LISTERS

Geotechnical Consultants

Wates Construction Limited

Ground Investigation

Abbey Road
Camden
London
NW6 4AQ

Report No: 15.07.037
February 2016

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DOCUMENT RECORD

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Project Title	Residential Redevelopment
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Client	Wates Construction Limited

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For and on behalf of Listers Geotechnical Consultants

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1	16th October 2015	Draft
2	20th October 2015	Final
2	15th February 2015	Contamination assessment review

EXECUTIVE SUMMARY

Project Reference	15.07.037
Site Location	Abbey Road, Camden, London NW6 4AQ
OS Grid Reference	525753, 183825
Development Proposals	New mixed multi storey residential led building with a basement.
Existing Buildings	None on site.
Topography	Sloping ground present alongside the majority of the north western boundary, adjacent to Belsize Road, with site levels falling some 2m towards a railway cutting.
Vegetation	None on site.
Published Geology	London Clay Formation at surface.
Site History	Terraced residential properties from at least 1896 to 1955. A car park is shown on maps from 1972 onwards. We understand that a former car repair garage occupied the ground floor level in the western part of the site.
Hydrology	No surface water features in the vicinity.
Hydrogeology	Non-productive strata. No potable groundwater and surface water abstractions within a 1km radius.
Ground Conditions Encountered	Made Ground down to between 1m and 2m with localised deep Made Ground in the south western part of the site to 3.45m.
Groundwater Encountered	A perched water inflow was recorded at the interface of the Made Ground and natural soils at one location and a discrete inflow in the London Clay Formation at a second location. The remaining excavations were dry.
Ground Contamination	Isolated elevated lead recorded in the cohesive near surface Made Ground soils as part of this investigation and marginally elevated benzo(b)fluoranthene during previous investigations at the site.
Groundwater Contamination	Low risk to groundwater.
Site Remediation Required	None required based on the results and development proposals.
Waste Soil Classification	In our opinion the cohesive Made Ground and London Clay Formation soils at the site are classified as inert waste. We recommend however that the results of testing relevant to the materials being disposed of should be provided to the landfill operators or waste management contractors to confirm whether it meets their license agreements and to confirm tipping costs
Working Platforms for Tracked Plant	Plate bearing tests provided modulus of sub grade reaction results of between 17MN/m^2/m to 64MN/m^2/m
Recommended Further Work	Supplementary plate bearing tests are recommended should tracked plant be proposed at basement formation depth. Additional testing and revised contamination assessment, should soils be at variance with this investigation during redevelopment.

This executive summary should be read in conjunction with the main report.

CONTENTS

APPENDICES

APPENDIX A - PLANS AND PHOTOGRAPHS

- Site Location Plan
- Exploratory Hole Location Plan – Showing Development Proposals
- Development Proposals and Section Drawings
- Site Photographs

APPENDIX B – FIELDWORK AND TESTING

- Continuous Tube Sampler Logs
- Super Heavy Dynamic Probe Results
- Insitu Plate Bearing Records

APPENDIX C- LABORATORY TESTING RESULTS AND HAZARDOUS WASTE ASSESSMENT WORKSHEET

- Chemical Analysis Testing Results
- ESI Statistical Analysis
- HazWasteOnline Summary
- WAC Testing Results

GROUND INVESTIGATION REPORT

INTRODUCTION

A ground investigation has been undertaken for proposed residential led redevelopment on land adjoining Abbey Road and Belsize Road, Camden, London NW6 4AQ. A Site Location Plan is provided in Appendix A.

The Ordnance Survey National Grid reference for the centre of the site is 525753, 183825.

This report describes the intrusive site investigation activities carried out by Listers Geotechnical Consultants in order to provide an evaluation of the ground conditions and the extent of any soil contamination present on the site. The report presents initial human health and groundwater risk assessments based on the findings of previous desk study information undertaken by others and subsequent contamination laboratory testing. The soil and groundwater contamination risk assessment has been carried out using the source-pathway-receptor risk assessment methodology.

Instructions to undertake the investigation were received from Wates Construction Limited, in their purchase order number 206191/00053432/0, dated 24th July 2015.

This report supplements previous ground investigation reports for the wider redevelopment area as detailed below

- Ground Investigation Report - Soil Engineering Geoservices Limited, Project No TB6349, dated 29/10/2012, instructed by Atkins Limited acting on behalf of London Borough of Camden.
- Geotechnical Interpretative Report Rev2– Atkins Limited, Job No 5109119, dated January 2013, for London Borough of Camden.
- Detailed Unexploded Ordnance (UXO) Risk Assessment – 6 Alpha Associated Limited, Project No P3263, dated April 2013, for London Borough of Camden

We understand our client has the benefit of the previous reports and we have relied on information within these reports to aid our recommendations.

This current report should be read in conjunction with the previous reports for full details of the investigations undertaken at the site.

This report has been prepared for the sole use of the client and their professional advisors. This report shall not be relied upon by third parties without the express written authority of Listers Geotechnical Consultants. If an unauthorised third party comes into possession of this report they must not rely on it and the authors owe them no duty of care and skill.

SCOPE OF THE INVESTIGATION

The scope of the investigation was to undertake a walkover survey, and undertake intrusive investigations to provide an assessment of extent of any soil contamination on the site and classify the soils for waste disposal. A contaminated land risk assessment was undertaken based on the Contaminated Land Exposure Assessment (CLEA) and Environment Agency RTM guidelines.

The investigation also includes insitu plate bearing tests to provide parameters to aid working platform design for piling operations at the site.

PROPOSALS

It is proposed to redevelop the site to accommodate a new multi storey, residential led, building with a basement and limited landscaped and garden areas. The contaminated land risk assessment has been prepared in support of the planning application for the development.

SITE INFORMATION AND WALKOVER SURVEY

A walkover survey of the site and its immediate surrounds was undertaken on the 2nd September 2015. A selection of site photographs is presented in Appendix A along with the site plans.

The site lies in a residential and commercial area, and is currently open land surfaced with crushed concrete along with a large 5-6m high stockpile of crushed concrete in the south western part of the site. We understand the site was formerly occupied by a six storey mixed use car park and commercial properties prior to its demolition as part of the redevelopment works.

The site is bound by a railway cutting which forms the south eastern boundary to the site and Abbey Road, which continues over the railway to the north east of the site. Belsize Road forms the north western boundary and houses fronting Belsize Road form the south western boundary to the site.

The general area falls from the north east to the south west. Within the site itself, sloping ground was present alongside the majority of the north western boundary adjacent to Belsize Road with site levels falling some 2m towards the railway cutting.

GEOLOGY

Published Geology

Reference to the British Geological Survey 1:50,000 scale map and other published geological information on the area indicate that the site is underlain by London Clay Formation of Eocene age. This Formation is generally represented by blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand occurring up to 60m in thickness in this area.

PREVIOUS WORK

An investigation was previously undertaken by Atkins, job number 5109119, dated January 2013. The report provides references to a previous Geo-Environmental Report undertaken by WSP in January 2012, which was not available for review. The salient points relevant to this report are presented in the text of the main Atkins report and are included below, but the full reports should be referred to for more detail.

Desk study research established that the site comprised terraced residential properties from at least 1896 to 1955. The car park is shown on maps from 1972 onwards. From discussions with Wates Construction Limited we understand that a former car repair garage occupied the ground floor level in the western part of the site.

The classification of the site can be designated as a 'green' environment, indicating low sensitivity of site setting for:

- The underlying non-productive strata
- The absence of on site surface water features in the vicinity of the site
- The absence of potable groundwater and surface water abstractions within a 1km radius
- The absence of a Ground Water Protection Zone
- The absence of ecological sensitive nature of the surrounding area and
- The residential land use on site and the surrounding area

Intrusive investigations were undertaken and reported within the Soil Engineering Geoservices Limited report on behalf of Atkins Limited. The investigation was undertaken across the wider redevelopment area with two boreholes located within the area of this redevelopment site (BHB and BHC to the north east and south west within the site respectively). The investigation was undertaken prior to demolition of the car park and the boreholes recorded Made Ground extending to 2.5m depth overlying weathered London Clay Formation soils. The Made Ground at BHB location recorded firm brown and dark grey sandy gravelly clay with gravel consisting of flint, brick and concrete along with rare ash, concrete boulders and whole bricks along with organic material below 2.0m. At BHC greyish brown silty sand and gravel sized fragments of brick, concrete and flint with rare roots was recorded to 0.5m depth which in turn was underlain by dark greenish brown slightly sandy slightly gravelly clay with low cobble content and the gravel fraction comprising brick, flint and concrete, rare ash rusty metal and pottery. Both boreholes remained dry during boring.

Laboratory analysis was undertaken across the whole redevelopment site however a contamination assessment was not undertaken.

We understand from Wates Construction Limited that as part of the subsequent demolition works, contaminated smelling soils were encountered in the western part of the site associated with a car repair garage in this area. We understand the soils, which presented olfactory evidence of contamination, were excavated out and the resultant void infilled with site won crushed demolition materials. No independent validation testing or reporting for this area was available for review.

UNEXPLODED ORDNANCE AND BOMB SITES

A Detailed Unexploded Ordnance (UXO) Risk Assessment, has been undertaken at the site by 6 Alpha Associates Limited (Project No P3263 dated April 2013). The report identifies that the site medium to high risk area of encountering UXO.

As a result a UXO risk management plan and safety awareness briefing was conducted prior to any works and specialist UXO supervisor attendance provided during our investigations on site.

From a contamination point there are three main concerns arising from UXBs and exploded bombsites. These are:

- Heavy metals such as Copper and Zinc contamination derived from the bomb's casing.
- Organic aromatics such as Toluene, Nitrosamines and daughter products contamination derived from the degradation of the explosive charge.

- Heavy metal such as Lead or Mercury contamination derived from the degradation of the detonator charge.

CONCEPTUAL SITE MODEL

A preliminary qualitative risk assessment has been carried out using the source-pathway-receptor principle to create a conceptual model for the site.

As such, potential sources of contamination and potential receptors have been assessed using the Contaminated Land Exposure Assessment (CLEA) Guidelines. The fact that a pathway must exist between a potential source of contamination and a potential receptor for there to be a risk, has been taken into account.

The results of the desk study and walkover indicate that the following potential sources of ground contamination are present at or in close proximity to the site:

- Made Ground is present at the site associated with historical development including possible in-filled cellars from former terraced houses and disturbance/ in-filling as a result of the more recent demolition works.
- Car repair garage in the west of the site.
- Possible localised oil spillages from domestic cars.
- Possible residual contaminants from WWII bombings and in-filled bomb craters.

The following most sensitive receptors have been identified at the site:

Human Health

- End users of the site (residents and workers).
- Surrounding residents.
- Construction workers.

Environmental

- The risk to environmental receptors is considered to be low based on the environmental setting of the site.

EXPLORATION AND TESTING

GENERAL

A total of ten exploratory holes were formed at the site, inclusive of six continuous tube sample boreholes and four dynamic probe holes, undertaken on the 2nd and 3rd September 2015.

In addition, four insitu plate bearing tests were undertaken to provide parameters to aid working platform design for piling plant. The logs are provided in Appendix B.

SAMPLING STRATEGY

The positions of the exploratory holes were selected by Listers Geotechnical Consultants in conjunction with Wates Construction Limited to provide a wide coverage of information on the site area. Excavations were not possible within the central and south western part of the site due to a large stockpile of crushed concrete at this location or where suspected services were present on the site. Site levels generally fell towards the railway embankment in the south east with a slope along much of the north western boundary fronting Belsize Road. Excavations were undertaken at the lower site level beyond the slope fronting Belsize Road.

As the desk study had identified a former car repair garage in the western part of the site, borehole WSA was located in this area. The remaining boreholes were non-targeted and positioned to create a spread of information across the site.

The position of all exploratory holes undertaken at the site as part of this investigation can be seen on the Exploratory Hole Location Plans in Appendix A. The results of the laboratory testing are provided in Appendix C.

METHODOLOGY

The continuous tube sample boreholes, WSA to WSF, were put down using a Competitor 130 rig to a maximum depth of 9.6m. Boreholes were advanced using a plastic lined steel tube sampling system, driven into the ground by a top drive percussive hammer. A near continuous 87mm – 67mm diameter core sample was recovered of the sampled materials for future examination and sub-sampling. Following the sampling, Super Heavy dynamic probing, SHDA, SHDPB, SHDPF and SHDPE, were carried out adjacent to boreholes WSA, WSB, WSF and WSE respectively to give an indication of the relative density of the soils encountered.

The plate bearing tests PB1 to PB4 were undertaken immediately below the initial surface crust of demolition materials (crushed concrete) with the exception of PB1 where more extensive crushed concrete was present and hence the test was performed on the demolition materials at this location. 300mm diameter plate tests were undertaken using a JCB 3CX excavator as kentledge.

Geoenvironmental conclusions given in this report are based on data obtained from these sources but it should be noted that variations, which affect these conclusions, may occur between and beyond the test locations. Also water levels may vary with time.

GROUND CONDITIONS

The site and laboratory test work revealed that the general succession of strata can be represented by Made Ground overlying London Clay Formation. It may be summarised as follows:

Made Ground - encountered at each borehole location and generally extended to between 1.0m and 2.0m, with the exception of the south western part of the site where deepened Made Ground was present to 3.45m. The deeper area of Made Ground is suspected to be as a result of remedial works undertaken in this area to remove hydrocarbon impacted soils, which were subsequently infilled with site won crushed demolition materials. The Made Ground was represented in general by a surface crust of suspected crushed demolition materials, in parts up to 0.5m depth, across the majority of the site, extending to 3.0m depth in the south western party of the site at WSA location. Firm and stiff grey brown and brown silty sandy very gravelly clay was encountered beneath the demolition material which was soft at WSA location. The gravel fraction included fragments of brick, concrete, flint, rare ash and slate. The clay fill extended to the natural London Clay Formation at depth.

A single 'N' value derived from a standard penetration test in WSA at 3.0m depth provided a result of 8.

The results of the Super Heavy dynamic probing indicated that the demolition derived materials were generally very loose and loose.

London Clay Formation - encountered at each borehole location from between 1.5m and 3.45m depth and extended down to beyond the base of the boreholes, proven to a maximum depth of 9.6m. Represented in general by stiff becoming very stiff brown with occasional grey mottling closely fissured silty CLAY with occasional selenite crystals.

'N' values derived from standard penetration tests in the boreholes ranged from 10 to 37 with a general increase with depth. At WSD location an SPT N value of >50 was recorded which probably reflects a siltstone nodule within the clay soils.

The results of the Super Heavy dynamic probing a general increase in strength with depth.

GROUNDWATER

Groundwater was encountered at 3.4m at WSA and WSB locations during the fieldwork. It is suspected this is perched water at the interface of the Made Ground and natural soils at WSA and a discrete inflow from fissures within the London Clay Formation at WSB. The remaining boreholes were dry for the short period they remained open.

OBSERVED SOIL CONTAMINATION

No obvious visual or olfactory evidence of contamination was noted during the fieldwork, including WSA location where remedial works are understood to have taken place.

GROUND CONTAMINATION ASSESSMENT

SOIL TESTING

Nine samples of the Made Ground and six samples of the natural London Clay Formation soils collected on site during this investigation were tested for a range of contaminants.

The suite of testing carried out on the samples was decided upon following consultation of R&D CLR Publications, published as part of the Contaminated Land Exposure Assessment (CLEA), a joint venture between the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency.

The test suite included a range of:

- Metals and inorganic substances.
- Speciated Polyaromatic Hydrocarbons (PAH).
- Total Petroleum Hydrocarbons (TPH), with eight band split.
- Asbestos screening.

The soil samples were tested to obtain 'Total' values within the soil.

RISK ASSESSMENT GUIDELINES – HUMAN HEALTH

The human health risk assessment has been undertaken using the guidance provided in the Environment Agency's publication CLR11, Model Procedures for the Management of Contaminated Land, published in September 2004. Human health assessment criteria used are based upon the proposed final land use of the site, in this case the guidelines for 'Residential with homegrown produce' have been used as a preliminary screening tool.

Currently in the UK, no statutory limits for the presence of contaminants in soils or groundwater exist. Therefore, the results of the soil samples tested are compared to the following environmental quality standards:

Category 4 Screening Levels (C4SLs)

Published in March 2014 by DEFRA, C4SLs were primarily produced to support the revised Statutory Guidance to support Part 2A of the Environmental Protection Act 1990, which was published in April 2012. This Guidance introduced a new four-category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health, where Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is acceptably low.

With regards to using the C4SLs for planning purposes the DEFRA letter of 3rd September 2014 from Lord de Mauley established that they are also meant for use in planning situations, as does the DCLGs 'Planning Portal' document 2014.

Suitable 4 Use Levels (S4ULs)

As well as limited number of C4SLs (and where C4SLs are not available), the set of S4ULs produced by Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) in 2015 using the CLEA software, are used as a screening tool.

The CLEA software 1.06 version was released in October 2009 and is a deterministic exposure model with altered exposure data to the original model. The model allows the creation of a generic assessment criteria database with which to screen laboratory testing results. These generic assessment criteria are conservative and based upon common assumptions.

RISK ASSESSMENT GUIDELINES – GROUNDWATER

The procedures set out in Environment Agency's Remedial Targets Methodology *Hydrogeological risk assessment for contaminated land* (2006), have been followed.

As the site is located remote from any sensitive groundwater receptors, the risk to such receptors is considered to be very low.

RESULTS OF TOTAL SOIL TESTS

Soil Engineering Geoservices Limited Results

The results of laboratory testing presented in the Soil Engineering Geoservices Limited report does not identify elevated contaminants within the specific area of the subject site, with the exception of one elevated lead result from borehole BHC at a depth of 1m and a marginally elevated benzo(b)fluoranthene result at 0.5m depth. At this location, a lead result of 1100mg/kg is recorded, which is above the C4SL of 200mg/kg for lead and a benzo(b)fluotranthene result of 3.4mg/kg which marginally exceeds the S4UL of 3.3mg/kg (based on a soil organic matter of 2.5%). The elevated results corresponds to Made Ground soils, comprising clay with subordinate fragments of brick, flint, concrete, rare ash and rusty metal.

Listers Geotechnics Limited Results

Screening for the presence of asbestos as part of this investigation did not revealed asbestos containing materials in any of the samples analysed.

Of all the contaminants tested as part of this investigation again, only lead recorded concentrations higher than their relevant environmental standard value for human health for a residential setting.

Statistical analyses using the methodology set out in the CL:AIRE Document "Guidance on Comparing Soil Contamination Data with a Critical Concentration", has been undertaken on the laboratory test results from this investigation in order to establish a 'true mean concentration (μ)' within the planning scenario for each determinant over the whole site area.

This is to establish whether the data is normally distributed as well as taking into account possible erroneously high values and determine whether contamination 'outliers' features are present on the site. Once this has been established the 'upper confidence limit of 95% on μ' is subsequently compared with the relevant environmental standard value, or 'Critical Concentration (C_c)'.

The results of the analysis for lead are described below and the test data is presented in Appendix C of this report.

Lead

Of the fifteen samples tested as part of our investigations, the values obtained ranged from 17mg/kg to 460mg/kg. Two results exceed the C4SL of 200mg/kg for lead and the highest result is also considered to be an outlier.

The elevated results corresponds to a sample at 0.4m depth from borehole WSD, and at 0.45m depth from borehole WSC, which comprised stiff clay with subordinate fragments of concrete, brick and flint.

In view of the variability of the Made Ground soils, the results are considered to reflect the range of concentrations present and zoning of the outlier is considered unrealistic. Hence including this value, the statistical analysis has revealed critical concentration values of 348mg/kg, which is above C4SL value of 200mg/kg for this contaminant.

HUMAN HEALTH RISK ASSESSMENT

The following qualitative risk assessment has been carried out using the source-pathway-receptor principle. As such, potential sources of contamination have been assessed using the CLEA Guidelines. The fact that a pathway must exist between a potential source and potential receptor for there to be a risk, has been taken into account. The potential human receptors evaluated for their individual risk are:

- End users of the site (residents and workers).
- Surrounding residents.
- Construction workers.

GENERAL

It is understood the proposals are for a new building with a basement, which will occupy the majority of the site along with limited landscaped and garden areas. It is understood from Wates Construction Limited that in order to facilitate piling operations at the site, the soils will be removed and disposed from across the whole site area down to the proposed basement formation level. The development proposal section drawings indicate the basement will be at a level of between 33.19mAOD and 32.89mAOD. Based on existing ground levels (provided on survey drawings MAL_WAT_1007_TOPO01 and TOPO02) it is estimated that this will require an excavation in the order of around 2m to 3m below existing site levels (excluding the area of the crushed concrete mound).

With the exception of the south western part of the site (at borehole WSA location), this is likely to remove the majority of Made Ground soils at the site encountered as part of this and the previous investigation. Laboratory testing indicates the remaining natural soils and crushed demolition materials at WSA location, are unlikely to pose a significant risk to identified receptors.

We understand that new imported soil is proposed from the basement level to circa 35.27mAOD in landscaped and garden areas. This is likely to require a significant thickness of imported materials (circa 2m). We recommend test certificates are provided for the imported material to demonstrate that it poses a low risk to identified receptors.

Following the significant removal of the Made Ground soils, the introduction of clean imported material and construction of the new building, which will almost entirely occupy the site, it is considered the risk to human end users will be very low.

We understand the demolition contractors identified hydrocarbon contaminated soils in the west of the site associated with a former car repair garage. We understand this was excavated out and the resultant void backfilled with crushed demolition materials sourced on site. No evidence of hydrocarbon impacted soils was encountered at our borehole located in this area. During excavation of the basement significantly more of the soils will be exposed. Hence should any soils provide visual or olfactory evidence of suspected contamination, then we recommend further investigations are undertaken and this risk assessment updated accordingly. This would be particularly pertinent if any vapours are identified within the soils, as these could permeate into buildings if they are not removed or without suitable precautionary design measures in the building.

The above conclusion should be agreed with the relevant regulator prior to construction to avoid any possible delays.

END USERS OF THE SITE

Based on the development proposals and the results of this investigation the risk to end users at the site is considered to be low.

It is therefore considered that remedial measures are not required at the site. As detailed above should any suspected contaminated soils not encountered as part of our works be encountered then these should be investigated and our risk assessment updated accordingly.

SURROUNDING RESIDENTS

The guideline values listed above have been calculated with the most sensitive receptor in mind, the end users of the site. Therefore, the conclusions made for the end users are also relevant to the slightly less sensitive surrounding population.

CONSTRUCTION WORKERS

The exposure route of primary concern for the contamination is ‘direct soil ingestion’. For the construction workers there is a direct link to the soil when they undertake the site work and therefore different measures should be taken to manage the short-term exposure risk of coming into contact with contaminated soil.

To reduce the risk to as low as reasonably practicable for the construction workers it is recommended that appropriate health and safety measures be implemented along with the use of Personal Protective Equipment (PPE). All personnel coming into contact with the soil, ground workers in particular, should be instructed to use gloves when on site to avoid dermal contact and restrict inadvertent hand-to-mouth ingestion. Washing facilities should be provided for the site staff to use, and should be used prior to eating or smoking. Reference should be made to the HSE Document, "Protection of Workers and the General Public during Development of Contaminated Land".

Imported Soil/Topsoil Specification

Any new soil imported to the site should have been tested for a range of chemicals or determinants by the supplier to demonstrate that it is suitable for use and poses a low risk to human health. The TPH analysis should ideally have a breakdown of the carbon banding ranges.

UNDERGROUND SERVICES

It should be noted that the utility companies often have their own local guidelines and standards on levels of shallow soil contamination in the ground that may or may not be acceptable for the installation of below ground services. These standards may be different to those specified for assessing risks to human health and groundwater.

The local requirements should be obtained from the particular service supply company as soon as possible to avoid unexpected delays or additional development costs.

Guidance can be sought from the UK Water Industry Research (UKWIR), 'Guidance for the selection of water supply pipes to be used in brownfield sites', reference 10/WM/03/21 and 'Pipe materials selection and specification for use in contaminated land', referenced 04/WM/03/0. These documents propose that the assessment of the hazard to potable water supply pipes should be based on the following pathways: contact with migrating groundwater, permeation of vapour, and direct contact with soil.

Approval should be sought for the type of pipes proposed before they are installed.

GROUNDWATER RISK ASSESSMENT

The following risk assessment has, again, been carried out using the source-pathway-receptor principle. The procedures set out in the Environment Agency's Remedial Targets Methodology *Hydrogeological risk assessment for contaminated land* (2006), have been followed.

GENERAL

Based on the sites environmental setting and the development proposals, the risk to controlled waters is considered to be very low and remedial measures are not considered necessary.

The Environment Agency (EA) is the regulatory body charged with protection of controlled waters. Based upon the sites low sensitivity it is considered that the EA may not be consulted by the planning authority. However we recommend that the conclusions of this report are agreed with the relevant Local Authority at the earliest stage, to reduce potential delays to the development.

CLASSIFICATION OF WASTE MATERIAL

The excavations on site from the basement and foundation excavations and services trenches will produce a considerable amount of surplus soil. Under current waste management legislation if this soil is surplus to requirements it will be classified as waste and needs disposing of at a licensed facility. However, some of the soil may be able to be re-used on-site or off-site.

If surplus soil is to be taken off-site as waste and disposed of, the implementation of the Landfill Directive means that the waste soil requires classification in accordance with the European Waste Catalogue prior to leaving site.

European Waste Catalogue Determination

Using the 'Total' soil contamination test results from this investigation in conjunction with the HazWasteOnline spreadsheets, all of the soil has been classified as **non-hazardous** waste.

A summary of the results of the assessment is provided in Appendix C. The full details of the assessment are available upon request.

Waste Acceptance Criteria (WAC) Testing Results

To further classify the waste soil for landfill disposal, Waste Acceptance Criteria (WAC) testing has been carried out on representative samples of the cohesive Made Ground and London Clay Formation collected from site. The results show that the cohesive Made Ground soils include elevated Sulphate while the London Clay Formation includes elevated Sulphate and Total Dissolved Solids (TDS). The WAC testing undertaken by Soil Engineering Geoservices Limited also records elevated Sulphate in both the Made Ground and London Clay Formation, as well as elevated TDS in the London Clay Formation soils and Fluoride in the cohesive Made Ground. However, the Sulphate results within the cohesive Made Ground soil pass the inert waste criteria, when taking into account the alternative value allowed for SO_4 of 6000mg/kg for an initial eluate of ≤1500mg/l.

The laboratory testing results are presented in Appendix C.

Waste Classification

From the results of the HazWasteOnline spreadsheets and the WAC testing, the waste soil on this site is classified as non-hazardous. Elevated Sulphate and TDS was encountered as part of our investigations as well as elevated Fluoride in the previous results presented in the Soil Engineering Geoservices Limited report. It is considered however that the elevated results are likely to correspond to naturally occurring concentrations present within the London Clay Formation soils and cohesive Made Ground deposits derived from the London Clay Formation.

It should be noted that in May/June 2012 HMR&C issued Briefs 15/12 and 18/12 clarifying how construction spoil and excess soils will be assessed for landfill tax purposes. Detailed accurate descriptions of waste are required for all wastes to support the landfill tax assessment. Uncontaminated naturally occurring soils will remain inert by default and eligible for the lower rate of landfill tax. Similarly 'reworked soils' and demolition 'stone' comprising ONLY materials listed in the Schedule of the Landfill Tax (Qualifying Material) Order 2011 (SI 2011/1017) will also be eligible for the lower rate of landfill tax.

With regard to the European Waste Catalogue Code 17 05 04 'Stone and soils from uncontaminated sites' should be classified as inert. In our opinion the natural London Clay Formation soils and the cohesive Made Ground derived from London Clay Formation deposits from this site may therefore be classified as **inert** waste. We recommend however that the analytical results relevant to the materials being disposed of should be provided to the landfill operators or waste management contractors to confirm whether it meets their license agreements and to confirm tipping costs.

It should be appreciated that Made Ground containing soil and foreign objects such as timber, plastic, rubber, metal, paper, plasterboard, asbestos, etc., regardless of the results of chemical analysis for waste classification purposes, will be eligible for the standard (higher) rate of landfill tax. Therefore, to maximise eligibility for lower rate landfill tax on waste construction spoil/ reworked ground, careful waste segregation and controls are necessary. All material intended for off-site disposal should be transported and disposed in accordance with the Environmental Protection (Duty of Care) Regulations, 1991 and the Landfill (England and Wales) Regulations, 2002 (as amended). Waste legislation stipulates that hazardous and not hazardous waste should be pre-treated prior to disposal.

Uncontaminated soil and stones, including naturally occurring sands and clays, may be accepted in an inert landfill without testing, provided that it is not topsoil or peat and excludes soil from contaminated sites. Inert waste should not undergo change, will not burn, react, biodegrade or adversely affect human health or the environment. It should not contain metals or plastics.

The Landfill Regulations dictate that all waste must be treated before going to landfill. This treatment should fulfil all of the following three criteria:

- Physical, thermal, chemical or biological process including sorting.
- Change the characteristics of the waste.
- Reduce the volume, reduce the hazardous nature, facilitate its handling or enhance its recovery.

The most basic method of pre-treatment is sorting of the waste and re-cycling any possible materials, many waste disposals companies will have on-site recycling facilities that will be able to undertake this process at the landfill site. However, if treatment would not reduce its quantity or the hazards it poses to human health or the environment, then all three steps may not be necessary. The exception is inert waste for which treatment is not technically feasible.

The Environment Agency expect all landfill operators to obtain written evidence that the waste they accept has been pre-treated. We recommend that a signed certificate should be obtained describing the treatment to give to the receiving landfill. Further testing may be required after the treatment before the soil is accepted by the relevant landfill.

WORKING PLATFORMS FOR TRACKED PLANT

We understand the proposed re-development comprises the construction a multi storey building with a basement occupying the majority of the site. Plans showing the development proposals are appended. We understand a piled foundation solution is proposed as part of the redevelopment.

If construction on the site requires the use of heavy tracked plant then reference will need to be made to the most recent guide for the design of 'Working Platforms for Tracked Plant', 2004, produced by the BRE.

Use of such plant will require construction of either a working platform or an adequate running surface if the subgrade is determined as being already adequate to support the anticipated plant loadings.

The subgrade down to around 2m depth below the existing site level should be considered as essentially a cohesive soil with localised granular demolition backfill towards the south western part of the site.

Insitu plate bearing tests PB1 to PB4 have been undertaken on both the shallow cohesive and granular Made Ground. The results are tabulated below and are also provided in Appendix B to aif platform design.

Test Location	Soil Type	Modulus of Subgrade Reaction $MN/m^2/m$	Equivalent CBR %
PB1	Granular demolition backfill	64	13
PB2	Made Ground clay	43	6.5
PB3	Made Ground clay	47	7.5
PB4	Made Ground clay	17	1.4

It should be noted that the tests were undertaken on the near surface soils, which we understand will be excavated out down to basement formation depth. Should tracked plant be positioned at the reduced level then such soils at depth may provide significantly different values. In addition, soft spots (such as at WSA location at 3m depth) and zones of weaker soil may exist on any site, within the zone of influence of tracked plant, which may have a significant influence on the instability of tracked plant. The location of such features will not readily be determined by a general ground investigation for foundation design and more specific investigation may be required at the formation depth before the design of a working platform can be completed.

The advice of a specialist contractor should be sought to determine the most suitable size and thickness of platform required for their specific plant. This will take into account the size of the plant and anticipated loadings imposed on the working platform.

FURTHER WORK

During excavation of the basement significantly more of the soils will be exposed. Hence should any soils be at variance with this investigation and provide visual or olfactory evidence of suspected contamination, then we recommend further investigations are undertaken and this risk assessment updated accordingly.

It should be noted that the plate bearing tests were undertaken on the near surface soils, which we understand will be excavated out down to basement formation depth. Should tracked plant be positioned at the reduced level then such soils at depth may provide significantly different values and supplementary testing is recommended.

REFERENCES

1. Site Investigations, Code of Practice, BS5930:1999+A2 2010.
2. Investigation of Potentially Contaminated Sites – Code of Practice, BS10175, 2011.
3. Environment Agency, The Model Procedures for the Management of Land Contamination, CLR 11, 2004.
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7. Health and Safety Executive (HSE), Protection of Workers and the General Public during Development of Contaminated Land, HS(G) 66. HMSO London 1991.
8. Environment Agency, Remedial Target Methodology, Hydrogeological Risk Assessment for Contaminated Land, 2006.
9. Soils for Civil Engineering Purposes, BS1377, 1990.
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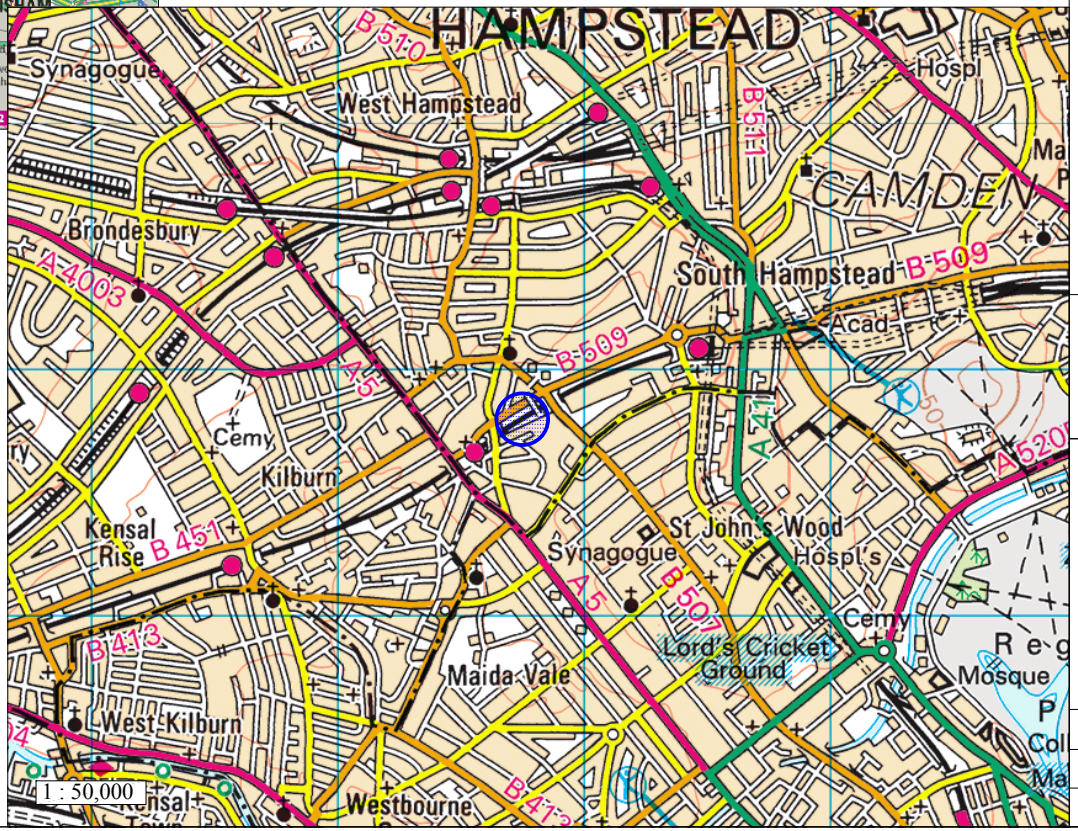
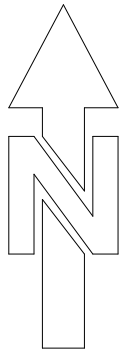
13. Environment Agency, Waste Acceptance at landfill, ea/br/e/std/v1, November 2010.
14. Environment Agency, HWR08 Version 3.1, 'How to find out if waste oil and wastes that contain oils are hazardous', June 2007.
15. UK Water Industry Research (UKWIR), 'Guidance for the Selection of Water Supply Pipes to be Used in Brownfield Sites', 10/WM/03/21.

APPENDIX 'A'

Plans and Photographs





Key:

Approximate Site Location

Listers Geotechnical Consultants

Slapton Hill Barn,
Blakesley Road,
Slapton,
Towcester,
Northants
NN12 8QD.

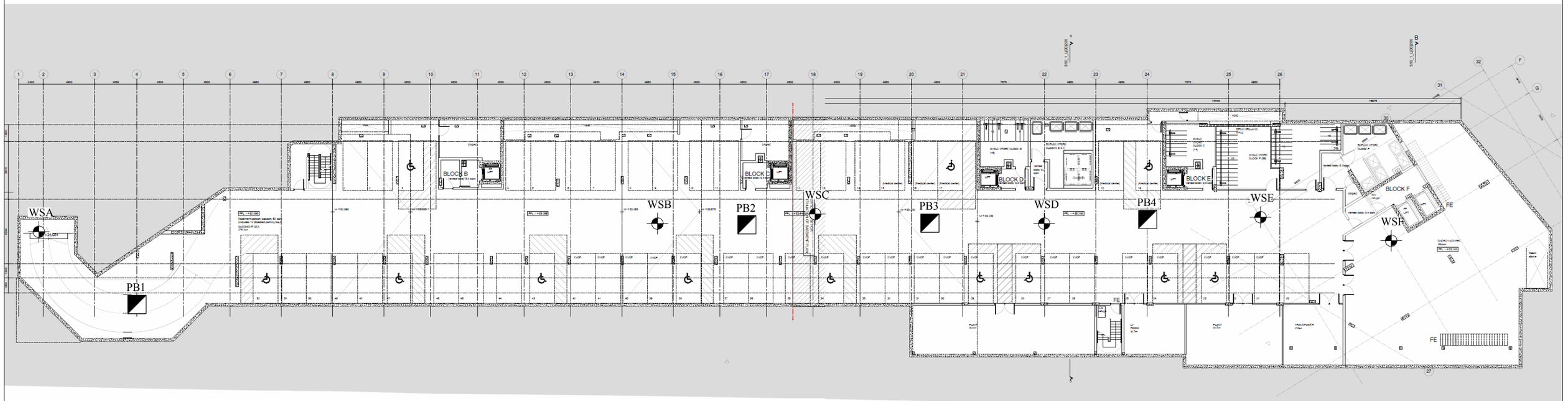
Telephone: (01327) 860060
Fax: (01327) 860430
E-mail: info@listersgeotechnics.co.uk

Site Location Plan

Site:

Scale: NTS | Job No.: 15.07.037a

Plan Showing Development Proposals & Approximate Exploratory Locations



Key: ⌖ Window Sampler Borehole ◪ Plate Bearing Test

Listers Geotechnical Consultants

Slapton Hill Barn,
Blakesley Road,
Slapton,
Towcester,
Northants
NN12 8QD.

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Fax: (01327) 860430
E-mail: info@listersgeotechnics.co.uk

Exploratory Hole Location Plan

Site: Abbey Road, Camden, London, NW6 4AQ

Scale: NTS | Job No.: 15.07.037a


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All levels are in metres above ordnance datum unless noted otherwise
This drawing must be read in conjunction with all other relevant drawings and specifications from the Architect and other consultants
If in doubt, ask
Bus Stop
BELSIZE RD.
1:20
PRIVATE PATIO
VOID
REFUSE STORE Block A
REFUSE STORE Block B
REFUSE STORE Block C
STORE
STAIRCASE
AOV
LIFT
RISER
Post
BLOCK A FFL = +35.890
BLOCK B FFL = +36.265
BLOCK C FFL = +36.640
REFER TO SK 005 FOR CONTINUATION OF SITE PLAN
lvl +34.654
Green Roof
Private Garden 86.4m²
Private Garden 82.4m²
Private Garden 99.4m²
A
B
C
D
E
F
1650
5515
6244
1340
1462

SCALE BAR

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

Millimetres 1:100

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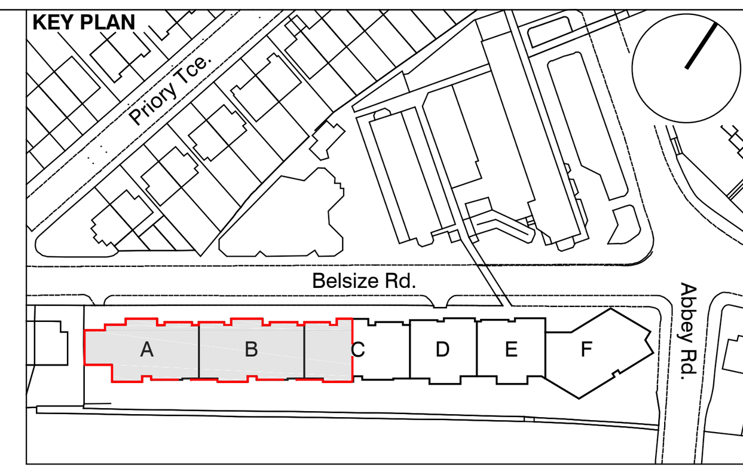
- All levels are in metres above ordnance datum unless noted otherwise
- This drawing must be read in conjunction with all other relevant drawings and specifications from the Architect and other consultants

NOTES

- All setting out to be confirmed on site prior to construction - any discrepancy must be immediately reported to the Architect.
- All existing level to be check and confirmed on-site prior to construction
- Assume crossfall to pavement of between 1.25 and 1.40 gradient. To be confirmed by Structural Engineer.

KEY PLAN



rev	date	description	drawn	audited
\	10.06.15	Continuation line position altered	JP	DPD

drawing status

SKETCH

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Pollard Thomas Edwards

project	job no.	drawn audited	scale	date
Abbey Area Phase 1 London	15-029	DPDCC	1:100@A1	June'15

drawing title	drawing number	revision
Site Plan Sheet 1	**SK 004**	**/**

\\PTEFILESERVER\PROJECTS\15-029 ABBEY AREA PHASE 1\CAD\2015-04 3-4 TENDER\02 PRINT\03 SK SKETCHES\SK 004.DWG

REFER TO SK 004 FOR CONTINUATION OF SITE PLAN

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All levels are in metres above ordnance datum unless noted otherwise

This drawing must be read in conjunction with all other relevant drawings and specifications from the Architect and other consultants

If in doubt, ask

SCALE BAR

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Millimetres 1:100

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- All dimensions are in millimetres unless noted otherwise
- All levels are in metres above ordnance datum unless noted otherwise
- This drawing must be read in conjunction with all other relevant drawings and specifications from the Architect and other consultants

NOTES

- All setting out to be confirmed on site prior to construction - any discrepancy must be immediately reported to the Architect.
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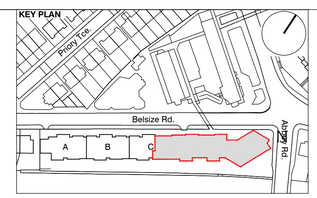
- Assume crossfall to pavement of between 1.25 and 1.40 gradient. To be confirmed by Structural Engineer.

KEY PLAN



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rev	date	description	drawn	audited
1	10.06.15	Continuation line position altered	JP	DPD

drawing status

SKETCH

project	job no.	drawn	audited	scale	date
Abbey Area Phase 1 London	15-029	DPDCC		1:100@A1	June'15

drawing title: **Site Plan Sheet 2**

drawing number: **SK 005**

revision: /

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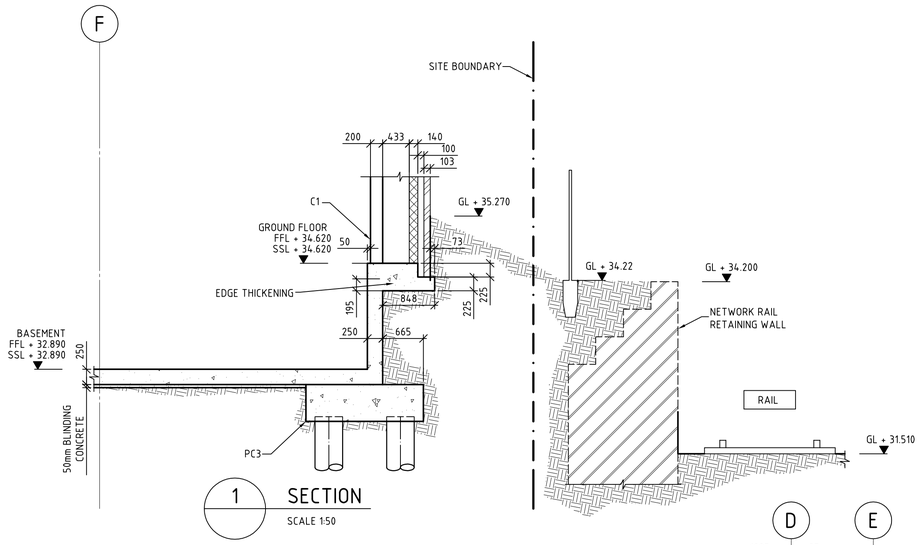

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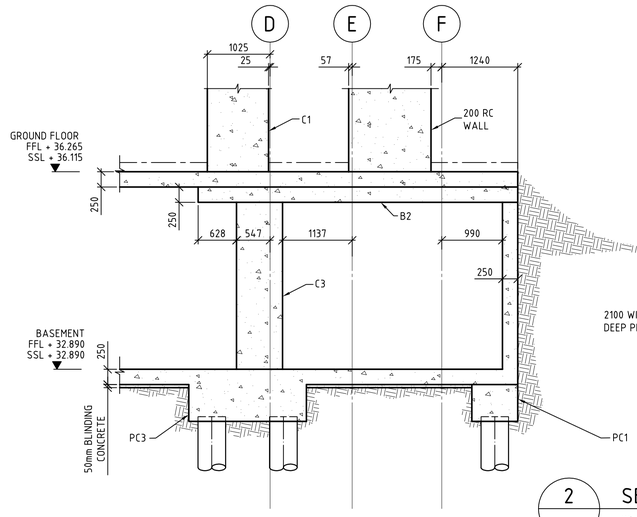

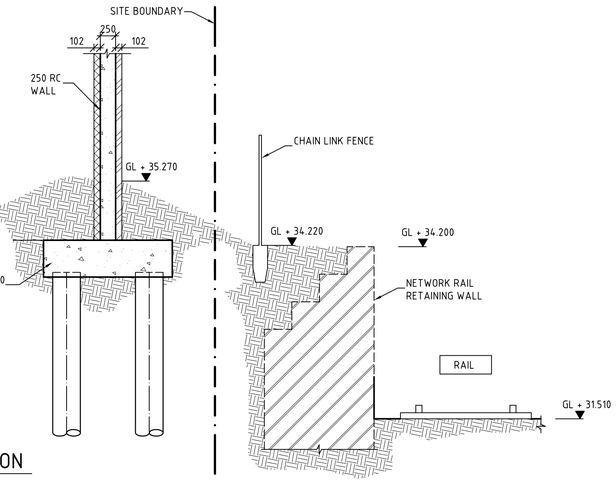

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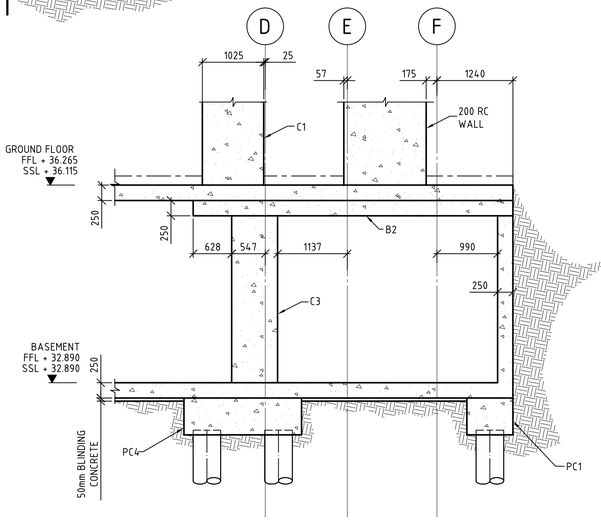

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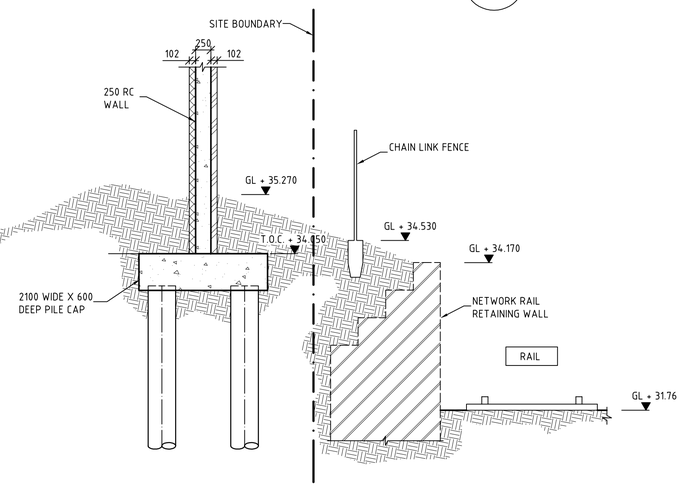

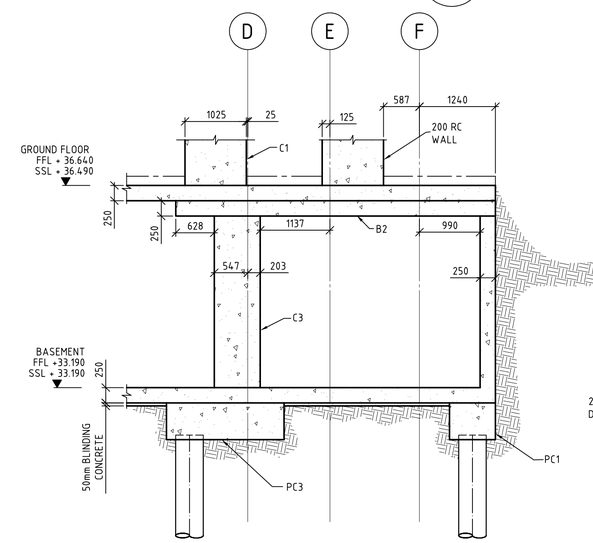

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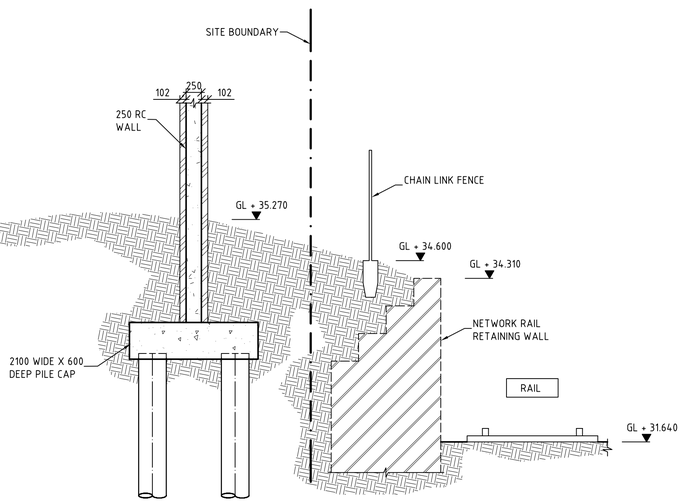

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DRG STATUS: PRELIMINARY

CLIENT: WATES LIVING SPACE

PROJECT: ABBEY AREA DEVELOPMENT
LONDON NW6

DRG TITLE: SECTIONS & DETAILS
SHEET 1

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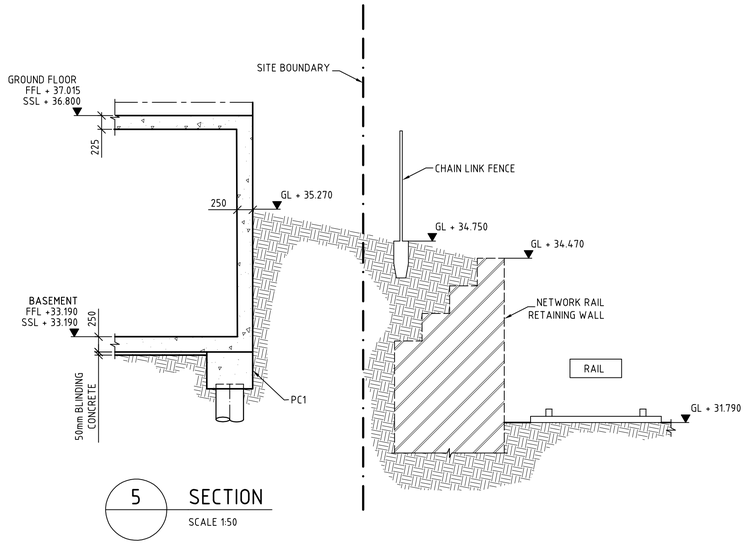

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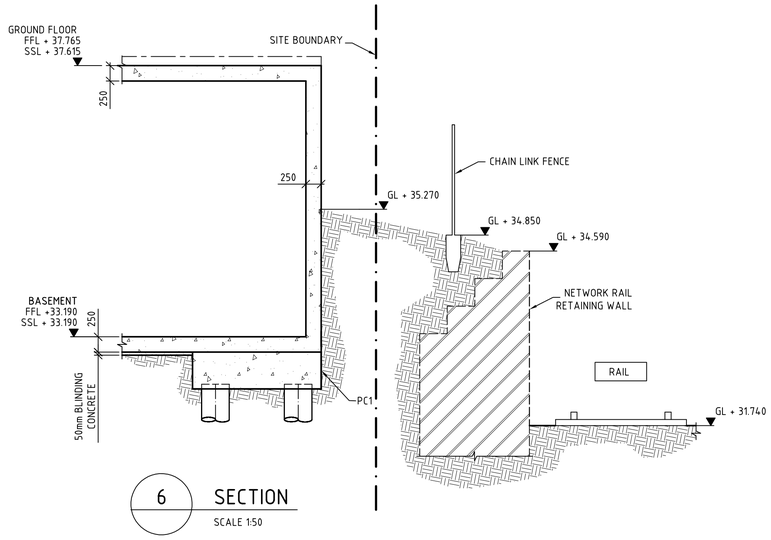

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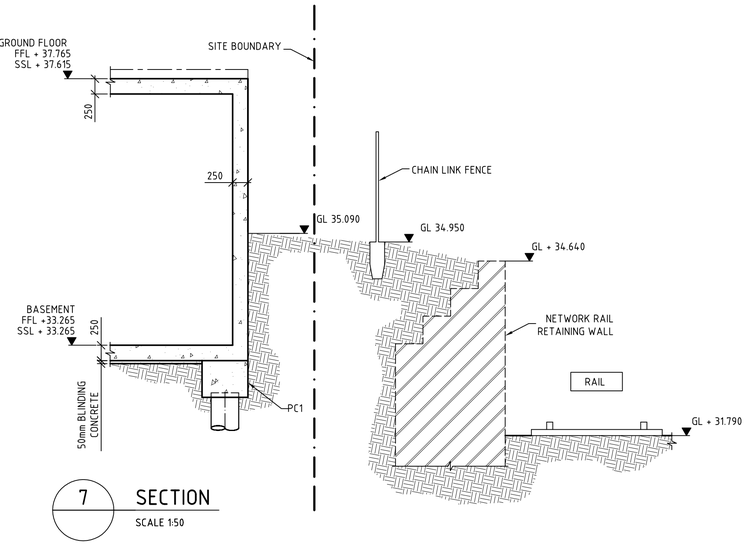

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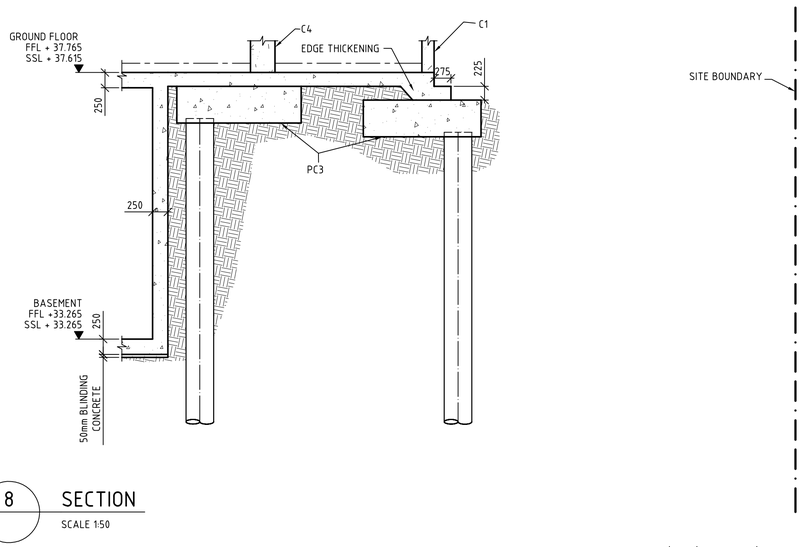

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CLIENT
WATES LIVING SPACE

PROJECT
ABBEY AREA DEVELOPMENT
LONDON NW6

DRG TITLE
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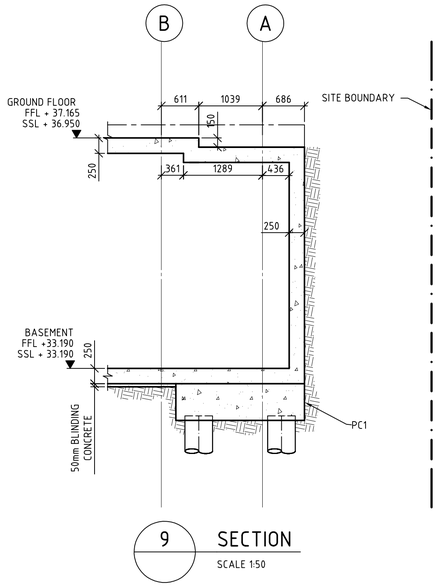

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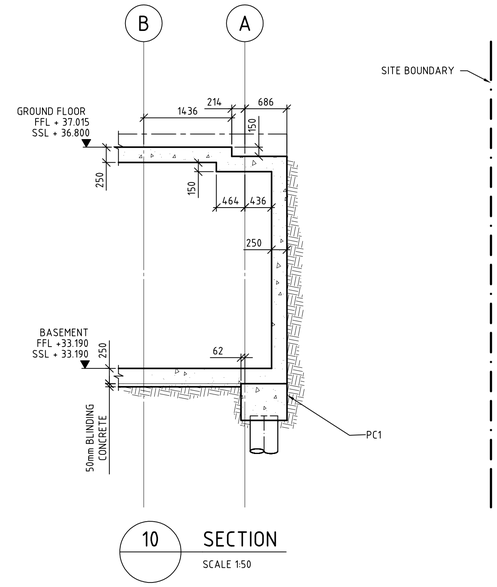

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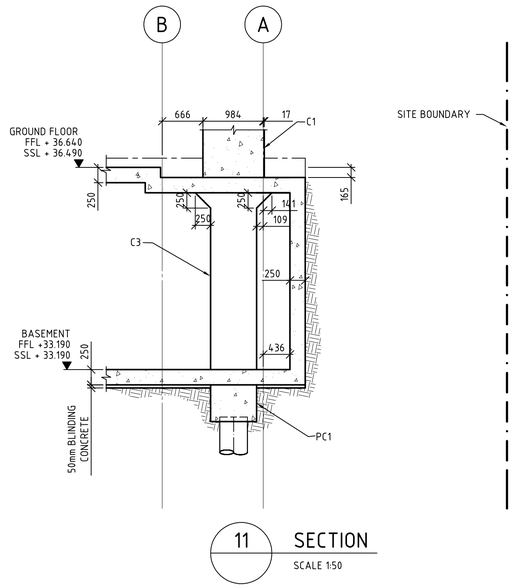

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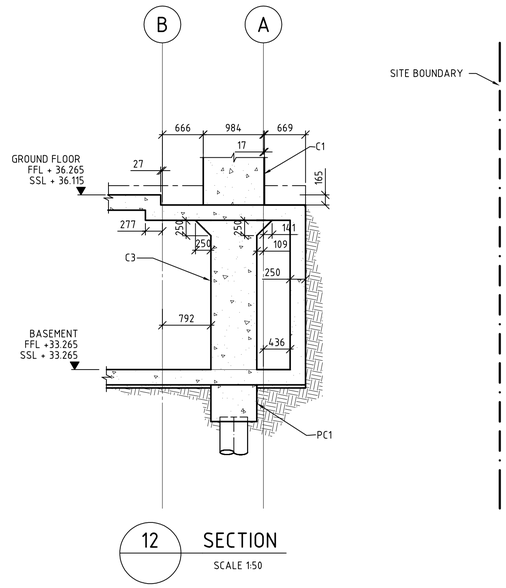

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DRG STATUS
PRELIMINARY

CLIENT
WATES LIVING SPACE

PROJECT
ABBEY AREA DEVELOPMENT
LONDON NW6

DRG TITLE
SECTIONS & DETAILS
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PROJECT NO	DRG NO	REV	SCALE	
13050	S42	P1	1:50	
		DRN JD	DATE JUL 15	

Sloping ground fronting Belsize Road along the north western boundary

View north across the site

SITE PHOTOGRAPHS	Report No: 15.07.037

View south across the site

View along south eastern boundary

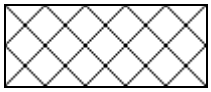
SITE PHOTOGRAPHS	Report No: 15.07.037

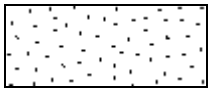
APPENDIX ‘B’

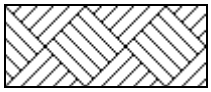
Fieldwork and Testing

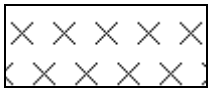
1.0 SOIL/ROCK SYMBOLS

1.1 Soils

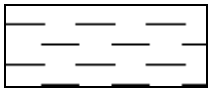

Made Ground

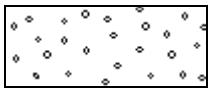

Sand

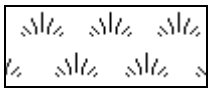

Topsoil


Silt


Boulders and Cobbles


Clay


Gravel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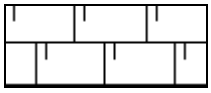
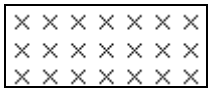
1.2 Rocks, Sedimentary


Chalk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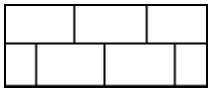
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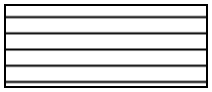
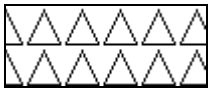
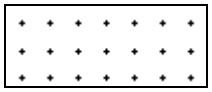

Mudstone


Conglomerate


Breccia


Coal


Sandstone

SOIL/ROCK SYMBOLS

LOCATION: Abbey Road, Camden

BOREHOLE NO. WSA

Date of Boring: 03/09/2015

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	SPT CPT N - Value	Water Level -m
MADE GROUND Very loose and loose grey brown sandy fine to coarse sub-angular GRAVEL and occasional cobbles of concrete with occasional reinforcement bar.		0.0		0.00	D		
		1.0		1.00	D		
			(3.00)				
		2.0					
MADE GROUND Soft grey brown silty gravelly CLAY. Gravel is fine and medium sub-angular flint.		3.0	3.00	3.00	D	8	▼
			3.45	3.45	D		
LONDON CLAY FORMATION Stiff grey brown and occasionally grey mottled silty CLAY.		4.0	(1.15)	4.00	D	12	
Base of borehole at 4.60 m			4.60				
		5.0					
		6.0					
		7.0					
		8.0					
		9.0					
		10.0					

Borehole Diameter: 87mm - -

▼ Water Strike
▼ Water (Standing Level)
W Water Sample
B Bulk Sample
D Small Disturbed Sample
U Undisturbed Sample
(No. of blows shown in brackets)
SPT Standard Penetration Test
CPT Cone Penetration Test
* Extrapolated Value

Remarks:
1. Method of Boring: Continuous tube
2. Groundwater: Struck at 3.4m
3. Logged by IE to BS5930 +A2

BOREHOLE LOG

Report No: 15.07.037

LOCATION: Abbey Road, Camden

BOREHOLE NO. WSB

Date of Boring: 02/09/2015

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	SPT CPT N - Value	Water Level -m
MADE GROUND Stiff brown and orange brown mottled silty sandy slightly gravelly and very gravelly CLAY. Gravel is fine to coarse sub-angular flint, concrete and brick.		0.0		0.00 0.30 0.60	D D D		
		1.0	(2.00)				
LONDON CLAY FORMATION Stiff to very stiff becoming very stiff brown with occasional grey mottled closely fissured silty CLAY with rare selenite crystals.		2.0	2.00	2.00	D		
		3.0		3.00	D	15	▼
			(3.45)				
		4.0		4.00	D	20	
				4.50	D		
		5.0		5.00	D	15	
Base of borehole at 5.45 m			5.45				
		6.0					
		7.0					
		8.0					
		9.0					
		10.0					

Borehole Diameter: 87mm

Remarks:
1. Method of Boring: Continuous tube
2. Groundwater: Struck at 3.4m
3. Logged by IE to BS5930 +A2

- ▼ Water Strike
- ▼ Water (Standing Level)
- W Water Sample
- B Bulk Sample
- D Small Disturbed Sample
- U Undisturbed Sample

(No. of blows shown in brackets)

- SPT Standard Penetration Test
- CPT Cone Penetration Test
- * Extrapolated Value

BOREHOLE LOG

Report No: 15.07.037

LOCATION: Abbey Road, Camden

BOREHOLE NO. WSC

Date of Boring: 02/09/2015

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	SPT CPT N - Value	Water Level -m
MADE GROUND Stiff grey brown silty sandy very gravelly CLAY. Gravel is fine to coarse sub-angular concrete, brick and rare ash and slate.		0.0	(1.00)	0.00	D		
				0.45	D		
		1.0	1.00	1.00	D		
LONDON CLAY FORMATION Stiff becoming very stiff brown with occasional grey mottled silty CLAY.				1.50	D		
		2.0		2.00	D		
				2.50	D		
		3.0		3.00	D	13	Dry
				3.50	D		
		4.0		4.00	D	15	
				4.50	D		
		5.0	(8.60)	5.00	D	19	
...with occasional selenite crystals below approximately 5.00m				5.50	D		
		6.0		6.00	D	22	
				6.50	D		
		7.0		7.00	D	25	
				7.50	D		
		8.0		8.00	D	29	
				8.50	D		
...becoming dark grey below 8.8m		9.0				37	
Base of borehole at 9.60 m		10.0	9.60				

Borehole Diameter: 87mm

-

-

▼ Water Strike

▼ Water (Standing Level)

W Water Sample

B Bulk Sample

D Small Disturbed Sample

U Undisturbed Sample

(No. of blows shown in brackets)

SPT Standard Penetration Test

CPT Cone Penetration Test

* Extrapolated Value

Remarks:

1. Method of Boring: Continuous tube
2. Groundwater: None encountered
3. Logged by IE to BS5930 +A2

BOREHOLE LOG

Report No: 15.07.037

LOCATION: Abbey Road, Camden

BOREHOLE NO. WSD

Date of Boring: 02/09/2015

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	SPT CPT N - Value	Water Level -m
MADE GROUND Stiff brown silty slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular concrete, brick and flint.		0.0		0.00	D		
				0.40	D		
		1.0	(2.00)	1.00	D		
				1.50	D		
LONDON CLAY FORMATION Stiff becoming very stiff brown with occasional grey mottling silty CLAY with occasional selenite crystals.		2.0	2.00	2.00	D		
				2.50	D		
		3.0		3.00	D	10	Dry
		4.0		4.00	D	19	
				4.50	D		
		5.0	(6.23)	5.00	D	22	
				5.50	D		
		6.0		6.00	D	24	
				6.50	D		
		7.0		7.00	D	28	
				7.50	D		
		8.0				50+	
Base of borehole at 8.23 m			8.23				
		9.0					
		10.0					

Borehole Diameter: 87mm

Remarks:
1. Method of Boring: Continuous tube
2. Groundwater: none encountered
3. Logged by BS5930 +A2

- Water Strike
- Water (Standing Level)

W Water Sample
B Bulk Sample
D Small Disturbed Sample
U Undisturbed Sample
(No. of blows shown in brackets)
SPT Standard Penetration Test
CPT Cone Penetration Test
* Extrapolated Value

BOREHOLE LOG

Report No: 15.07.037

LOCATION: Abbey Road, Camden

BOREHOLE NO. WSE

Date of Boring: 02/09/2015

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	SPT CPT N - Value	Water Level -m
MADE GROUND Very loose to grey brown slightly clayey sightly sandy fine to coarse GRAVEL and occasional cobbles of concrete and occasional brick.		0.0		0.00	D		
			0.50	0.50	D		
MADE GROUND Firm to stiff becoming firm brown silty slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular flint, concrete and brick.		1.0	(1.50)	1.00	D		
				1.50	D		
		2.0	2.00	2.00	D		
LONDON CLAY FORMATION Stiff becoming very stiff brown with occasional grey mottling closely fissured silty CLAY with occasional selenite crystals.				2.50	D		
		3.0		3.00	D	15	Dry
				3.50	D		
		4.0	(4.45)	4.00	D	18	
				4.50	D		
		5.0		5.00	D	22	
				5.50	D		
		6.0		6.00	D	26	
Base of borehole at 6.45 m			6.45				
		7.0					
		8.0					
		9.0					
		10.0					

Borehole Diameter: 87mm

Remarks:
1. Method of Boring: Continuous tube
2. Groundwater: None encountered
3. Logged by BS5930 +A2

- Water Strike
- Water (Standing Level)

W Water Sample
B Bulk Sample
D Small Disturbed Sample
U Undisturbed Sample
(No. of blows shown in brackets)
SPT Standard Penetration Test
CPT Cone Penetration Test
* Extrapolated Value

BOREHOLE LOG

Report No: 15.07.037

LOCATION: Abbey Road, Camden

BOREHOLE NO. WSF

Date of Boring: 02/09/2015

Description of Strata	Strata Change			Samples		SPT CPT N - Value	Water Level -m
	Legend	Depth -m		Depth -m	Type		
		Scale	Strata				
MADE GROUND Firm becoming stiff brown silty very gravelly CLAY. Gravel is fine to coarse sub-angular concrete brick and flint.		0.0 1.0	(1.50) 1.50	0.00 0.50 1.00	D D D		
LONDON CLAY FORMATION Stiff becoming very stiff brown with occasional grey mottling silty CLAY with occasional selenite crystals.		2.0 3.0 4.0	(4.95)	1.50 2.00 2.50 3.00 3.50 4.00 4.50	D D D D D D D	15 19	Dry
		5.0 6.0	6.45	5.00 5.50 6.00	D D D	18 26	
Base of borehole at 6.45 m		7.0 8.0 9.0 10.0					

Borehole Diameter: 87mm

Remarks:
1.Method of Boring: Continuous tube
2. Groundwater: None encountered
3. Logged by IE to BS5930 +A2

- Water Strike
- Water (Standing Level)

W Water Sample
B Bulk Sample
D Small Disturbed Sample
U Undisturbed Sample
(No. of blows shown in brackets)
SPT Standard Penetration Test
CPT Cone Penetration Test
* Extrapolated Value

BOREHOLE LOG

Report No: 15.07.037

DPH and SHDP DYNAMIC PROBING

This is a simple test consisting of driving a rod with an oversize point at its base into the ground. A uniform, regular, hammer blow is used. The blow count is recorded for every 100mm of driving (N_{100}) and the results presented as a plot of blow count against depth.

Outside the UK this type of testing has been used extensively in a wide range of formats (ie. various hammer weights, hammer drops, point sizes, etc.) for many years. Since 1985 Dynamic Probing has become widely accepted in this country and the first British Standard for this test was published in 1990.

The standard equipment is a petrol powered unit using a 50kg hammer dropping through 0.50m 32mm diameter rods and a 15cm^2 area cone. This is the Heavy Dynamic Probe (DPH) and the equipment has been selected for general use as giving a good compromise between sensitivity in loose materials and penetration rates in denser materials. A sacrificial cone is used for each probing. A damper is used between the hammer and anvil.

The Super Heavy Dynamic Probe (DPSH) is a heavier version, using a 63.5kg hammer dropping through 0.75m, 32mm diameter rods and a 20cm^2 area cone.

The hammer operation is automated and driving is carried out as a continuous operation from ground level without a borehole. The test therefore not only provides a continuous record for the full depth penetration but also avoids many of the problems associated with poor operator technique when carrying out SPTs in boreholes.

Dynamic Probing provides an excellent method for locating boundaries between strata of differing density and driving resistance as well as comparative assessments of a single strata across a site. Comparisons between Dynamic probing results, SPT values and other soil parameters are given in DIN4094. Information on UK practice and correlation data in UK soils was published at the ICE Conference on Penetration Testing in 1988.

The complete machine weights 140kg stands 2.5m high and measures 750mm wide x 850mm deep when erected. For movement between positions the mast is lowered and the machine wheeled on an integral axle. Probing can be carried out within 300mm of a vertical wall.

References:

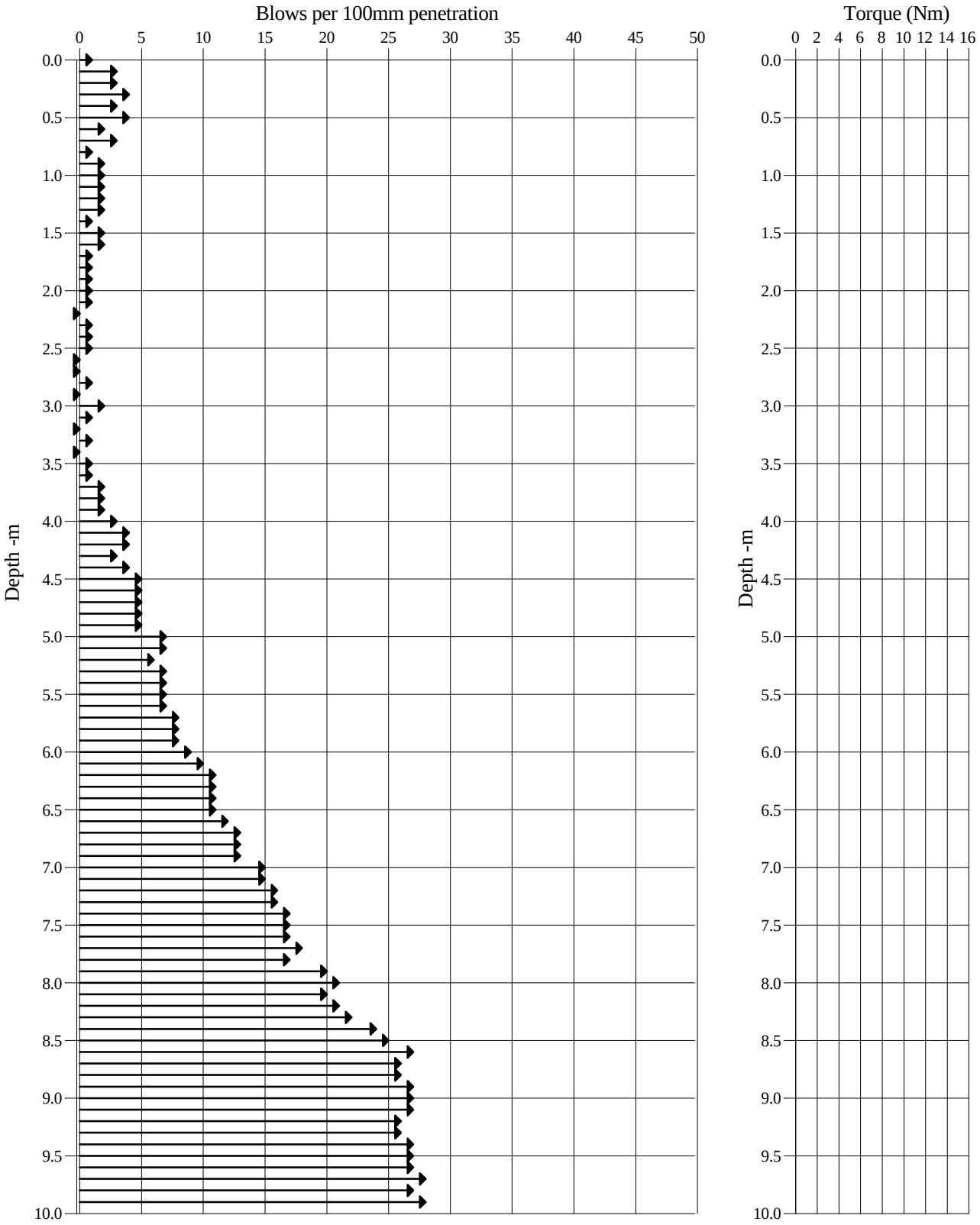
1. Subsoil; exploration by penetration tests -DIN4094. December 1990 (Standard and supplement)
2. Soils for civil engineering purposes. In-situ tests. - BS1377 Part 9 1990
3. Penetration testing in the UK. (Proceedings of the geotechnology conference organised by the Institution of Civil Engineers and held in Birmingham 6-8 July 1988)
4. Code of Practice for Site Investigations – BS5930 1999 Section 4

DPH and SHDP DYNAMIC PROBING

Site: Abbey Road, Camden

Probe No: SHDPA

Date Probed: 03/09/2015



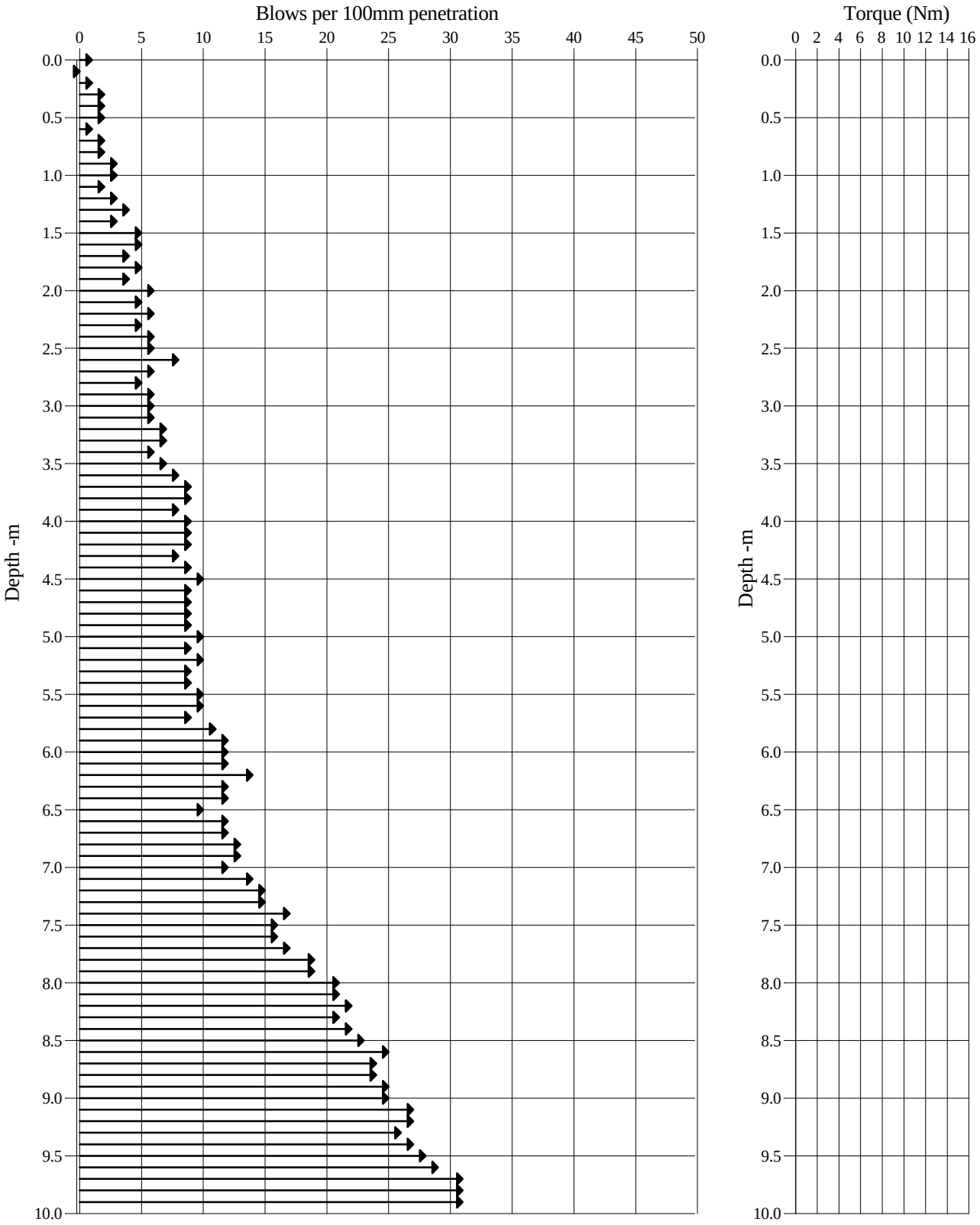
PENETRATION PROBE / TORQUE

Report No: 15.07.037

Site: Abbey Road, Camden

Probe No: SHDPB

Date Probed: 03/09/2015



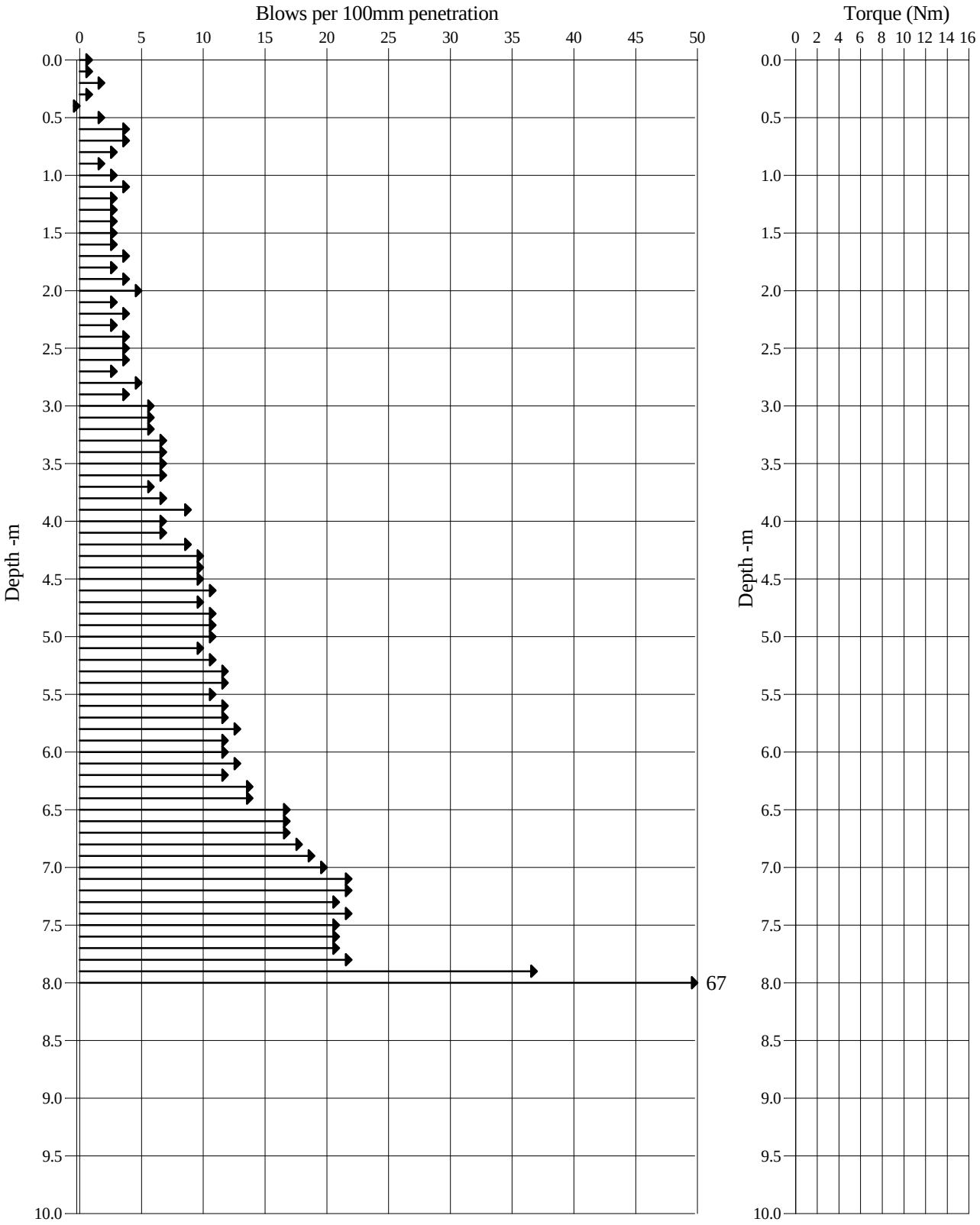
PENETRATION PROBE / TORQUE

Report No: 15.07.037

Site: Abbey Road, Camden

Probe No: SHDPE

Date Probed: 03/09/2015



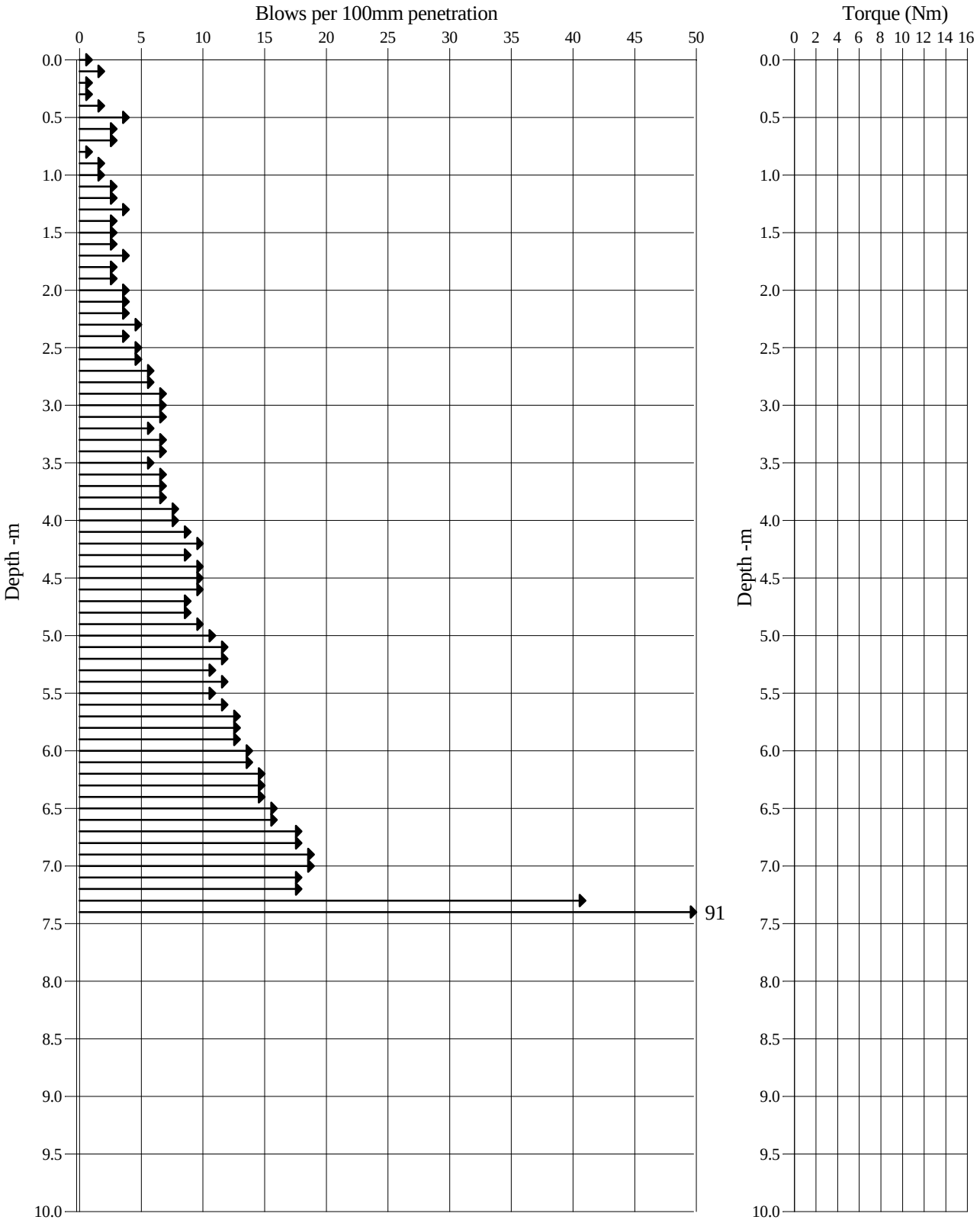
PENETRATION PROBE / TORQUE

Report No: 15.07.037

Site: Abbey Road, Camden

Probe No: SHDPF

Date Probed: 03/09/2015



PENETRATION PROBE / TORQUE

Report No: 15.07.037

2304

Enverity

Quarry Farm View Bowbridge Lane
Newark Nottinghamshire NG24 3BZ
t: 01636 705100 f: 01636 640640
e: newark @ enverity . co . uk

TEST CERTIFICATE

Determination of Approximate Equivalent CBR Value derived from Plate Bearing Test

Tested in accordance with Design Manual Roads & Bridges IAN 73/06

Client: Listers Geotechnical Consultants Ltd
Client Address: Slapton Hill Barn
Blakesley Road
Slapton, Towcester
Northants, NN12 8QD

Certificate Number: NL4632-1/1/714-4

Client Reference: N/A
Lab Job Number: NL4632-1

Contact: Sandy David

Site Name: London
Site Address: Abbey Road, Camden

Date Received: 02.09.2015
Date Tested: 02.09.2015

Test Results:

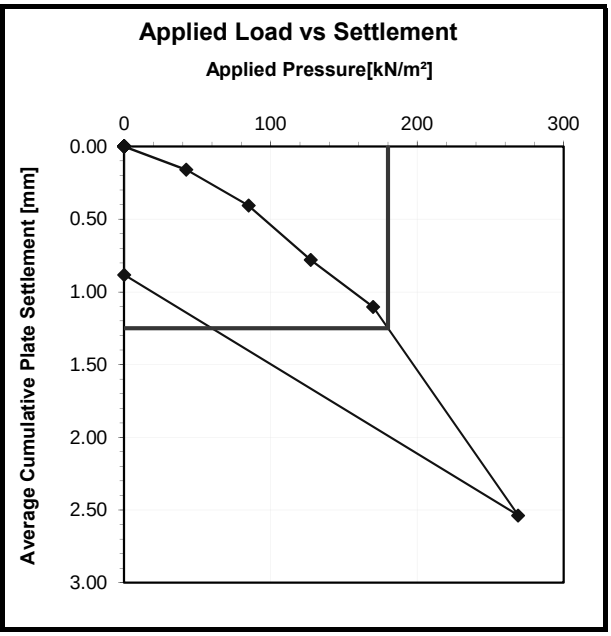
Laboratory Reference: NL4632-1/1
Sample Reference: PBT 1

Description: Crushed Concrete & Brick

Test Location: PB 1 **Depth:** N/A

Kentiledge Type: 7TN **Plate Diameter [m]:** 0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0	0	0.00
3	42	0.16
6	85	0.41
9	127	0.78
12	170	1.10
19	269	2.54
0	0	0.88
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	



Initial Pressure Applied to Induce 1.5mm Settlement **170 kN/m²**

Pressure at 1.25mm Settlement **180 kN/m²**

Modulus of Subgrade Reaction **64 MN/m²/m**

Equivalent CBR Value **13%**

Comments:

Approved Signatory: C. Simmonite - Site Services Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported: 11.09.2015
Form Number: EN/C/714-4 Version 6

Registered in England & Wales
Registration Number 6930692
Reg Office; Charleston House
Cruckmoor Lane, Prees Green
Whitchurch, Shropshire, SY13 2BS

2304

Enverity

Quarry Farm View Bowbridge Lane
Newark Nottinghamshire NG24 3BZ
t: 01636 705100 f: 01636 640640
e: newark @ enverity . co . uk

TEST CERTIFICATE

Determination of Approximate Equivalent CBR Value derived from Plate Bearing Test

Tested in accordance with Design Manual Roads & Bridges IAN 73/06

Client: Listers Geotechnical Consultants Ltd
Client Address: Slapton Hill Barn
Blakesley Road
Slapton, Towcester
Northants, NN12 8QD

Certificate Number: NL4632-1/2/714-4

Client Reference: N/A
Lab Job Number: NL4632-1

Contact: Sandy David

Site Name: London
Site Address: Abbey Road, Camden

Date Received: 02.09.2015
Date Tested: 02.09.2015

Test Results:

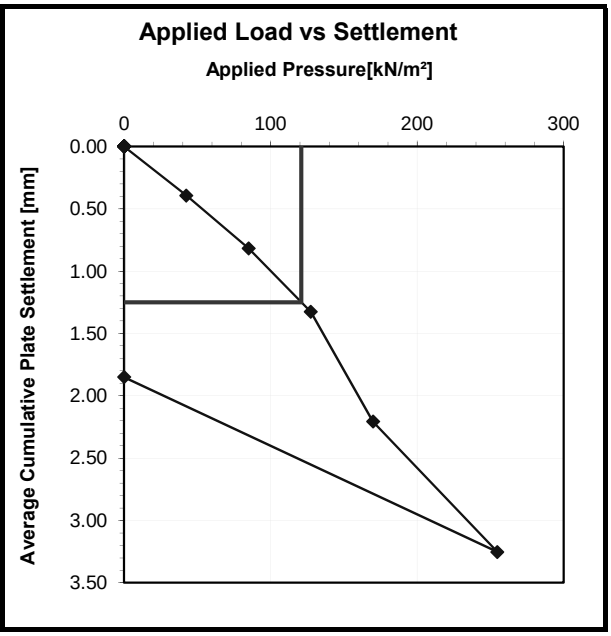
Laboratory Reference: NL4632-1/2
Sample Reference: PBT 2

Description: Brown Clay occasional Brick/Stone

Test Location: PB 2 **Depth:** N/A

Kentiledge Type: 7TN **Plate Diameter [m]:** 0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0	0	0.00
3	42	0.39
6	85	0.82
9	127	1.33
12	170	2.21
18	255	3.25
0	0	1.85
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	



Initial Pressure Applied to Induce 1.5mm Settlement **28 kN/m²**

Pressure at 1.25mm Settlement **121 kN/m²**

Modulus of Subgrade Reaction **43 MN/m²/m**

Equivalent CBR Value **6.5%**

Comments:

Approved Signatory: C. Simmonite - Site Services Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported: 11.09.2015
Form Number: EN/C/714-4 Version 6

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Registration Number 6930692
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Newark Nottinghamshire NG24 3BZ
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e: newark @ enverity . co . uk

TEST CERTIFICATE

Determination of Approximate Equivalent CBR Value derived from Plate Bearing Test

Tested in accordance with Design Manual Roads & Bridges IAN 73/06

Client: Listers Geotechnical Consultants Ltd
Client Address: Slapton Hill Barn
Blakesley Road
Slapton, Towcester
Northants, NN12 8QD

Certificate Number: NL4632-1/3/714-4

Client Reference: N/A
Lab Job Number: NL4632-1

Contact: Sandy David

Site Name: London
Site Address: Abbey Road, Camden

Date Received: 02.09.2015
Date Tested: 02.09.2015

Test Results:

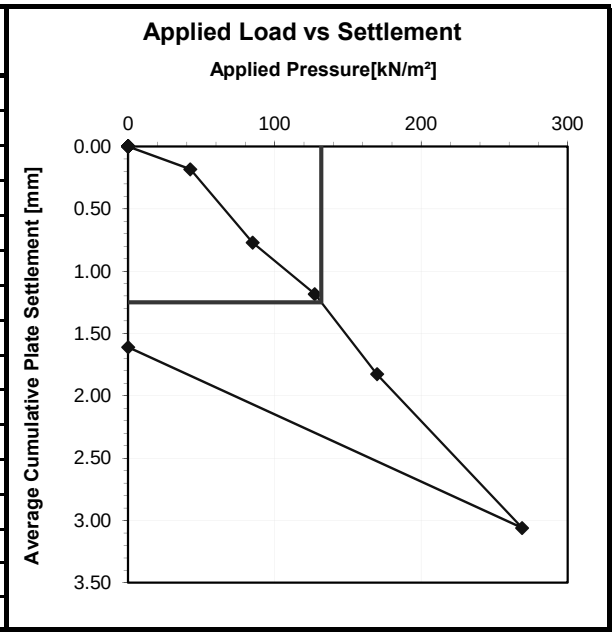
Laboratory Reference: NL4632-1/3
Sample Reference: PBT 3

Description: Brown Clay occasional Brick/Stone

Test Location: PB 3 **Depth:** N/A

Kentiledge Type: 7TN **Plate Diameter [m]:** 0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0	0	0.00
3	42	0.18
6	85	0.77
9	127	1.18
12	170	1.83
19	269	3.06
0	0	1.61
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	



Initial Pressure Applied to Induce 1.5mm Settlement **28 kN/m²**

Pressure at 1.25mm Settlement **132 kN/m²**

Modulus of Subgrade Reaction **47 MN/m²/m**

Equivalent CBR Value **7.5%**

Comments:

Approved Signatory: C. Simmonite - Site Services Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported: 11.09.2015
Form Number: EN/C/714-4 Version 6

Registered in England & Wales
Registration Number 6930692
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Whitchurch, Shropshire, SY13 2BS

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Newark Nottinghamshire NG24 3BZ
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e: newark @ enverity . co . uk

TEST CERTIFICATE

Determination of Approximate Equivalent CBR Value derived from Plate Bearing Test

Tested in accordance with Design Manual Roads & Bridges IAN 73/06

Client: Listers Geotechnical Consultants Ltd
Client Address: Slapton Hill Barn
Blakesley Road
Slapton, Towcester
Northants, NN12 8QD

Certificate Number: NL4632-1/4/714-4

Client Reference: N/A
Lab Job Number: NL4632-1

Contact: Sandy David

Site Name: London
Site Address: Abbey Road, Camden

Date Received: 02.09.2015
Date Tested: 02.09.2015

Test Results:

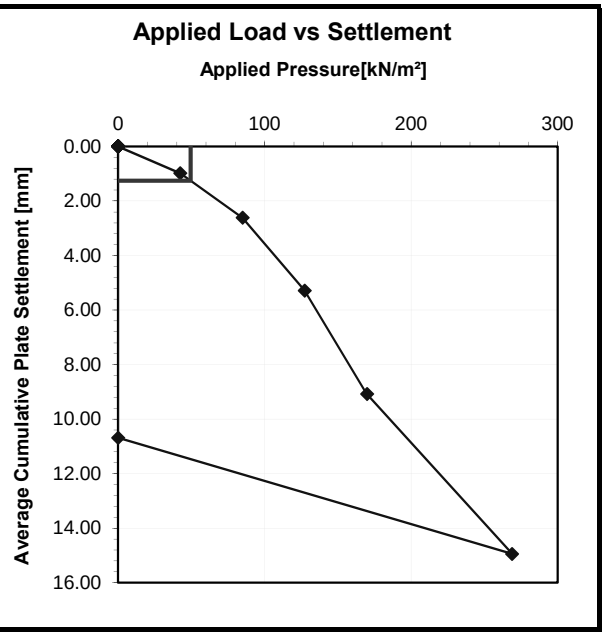
Laboratory Reference: NL4632-1/4
Sample Reference: PBT 4

Description: Brown Clay occasional Brick/Stone

Test Location: PB 4 **Depth:** N/A

Kentiledge Type: 7TN **Plate Diameter [m]:** 0.30

Applied Load [kN]	Applied Pressure [kN/m²]	Average Plate Settlement [mm]
0	0	0.00
3	42	0.98
6	85	2.61
9	127	5.29
12	170	9.08
19	269	14.94
0	0	10.68
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	



Initial Pressure Applied to Induce 1.5mm Settlement **28 kN/m²**

Pressure at 1.25mm Settlement **49 kN/m²**

Modulus of Subgrade Reaction **17 MN/m²/m**

Equivalent CBR Value **1.4%**

Comments:

Approved Signatory: C. Simmonite - Site Services Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported: 11.09.2015 Page 1 of 1
Form Number: EN/C/714-4 Version 6

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

Registered in England & Wales
Registration Number 6930692
Reg Office; Charleston House
Cruckmoor Lane, Prees Green
Whitchurch, Shropshire, SY13 2BS

APPENDIX 'C'

Laboratory Testing Results and Hazardous Waste Assessment Worksheet

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	15-21073 Issue-1
Initial Date of Issue:	17-Sep-2015
Client:	Listers Geotechnical Consultants
Client Address:	Slapton Hill Barn, Blakesley Road Slapton Towcester Northamptonshire NN12 8QD
Contact(s):	Ian Evetts
Project:	15.07.037a Abbey Rd, Camden, London

Quotation No.:		**Date Received:**	11-Sep-2015
Order No.:	15.07.037a/040	**Date Instructed:**	11-Sep-2015
No. of Samples:	15		
Turnaround: (Wkdays)	3	**Results Due Date:**	15-Sep-2015
Date Approved:	17-Sep-2015		

Approved By:

Details: Keith Jones, Technical Manager

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: 15.07.037a Abbey Rd, Camden, London

Client: Listers Geotechnical Consultants														
Quotation No.:					**Chemtest Job No.:**	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073
Order No.: 15.07.037a/040					**Chemtest Sample ID.:**	190799	190800	190801	190802	190803	190804	190805	190806	190807	190808
					Client Sample Ref.:										
					Client Sample ID.:	WSA	WSA	WSA	WSB	WSB	WSB	WSC	WSC	WSD	WSD
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	3.00	3.45	0.30	0.60	2.00	0.45	1.00	0.40	1.00
					Bottom Depth(m):										
					Date Sampled:	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15
Determinand	**Accred.**	**SOP**	**Units**	**LOD**											
ACM Type	U	2192			-							-			
Asbestos Identification	U	2192			No Asbestos Detected							No Asbestos Detected			
Moisture	N	2030	%	0.02	9.1	11	25	22	22	23	21	20	21	23	
Stones	N	2030	%	0.02	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4	0.78	0.67	1.6	4.6	0.92	1.4	1.0	0.66	1.1	1.4	
Arsenic	U	2450	mg/kg	1	23	21	23	17	17	21	22	20	18	22	
Cadmium	U	2450	mg/kg	0.1	0.21	0.19	0.20	< 0.10	< 0.10	0.13	0.18	0.30	0.20	0.17	
Chromium	U	2450	mg/kg	1	37	32	71	66	62	72	47	61	59	65	
Copper	U	2450	mg/kg	0.5	36	25	41	30	27	31	49	28	27	35	
Mercury	U	2450	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10	0.47	< 0.10	0.13	0.41	
Nickel	U	2450	mg/kg	0.5	27	26	59	36	27	52	35	48	44	51	
Lead	U	2450	mg/kg	0.5	60	43	21	27	28	17	240	17	460	190	
Selenium	U	2450	mg/kg	0.2	< 0.20	< 0.20	0.28	< 0.20	< 0.20	0.49	< 0.20	< 0.20	< 0.20	< 0.20	
Zinc	U	2450	mg/kg	0.5	70	60	170	76	69	85	120	70	98	100	
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
TPH >C5-C6	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C6-C7	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C7-C8	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C8-C10	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C10-C12	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C12-C16	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C16-C21	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
TPH >C21-C35	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total TPH >C5-C35	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	
Naphthalene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.45	< 0.10	< 0.10	< 0.10	
Acenaphthylene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.20	< 0.10	< 0.10	< 0.10	
Acenaphthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.37	< 0.10	< 0.10	< 0.10	
Fluorene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.41	< 0.10	< 0.10	< 0.10	
Phenanthrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.81	< 0.10	< 0.10	< 0.10	
Anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.23	< 0.10	< 0.10	< 0.10	
Fluoranthene	U	2700	mg/kg	0.1	0.39	0.35	< 0.10	< 0.10	< 0.10	< 0.10	0.89	< 0.10	0.44	0.44	
Pyrene	U	2700	mg/kg	0.1	0.81	0.89	< 0.10	< 0.10	< 0.10	< 0.10	1.4	< 0.10	0.56	0.67	

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: 15.07.037a Abbey Rd, Camden, London

Client: Listers Geotechnical Consultants														
Quotation No.:				**Chemtest Job No.:**	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073	15-21073
Order No.: 15.07.037a/040				**Chemtest Sample ID.:**	190799	190800	190801	190802	190803	190804	190805	190806	190807	190808
				Client Sample Ref.:										
				Client Sample ID.:	WSA	WSA	WSA	WSB	WSB	WSB	WSC	WSC	WSD	WSD
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	3.00	3.45	0.30	0.60	2.00	0.45	1.00	0.40	1.00
				Bottom Depth(m):										
				Date Sampled:	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Benzo[a]anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.32	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.59	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.50	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.31	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.36	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	6.8	< 2.0	< 2.0	< 2.0

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: 15.07.037a Abbey Rd, Camden, London

Client: Listers Geotechnical Consultants									
				Chemtest Job No.:	15-21073	15-21073	15-21073	15-21073	15-21073
Quotation No.:				**Chemtest Sample ID.:**	190809	190810	190811	190812	190813
Order No.: 15.07.037a/040				Client Sample Ref.:					
				Client Sample ID.:	WSD	WSE	WSE	WSF	WSF
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	3.00	0.50	3.00	1.00	3.00
				Bottom Depth(m):					
				Date Sampled:	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192				-		-	
Asbestos Identification	U	2192				No Asbestos Detected		No Asbestos Detected	
Moisture	N	2030	%	0.02	25	22	22	24	22
Stones	N	2030	%	0.02	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4	0.95	1.0	1.3	1.0	1.7
Arsenic	U	2450	mg/kg	1	20	18	14	18	16
Cadmium	U	2450	mg/kg	0.1	0.14	0.20	0.15	0.16	0.12
Chromium	U	2450	mg/kg	1	68	52	62	62	67
Copper	U	2450	mg/kg	0.5	31	32	32	29	33
Mercury	U	2450	mg/kg	0.1	< 0.10	0.18	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.5	52	42	55	47	54
Lead	U	2450	mg/kg	0.5	36	160	19	41	19
Selenium	U	2450	mg/kg	0.2	< 0.20	< 0.20	0.42	< 0.20	0.36
Zinc	U	2450	mg/kg	0.5	85	130	87	86	92
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
TPH >C5-C6	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C16-C21	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C21-C35	N	2670	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total TPH >C5-C35	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.1	< 0.10	0.33	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.1	< 0.10	0.54	< 0.10	< 0.10	< 0.10

Results Summary - Soil

Project: 15.07.037a Abbey Rd, Camden, London

Client: Listers Geotechnical Consultants									
			Chemtest Job No.:		15-21073	15-21073	15-21073	15-21073	15-21073
Quotation No.:			**Chemtest Sample ID.:**		190809	190810	190811	190812	190813
Order No.: 15.07.037a/040			Client Sample Ref.:						
			Client Sample ID.:		WSD	WSE	WSE	WSF	WSF
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		3.00	0.50	3.00	1.00	3.00
			Bottom Depth(m):						
			Date Sampled:		03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15	03-Sep-15
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Benzo[a]anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

#REF!

	Lead (mg/kg)									
Critical concentration, C_c	**200**									
Notes										
Sample size, n	9	0	0	0	0	0	0	0	0	0
Sample mean, $\overline{x}$	138.777778	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	144.139496									
Number of non-detects	0									
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	Yes									
Distribution	Non-normal									
Statistical approach	Auto: Chebychev	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers		
t statistic, t_0 (or k_0)	-1.274228585									
Upper confidence limit (on true mean concentration, μ)	348.207611									
Evidence level	**62%**									
Base decision on:	evidence level									
Result	**μ ≈≥ Cc**									
Select dataset	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Waste Classification Report

U668L-FXHJF-GS9KA

Job name

15.07.037 Abbey Road, Camden, London

Waste Stream

Suite 6 & chromium VI

Comments

Project

Site

Classified by

Name:
David, Amanda
Date:
16/10/2015 08:57 UTC
Telephone:
01327 860060

Company:
Listers Geotechnical Consultants
Slapton Hill Barn, Blakesley Road
Slapton,
Towcester
NN12 8QD

Report

Created by: David, Amanda
Created date: 16/10/2015 08:57 UTC

Job summary

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	15-21066 Issue-1
Initial Date of Issue:	17-Sep-2015
Client:	Listers Geotechnical Consultants
Client Address:	Slapton Hill Barn, Blakesley Road Slapton Towcester Northamptonshire NN12 8QD
Contact(s):	Ian Evetts
Project:	15.07.037a Abbey Road, Camden, London

Quotation No.:		**Date Received:**	11-Sep-2015
Order No.:	15.07.037a/040	**Date Instructed:**	11-Sep-2015
No. of Samples:	3		
Turnaround: (Wkdays)	5	**Results Due Date:**	17-Sep-2015
Date Approved:	17-Sep-2015		

Approved By:

Details: Keith Jones, Technical Manager

Results Summary - 2 Stage WAC

Project: 15.07.037a Abbey Road, Camden, London

Chemtest Job No: 15-21066 Chemtest Sample ID: 190767 Sample Ref: Sample ID: WSB Top Depth(m): 0.30 Bottom Depth(m): Sampling Date: 03-Sep-2015							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	U	%			0.5	3	5	6
Loss on Ignition	2610	U	%			4.9	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			18	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.011	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.012	0.002	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0062	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.011	0.0011	0.021	0.022	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	28	1.2	54	41	800	15000	25000
Fluoride	1220	U	0.76	0.24	1.5	2.9	10	150	500
Sulphate	1220	U	220	13	430	350	1000	20000	50000
Total Dissolved Solids	1020	N	400	47	780	850	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	18	16	< 50	160	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.303
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.189

Results Summary - 2 Stage WAC

Project: 15.07.037a Abbey Road, Camden, London

Chemtest Job No: 15-21066 Chemtest Sample ID: 190768 Sample Ref: Sample ID: WSB Top Depth(m): 2.00 Bottom Depth(m): Sampling Date: 03-Sep-2015							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	U	%			0.35	3	5	6
Loss on Ignition	2610	U	%			5.8	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			31	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.016	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.0013	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.013	0.0021	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0017	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0025	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0031	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.065	0.0027	< 0.50	< 0.50	4	50	200
Chloride	1220	U	40	1.8	77	55	800	15000	25000
Fluoride	1220	U	0.25	0.091	< 1.0	1.1	10	150	500
Sulphate	1220	U	2200	120	4200	3200	1000	20000	50000
Total Dissolved Solids	1020	N	1800	280	3500	4300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	16	12	< 50	120	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	22

Leachate Test Information	
Leachant volume 1st extract/l	0.3
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.169

Results Summary - 2 Stage WAC

Project: 15.07.037a Abbey Road, Camden, London

Chemtest Job No: 15-21066 Chemtest Sample ID: 190769 Sample Ref: Sample ID: WSD Top Depth(m): 1.00 Bottom Depth(m): Sampling Date: 03-Sep-2015							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	U	%			0.53	3	5	6
Loss on Ignition	2610	U	%			5.5	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			32	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.027	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.0019	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.02	0.0032	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0052	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0019	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0015	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0028	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.051	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	30	1.3	58	44	800	15000	25000
Fluoride	1220	U	0.94	0.2	1.8	2.8	10	150	500
Sulphate	1220	U	1500	97	3000	2500	1000	20000	50000
Total Dissolved Solids	1020	N	1300	230	2500	3400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	15	14	< 50	140	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	22

Leachate Test Information	
Leachant volume 1st extract/l	0.3
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.189

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk