



**9-10 High Street
Hitchin
Hertfordshire
SG5 1BH**

**Desk Study &
Ground Investigation**

Bellborough Limited and
Petit Papillion Limited

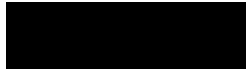
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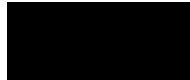


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This report is intended as a Ground Investigation Report (GIR) as defined in BS EN1997-2, unless specifically noted otherwise. The report is not a Geotechnical Design Report (GDR) as defined in EN1997-2 and recommendations made within this report are for guidance only.

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Executive summary

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

Brief

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Tigg Coll Architects, on behalf of Bellborough Limited and Petit Papillion Limited, with respect to the redevelopment of the site by the excavation of a lower ground floor level in the west, with three-storey to four-storey residential accommodation above the lower ground level. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground conditions, to assess the extent of any contamination and to provide information to assist with the design of retaining walls and foundations.

Site history

The earliest map studied, dated 1881, shows the centre and east of site to have been occupied by several large buildings labelled as a granary. The west of the site was vegetated with trees. A row of what were probably residential buildings bounded the site to the south, and several small buildings and vegetated land were present to the north. An iron foundry was present approximately 80 m to the south. The 1898 map no longer notes the site as a granary and the vegetation in the west had been removed. The iron foundry to the south is no longer noted, although a tank is noted approximately 80 m to the south in the 1923 map. By 1965, all of the buildings on site had been demolished and the site cleared. A warehouse, garage and works had been established approximately 80 m to the south, although the tank had been removed.

By 1982, the site had been developed with a large commercial building in the current layout. The garage to the south is no longer noted and the warehouse is now labelled as a depot. Both the site and the surrounding area have since remained essentially unchanged.

Ground conditions

Below a moderate thickness of made ground, Glaciofluvial Deposits were encountered over the Lowestoft Formation which was proved to a depth of 30 m. The made ground extends to a depth of up to 1.20 m in the west of the site, where the ground level is higher. It comprises dark grey clayey slightly gravelly sand with black staining, and fragments of brick, cement, as, coal, bituminous material and concrete. An increased thickness of made ground extending to 2.10 m was encountered in the east of the site possibly indicating a backfilled basement. The underlying Glaciofluvial Deposits comprised sand and gravel, gravelly sand, or firm brown gravelly clay, and extended to depths of between 1.80 m and 3.30 m. The Lowestoft Formation initially comprised medium dense yellowish brown slightly clayey fine to medium sand, over very stiff bluish grey sandy clay which extends to the maximum depth investigated, of 30.00 m. Layers of cobbles were noted in the Lowestoft Formation from 19.00 m to 20.00 m and from 26.30 m to 27.00 m.

Groundwater was not encountered during drilling of the shallow sampler boreholes, but was noted at 14.00 m in the cable percussion borehole. Shallower inflows may have been masked by the addition of water during drilling of the granular soils. An overnight rest level of 7.00 m was noted in the cable percussion borehole.

The results of the chemical analyses have indicated a single sample to contain an elevated concentration of lead (410 mg/kg), and two samples with elevated arsenic. No asbestos was detected and PCBs were not measured above background levels.

Recommendations

The formation level for the basement is likely to be within the medium dense sand of the Lowestoft Formation at an assumed depth of around 3.50 m. Groundwater inflows are not anticipated but shallow inflows of perched water may be encountered from within the made ground. Moderate width strip or pad foundations constructed from ground level will need to bypass the made ground to bear on the firm clay of the Glaciofluvial Deposits, and may be designed to apply a net allowable bearing pressure of 100 kN/m² at a minimum depth of 1.50 m. Moderate width spread foundations constructed from basement level bearing on the medium dense sand of the Lowestoft Formation below basement level may be designed to apply a net allowable bearing pressure of 150 kN/m². The foundation plan should be reviewed once the development proposals have been finalised. It is proposed to excavate a lower ground floor beneath the western part of the site, which is where the elevated concentration of contaminants has been measured and as a result, the majority of the made ground will be removed. In addition, no areas of soft landscaping proposed at lower ground floor level and therefore no risk is envisaged to end users. The contamination will however pose a risk to site workers during the ground works.



Part 1: Investigation Report

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 Introduction

Geotechnical and Environmental Associates Limited (GEA) has been commissioned by Tigg Coll Architects, on behalf of Bellborough Limited and Petit Papillion Limited, to carry out a desk study and ground investigation at 9-10 High Street, Hitchin, Hertfordshire, SG1 1BH.

1.1 Proposed Development

It is understood that it is proposed to demolish the existing structures on the site and subsequently construct a series of two-storey to three storey residential buildings, which will be partly underlain by a single level basement to be used for parking in the west of the site.

This report is specific to the proposed development and the advice herein should be reviewed once the development proposals are finalised. The draft ground floor layout of the proposed development is shown opposite.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- ✿ to check the history of the site with respect to previous contaminative uses;
- ✿ to provide an assessment of the risk of encountering unexploded ordnance (UXO);
- ✿ to determine the ground conditions and their engineering properties;
- ✿ to use the above information to provide recommendations for spread and piled foundations;
- ✿ to provide an indication of the degree of soil contamination present; and
- ✿ to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.



1.3 Scope of Work

In order to meet the above objectives, a desk study was carried out, followed by a ground investigation. The desk study comprised:

- ✿ a review of historical Ordnance Survey (OS) maps and environmental searches sourced from the Envirocheck database;
- ✿ a review of readily available geology maps; and
- ✿ a preliminary UXO report prepared by 1st Line Defence.

In the light of this desk study an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- ✿ a single borehole advanced to a depth of 30.00 m by a cable percussion rig;
- ✿ five window sampler boreholes advanced to depths of between 1.20 m and 4.45 m;



- standard penetration tests (SPTs) carried out at regular intervals within the boreholes to provide quantitative data on the strength of the soils;
- two continuous dynamic probing tests advanced to depths of 1.60 m and 5.00 m ;
- testing of selected soil samples for contamination and geotechnical purposes; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

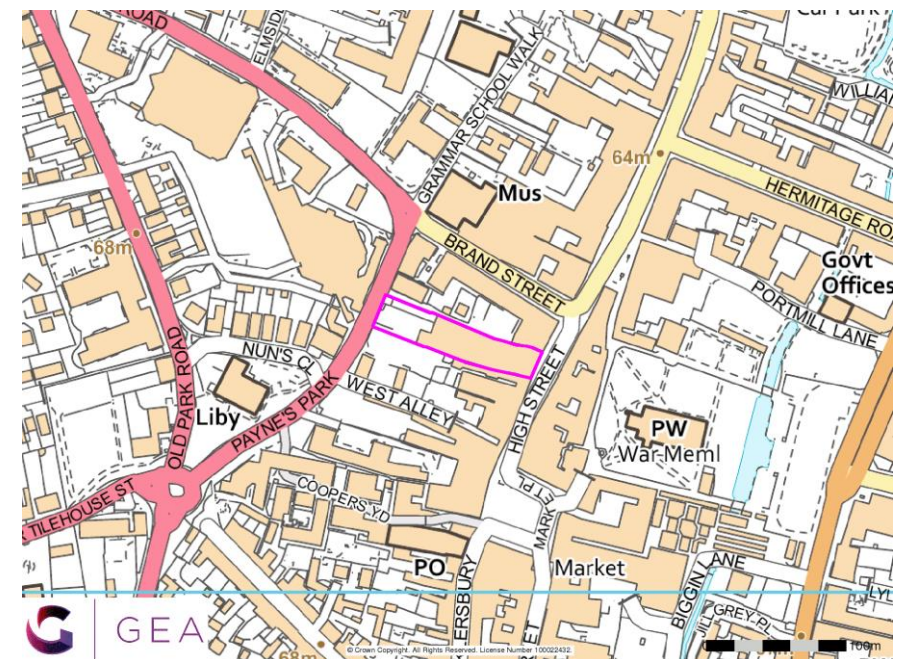
This report includes a contaminated land assessment which has been undertaken by a suitably qualified and competent professional in accordance with the methodology presented by the Environment Agency in their Land contamination risk assessment (LCRM)¹ published 19 April 2021. This involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. Risk management is divided into three stages; Risk Assessment, Options Appraisal and Remediation, and each stage comprises three tiers. The Risk Assessment stage includes preliminary risk assessment (PRA), generic quantitative risk assessment (GQRA) and detailed quantitative risk assessment (DQRA) and this report includes the PRA and GQRA.

The exploratory methods adopted in this investigation have been selected on the basis of the constraints of the site including but not limited to access and space limitations, together with any budgetary or timing constraints. Where it has not been possible to reasonably use an EC7 compliant investigation technique a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

2.0 The Site

2.1 Site Description

The site is located in the west of Hitchin, approximately 1.2 km southwest of Hitchin railway station. It fronts onto High Street to the east and Pynes Park (A505) to the west. It is bounded by residential and commercial properties with associated car parks to the north and south. The site may be additionally located by National Grid Reference 518350, 229180 and is shown on the map extract below.



The site is rectangular in shape and measures approximately 120 m west to east and 25 m north to south. It slopes down towards the east and the existing building in the east of the site cuts into the slope to create a partial basement, with a three storey building in the east and the ground level of the western half of the site at second floor level. The centre and

¹ <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>



east of the site is occupied by a Poundland shop at ground floor level on High Street, with the upper floors occupied as residential units. The centre of the site also contains a rooftop car park. The west of the site is occupied by a concrete covered surface car park and loading area that slopes gently down towards the east from Paynes Park (A505). This area also includes a ramp to access the rooftop parking; as substation was noted under the ramp.

The site is entirely devoid of vegetation, with exception to a few strips of grass and shrubs growing through cracks in the concrete car park.

2.2 Site History

The site history has been researched by reference to internet sources and historical Ordnance Survey (OS) maps obtained from the Envirocheck database.

The earliest map studied, dated 1881, shows the centre and east of site to have been occupied by several large buildings labelled as a granary. The west of the site was vegetated with trees. High Street was present on the eastern boundary and the A505 on the western boundary, then named as West Lane. A row of what were presumably residential buildings bounded the site to the south and several small buildings and vegetated land were present to the north. An iron foundry was present approximately 80 m to the south.

The 1898 map no longer notes the site as a granary and the vegetation in the west had been removed. The iron foundry to the south is no longer noted, although a tank is noted approximately 80 m to the south in the 1923 map. By 1965, all of the buildings on site had been demolished and the site cleared. A warehouse, garage and works had been established approximately 80 m to the south, although the tank had been removed.

By 1982, the site had been developed with a large commercial building in the layout of the current building. The garage to the south is no longer noted and the warehouse is now labelled as a depot. Both the site and the surrounding area have since remained essentially unchanged.

2.3 Other Information

A search of public registers and databases has been made via the Envirocheck database and relevant extracts from the search are appended. Full results of the search can be provided if required.

The Envirocheck report has indicated no landfill sites located within 500 m of the site and additionally, no waste management or waste transfer sites are located within 500 m of the site.

There are two areas of potentially infilled land (non-water) recorded within 250 m, the closest being noted 361 m east. From the maps this appears to be related to an area of land next to an open air theatre. There are eight pollution incidents to controlled waters recorded within 250 m of the site. The closest is located 156 m to the northeast with the incident occurring in November 1995. The receiving water noted as freshwater stream / river and the pollutant being oils, tars / bitumen. The incident is classified as Category 3 – Minor Incident.

There are no contemporary trade directory entries recorded on site, but there are 45 noted within 250 m. The nearest active entry is located 34 m to the west and is classified as a tyre dealers. From the maps this would be Tyre Pros Hitchin on Paynes Park. The site is within a Nitrate Vulnerable Zone.

Reference to records compiled by the Health Protection Agency (formerly the National Radiological Protection Board) indicates that the site falls within an area where less than 1% of homes are affected by radon emissions and therefore radon protective measures will not be necessary.

2.4 Preliminary UXO Risk Assessment

A Preliminary UXO Risk Assessment has been completed by 1st Line Defence (report ref PA17193-00, dated 16th January 2023), and the report is included in the appendix. The risk assessment has been carried out in accordance with the guidelines provided by CIRIA², which state that the likelihood of encountering and detonating UXO below a site should be assessed along with establishing the consequences that may arise. The first phase comprises a preliminary risk assessment, which should be undertaken at an early stage of the development planning. If such an assessment identifies a high level of risk then a

2 CIRIA C681 (2009) *Unexploded ordnance (UXO) A guide for the construction industry*



detailed risk assessment should be carried out by a UXO specialist, which will identify an appropriate course of action with regard to risk mitigation.

The report indicates that, during World War II (WWII), the site was located within the Urban District of Hitchin, which sustained an overall very low density of bombing. No positive evidence was found to suggest that any bombing incidents affected the site boundary. This is corroborated with the comparison of pre- and post-WWII OS mapping and an analysis of post-WWII aerial photography, which do not suggest that the site or immediate surrounding area underwent any significant changes during the war. It is therefore concluded that no further research is necessary for this site.

2.5 Geology

The British Geological Survey (BGS) map of the area indicates that the site is underlain by superficial Glaciofluvial Deposits and Lowestoft Formation which is underlain by the Zig Zag Chalk Formation.

The Glaciofluvial Deposits are described as sands and gravel whereas the Zig Zag Chalk Formation is described mostly firm, pale grey to off-white blocky chalk with a lower part characterised by rhythmic alternations of marls and marly chalks with firm white chalk.

A previous GEA investigation, carried out approximately 120 m to the south of the site, encountered, beneath a moderate thickness of made ground, Glaciofluvial Deposits to the maximum explored depth of 5.00 m. These deposits were described as orange-brown and yellowish brown clayey silty sand with occasional chalk gravel and extended to depths of between 1.90 m and 4.00 m whereupon yellowish brown silty fine sand was generally encountered and extended to 5.00 m.

2.6 Hydrology and Hydrogeology

The Glaciofluvial Deposits are classified as a Secondary A Aquifer, which refers to permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The Zig Zag Chalk Formation is classified as a Principal Aquifer, defined as strategically important rock units that have high permeability and water storage capacity.

The nearest surface water feature is recorded as being 157 m to the east. From the maps this is the River Hiz.



The site is not noted as being at risk from river flooding or from surface water flooding. The west of the site is recorded as having a limited potential for groundwater flooding to occur, whereas the east of the site has potential for groundwater flooding to occur in property situated below ground level.

Groundwater is likely to be present within the superficial and bedrock strata on site.

The site is within Zone 3 (total catchment) of a Source Protection Zone. The nearest water abstraction is located 110 m to the southeast from the River Hiz.



The site is entirely covered by the existing building and hardstanding and therefore infiltration of rain water into the ground beneath the site is limited such that the majority of surface runoff is likely to drain into combined sewers in the road.

2.7 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.7.1 Source

The desk study has indicated that the site was initially developed with a granary prior to the construction of the existing commercial building. The previous developed history of the site may have led to the deposition of made ground which could be a potential source of contamination; specifically hydrocarbon fuel and metals. An electricity substation was observed on the site as part of the walk over and could be a source of polychlorinated biphenyls (PCBs).

The maps have indicated a former iron works with a tank and a vehicle repair garage to the south which may be an off site source of hydrocarbon, solvent, metal or asbestos contamination.

No nearby sources of landfill gas have been identified.

2.7.2 Receptor

The proposed redevelopment of the building for residential purposes will result in the end users representing relatively high sensitivity receptors. As the site is underlain by a Secondary 'A' Aquifer, adjacent sites are considered to be a moderately sensitive receptors. The deep Principal Aquifer is considered to be a high sensitivity receptor. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are potential receptors during construction or maintenance works.

2.7.3 Pathway

The granular Glaciofluvial Deposits would allow the migration of contaminated groundwater through the shallow soils to surrounding sites. It would also allow for groundwater percolation into the underlying chalk, and thus a pathway is considered likely to exist to the major aquifer. Within the site, end users will be isolated from direct contact with any contaminants present within the made ground by the presence of the buildings and the extent of the hardstanding, but could be exposed to soils in new soft landscaped areas. Buried services may be exposed to any contaminants present within the soil through direct contact and site workers will come into contact with the soils during construction works. There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

2.7.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work. A requirement for landfill gas monitoring has not been identified.



3.0 Exploratory Work

In order to meet the objectives described in Section 1.2, a single borehole was advanced to a depth of 30.00 m using a dismantlable cable percussion rig. Additionally, five further boreholes were advanced to depths of between 1.20 m and 1.45 m using an opendrive rig.

During boring, disturbed and undisturbed samples were obtained from the boreholes for subsequent laboratory examination and testing. Standard Penetration Tests (SPTs) were carried out at regular intervals to provide additional quantitative data on the strength of soils encountered. A selection of the samples recovered from the boreholes was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

All of the above work was carried out under the supervision of a geotechnical engineer from GEA. The borehole records are appended, together with a site plan indicating the exploratory positions.

3.1 Sampling Strategy

The borehole locations were chosen by the on site GEA engineer.

Five samples of the made ground have been tested for the presence of contamination. The analytical suite of testing was selected to identify a range of typical industrial contaminants for the purposes of general coverage. The analytical suite for the soil included a range of metals, polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. In addition, a single sample of made ground from close proximity to the substation, was tested for PCB concentrations.

The analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. A summary of the MCERTs accreditation and test methods are included with the attached results and further details are available upon request.

4.0 Ground Conditions

The investigation has generally confirmed the expected ground conditions in that, beneath a significant but variable thickness of made ground, Glaciofluvial deposits were encountered over the Lowestoft Formation, which was encountered to the full depth of investigation. The Zig Zag Chalk Formation was not encountered.

4.1 Made Ground

In the western half of the site the made ground extended to depths of between 0.60 m and 1.20 m. Below an initial layer of concrete and concrete fill, that extended to depths of between 0.16 m and 0.35 m, the made ground consisted of dark grey clayey slightly gravelly sand with black staining, and fragments of brick, cement, ash, coal, bituminous material and concrete. A slight hydrocarbon odour was noted in Borehole Nos 4 and 5, at depths of 0.60 m and 0.40 m respectively.

In the far east of the site, at the lower level, the made ground extended to the maximum depth investigated of 2.10 m in Borehole No 1, possibly indicating a backfilled cellar with a layer of brick at 1.70 m. Beneath this, brown gravelly sand with frequent brick, cement and concrete fragments and some ash extended to a depth of 2.00 m. This in turn was underlain by dark brown stained black sandy gravelly clay with black staining from ash and coal to a depth of 2.10 m. Within Borehole No 2, also in the east of the site, the 350 mm concrete slab was directly underlain by natural soils.

Five samples of the made ground have however been analysed for a range of contaminants as a precautionary measure and the results are detailed within Section 4.6.

4.2 Glaciofluvial Deposits

This stratum comprised a range of materials from sand and gravel and gravelly sand, to firm brown gravelly clay, with the latter most typically in the north of the site. It extended to depths of between 1.80 m and 3.30 m. Geotechnical testing indicates the clay portions to generally be of medium volume change potential, although modified plasticity indices indicate samples from Borehole No 6 are of high volume change potential.



4.3 Lowestoft Formation

This stratum comprised yellowish brown slightly clayey fine to medium sand, typically medium dense, which extended to a depth of 19.00 m in Borehole No 1. This was underlain by dense flint cobbles which extended to a depth of 20.00 m, over brown and then grey medium sand, which extended to a depth of 26.3 m, whereupon a second layer of cobbles was encountered and extended to 27.00 m. Very stiff bluish grey sandy clay extended from 27.00 m to the maximum depth investigated, of 30.00 m.

4.4 Groundwater

Groundwater was not encountered during drilling of the window sampler boreholes, but was noted at 14.0 m in the cable percussion borehole. Shallower inflows may have been masked by the necessary addition of water to assist drilling of the granular soils.

When the borehole had reached a depth of 20.0 m, groundwater level was recorded to be at a depth of 10.0 m at the end of the shift. The following day, the water level was measured at 7.0 m before recommencing drilling. The water level was noted at a depth of 10.0 m when the borehole was completed at 30.0 m.

4.5 Soil Contamination

In total, five samples of made ground were tested for a range of contaminants and the results are discussed below.

4.5.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. Contaminants of concern are those that have values in excess of generic human health risk-based guideline values, which are either the CLEA³ Soil Guideline Values where available, the Sutable 4 Use Values⁴ (S4UL) produced by LQM/CIEH calculated using the CLEA UK Version 1.07⁵ software, or the DEFRA Category 4 Screening values⁶, assuming a residential end use without plant uptake. The key generic assumptions for this end use are as follows:

- that groundwater will not be a critical risk receptor;

- that the critical receptor for human health will be young female children aged less than six years old;
- that the exposure duration will be six years;
- that the critical exposure pathways will be indoor dust ingestion, skin contact with indoor dust, and inhalation of indoor and outdoor dust and vapours; and
- that the building type equates to a two-storey small terraced house.

It is considered that these assumptions are acceptable for this generic assessment of this site. The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

The results of the chemical analyses have indicated a single sample to contain an elevated concentration of lead (410 mg/kg), and two samples with elevated arsenic. No asbestos was detected and PCBs were not measured above background levels. The significance of these results is considered further in Part 2 of the report.

³ Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009 and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.

⁴ The LQM/CIEH S4ULs for Human Health Risk Assessment S4UL3065 November 2014

⁵ Contaminated Land Exposure Assessment (CL|EA) Software Version 1.071 Environment Agency 2015

⁶ CL:AIRE (2013) Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination Final Project Report SP1010 and DEFRA (2014) Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination Policy Companion Document SP1010



Part 2: Design Basis Report

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to the proposed development.

5.0 Ground Model

It is proposed to demolish the existing building and construct a series of two-storey to three-storey residential buildings, partly underlain by a single level basement to be used for parking in the west of the site. The loads are not known but are anticipated to be moderate.

The desk study found that the site has had a long developed history, initially as a granary and then a commercial building and car park. The ground conditions can be characterised as follows:

-  below a moderate thickness of made ground, Glaciofluvial Deposits were encountered over the Lowestoft Formation which was proved to a depth of 30 m;
-  the made ground extends to a depth of up to 1.20 m in the west of the site, where ground level is higher. It comprises dark grey clayey slightly gravelly sand with black staining, and fragments of brick, cement, , coal, bituminous material and concrete;
-  in the east of the site the made ground extends to 2.10 m, possibly indicating a backfilled basement. In the centre, at lower ground floor level the made ground was absent;
-  sand and gravel, gravelly sand, or firm brown gravelly clay, of the Glaciofluvial Deposits extends to depths of between 1.80 m and 3.30 m;
-  the Lowestoft Formation initially comprises medium dense yellowish brown slightly clayey fine to medium sand, over very stiff bluish grey sandy clay which extends to the maximum depth investigated, of 30.00 m;
-  layers of cobbles were noted from 19.00 m to 20.00 m and from 26.30 m to 27.00 m;
-  groundwater was recorded at an overnight rest level of 7.00 m; and

-  contamination testing has revealed the presence of lead and arsenic contamination within the made ground.

6.0 Advice & Recommendations

It is proposed to extend the existing ground floor level to the west to create a single level basement car park at the rear (Paynes Park side). This will create a new Lower Ground Floor (LGF) level. Three to four storey structures, to provide residential accommodation, are then proposed above the LGF carpark. Communal soft landscaping will be introduced above the LGF level.

Formation level for the basement is likely to bypass the Glaciofluvial Deposits to bear within the Lowestoft Formation.

6.1 Basement Construction

The formation level for the basement is likely to be within the medium dense sand of the Lowestoft Formation at an assumed depth of around 3.50 m. Groundwater inflows are not anticipated but shallow inflows of perched water may be encountered from within the made ground and ideally a number of trial excavations should be carried out, to depths as close to the full basement depth as possible, to provide an indication of stability and the extent to which the excavation may be affected by groundwater.

The design of basement support in the temporary and permanent conditions needs to take account of the necessity to maintain the stability of the surrounding structures and roadway, and the possible requirement to control groundwater inflows.

There are a number of methods by which the sides of the basement excavation could be supported in the temporary and permanent conditions. The choice of wall may be governed to a large extent by whether it is to be incorporated into the permanent works and have a load bearing function.

For the ground conditions at this site a bored pile wall could be utilised to support the basement excavation and could have the advantage of being incorporated into the permanent works to provide support for structural loads. In view of the presence of granular soil, a cfa pile is likely to be most appropriate to avoid the requirement for temporary casing. Alternatively, sheet piles could be used to create a temporary retaining wall.



The ground movements associated with the basement excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity. In this respect the timing of the provision of support to the wall will have an important effect on movements

6.1.1 Basement Retaining Walls

The following parameters are suggested for the design of the permanent basement retaining walls.

Stratum	Bulk Density (kg/m ³)	Effective Cohesion (c' – kN/m ²)	Effective Friction Angle (ϕ' – degrees)
Made ground	1700	Zero	27
Glaciofluvial Deposits	1800	Zero	34
Lowestoft Formation	1900	Zero	25

Monitoring of the standpipe should be continued to assess the design water level but at this stage it would appear that groundwater may be assumed to be below basement level; the advice in BS8102:2009⁷ should also be followed in this respect.

6.1.2 Basement Heave

The 3.50 m deep excavation of the basement will result in a net unloading of around 75 kN/m². This will result in heave of the underlying soil which will comprise immediate elastic movement, which will account for a significant proportion of the total movement and be expected to be complete during the construction period, and long term movements, which will theoretically take many years to complete. These movements will, to some extent, be mitigated by the loads applied by the proposed development, but should be checked once the loads and levels are known.

6.2 Spread Foundations

Moderate width strip or pad foundations constructed from ground floor level would need to bypass made ground to found within the firm clay at a minimum depth of 1.50 m, allowing for restricted new planting in accordance with Table 4 of NBHC Standards Chapter 4.2 (2023). If trees are excluded within the zone of influence shown in Table 4 of the NHBC

guidance, the minimum depth can be reduced to 1.0 m subject also to the further advice on new tree and shrub planting as detailed in the NHBC guidelines. The foundations may be designed to apply a net allowable bearing pressure of 100 kN/m². This assumes high shrinkability clay.

Moderate width strip or pad foundations bearing on the medium dense sand of the Lowestoft Formation below basement level may be designed to apply a net allowable bearing pressure of 150 kN/m².

These values incorporate an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits. The recommended bearing pressure takes account of the variable nature of the soils and any foundations should be nominally reinforced where they span clay and granular material to protect against differential settlement.

Where the made ground extends to depths that spread foundations become uneconomic, or particularly heavy loads are included, piled foundations should be considered as an alternative.

If spread foundations are to be adopted, once the development proposals and formation levels have been finalised it would be prudent to carry out further assessment of the layout of the foundations and proposed bearing pressures to ensure an efficient design and to check differential settlements.

6.2.1 Raft Foundation

The suitability of a raft foundation will depend on the net load applied by the new structure following excavation of the lower ground floor level. Consideration will need to be given to the variation in loading, where the lower ground floor level already exists and the settlement should be considered in more detail if this option is pursued.

6.3 Piled Foundations

For the ground conditions at this site some form of bored pile could be considered. In view of the presence of granular soils and groundwater at a depth of 7.0 m, consideration should be given to the use of bored piles installed using continuous flight auger (cfa) techniques, which would negate the requirement for temporary casing.

7 BS8102 (2009) *Code of practice for protection of below ground structures against water from the ground*



The following table of ultimate coefficients may be used for the preliminary design of bored piles, based on the SPT / depth graph in the appendix.

Stratum	Depths m	kN / m ²
Ultimate Skin Friction		
Made ground & Glaciofluvial soils	GL to 3.50	Ignore
Lowestoft Formation	3.50 to 25.00	Increasing linearly from 60 to 200 (average limited to 110)
Ultimate End Bearing		
Lowestoft Formation	15.00 to 25.00	10,000 (limit)

BS EN 1997-1:2004; Eurocode 7: Geotechnical Design Part 1 (Eurocode 7) provides factors to be applied to the ultimate skin friction and ultimate end bearing capacity in calculating pile resistance ($R_{d,GEO}$). For bored piles, in the absence of either working load tests or combined working load tests and preliminary pile tests, a model factor of 1.4 should be combined with a factor of 1.6 to be applied to the skin friction, and combined with a factor of 2.0 to be applied to the end bearing.

On the basis of the above, the estimated pile resistance for 450 mm diameter pile to 15 m will be 880 kN. Average ultimate skin friction has been limited to 110 kN/m²

In order to determine the required pile length for design, the above outline pile resistance will need to be compared with structural loads (actions) that have been factored to determine the design effect, in accordance with Eurocode 7.

The above example is not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of an appropriate piling scheme and their attention should be drawn to the presence of layers of cobbles at depths of 19.0 m and 26.0 m in the Lowestoft Formation.

6.4 Low Carbon Options

In view of the proposed basement there is not much scope for re-use of any existing foundations at this site, although this should be reviewed once the final formation levels

are known. In addition, the typical greener alternative foundation solutions such as timber or screw piles are unlikely to be suitable. Consideration should be given to ensuring the new structure is as lightweight as possible to reduce the foundation loads and reduce the requirement for cement. Consideration should also be given to reuse of the excavated soil as around 50% of the basement dig is likely to comprise natural granular soils which could be used as an aggregate, on site or elsewhere subject to the appropriate licensing.

6.5 Shallow Excavations

On the basis of the borehole findings it is considered that it will be generally feasible to form relatively shallow excavations terminating within the Glaciofluvial Deposits without the requirement for lateral support, although localised instabilities may occur where more granular material or groundwater is encountered.

Significant inflows of groundwater into shallow excavations are not generally anticipated, although seepages may be encountered from perched water tables within the made ground, although such inflows should be suitably controlled by sump pumping.

If deeper excavations are considered or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

6.6 Lower Ground Floor Slab

Following the excavation of the basement and the removal or infilling of any deeper areas of made ground, formation level will be within the granular soils of the Glaciofluvial Deposits and it should be possible to adopt a moderately loaded ground bearing slab on these soils.

6.7 Effect of Sulphates

Chemical analyses of samples of the natural soil have revealed relatively low concentrations of soluble sulphate and near-neutral pH in accordance with Class DS-1 conditions of Table C2 of BRE Special Digest 1:SD Third Edition (2005). The measured pH values of the samples show that an ACEC class of AC-1 would be appropriate for the site.



Chemical analysis of samples of the made ground have revealed relatively low concentrations of soluble sulphate and near-neutral pH in accordance with Class DS-2 conditions of Table C2 of BRE Special Digest 1:SD Third Edition (2005). The measured pH values of the samples show that an ACEC class of AC-2 would be appropriate for the site.

This assumes a mobile water condition at the site. The guidelines contained in the digest should be followed in the design of foundation concrete.

6.8 Contamination Risk Assessment

The site was initially developed as a granary and then with the existing building. The contamination testing has indicated elevated lead and arsenic to be present in the made ground.

The elevated metals are most likely to be attributable to extraneous material in the made ground and it is possible that a fragment of coal or old paint fragments, could account for the elevated concentration. As a result the contamination is not thought to be in a soluble state and does not, therefore, pose a risk to adjacent sites, groundwater or buried services.

It is proposed to excavate a lower ground floor beneath the western part of the site which is where the elevated concentration has been measured, and as a result, the majority of the made ground will be removed. In addition, the footprint of the proposed building is to extend across the entire site and no areas of soft landscaping proposed at lower ground floor level. Therefore no risk is envisaged to end users. The contamination will however pose a risk to site workers during the ground works. These risks are further assessed below.

6.8.1 Site Workers

Site workers should be made aware of the contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE⁸ and CIRIA⁹ and the requirements of the Local Authority Environmental Health Officer.

6.9 Waste Disposal

Under the Waste Framework Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3¹⁰ states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE¹¹ guidance, will need to be disposed of to a licensed tip. Waste going to landfill is subject to landfill tax at either the standard rate of £103.70 per tonne (about £190.00 per m³) or at the lower rate of £3.30 per tonne (roughly £6.10 per m³). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order, would qualify for the 'lower rate' of landfill tax.

Based on the technical guidance provided by the EA it is considered likely that the soils encountered during this ground investigation, as represented by the chemical analyses carried out, would be generally classified as follows.

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Current applicable rate of Landfill Tax
Made ground	Non-hazardous (17 05 04)	No	£103.70/tonne (Standard rate)
Natural soil	Inert non-hazardous (17 05 04)	Should not be required but confirm with receiving landfill	£3.30 / tonne (Reduced rate for uncontaminated naturally occurring rocks and soils)

8 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO

9 CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association

10 Environment Agency 2015. *Guidance on the classification and assessment of waste*. Technical Guidance WM3 First Edition

11 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2



Under the requirements of the Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper¹² which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils insitu prior to excavation.

The above opinion with regard to the classification of the excavated soils is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified. The local waste regulation department of the Environment Agency (EA) should be contacted to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

7.0 Outstanding Risks & Issues

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive, but covers the main areas where additional work may be required.

7.1 Site-Specific Risks

It is recommended that trial excavations extending to as close to the full depth of the proposed basement as possible should be carried out to determine likely groundwater inflows into the lower ground floor excavation, although these are not currently expected to be significant.

Once the development proposals have been finalised, the foundation proposals should be reviewed.

This investigation has identified the presence of limited contamination and there may be a requirement for a separate remediation proposals report to be prepared to comply with planning requirements. The remediation will need to be supervised and verified by a geoenvironmental engineer and a completion or validation report will also probably be required to support the planning application.

If during ground works any visual or olfactory evidence of contamination is identified it is recommended that further investigation be carried out and that the risk assessment is reviewed.

These areas of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk.

7.2 General Risks

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the general

12 Environment Agency 23 Oct 2007 *Regulatory Position Statement Treating non-hazardous waste for landfill - Enforcing the new requirement*



ground conditions based on the discrete points at which the ground was sampled, but there may be ground conditions (including soil, rock, gas and groundwater) elsewhere on site that have not been revealed by this investigation and therefore could not have been taken into account in this report. The ground conditions should be subject to review as the development proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

The comments made regarding gas and groundwater are based on observations made during the period the work has been carried out. Conditions may vary as a result of seasonal or other effects.

Where any conclusions and recommendations contained in this report have been based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information has not been independently verified by GEA, unless otherwise stated in the report. GEA accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to GEA from others.



Appendix

a. Field Work

Site Plan
Borehole Records
Dynamic Probe Records

b. Lab Testing

Geotechnical Test Results
SPT & Cohesion/Depth Graph
Chemical Test Results
Generic Risk Based Screening Values

c. Desk Study

Risk Assessment Tables
Envirocheck Extracts
Historical Maps
Preliminary UXO Risk Assessment



appendix a

Field Work

Site Plan
Borehole Records
Dynamic Probe Records

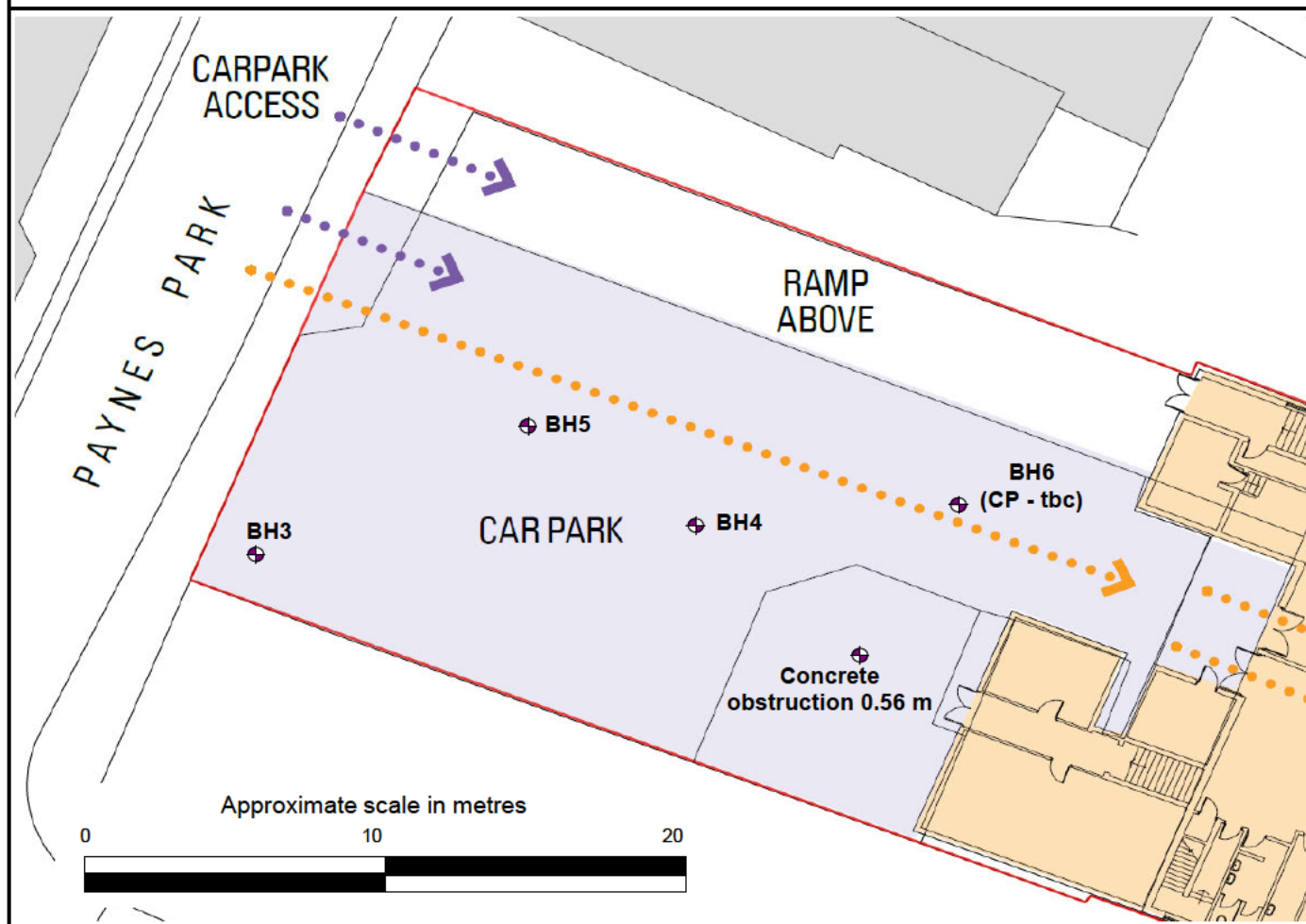
Site 9-10 High Street, Hitchin

Client Bellborough Ltd.

Engineer

Job Number
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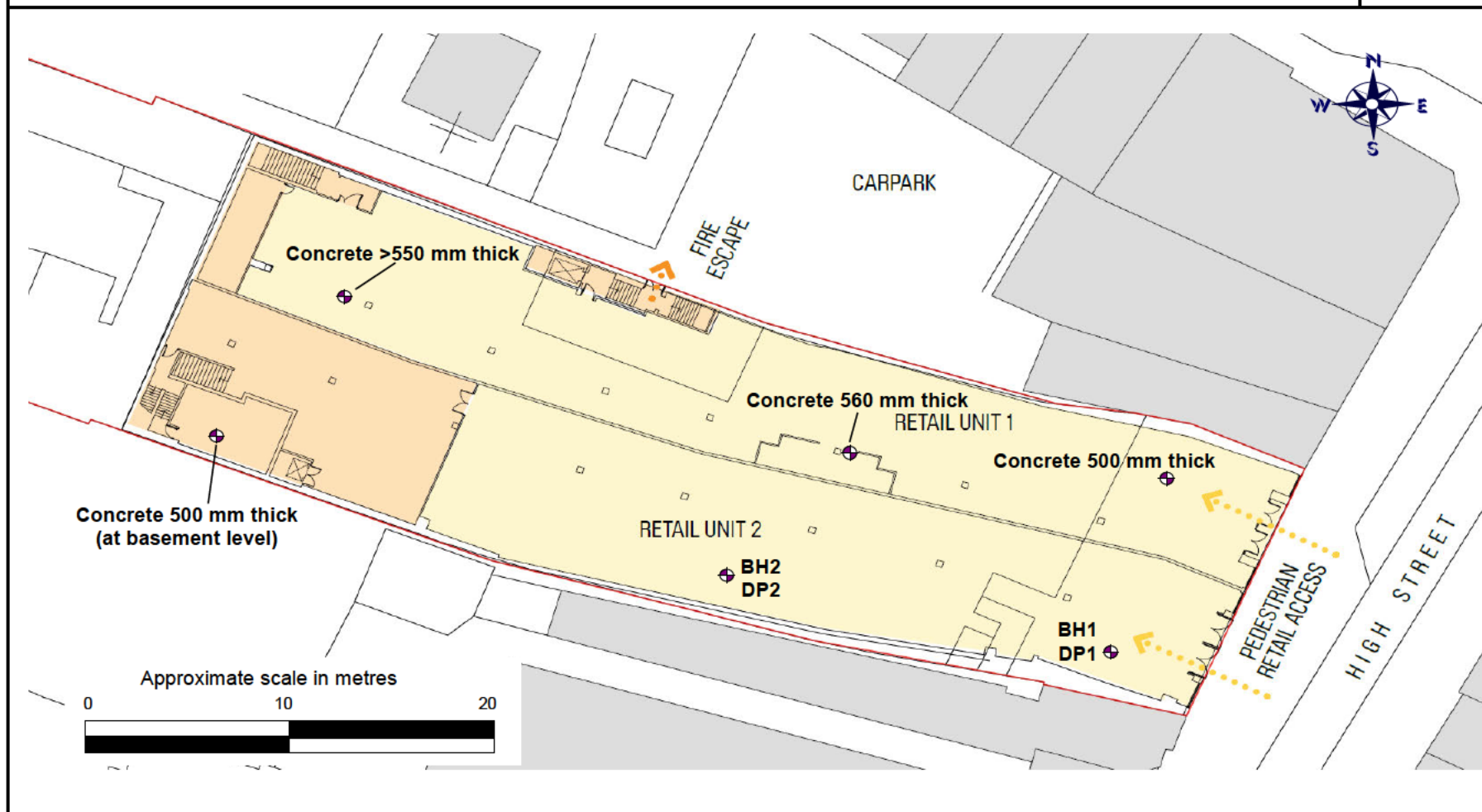
Site 9-10 High Street, Hitchin

Client Bellborough Ltd.

Engineer

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Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH1	
Job No J24068	Date 03-04-24	Ground Level (m TBM)	Co-Ordinates ()		
Client Bellborough Ltd. & Petit Papillon			Engineer		Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.60	ES					0.25	Concrete with laminate flooring at top. 6mm rebar at 140 mm.	
						0.30	Concrete infill (broken)	
						(1.40)	MADE GROUND (brown gravelly fine to coarse sand with brick and concrete fragments and fine to coarse flint gravel).	
						1.70		
						1.80	Red brick	
						2.00	MADE GROUND (brown gravelly sand with frequent brick, cement and concrete fragments. Some ash.)	
						2.10	MADE GROUND (dark brown stained black sandy gravelly clay with black staining from ash and coal. Gravel is medium to coarse flint).	

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
						Window sampled to 2.10 m. Dynamic Probing carried out adjacent to window sample borehole to 4.90 m - see separate record for DP1. Groundwater not encountered. Borehole backfilled with arisings on completion.

All dimensions in metres Scale 1:62.5	Method/ Plant Used	Logged By PRELIMINARY
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SAMPLES & TESTS			Water	STRATA			Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	
0.50	D				0.35	Concrete with 6 mm rebar at 220 mm and 270 mm depth. Clear plastic sheet memebrane at 10 mm.	
1.10	D			(0.85)	Brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse sub-rounded to sub-angular flint.		

All dimensions in metres Scale 1:62.5	Method/ Plant Used	Logged By PRELIMINARY
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Report ID: CABLE PERCUSSION | | Project: J24068 - 9-10 HIGH STREET.GPJ | | Library: GEA LIBRARY.GLB | | Date: 25 June 2024

Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH3	
Job No J24068	Date 04-04-24	Ground Level (m TBM)	Co-Ordinates ()		
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.40	ES	1,3/4,4,4,5 N60 = 26				0.17	Concrete with 6 mm rebar at 9 mm and 12 mm depth.	
						0.22	Concrete crush and rubble infill.	
0.80	D					0.60	MADE GROUND (greyish brown becoming brown slightly clayey gravelly sand with frequent brick and some concrete fragments at top. Gravel is flint and quartzite with rare bituminous material).	
1.20	D					(0.70)		
1.40	D	3,4/4,6,5,6 N60 = 33				1.30	Reddish brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded to angular flint and quartzite. Band of dense green fine to medium sand at 0.9 m.	
						1.60		
2.10	D					1.80	Yellowish brown slightly clayey gravelly fine to coarse SAND with calcite crystallisation veins in undisturbed samples. Gravel is sub-rounded to angular fine to medium flint and quartzite.	
2.70	D					(2.65)	Dark orange-brown gravelly fine to coarse SAND. Gravel is fine to coarse flint.	
3.30	D	5,5/5,4,5,5 N60 = 30					Light brown very clayey fine to medium SAND with occasional orange-brown bands.	
3.90	D						2.70 Coarse sub-angular claystone gravel.	
							3.05 Dark grey banding.	
4.40	D					4.45	4.20 ...becoming orange...	

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

All dimensions in metres Scale 1:62.5	Method/ Plant Used	Logged By PRELIMINARY
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Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH4
Job No J24068	Date 04-04-24	Ground Level (m TBM)	Co-Ordinates ()	
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	
0.70	ES	1,1/1,3,5,5 N60 = 22			0.18	Concrete with flints. 6 mm diameter rebar at 80 mm and 100 mm depth.	
1.00	D				0.60	MADE GROUND (greyish brown gravelly fine to coarse sand with brick and concrete fragments. Gravel is fine to coarse sub-rounded to angular flint with some quartzite).	
1.50	D				0.75		
2.20	D	6,11/10,8,9,8 N60 = 55			(1.35)	MADE GROUND (grey mottled black slightly gravelly fine to coarse sand with black staining, hydrocarbon odour, brick and small concrete fragments).	
2.60	D	9,11/14,15,15,14 N60 = 90			2.10	Firm brown slightly gravelly sandy CLAY. Gravel is fine to coarse well-rounded to angular flint. Sand is fine to coarse.	
3.50	D				2.40	Light brown very gravelly sandy CLAY. Gravel is well-rounded to angular fine to coarse flint. Light yellowish brown fine to medium SAND.	
					(1.60)		
					4.00		

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

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Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH5
Job No J24068	Date 04-04-24	Ground Level (m TBM)	Co-Ordinates ()	
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.50	ES	1,1/2,4,5,6 N60 = 26				0.23	Concrete with 6 mm diameter rebar at 90 mm and 120 mm depth.	
						0.40		
						0.80	MADE GROUND (Sand and gravel of concrete and brick rubble crush).	
1.30	D	2,2/2,3,5,5 N60 = 23				(2.00)	MADE GROUND (dark grey clayey slightly gravelly sand with black staining, slight hydrocarbon odour and brick and concrete fragments). Brown becoming dark brown slightly gravelly sandy CLAY with small charcoal fragments throughout and decayed rootlets.	
2.10	D					2.80		
2.80	D	10,13/14,16,19,19 N60 = 106				(0.50)	Yellowish-brown very sandy CLAY. Sand is fine to medium.	
3.20	D					3.30		
3.50	D					3.50	Light brown clayey fine to medium SAND.	

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

All dimensions in metres Scale 1:62.5	Method/ Plant Used	Logged By PRELIMINARY
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Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH6	
Job No J24068	Date 05-04-24 18-04-24	Ground Level (m TBM)	Co-Ordinates ()		
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 1 of 4	

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.30	B					0.30	Reinforced concrete.	
0.50	B					0.60	Made ground (red brick rubble)	
						(0.60)	Made ground (grey silty brick and concrete rubble including ash)	
1.20-1.65	B	1,2/1,2,2,4 N60 = 10				1.20	Firm greyish brown silty CLAY with interbedded sand and occasional gravel.	
1.75	D							
2.00	D	3,8/8,9,9,11 N60 = 41				(1.80)		
2.75	D							
3.00	D	5,9/8,9,11,17 N60 = 50				3.00	Dense brown SAND with occasional flint gravel. Becoming dense from 6.00 m.	
3.75	D							
4.00	D	4,6/7,7,8,7 N60 = 32						
4.75	D							
5.00	D	3,7/11,10,9,9 N60 = 44				(4.50)		
6.00	D							
6.50	D	4,5/5,7,7,7 N60 = 29						
7.50	D					7.50	Medium dense brown silty SAND and sandy silty CLAY.	
8.00	D	1,3/2,2,3,3 N60 = 11						
9.00	D							
9.50	D	2,2/2,3,3,4 N60 = 13						

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
6.00	05-04-24	00.00	6.00	200		Half an hour spent breaking out position to wider diameter to facilitate dropping casing in. One hour spent reducing casing diameter. Water added throughout to assist with drilling. Groundwater strike at 14.00 m, rising to 7.00 m (borehole depth at 20.00 m) overnight and standing at 10.00 m on completion of the borehole. No recovery in U100 at 14.00 m. One hour spent chiselling on flint at 26.50 m. Standpipe installed to a depth of 7.00 m with a response zone from 1.50 m.

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable percussion	Logged By PRELIMINARY
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Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH6	
Job No J24068	Date 05-04-24 18-04-24	Ground Level (m TBM)	Co-Ordinates ()		
Client Bellborough Ltd. & Petit Papillon			Engineer		Sheet 2 of 4

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
10.50	D					(4.90)	Medium dense brown silty SAND and sandy silty CLAY.(continued)	
11.00	D	2,2/3,3,3,3 N60 = 13						
12.00	D					12.40		
12.50	D	3,4/6,5,6,6 N60 = 26					Medium dense greyish-blue silty SAND including occasional gravel.	
13.50	D					(2.10)		
14.00	U					14.50		
14.50	D	2,3/2,2,3,3 N60 = 11					Medium dense grey silty fine and medium banded SAND with occasional gravel and silty slightly sandy CLAY.	
15.50	D							
16.00	D	2,3/2,3,3,4 N60 = 13				(4.50)		
17.00	D							
17.50	D	2,2/3,3,4,6 N60 = 18						
18.50	D					19.00		
19.00	D	7,7/10,11,11,9 N60 = 46				(1.00)	Dense flint COBBLES including sand and gravel.	
						20.00		

Boring Progress and Water Observations

Depth	Date	Time	Casing		Water Depth	REMARKS
			Depth	Dia. mm		
20.00	12-04-24	00.00	20.00	200	10	Half an hour spent breaking out position to wider diameter to facilitate dropping casing in. One hour spent reducing casing diameter. Water added throughout to assist with drilling. Groundwater strike at 14.00 m, rising to 7.00 m (borehole depth at 20.00 m) overnight and standing at 10.00 m on completion of the borehole. No recovery in U100 at 14.00 m. One hour spent chiselling on flint at 26.50 m. Standpipe installed to a depth of 7.00 m with a response zone from 1.50 m.

All dimensions in metres
Scale 1:62.5Method/
Plant Used Cable percussionLogged By
PRELIMINARY



Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH6	
Job No J24068	Date 05-04-24 18-04-24	Ground Level (m TBM)	Co-Ordinates ()		
Client Bellborough Ltd. & Petit Papillon			Engineer		Sheet 3 of 4

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
20.00	D	4,3/6,6,7,6 N60 = 28					Medium-dense brown medium to coarse sand with occasional fine flint gravel.	
20.50	D							
21.50	D					(3.00)		
22.00	D	3,3/5,6,7,7 N60 = 28						
23.00	D					23.00		
23.50	D	4,6/7,8,7,8 N60 = 34					Dense blueish grey silty SAND and silty sandy CLAY.	
24.50	D					(3.30)		
25.00	D							
26.00	D	3,5/6,7,7,8 N60 = 31						
26.50	D					26.30		
27.50	D	7,10/12,17,16,19 N60 = 71					Dense slightly clayey flint cobbles.	
28.00-28.45	U					(0.70)		
28.50	D					27.00		
29.50	D	3,7/8,9,9,12 N60 = 42					Stiff blue CLAY and dense clayey SAND including occasional chalk fragments. Becomes slightly clayey SAND from 29.00 m.	
						(3.00)		
						30.00		

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	
30.00	18-04-24	00.00	30.00		10	Half an hour spent breaking out position to wider diameter to facilitate dropping casing in. One hour spent reducing casing diameter. Water added throughout to assist with drilling. Groundwater strike at 14.00 m, rising to 7.00 m (borehole depth at 20.00 m) overnight and standing at 10.00 m on completion of the borehole. No recovery in U100 at 14.00 m. One hour spent chiselling on flint at 26.50 m. Standpipe installed to a depth of 7.00 m with a response zone from 1.50 m.

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable percussion	Logged By PRELIMINARY
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Project 9-10 High Street, Hitchin, SG5 1BH				BOREHOLE No BH6
Job No J24068	Date 05-04-24 18-04-24	Ground Level (m TBM)	Co-Ordinates ()	
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 4 of 4

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
30.00	D	5,6/8,9,10,14 N60 = 46						

Boring Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Depth	Casing Dia. mm	Water Depth	
						Half an hour spent breaking out position to wider diameter to facilitate dropping casing in. One hour spent reducing casing diameter. Water added throughout to assist with drilling. Groundwater strike at 14.00 m, rising to 7.00 m (borehole depth at 20.00 m) overnight and standing at 10.00 m on completion of the borehole. No recovery in U100 at 14.00 m. One hour spent chiselling on flint at 26.50 m. Standpipe installed to a depth of 7.00 m with a response zone from 1.50 m.

All dimensions in metres Scale 1:62.5	Method/ Plant Used Cable percussion	Logged By PRELIMINARY
--	--	--------------------------

Report ID: CABLE PERCUSSION | Project: J24068 - 9-10 HIGH STREET.GPJ | Library: GEA LIBRARY.GLB | Date: 25 June 2024

Project 9-10 High Street, Hitchin, SG5 1BH				PROBE No DP1
Job No J24068	Date 03-04-24	Ground Level (m TBM)	Co-Ordinates ()	
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 1 of 1

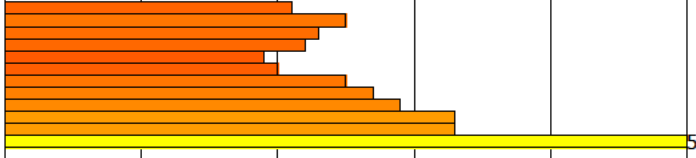
Depth (m)	Readings (blows/ 100mm)	Diagram (N100 Values)					Torque (Nm)	Remarks
		10	20	30	40	50		
1	2 2 2							
2	0 0 3							
3	2 3 3							
4	6 8 5							
5	13 16 9							
6	9 11 17							
7	19 18 11							
8	10 13 21							
9	15 14 13							
10	16 24							

Hammer Wt (kg)		GENERAL REMARKS Dynamic probe advanced adjacent to BH1 - see separate record.
Hammer Drop (mm)		
Cone Dia (mm)		
Cone Type	DPH	
Damper		

All dimensions in metres Scale 1:62.5	Method/ Plant Used	Logged By PRELIMINARY
--	-----------------------	---------------------------------



Project 9-10 High Street, Hitchin, SG5 1BH				PROBE No DP2
Job No J24068	Date 03-04-24	Ground Level (m TBM)	Co-Ordinates ()	
Client Bellborough Ltd. & Petit Papillon		Engineer		Sheet 1 of 1

Depth (m)	Readings (blows/ 100mm)	Diagram (N100 Values)					Torque (Nm)	Remarks
		10	20	30	40	50		
1	21 25 23 22 19 20 25 27 29 33 33 54						54	
2								
3								
4								
5								
6								
7								
8								
9								

Hammer Wt (kg)		GENERAL REMARKS Dynamic probe advanced adjacent to BH2 - see separate record.
Hammer Drop (mm)		
Cone Dia (mm)		
Cone Type	DPH	
Damper		

All dimensions in metres Scale 1:62.5	Method/ Plant Used	Logged By PRELIMINARY
--	-----------------------	---------------------------------



appendix b

Lab Testing

Geotechnical Test Results
SPT & Cohesion/Depth Graph
Chemical Test Results
Generic Risk Based Screening Values



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35272

Borehole/Pit No.

BH4

Site Name

9-10 High Street, Hitchin

Sample No.

-

Project No.

J24068

Client

GEA

Depth Top

2.20

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular)

Samples received

22/04/2024

Schedules received

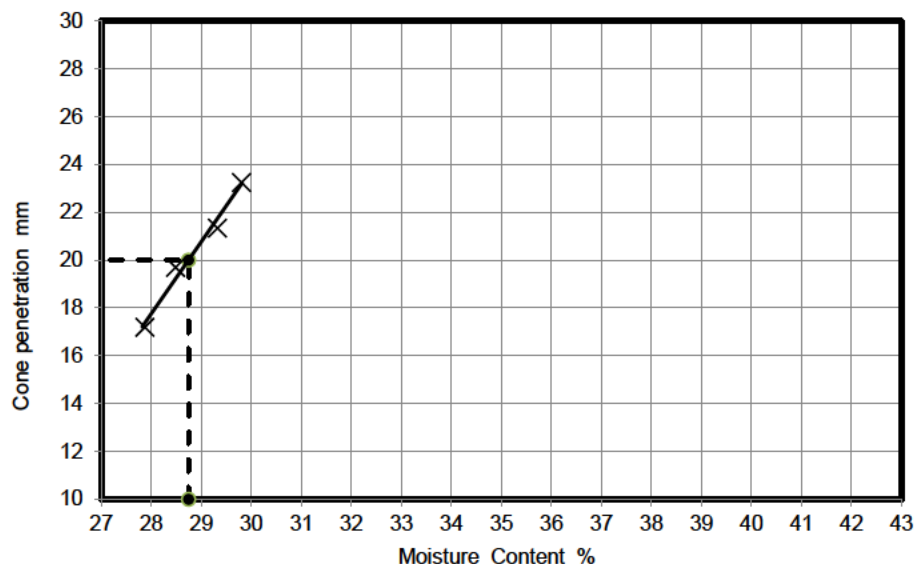
01/05/2024

Project Started

02/05/2024

Date Tested

28/05/2024



NATURAL MOISTURE CONTENT

6.2

%

% PASSING 425µm SIEVE

27

%

LIQUID LIMIT

29

%

PLASTIC LIMIT

14

%

PLASTICITY INDEX

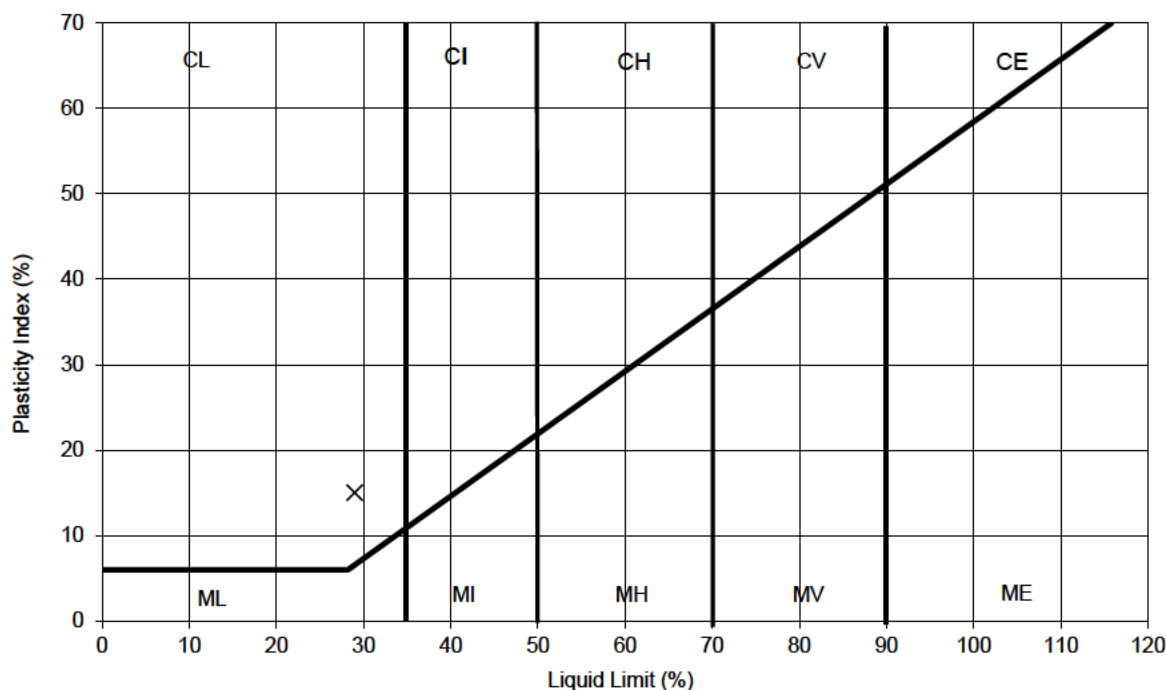
15

%

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 04/06/2024

MSF-5 R2

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35272

Borehole/Pit No.

BH5

Site Name

9-10 High Street, Hitchin

Sample No.

-

Project No.

J24068

Client

GEA

Depth Top

2.10

m

Depth Base

-

m

Sample Type

D

Soil Description

Dark brown slightly gravelly slightly sandy silty CLAY (gravel is fm and angular to sub-angular)

Samples received

22/04/2024

Schedules received

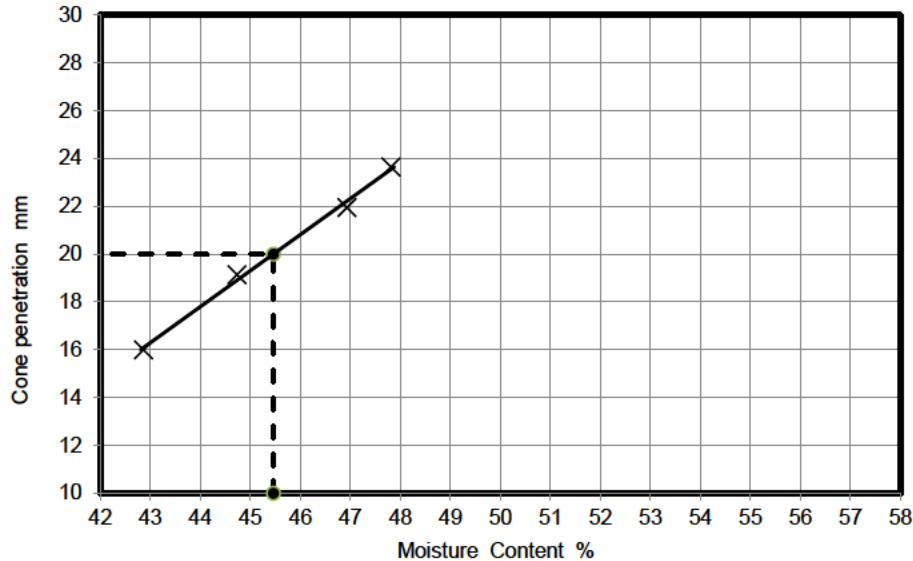
01/05/2024

Project Started

02/05/2024

Date Tested

28/05/2024



NATURAL MOISTURE CONTENT

26

%

% PASSING 425µm SIEVE

81

%

LIQUID LIMIT

45

%

PLASTIC LIMIT

23

%

PLASTICITY INDEX

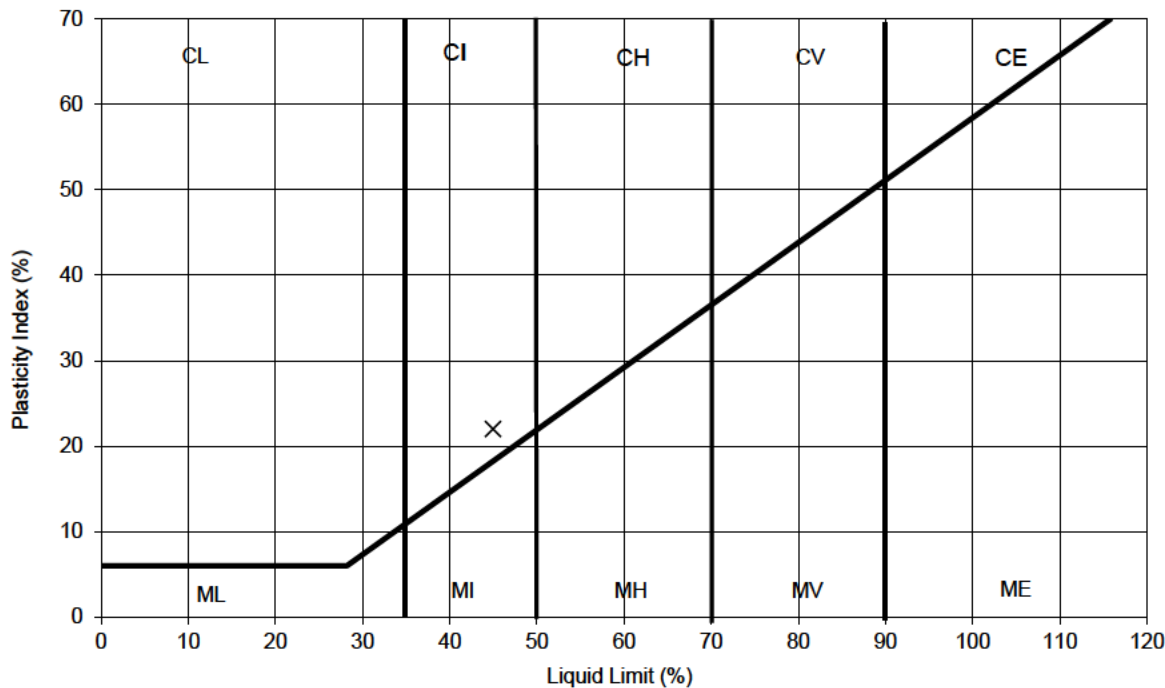
22

%

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35272

Borehole/Pit No.

BH5

Site Name

9-10 High Street, Hitchin

Sample No.

-

Project No.

J24068

Client

GEA

Depth Top

3.20

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown slightly sandy slightly gravelly silty CLAY (gravel is fm and angular to sub-angular)

Samples received

22/04/2024

Schedules received

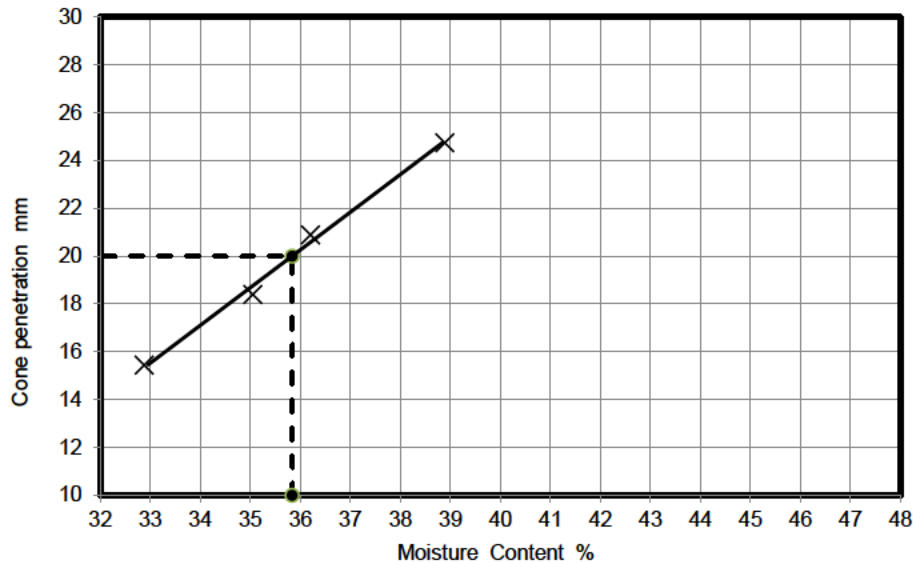
01/05/2024

Project Started

02/05/2024

Date Tested

28/05/2024



NATURAL MOISTURE CONTENT

18

%

% PASSING 425µm SIEVE

97

%

LIQUID LIMIT

36

%

PLASTIC LIMIT

15

%

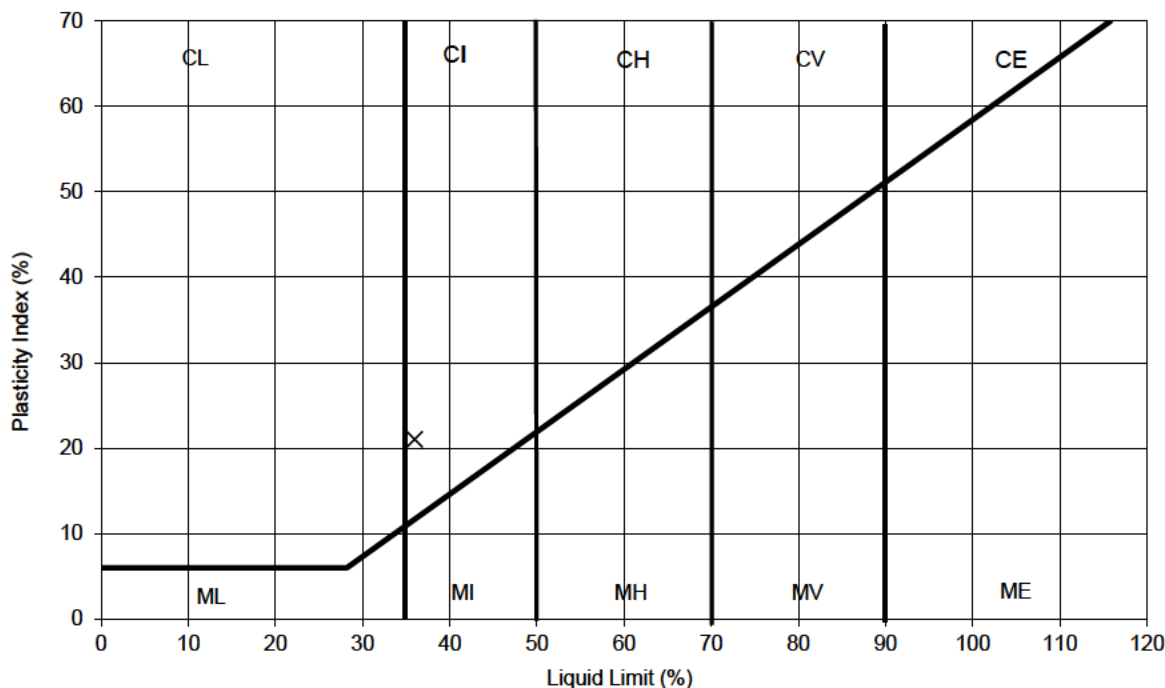
PLASTICITY INDEX

21

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35272

Borehole/Pit No.

BH6

Site Name

9-10 High Street, Hitchin

Sample No.

-

Project No.

J24068

Client

GEA

Depth Top

2.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown slightly sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular)

Samples received

22/04/2024

Schedules received

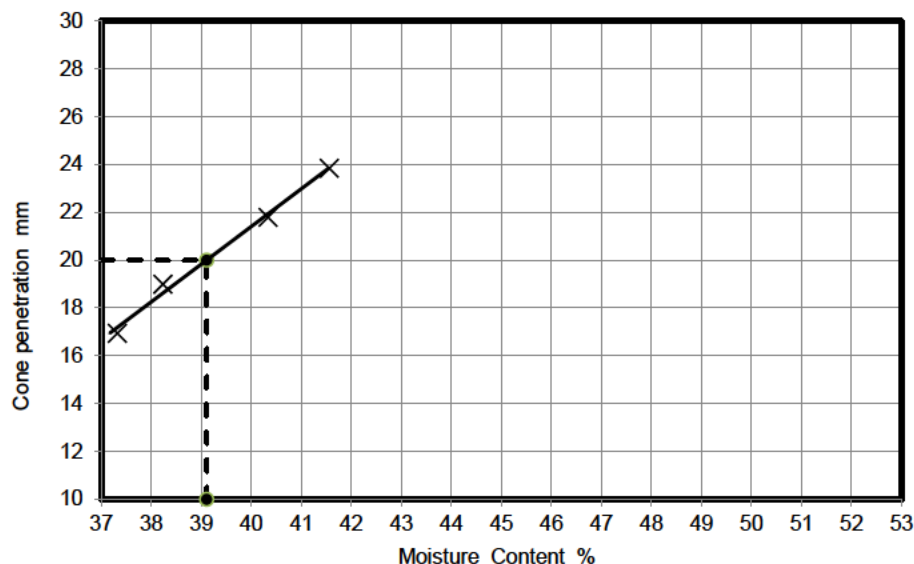
01/05/2024

Project Started

02/05/2024

Date Tested

28/05/2024



NATURAL MOISTURE CONTENT

20

%

% PASSING 425µm SIEVE

55

%

LIQUID LIMIT

39

%

PLASTIC LIMIT

16

%

PLASTICITY INDEX

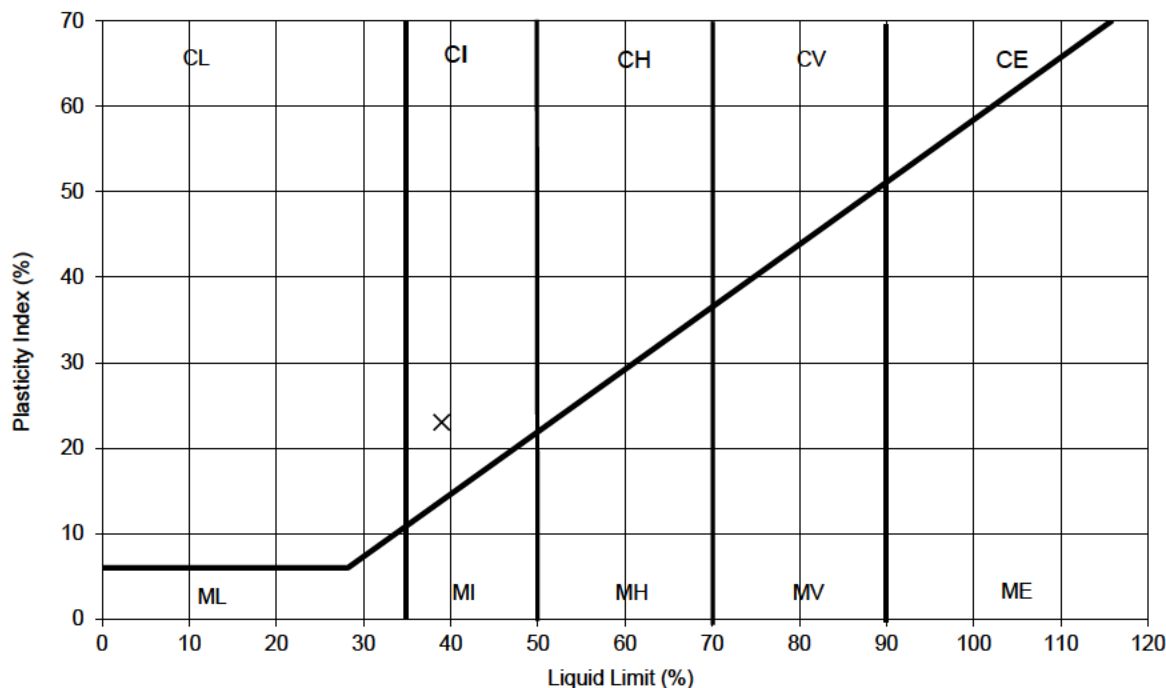
23

%

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Initials: J.P

Date: 04/06/2024

MSF-5 R2

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35272

Borehole/Pit No.

BH6

Site Name

9-10 High Street, Hitchin

Sample No.

-

Project No.

J24068

Client

GEA

Depth Top

2.75

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown and yellowish brown slightly sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular)

Samples received

22/04/2024

Schedules received

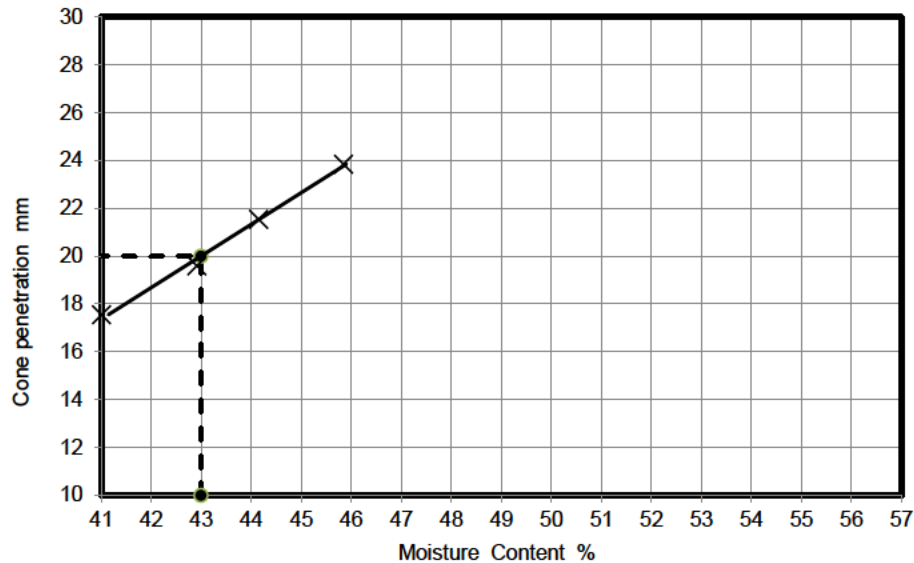
01/05/2024

Project Started

02/05/2024

Date Tested

28/05/2024



NATURAL MOISTURE CONTENT

20

%

% PASSING 425µm SIEVE

57

%

LIQUID LIMIT

43

%

PLASTIC LIMIT

18

%

PLASTICITY INDEX

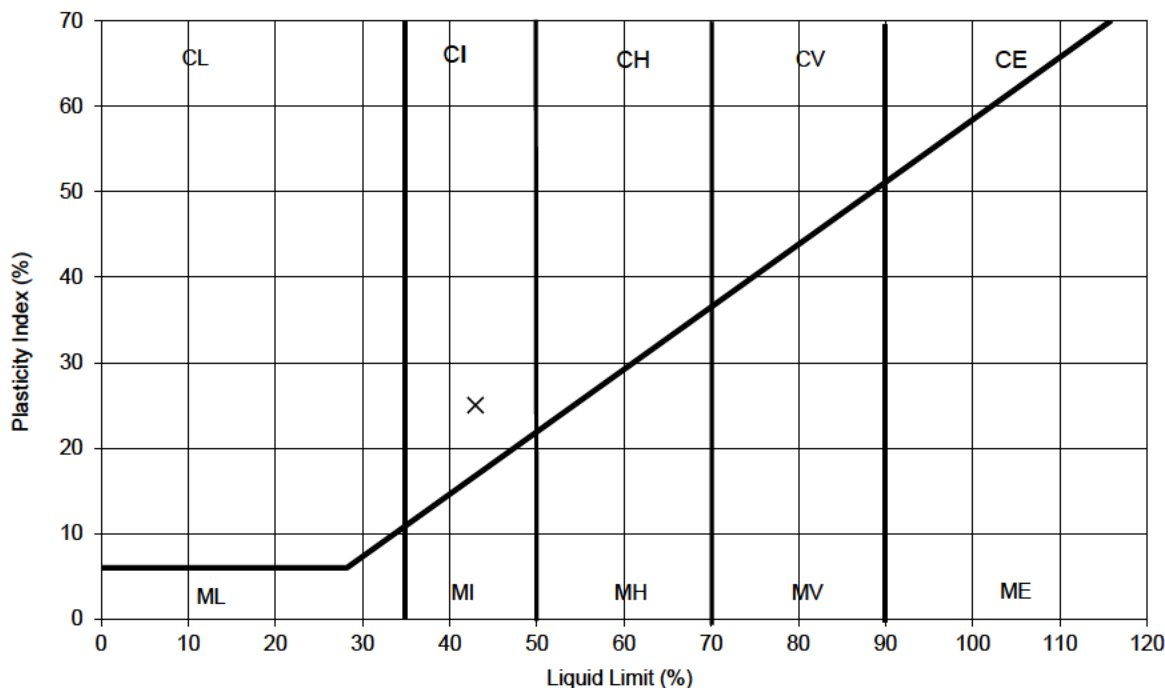
25

%

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

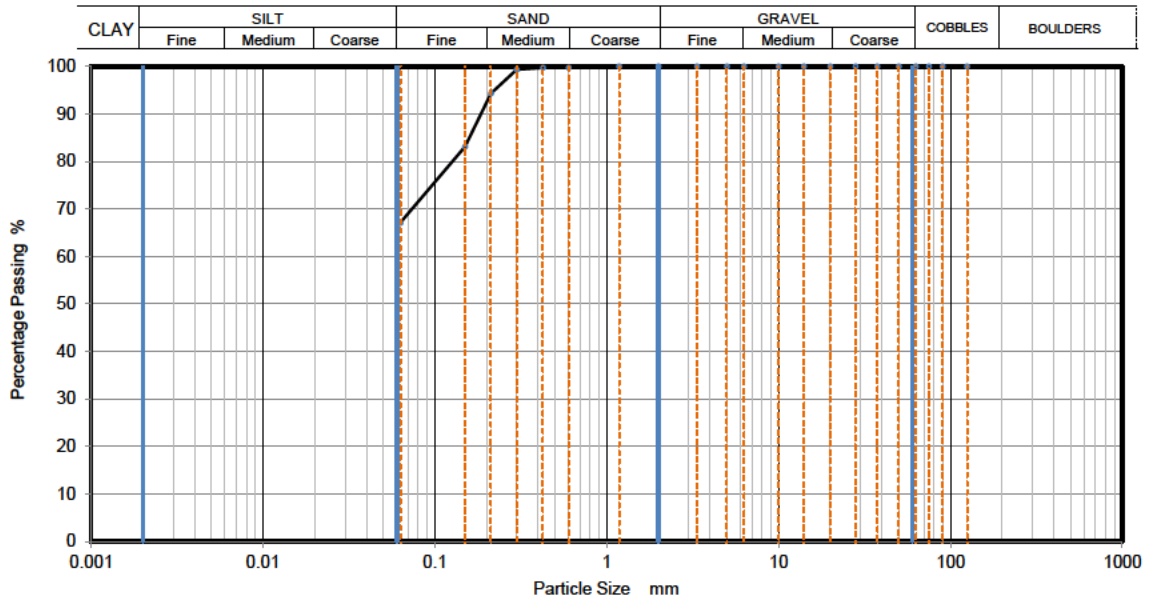
Date: 04/06/2024

MSF-5 R2

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

	PARTICLE SIZE DISTRIBUTION		Job Ref	35272	
			Borehole/Pit No.	BH3	
Site Name	9-10 High Street, Hitchin		Sample No.	-	
Project No.	J24068	Client	GEA	Depth Top	4.40 m
Soil Description	Brown slightly sandy silty CLAY		Depth Base	- m	
			Sample Type	D	
			Samples received	22/04/2024	
			Schedules received	01/05/2024	
Test Method	BS1377:Part 2: 1990, clause 9.0		Project started	02/05/2024	
These results only apply to the items tested			Date tested	21/05/2024	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	94		
0.15	83		
0.063	67		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	33
Fines <0.063mm	67

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

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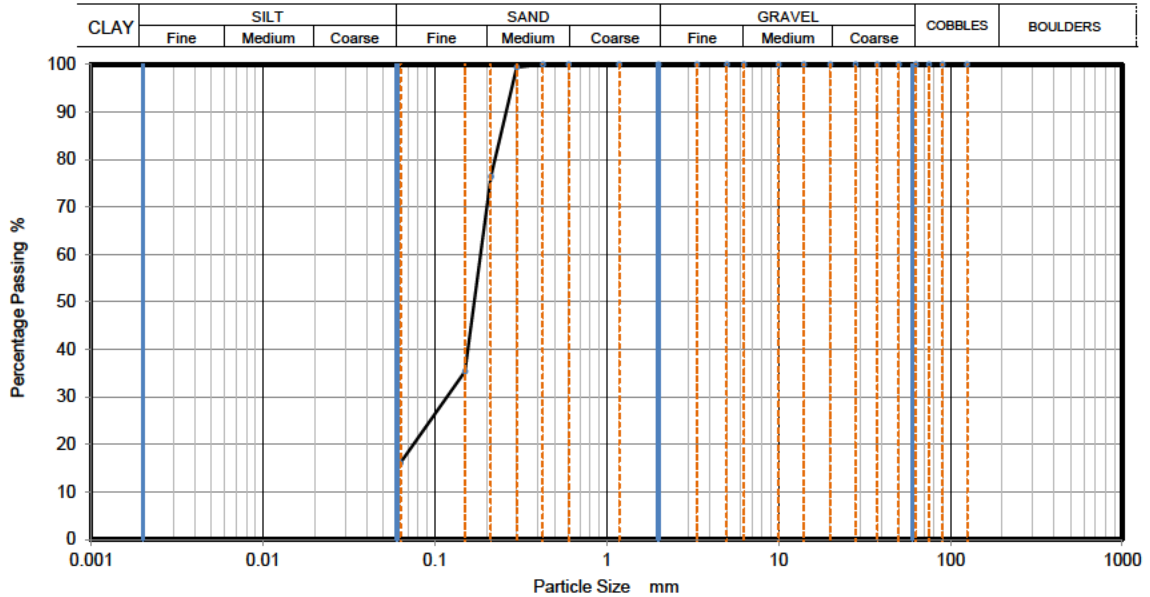
	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 04/06/2024
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-S-R3
	2519		



PARTICLE SIZE DISTRIBUTION

	PARTICLE SIZE DISTRIBUTION			Job Ref	35272	
				Borehole/Pit No.	BH4	
Site Name	9-10 High Street, Hitchin			Sample No.	-	
Project No.	J24068	Client	GEA	Depth Top	3.50	m
Soil Description	Orangish brown silty SAND			Depth Base	-	m
				Sample Type	D	
				Samples received	22/04/2024	
				Schedules received	01/05/2024	
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	02/05/2024	
These results only apply to the items tested				Date tested	21/05/2024	

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	76		
0.15	35		
0.063	16		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	84
Fines <0.063mm	16

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: J.P

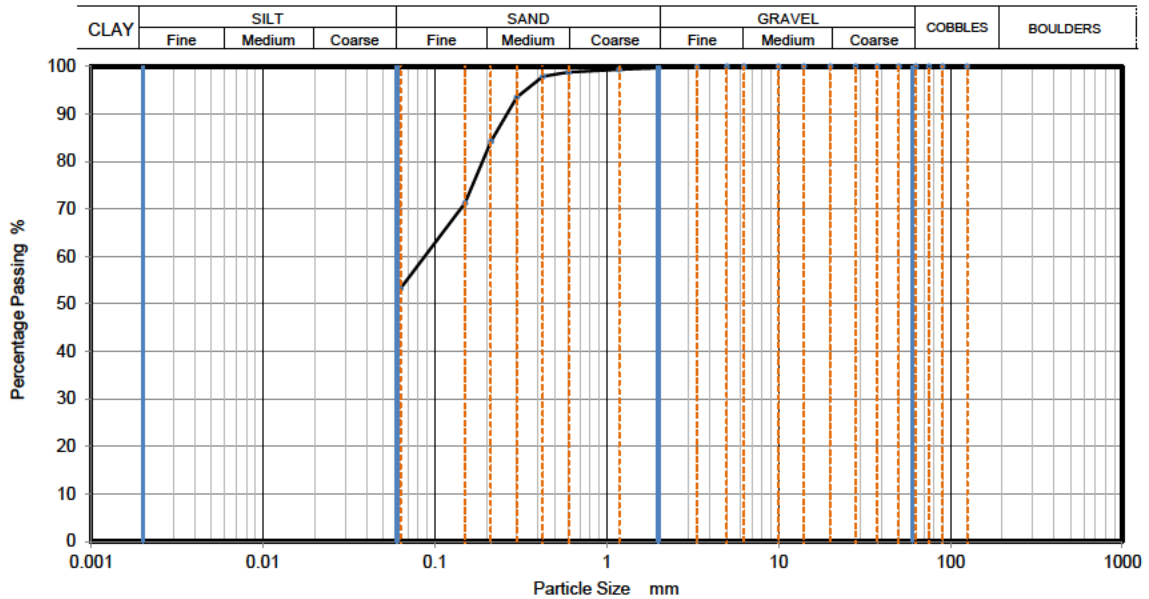
Date: 04/06/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-S-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	35272
				Borehole/Pit No.	BH6
Site Name	9-10 High Street, Hitchin			Sample No.	-
Project No.	J24068	Client	GEA	Depth Top	11.00 m
Soil Description	Brown sandy silty CLAY			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2024
				Schedules received	01/05/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	02/05/2024
These results only apply to the items tested				Date tested	21/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	98		
0.3	94		
0.212	84		
0.15	71		
0.063	53		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	47
Fines <0.063mm	53

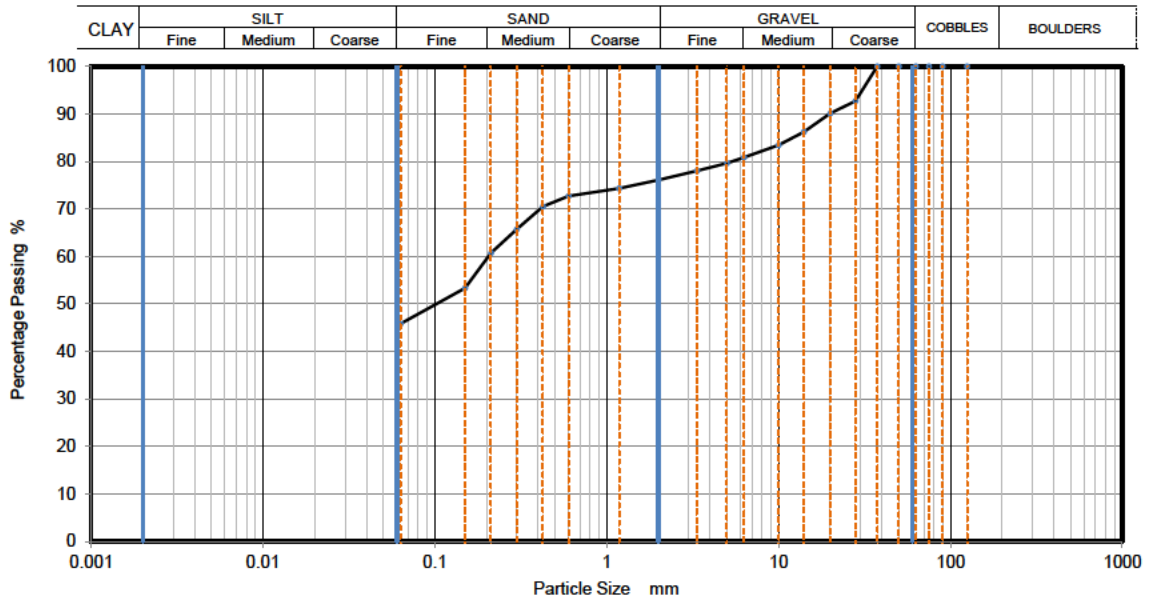
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-S-R3
	2519		

	PARTICLE SIZE DISTRIBUTION			Job Ref	35272
				Borehole/Pit No.	BH6
Site Name	9-10 High Street, Hitchin			Sample No.	-
Project No.	J24068	Client	GEA	Depth Top	15.50 m
Soil Description	Grey slightly gravelly slightly sandy silty CLAY (gravel is fmc and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2024
				Schedules received	01/05/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	02/05/2024
These results only apply to the items tested				Date tested	21/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	90		
14	86		
10	83		
6.3	81		
5	80		
3.35	78		
2	76		
1.18	74		
0.6	73		
0.425	71		
0.3	66		
0.212	61		
0.15	53		
0.063	46		

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	30
Fines <0.063mm	46

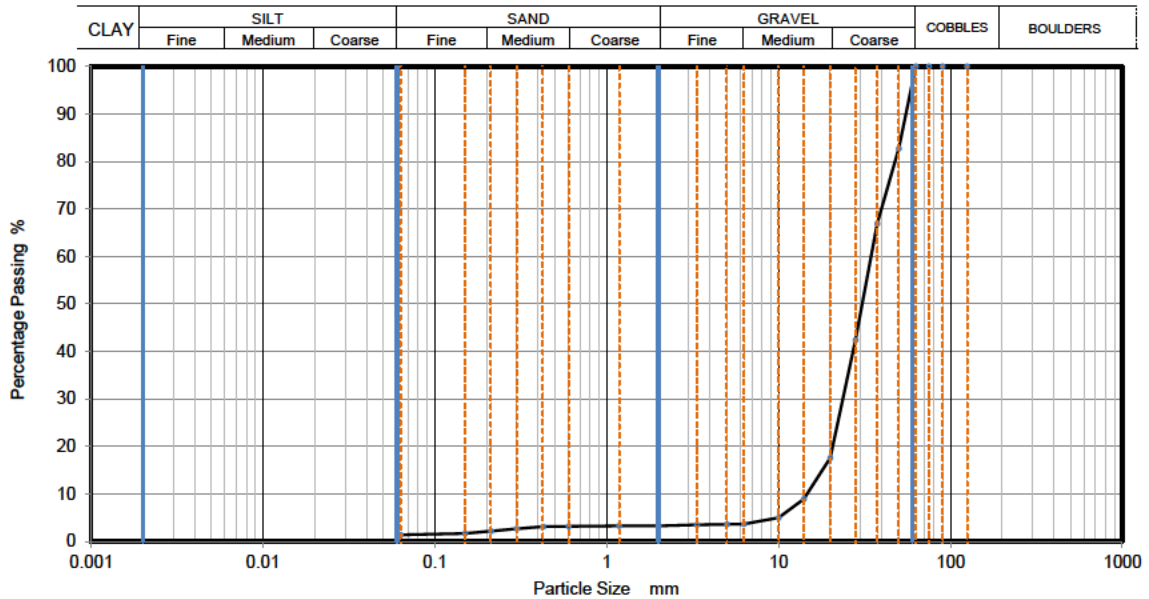
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288	Checked and Approved Initials: J.P Date: 04/06/2024
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-S-R3
	2519	

	PARTICLE SIZE DISTRIBUTION			Job Ref	35272
				Borehole/Pit No.	BH6
Site Name	9-10 High Street, Hitchin			Sample No.	-
Project No.	J24068	Client	GEA	Depth Top	19.00 m
Soil Description	Greyish brown slightly sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2024
				Schedules received	01/05/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	02/05/2024
These results only apply to the items tested				Date tested	21/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	83		
37.5	67		
28	42		
20	18		
14	9		
10	5		
6.3	4		
5	4		
3.35	4		
2	3		
1.18	3		
0.6	3		
0.425	3		
0.3	3		
0.212	2		
0.15	2		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0
Gravel	97
Sand	2
Fines <0.063mm	1

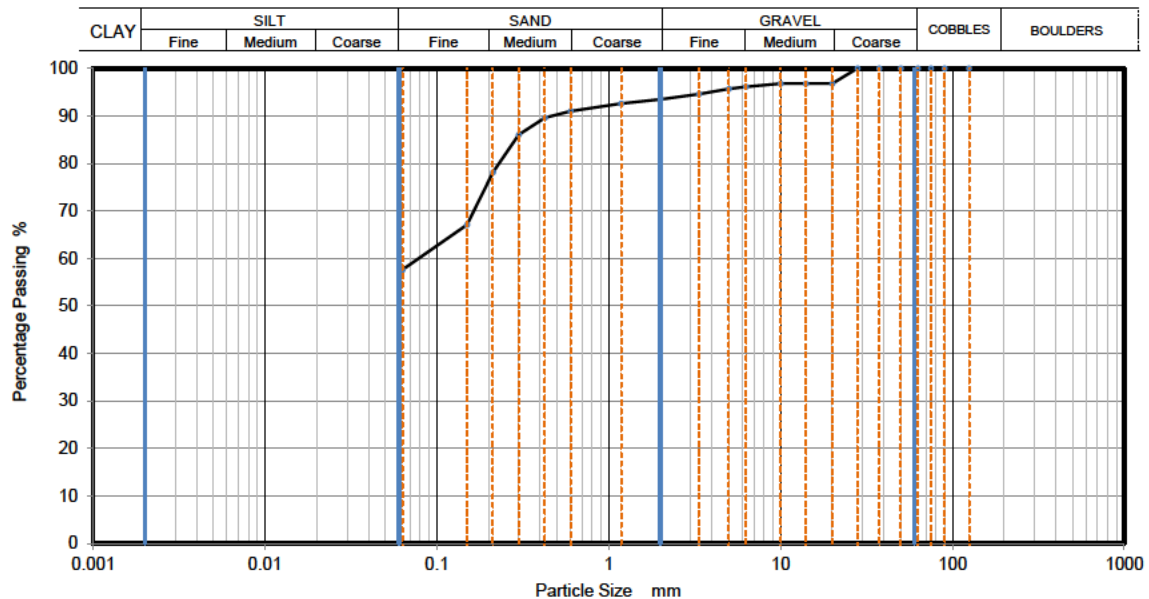
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	2.4
Curvature Coefficient	1.1

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

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	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-S-R3
	2519		

	PARTICLE SIZE DISTRIBUTION			Job Ref	35272
				Borehole/Pit No.	BH6
Site Name	9-10 High Street, Hitchin			Sample No.	-
Project No.	J24068	Client	GEA	Depth Top	26.00 m
Soil Description	Greyish brown slightly gravelly sandy silty CLAY (gravel is fmc and sub-angular)			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2024
				Schedules received	01/05/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	02/05/2024
These results only apply to the items tested				Date tested	21/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	97		
10	97		
6.3	96		
5	96		
3.35	95		
2	94		
1.18	93		
0.6	91		
0.425	90		
0.3	86		
0.212	78		
0.15	67		
0.063	58		

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	35
Fines <0.063mm	58

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 04/06/2024
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-S-R3
	2519		

		Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results Tested in accordance with BS1377 : Part 3 : 2018, Clause 7.6 & Clause 12								
		Job No. 35272						Project Name 9-10 High Street, Hitchin		Programme Samples received 22/04/2024 Schedule received 01/05/2024 Project started 02/05/2024 Testing Started 20/05/2024
Project No. J24068		Client GEA								
Hole No.	Sample				Soil description	Dry Mass passing 2mm %	SO4 Content mg/l	pH	Remarks	
	Ref	Top m	Base m	Type						
BH4	-	2.20	-	D	Brown sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular)	80	90	7.7		
BH5	-	3.20	-	D	Brown slightly sandy slightly gravelly silty CLAY (gravel is fm and angular to sub-angular)	99	90	7.8		
BH6	-	2.75	-	D	Brown and yellowish brown slightly sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular)	83	110	7.8		
BH6	-	12.50	-	D	Greenish grey slightly gravelly clayey SAND (gravel is fm and sub-angular)	97	330	7.8		
		Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com These results only apply to the items tested NOTE: The report shall not be reproduced except in full without authority of the laboratory							Checked and Approved Initials J.P Date: 04/06/2024	
		Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)							MSF-5-R29	
		2519								

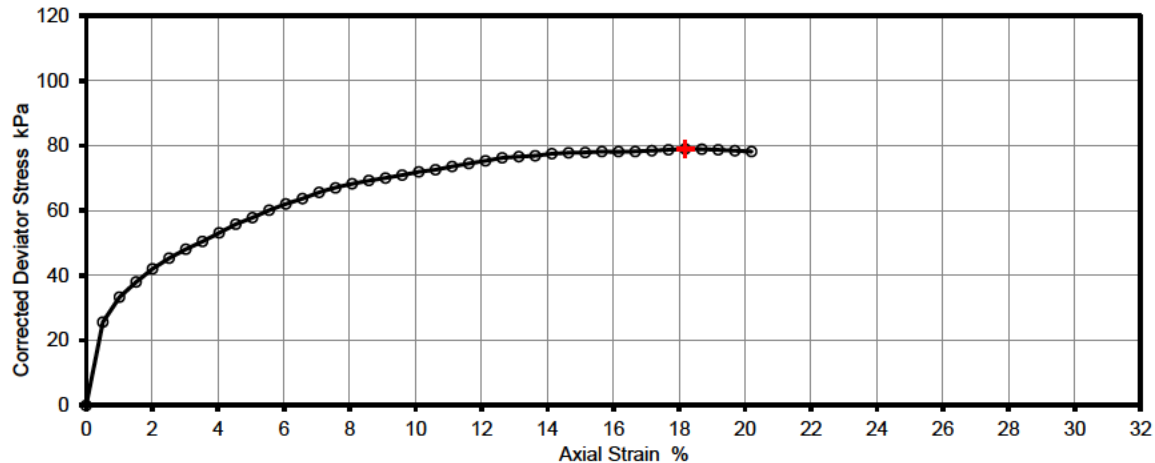
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	35272
				Borehole/Pit No.	BH6
Site Name	9-10 High Street, Hitchin			Sample No.	-
Project No.	J24068	Client	GEA	Depth Top	28.00 m
Soil Description	Medium strength grey slightly gravelly slightly sandy silty CLAY with chalk fragments (gravel is fm and sub-angular) becoming @ 28.15 m clayey SAND			Depth Base	- m
				Sample Type	U
				Samples received	22/04/2024
				Schedules received	01/05/2024
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	21/05/2024

Remarks

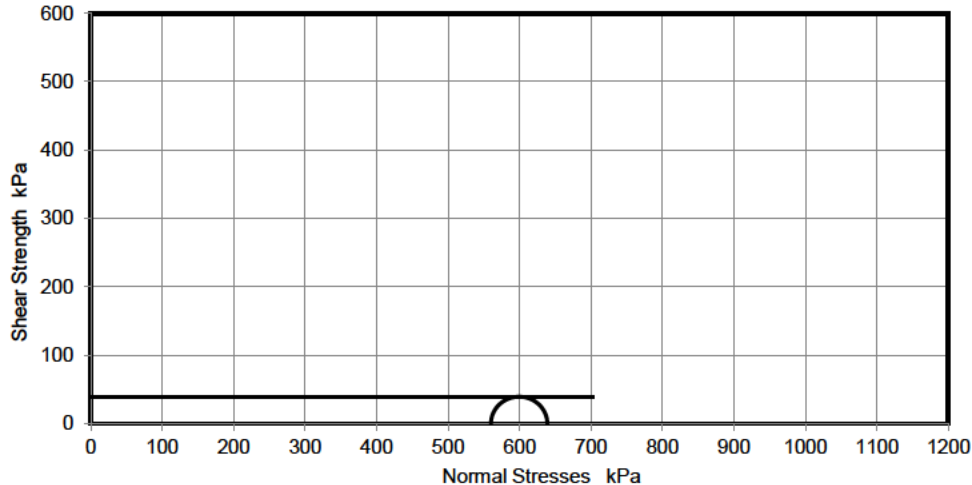
Position within sample

Test Number	1
Length	198.0 mm
Diameter	103.0 mm
Bulk Density	2.25 Mg/m ³
Moisture Content	17 %
Dry Density	1.93 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	560 kPa
Axial Strain	18 %
Deviator Stress, $(\sigma_1 - \sigma_3)_f$	79 kPa
Undrained Shear Strength, c_u	39 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.



Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved
Initials: J.P
Date 04/06/2024

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure

Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
35272	9-10 High Street, Hitchin	Samples received	22/04/2024
		Schedule received	01/05/2024
Project No.	Client	Project started	02/05/2024
J24068	GEA	Testing Started	21/05/2024

[illegible]

Legend	UU - single stage test (single and multiple specimens)	σ_3	Cell pressure	Mode of failure ;	B - Brittle
	UUM - Multistage test on a single specimen	$\sigma_1 - \sigma_3$	Maximum corrected deviator stress		P - Plastic
	suffix R - remoulded or recompacted	cu	Undrained shear strength, $\frac{1}{2}(\sigma_1 - \sigma_3)$		C - Compound



Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: james@k4soils.com
Email: james@k4soils.com

Checked and Approved

Initials: J.P
Date: 04/06/2024

These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R7b

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Analytical Report Number : 24-014221

Project / Site name:	9-10 High Street Hitchin	Samples received on:	12/04/2024
Your job number:	J24068	Samples instructed on/ Analysis started on:	16/04/2024
Your order number:		Analysis completed by:	23/04/2024
Report Issue Number:	1	Report issued on:	23/04/2024
Samples Analysed:	1 soil sample		

Signed:

Joanna Szwarzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-014221
Project / Site name: 9-10 High Street Hitchin

Lab Sample Number				171155
Sample Reference				CP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				10/04/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Stone Content	%	0.1	NONE	48
Moisture Content	%	0.01	NONE	17
Total mass of sample received	kg	0.1	NONE	2

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	EWS

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	10.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	2100
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	620
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.309
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	309
Sulphide	mg/kg	1	MCERTS	35
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	63
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.35
Anthracene	mg/kg	0.05	MCERTS	0.08
Fluoranthene	mg/kg	0.05	MCERTS	0.78
Pyrene	mg/kg	0.05	MCERTS	0.73
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.41
Chrysene	mg/kg	0.05	MCERTS	0.54
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.75
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.29
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.59
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.36
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.09
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.4

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	5.37
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Analytical Report Number: 24-014221
Project / Site name: 9-10 High Street Hitchin

Lab Sample Number				171155
Sample Reference				CP1
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				10/04/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	28
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	62
Lead (aqua regia extractable)	mg/kg	1	MCERTS	410
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	4.8
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	220

Petroleum Hydrocarbons

TPH (>C8 - C10) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0
TPH (>C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	5
TPH (>C10 - C35) EH_CU_ID_TOTAL	mg/kg	10	NONE	430
TPH (>C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	120
TPH (>C16 - C21) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	230
TPH (>C21 - C35) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	76

TPH Total >C8 - C35 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	430
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TPH (C10 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	450
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 24-014221

Project / Site name: 9-10 High Street Hitchin

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
171155	CP1	None Supplied	0.3	Brown loam and sand with gravel and stones

Analytical Report Number : 24-014221
Project / Site name: 9-10 High Street Hitchin

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	In-house method	L010	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphénylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS

Analytical Report Number : 24-014221
Project / Site name: 9-10 High Street Hitchin

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

 GEA		Geotechnical & Environmental Associates www.gea-ltd.co.uk		Generic Risk-Based Soil Screening Values	
Site 9-10 High Street, Hitchin				Job Number J24068	
Client Bellborough Ltd and Petit Papillion				Sheet 1 / 2	
Engineer					
Proposed End Use Residential without plant uptake					
Soil Organic Matter content % 1.0					
Contaminant			Contaminant		
Screening Value mg/kg			Screening Value mg/kg		
Data Source			Data Source		
Metals			Hydrocarbons		
Arsenic	40	C4SL	Banded TPH (8-10)	72	Calc1
Cadmium	149	C4SL	Banded TPH (10-12)	385	Calc1
Chromium (III)	910	S4UL	Banded TPH (12-16)	2769	Calc1
Chromium (VI)	21	C4SL	Banded TPH (16-21)	2923	Calc1
Copper	7,100	S4UL	Banded TPH (21-35)	2923	Calc1
Lead	310	C4SL	Benzene	0.89	C4SL
Elemental Mercury	1.2	S4UL	Toluene	120	SGV
Inorganic Mercury	56	S4UL	Ethyl Benzene	65	SGV
Nickel	180	S4UL	Xylene	42	SGV
Selenium	595	SGV	Aliphatic C5-C6	42	S4UL
Zinc	40,000	S4UL	Aliphatic C6-C8	100	S4UL
Anions			Aliphatic C8-C10	27	S4UL
Soluble Sulphate	500 mg/l	Structures	Aliphatic C10-C12	130	S4UL
Sulphide	50	Structures	Aliphatic C12-C16	1100	S4UL
Chloride	400	Structures	Aliphatic C16-C35	65,000	S4UL
Others			Aromatic C6-C7	See Benzene	S4UL
Organic Carbon (%)	6	Methanogenic potential	Aromatic C7-C8	See Toluene	S4UL
Total Cyanide	140	WRAS	Aromatic C8-C10	47	S4UL
Total Mono Phenols	310	SGV	Aromatic C10-C12	250	S4UL
PAH			Aromatic C12-C16	1800	S4UL
Naphthalene	2.33	S4UL	Aromatic C16-C21	1900	S4UL
Acenaphthylene	2,900	S4UL	Aromatic C21-C35	1900	S4UL
Acenaphthene	3,000	S4UL	PRO (C ₅ –C ₁₀)	337	Calc2
Fluorene	2,800	S4UL	DRO (C ₁₂ –C ₂₈)	69,800	Calc2
Phenanthrene	1,300	S4UL	Lube Oil (C ₂₈ –C ₄₄)	66,900	Calc2
Anthracene	31,000	S4UL	TPH	500	Trigger to consider speciated testing
Fluoranthene	1,500	S4UL	Chlorinated Solvents		
Pyrene	3,700	S4UL	1,1,1 trichloroethane (TCA)	9	S4UL
Benzo(a)anthracene	11.0	S4UL	tetrachloroethane (PCA)	1.5	S4UL
Chrysene	30	S4UL	tetrachloroethene (PCE)	0.32	C4SL
Benzo(b)fluoranthene	3.9	S4UL	trichloroethene (TCE)	0.0097	C4SL
Benzo(k)fluoranthene	110.0	S4UL	1,2-dichloroethane (DCA)	0.16	C4SL
Benzo(a)pyrene	4.65	C4SL	vinyl chloride (Chloroethene)	0.015	C4SL
Indeno(1 2 3 cd)pyrene	45.0	S4UL	tetrachloromethane (Carbon tetra	0.026	S4UL
Dibenz(a h)anthracene	0.32	S4UL	trichloromethane (Chloroform)	1.2	S4UL
Benzo (g h i)perylene	360	S4UL			
Total PAH Screen	66.4	B(a)P / 0.15			
Notes Concentrations measured below these screening values may be considered to represent 'uncontaminated conditions' which pose a 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment. C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009 - where not superseded by C4SL S4UL - LQM/CIEH Suitable for use Level (2015) based on 'minimal' level of risk Calc1 - sum of thresholds for Ali & Aro fractions - assuming a 35% Aro:65% Ali ratio as is commonly encountered in the soil Calc2 - sum of nearest available carbon range specified including BTEX for PRO fraction Total PAH based on B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene rarely exceeds 15% of the total PAH concentration					



appendix c

Desk Study

Risk Assessment Tables

Envirocheck Extracts

Historical Maps

Preliminary UXO Risk Assessment

**Classification of Consequence**

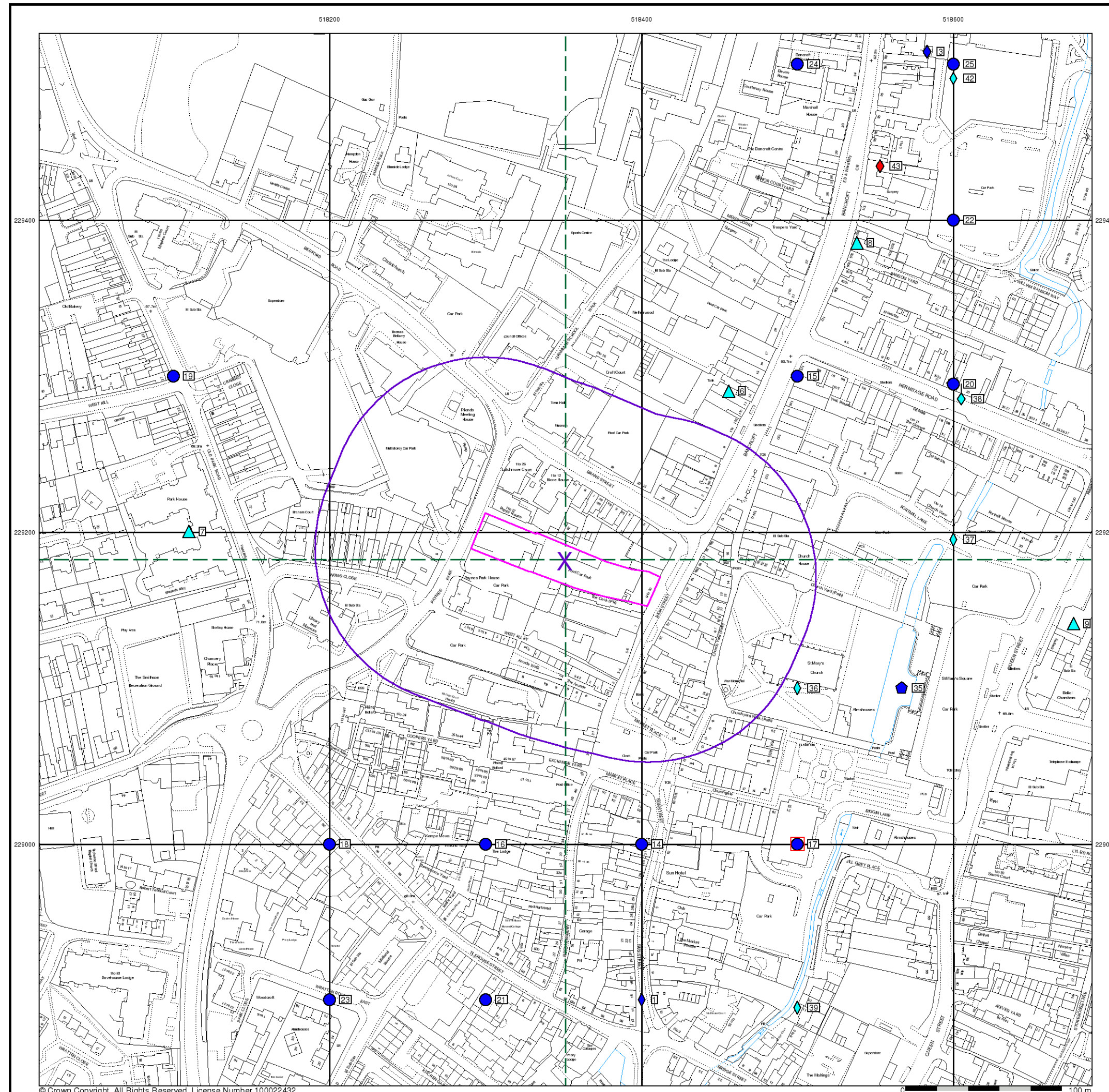
Classification	Definition	Examples
Severe (4)	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings / property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to short-term human health risk if buildings are occupied).
Medium (3)	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer Death of a species within a designated nature reserve.
Mild (2)	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular of Contaminated Land, DETR, 2000). Damage to sensitive buildings / structures / services or the environment.	Pollution of non-classified groundwater Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor (1)	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

Classification of Probability

Classification	Probability
High likelihood (4)	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely (3)	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood (2)	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely (1)	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

		Risk Assessment Matrix			
		Consequence			
		Severe	Medium	Mild	Minor
Probability	High likelihood	Very high risk (16)	High risk (12)	Moderate risk (8)	Moderate / low risk (4)
	Likely	High risk (12)	Moderate risk (9)	Moderate / low risk (6)	Low risk (3)
	Low likelihood	Moderate risk (8)	Moderate / low risk	Low risk (3)	Very low risk (2)
	Unlikely	Moderate / low risk (4)	Low risk (3)	Very low risk (2)	Very low risk (1)

	Description of the assessed risks and likely action required
Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.



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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Types at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

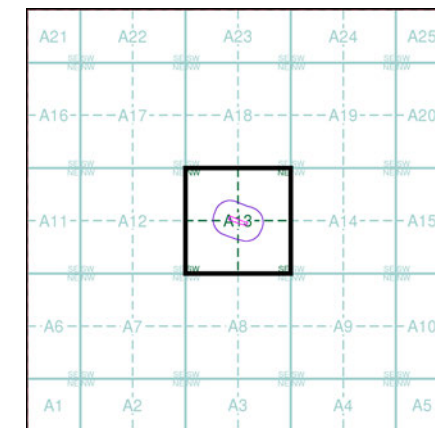
- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement
- BGS Recorded Mineral Site
- BGS Recorded Landfill Site (Location)
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Geological

Site Sensitivity Map - Segment A13



Order Details

Order Number: 305928621_1_1
Customer Ref: J22397
National Grid Reference: 518350, 229180
Slice: A
Site Area (Ha): 0.28
Plot Buffer (m): 100

Site Details

9-10 High Street, Hitchin, SG5 1EH

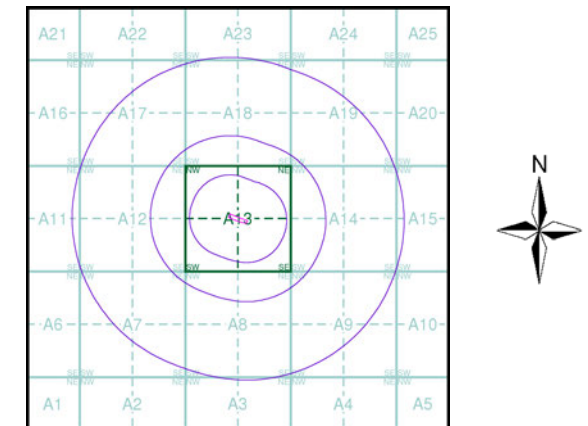
Landmark
INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



- General**
- Specified Site
 - Specified Buffer(s)
 - Bearing Reference Point
 - Map ID
 - Several of Type at Location
- Agency and Hydrological**
- Contaminated Land Register Entry or Notice (Location)
 - Contaminated Land Register Entry or Notice
 - Discharge Consent
 - Enforcement or Prohibition Notice
 - Integrated Pollution Control
 - Integrated Pollution Prevention Control
 - Local Authority Integrated Pollution Prevention and Control
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 - Registered Radioactive Substance
 - River Network or Water Feature
 - River Quality Sampling Point
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 - Water Abstraction
 - Water Industry Act Referral
- Hazardous Substances**
- COMAH Site
 - Explosive Site
 - NIHHS Site
 - Planning Hazardous Substance Consent
 - Planning Hazardous Substance Enforcement
 - BGS Recorded Mineral Site
- Waste**
- BGS Recorded Landfill Site (Location)
 - BGS Recorded Landfill Site
 - EA Historic Landfill (Buffered Point)
 - EA Historic Landfill (Polygon)
 - Integrated Pollution Control Registered Waste Site
 - Licensed Waste Management Facility (Landfill Boundary)
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 - Potentially Infilled Land (Non-water)
 - Potentially Infilled Land (Water)
 - Potentially Infilled Land (Water)
 - Potentially Infilled Land (Water)
 - Registered Landfill Site (Location)
 - Registered Landfill Site (Point Buffered to 100m)
 - Registered Landfill Site (Point Buffered to 250m)
 - Registered Waste Transfer Site (Location)
 - Registered Waste Transfer Site
 - Registered Waste Treatment or Disposal Site (Location)
 - Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Slice A



Order Details

Order Number: 305928621_1_1
Customer Ref: J22397
National Grid Reference: 518350, 229180
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details

9-10 High Street, Hitchin, SG5 1EH

Landmark
INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Industrial Land Use Map

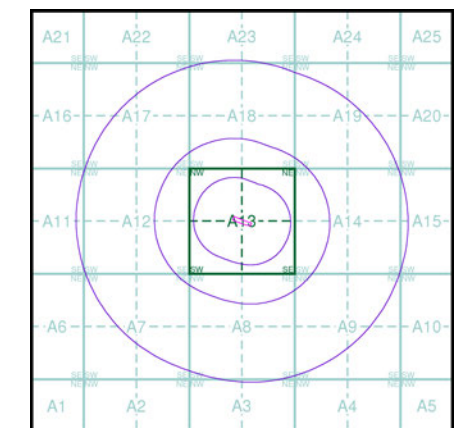
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



Order Details

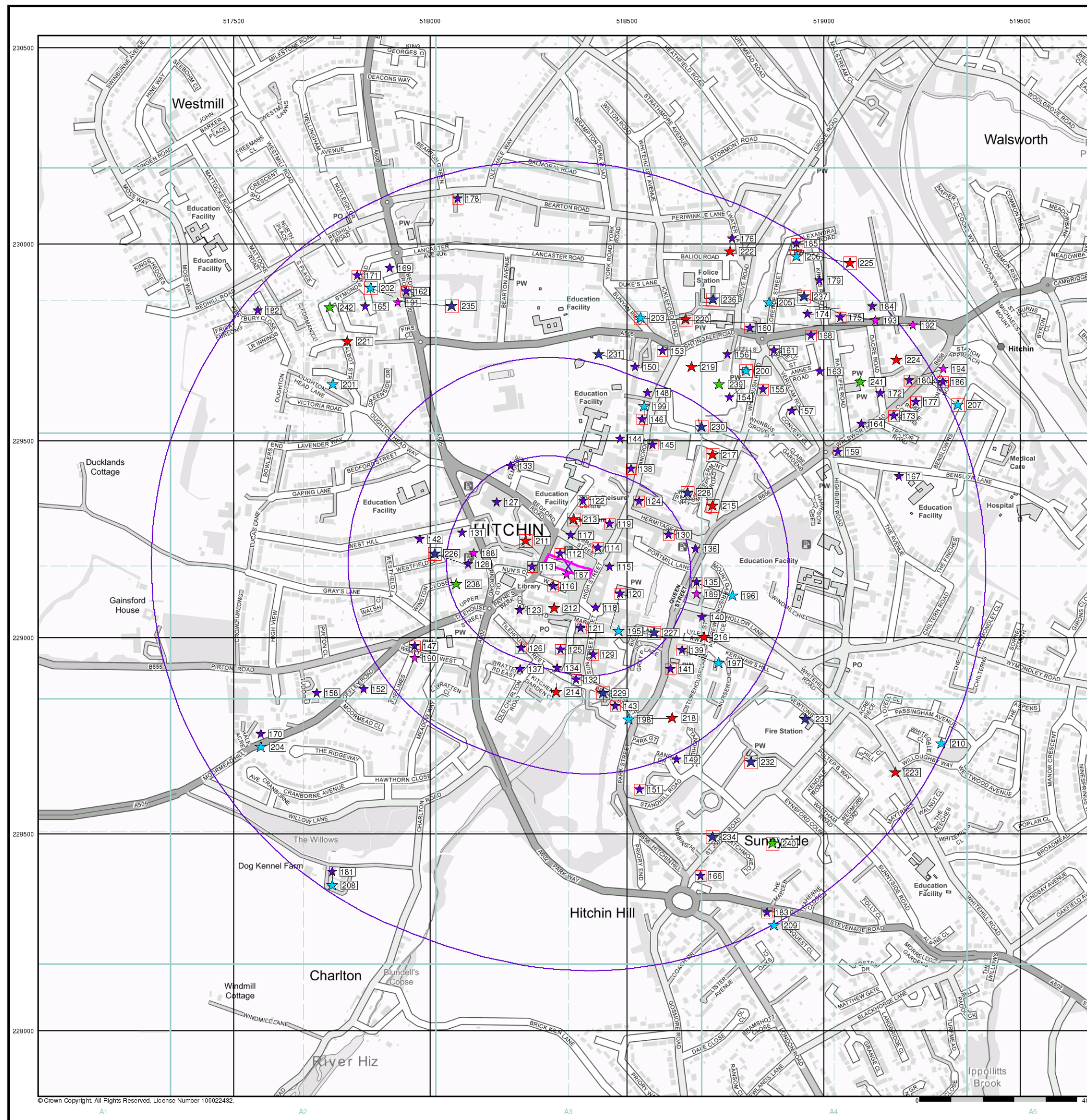
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Customer Ref: J22397
National Grid Reference: 518350, 229180
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details

9-10 High Street, Hitchin, SG5 1EH

Landmark
INFORMATION GROUP

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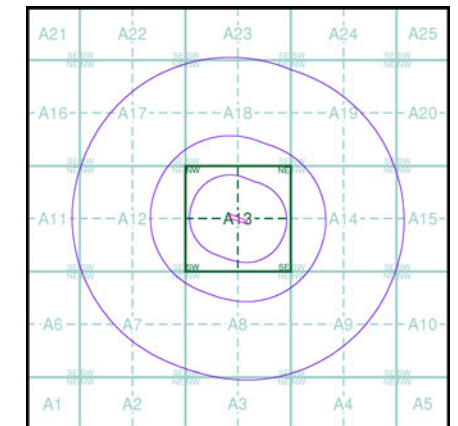
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



Order Details

Order Number: 305928621_1_1
Customer Ref: J22397
National Grid Reference: 518350, 229180
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details

9-10 High Street, Hitchin, SG5 1EH



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