A REPORT ON A GROUND INVESTIGATION FOR A PROPOSED ANAEROBIC DIGESTION PLANT AT SS AGRI, ELLINGHAM ROAD, ATTLEBOROUGH, NORFOLK, NR17 1AE

CLIENT: Privilege Finance Services

ENGINEER: Plandescil Limited

Date: 7 October 2019

Reference: JAH/19.287

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1. INTRODUCTION

A F Howland Associates Limited (AFHA) was instructed by Privilege Finance Services to carry out a ground investigation for the proposed extension to an existing anaerobic digestion (AD) plant at SS Agri, Ellingham Road, Attleborough, Norfolk, NR18 1AE (Drawing 19.287/01). This was required to provide information on the subsoil conditions and relevant geotechnical parameters pertinent to the proposed buildings, tanks, and ancillary equipment.

This report provides the factual details of the fieldwork undertaken during the investigation and subsequent laboratory testing and provides a consideration of the findings with respect to the proposed construction.

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2. FIELDWORK

Fieldwork was carried out on 27 and 30 August 2019 and comprised two cable percussive boreholes, six windowless sample holes, and five plate load tests.

The exploratory hole positions were set out in general accordance with the requirements of the Client and Consulting Engineers for the scheme (Plandescil Limited), as shown approximately on Drawings 19.287/02 and 19.287/03. The National Grid references, and elevation of the hole locations relative to Ordnance Datum, were measured using a Hemisphere S320 VRS GPS (RTK) system. Exploratory holes were not positioned in the north west of the proposed AD plant where a pond is present.

A cable avoidance tool (CAT) was used to sweep the positions and the immediate surrounding area to locate any potential services and the position adjusted as necessary.

The **cable percussive boreholes,** referenced BH01 and BH02, were taken to depths of 8.00 and 5.60 m below ground level (bgl), respectively, where they refused upon very dense granular deposits. Both boreholes were advanced using conventional cable percussive techniques ('shell and auger') in 150 mm diameter casing.

The **windowless sample holes**, referenced WS01 to WS06, were advanced with a tracked dynamic sampling rig to a depth of 5.00 m bgl, with the exception of WS03 which refused upon very dense granular deposits at 1.70 m bgl. The sampling system utilises a 63.5 kg weight falling a distance of 750 mm to drive rods and sampling tubes into the ground, these are then extracted and the continuous samples described. Disturbed sub-samples were taken from the liners for laboratory testing. An open drive sample (U70) was taken within the cohesive deposits of WS06 to allow laboratory testing of undisturbed material. Pocket penetrometer tests were carried out in suitable cohesive materials to provide an additional strength information.

During advance, sampling and *in situ* testing were carried out in general accordance with the recommendations of BS EN1997-2:2007 Eurocode 7 and its UK National Annex supported by BS 5930:2015. Standard penetration tests (SPT) were carried out using a split barrel sampler or a solid cone as appropriate. The SPT N value was taken as the number of blows for 300 mm of penetration, following a seating drive of 150 mm or 25 blows.

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Disturbed samples were taken to facilitate accurate logging, allow later inspection of materials encountered and for subsequent laboratory testing. Specialist environmental samples were also taken and placed in suitable containers, stored in cool boxes, and delivered to a UKAS accredited facility for analysis.

The boreholes and windowless sample holes were monitored for groundwater ingress during advance.

Upon completion the cable percussive boreholes and the windowless sample holes were backfilled with arisings.

The **plate loading tests**, referenced PLT01 to PLT05, were carried out in general accordance with the recommendations of BS 1377: Part 9 : 1990 and performed by measuring the vertical deformation and strength characteristics of the ground *in-situ* by assessing the force and amount of penetration with time of a rigid plate under a load. The tests were carried out utilising a 610 mm diameter plate and hydraulic jack with 20 tonne capacity. A 14 tonne excavator provided the counterweight. The tests were carried out at ground level on the crushed hardcore surface.

Details of the strata encountered, the sampling, *in situ* testing, and laboratory testing are shown on records appended to this report.

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3. LABORATORY TESTING

3.1 GENERAL

Subsequent to the fieldwork, a programme of laboratory testing was carried out to provide additional quantitative data on the materials encountered. The tests were completed in accordance with the procedures laid down in BS1377: 1990 and BS EN ISO 17892, unless stated otherwise and consisted of:

- Natural Moisture Content
- Atterberg Limits
- Unconsolidated Undrained Triaxial Testing
- Particle Size Distribution
- Sulphate Content and pH Value
- Total Sulphur Content
- Contamination Testing

3.2 TEST PROCEDURES

3.2.1 Natural Moisture Content

The natural moisture content (also known as water content) is determined according to BS EN ISO 17892: Part 1: 2014: clause 5.2. This represents the mass of moisture content retained by the soil in its natural state as a percentage of its dry mass. For organic soils and peats care should be taken to avoid heating the sample above 50°C to prevent irreversible physical changes to the material.

3.2.2 Atterberg Limits

The atterberg limits are determined in the laboratory by the procedures given in BS EN ISO 17892: Part 12: 2018. The liquid limit (LL) is the moisture content of the soil at the point that its behaviour passes from that of a plastic solid to that of a liquid. The test procedure given as clause 5.3 was used based on the cone penetrometer in which the penetration of a free-fall cone into moistened and cured samples of the soil is measured. The plastic limit (PL) is the moisture content of the soil at the point that its behaviour passes from a plastic solid to a brittle solid. This point is measured according to clause 5.5 and is the point at which a thread of the soil rolled to 3 mm diameter begins to crumble.

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Together the atterberg limits can be used to define the plastic range of the soil. The plasticity index (PI) is the difference between the liquid and plastic limit and is broadly correlated to the engineering behaviour of the soil. When used with the natural moisture content of the soil they can also give an indication of its *in situ* condition.

3.2.1 Unconsolidated Undrained Triaxial Testing

The undrained shear strength of the soil was measured, as stated in BS EN ISO 17892: Part 8: 2018 or BS 1377: Part 7: 1990: clause 8, by axial compression of 70/100 mm diameter cylindrical specimens cut from the U70/100 undisturbed samples. The nature of the test is such that no change in moisture content of the specimen is allowed during shear.

The theory of behaviour of saturated clay materials in undrained shear failure gives that the strength will not be influenced by the confining pressure such that the measured angle of internal friction for the material will apparently be equal to zero. Experience has shown that this is true only for samples of unweathered heavily overconsolidated pure clays. Where the material is weathered or it contains a significant granular content a plastic rather than a brittle failure develops which produces a strain hardening during shear. In this situation measurable apparent undrained angle of internal friction is produced. A similar situation develops in partially saturated materials. The test results are also influenced by sample variation, and in particular the presence of natural fissures or inclusions within the sample.

The use of large diameter specimens is preferred as this compensates for the scale effects of random features in smaller specimens. One of two tests are carried out according to the soil characteristic. Unweathered specimens of heavily overconsolidated clays which have a brittle failure in shear are tested in a single stage according to BS EN ISO 17892: Part 8: 2018. The confining pressure is taken as the total overburden pressure of the sample *in situ*. It is then failed by axial compression and the measured deviator stress reported as the apparent undrained cohesion. Specimens of weathered clay or the clays with granular contents are tested in a multistage manner according to BS 1377: Part 7: 1990: clause 9.

The test procedure is similar to the single stage but at the point that failure begins the confining pressure is increased and the specimen compressed for a further 2% of vertical strain at which point the confining pressure is again increased and held for a further 2%

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strain. The deviator stresses at each of the confining pressures are used to plot the Mohr envelope and the apparent undrained cohesion and if appropriate the undrained angle of internal friction.

3.2.2 Particle Size Distribution

A quantitative assessment of the particle size distribution of the soil down to the fine grained sand size is made according to BS EN ISO 17892: Part 4: 2016: clause 5.2. In this the percentage of certain sized fractions of the soil are found by determining the weight retained on a variety of sieve sizes through which the material is allowed to pass. The combined silt and clay fraction is determined by the difference between the sum of the retained weights and the original sample weight. Variations of the test procedure allow the silt and clay fraction to be removed from the coarser fraction by wet sieving during which the fine material is washed from the surface of the coarser material.

The quantitative determination of the particle size distribution for fine soils, from coarse silt to clay size, is made according to BS EN ISO 17892: Part 4: 2016: clause 5.4, using the sedimentation by pipette method. These tests are generally carried out if greater than 10% of the material passes the BS test sieve size of 63 μm. The percentages of the constituents of the fine soil can be linked to the curve obtained by sieving to provide a single curve for the whole material.

3.2.3 Sulphate Content and pH Value

In order to aid the evaluation of any aggressive tendency of the subsoil or groundwater to buried concrete the pH and soluble sulphate of a number of samples were determined using in-house procedures based on British Standard methods. The pH of a groundwater sample, or a soil suspension was determined electrometrically according to BS 1377: Part 3: 1990: clause 9.5. The water soluble sulphate content was undertaken using a procedure based on BS 1377: Part 3: 1990: clause 5.5 in which the sulphate is analysed by ICP-OES in a distilled water filtrate from the soil or a groundwater sample. The total sulphate of a soil was measured on a filtrate following digestion of the soil by 10% hydrochloric acid.

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3.2.4 Total Sulphur Content

To aid the evaluation of aggressive tendency of the subsoil to buried concrete as a result of its pyritic potential, the total potential sulphate content can be determined from the relationship between the total (acid soluble) sulphate content and the amount of total sulphur present. The total sulphur content is determined by a laboratory in-house method based on the Methods for the Examination of Waters and Associated Materials (MEWAM Environment Agency, 2006).

A dried portion of the soil is extracted at 115 °C for 75 minutes using 100% aqua regia and potassium bromate/bromide oxidizing mixture. The principle of this digest is to oxidize all sulphur to sulphate, and use the aqua regia acid mixture to digest the sample. The resultant digest solution is then filtered and analysed by ICP-OES. The results are expressed as % S, and include water soluble and acid soluble sulphates and total reduced sulphur, as well as insoluble sulphates and organic sulphur.

3.2.5 Contamination Testing

In order to determine the presence of other chemical contamination not otherwise naturally present in soils and groundwater, the total content of metals, speciated polycyclic aromatic hydrocarbons (USEPA-16), phenol (total - monohydric), cyanide (total, free, and complex), thiocyanate, pH, petroleum hydrocarbons (TPH - CWG banding), BTEX[1], and MTBE[2], was assessed. The samples were also screened for the presence of asbestos. They were tested using a variety of analytical techniques.

[1] Benzene, Toluene, Ethylbenzene, p & m-Xylene, and o-Xylene
[2] Methyl Tert Butyl Ether

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4. DISCUSSION

4.1 GENERAL GEOLOGY

The regional geology as mapped for the area by the British Geological Survey (BGS, 2019) shows a bedrock geology of the White Chalk Subgroup[3]. Various superficial deposits were mapped across the site, with River Terrace Deposits/Alluvium mapped along the southern site boundary, and an outcrop of the Lowestoft Formation (sand and gravel) mapped in the north-east corner of the site. The superficial deposits across the remainder of the site were mapped as Lowestoft Formation (Diamicton).

The **White Chalk Subgroup**[3] is a carbonate rock made up from the debris of microfossil skeletal material laid down during the Cretaceous Period. It contains beds of flint nodules, which developed during early diagenesis. It is also very susceptible to freeze-thaw action and its upper levels may show the evidence of severe disruption and fracturing as a result of the climatic changes in the geologic past. Besides an increase in the frequency of fracturing this disruption also allowed an increase in the moisture content producing a softer material, generally referred to as 'putty chalk'. In the disrupted state the chalk was subject to remoulding and transport by hillslope processes and may have produced a mantle of material very different to the underlying intact material.

Weathering effects can manifest in the form of dissolution features where the flow of water has historically been concentrated in certain areas, for example, along joints. Such features are not uncommon in East Anglia and are often present as distinct solution pipes partially or wholly infilled with the unconsolidated superficial deposits. Where only partially infilled, meta-stable cavities may be present. The engineering behaviour of the Chalk is strongly influenced by weathering, which may extend to depths of several metres.

The **River Terrace Deposits** were derived from the chalk and younger Eocene deposits during the Pleistocene and laid down while rivers were flowing with greater discharges than today. Subsequent readjustment has left these deposits as terraces along valley sides or as lag deposits along the floor of present day valleys. They comprise a superficial sequence of flint sand and gravel, locally displaying vertical sorting. Terraces may be

[3] Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation, and Portsdown Chalk Formation (undifferentiated)

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capped by finer alluvium, but often this has been removed by later erosion. Towards the edges of the terraces the material has often been reworked and transported so that it may be found draped over lower levels than those at which it was originally deposited.

The **Alluvium** comprises a sequence of Recent silty clays, silts and sands which can be found interspersed with subordinate and sometimes extensive peats. The Alluvium has been laid down since the end of the Pleistocene some 10,000 years ago following the associated general rise in sea level. It is typically normally consolidated and therefore in a soft condition, but at surface the effects of desiccation caused by intermittent drying by weather and vegetation often produces a firmer crust.

The **Lowestoft Formation** of the Anglian stage glaciation includes a variable sequence of granular deposits (the Sand and Gravel) and cohesive material (the Diamicton, which is a pebbly chalky clay). In its unweathered state, it cohesive material comprises typically bluish grey, variably sandy and silty clay, with abundant flint and chalk gravel. Other gravel lithologies may also be found and fine-grained chalk may be present within the matrix of the deposit. At surface the material may be decalcified, weathering to yellowish brown or brownish grey with a noticeable absence of chalk.

The whole is generally stiff with apparent high degrees of overconsolidation, although it may contain or overlie other glacial materials which can be very much softer. Glacial deposits are irregular in deposition so that extrapolation is not always reliable. Bands of sand and gravel may be found within or above the general sequence and can often be water bearing.

More substantial granular deposits are also present in the Lowestoft Formation. Although such materials are commonly associated with the Diamicton, they can be found separately as a result of deposition by glacial meltwater. Consequently the sand and gravel may vary in grading according to the previous depositional setting. The materials derived from glacial deposits may have travelled long distances and therefore contain exotic material. However, the bulk has been found to comprise predominantly flint.

4.2 SITE GEOLOGY AND GEOTECHNICAL CONDITION

4.2.1 Made Ground

Made ground was encountered from surface at each of the exploratory holes.

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Within BH01, BH02 and WS03 the made ground comprised a slightly sandy flint gravel, which had been compacted to form a hardcore, with base depths between 0.15 and 0.25 m bgl (below ground level). The made ground in WS01 and WS02 extended to depths of 0.60 and 0.40 m respectively and comprised an initial layer of sandy flint gravel (hardcore) overlying a slightly clayey slightly gravelly sand with rare clinker. In WS04, made ground comprising a slightly clayey slightly silty sandy flint gravel with rare fragments of brick and concrete, and rare clinker, was recorded to a depth of 0.45 m. WS05 and WS06 recorded a thin layer of topsoil-like material overlying a slightly clayey slightly gravelly sand, with base depths of 0.65 and 0.30 m bgl, respectively. Suspected fragments of asbestos containing materials (ACMs) were encountered within the made ground in WS06. These fragments were between 1 and 10 cm^2 in size and occupied <5% of the volume of material.

Plate loading tests carried out on hardcore at the site surface recorded modulus of subgrade reaction values of between 64.76 $MN/m^2/mm$ and 181.52 $MN/m^2/mm$ together with corresponding CBR values of between 13 and 79%.

4.2.2 River Terrace Deposits / Alluvium

Suspected River Terrace Deposits/Alluvium were encountered within WS01 and WS02 underlying the initial made ground. This material comprised a very loose to medium dense slightly clayey slightly silty variably gravelly sand down to 2.60 and 2.85 m bgl respectively, becoming a soft locally firm silty slightly sandy clay, down to 4.30 and 5.00 m bgl. Within WS01 a loose slightly clayey silty sand was encountered at the base of the exploratory hole (5.00 m bgl).

An atterberg limit determination carried out within WS02 recorded a plasticity index of 13% indicating a clay of very low plasticity.

4.2.3 Lowestoft Formation (Sand and Gravel)

Material considered representative of the Lowestoft Formation (Sand and Gravel), was encountered within BH01, BH02, WS03, WS04, beneath the overlying made ground to the base of each of the exploratory holes. This material generally comprised a slightly clayey slightly silty sandy to very sandy gravel typically in a dense to very dense condition. The gravel was noted to be predominantly flint, with rare quartzite.

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BH01, BH02, and WS03 all refused within very dense granular material at 8.00, 5.60, and 1.70 m bgl, respectively.

Shell fragments were recorded within BH01 and BH02 at various depths. It should be noted that these are not typically part of the Lowestoft Formation, and the source of these materials is unclear.

4.2.4 Lowestoft Formation (Diamicton)

Material considered representative of the Lowestoft Formation (Diamicton), was encountered within WS05 and WS06 underlying the initial made ground down to a depth of 5.00 m bgl. This material comprised a variably clayey slightly silty sand and gravel in a loose condition within WS05, and a soft locally firm slightly silty slightly gravelly clay within WS06. The gravel content was noted to be flint within WS05 and chalk and flint within WS06.

An undrained triaxial test carried out on a cohesive sample from WS06 gave a shear stress of 126 kPa.

Atterberg limit determinations carried out within this material recorded a plasticity index of 18 and 23% indicating a clay of low plasticity.

4.2.5 Groundwater

Groundwater seepage was recorded in WS01 and WS02 at 1.95 m and 2.10 m bgl, respectively.

However, observations reported during advancement of the exploratory holes will have been affected by the permeability of the ground, the rate of progress of the exploratory hole and the techniques in operation. The general procedures used do not allow precise measurements of the groundwater conditions, but give only a general guide to the overall situation. Fluctuations in any groundwater table will also occur as a result of seasonal or climatic effects, as well as other outside influences.

4.3 CHEMICAL CONSIDERATIONS

Risks to construction materials can be assessed primarily using the sulphate and pH results according to the recommendations of Building Research Establishment Special Digest 1

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(BRE, 2005). The analysis was undertaken in order to evaluate any aggressive tendency of the soil.

Eight samples of natural soil were tested. The results can be summarised as follows:

- pH values between 7.3 and 8.4,
- water soluble sulphate (SO_3) concentrations ranging between <0.01 and 0.003 gl^{-1},
- acid soluble sulphate (SO_4) of <0.02,
- total sulphur of <0.02.

4.3.1 Pyritic Potential

The sulphur determinations were made to complement the sulphate testing according to the recommendations of Building Research Establish Special Digest 1 (BRE, 2005). This establishes if a material is pyritic and uses a relationship between total sulphur, acid soluble and water soluble sulphate, and total potential sulphate to determine whether it is necessary to increase the Design Sulphate (DS) class. A sample is considered to be potentially pyritic if the oxidisable sulphides exceed a threshold value of 0.3 %. None of the samples exceed this criteria.

4.4 CONTAMINATION

4.4.1 Assessment Methodology

The results of chemical analysis have been assessed against human health guideline values produced by Land Quality Management Limited in association with the Chartered Institute of Environmental Health (LQM, 2015) and which are referred to as 'suitable for use levels' (S4ULs). The S4ULs provide generic assessment criteria (GAC) values from a risk based approach to human exposure through the pathways of inhalation, ingestion and dermal contact which have been derived using the CLEA software version 1.06 and Environment Agency guidance (Environment Agency, 2009). The S4UL 'commercial' scenario and a soil organic matter content (SOM) of 1.0 % have been used for the assessment.

When relevant S4ULs were unavailable, such as in the case of antimony, lead, and cyanide, the results were compared to alternative 'soil screening values' (SSVs). For antimony and cyanide, the SSV was derived by WS Atkins Consultants Limited (W S Atkins, 2017), using the ATRISKsoil programme. For lead, 'category 4 screening levels' (C4SLs) were used which have been developed by Contaminated Land: Applications in Real Environments

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(CL:AIRE, 2014) using a modified version of the CLEA model. The derivation of C4SLs uses the concept of a low level of toxicological concern (LLTC), which represents the estimated concentration of a contaminant that would pose an 'acceptably low' risk to human health. These allow a higher (though still 'acceptably low') level of risk while maintaining the precautionary approach. A 'commercial' scenario and a SOM of 1.0 % has been used for the assessment of these determinands.

4.4.2 Results

No contaminants were recorded in excess (or equal to) their respective adopted screening criteria.

Loose chrysotile asbestos fibres were recorded within the made ground of WS05 and WS06. The suspected ACM fragments identified within the made ground of WS06 were sampled separately and confirmed to contain chrysotile asbestos in a cement binding.

4.4.3 Recommendations

It is understood that WS05 and WS06 are located in the area of the proposed lagoon, and as such this material is likely to be removed from site. It may be prudent to adopt dust suppression methods throughout the excavation of this material due to the presence of asbestos fibres. All construction workers should be informed of the potential presence of asbestos containing materials and soils on site, prior to commencing work. Any residual risks from handling soil can be addressed by usual hygiene precautions (such as washing hands before eating) and standard personal protective equipment. In accordance with the Control of Asbestos Regulations 2012 (as discussed in CL:AIRE, 2016), a duty is placed on the employer or Principal Contractor to prevent the exposure of their employees and members of the public to asbestos fibres, so far as is reasonably practicable, and this should be the first consideration.

If any additional suspected ACM is reported on site during the construction, they should be removed and disposed of in an appropriate manner.

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5. ENGINEERING INTERPRETATION

5.1 GENERAL

It is understood that the proposed development will involve the construction of four 26 m diameter tanks and other structures associated with an AD plant, as well as a lagoon and associated areas of hardstanding, as indicated on the Bioconstruct drawing dated 26 August 2019, appended.

The comments and recommendations contained in the report are based on the data obtained from the current exploratory holes and associated laboratory testing. Extrapolation between and to other parts of the site is considered within the light of the geological setting as interpreted, but no responsibility can be accepted for varying geological and geotechnical conditions from those on which the report is based. It should be noted that the solutions are discussed in principle only and must be subject to a more complete assessment at the detailed design stage of the project.

5.2 GROUND MODEL

The exploratory holes have shown that the Lowestoft Formation (Sand and Gravel) was encountered in a dense to very dense condition in the anticipated location of the proposed tanks.

Loose and soft River Terrace Deposits / Alluvium were encountered in the anticipated location of some of the ancillary plant/equipment.

The Lowestoft Formation (Diamicton) was encountered in the location of the proposed lagoon. No assessment of the ground conditions with respect to the proposed lagoon is made within this report.

Groundwater was noted at two positions only and in each case as a seepage. Although no long-term groundwater monitoring was undertaken, groundwater is unlikely to be present in significant quantities within the normal depths of excavation for the anticipated construction.

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5.3 TANK FOUNDATIONS

5.3.1 Wall and Column Support

From the information provided, the ground model for the area of the proposed tanks indicates a sequence of natural superficial soils comprising dense to very dense granular soils.

Observations suggest significant groundwater ingress is unlikely in the proposed location of the tanks.

The foundations for the tanks can be considered as two elements; that for the perimeter walls and central column loads, and that for the base loads. However, collectively and individually they will influence the overall behaviour of the structures. The formation depth was not specified but it was assumed that this will be around 1.0 m below current ground level; therefore the structures would load and be influenced by granular soil.

Experience from similar projects elsewhere has indicated that a perimeter wall load of 250 kPa would be exerted onto a perimeter ring beam of about a metre width, with a similar central column load exerted onto a central pad foundation. In addition, the contained fluid has been assumed to induce a stress across the tank base of approximately 65 kPa.

For foundations acting onto granular soil the allowable bearing capacity may be simply related to settlement for various foundation widths through the relationship with the standard penetration test developed by Terzaghi and Peck (1967). Settlements induced in granular materials are generally accepted to be relatively rapid and likely to be largely completed during the construction period.

If an effective N-value of 40 is taken for design purposes at a depth of approximately 1.0 m, an allowable bearing pressure of 500 kNm^{-2} would produce approximately 25 mm of settlement for a footing width of 1.0 m, which would reduce to 12.5 mm for an imposed bearing stress of 250 kNm^{-2}.

5.3.2 Base Slab

The potential settlement that develops from the wider loaded area of the base slab can be similarly determined where the relevant imposed load is 65 kNm^{-2} and the assumption made that the superficial materials continue to significant depth. On this basis, a similar approach

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to provide an estimate of settlement can be adopted. The Terzahgi and Peck approach would suggest settlement of less than 10 mm.

5.4 ANCILLIARY STRUCTURES

The remaining buildings / ancillary plant for the proposed AD plant, are to be located along the southern site boundary, where the granular River Terrace Deposits / Alluvium were encountered. It should be noted that the ground conditions for the structures proposed in the north west of the AD plant are not known. This area is currently occupied by a pond and could not be investigated. The ground conditions should be determined in this location and any foundation design should also take into account the need to fill the pond to create a level formation.

For the buildings / ancillary plant located along the southern boundary this shows that for a granular material at a depth at about 1.00 m, where the effective N-value for design purposes is taken as 3[4], an allowable bearing capacity of 33 kNm^{-2} would produce approximately
25 mm of settlement for a 1 m wide strip footing.

It should also be noted that SPT N-values below a metre, range between 0 and 6.

Given the low calculated allowable bearing capacity, consideration could be given to ground improvement, or an alternative foundation solution such as piling.

5.5 BURIED CONCRETE

Selected samples were subjected to chemical analyses in order to evaluate any aggressive tendency of the subsoil to buried concrete. The results corresponded with a maximum design sulphate class of **DS-1** according to Building Research Establishment Special Digest 1 (BRE, 2005).

The Digest identifies a number of different site categories, which include those with 'natural' soil conditions, those that have been subject to 'brownfield' development, and also

[4] Lowest SPT N-value at this depth

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sites which contain pyrite bearing ground that will be subject to future disturbance and could result in pyritic oxidation.

The BRE Digest also shows that it is necessary to take into account other factors related to the environment into which any new concrete may be placed i.e. the pH of the ground and the mobility of the groundwater table. It is then possible to assign an ACEC (aggressive chemical environment for concrete) class.

The site has been considered to represent a brownfield scenario and the laboratory results indicate that the soils are not potentially pyritic. Considering a static groundwater environment, an ACEC classification of **AC-1s** would be appropriate.

5.6 EXCAVATIONS

Based on the information provided, shallow excavations would probably be free-standing for limited periods, although some ravelling may develop in the made ground and granular soils but this, and the overall stability of any excavation in general, may be improved by applying a batter to the sidewalls.

Deeper excavations will require positive support to enable work in close proximity of the sidewalls. The natural soils may provide temporary stability sufficient to allow the installation of the support after excavation. If land take allows, the need for support could be reduced if the sidewalls are battered to improve their stability.

Although significant free groundwater is unlikely to be present in excavations, provision should be made to control the ingress of locally perched water and surface run-off, in order to maintain adequately dry conditions for work. This may be adequately accomplished by sump pumping.

5.7 ROADS AND PAVEMENTS

The development includes a new access roadway onto the site and a new area of hardstanding to act as a HGV turning circle.

The plate load tests provide some data on the shallow soil. All of the tests were carried out on hardcore at ground level.

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The modulus of subgrade reaction ranged between 64.76 and 181.52 $MN/m^2/m$ and the maximum settlement recorded was between 1.44 and 3.98 mm for an applied load of 337.35 kNm^{-2}. The equivalent CBR ranged between 13 and 79 %.

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6. SUMMARY

1. A ground investigation was undertaken in the area of the proposed AD plant at SS Agri, Ellingham Road, Attleborough, NR17 1AE.

2. The fieldwork proved a variable geology across the site, with River Terrace Deposits / Alluvium along the southern boundary, Lowestoft Formation (Sand and Gravel) across the centre of the site, and Lowestoft Formation (Diamicton) in the eastern portion of the site.

3. The proposed tanks should be founded upon the dense to very dense natural granular soils of the Lowestoft Formation (Sand and Gravel). At a depth of approximately 1.0 m, an allowable bearing pressure of 250 kNm^{-2} would produce approximately 12.5 mm of settlement for a 1.0 m side strip footing.

4. The tank base load would generate a potential settlement of <10 mm.

5. For the remaining buildings / ancillary plant located along the southern boundary, an allowable bearing capacity of 33 kNm^{-2} would produce approximately 25 mm of settlement for a 1 m strip footing. Consideration could be given to ground improvement, or an alternative foundation solution such as piles.

6. A design sulphate class of DS-1 and an ACEC classification of AC-1s can be adopted for buried concrete.

7. The plate load test results confirmed a modulus of subgrade reaction between 64.76 and 181.52 MN/m2/m and a maximum settlement between 1.44 and 3.98 mm for an applied load of 337.35 kNm-2. The equivalent CBR ranged between 13 and 79 %.

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7 October 2019

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APPENDIX C: DRAWINGS

Drawing 19.287/01	Site Location Plan
Drawing 19.287/02	Exploratory Hole Location Plan (Existing Site Layout)
Drawing 19.287/03	Exploratory Hole Location Plan (Proposed Site Layout)
Bioconstruct Drawing	Proposed Site Layout (dated 26 August 2019)

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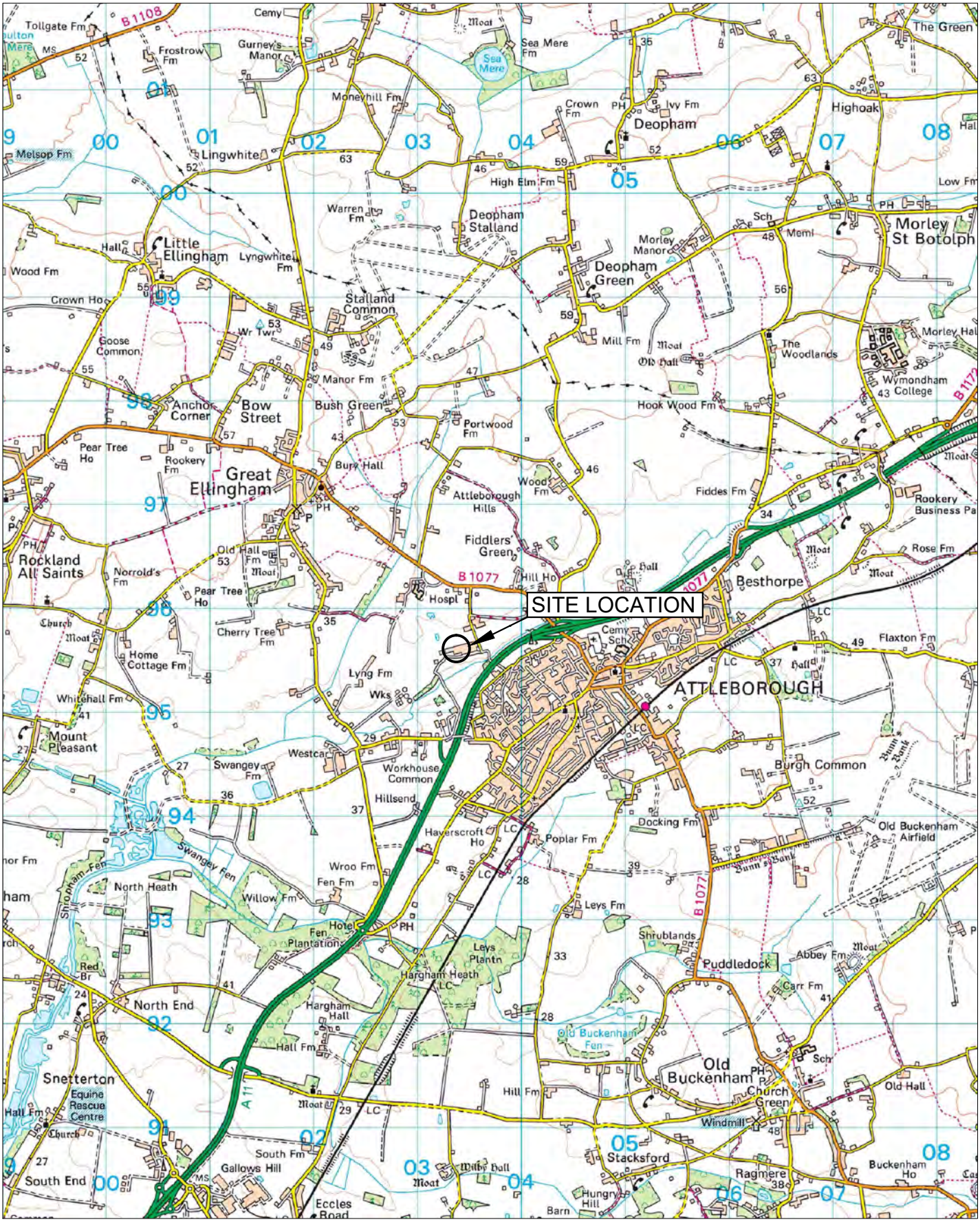

North

Circle indicates approximate location of site

Scale 1: 50,000 @ A4

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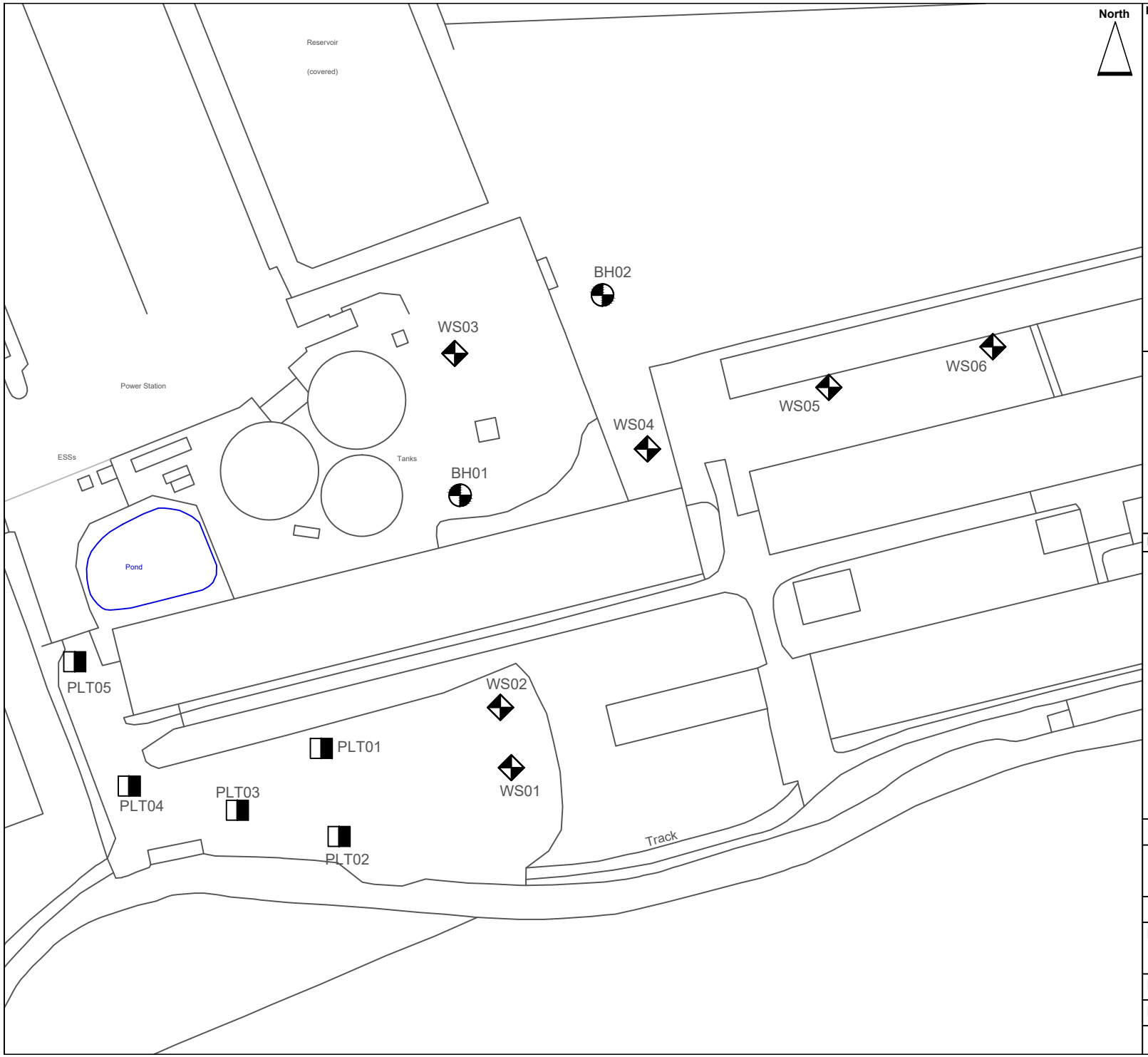
Geotechnical Engineers

Site: SSAgri AD Plant, Ellingham Road, Attleborough

SITE LOCATION PLAN

Client : Privilege Finance Services

Date : January 2019 **Dwg :** 19.287/01



Key:

- Borehole location and reference
- Window sample exploratory hole location and reference
- Plate load test location and reference

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Client: Privilege Finance Services

Site:
SS AGRI AD Plant, Attleborough

Job No.: 19.278

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN (Existing)

Date: September 2019

Drawing No: 19.278/02

Scale: 1:250 @ A4

Key:

- Borehole location and reference
- Window sample exploratory hole location and reference
- Plate load test location and reference

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Site:
SS AGRI AD Plant, Attleborough

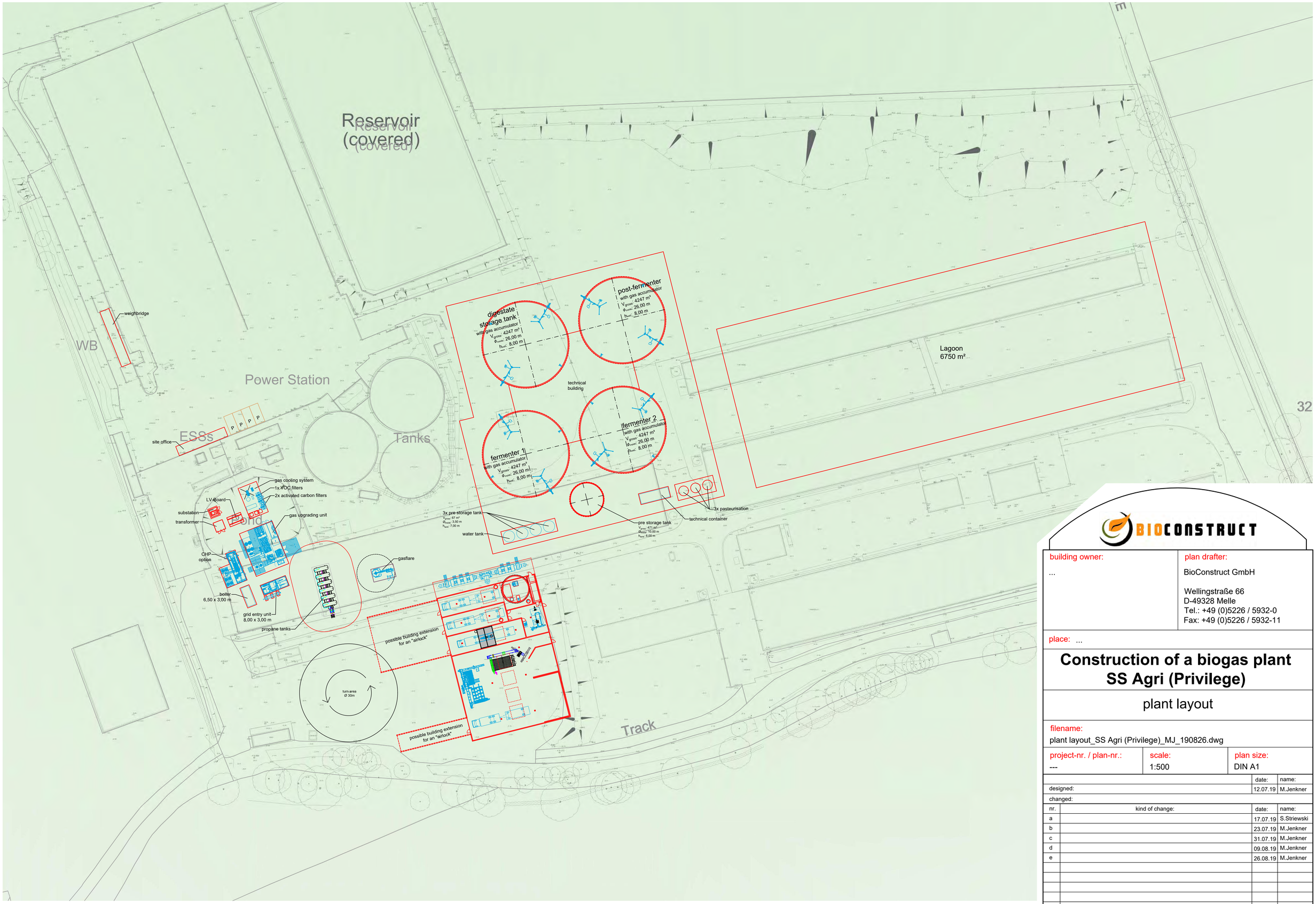
Job No.: 19.278

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN (Proposed)

Date: September 2019

Drawing No: 19.278/03

Scale: 1:250 @ A4



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BIOCONSTRUCT

building owner:	plan drafter:
...	BioConstruct GmbH Wellingstraße 66 D-49328 Melle Tel.: +49 (0)5226 / 5932-0 Fax: +49 (0)5226 / 5932-11

place: ...

Construction of a biogas plant SS Agri (Privilege)

plant layout

filename:
plant layout_SS Agri (Privilege)_MJ_190826.dwg

project-nr. / plan-nr.:	scale:	plan size:
---	1:500	DIN A1

	date:	name:
designed:	12.07.19	M.Jenkner
changed:		

nr.	kind of change:	date:	name:
a		17.07.19	S.Striewski
b		23.07.19	M.Jenkner
c		31.07.19	M.Jenkner
d		09.08.19	M.Jenkner
e		26.08.19	M.Jenkner

APPENDIX D: CABLE PERCUSSIVE BOREHOLE RECORDS

ES	Environmental sample
U	70 mm diameter undisturbed open tube sample
B	Bulk disturbed sample
D	Small disturbed sample
SPT	Standard penetration test. N Value is uncorrected, but the hammer energy ratio is given where known (in remarks).
S x,x	SPT seating drive blow count given by the summation of the blows 'X' required to drive the seating length
T x,x,x,x	SPT test drive blow count 'N' given by the summation of the blows 'X' required to drive the seating length (300 mm)
X*Y	Incomplete standard penetration test where the seating/test drive could not be completed. The blows 'X' represent the total blows for the given length of seating drive 'Y' (mm)
dd/mm/yy: 1.0 **dd/mm/yy: dry**	Date, water level at the window sample hole depth at the end of shift and the start of the following shift

Each sample type is numbered sequentially with depth and relates to the depth range quoted

All depths and measurements are given in metres, except as noted

Strata descriptions compiled by visual examination of liner samples obtained after BS 5930:2015 and modified in accordance with laboratory test results where applicable

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Site SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE			**Borehole Number** BH01
Machine : Dando D2500 **Method :** Cable Percussion	**Casing Diameter** 150 mm to 8.00 m	**Ground Level (mOD)** 34.75	**Client** Privilege Finance Services	**Job Number** 19.287
	Location 603353 E 295610 N	**Dates** 27/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					34.60	(0.15) 0.15	MADE GROUND (Greyish brown slightly sandy angular to subangular fine to medium flint gravel)		
0.10	ES1					(0.45)			
0.50	D1				34.15	0.60	Brown slightly clayey sandy angular to subrounded fine to medium occasionally coarse flint GRAVEL		
0.60-0.80	B1								
1.00	D2					(0.80)	Dense brown slightly clayey sandy angular to subrounded fine to medium occasionally coarse flint GRAVEL with rare pockets of firm brown clay		
					33.35	1.40			
1.50-1.95	SPT(C) N=47	1.50	1.20	8,11/15,15,17		(0.40)	Dense brown slightly clayey sandy angular to subangular fine occasionally medium flint and rare subangular to rounded fine quartzite GRAVEL		
1.50-2.00	B2				32.95	1.80			
							Medium dense brown slightly clayey slightly silty very sandy subangular to rounded fine to coarse flint GRAVEL ...rare coarse flint between 1.80 and 2.00 m		
2.50-2.95	SPT(C) N=26	2.50	2.00	3,6/5,7,7,7					
2.50-3.00	B3						...rare shell fragments between 3.00 and 4.40 m		
3.50-3.95	SPT(C) N=11	3.50	3.00	2,3/3,3,2,3					
3.50-4.00	B4					(4.95)			
4.50-4.95	SPT(C) N=44	4.50	3.60	3,5/8,9,11,16			...dense at 4.50 m		
4.50-5.00	B5						...rare rounded elongated flint between 5.00 and 6.00 m		
5.50-6.00	B6								
6.00-6.45	SPT(C) N=22	6.00	4.80	6,15/9,6,4,3					
6.00-6.50	B7				28.00	6.75	Very dense brown sandy angular to subrounded fine to coarse flint and rare subrounded fine quartzite GRAVEL with fine shell fragments		
						(1.25)			
7.50-7.95	SPT(C) N=50	7.50		25/50			...subrounded flint cobble at 7.50 m		
7.50-8.00	B8								
				27/08/2019:6.30m	26.75	8.00			
8.00-8.45	SPT(C) N=41	8.00	6.00	6,8/9,10,11,11			Terminated at 8.00m		

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. Chiselling Required from 7.50 m to 8.00 m for 1 hr
5. Water added from 1.20 m to 8.00 m approx 675 litres
6. SPT Hammer Energy Ratio = 64.15%
7. Borehole backfilled with arisings and bentonite

Scale (approx)	Logged By
1:50	JAH

Figure No. 19.287.BH01

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Site	Borehole Number
SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE	BH02

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Dando D2500	150 mm to 5.50 m	36.46	Privilege Finance Services	19.287
Method : Cable Percussion	**Location** 603387 E 295659 N	**Dates** 28/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	ES1				36.21	(0.25) 0.25	MADE GROUND (Brown becoming mottled dark brown clayey slightly silty slightly sandy angular to subrounded fine to medium occasionally coarse flint gravel)		
0.50 0.60-0.80	D1 B1					(0.70)	Brown slightly clayey sandy angular to subrounded fine to medium occasionally coarse flint GRAVEL		
1.00	D2				35.51	0.95 (0.40)	Brown slightly clayey sandy angular to subrounded fine to medium occasionally coarse flint GRAVEL		
1.50-1.95 1.50-1.70 1.80-2.00	SPT(C) N=50 B2 D3	1.50	1.20	6,9/10,11,13,16	35.11 34.76	1.35 (0.35) 1.70	Very dense brown slightly clayey sandy angular to subrounded fine occasionally medium flint and rare subrounded to rounded fine quartzite GRAVEL		
2.50-2.95 2.50-3.00	SPT(C) N=26 B3	2.50	1.80	3,3/5,6,7,8		(1.35)	Medium dense brown slightly clayey slightly silty gravelly fine to coarse SAND with rare shell fragments, rare pockets of firm brown clay, and rare lenses of black fine to coarse sand. Gravel is sandy angular to subrounded fine to coarse flint and rare subrounded to rounded fine quartzite		
3.50-3.95 3.50-4.00	SPT(C) N=50 B4	3.50	2.50	12,13/28,22	33.41	3.05 (1.95)	Very dense brown slightly clayey very sandy angular to subrounded fine to coarse flint GRAVEL and rare subrounded to rounded cobbles and rare fine shell fragments		
4.50-4.95 4.50-5.00	SPT(C) N=50 B5	4.50	3.00	8,9/14,19,17					
5.00-5.45	SPT(C) N=50	5.00	DRY	12,13/15,18,17	31.46	5.00 (0.60)	Dense to very dense brown angular to subrounded fine to coarse GRAVEL and rare subrounded to rounded cobbles		
5.50-5.95	SPT(C) N=33	5.50	DRY	5,6/7,7,9,10	30.86	5.60	Terminated at 5.60m		

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. Chiselling Required from 3.50 m to 3.80 m for 0.75 hr, 5.40 m to 5.50 m for 0.75 hr
5. Water added from 1.20 m to 2.00 m approx 125 litres, 2.00 m to 3.00 m approx 150 litres, 3.00 m to 4.00 m approx 150 litres, 4.00 m to 5.00 m approx 325 litres, 5.00 m to 5.50 m approx 525 litres
6. SPT Hammer Energy Ratio = 64.15%
7. Borehole backfilled with arisings and bentonite

Scale (approx)	Logged By
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Figure No. 19.287.BH02

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APPENDIX E: WINDOWLESS SAMPLE HOLE RECORDS

A	Sample of suspected asbestos containing material (ACM)
ES	Environmental sample
U	70 mm diameter undisturbed open tube sample
L	Plastic liner
B	Bulk disturbed sample
D	Small disturbed sample
SPT	Standard penetration test. N Value is uncorrected, but the hammer energy ratio is given where known (in remarks).
IP xx	Initial penetration during the SPT recorded in millimetres. If initial penetration equals or exceeds 450 mm the test is aborted.
S x,x	SPT seating drive blow count given by the summation of the blows 'X' required to drive the seating length
T x,x,x,x	SPT test drive blow count 'N' given by the summation of the blows 'X' required to drive the seating length (300 mm)
X*Y	Incomplete standard penetration test where the seating/test drive could not be completed. The blows 'X' represent the total blows for the given length of seating drive 'Y' (mm)
dd/mm/yy: 1.0 **dd/mm/yy: dry**	Date, water level at the window sample hole depth at the end of shift and the start of the following shift

Each sample type is numbered sequentially with depth and relates to the depth range quoted

All depths and measurements are given in metres, except as noted

Strata descriptions compiled by visual examination of liner samples obtained after BS 5930:2015 and modified in accordance with laboratory test results where applicable

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Geotechnical Engineers

Site SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE			**Number** WS01
Machine : Dando Terrier 2002 **Method :** Windowless Dynamic Sampling	**Dimensions** 102mm to 2.00m 87mm to 4.00m 75mm to 5.00m	**Ground Level (mOD)** 32.12	**Client** Privilege Finance Services	**Job Number** 19.287
	Location 603365 E 295547 N	**Dates** 29/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND (Brown sandy angular to subangular fine to coarse flint gravel with rare rootlets)		
				31.92	0.20			
0.30	ES1					MADE GROUND (Dark grey/brown slightly clayey slightly gravelly fine to medium occasionally coarse sand with rare clinker. Gravel is angular to subangular fine to medium flint)		
0.40-0.60	D1				(0.40)			
				31.52	0.60			
0.60-1.20	B1					Very loose brown mottled pale brown slightly clayey slightly silty fine to medium SAND with rare gravel. Gravel is angular to subangular fine to medium flint		
					(1.10)			
1.20-1.65	SPT N=3	DRY	IP 0/S 1,1 T 1,1,1,0					
1.20-1.65	D2							
1.20-2.00	L1							
				30.42	1.70			
1.70-2.00	D3					Very loose brown mottled pale brown slightly clayey silty gravelly fine to medium SAND. Gravel is angular to subangular fine occasionally medium flint		
			Water seepage(1) at 1.95m.			...damp at 1.95 m		▽1
2.00-2.45	D4							
2.00-2.45	SPT N=0	DAMP	IP 450 Test Failed					
2.00-3.00	L2				(0.90)			
2.10-2.50	D5							
				29.52	2.60			
2.70	PP 15kPa		0.5, 0.5, 0.5,0,0/Av. 0.30			Soft brown mottled pale brown slightly silty sandy CLAY		
2.70-3.00	D6							
					(0.80)			
3.00-3.45	SPT N=4	DAMP	IP 0/S 1,1 T 1,1,1,1					
3.00-3.40	D8							
3.00-3.45	D7							
3.00-4.00	L3							
				28.72	3.40			
						Soft locally firm brown mottled pale brown silty slightly sandy CLAY with rare gravel. Gravel is angular to subangular fine to medium flint		
3.70-3.90	D9							
					(0.90)			
4.00-4.49	SPT	DAMP	IP 40/S 1,1					
4.00-4.45	D10							
4.00-5.00	L4							
	N=5		T 1,1,1,2	27.82	4.30	Loose brown slightly clayey silty fine to medium SAND		
4.50-5.00	D11							
					(0.70)			
			29/08/2019:DRY					
				27.12	5.00			

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. Water seepage at 1.95 m
4. SPT Hammer Energy Ratio = 68.30%
5. Exploratory hole collapsed to 4.80 m upon completion
6. Exploratory hole backfilled with natural arisings and bentonite

Scale (approx)	Logged By
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Figure No. 19.287.WS01

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Site SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE			**Number** WS02
Machine : Dando Terrier 2002 **Method :** Windowless Dynamic Sampling	**Dimensions** 102mm to 2.00m 87mm to 3.00m 75mm to 5.00m	**Ground Level (mOD)** 32.56	**Client** Privilege Finance Services	**Job Number** 19.287
	Location 603362 E 295561 N	**Dates** 29/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				32.46	(0.10) 0.10	MADE GROUND (Brown sandy angular to subangular fine to coarse flint gravel)		
0.20 0.20-0.40	ES1 D1				(0.30)	MADE GROUND (Dark grey/brown slightly clayey slightly gravelly fine to medium occasionally coarse sand with rare clinker. Gravel is angular to subangular fine to medium flint)		
0.50-1.10	B1			32.16	0.40	Brown mottled pale brown slightly clayey slightly silty gravelly fine to medium SAND. Gravel is angular to subangular fine to medium occasionally coarse flint		
					(0.75)			
1.20-1.65 1.20-1.65 1.20-2.00 1.50-2.00	SPT N=11 D2 L1 B2	DRY	IP 0/S 2,3 T 3,3,3,2	31.41	1.15	Medium dense brown mottled pale brown clayey silty gravelly fine to medium SAND. Gravel is angular to subangular fine occasionally medium flint		
2.00-2.55 2.00-2.45 2.00-3.00 2.40-2.70	SPT D3 L2 N=4 D4	DAMP	IP 100/S 0,1 Water seepage(1) at 2.10m. T 1,1,1,1		(1.70)	...loose from 2.00 m ...damp at 2.10 m		▽1
2.90 2.90-3.10 3.00-3.55 3.00-3.45 3.00-4.00	PP 25kPa D5 SPT D6 L3 N=4	DAMP	0.5,1.0,0.5,0,0.5/Av. 0.50 IP 100/S 0,1 T 0,2,1,1	29.71	2.85 (0.30)	Soft brown mottled pale brown slightly silty sandy CLAY		
3.50 3.50-3.70	PP 20kPa D7		0.5,0.5,0,1.0,0/Av. 0.40	29.41	3.15	Soft locally firm brown mottled pale brown silty slightly sandy CLAY with rare gravel. Gravel is angular to subangular fine to medium flint		
4.00 4.00-4.55 4.00-4.45 4.00-5.00 4.00-5.00	PP 15kPa SPT D8 D9 L4 N=6	DRY	0,0,0.5,0.5,0.5/Av. 0.30 IP 100/S 0,1 T 2,1,1,2		(1.85)			
			29/08/2019:DRY	27.56	5.00			

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. Water seepage at 2.10 m
4. SPT Hammer Energy Ratio = 68.30%
5. Poor sample recovery between 4.00 and 5.00 m [No recovery with the 75 mm barrel, partial recovery with the 65 mm barrel]
6. Exploratory hole collapsed to 4.60 m upon completion
7. Exploratory hole backfilled with natural arisings and bentonite

Scale (approx)	Logged By
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Figure No. 19.287.WS02

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Site SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE			**Number** WS03
Machine : Dando Terrier 2002 **Method :** Windowless Dynamic Sampling	**Dimensions** 87mm to 1.70m	**Ground Level (mOD)** 35.56	**Client** Privilege Finance Services	**Job Number** 19.287
	Location 603353 E 295636 N	**Dates** 29/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND (Greyish brown slightly sandy angular to subangular fine to medium flint gravel)		
				35.36	0.20			
0.30	ES1					Greyish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium flint		
0.30-0.50	D1				(0.35)			
				35.01	0.55			
0.60-1.20	B1					Dense to very dense brown slightly clayey slightly silty very gravelly SAND. Gravel is angular to subangular fine to medium occasionally coarse flint		
						...subrounded flint cobble at 0.90 m		
					(1.15)			
1.20-1.65	SPT N=41	DRY	IP 0/S 3,5 T 6,9,11,15					
1.20-1.65	D2							
1.20-1.70	B2							
1.20-1.70	L1							
			29/08/2019:DRY	33.86	1.70			
1.70-2.15	SPT(C) N=77	DRY	IP 0/S 18,20 T 18,19,18,22			Terminated at 1.70m		

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. SPT Hammer Energy Ratio = 68.30%
5. Exploratory hole backfilled with natural arisings and bentonite

Scale (approx)	Logged By
1:25	JAH

Figure No. 19.287.WS03

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Site	Number
SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE	**WS04**

Machine / Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine : Dando Terrier 2002 **Method :** Windowless Dynamic Sampling		34.89	Privilege Finance Services	19.287
	Location 603398 E 295620 N	**Dates** 29/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1					MADE GROUND (Dark grey slightly clayey slightly silty sandy angular to subrounded fine to medium flint gravel with rare fragments of brick and concrete, and rare clinker)		
0.10	ES1				(0.45)			
				34.44	0.45			
0.50-1.00	B1					Medium dense greyish brown slightly clayey slightly silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium occasionally coarse flint		
					(1.25)			
1.20-1.65	SPT(C) N=17	DRY	IP 0/S 3,3 T 4,5,4,4					
1.20-2.00	L1							
1.30-1.60	D2							
				33.19	1.70			
1.80-2.00	D3					Medium dense to dense brown clayey slightly sandy angular to subangular fine to coarse flint GRAVEL		
2.00-2.45	SPT(C) N=30	DRY	IP 0/S 5,5 T 5,9,8,8		(0.70)			
2.00-3.00	L2							
2.10-2.20	D4							
2.40-3.00	D5			32.49	2.40	Dense greyish brown slightly sandy very angular to subangular fine to coarse flint GRAVEL ...pocket of firm brown sandy clay at 2.50 m		
3.00-3.45	SPT(C) N=38	DRY	IP 0/S 9,9 T 8,9,10,11					
3.00-3.60	D6							
3.00-4.00	L3							
3.60-4.00	D7				(2.60)	...cobbly between 3.60 and 4.20 m [recovered as very angular fine to coarse flint]		
4.00-4.45	SPT(C) N=34	DRY	IP 0/S 3,9 T 9,11,7,7					
4.00-4.40	D8							
4.00-5.00	L4							
4.40-5.00	D9					...rare pockets of firm brown slightly sandy clay from 4.40 m		
			29/08/2019:DRY					
				29.89	5.00			

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. SPT Hammer Energy Ratio = 68.30%
5. Exploratory hole backfilled with natural arisings and bentonite

Scale (approx)	Logged By
1:25	JAH

Figure No.
19.287.WS04

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Site	Number
SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE	**WS05**

Machine / Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine : Dando Terrier 2002 **Method :** Windowless Dynamic Sampling		34.94	Privilege Finance Services	19.287
	Location 603430 E 295634 N	**Dates** 30/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				34.83	(0.11) 0.11	TOPSOIL (Grass overlying dark brown slightly clayey slightly gravelly fine to coarse sand with rootlets. Gravel is angular to subangular fine occasionally medium flint)		
0.25	ES1				(0.54)	MADE GROUND (Dark brown slightly clayey slightly gravelly fine to coarse sand with rare rootlets. Gravel is angular to subangular fine occasionally medium flint with rare fragments of brick)		
0.70-1.20	B1			34.29	0.65	Brown slightly clayey slightly silty gravelly fine to medium occasionally coarse SAND. Gravel is angular to subangular fine occasionally medium flint		
					(0.60)			
1.20-1.69 1.20-1.65 1.20-2.00 1.30-2.00	SPT D1 L1 B2 N=13	DRY	IP 40/S 2,3 T 3,3,4,3	33.69	1.25	Medium dense orange-brown clayey slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium flint		
					(1.05)			
2.00-2.45 2.00-2.30 2.00-2.45 2.00-3.00	SPT N=8 D3 D2 L2	DRY	IP 0/S 4,5 T 2,3,1,2	32.64	2.30	Loose orange-brown slightly clayey slightly sandy angular to subangular fine to medium flint GRAVEL		
				32.49	(0.15) 2.45	Firm greyish brown mottled orange-brown slightly silty slightly gravelly CLAY with pockets of pale grey silty fine to medium sand. Gravel is angular to subrounded fine to medium flint		
2.60-2.75 2.60	D4 PP 32.5kPa		1.0,1.0,0.5,0.5,0.25/Av. 0.65		(0.50)	...soft from 2.85 m		
3.00-3.45 3.00-3.30 3.00-3.45 3.00-4.00	SPT N=6 D6 D5 L3	DRY	IP 0/S 2,2 T 1,2,1,2	31.99	2.95	Loose orange-brown mottled grey clayey slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium flint		
					(0.35)			
3.60-3.80	D7			31.64	3.30	Very loose grey mottled orange-brown very clayey slightly silty fine to medium SAND with rare pockets of greyish brown slightly clayey sandy silt		
4.00-4.45 4.00-4.45 4.00-5.00 4.10-4.40	SPT N=2 D8 L4 D9	DRY	IP 0/S 1,1 T 0,1,0,1		(1.40)			
4.80-5.00	D10		30/08/2019:DRY	30.24 29.94	4.70 (0.30) 5.00	Brown slightly clayey slightly silty sandy angular to subangular fine to medium flint GRAVEL		

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. No groundwater encountered
4. SPT Hammer Energy Ratio = 68.30%
5. Exploratory hole backfilled with natural arisings and bentonite

Scale (approx)	Logged By
1:25	JAH

Figure No.
19.287.WS05

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Site	Number
SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE	**WS06**

Machine / Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine : Dando Terrier 2002 **Method :** Windowless Dynamic Sampling		34.83	Privilege Finance Services	19.287
	Location 603463 E 295641 N	**Dates** 30/08/2019	**Engineer** Plandescil Limited	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.09)			
0.09-0.30	A1			34.74	0.09	TOPSOIL (Grass overlying dark brown slightly clayey slightly gravelly fine to coarse sand with rootlets. Gravel is angular to subangular fine occasionally medium flint)		
					(0.21)			
0.25	ES1			34.53	0.30	MADE GROUND (Dark brown slightly clayey slightly gravelly fine to coarse SAND with rare rootlets. Gravel is angular to subangular fine occasionally medium flint with fragments of cement board [possible ACM]. Approximately <5 % ACM ranging between 1 and 10 cm², and >95 % matrix)		
0.40-0.60	D1							
					(0.40)			
0.70-1.20	B1			34.13	0.70	Dark brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine occasionally medium flint		
						Loose brown clayey slightly silty gravelly fine to medium occasionally coarse SAND. Gravel is angular to subangular fine occasionally medium and coarse flint		
					(0.70)			
1.20-1.65	SPT N=7	DRY	IP 0/S 1,1 T 1,2,1,3					
1.20-1.65	D2							
1.20-2.00	L1			33.43	1.40	Soft locally firm brown slightly silty slightly sandy gravelly CLAY. Gravel is angular to subangular fine occasionally medium flint		
1.50-1.70	D3					...mottled greyish brown from 1.60 m		
					(0.70)			
2.00-2.57	SPT	DRY	IP 120/S 0,1					
2.00-3.00	L2			32.73	2.10			
2.10-2.30	D4					Soft locally firm pale brown mottled greyish brown silty slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium chalk and rare subangular to subrounded fine to medium flint		
	N=6		T 2,2,1,1					
2.60	PP 75kPa		2.5,1.5,1.0,1.5,1.0/Av. 1.50					
2.60-2.80	D5							
3.00-3.45	SPT N=10	DRY	IP 0/S 2,3 T 1,4,2,3			...rounded coarse chalk at 3.05 m		
3.00-3.45	D6							
3.00-4.00	L3							
3.20-3.30	D7				(2.40)			
						...greyish brown mottled brown from 3.55 m		
3.70-3.80	D8							
4.00-4.45	U1	DRY	31 blows					
4.00-5.00	L4							
				30.33	4.50	Firm grey gravelly CLAY. Gravel is subrounded to rounded fine to medium occasionally coarse chalk and rare angular to subrounded fine occasionally medium flint		
4.60-4.80	D9							
					(0.50)			
			30/08/2019:DRY	29.83	5.00			

Remarks
1. Location CAT scanned prior to excavation
2. Hand dug inspection pit to 1.20 m
3. ACM = Asbestos Containing Material [cement board fragments picked and sampled separately as A1]
4. No groundwater encountered
5. Water added to reduce risk of exposure to asbestos fibres from 0.00 m to 1.20 m approx 1 litres, 1.20 m to 2.00 m approx 0.5 litres, 2.00 m to 3.00 m approx 0.5 litres, 3.00 m to 4.00 m approx 0.5 litres, 4.00 m to 5.00 m approx 0.5 litres
6. SPT Hammer Energy Ratio = 68.30%
7. Exploratory hole backfilled with bentonite and natural arisings

Scale (approx)	Logged By
1:25	JAH

Figure No. 19.287.WS06

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APPENDIX F: PLATE LOADING TEST RECORDS

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Field Test

Site : SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE

Client : Privilege Finance Services

Engineer : Plandescil Limited

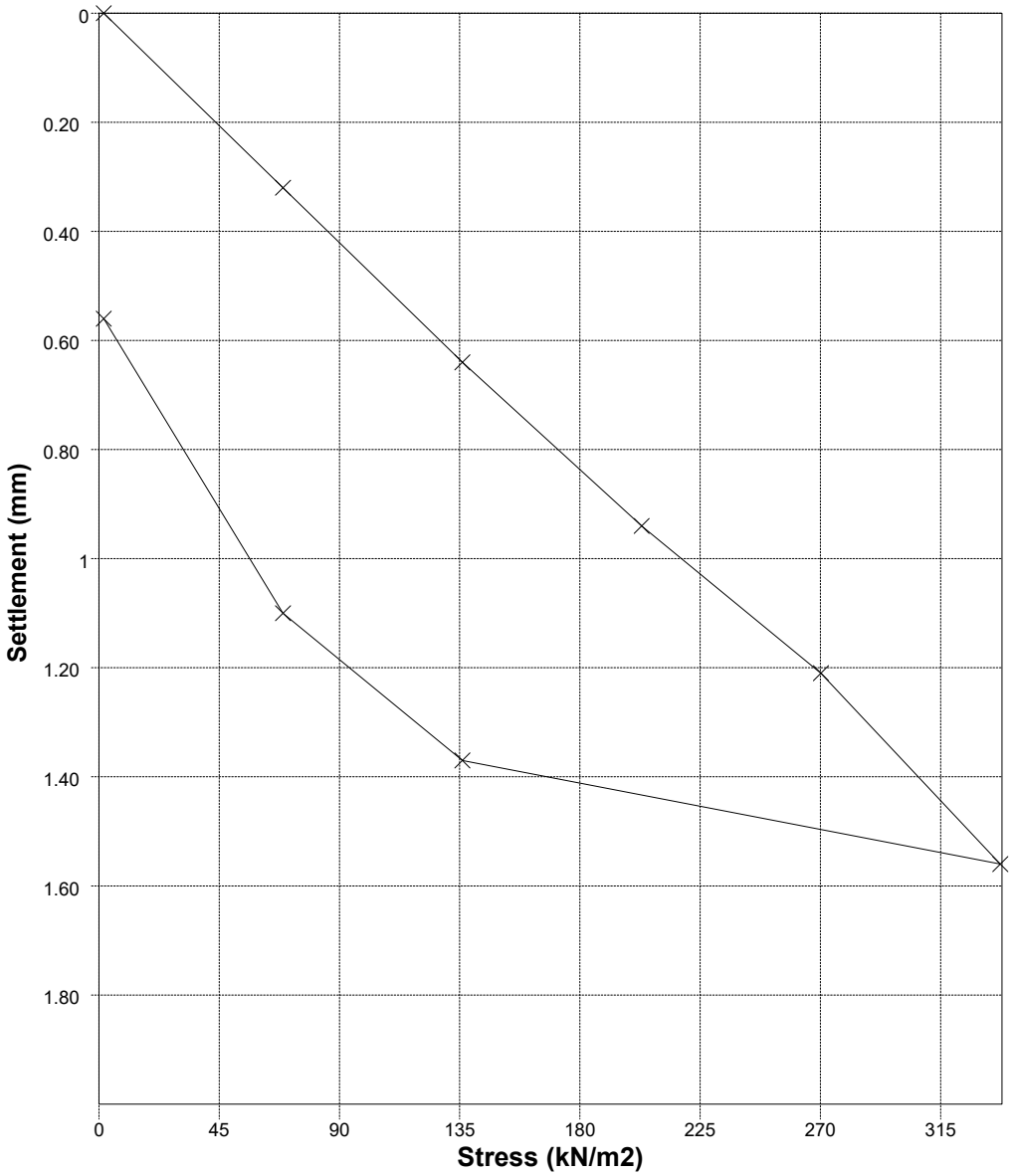
Job Number 19.287

Sheet 1 / 5

REPORT ON THE DETERMINATION OF THE VERTICAL DEFORMATION AND STRENGTH CHARACTERISTICS BY THE PLATE LOADING TEST TO BS 1377:Part 9: 1990: Clause 4.1

Test Ref	Test no	Location	Date Tested
PLT01	1	603329.0911 E, 295552.6612 N; Elevation 32.7344 m	29/08/2019

Plate Diameter (mm)	610	**Weight of apparatus (kg)**	53.00	**Type of Test**	Incremental
Depth (m)	GL	**In-situ density (Mg/m³)**	N/A	**Description**	Hardcore
Distance from side wall (m)	N/A	**Moisture Content (%)**	N/A	**Reaction Load**	14TONS



Max applied pressure (kN/m²)	337.35	**Stress at 1.25mm plate settlement (kN/m²)**	277.89	**Max deformation (mm)**	1.56
Constrained Soil Modulus (MN/m²/m)		**Modulus of Subgrade Reaction (MN/m²/m)**	181.52	**Equivalent CBR value (%)**	79

Remarks

Test results should be interpreted by a qualified Engineer taking into account all relevant factors including overall settlement and the shape of the load-penetration curve.

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Client : Privilege Finance Services

Engineer : Plandescil Limited

Job Number 19.287

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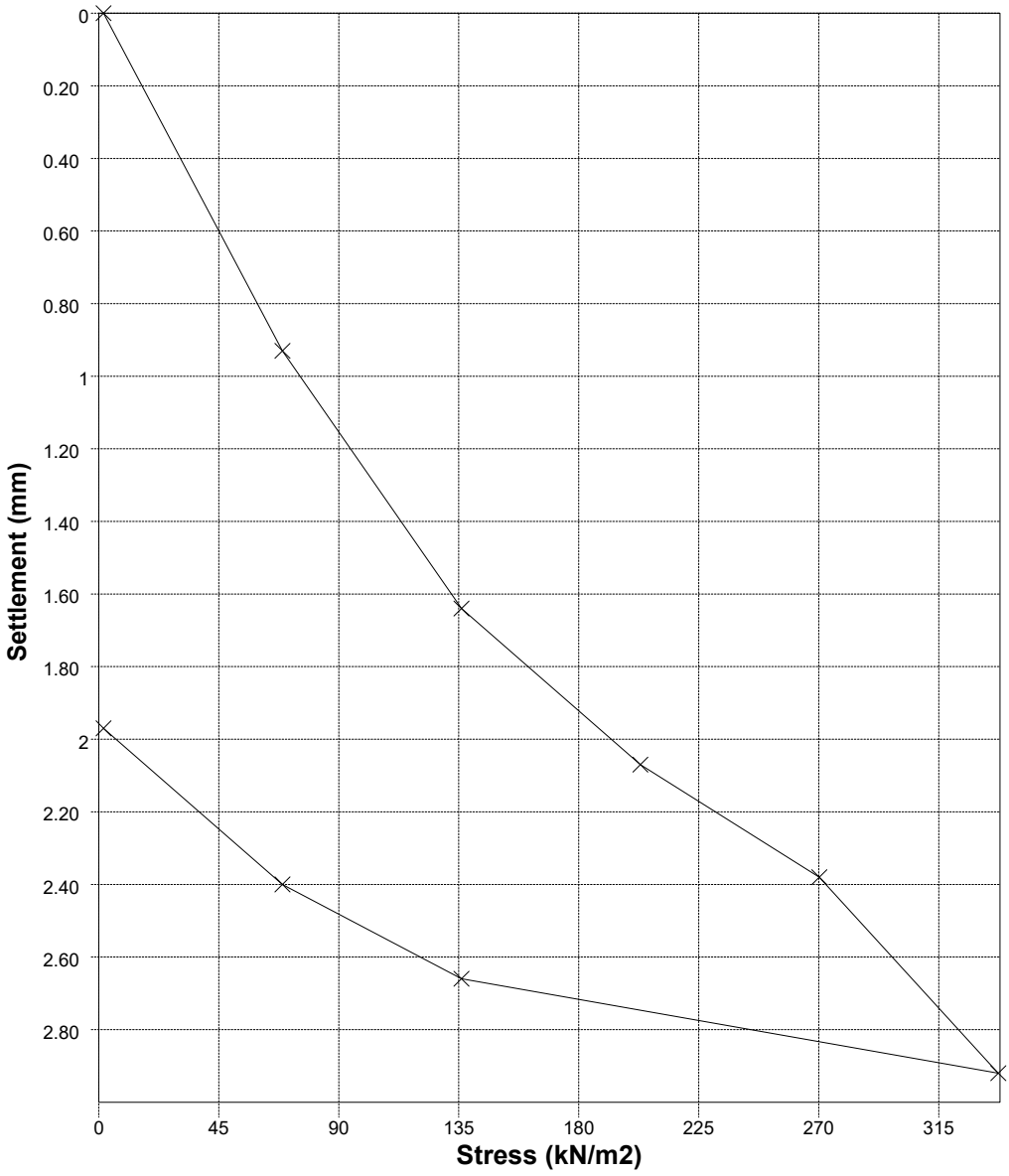
REPORT ON THE DETERMINATION OF THE VERTICAL DEFORMATION AND STRENGTH CHARACTERISTICS BY THE PLATE LOADING TEST TO BS 1377:Part 9: 1990: Clause 4.1

Test Ref	Test no	Location	Date Tested
PLT02	1	603334.6978 E, 295538.7878 N; Elevation 32.1961 m	30/08/2019

Plate Diameter (mm)	610	**Weight of apparatus (kg)**	53.00	**Type of Test**	Incremental
Depth (m)	GL	**In-situ density (Mg/m³)**	N/A	**Description**	Hardcore
Distance from side wall (m)	N/A	**Moisture Content (%)**	N/A	**Reaction Load**	14TONS



Max applied pressure (kN/m²)	337.35	**Stress at 1.25mm plate settlement (kN/m²)**	99.14	**Max deformation (mm)**	2.92
Constrained Soil Modulus (MN/m²/m)		**Modulus of Subgrade Reaction (MN/m²/m)**	64.76	**Equivalent CBR value (%)**	13

Remarks

Test results should be interpreted by a qualified Engineer taking into account all relevant factors including overall settlement and the shape of the load-penetration curve.

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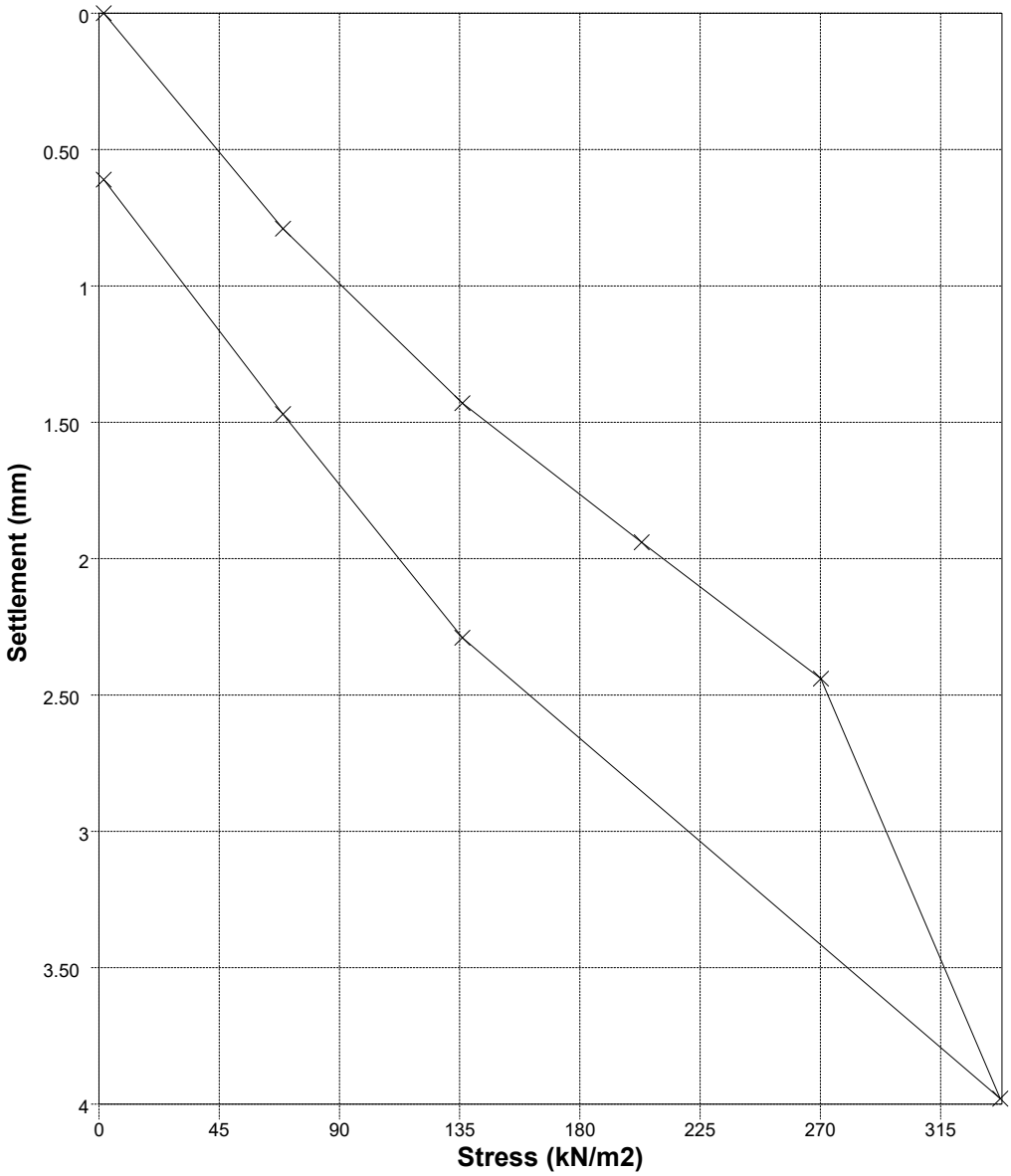
REPORT ON THE DETERMINATION OF THE VERTICAL DEFORMATION AND STRENGTH CHARACTERISTICS BY THE PLATE LOADING TEST TO BS 1377:Part 9: 1990: Clause 4.1

Test Ref	Test no	Location	Date Tested
PLT03	1	603315.3459 E, 295542.5423 N; Elevation 32.3277 m	30/08/2019

Plate Diameter (mm)	610	**Weight of apparatus (kg)**	53.00	**Type of Test**	Incremental
Depth (m)	GL	**In-situ density (Mg/m³)**	N/A	**Description**	Hardcore
Distance from side wall (m)	N/A	**Moisture Content (%)**	N/A	**Reaction Load**	14TONS



Max applied pressure (kN/m²)	337.35	**Stress at 1.25mm plate settlement (kN/m²)**	117.14	**Max deformation (mm)**	3.98
Constrained Soil Modulus (MN/m²/m)		**Modulus of Subgrade Reaction (MN/m²/m)**	76.51	**Equivalent CBR value (%)**	18

Remarks

Test results should be interpreted by a qualified Engineer taking into account all relevant factors including overall settlement and the shape of the load-penetration curve.

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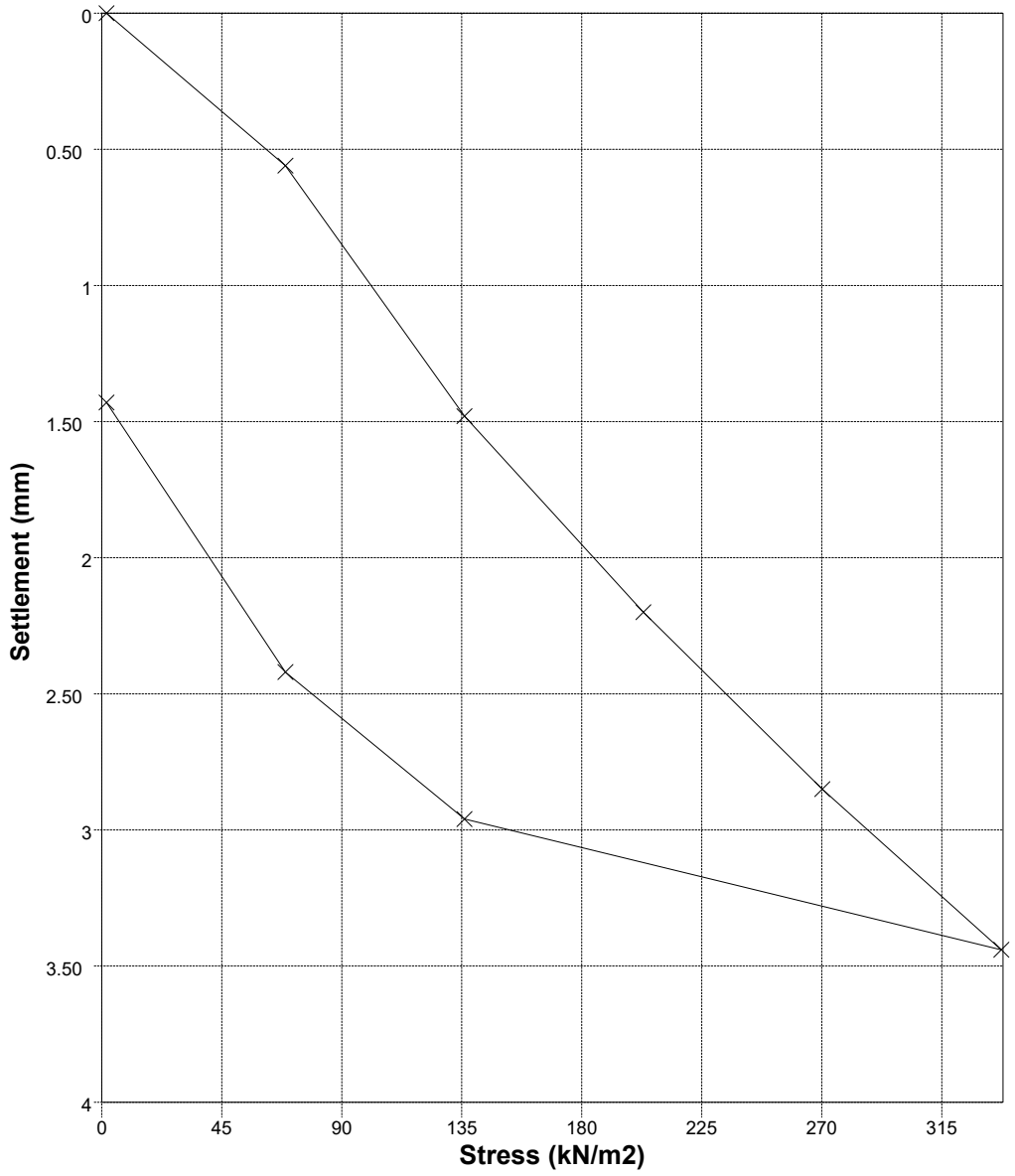
REPORT ON THE DETERMINATION OF THE VERTICAL DEFORMATION AND STRENGTH CHARACTERISTICS BY THE PLATE LOADING TEST TO BS 1377:Part 9: 1990: Clause 4.1

Test Ref	Test no	Location	Date Tested
PLT04	1	603276.0322 E, 295542.4227 N; Elevation 32.9112 m	30/08/2019

Plate Diameter (mm)	610	**Weight of apparatus (kg)**	53.00	**Type of Test**	Incremental
Depth (m)	GL	**In-situ density (Mg/m³)**	N/A	**Description**	Hardcore
Distance from side wall (m)	N/A	**Moisture Content (%)**	N/A	**Reaction Load**	14TONS



Max applied pressure (kN/m²)	337.35	**Stress at 1.25mm plate settlement (kN/m²)**	119.24	**Max deformation (mm)**	3.44
Constrained Soil Modulus (MN/m²/m)		**Modulus of Subgrade Reaction (MN/m²/m)**	77.88	**Equivalent CBR value (%)**	18

Remarks

Test results should be interpreted by a qualified Engineer taking into account all relevant factors including overall settlement and the shape of the load-penetration curve.

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Engineer : Plandescil Limited

Job Number 19.287

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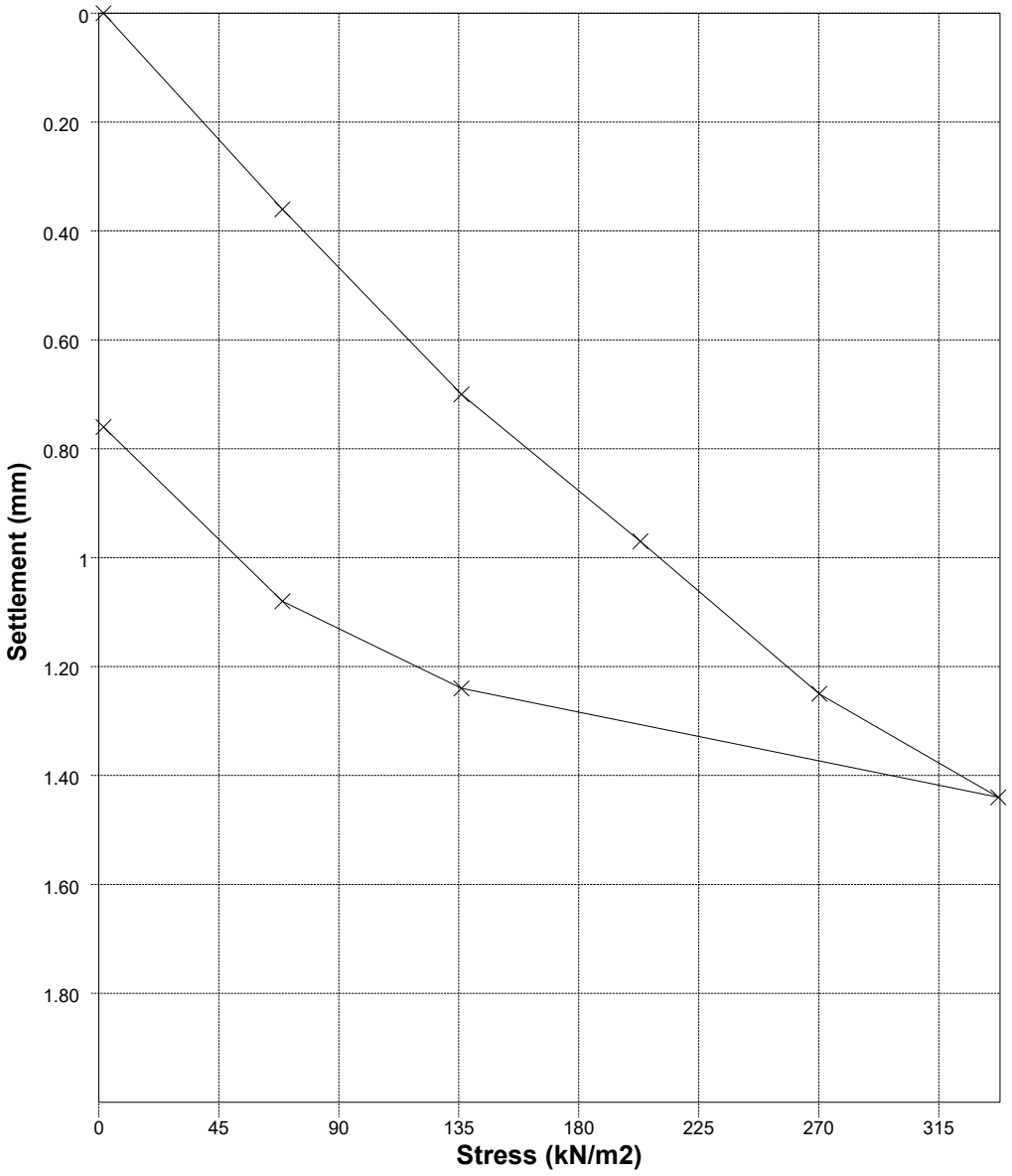
REPORT ON THE DETERMINATION OF THE VERTICAL DEFORMATION AND STRENGTH CHARACTERISTICS BY THE PLATE LOADING TEST TO BS 1377:Part 9: 1990: Clause 4.1

Test Ref	Test no	Location	Date Tested
PLT05	1	603263.405 E, 295571.2762 N; Elevation 33.4321 m a	30/08/2019

Plate Diameter (mm)	610	**Weight of apparatus (kg)**	53.00	**Type of Test**	Incremental
Depth (m)	GL	**In-situ density (Mg/m³)**	N/A	**Description**	Hardcore
Distance from side wall (m)	N/A	**Moisture Content (%)**	N/A	**Reaction Load**	14TONS



Max applied pressure (kN/m²)	337.35	**Stress at 1.25mm plate settlement (kN/m²)**	270.22	**Max deformation (mm)**	1.44
Constrained Soil Modulus (MN/m²/m)		**Modulus of Subgrade Reaction (MN/m²/m)**	176.51	**Equivalent CBR value (%)**	76

Remarks

Test results should be interpreted by a qualified Engineer taking into account all relevant factors including overall settlement and the shape of the load-penetration curve.

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APPENDIX G: LABORATORY TESTING

Natural moisture content

Atterberg limits

Unconsolidated Undrained Triaxial Testing

Particle Size Distribution

Sulphate Content and pH Value

Total Sulphur Content

Contamination Testing

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Laboratory Test Results

Site : SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE

Client : Privilege Finance Services

Engineer : Plandescil Limited

Job Number 19.287

Sheet 1 / 1

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %						
WS01	2.70	D6	21.0	100	21.0	26	15	11	0.55	CL	Yellowish brown mottled grey fine sandy CLAY with rare rootlets.
WS02	3.50	D7	21.7	99	21.9	28	15	13	0.54	CL	Yellowish brown mottled grey fine sandy CLAY with rare gravel.
WS05	2.60	D4	19.1	100	19.1	36	13	23	0.26	CI	Mottled yellowish brown and light grey silty CLAY.
WS06	4.00	U1	19.6	96	20.4	36	18	18	0.11	CI	Stiff grey gravelly CLAY. Gravel is fine to medium and includes chalk.

Method of Preparation : BS EN ISO 17892:PART 1:2014:5.1 Test specimen preparation (moisture content). BS EN ISO 17892:PART 1:2018:5.2 Preparation of samples for classification tests

Method of Test : BS EN ISO 17892:PART 1:2014:5.2 Test execution (moisture content) BS EN ISO 17892: PART 12:5.3 & 6.2 Determination of the liquid limit BS EN ISO 17892:PART 5.5, 6.4 & 6.5 Determination of the plastic limit and plasticity index

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Laboratory Test Results

Site : SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE

Client : Privilege Finance Services

Engineer : Plandescil Limited

Job Number 19.287

Sheet 1 / 1

DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Cell Pressure (kN/m^2)	Deviator Stress (kN/m^2)	Apparent Cohesion (kN/m^2)	Angle of Shearing Resistance (degrees)	Laboratory Description
WS06	4.00	U1	19.6	2.16	1.81	40 80 160	220 239 294	73	13.5	Stiff grey gravelly CLAY. Gravel is fine to medium and includes chalk.

Method of Preparation : BS EN ISO 17892:PART 1:2014:5.1 Test specimen preparation (moisture content). BS EN ISO 17892:PART 8:2018: 6.2 Preparation of undisturbed samples for testing

Method of Test : BS EN ISO 17892:PART 1:2014:5.2 Test execution (moisture content) and PART 2:2014 Determination of density. BS EN ISO 17892: PART 8: 2018: 6,7 + 8 Undrained shear strength (Single stage). BS 1377:PART 7:1990:9 Multistage loading

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Laboratory Test Results

Site : SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE

Client : Privilege Finance Services

Engineer : Plandescil Limited

Job Number 19.287

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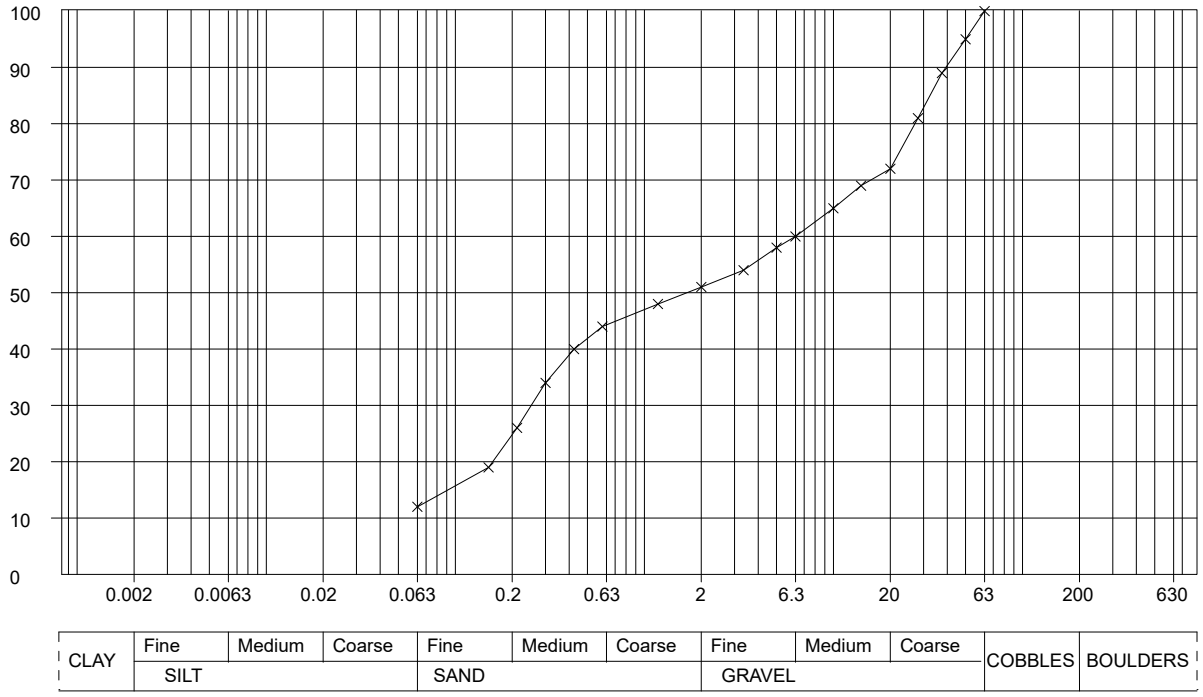
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	0.60	B1	Brown silty clayey very sandy GRAVEL



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	95.0
37.5 mm	89.0
28 mm	81.0
20 mm	72.0
14 mm	69.0
10 mm	65.0
6.3 mm	60.0
5 mm	58.0
3.35 mm	54.0
2 mm	51.0
1.18 mm	48.0
600 µm	44.0
425 µm	40.0
300 µm	34.0
212 µm	26.0
150 µm	19.0
63 µm	12.0

Grading Analysis	
D85	32.8 mm
D60	6.3 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	1.1%
Gravel	47.9%
Sand	39.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

Remarks :

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Engineer : Plandescil Limited

Job Number 19.287

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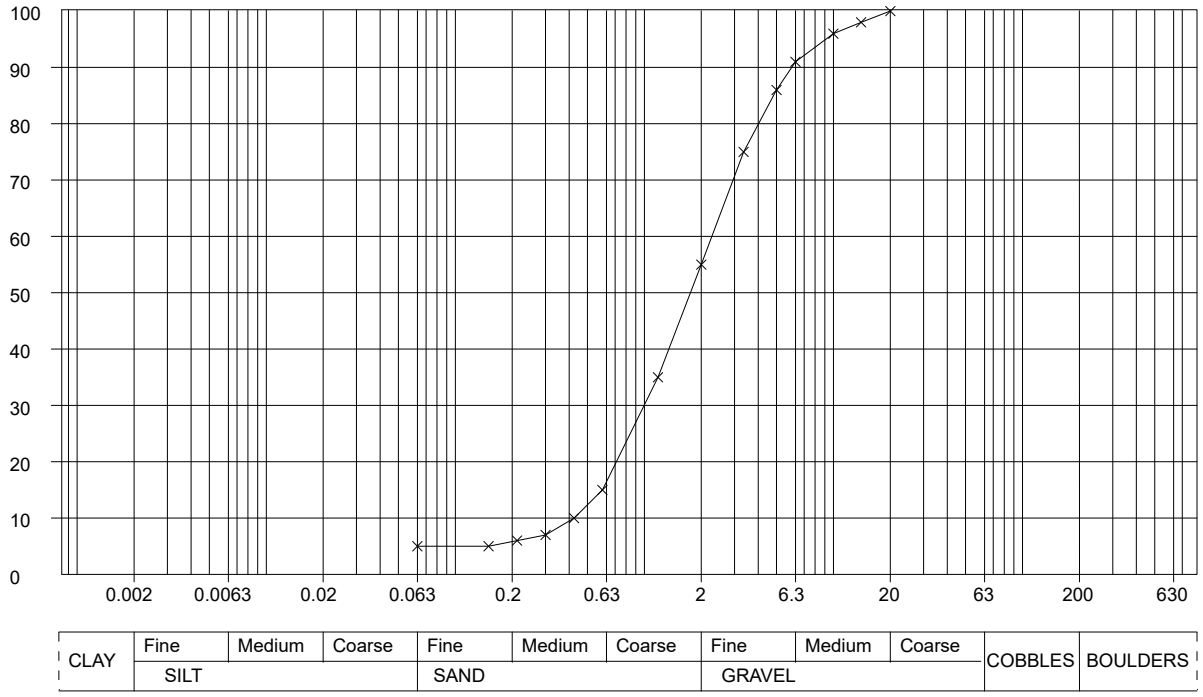
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH01	2.50	B3	Yellowish brown silty GRAVEL and SAND



Sieve / Particle Size	% Passing
20 mm	100.0
14 mm	98.0
10 mm	96.0
6.3 mm	91.0
5 mm	86.0
3.35 mm	75.0
2 mm	55.0
1.18 mm	35.0
600 µm	15.0
425 µm	10.0
300 µm	7.0
212 µm	6.0
150 µm	5.0
63 µm	5.0

Grading Analysis	
D85	4.8 mm
D60	2.3 mm
D10	425.0 µm
Uniformity Coefficient	5.5

Particle Proportions	
Cobbles + Boulders	-
Gravel	45.0%
Sand	50.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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Engineer : Plandescil Limited

Job Number 19.287

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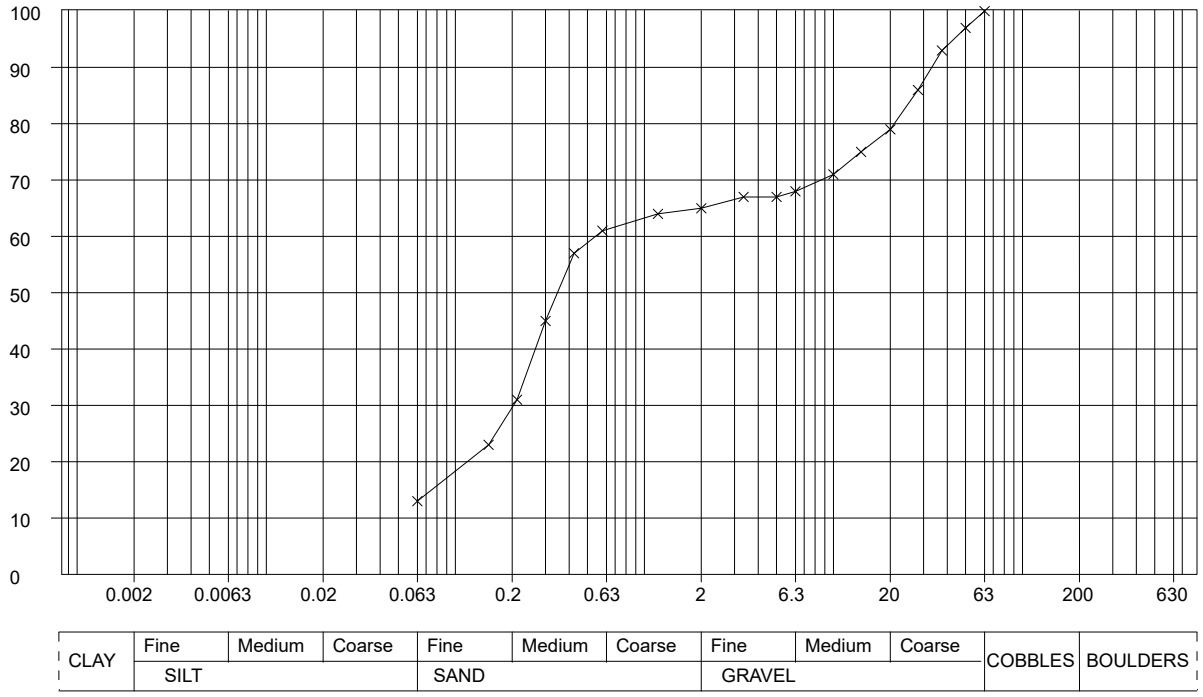
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	0.60	B1	Brown clayey silty very gravelly SAND



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	97.0
37.5 mm	93.0
28 mm	86.0
20 mm	79.0
14 mm	75.0
10 mm	71.0
6.3 mm	68.0
5 mm	67.0
3.35 mm	67.0
2 mm	65.0
1.18 mm	64.0
600 µm	61.0
425 µm	57.0
300 µm	45.0
212 µm	31.0
150 µm	23.0
63 µm	13.0

Grading Analysis	
D85	26.9 mm
D60	556.3 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	0.6%
Gravel	34.4%
Sand	52.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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Engineer : Plandescil Limited

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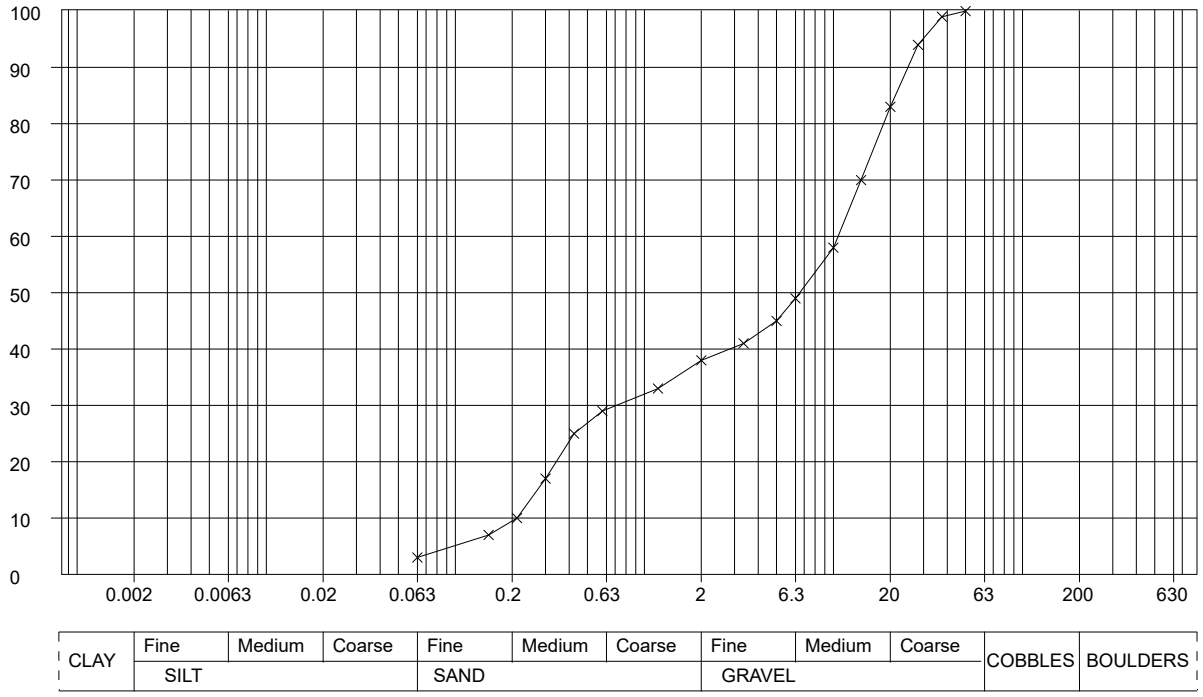
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	1.50	B2	Brown silty very sandy flint GRAVEL



Sieve / Particle Size	% Passing
50 mm	100.0
37.5 mm	99.0
28 mm	94.0
20 mm	83.0
14 mm	70.0
10 mm	58.0
6.3 mm	49.0
5 mm	45.0
3.35 mm	41.0
2 mm	38.0
1.18 mm	33.0
600 µm	29.0
425 µm	25.0
300 µm	17.0
212 µm	10.0
150 µm	7.0
63 µm	3.0

Grading Analysis	
D85	21.5 mm
D60	10.7 mm
D10	212.0 µm
Uniformity Coefficient	50.3

Particle Proportions	
Cobbles + Boulders	-
Gravel	62.0%
Sand	35.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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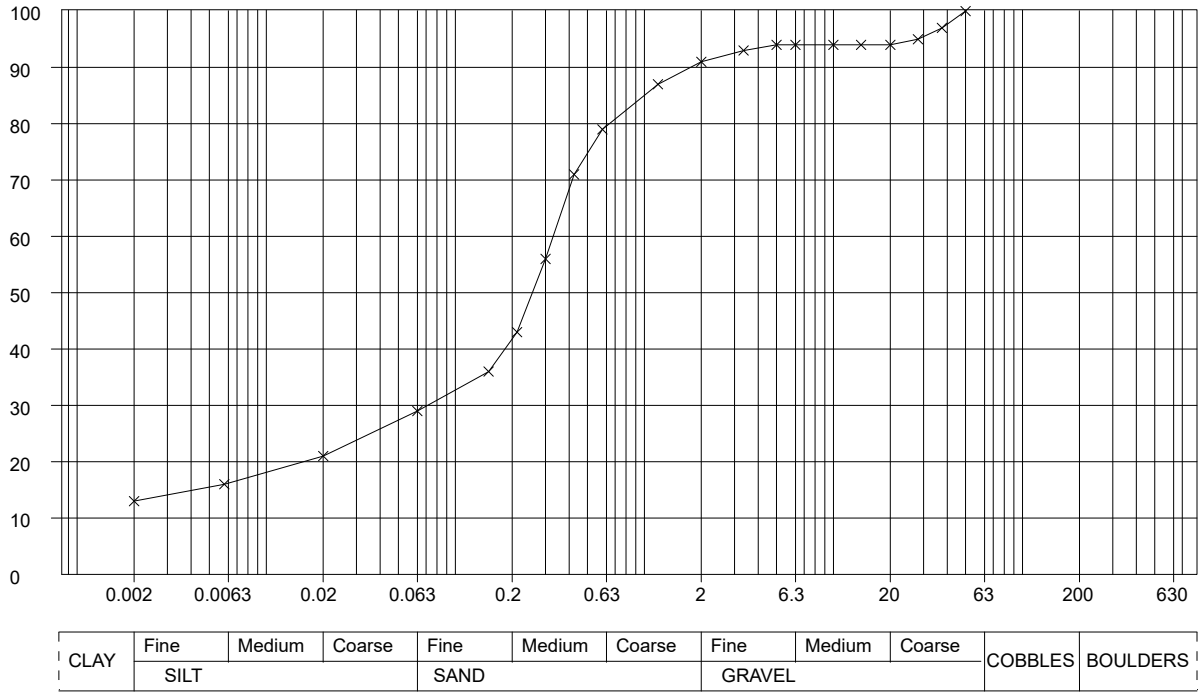
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	2.50	B3	Orange brown slightly gravelly clayey silty SAND.



Sieve / Particle Size	% Passing
50 mm	100.0
37.5 mm	97.0
28 mm	95.0
20 mm	94.0
14 mm	94.0
10 mm	94.0
6.3 mm	94.0
5 mm	94.0
3.35 mm	93.0
2 mm	91.0
1.18 mm	87.0
600 µm	79.0
425 µm	71.0
300 µm	56.0
212 µm	43.0
150 µm	36.0
63 µm	29.0
20 µm	21.0
6 µm	16.0
2 µm	13.0

Grading Analysis	
D85	1.0 mm
D60	333.3 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	9.0%
Sand	62.0%
Silt	16.0%
Clay	13.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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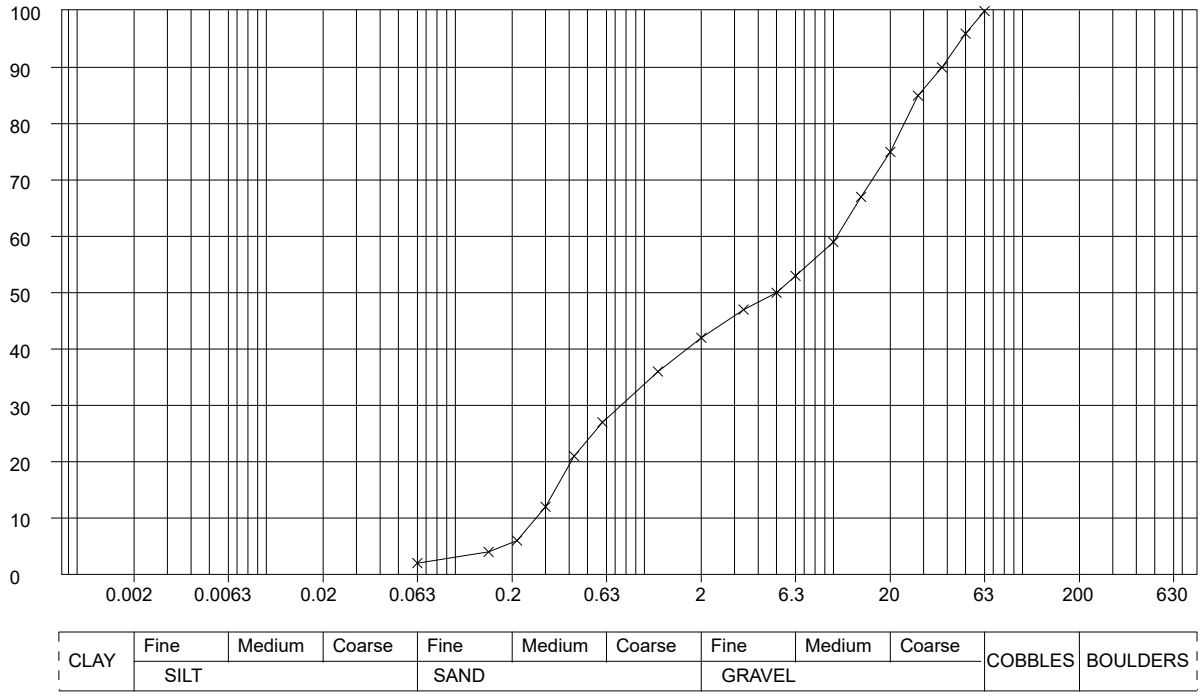
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	3.50	B4	Yellow brown very sandy GRAVEL



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	96.0
37.5 mm	90.0
28 mm	85.0
20 mm	75.0
14 mm	67.0
10 mm	59.0
6.3 mm	53.0
5 mm	50.0
3.35 mm	47.0
2 mm	42.0
1.18 mm	36.0
600 µm	27.0
425 µm	21.0
300 µm	12.0
212 µm	6.0
150 µm	4.0
63 µm	2.0

Grading Analysis	
D85	28.0 mm
D60	10.5 mm
D10	270.7 µm
Uniformity Coefficient	38.8

Particle Proportions	
Cobbles + Boulders	0.8%
Gravel	57.2%
Sand	40.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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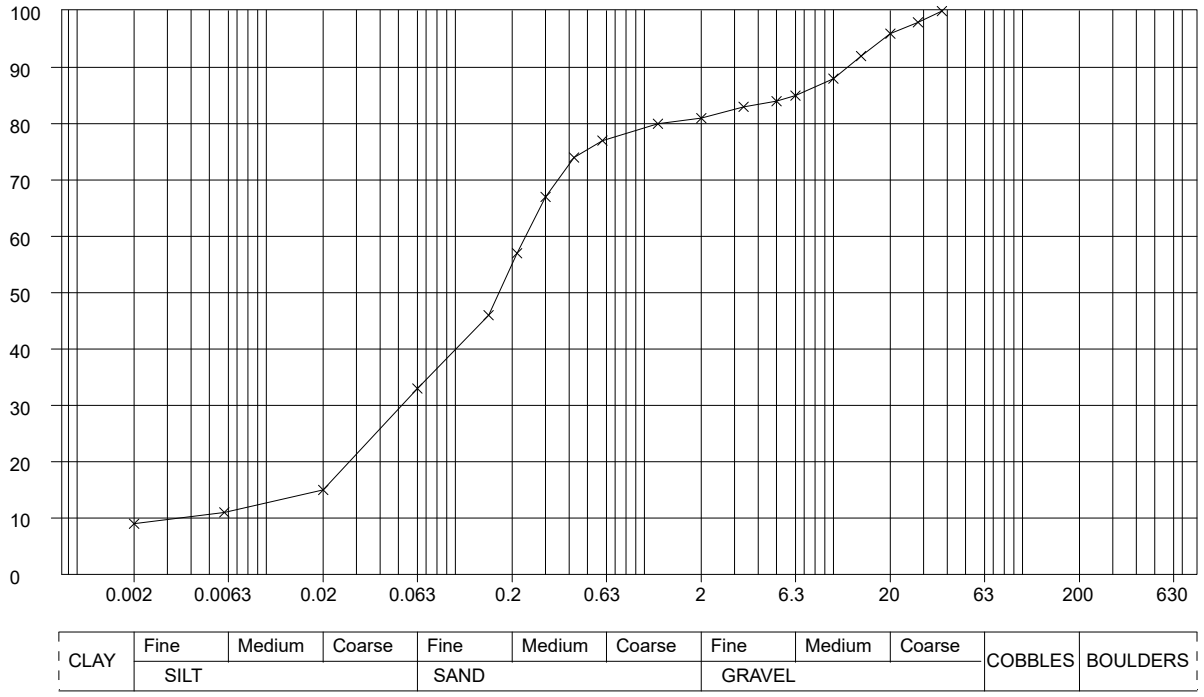
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS01	2.10	D5	Brownish grey gravelly very sandy silty clayey SILT.



Sieve / Particle Size	% Passing
37.5 mm	100.0
28 mm	98.0
20 mm	96.0
14 mm	92.0
10 mm	88.0
6.3 mm	85.0
5 mm	84.0
3.35 mm	83.0
2 mm	81.0
1.18 mm	80.0
600 µm	77.0
425 µm	74.0
300 µm	67.0
212 µm	57.0
150 µm	46.0
63 µm	33.0
20 µm	15.0
6 µm	11.0
2 µm	9.0

Grading Analysis	
D85	6.3 mm
D60	238.4 µm
D10	4.0 µm
Uniformity Coefficient	59.6

Particle Proportions	
Cobbles + Boulders	-
Gravel	19.0%
Sand	48.0%
Silt	24.0%
Clay	9.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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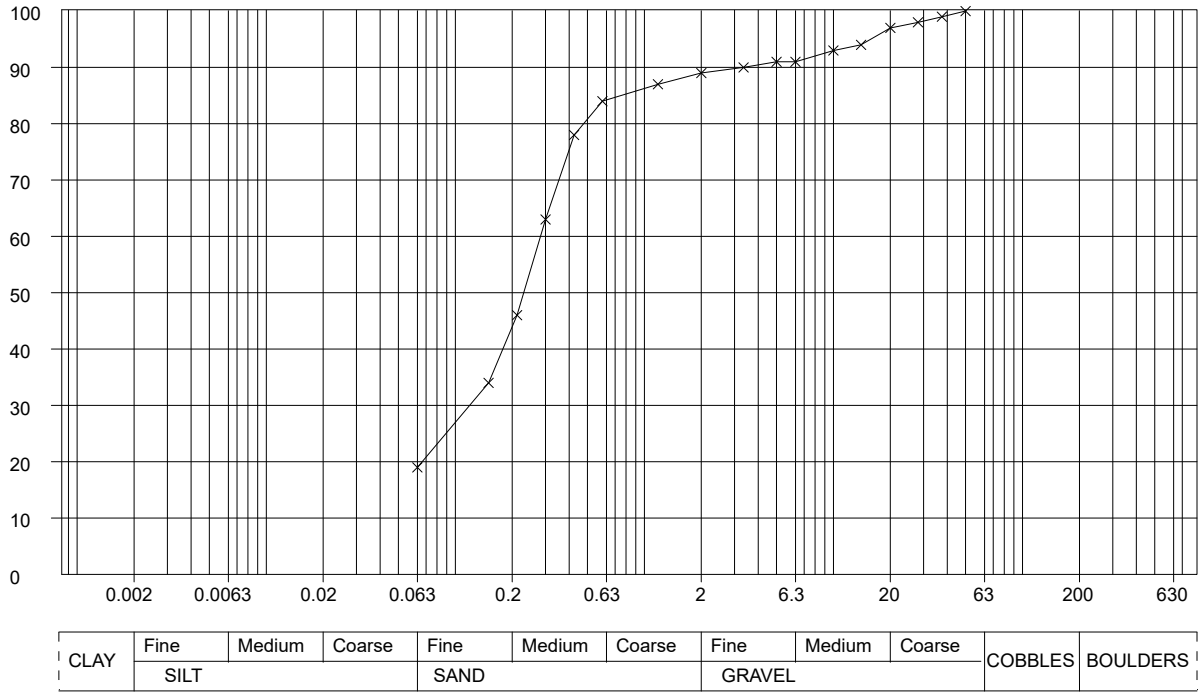
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS02	0.50	B1	Brown slightly clayey silty gravelly SAND.



Sieve / Particle Size	% Passing
50 mm	100.0
37.5 mm	99.0
28 mm	98.0
20 mm	97.0
14 mm	94.0
10 mm	93.0
6.3 mm	91.0
5 mm	91.0
3.35 mm	90.0
2 mm	89.0
1.18 mm	87.0
600 µm	84.0
425 µm	78.0
300 µm	63.0
212 µm	46.0
150 µm	34.0
63 µm	19.0

Grading Analysis	
D85	793.3 µm
D60	284.5 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	11.0%
Sand	70.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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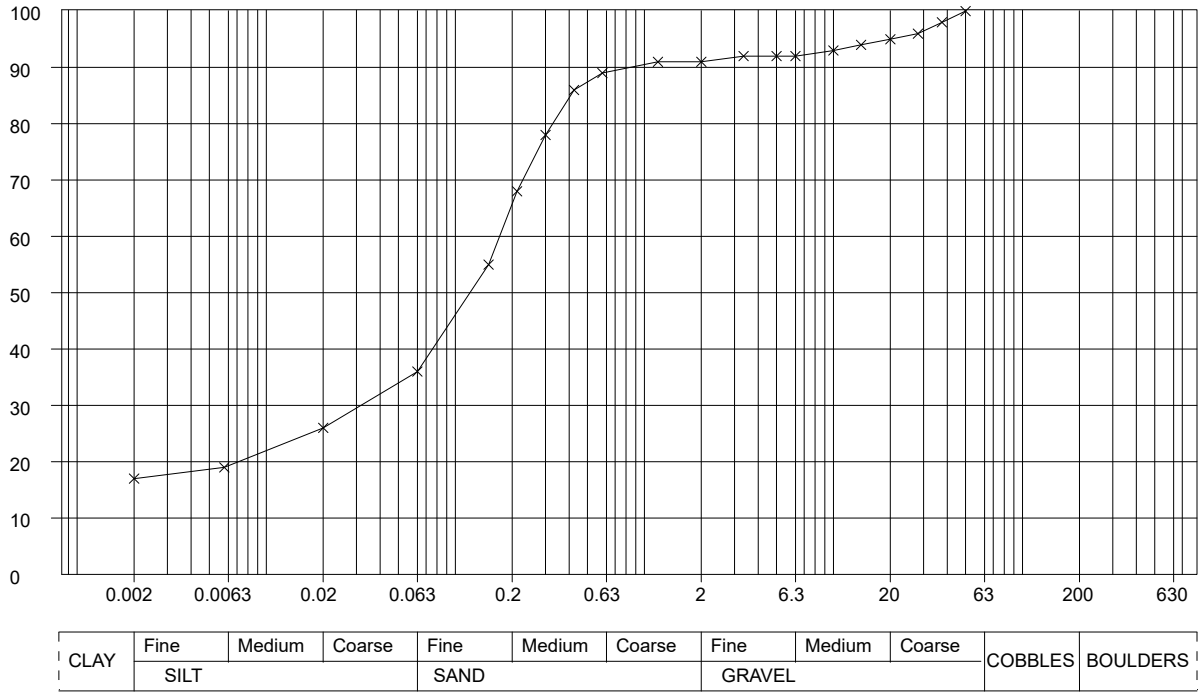
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS02	1.50	B2	Orange brown and grey gravelly silty clayey SAND.



Sieve / Particle Size	% Passing
50 mm	100.0
37.5 mm	98.0
28 mm	96.0
20 mm	95.0
14 mm	94.0
10 mm	93.0
6.3 mm	92.0
5 mm	92.0
3.35 mm	92.0
2 mm	91.0
1.18 mm	91.0
600 µm	89.0
425 µm	86.0
300 µm	78.0
212 µm	68.0
150 µm	55.0
63 µm	36.0
20 µm	26.0
6 µm	19.0
2 µm	17.0

Grading Analysis	
D85	409.4 µm
D60	173.8 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	9.0%
Sand	55.0%
Silt	19.0%
Clay	17.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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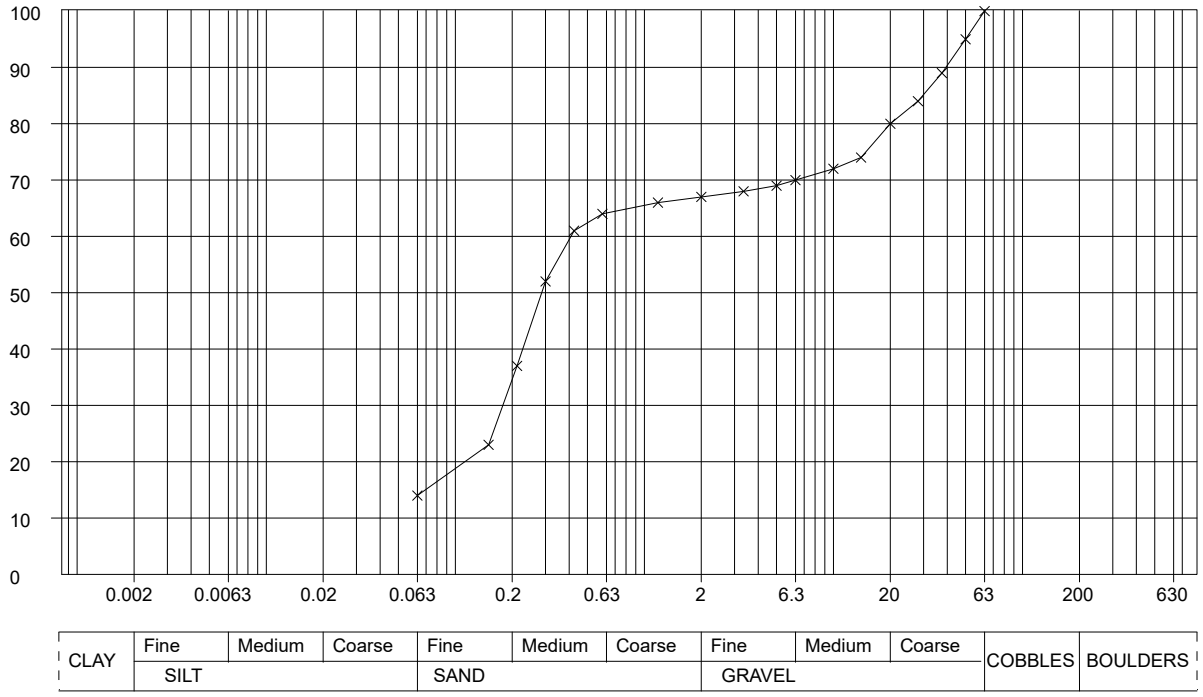
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS03	0.60	B1	Orange brown clayey silty very gravelly SAND.



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	95.0
37.5 mm	89.0
28 mm	84.0
20 mm	80.0
14 mm	74.0
10 mm	72.0
6.3 mm	70.0
5 mm	69.0
3.35 mm	68.0
2 mm	67.0
1.18 mm	66.0
600 µm	64.0
425 µm	61.0
300 µm	52.0
212 µm	37.0
150 µm	23.0
63 µm	14.0

Grading Analysis	
D85	29.9 mm
D60	411.1 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	1.1%
Gravel	31.9%
Sand	53.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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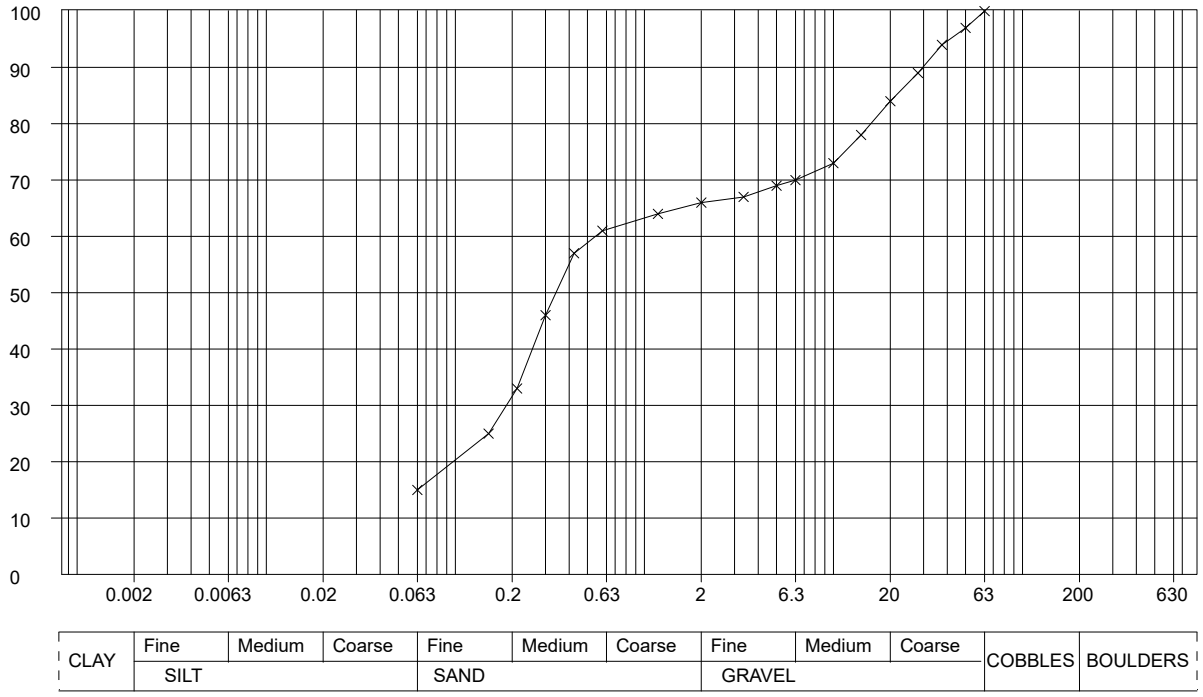
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS04	0.50	B1	Brown slightly clayey silty very gravelly SAND.



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	97.0
37.5 mm	94.0
28 mm	89.0
20 mm	84.0
14 mm	78.0
10 mm	73.0
6.3 mm	70.0
5 mm	69.0
3.35 mm	67.0
2 mm	66.0
1.18 mm	64.0
600 µm	61.0
425 µm	57.0
300 µm	46.0
212 µm	33.0
150 µm	25.0
63 µm	15.0

Grading Analysis	
D85	21.6 mm
D60	556.3 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	0.6%
Gravel	33.4%
Sand	51.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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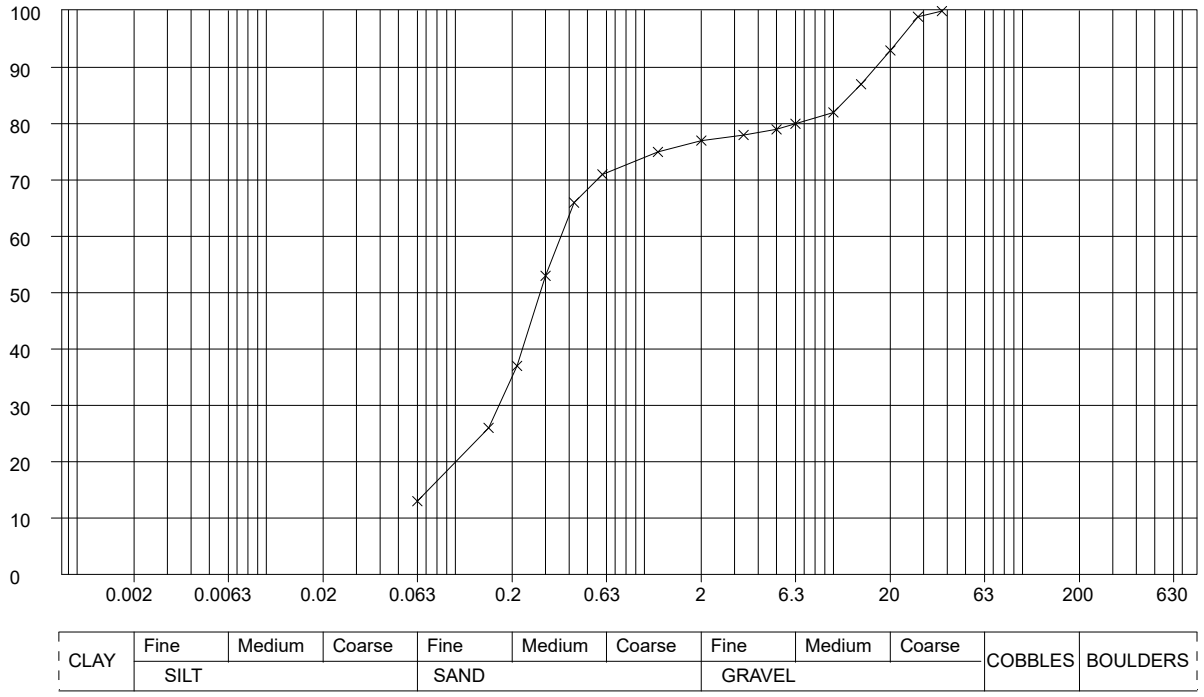
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS05	0.70	B1	Orange brownslightly clayey silty gravelly SAND.



Sieve / Particle Size	% Passing
37.5 mm	100.0
28 mm	99.0
20 mm	93.0
14 mm	87.0
10 mm	82.0
6.3 mm	80.0
5 mm	79.0
3.35 mm	78.0
2 mm	77.0
1.18 mm	75.0
600 µm	71.0
425 µm	66.0
300 µm	53.0
212 µm	37.0
150 µm	26.0
63 µm	13.0

Grading Analysis	
D85	12.4 mm
D60	367.3 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	23.0%
Sand	64.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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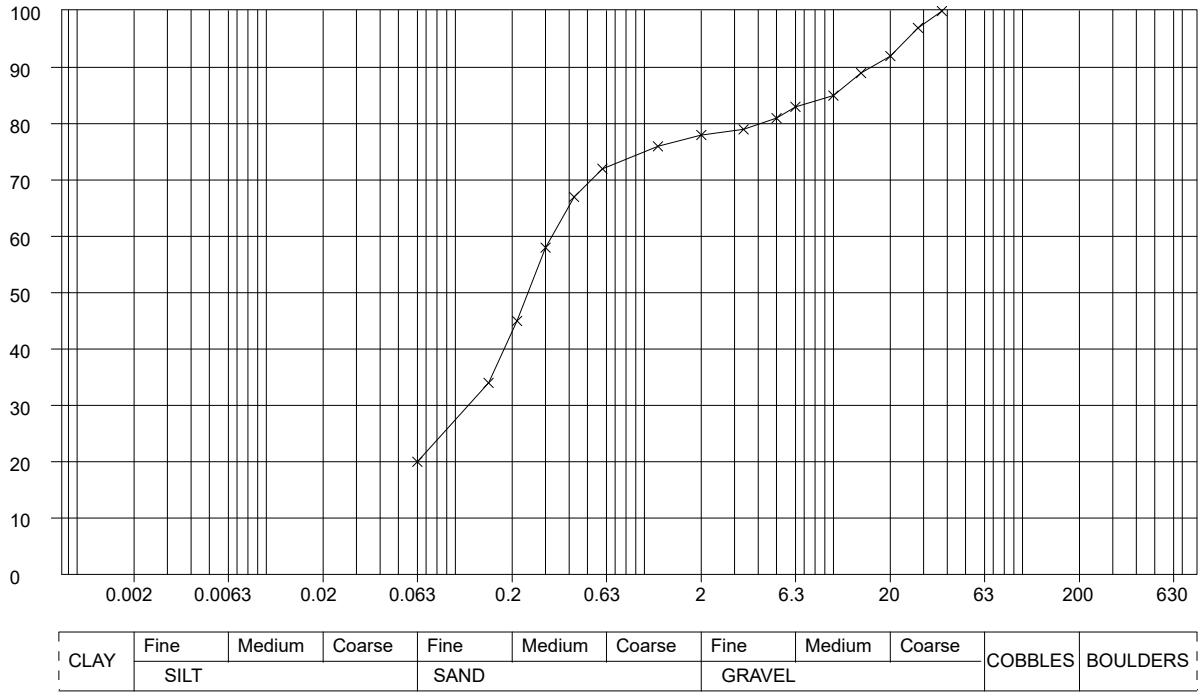
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS05	1.30	B2	Orange brown silty clayey gravelly SAND



Sieve / Particle Size	% Passing
37.5 mm	100.0
28 mm	97.0
20 mm	92.0
14 mm	89.0
10 mm	85.0
6.3 mm	83.0
5 mm	81.0
3.35 mm	79.0
2 mm	78.0
1.18 mm	76.0
600 µm	72.0
425 µm	67.0
300 µm	58.0
212 µm	45.0
150 µm	34.0
63 µm	20.0

Grading Analysis	
D85	10.0 mm
D60	327.8 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	22.0%
Sand	58.0%
Silt	-
Clay	-

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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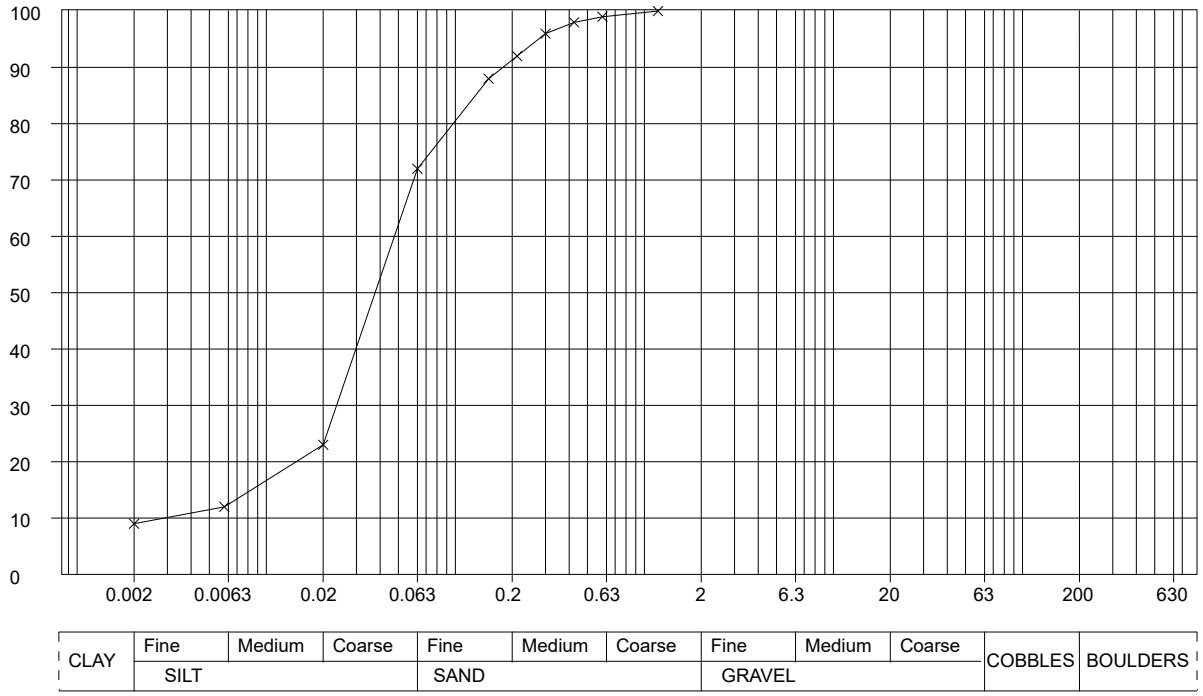
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS05	3.60	D7	Grey brown clayey sandy SILT



Sieve / Particle Size	% Passing
1.18 mm	100.0
600 µm	99.0
425 µm	98.0
300 µm	96.0
212 µm	92.0
150 µm	88.0
63 µm	72.0
20 µm	23.0
6 µm	12.0
2 µm	9.0

Grading Analysis	
D85	133.7 µm
D60	52.5 µm
D10	3.3 µm
Uniformity Coefficient	15.7

Particle Proportions	
Cobbles + Boulders	-
Gravel	-
Sand	28.0%
Silt	63.0%
Clay	9.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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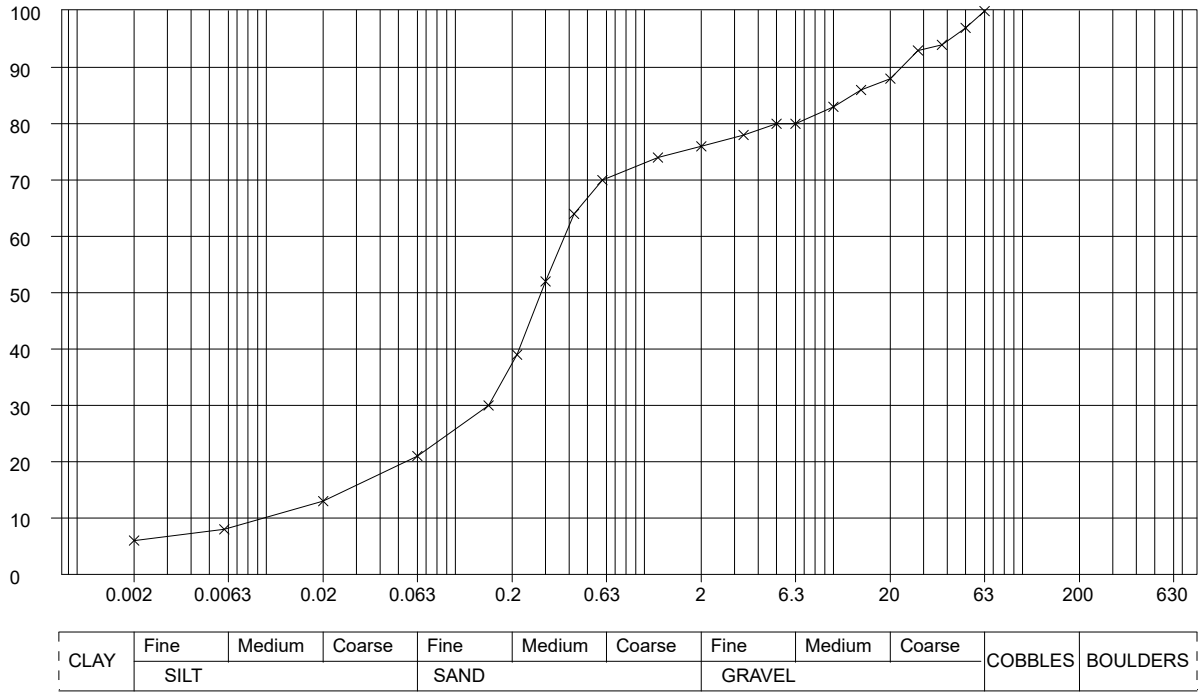
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
WS06	0.70	B1	Brown gravelly clayey silty SAND



Sieve / Particle Size	% Passing
63 mm	100.0
50 mm	97.0
37.5 mm	94.0
28 mm	93.0
20 mm	88.0
14 mm	86.0
10 mm	83.0
6.3 mm	80.0
5 mm	80.0
3.35 mm	78.0
2 mm	76.0
1.18 mm	74.0
600 µm	70.0
425 µm	64.0
300 µm	52.0
212 µm	39.0
150 µm	30.0
63 µm	21.0
20 µm	13.0
6 µm	8.0
2 µm	6.0

Grading Analysis	
D85	12.7 mm
D60	383.3 µm
D10	11.6 µm
Uniformity Coefficient	33.0

Particle Proportions	
Cobbles + Boulders	0.6%
Gravel	23.4%
Sand	55.0%
Silt	15.0%
Clay	6.0%

Method of Preparation : BS EN ISO 17892:2016 Part 4. Determination of particle size distribution

Method of Test : BS EN ISO 17892: Part 4: 2016: Clause 5.2 Wet or dry sieve. Clause 5.4 Sedimentation by pipette

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DETERMINATION OF pH, SULPHATE CONTENT AND TOTAL SULPHUR OF SOIL AND GROUNDWATER

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Soluble Sulphate			Total Sulphur %	Percentage of sample passing 2mm Sieve %	pH	Classification	Laboratory Description
			Soil		Groundwater g /l					
			Total S04 %	S03 in 2:1 water:soil g /l						
BH01	1.50	B2		<0.01				8.2	DS-1	Brown sand with stones
BH02	1.00	D2	<0.02	<0.01		< 0.02		8.1	DS-1	Brown clayey sand with stones
WS03	0.30	D1		0.03				7.3	DS-1	Light brown sandy clay with stones
WS04	1.80	D3		0.03				8.0	DS-1	Brown sandy clay with gravel
WS05	1.20	D1	<0.02	0.01		< 0.02		8.4	DS-1	Light brown sandy clay with stones
WS05	2.00	D3	<0.02	<0.01		< 0.02		7.9	DS-1	Brown sandy clay
WS06	1.20	D2		<0.01				7.8	DS-1	Brown sandy clay
WS06	2.10	D4	<0.02	0.01		< 0.02		8.1	DS-1	Brown sandy clay

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 9.4

Method of Test : Laboratory in-house methods based on BS1377: Part 3 for contents of water soluble sulphate, total sulphate and pH. Laboratory in-house method based on MEWAM (Environment Agency, 2006) for total sulphur

Remarks : Classification relates to Design Sulphate Class of BRE Special Digest 1 (2005)

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DETS Report No: 19-12694

Site Reference:	SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites
Project / Job Ref:	19.287
Order No:	JAH/19.287/00/01
Sample Receipt Date:	04/09/2019
Sample Scheduled Date:	04/09/2019
Report Issue Number:	1
Reporting Date:	12/09/2019

Authorised by:

Dave Ashworth
Technical Manager

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

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Soil Analysis Certificate						
DETS Report No: 19-12694	Date Sampled	27/08/19	27/08/19	27/08/19	27/08/19	27/08/19
AF Howland & Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS01	WS02	WS03	WS04	WS05
Project / Job Ref: 19.287	Additional Refs	ES1	ES1	ES1	ES1	ES1
Order No: JAH/19.287/00/01	Depth (m)	0.30	0.20	0.30	0.10	0.25
Reporting Date: 12/09/2019	DETS Sample No	432483	432484	432485	432486	432487

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Detected
Sample Matrix (S)	Material Type	N/a	NONE					Loose & Cement like material
Asbestos Type (S)	PLM Result	N/a	ISO17025					Chrysotile
pH	pH Units	N/a	MCERTS	7.5	7.6	8.0	7.9	7.7
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Complex Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Free Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Thiocyanate as SCN	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Organic Matter	%	< 0.1	MCERTS	1.4	2.2	0.5	1.7	1.2
Antimony (Sb)	mg/kg	< 1	NONE	< 1	< 1	< 1	1.2	< 1
Arsenic (As)	mg/kg	< 2	MCERTS	4	7	6	8	5
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.2	< 0.2	0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	6	9	8	10	5
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	6	9	5	11	5
Lead (Pb)	mg/kg	< 3	MCERTS	11	29	5	20	11
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	4	6	6	8	3
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	11	18	17	20	10
Zinc (Zn)	mg/kg	< 3	MCERTS	22	41	29	69	25
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 19-12694	Date Sampled	27/08/19				
AF Howland & Associates Ltd	Time Sampled	None Supplied				
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS06				
Project / Job Ref: 19.287	Additional Refs	ES1				
Order No: JAH/19.287/00/01	Depth (m)	0.25				
Reporting Date: 12/09/2019	DETS Sample No	432489				

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Detected				
Sample Matrix (S)	Material Type	N/a	NONE	Loose & Cement Like material				
Asbestos Type (S)	PLM Result	N/a	ISO17025	Chrysotile				
pH	pH Units	N/a	MCERTS	8.5				
Total Cyanide	mg/kg	< 2	NONE	< 2				
Complex Cyanide	mg/kg	< 2	NONE	< 2				
Free Cyanide	mg/kg	< 2	NONE	< 2				
Thiocyanate as SCN	mg/kg	< 3	NONE	< 3				
Organic Matter	%	< 0.1	MCERTS	2.4				
Antimony (Sb)	mg/kg	< 1	NONE	< 1				
Arsenic (As)	mg/kg	< 2	MCERTS	7				
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				
Chromium (Cr)	mg/kg	< 2	MCERTS	8				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	9				
Lead (Pb)	mg/kg	< 3	MCERTS	39				
Mercury (Hg)	mg/kg	< 1	NONE	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	6				
Selenium (Se)	mg/kg	< 3	NONE	< 3				
Vanadium (V)	mg/kg	< 2	NONE	16				
Zinc (Zn)	mg/kg	< 3	MCERTS	46				
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 19-12694	Date Sampled	27/08/19	27/08/19	27/08/19	27/08/19	27/08/19
AF Howland & Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS01	WS02	WS03	WS04	WS05
Project / Job Ref: 19.287	Additional Refs	ES1	ES1	ES1	ES1	ES1
Order No: JAH/19.287/00/01	Depth (m)	0.30	0.20	0.30	0.10	0.25
Reporting Date: 12/09/2019	DETS Sample No	432483	432484	432485	432486	432487

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.27	< 0.1	0.23	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.37	< 0.1	0.96	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.27	< 0.1	0.81	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.54	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	< 0.1	0.32	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.16	< 0.1	0.36	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.16	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.26	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.19	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.17	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	4	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{o}C

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-12694	Date Sampled	27/08/19				
AF Howland & Associates Ltd	Time Sampled	None Supplied				
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS06				
Project / Job Ref: 19.287	Additional Refs	ES1				
Order No: JAH/19.287/00/01	Depth (m)	0.25				
Reporting Date: 12/09/2019	DETS Sample No	432489				

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1				
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1				
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1				
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1				
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 19-12694	Date Sampled	27/08/19	27/08/19	27/08/19	27/08/19	27/08/19
AF Howland & Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS01	WS02	WS03	WS04	WS05
Project / Job Ref: 19.287	Additional Refs	ES1	ES1	ES1	ES1	ES1
Order No: JAH/19.287/00/01	Depth (m)	0.30	0.20	0.30	0.10	0.25
Reporting Date: 12/09/2019	DETS Sample No	432483	432484	432485	432486	432487

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 19-12694	Date Sampled	27/08/19				
AF Howland & Associates Ltd	Time Sampled	None Supplied				
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS06				
Project / Job Ref: 19.287	Additional Refs	ES1				
Order No: JAH/19.287/00/01	Depth (m)	0.25				
Reporting Date: 12/09/2019	DETS Sample No	432489				

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01				
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10				
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21				
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01				
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2				
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3				
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10				
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21				
Total >C5 - C35	mg/kg	< 42	NONE	< 42				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{o}C

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Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 19-12694	Date Sampled	27/08/19	27/08/19	27/08/19	27/08/19	27/08/19
AF Howland & Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS01	WS02	WS03	WS04	WS05
Project / Job Ref: 19.287	Additional Refs	ES1	ES1	ES1	ES1	ES1
Order No: JAH/19.287/00/01	Depth (m)	0.30	0.20	0.30	0.10	0.25
Reporting Date: 12/09/2019	DETS Sample No	432483	432484	432485	432486	432487

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-12694	Date Sampled	27/08/19				
AF Howland & Associates Ltd	Time Sampled	None Supplied				
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS06				
Project / Job Ref: 19.287	Additional Refs	ES1				
Order No: JAH/19.287/00/01	Depth (m)	0.25				
Reporting Date: 12/09/2019	DETS Sample No	432489				

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2				
Toluene	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene	ug/kg	< 2	MCERTS	< 2				
p & m-xylene	ug/kg	< 2	MCERTS	< 2				
o-xylene	ug/kg	< 2	MCERTS	< 2				
MTBE	ug/kg	< 5	MCERTS	< 5				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{o}C

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UKAS TESTING
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Bulk Analysis Certificate						
DETS Report No: 19-12694	Date Sampled	27/08/19				
AF Howland & Associates Ltd	Time Sampled	None Supplied				
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	TP / BH No	WS06				
Project / Job Ref: 19.287	Additional Refs	A1				
Order No: JAH/19.287/00/01	Depth (m)	0.09				
Reporting Date: 12/09/2019	DETS Sample No	432488				

Determinand	Unit	RL	Accreditation					
Asbestos Type (S)	PLM Result	N/a	ISO17025	Chrysotile				
Sample Matrix (S)	Material Type	N/a	NONE	Cement				

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification) that is in accordance with the Health and Safety Executive HSG 248 Appendix 2.

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

RL: Reporting Limit

Subcontracted analysis (S)

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UKAS TESTING 4480

Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 19-12694	
AF Howland & Associates Ltd	
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites	
Project / Job Ref: 19.287	
Order No: JAH/19.287/00/01	
Reporting Date: 12/09/2019	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
432483	WS01	ES1	0.30	6.9	Black loamy sand with stones
432484	WS02	ES1	0.20	8.4	Brown loamy sand with stones
432485	WS03	ES1	0.30	3.4	Brown sandy clay with stones
432486	WS04	ES1	0.10	7.5	Brown loamy sand with stones and concrete
432487	WS05	ES1	0.25	2.3	Brown sandy clay with stones and vegetation
432489	WS06	ES1	0.25	7.5	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

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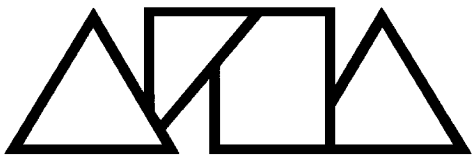
Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 19-12694
AF Howland & Associates Ltd
Site Reference: SSAgri AD Plant, Ellingham Road, Attleborough, NR17 1AE - AFHA Suites
Project / Job Ref: 19.287
Order No: JAH/19.287/00/01
Reporting Date: 12/09/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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