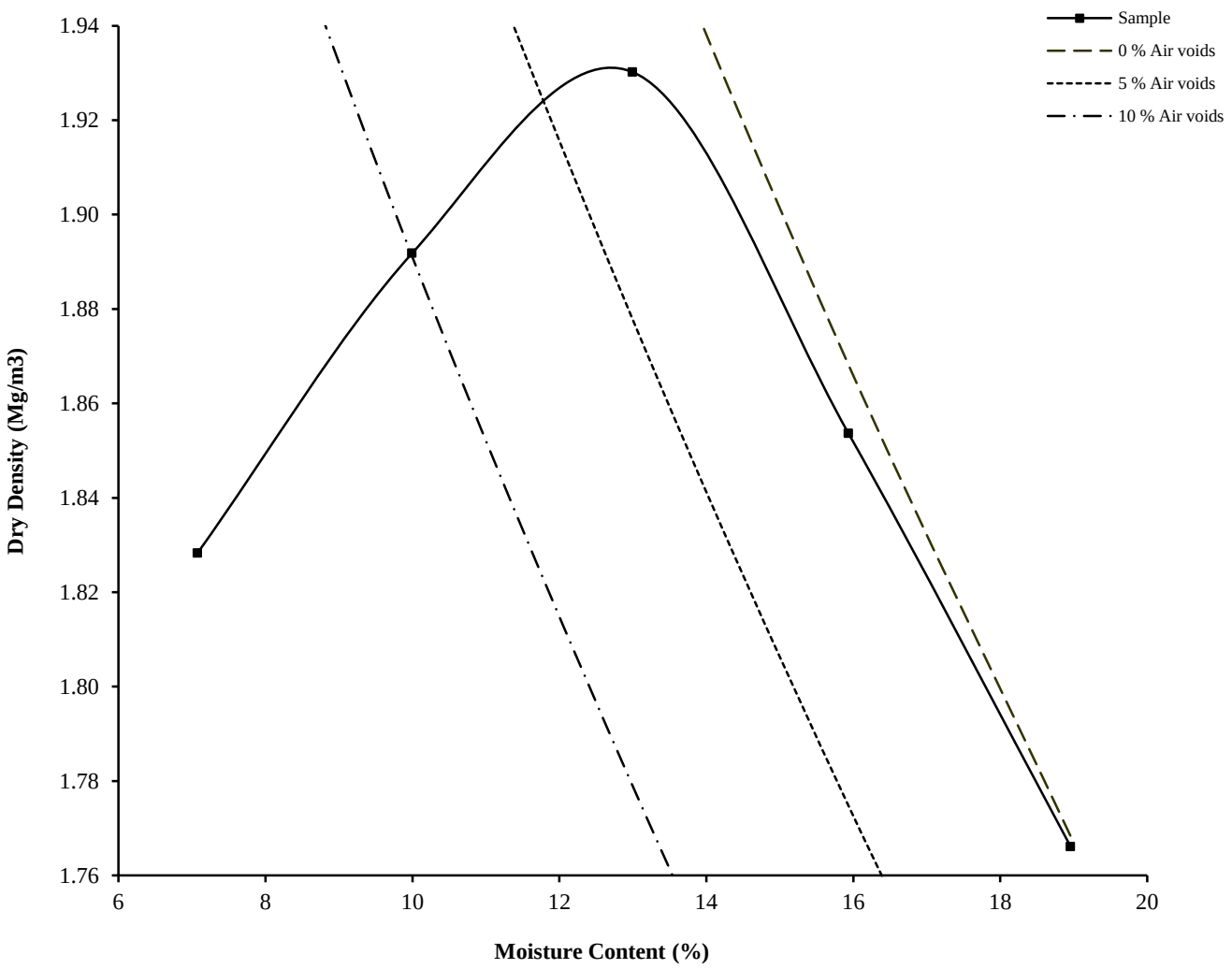
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP337 **Top Depth (m) :** 1.00

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

Sample Type: DB



Initial Moisture Content:		10	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.66	Actual	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.93	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		13			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved	Date 15/06/16	Contract No. PSL16/2130
		Tankersley		Client Ref 4776

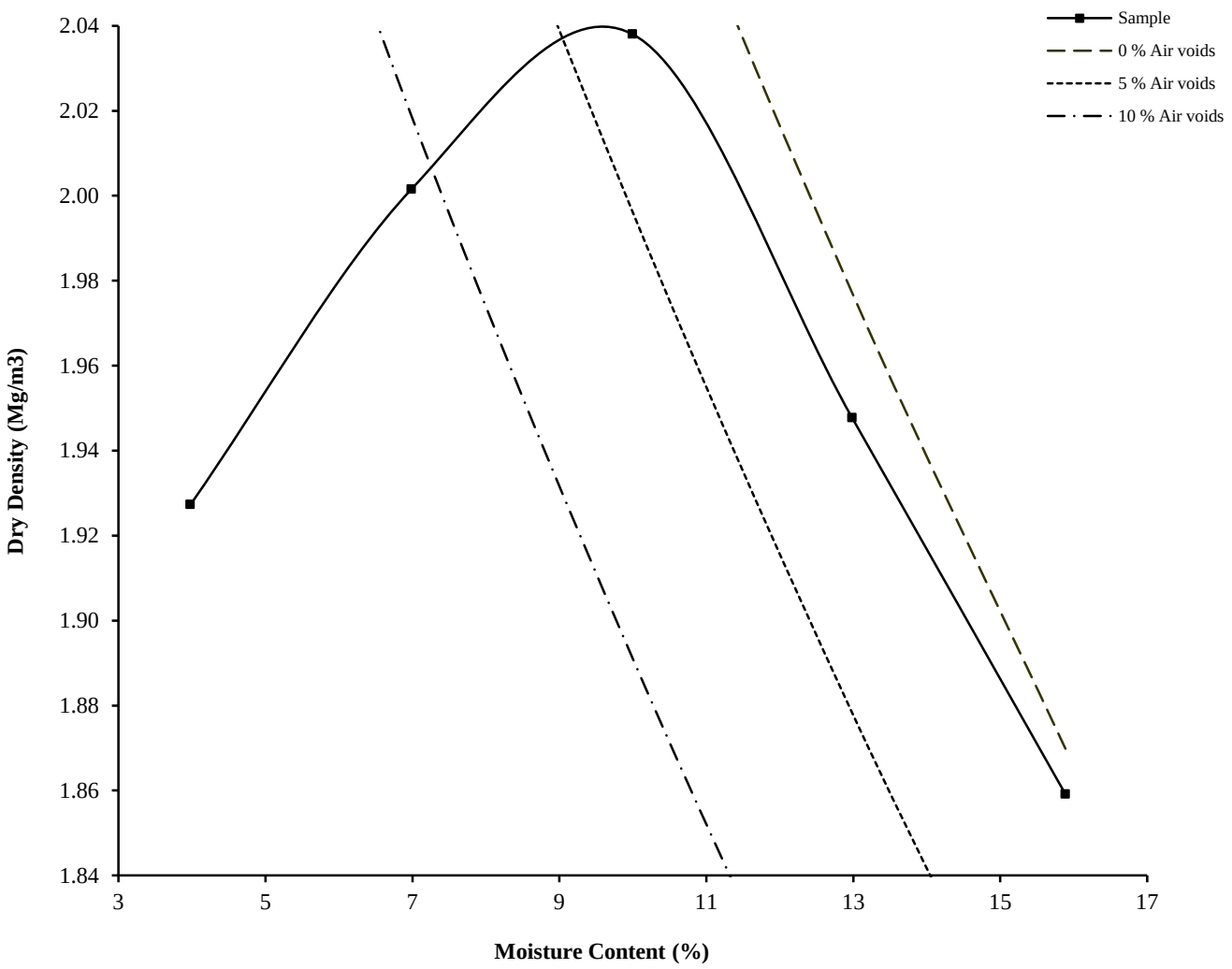
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP337 **Top Depth (m) :** 1.00

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

Sample Type: DB



Initial Moisture Content:		10	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.66	Actual	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		2.04	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		10			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved		Date 15/06/16	Contract No. PSL16/2130
		Tankersley			Client Ref 4776

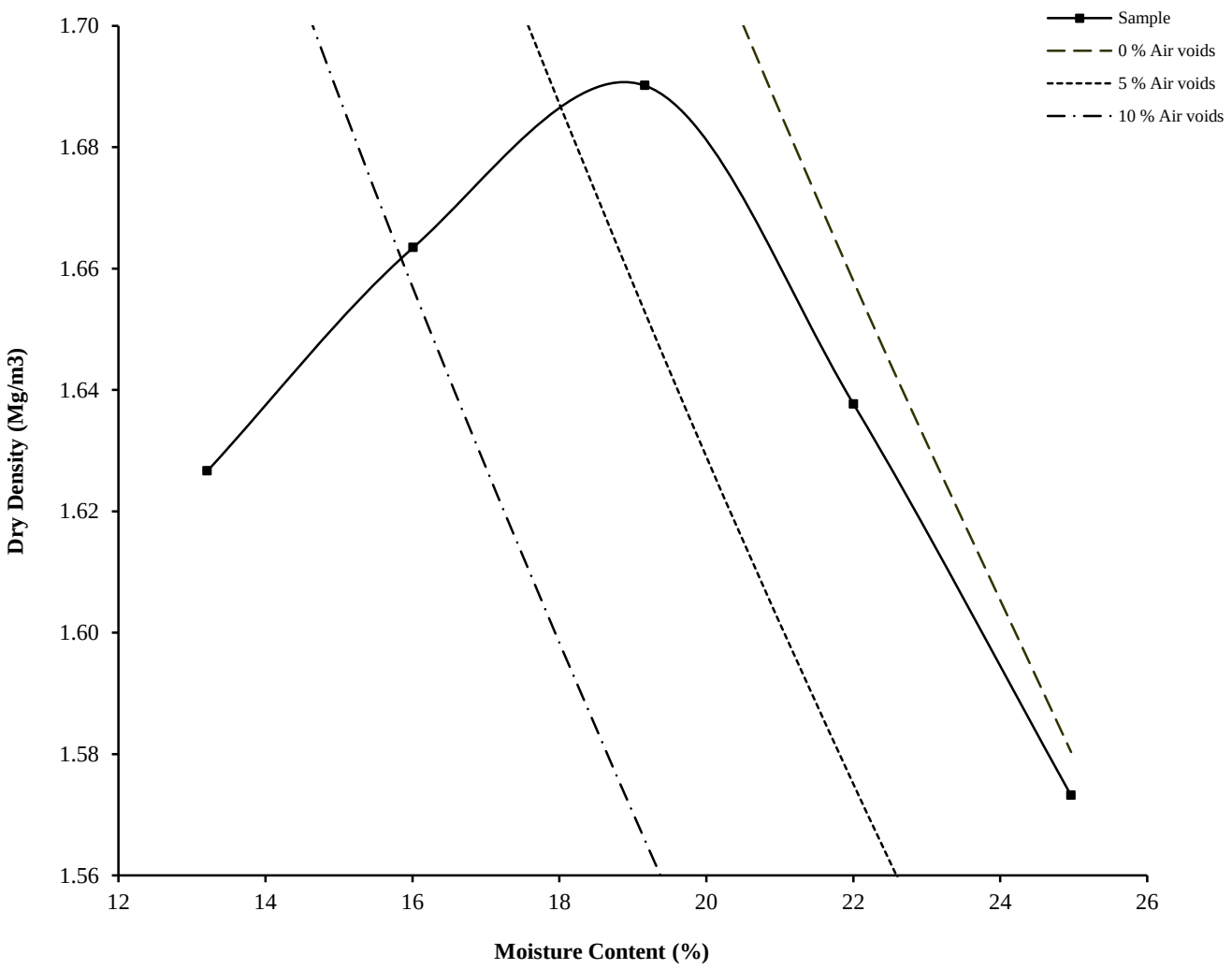
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP344 **Top Depth (m) :** 1.00

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

Sample Type: DB



Initial Moisture Content:		22	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.61	Actual	Material Retained on 37.5 mm Test Sieve (%):		4
Maximum Dry Density (Mg/m3):		1.69	Material Retained on 20.0 mm Test Sieve (%):		2
Optimum Moisture Content (%):		19			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Checked / Approved	Date 15/06/16	Contract No. PSL16/2130
		Tankersley		Client Ref 4776

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 16-68291

07-Jun-16

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

Our Reference	16-68291
Client Reference	PSL16/2130
Order No	(not supplied)
Contract Title	Tankersley
Description	17 Soil samples.
Date Received	01-Jun-16
Date Started	01-Jun-16
Date Completed	07-Jun-16
Test Procedures	Identified by prefix DETSn (details on request).

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

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 16-68291
Client Ref PSL16/2130
Contract Title Tankersley

			Lab No	997570	997571	997572	997573	997574	997575	997576	997577	997578	997579	997580
			Sample ID	TP303	TP304	TP307	TP319	TP324	TP359	TP331	TP332	TP337	TP343	TP344
			Depth	0.60	1.40	0.20	0.60	2.00	1.80	1.00	0.90	1.00	1.00	1.00
			Other ID											
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
			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														
pH	DETSC 2008#			9.0	7.7	5.4	7.7	7.3	7.3	7.8	7.7	8.3	6.2	6.0
Calorific Value	DETSC 5008	1	MJ/kg			3.7	7.4		3.9	< 1.0		< 1.0		< 1.0
Organic matter	DETSC 2002#	0.1	%					4.9						
Chloride	DETSC 2055	1	mg/kg		26.4	9.0		8.1		12.6		13.6	15.5	8.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	31	130	770	150	450	1300	790	74	13	21	110
Sulphur as S, Total	DETSC 2320	0.01	%		0.02	0.29	0.21	0.12	0.52	0.12		< 0.01	< 0.01	0.02
Sulphate as SO4, Total	DETSC 2321#	0.01	%		0.04	0.24	0.10	0.15	0.39	0.20		< 0.01	0.02	0.04

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

Summary of Chemical Analysis

Soil Samples

Our Ref 16-68291
Client Ref PSL16/2130
Contract Title Tankersley

			Lab No	997581	997582	997583	997584	997585	997586
			Sample ID	TP344	TP306	TP304	TP322	TP328	TP336
			Depth	1.70	2.00	0.50	1.20	0.70	1.20
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Inorganics									
pH	DETSC 2008#			6.6					
Calorific Value	DETSC 5008	1	MJ/kg		< 1.0	< 1.0	2.1	10.5	4.4
Organic matter	DETSC 2002#	0.1	%						
Chloride	DETSC 2055	1	mg/kg	11.3					
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1100					
Sulphur as S, Total	DETSC 2320	0.01	%	0.39					
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.47					

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

Information in Support of the Analytical Results

Our Ref 16-68291
Client Ref PSL16/2130
Contract Tankersley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
997570	TP303 0.60 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
997571	TP304 1.40 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997572	TP307 0.20 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Calorific Value (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997573	TP319 0.60 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Calorific Value (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997574	TP324 2.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), Organic Matter (Manual) (730 days), pH + Conductivity (7 days)	
997575	TP359 1.80 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Calorific Value (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997576	TP331 1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Calorific Value (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997577	TP332 0.90 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
997578	TP337 1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Calorific Value (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997579	TP343 1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997580	TP344 1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Calorific Value (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	

Information in Support of the Analytical Results

Our Ref 16-68291
Client Ref PSL16/2130
Contract Tankersley

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
997581	TP344 1.70 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Total Sulphur ICP (365 days), Total Sulphate ICP (730 days), Metals ICP Prep (365 days), pH + Conductivity (7 days)	
997582	TP306 2.00 SOIL		PT 1L	Sample date not supplied, Calorific Value (365 days)	
997583	TP304 0.50 SOIL		PT 1L	Sample date not supplied, Calorific Value (365 days)	
997584	TP322 1.20 SOIL		PT 1L	Sample date not supplied, Calorific Value (365 days)	
997585	TP328 0.70 SOIL		PT 1L	Sample date not supplied, Calorific Value (365 days)	
997586	TP336 1.20 SOIL		PT 1L	Sample date not supplied, Calorific Value (365 days)	

Key: P-Plastic T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 16-68291-1

14-Jun-16

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

Our Reference	16-68291-1
Client Reference	PSL16/2130
Order No	(not supplied)
Contract Title	Tankersley
Description	1 Soil sample.
Date Received	10-Jun-16
Date Started	10-Jun-16
Date Completed	14-Jun-16
Test Procedures	Identified by prefix DETSn (details on request).

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

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 16-68291-1
Client Ref PSL16/2130
Contract Title Tankersley

Lab No	997678
Sample ID	TP343
Depth	1.00
Other ID	
Sample Type	SOIL
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#			8.8
Calorific Value	DETSC 5008	1	MJ/kg	
Organic matter	DETSC 2002#	0.1	%	
Chloride	DETSC 2055	1	mg/kg	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	35
Sulphur as S, Total	DETSC 2320	0.01	%	
Sulphate as SO4, Total	DETSC 2321#	0.01	%	

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

Information in Support of the Analytical Results

Our Ref 16-68291-1
Client Ref PSL16/2130
Contract Tankersley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
997678	TP343 1.40 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix E Gas and Groundwater Monitoring Results

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 1 **Date:** 06/05/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	7.2	0.0	0.0	7.2	1	1	4.6	0.0	0.0	11.58	12.28
BH302	>100	12.1	1.9	>100	12.1	1.9	2	1	0.0	36.4	33.7	11.97	12.26
BH303	1.4	0.0	1.3	0.0	0.0	1.3	2	1	2.7	0.0	0.0	11.57	13.19
BH304	0.0	0.0	1.5	0.0	0.0	1.5	1	1	17.5	0.0	0.0	DRY	6.61
BH305	0.0	0.0	10.3	0.0	0.0	10.3	1	0	0.0	0.0	0.0	5.55	12.05
BH306	0.0	0.0	0.2	0.0	0.0	0.2	1	0	20.8	0.0	0.0	3.17	3.18
BH307	0.0	0.0	0.8	0.0	0.0	0.8	1	1	13.4	0.0	0.0	4.95	4.99
BH308	0.0	0.0	0.8	0.0	0.0	0.8	1	1	20.3	0.0	0.0	1.22	2.57
BH309	0.0	0.0	1.9	0.0	0.0	1.9	2	1	19.9	0.0	0.0	DRY	10.05
BH 310	0.0	0.0	0.1	0.0	0.0	0.1	1	1	1.3	0.0	0.0	4.52	6.92
R301	0.0	0.0	6.1	0.0	0.0	6.1	2	0	8.4	0.0	0.0	7.55	7.57
R302	0.0	0.0	0.6	0.0	0.0	0.6	1	1	20.4	0.0	0.0	2.71	6.70
R303	0.0	0.0	2.0	0.0	0.0	2.0	2	1	19.5	0.0	0.0	4.97	6.93
R304	0.0	0.0	4.0	0.0	0.0	4.0	5	40	0.0	0.0	0.0	7.44	8.59
R305	0.0	0.0	2.2	0.0	0.0	2.2	1	1	18.5	0.0	0.0	5.11	5.16
R306	0.0	0.0	0.8	0.0	0.0	0.8	2	0	18.7	0.0	0.0	6.70	7.01
R307	0.0	0.0	4.2	0.0	0.0	4.2	2	1	14.5	0.0	0.0	6.39	6.39
R308	0.0	0.0	3.0	0.0	0.0	3.0	2	0	18.7	0.0	0.0	DRY	7.28

Ambient Concentration (% volume): **CH_4** 0 %v/v **CO_2** 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 994 **Monitoring Equipment:** Gas Data GFM 430
End 990 **Serial Number of Equipment:** 10301
Barometric Pressure Trend: Falling Falling Regionally **Date of Last Calibration:** 21/07/2015
Weather: Overcast, no wind **Operator:** APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 2 **Date:** 11/05/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	5.7	0.0	0.0	5.7	0	1	7.9	0.0	0.0	11.60	12.28
BH302	>100	14.4	1.4	>100	14.4	1.4	1	1	0.0	30.6	27.3	11.98	12.26
BH303	0.0	0.0	1.2	0.0	0.0	1.2	0	1	0.0	1.0	0.3	11.58	13.19
BH304	0.0	0.0	10.1	0.0	0.0	10.1	2	5	0.0	0.0	0.0	DRY	6.61
BH305	26.0	1.3	9.3	0.0	0.0	9.3	1	1	0.0	0.0	0.0	5.55	12.05
BH306	0.0	0.0	0.3	0.0	0.0	0.3	1	5	20.5	0.0	0.0	3.13	3.18
BH307	0.0	0.0	1.2	0.0	0.0	1.2	1	5	10.6	0.0	0.0	4.99	4.99
BH308	0.0	0.0	4.6	0.0	0.0	4.6	1	1	11.0	0.0	0.0	1.29	2.57
BH309	0.0	0.6	2.5	0.0	0.0	2.5	0	5	18.8	0.0	0.0	9.97	10.05
BH 310	0.0	0.0	2.4	0.0	0.0	2.4	2	0	0.0	0.0	0.0	4.69	6.92
R301	0.0	0.0	0.8	0.0	0.0	0.8	1	1	18.0	0.0	0.0	DRY	7.57
R302	0.0	0.0	0.7	0.0	0.0	0.7	1	1	19.5	0.0	0.0	2.92	6.70
R303	0.0	0.0	2.2	0.0	0.0	2.2	1	1	18.0	0.0	0.0	4.42	6.93
R304	0.0	0.0	4.3	0.0	0.0	4.3	1	6	0.0	0.0	0.0	7.16	8.59
R305	0.0	0.0	4.1	0.0	0.0	4.1	2	1	11.5	0.0	0.0	5.09	5.16
R306	0.0	0.0	2.4	0.0	0.0	1.7	1	0	12.1	0.0	0.0	4.78	7.01
R307	0.0	0.0	2.1	0.0	0.0	1.5	0	0	16.2	0.0	0.0	DRY	6.39
R308	0.0	0.0	0.7	0.0	0.0	0.7	1	0	19.7	0.0	0.0	DRY	7.28

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 986
End 984
Barometric Pressure Trend: Falling Falling Regionally
Weather: Overcast, light breeze (NE)

Monitoring Equipment: Gas Data GFM 430
Serial Number of Equipment: 10301
Date of Last Calibration: 21/07/2015
Operator: APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 3 **Date:** 18/05/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	7.3	0.0	0.0	7.3	1	0	4.4	0.0	0.0	11.62	12.28
BH302	>100	14.3	1.8	>100	14.4	1.8	2	1	0.0	33.1	33.0	12.05	12.26
BH303	0.0	0.0	1.7	0.0	0.0	1.7	1	3	1.4	0.0	0.0	11.66	13.19
BH304	0.0	0.0	0.8	0.0	0.0	0.8	1	1	19.5	0.0	0.0	DRY	6.61
BH305	60.0	3.0	10.1	0.0	0.0	10.1	1	1	0.0	0.0	0.0	5.55	12.05
BH306	0.0	0.0	0.1	0.0	0.0	0.1	0	1	20.7	0.0	0.0	3.05	3.18
BH307	0.0	0.0	1.8	0.0	0.0	1.8	1	1	7.5	0.0	0.0	4.99	4.99
BH308	0.0	0.0	7.0	0.0	0.0	4.0	1	0	10.1	0.0	0.0	1.40	4.99
BH309	0.0	0.0	4.4	0.0	0.0	4.4	0	0	14.5	0.0	0.0	9.99	10.05
BH 310	0.0	0.0	4.8	0.0	0.0	4.8	1	5	2.9	0.0	0.0	4.59	6.92
R301	0.0	0.0	4.2	0.0	0.0	4.2	0	0	11.1	0.0	0.0	7.56	7.57
R302	0.0	0.0	0.8	0.0	0.0	0.8	1	0	19.9	0.0	0.0	2.95	6.70
R303	0.0	0.0	2.3	0.0	0.0	2.3	0	0	18.1	0.0	0.0	5.23	6.93
R304	0.0	0.0	4.0	0.0	0.0	4.0	1	8	0.0	0.0	0.0	7.40	8.59
R305	0.0	0.0	2.1	0.0	0.0	2.1	1	3	19.4	0.0	0.0	5.11	5.16
R306	0.0	0.0	1.8	0.0	0.0	1.8	1	3	12.3	0.0	0.0	6.13	7.01
R307	0.0	0.0	6.9	0.0	0.0	6.9	1	3	11.9	0.0	0.0	DRY	6.39
R308	0.0	0.0	4.9	0.0	0.0	4.9	0	3	16.7	0.0	0.0	DRY	7.28

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 981 **Monitoring Equipment:** Gas Data GFM 430
End 980 **Serial Number of Equipment:** 10301
Barometric Pressure Trend: Falling Falling Regionally **Date of Last Calibration:** 21/07/2015
Weather: Overcast, light breeze (N) **Operator:** APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 4 **Date:** 23/05/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	5.4	0.0	0.0	5.4	1	0	10.1	0.0	0.0	11.64	12.28
BH302	0.0	0.0	0.0	0.0	0.0	0.0	1	0	20.7	-36.9	-34.9	DRY	12.26
BH303	0.0	0.0	1.8	0.0	0.0	1.8	1	0	7.0	0.0	0.0	11.77	13.19
BH304	0.0	0.0	0.7	0.0	0.0	0.7	1	0	19.1	0.0	0.0	DRY	6.61
BH305	0.0	0.0	9.9	0.0	0.0	9.9	0	0	0.0	0.0	0.0	5.57	12.05
BH306	0.0	0.0	0.2	0.0	0.0	0.2	1	0	20.6	0.0	0.0	3.02	3.18
BH307	0.0	0.0	1.1	0.0	0.0	1.1	1	0	11.8	0.0	0.0	4.98	4.99
BH308	0.0	0.0	6.7	0.0	0.0	4.3	0	0	8.7	0.0	0.0	1.47	4.99
BH309	0.0	0.0	4.3	0.0	0.0	4.3	1	0	14.2	0.0	0.0	10.01	10.05
BH 310	0.0	0.0	2.0	0.0	0.0	2.0	0	0	15.2	0.0	0.0	4.60	6.92
R301	0.0	0.0	0.0	0.0	0.0	0.0	1	0	20.7	0.0	0.0	DRY	7.57
R302	0.0	0.0	0.6	0.0	0.0	0.6	1	0	19.7	0.0	0.0	3.10	6.70
R303	0.0	0.0	2.4	0.0	0.0	2.4	1	0	15.8	0.0	0.0	4.27	6.93
R304	0.0	0.0	1.0	0.0	0.0	1.0	1	0	18.1	0.0	0.0	7.55	8.59
R305	0.0	0.0	0.5	0.0	0.0	0.5	1	0	20.4	0.0	0.0	4.90	5.16
R306	0.0	0.0	1.3	0.0	0.0	1.1	1	0	16.5	-5.9	0.0	5.75	7.01
R307	0.0	0.0	0.4	0.0	0.0	0.4	1	0	20.5	0.0	0.0	6.39	6.39
R308	0.0	0.0	2.0	0.0	0.0	2.0	0	0	15.2	0.0	0.0	DRY	7.28

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 999 **Monitoring Equipment:** Gas Data GFM 430
End 992 **Serial Number of Equipment:** 10301
Barometric Pressure Trend: Falling Rising Regionally **Date of Last Calibration:** 21/07/2015
Weather: Overcast, light breeze (NE) **Operator:** APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 5 **Date:** 02/06/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	8.5	0.0	0.0	8.1	1	0	5.8	0.0	0.0	11.67	12.28
BH302	0.0	0.0	0.6	0.0	0.0	0.6	1	1	17.3	4.6	4.2	DRY	12.26
BH303	0.0	0.0	2.4	0.0	0.0	2.4	0	0	4.8	0.0	0.0	11.89	13.19
BH304	0.0	0.0	10.5	0.0	0.0	10.2	1	0	0.1	0.0	0.0	DRY	6.61
BH305	0.0	0.0	11.6	0.0	0.0	11.6	2	1	0.0	0.0	0.0	5.56	12.05
BH306	0.0	0.0	0.2	0.0	0.0	0.1	1	1	20.8	0.0	0.0	3.07	3.18
BH307	0.0	0.0	3.2	0.0	0.0	3.2	1	0	13.9	0.0	0.0	4.99	4.99
BH308	0.0	0.0	4.8	0.0	0.0	4.2	1	0	11.1	0.0	0.0	1.65	4.99
BH309	0.0	0.0	8.1	0.0	0.0	8.1	1	0	8.5	0.0	0.0	10.00	10.05
BH 310	0.0	0.0	6.4	0.0	0.0	6.4	0	0	1.3	0.0	0.0	4.95	6.92
R301	0.0	0.0	0.2	0.0	0.0	0.2	0	0	20.5	0.0	0.0	DRY	7.57
R302	0.0	0.0	0.9	0.0	0.0	0.9	0	0	19.9	0.0	0.0	3.22	6.70
R303	0.0	0.0	2.4	0.0	0.0	2.4	0	0	18.3	0.0	0.0	5.53	6.93
R304	0.0	0.0	4.2	0.0	0.0	4.2	0	0	0.0	0.0	0.0	7.96	8.59
R305	0.0	0.0	4.6	0.0	0.0	4.6	1	0	16.3	0.0	0.0	5.10	5.16
R306	0.0	0.0	1.9	0.0	0.0	1.9	0	0	11.9	0.0	0.0	DRY	7.01
R307	0.0	0.0	1.8	0.0	0.0	1.8	1	0	19.3	0.0	0.0	6.47	6.39
R308	0.0	0.0	0.0	0.0	0.0	0.0	1	0	20.8	0.0	0.0	DRY	7.28

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 1006
End 1002
Barometric Pressure Trend: Falling. Steady regionally.
Weather: Overcast and dry. Breezy.

Monitoring Equipment: Gas Data GFM 430
Serial Number of Equipment: 10301
Date of Last Calibration: 21/07/2015
Operator: JP

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 6 **Date:** 10/06/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	4.5	0.0	0.0	4.5	2	3	14.0	0.0	0.0	11.67	12.28
BH302	>100	9.2	2.4	>100	9.2	2.4	2	0	0.0	10.2	9.6	DRY	12.26
BH303	0.0	0.0	2.2	0.0	0.0	2.2	2	1	4.3	0.0	0.0	11.91	13.19
BH304	0.0	0.0	6.8	0.0	0.0	6.8	2	3	7.2	0.0	0.0	DRY	6.61
BH305	0.0	0.0	10.6	0.0	0.0	10.6	3	0	0.0	0.0	0.0	5.56	12.05
BH306	0.0	0.0	0.4	0.0	0.0	0.4	2	1	20.8	0.0	0.0	3.05	3.18
BH307	0.0	0.0	3.1	0.0	0.0	2.8	1	5	5.4	0.0	0.0	DRY	4.99
BH308	0.0	0.0	5.6	0.0	0.0	5.6	3	5	5.7	0.0	0.0	1.79	2.57
BH309	0.0	0.0	0.4	0.0	0.0	0.4	1	3	20.3	0.0	0.0	9.97	10.05
BH 310	0.0	0.0	4.9	0.0	0.0	4.9	0	0	7.1	0.0	0.0	5.02	6.92
R301	0.0	0.0	3.2	0.0	0.0	3.2	2	1	14.7	0.3	0.0	DRY	7.57
R302	0.0	0.0	1.7	0.0	0.0	1.7	1	6	15.1	0.0	0.0	3.45	6.70
R303	0.0	0.0	2.1	0.0	0.0	2.1	1	0	18.8	0.0	0.0	DRY	6.93
R304	0.0	0.0	3.8	0.0	0.0	3.8	1	5	0.0	0.0	0.0	8.27	8.59
R305	0.0	0.0	10.4	0.0	0.0	10.4	1	0	10.4	0.0	0.0	5.10	5.16
R306	0.0	0.0	2.5	0.0	0.0	2.5	1	0	6.8	0.0	0.0	7.01	7.01
R307	0.0	0.0	9.6	0.0	0.0	9.6	1	0	3.7	0.0	0.0	6.39	6.39
R308	0.0	0.0	4.0	0.0	0.0	4.0	0	0	18.7	0.0	0.0	DRY	7

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 993
End 987
Barometric Pressure Trend: Falling. Falling regionally.
Weather: Overcast, warm, light breeze (NE).

Monitoring Equipment: Gas Data GFM 430
Serial Number of Equipment: 10301
Date of Last Calibration: 21/07/2015
Operator: APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 7 **Date:** 14/06/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	4.6	0.0	0.0	4.6	1	0	10.8	0.0	0.0	11.68	12.28
BH302	>100	13.4	2.1	>>	13.4	2.1	1	0	0.0	33.0	31.5	11.84	12.26
BH303	0.0	0.0	4.1	0.0	0.0	4.1	1	0	4.5	7.8	5.8	-	13.19
BH304	0.0	0.0	9.4	0.0	0.0	9.4	1	0	1.9	0.0	0.0	DRY	6.61
BH305	>100	>5	12.0	0.0	0.0	12.0	1	0	0.0	0.0	0.0	5.50	12.05
BH306	0.0	0.0	0.2	0.0	0.0	0.2	1	0	20.7	0.0	0.0	2.91	3.18
BH307	0.0	0.0	4.8	0.0	0.0	4.8	0	0	0.1	0.0	0.0	3.99	4.99
BH308	19.3	0.8	6.4	0.0	0.0	0.9	1	0	0.0	0.0	0.0	1.29	2.57
BH309	0.0	0.0	1.0	0.0	0.0	1.0	1	0	19.5	0.0	0.0	9.97	10.05
BH 310	0.0	0.0	8.9	0.0	0.0	8.9	0	0	0.0	0.0	0.0	3.88	6.92
R301	0.0	0.0	5.0	0.0	0.0	5.0	1	0	11.3	0.0	0.0	7.47	7.57
R302	0.0	0.0	0.9	0.0	0.0	0.9	0	0	4.3	0.0	0.0	3.06	6.70
R303	0.0	0.0	2.1	0.0	0.0	2.1	0	0	17.4	0.0	0.0	1.56	6.93
R304	0.0	0.0	3.9	0.0	0.0	3.9	0	0	0.0	0.0	0.0	6.83	8.59
R305	0.0	0.0	4.1	0.0	0.0	4.1	0	5	9.4	0.0	0.0	5.08	5.16
R306	0.0	0.0	2.0	0.0	0.0	1.5	0	1	8.2	0.0	0.0	5.07	7.01
R307	0.0	0.0	4.9	0.0	0.0	4.9	1	5	10.0	0.0	0.0	6.33	6.39
R308	0.0	0.0	3.5	0.0	0.0	3.5	1	0	18.8	0.0	0.0	DRY	7

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 21.2 %v/v

Barometric Pressure: **Start** 975
End 972
Barometric Pressure Trend: Falling. Falling regionally.
Weather: Overcast, cool, light breeze (NE).

Monitoring Equipment: Gas Data GFM 430
Serial Number of Equipment: 10301
Date of Last Calibration: 21/07/2015
Operator: APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

GAS AND GROUNDWATER MONITORING RESULTS

Site: Wentworth Way, Tankersley
Job No: 4776 **Client:** Wilton Development Limited
Visit No: 8 **Date:** 20/06/2016

Monitoring Location	Gas Concentration									Gas Emission Rate		GWL	Base of Standpipe
	Peak			Steady			Highest	Highest	Lowest				
BH	CH_4		CO_2	CH_4		CO_2	H_2S	CO	O_2	Litre/Hour			
	% lel	%v/v	%	% lel	%v/v	%	ppm	ppm	%	Peak	Steady	(m) bgl	(m) bgl
BH301	0.0	0.0	5.8	0.0	0.0	5.8	1	5	9.9	0.0	0.0	11.62	12.28
BH302	87.9	3.8	4.5	87.9	3.8	4.5	2	6	0.0	34.4	30.5	DRY	12.26
BH303	0.0	0.0	1.8	0.0	0.0	1.8	2	6	2.8	0.0	0.0	11.41	13.19
BH304	0.0	0.0	1.0	0.0	0.0	0.8	2	1	18.4	0.0	0.0	DRY	6.61
BH305	2.3	1.2	12.9	0.0	0.0	12.1	2	5	0.0	0.0	0.0	5.52	12.05
BH306	0.0	0.0	0.1	0.0	0.0	0.1	1	5	20.6	0.0	0.0	2.93	3.18
BH307	0.0	0.0	4.9	0.0	0.0	4.9	1	5	0.8	0.0	0.0	4.45	4.99
BH308	0.0	0.0	0.4	0.0	0.0	0.4	1	5	20.3	0.0	0.0	0.57	2.57
BH309	0.0	0.0	2.1	0.0	0.0	2.1	5	5	18.3	0.0	0.0	9.96	10.05
BH 310	0.0	0.0	4.8	0.0	0.0	4.8	1	1	3.8	0.0	0.0	3.48	6.92
R301	0.0	0.0	0.9	0.0	0.0	0.9	1	5	17.5	0.0	0.0	7.46	7.57
R302	0.0	0.0	0.9	0.0	0.0	0.9	1	5	15.4	0.0	0.0	2.44	6.70
R303	0.0	0.0	2.4	0.0	0.0	2.4	1	5	17.4	0.0	0.0	2.87	6.93
R304	0.0	0.0	4.1	0.0	0.0	4.1	5	25	0.0	0.0	0.0	6.79	8.59
R305	0.0	0.0	3.0	0.0	0.0	3.0	1	5	15.9	0.0	0.0	5.09	5.16
R306	0.0	0.0	2.7	0.0	0.0	2.2	2	5	5.9	0.0	0.0	3.93	7.01
R307	0.0	0.0	10.7	0.0	0.0	10.7	1	1	1.8	0.2	0.0	6.39	6.39
R308	0.0	0.0	4.7	0.0	0.0	4.7	1	5	15.8	0.0	0.0	7.28	7.28

Ambient Concentration (% volume): CH_4 0 %v/v CO_2 0 %v/v
O_2 20.9 %v/v

Barometric Pressure: **Start** 987
End 984
Barometric Pressure Trend: Falling. Falling regionally.
Weather: Overcast, cool, light rain, light breeze (W).

Monitoring Equipment: Gas Data GFM 430
Serial Number of Equipment: 10301
Date of Last Calibration: 21/07/2015
Operator: APN

Key	Remarks
NR - Not Recorded NA - Not Applicable OS - Off Scale	

Checked: **Approved:**

SUMMARY OF GROUND GAS MONITORING

BH NO.	Peak CH4 (% v/v) MIN	Peak CH4 (% v/v) MAX	Steady CH4 (% v/v) MIN	Steady CH4 (% v/v) MAX	Peak CO2 (% v/v) MIN	Peak CO2 (% v/v) MAX	Steady CO2 (% v/v) MIN	Steady CO2 (% v/v) MAX	O2 (% v/v) MIN	O2 (% v/v) MAX	max limiting bh flow rate for CH4	max limiting bh flow rate for CO2	Peak Flow (l/hr) MAX	Steady Flow (l/hr) MAX	SWL (m bgl) MIN	SWL (m bgl) MAX
BH301	0	0.0	0	0	4.5	8.5	4.5	8.1	4.4	14	0	0	0.0	0.0	11.58	11.68
BH302	0	14.4	0	14	0	4.5	0	4.5	0	20.7	4.8528	1.5165	36.4	33.7	11.84	12.05
BH303	0	0.0	0	0	1.2	4.1	1.2	4.1	0	7	0	0.2378	7.8	5.8	11.41	11.91
BH304	0	0.0	0	0	0.7	10.5	0.7	10.2	0	19.5	0	0	0.0	0.0	DRY	DRY
BH305	0	3.0	0	0	9.3	12.9	9.3	12.1	0	0	0	0	0.0	0.0	5.50	5.57
BH306	0	0.0	0	0	0.1	0.4	0.1	0.4	20.5	20.8	0	0	0.0	0.0	2.91	3.17
BH307	0	0.0	0	0	0.8	4.9	0.8	4.9	0.1	13.9	0	0	0.0	0.0	3.99	4.99
BH308	0	0.8	0	0	0.4	7	0.4	5.6	0	20.3	0	0	0.0	0.0	0.57	1.79
BH309	0	0.6	0	0	0.4	8.1	0.4	8.1	8.5	20.3	0	0	0.0	0.0	9.96	10.01
BH 310	0	0.0	0	0	0.1	8.9	0.1	8.9	0	15.2	0	0	0.0	0.0	3.48	5.02
R301	0	0.0	0	0	0	6.1	0	6.1	8.4	20.7	0	0	0.3	0.0	7.46	7.56
R302	0	0.0	0	0	0.6	1.7	0.6	1.7	4.3	20.4	0	0	0.0	0.0	2.44	3.45
R303	0	0.0	0	0	2	2.4	2	2.4	15.8	19.5	0	0	0.0	0.0	1.56	5.53
R304	0	0.0	0	0	1	4.3	1	4.3	0	18.1	0	0	0.0	0.0	6.79	8.27
R305	0	0.0	0	0	0.5	10.4	0.5	10.4	9.4	20.4	0	0	0.0	0.0	4.90	5.11
R306	0	0.0	0	0	0.8	2.7	0.8	2.5	5.9	18.7	0	0	0.0	0.0	3.93	7.01
R307	0	0.0	0	0	0.4	10.7	0.4	10.7	1.8	20.5	0	0	0.2	0.0	6.33	6.47
R308	0	0.0	0	0	0	4.9	0	4.9	15.2	20.8	0	0	0.0	0.0	7.28	7.28

	VISIT 1	VISIT 2	VISIT 3	VISIT 4	VISIT 5	VISIT 6	VISIT 7	VISIT 8	VISIT 9	VISIT 10	VISIT 11	VISIT 12
MB Start	994	986	981	999	1006	993	975	987				
MB Finish	990	984	980	992	1002	987	972	984				
Pressure Change	Falling	Falling	Falling	Rising	Steady	Falling	Falling	Falling				

Appendix F Notes on Limitations

General

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

JPG (Leeds) Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) this document to any third party with whom an agreement has not been executed.

Phase I Desk Study Reports

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JPG (Leeds) Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Geo-Environmental Investigations

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics and ground and groundwater conditions to allow a reasonable assessment of the environmental risks together with engineering and development implications. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and groundwater.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

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