Stage 1: Tier 2 Site Investigation GQRA

Project Reference: P24.118.GQRA
9 Cranbury Place

Prepared For

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The data collected through direct operations in the production of this report has been so obtained, unless directly otherwise stated, in accordance with current UK guidance, law or accepted industry practice, including but not limited to: BS.5930: 1990 Code of Practice for Site Investigations (Amendment 3: 2015+A1:2020), & BS.10175: 2011 + A2: 2017 Investigations into Potentially Contaminated Sites. Exact exploratory locations will depend upon access conditions, site use and plant capability, IGL do not accept liability for issues arising from material identified between or outside of the area of exploratory locations.

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Unless stated otherwise within the text, all geotechnical and material laboratory tests have been performed in accordance with the relevant British Standard Documents. Laboratory testing for contaminated land assessment is completed under the UKAS / MCERTS accreditation schemes, unless identified as otherwise in the report.

Human Health Risk Assessment Criteria
The Environment Agency has undertaken revision of the Soil Guideline Values (SGVs) which are partially complete. Where standards are available using the "new" approach, these have been utilised for correlative purposes. Where standards have not yet been revised, guidance following the "old" approach has been utilised. Please note that upon release of the remaining guidelines, the standards contained within this report may be subject to change. In addition, the second edition of the LQM CIEH guidance has now been released and will be utilised in favour of previously published guideline values.

Third Parties
The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from previous Site investigations and chemical testing laboratories. IGL has assumed that such information is correct. IGL cannot and does not guarantee the authenticity or reliability of the information it has relied upon and can accept no responsibility for inaccuracies with the data supplied by other parties.

The accuracy of the historical map extracts supplied cannot be guaranteed and it should be noted that different conditions may have existed between mapping sheet editions. Therefore, there can be no certainty that all areas of contamination have been identified during the Stage 1: Tier 1 Preliminary Risk Assessment.

Definitions
Reference to the word "contamination" in this report does not relate to the statutory definition of contaminated land under 1990 Environmental Protection Act unless otherwise stated. The definition used in this report is: "Land that contains substances that, when present in sufficient quantities or concentrations, are likely to cause harm, directly or indirectly, to man, to the environment, or on occasion to other targets" (NATO CCMS, 1985).

1. INTRODUCTION

1.1 Brief

Impact Geotechnical Ltd (IGL) were instructed by Roath Construction Ltd (the Client) (Q24.111) to carry out a ground investigation and compile a report of the findings to inform on a Stage 1: Tier 2 Site Investigation and Generic Quantitative Risk Assessment (GQRA) at 9 Cranbury Place / 17 Lyon Street, Southampton, SO14 0LG (hereafter referred to as the "site"). In summary, the site comprises a residential terraced dwelling, private garden and domestic garage, all undergoing building works/redevelopment.

The brief was to undertake a ground investigation to identify any ground condition issues that may affect redevelopment of the site in terms of geo-environmental and geotechnical aspects, as well as to inform on the detailed design of temporary and permanent works associated with the planned construction. In summary, the investigation included two windowless sample boreholes along with associated in-situ testing and one hand excavated trial pit to provide further site coverage.

IGL have previously issued a Stage 1: Tier 1 Preliminary Risk Assessment (PRA) (Ref: P24.118.PRA, dated: March 2024) at the study site. This document should be read in conjunction with this report for completeness. A summary is included within later report sections.

1.2 Proposals

Proposals include conversion of the existing dwelling (9 Cranbury Place) into 2no one-bedroom flats, and the erection of a 3no bedroom dwelling to the rear (17 Lyon Street). Development proposals are pertained to Southampton City Council (SCC) Planning Application No.: 22/01704/FUL. Proposed drawings are included within Appendix A.

This assessment only pertains to 17 Lyon Street and the proposals for the new 3no bedroom dwelling, i.e. the red outline within the Hole Location Plan (Appendix B); no interpretation has been made to the conversion of 9 Cranbury Place.

2. SITE LAYOUT

The descriptions below relate to site conditions at the time of the investigation only.

2.1 Location and Topography

The site is centred on Easting 442285, Northing 112879, located within Southampton. The site is relatively flat situated at approximately 18m AOD (Above Ordnance Datum), according to Ordnance Survey.

2.2 Site Description

The study areas includes a rectangular plot comprising a residential terraced dwelling (9 Cranbury Place) with private rear garden and demolished domestic garage.

The residential dwelling comprises a brick-built two-storey structure, with pitched roof. Access is afforded to the building at the north, from Cranbury Place. At the time of the walkover survey, building works were happening at the building; all fireplaces and associated chimney breasts had been removed with steel beams across the first-floor walls. Moreover, a single-storey rear extension was being constructed at the southern elevation of the building. It is understood that the building is powered and heated by mains electricity/gas.

A private garden is located to the rear of the aforementioned dwelling, as the southern elevation. A footpath runs along the western perimeter. The garden was noted to contain detritus, used as a storage/waste area for 9 Cranbury Place build, including:

A cement mixer, ballast and bags of cement are located by the residential building, at the northern end of the garden.

3no fridge/freezers.

Bits of timber, plastic piping, profile sheeting and picture frames.

A mound of chopped branches, leaf litter, and wood.

At the southern extents of this garden is the remnants of a domestic garage. What remains of the garage is the concrete floor slab. Access to this part of the site is afforded from Lyon Street at the south of the site.

2.3 Vegetation

A tree stump is located at the rear of the garden, at the northern elevation of the garage floor slab. This is suspected to be a magnolia (or similar) based on the branches and leaf litter in a pile within the garden. The soil around this stump has been removed leaving the exposed roots.

Several young cheery trees line the western edge of the garden.

2.4 Surroundings

The surroundings are predominantly urban, mostly residential but with some commercial premises. The immediate surrounds are composed of residential terraced dwellings.

3. PHYSICAL SETTING

The GeoIndex (BGS, 2024) indicates that the site is likely underlain by Superficial River Terrace Deposits, overlying Bedrock Geology of the Wittering Formation. The table below identifies the expected composition of the published stratum and the associated aquifer classification.

Superficial / Drift Geology	
Unit Name	River Terrace Deposits
Geology Description	Deposits of the Quaternary Period usually comprising sand and gravel, but with some clay and silt
Aquifer Class	Secondary A Aquifer
Aquifer Description	Permeable layers that can support local water supplies, and may form an important source of base flow to rivers
Bedrock / Solid Geology	
Unit Name	Wittering Formation
Geology Description	Greyish brown laminated clay interbedded with sand, with sparsely glauconitic sand.
Aquifer Class	Secondary A Aquifer
Aquifer Description	Permeable layers that can support local water supplies, and may form an important source of base flow to rivers

Table 3.1: Geology and Hydrogeology

3.1 Geological Hazards

The British Geological Survey (BGS, 2024) has provided the available published Geological Hazard directory information for the study site. The information returned is displayed in the table below. Where multiple records are present, the worst case classification is presented.

Hazard	Risk Level
Shrink Swell Clays	Moderate
Landslides	Very Low
Collapsible Ground	Very Low
Running Sands	Very Low
Ground Dissolution	Negligible
Compressible Ground	Negligible

Table 3.2: Geological Hazards

A Moderate risk has been identified from shrink swell clays on site, likely attributable to the underlying cohesive soils of the Wittering Formation. Further information is included in later report sections.

3.2 Radon

The site is located within a lower probability radon area, as less than 1% of homes are estimated to be at or above the radon Action Level. As a result, no radon protective measures are necessary in the construction of new dwellings or extensions.

3.3 Hydrology

3.3.1. Surface Water Features

There are no notable surface water features within a 250m radius of the site. The River Itchen is situated approximately 600-700m east of site.

3.3.2. Flooding

The site is located within a flood zone 1 area (Low probability of flooding; less than a 0.1% annual chance of flooding from rivers or the sea).

3.4 Controlled Waters

3.4.1. Abstraction Licences

There are currently no abstraction licences (including potable, groundwater and surface water) in or within a 1000m radius of the study site.

3.4.2. Source Protection Zones (SPZ)

The site is not located within a SPZ.

3.4.3. Nitrate Vulnerable Zones (NVZ)

The site is located within Hamble Estuary NVZ.

4. PREVIOUS REPORTS

A Stage 1: Tier 1 PRA Report was completed by IGL (Ref: P24.118.PRA, dated: March 2024) was completed at the site. The purpose of the PRA was to provide information on the expected geology and hydrogeology, the development history and most recent uses of the site, potential sources of contamination, and, to enable the development of a preliminary Conceptual Site Model (CSM) and risk assessment.

Following a site walkover, review of historical maps, and information on public record, the preliminary CSM identified a potential contaminant sources:

4.1.1. On-Site

Possibility of Made Ground on site as a result of the historical development, including demolition of the previous structures; urban areas, such as Southampton, can have high levels of background heavy metals. Contaminants of Concern (CoCs) include heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs) and Asbestos Containing Soils (ACMs).

4.1.2. Off-Site

Potential for spills/leaks of fuels/oils associated with the processes and infrastructure at the neighbouring historical garage (30-40m west). CoCs pertain to hydrocarbon-specific contaminants, such as Total Petroleum Hydrocarbons (TPH) and BTEX.

In summary, the preliminary CSM identified a Low to Moderate risk to residential end users, through contact with potentially impacted soils associated with the Made Ground on site, driven as a result of the sensitivity of the receptor and potential for impacted soils (Made Ground) to be present within proposed private gardens. This risk is defined as, 'The site may not be suitable for the present or future use and environmental setting. Contaminants are probably present and might have unacceptable impact on key targets'.

Consequently, further assessment of the pollutant linkages, mindful of the proposed development were considered to be necessary. It was recommended that an intrusive site investigation is required to assess these potential pollutant linkages, with the aim to refine the associated risks.

4.1.3. Outline Intrusive Investigation Proposal

The following investigation aims were considered pertinent mindful of the potential risks identified within the Preliminary CSM:

Ascertain the thickness and composition of Made Ground Soils associated with historical development of the site. This to be achieved with a combination of boreholes and/or trial pits.

Complete exploratory holes targeting specific areas of concern, specifically: areas of private gardens.

Compile details of visual/olfactory evidence of soil contamination and collect suitable soil samples to facilitate analysis for the CoC.

Comparison of soil results against published Generic Assessment Criteria on the basis of the future use of the site as 'Residential with Home Grown Produce'. Results may be used to determine the suitability of the site for the proposed use, particularly in respect of future gardens.

5. FIELDWORKS

An investigation was required to identify the ground conditions on site to inform on the proposed development in terms of geo-environmental and geotechnical aspects.

5.1 Site Management and Preparation

The following intrusive works were undertaken on 19th February 2024, supervised by an Engineer from IGL. The works were carried out in general accordance with statutory guidance including BS5930:2015+A1:2020 Code of Practice for Site Investigations and BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites: Code of Practice. Prior to any excavations taking place, a Cable Avoidance Tool (CAT) was used to check for the position of any underlying electrical services. In addition, starter pits were excavated to 1.00-1.20 metres below ground level (mbgl) to clear test locations prior to the boreholes.

5.2 Rationale and Methodology

The scope was designed between the relevant parties and IGL, based on the proposed development plans. The aim of the scope was to advance intrusive locations to assist with the geo-environmental and geotechnical design recommendations in relation to the proposed development. This was to be achieved with the completion of exploratory holes to assess the nature of the underlying soils and groundwater conditions, along with specified in-situ testing. Samples were collected for subsequent geotechnical and environmental laboratory analysis. A plan indicating intrusive locations can be viewed in Appendix B.

5.2.1. Windowless Sample Boreholes

Two windowless sample boreholes (WS1 and WS2) were advanced through the base of their respective inspection pits to a maximum depth of 4.60mbgl, completed using a tracked dynamic sampling rig. The primary objective was to allow for the assessment of underlying ground conditions, production of detailed engineering logs and the recovery of samples for laboratory testing. Furthermore, these boreholes allowed for in-situ Standard Penetration Testing (SPT) to provide geotechnical parameters for future use. The boreholes were backfilled with arisings, in reverse order, upon completion.

5.2.2. Trial Pits

One hand excavated trial pit (TP1) was undertaken using insulated hand tools. The purpose of this trial pit was to provide suitable coverage of the site, as well as targeting specific areas of concern (i.e. private gardens). The hole was backfilled once logged and representative soil samples taken.

5.2.3. Soil Sampling

All intrusive locations were logged, and visual/olfactory evidence of contamination noted in accordance with best practice. Soil sampling of the near surface materials was undertaken to assess generic contamination risks to human health. Samples were also removed at varying depths for geotechnical testing. Environmental samples were handled using a fresh pair of nitrile gloves. Selected samples were placed in sealable bags, sealed glass jars or plastic tubs (dependent on the exact laboratory requirement and analysis to be undertaken) and stored in a temperature-controlled environment before transit.

5.3 Limitations

Both WS1 and WS2 were terminated early on refusal, within the underlying gravels, at 4.60mbgl (WS1) and 3.70mbgl (WS2).

6. GROUND CONDITIONS

6.1 Summary of Ground Conditions

The following soil conditions were encountered during the investigation works. They are generally considered to be consistent with the published geology. A summary of the encountered ground strata is included within the table below. Please refer to the engineering logs within Appendix C for more detailed descriptions.

Stratum	Depth to Top (mbgl)	Depth to Base (mbgl)
Concrete	Ground level	0.10
Topsoil	Ground level	0.20
Made Ground	0.10 – 0.20	0.65 – 0.75
Sandy Clay (River Terrace Deposits)	0.65 – 0.75	>1.00 – 1.60
Very Sandy Clay (River Terrace Deposits)	1.20 – 1.60	2.40 – 2.50
Gravel	2.40 – 2.50	>3.70 – >4.60

Table 6.1: Summary of Ground Conditions

6.2 Soil Conditions

Photographs of the recovered soils are included within Appendix D. Information regarding each stratum is included below.

6.2.1. Surface Covering

The surface of both windowless sample boreholes (WS1 and WS2) comprised concrete, recorded to be 100mm thick. Topsoil was recorded within TP1 to a depth of 0.20mbgl (metres below ground level); described as a dark brown very sandy silty Clay, with frequent roots and occasional gravel of flint.

6.2.2. Made Ground

Made Ground was encountered in all locations, from below the surface covering to a maximum depth of 0.75mbgl (in the case of WS2). Generally, the Made Ground soils were recorded as granular, i.e. either sand or gravel.

The initial Made Ground soils encountered within WS1 were recorded below the surface concrete to a depth of 0.20mbgl. This material was described as a light grey speckled red sandy Gravel of concrete, flint and brick, presumably as a sub-base layer for the concrete slab above. Below this, the soils within WS1 were logged as a dark brown very clayey gravelly Sand, with the gravel recorded as flint, brick and clinker, with rare pieces of plastic, recorded from 0.20m to 0.70mbgl.

A brown speckled red clayey gravelly Sand was encountered within WS2 below the surface concrete to a depth of 0.30mbgl. Thereafter, the Made Ground within WS2 was recorded as a brown speckled light brown slightly sandy Gravel of flint, to a depth of 0.75mbgl.

In the case of TP1, these soils were logged as a dark brown clayey slightly gravelly Sand, with the gravel portion recorded as flint, clinker and brick, with rare pieces of plastic. These soils were encountered to a depth of 0.65mbgl.

It is recommended that the reader reviews the logs within Appendix C for more information pertaining to the encountered Made Ground soils.

6.2.3. Sandy Clay

The initial natural soils encountered within all exploratory holes, below the Made Ground described above, were generally described as a sandy Clay to depths of 1.60mbgl. The soils were logged as ranging from very soft to firm consistency, orangish brown, sandy Clay, with occasional angular and sub-angular fine and medium gravel of flint, and occasional roots. These soils were sometimes recorded as silty and/or locally very sandy depending on the hole location. The sand portion of these soils was logged as fine and medium grained-size.

6.2.4. Very Sandy Clay

Exclusively within WS1 and WS2, from depths ranging 1.20-1.60m to 2.40-2.50mbgl, a very sandy Clay was encountered. This stratum was logged as a firm orangish brown speckled light brown very sandy slightly gravelly Clay. It is suspected that at a larger scale this material is likely interbedded Sand and Clay.

6.2.5. Gravel

Soils considered to be representative of the underlying River Terrace Deposits were exclusively encountered within the two windowless sample boreholes (WS1 and WS2) from depths ranging 2.40-2.50mbgl to the maximum intrusive depth of 4.60mbgl.

These granular soils were predominantly logged as a brown speckled light brown and grey slightly silty sandy angular to sub-rounded fine to coarse Gravel of flint, with the sand portion recorded as fine to coarse grained-size. Based on the SPT data this stratum can mostly be described as Dense in terms of relative density.

At the base of WS1, from 4.30m to 4.60mbgl, these granular soils were recorded as orange silty very sandy Gravel. Similarly, at the base of WS2, the granular soils were logged as brown speckled light brown slightly clayey sandy Gravel.

6.3 Groundwater Conditions

Groundwater was only encountered within WS1 at a depth of 4.00mbgl during the investigation.

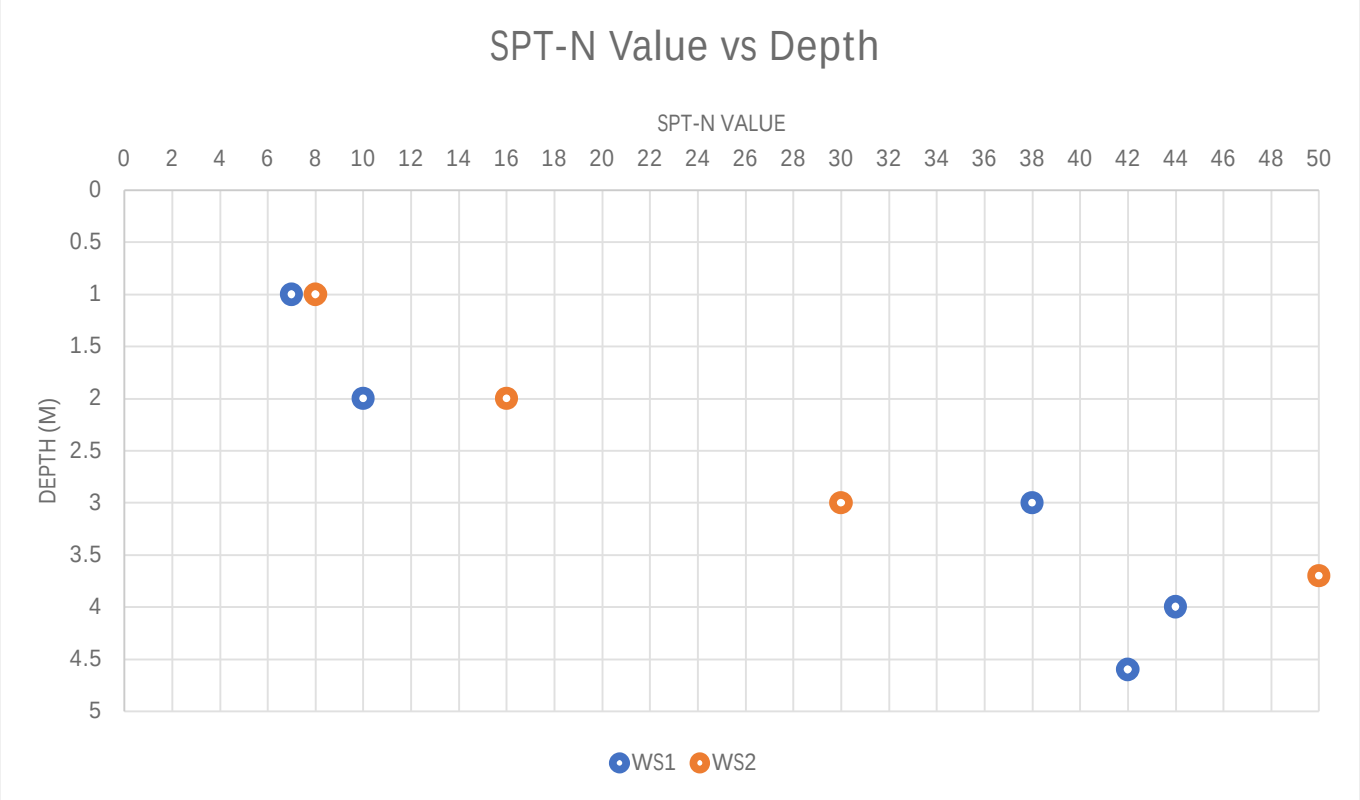
6.4 Visual and Olfactory Observations

Other than the anthropogenic material observed in the Made Ground soils, no other visual or olfactory evidence of contamination was noted during the investigation.

6.5 In-Situ Testing

6.5.1. Standard Penetration Testing

Standard Penetration Testing (SPT) was completed throughout the drilling of the boreholes at circa 1.00m centres. SPT is an in-situ dynamic penetration test to provide information on the geotechnical engineering properties of soil. This form of testing is completed using a 63.5kg drop hammer weight, over a 750mm drop, measuring the blow counts for six, 75mm increments. The first two values are recorded as seating blows, with the remaining four values, added together to provide an 'N-value'. 'N-value' of N≥50 is considered a refusal. The results are presented within the graph overleaf. It is recommended to review the engineering logs within Appendix C for further information.



Graph 6.1: Standard Penetration Testing

The results initially show relatively low values at 1.00mbgl, SPT-N=7-8, which correlates with firm consistency soils. Thereafter, at a depth of 2.00mbgl, a slight increase in SPT-N is recorded (N=10 to N=16). A notable increase in SPT-N value at 3.00mbgl tallies with the presence of the underlying gravel, with values ranging from N=30 to N=50, consistent with dense to very dense granular soils. The slight drop in SPT-N at circa 4.00mbgl within WS1, compared to WS2, may be as a result of the presence of underlying groundwater, loosening the granular soils.

7. LABORATORY TESTING

Soil samples collected during the IGL investigation from various depths and locations were submitted to UKAS accredited laboratories. Laboratory test certificates are included as Appendix E.

7.1 Geotechnical Testing

7.1.1. Atterberg Limits and Natural Moisture Content

Five soil samples were submitted for determination of their Natural Moisture Content (NMC) and Atterberg Limits testing to determine their respective Plasticity Index (PI). The results are tabulated below.

Hole ID (m)	Stratum	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425µm sieve (%)	Modified Plasticity Index (%)
WS1 1.00m	River Terrace Deposits	21	36	17	19	94	18
WS1 1.20-2.50m	River Terrace Deposits	17	36	16	20	90	18
WS2 1.00m	River Terrace Deposits	20	43	17	26	96	23
WS2 1.50m	River Terrace Deposits	19	39	15	24	92	22
WS2 2.00-2.40m	River Terrace Deposits	17	33	14	19	93	18

Table 7.1: Atterberg Limits Testing Results

The soils tested recorded NMC values ranging 17% to 21%, Plasticity Index values ranging 19% to 26%, with Liquid Limits of 33% to 43%. These values correspond to cohesive soils with low to intermediate Plasticity. Considering the percentage retained on the 425µm sieve (<5%), the modified plasticity index values range between 18% and 23%.. In accordance with NHBC guidance (chapter 4.2 'Building Near Trees'), these cohesive soils can be described as having 'worst-case' medium volume change potential.

It is possible to use the relationship between NMC and 40% of the respective Liquid Limit of a sample (0.40 LL) as a preliminary screen for potential desiccation in a clay soil, with those samples whose NMC <0.4 LL suspected as possibly desiccated. Based on the results and using this method no evidence of desiccation is indicated in the samples tested.

7.1.2. Particle Size Distribution (PSD)

In total, three disturbed samples of the underlying soils were submitted for Particle Size Distribution (PSD) testing by wet sieve; classification testing to determine the percentage, range and grain sizes of soil types. The table below provides a summary of the testing:

Sample Ref	Component of Sample (%)				Description
	Gravel	Sand	Silt	Clay	
WS1 1.20-2.50m	7	49	26	18	Slightly gravelly very sandy silty CLAY
WS1 2.50-3.50m	63	30	7		Very sandy silty/clayey GRAVEL
WS2 2.50-3.40m	72	22	6		Sandy silty/clayey GRAVEL

Table 7.2: PSD Testing Results

These results correlate well with the hand descriptions made by the logging engineer.

7.1.3. Water Soluble Sulphate and pH

Eleven samples were submitted for determination of pH and Water Soluble Sulphate concentration over the depth range of 0.10m to 3.45mbgl. Water soluble sulphate concentrations were found to range from 10mg/l to 190mg/l, with pH levels ranging from 7.4 to 8.1.

7.2 Geo-Environmental Testing

In light of the IGL PRA (Ref: P24.118.PRA, dated: March 2024), it was recommended to undertake an intrusive site investigation, along with soil analysis, in order to assess and refine the risks associated with the potential pollutant linkages.

7.2.1. Rationale

Soil samples collected during the IGL investigation were submitted to a UKAS accredited laboratory for analysis against a generic contamination suite. The generic contamination suite included heavy metals, phenols, speciated polyaromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPHs), BTEX and MTBE compounds and an asbestos screen. These suite was chosen to reflect the Contaminants of Concern (CoCs) identified within the preliminary CSM.

The soil samples were chosen at various locations and depths (ranging 0.10m to 0.80mbgl) in order to both target specific areas of concern (i.e. identified potential contaminant sources – proposed gardens), as well as to provide coverage of the development area. Generally, samples were selected from the encountered Made Ground; and therefore, probable worst-case with respect to the site and development area. Soil analysis rationale is tabulated below.

Sample ID	Material	Location	Rationale
WS1 at 0.40m	Made Ground	Proposed building footprint	Taken from Made Ground soils and therefore probable worst-case conditions
WS2 at 0.50m			
TP1 at 0.10m		Proposed rear garden to 17 Lyon Street	Taken from Made Ground soils within proposed garden area and therefore targeting pollutant linkages associated with residential end users (human health receptors)
TP1 at 0.30m			
TP1 at 0.80m	Natural soils		Sampled from natural soils below Made Ground above in order to provide vertical delineation, as well as to provide information as to background contamination levels

Table 7.3: Geo-Environmental Soil Analysis Rationale

7.2.2. Generic Assessment Criteria

In order to assess the soil analysis with regard to potential human health risks, IGL has compared the results against Generic Assessment Criteria (GAC). GAC are conservative contaminant concentration values used for comparison purposes to assess the risks associated with contaminant concentrations on site and are derived using non-site-specific information. For the purposes of these works, these include the following:

> Suitable 4 Use Levels (S4ULs) Generic Assessment Criteria (GAC) developed by the Chartered Institute of Environmental Health (CIEH) in partnership with Land Quality Management Ltd. (LQM).

Category 4 Screening Levels (C4SL) for lead, produced by CL:AIRE (2014).

The UK Soil Guideline Values (SGVs) for selected metals, BTEX and phenols, produced by the EA and Department of Environment, Food and Rural Affairs (2009).

Based on the proposed end use, comparisons have been made against the 'Residential with homegrown produce - RwHP' land use setting. A conservative Soil Organic Matter (SOM) value of 1% is used for organic contaminants (i.e. TPH and PAHs) as a worst-case scenario, unless otherwise stated.

7.2.3. Soil Results

Laboratory certificates are included as Appendix E.

Asbestos

Asbestos was not detected within any of the tested samples following the asbestos screen.

Heavy Metals

Concentrations of lead (Pb) from three of the five soil samples (scheduled for lead) were recorded exceeding the relevant screening criteria (pC4SL 'RwHP' – 200mg/kg). There were no other exceedances of the applicable screening criteria for any of the remaining heavy metal determinands from all tested soil samples. The table below summarises the lead results.

Contaminant - Lead			
Sample Location and Depth	Sample Concentration (mg/kg)	'RwHP' Screening Criteria (mg/kg)	'Commercial' Screening Criteria (mg/kg)
WS1 at 0.40m	948	200	1100
WS2 at 0.50m	188		
TP1 at 0.10m	1680		
TP1 at 0.30m	1120		
TP1 at 0.80m	152		

Table 7.4: Concentrations of Lead (Pb)

All three exceedances of the 'RwHP' screening criteria were recorded from the encountered Made Ground soils. Moreover, exceedances of the less stringent 'Commercial' setting (GAC = 1100mg/kg) were recorded from Made Ground within TP1 (at 0.10m = 1680mg/kg, and 0.30m = 1120mg/kg). However, it should be noted that the concentration of lead from the deeper tested natural soil sample within TP1 (TP1 at 0.80m) did not record any exceedances of the applicable screening criteria (sample = 152mg/kg, GAC 'RwHP'=200mg/kg).

PAHs

There were no exceedances of the screening criteria from any of the tested samples for all PAH determinands. Furthermore, all PAH determinands were recorded below their respective laboratory LOD from two of the five tested soil samples, WS2 at 0.50m and TP1 at 0.80m.

TPHs

An exceedance of the applicable screening criteria has been reported for TPH Aromatic >C21-C35 from TP1 at 0.30m, with a reported concentration of 1395mg/kg (GAC=1100mg/kg). There were no other exceedances of the

screening criteria for any of the remaining TPH determinands from the tested samples. Furthermore, all TPH determinands were recorded below their respective laboratory LOD from two of the five tested soil samples, WS2 at 0.50m and TP1 at 0.80m.

BTEX and MTBE

There were no exceedances of the screening criteria from any of the tested samples for all BTEX determinands and MTBE.

7.2.4. Summary

Exceedances of the RwHP' screening criteria were reported for lead and TPH (Aromatic >C21-C35) from the tested Made Ground soils on site. Elevated levels of lead within pre-war (WWII) terraced gardens is not uncommon, due to a combination of urban build-up and poor material validation (pre and post war) leading to poor soil conditions. The elevated concentration of TPH Aromatic >C21-C35 may be as a result of a historical localised oil spill, possibly from a domestic DIY project. Nevertheless, it appears to be restricted to shallow Made Ground soils, as the tested natural soils have not reported elevated (i.e. exceeding GAC) levels of TPH Aromatic >C21-C35, or lead. Asbestos was not detected within any of the tested samples following the asbestos screening.

8. GROUND GAS AND SOIL VAPOUR ASSESSMENT

A multiple-lines-of-evidence approach has been adopted to inform on both the ground gas and soil vapour risks on site. Factors detailed in the table below are pertinent to the risks on site. This information has been taken from a review of the PRA (Ref: P24.118.PRA, dated: March 2024) and/or interpreted from the intrusive investigation conducted.

Factor	Evidence for Ground Gas/Soil Vapour Potential on Site	Evidence against Ground Gas/Soil Vapour Potential on Site
Landfills	-	There are no records of current and/or historical landfills in or within a 500m radius of the site.
Ground/mine workings	-	There are no records within a 500m radius of site.
Made Ground organic content	Relatively high organic matter 4.5-6.2%, with a TOC in the order of 3%	Relatively thin layer of Made Ground. Limited evidence of any ground gas generating material (peat, decomposing organic matter).
Natural Soil organic content	-	Low organic matter value (1.6%). No evidence of any ground gas generating material (peat, decomposing organic matter).
Site Investigation	-	No notable hydrocarbon-specific visual and/or olfactory evidence of contamination; subsequent laboratory analysis confirmed this observation.
Volatiles	-	No evidence of any hydrocarbon-specific visual and/or olfactory evidence of contamination during investigation. Soil laboratory results returned comparatively low concentrations of hydrocarbon-specific contaminants.

Table 8.1: Factors Influencing Ground Gas Potential

8.1 Ground Gas and Soil Vapour Risk

Based on the information within Table 8.1, the risks from both ground gas and soil vapour are currently considered to be Low.

9. GEOTECHNICAL DISCUSSION

Proposals include conversion of the existing dwelling (9 Cranbury Place) into 2no one-bedroom flats, and the erection of a 3no bedroom dwelling to the rear (17 Lyon Street). The exact loadings for the new construction are not known at this stage. The selection and design of foundations is beyond the scope of current instruction and is the responsibility of the designers of the proposed building. The following discussion, deriving from observations made during the investigation and testing, are provided to support the design process.

9.1 Soil Engineering Properties

The following section discusses the key engineering properties of each encountered stratum as identified within the investigation and laboratory testing. In summary, the stratigraphy revealed during the investigation comprised Made Ground, over River Terrace deposits.

9.1.1. Made Ground

Below a surface of concrete, Made Ground soils were encountered in all locations, comprising of a mixture of Sand or Gravel.

The initial Made Ground soils encountered within WS1 were recorded below the surface concrete to a depth of 0.20mbgl. This material was described as a light grey speckled red sandy Gravel of concrete, flint and brick, presumably as a sub-base layer for the concrete slab above. Below this, the soils within WS1 were logged as a dark brown very clayey gravelly Sand, with the gravel recorded as flint, brick and clinker, with rare pieces of plastic, recorded from 0.20m to 0.70mbgl.

A brown speckled red clayey gravelly Sand was encountered within WS2 below the surface concrete to a depth of 0.30mbgl. Thereafter, the Made Ground within WS2 was recorded as a brown speckled light brown slightly sandy Gravel of flint, to a depth of 0.75mbgl.

In the case of TP1, these soils were logged as a dark brown clayey slightly gravelly Sand, with the gravel portion recorded as flint, clinker and brick, with rare pieces of plastic. These soils were encountered to a depth of 0.65mbgl.

9.1.2. River Terrace Deposits (Cohesive)

The initial natural soils encountered within all exploratory holes, below the Made Ground described above, were generally described as a sandy Clay, locally clayey Sand to maximum depth of 2.40mbgl in WS2 and 2.50mbgl in WS1. The soils were logged as ranging from very soft consistency in WS1 from 0.70-1.20mbgl and firm consistency below 1.20mbgl, and from 0.75mbgl in WS2. These soils were sometimes recorded as silty and/or locally very sandy depending on the hole location.

Laboratory testing indicates that these River Terrace Deposits are low to intermediate Plasticity and would be considered to have ‘worst-case’ medium volume change potential.

In-situ testing suggests that the stratum is generally soft to firm consistency, with SPT-N values ranging from N=7 to N=16, which correlate to generally firm consistency soils.

9.1.3. River Terrace Deposits (Granular)

Soils considered to be representative of the underlying River Terrace Deposits were exclusively encountered within the two windowless sample boreholes (WS1 and WS2) from depths ranging 2.40-2.50mbgl to the maximum intrusive depth of 4.60mbgl.

These granular soils were predominantly logged as a brown speckled light brown and grey slightly silty sandy angular to sub-rounded fine to coarse Gravel of flint, with the sand portion recorded as fine to coarse grained-size.

In-situ testing completed within stratum provided SPT N-values of N=30-50+, which correlates to dense to very dense soils.

9.1.4. Groundwater

Groundwater was only encountered within WS1 at a depth of 4.00mbgl during the investigation.

9.2 Shallow Foundations

It cannot be recommended to place major structural foundations within Made Ground Soils. Materials of this origin are frequently present in a weak and variable condition due to their emplaced nature and would be expected to give rise to unacceptable settlement even at light loading intensities.

The initial soils recorded in WS1 at 0.70mbgl are recorded as soft to firm, and are not considered a suitable founding medium for new foundations. The subsequent soils in WS1 below 1.20mbgl, and found beneath the Made Ground soils in WS2 at 0.70mbgl, are described as a firm very sand Clay. This stratum would be considered suitable for shallow foundations. However, this material is of firm consistency and low to medium strength, as such bearing capacities within this material will be limited.

When selecting foundation depths within cohesive soils, the presence of existing or removed trees should be taken into account as per NHBC guidance. If any trees are noted, the tree species and height should be noted and NHBC guidance reviewed, to ensure new foundations are placed suitable below any zone of influence of tree roots. It was noted during the site works, that a Magnolia tree had been partially removed as part of the works, which will be within the footprint of the proposed building.

On review of NHBC guidelines, a Magnolia tree is classified as low volume demand with a maximum height of 9m. The full height of this tree is unknown; however, it is unlikely to have been more than 3-4m high.

Taking into account soil conditions encountered – cohesive soils of medium volume change potential, a recommended foundation depth of 1.30-1.50mbgl should be adhered to on the basis of the low water demand Magnolia species.

These findings therefore do not supersede recommendations for foundation depth on the basis of soil strength and on the basis of both soil strength and tree root influence we would recommend that foundations are placed at a minimum depth of 1.50mbgl.

Therefore, at a depth of 1.50mbgl, within the firm very sandy Clay, a safe bearing pressure of 70kN/m^2 may be considered, increasing to 95kN/m^2 at a depth of 2.00mbgl. These values include a factor of safety of 3 and assumes a minimum foundation width of 600mm.

It should be noted that siting foundations within the underlying granular River Terrace Deposits would provide a greater safe bearing capacity of 150kN/m^2, at a depth of 2.50mbgl should this be practicable.

Structural reinforcement may be considered for additional design confidence. In addition, any soft spots encountered should be removed and replaced with suitable engineering fill material, foundation depth locally deepened or bridged, where possible. It is also recommended that foundation exposures should be inspected by the designing engineer to ensure that the founding material is appropriate for the applied design criteria / assumptions.

New foundations must not be cast over existing structures/ foundations relating to previous structures on site; these should be removed prior to forming final excavations. Loose material should be removed from the base of the excavations and the excavations should be concreted as soon as possible. Failure to do so could result in increased and differential settlement.

It is however noted that the proposed new construction is to be constructed in between two existing properties, which are in close proximity and therefore the excavation of deep trench foundation may prove problematic or undermine adjacent foundations, if these foundations are shallower. The adjacent foundations should therefore be confirmed as part of the design process.

In addition, should the provided bearing capacity be insufficient for the proposed loadings, then the use of a piled foundation would be required. The underlying granular River Terrace Deposits are recorded as dense to very dense material and as such, may provide a suitable bearing of piles, however confirmation of the soils below 5.00mbgl, may be required by the piling contractor. The completion of a deep borehole, therefore maybe required to satisfy their designs.

9.3 Deep Foundations

If a higher load is required for the proposed development, or the depth of excavations for trench fill foundation next to adjacent buildings dictates, then it is recommended that a piled solution is adopted.

Once the full development design and layout plans including anticipated loadings are known then it is recommended that a piling contractor is consulted to confirm the most appropriate pile design and construction methods. Actual design working loads will be dependent on the type of pile and installation method.

9.4 Floor Slabs

The floor slab design will depend on the final foundation designs and is dependent on the underlying materials, including bearing capacity and the presence of any cohesive or Made Ground soils. It is recommended to consider the use of a suspended floor for the new buildings in response to the presence of Made Ground soils in excess of 0.60m and the underlying medium shrinkage potential of the superficial soils.

9.5 Excavations and Groundwater

It is possible that excavations to depths of 1.20m will require support and shoring, based on the investigation to date, due to the granular Made Ground soils. Excavations into which personnel are to enter will require individual risk assessment and appropriate shoring and support provided in order to satisfy statutory safety regulations.

Temporary propping to adjacent structures may be required during foundation excavations on site, particularly where their foundations are to be undermined.

Groundwater was encountered at a depth of 4.00mbgl during the investigation. It should be noted that groundwater levels are dependent upon seasonal variations and levels may change after periods of heavy rainfall or prolonged drought; the investigation was undertaken during winter throughout a period of frequent rain. Where groundwater or surface water is encountered within any excavations during the construction phase it should be dealt with appropriately and removed using good engineering practices.

9.6 Retaining Structures

The design of any temporary retaining structures to support excavation faces should be made assuming the following moderately conservative parameters.

Material	Effective Angle of Friction (ϕ')	Effective Cohesion (kPa)	Bulk Density (kN/m^3)
Made Ground	23-24	0	16-17
River Terrace Deposits – Cohesive	25-26	0	17-18
River Terrace Deposits – Granular	32-34	0	18-19

Table 9.1: Retaining Wall Parameters

9.7 Aggressive Chemical Environment to Concrete

The results of laboratory testing (water soluble sulphate 10mg/l to 190mg/l, with pH levels ranging from 7.4 to 8.1 have indicated a design class of DS-1 and a subclass of AC-1, based on BRE SD1 and therefore buried concrete should be specified to comply with this classification.

10. GEO-ENVIRONMENTAL DISCUSSION AND CONCLUSIONS

The following conclusions and recommendations have been made based on the investigation undertaken to date in light of the outlined proposals. Any alterations to the proposals may warrant a reassessment.

10.1 Discussion of Findings

The preliminary Conceptual Site Model (Ref: P24.118.PRA, dated: March 2024) identified the following potential sources of contamination:

On-Site Sources

Possibility of Made Ground on site as a result of the historical development, including demolition of the previous structures; urban areas, such as Southampton, can have high levels of background heavy metals. Contaminants of Concern (CoCs) include heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs) and Asbestos Containing Soils (ACMs).

Off-Site

Potential for spills/leaks of fuels/oils associated with the processes and infrastructure at the neighbouring historical garage (30-40m west). CoCs pertain to hydrocarbon-specific contaminants, such as Total Petroleum Hydrocarbons (TPH) and BTEX.

In summary, the preliminary CSM identified a Low to Moderate risk to residential end users, through contact with potentially impacted soils associated with the Made Ground on site, driven as a result of the sensitivity of the receptor and potential for impacted soils (Made Ground) to be present within proposed private gardens. This risk is defined as, 'The site may not be suitable for the present or future use and environmental setting. Contaminants are probably present and might have unacceptable impact on key targets'.

10.1.1. Significance of Soil Results

Soil samples were submitted to the laboratory for analysis against a contamination suite reflecting the contaminants of concern highlighted within the Preliminary CSM.

Following analysis elevated levels of lead and TPH Aromatic >C21-C35 were reported from Made Ground soils. Most notably within TP1, where the concentration of lead within the encountered Made Ground was found to be in excess of the less stringent 'Commercial' land use setting screening criteria. The levels of lead recorded provide a viable hazard to human health. The location of TP1 is within the proposed garden to 17 Lyon Street; consequently, as the location of these exceedances are within proposed garden, there remains a viable pathway from these soils to residential end users.

The remaining soil samples reported no exceedances of the applicable screening criteria for any of the tested contaminants. Moreover, the sample from natural soils returned no exceedances, and a significant number of determinands from this sample were reported below their respective laboratory LOD; consequently, this suggests that the elevated contaminants encountered are restricted to Made Ground. Asbestos was not detected within any of the tested samples.

10.1.2. Controlled Water

During the investigation, groundwater was only encountered within WS1 at a depth of 4.00mbgl. As discussed with the Preliminary CSM, the sensitivity of controlled water (i.e. underlying groundwater) is relatively low due to the absence of an underlying Principal Aquifer, as well as water abstractions and SPZs within the site and surrounds. Therefore, following the investigation, and results of laboratory soil analysis, there are not deemed to be significant risks to controlled waters pertaining to the site (specifically the underlying groundwater). As a result, the risks to controlled waters associated with the source-pathway-receptor pollutant linkage identified within the PRA remain as Negligible to Low.

10.2 Conceptual Site Model

The refined Conceptual Site Model (CSM) has been formulated in accordance with BS EN ISO 21365:2019 Soil Quality – Conceptual Site Models for Potentially Contaminated Sites and following information collated within the Site Investigation conducted and is intended to complete the GQRA, in accordance with LCRM 2020. In this instance, it is used to assess the significance of contaminative sources associated with Made Ground soils identified across the site, receptors, and the validity of the pathway between them. As such, whilst other pollutant linkages may have been acknowledged within the Preliminary CSM, these will not be included within the updated CSM and Risk Assessment. An explanation of categories is provided below the CSM table.

Category	Examples
High	Residential with gardens/Groundwater Source Protection Zone
Medium	Residential without gardens/Principal (Major) Aquifer/sensitive watercourse
Low	Commercial and industrial use/Secondary (Minor) Aquifer
Very Low	Construction and maintenance workers/non-sensitive watercourse

Table 10.1: Sensitivity of Receptor

Category	Examples
Gross Impact	Heavily contaminated gasworks or industrial site, hazardous waste landfill
Moderate Impact	Major leaks and spills from fuel infrastructure (e.g. petrol stations), domestic waste landfills
Slight Impact	Minor leaks and spills from fuel infrastructure, 'inert' waste landfills

Table 10.2: Magnitude of Impact

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway.

Category	Examples
High likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
Low likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.

Table 10.3: Likelihood of Pollutant Linkage

A description of these risk classifications and likely action required are given in the tables below.

Negligible Risk	The site should be considered suitable for the present or future use and environmental setting. Contaminants unlikely to be present, which might have unacceptable impact on key targets.
Low Risk	The site should be considered suitable for the present or future use and environmental setting. Contaminants may be present but unlikely to have unacceptable impact on key targets.
Moderate Risk	The site may not be suitable for the present or future use and environmental setting. Contaminants are probably present and might have unacceptable impact on key targets.
High Risk	The site is probably or certainly not suitable for the present or future use and environmental setting. Contaminants are probably or certainly present and likely to have unacceptable impact on key targets.

Table 10.4: Risk Classification

10.2.1. Conceptual Site Model and Risk Assessment

The assessment below relates to current site conditions, based on the proposed development, and without any further investigation or mitigation measures.

Source	Pathway	Receptor	Likelihood	Potential Risk
Elevated levels of Lead, and locally TPH, within the Made Ground soils on site	Inhalation, ingestion and dermal contact from exposure to contaminated soils	Residential end users	Likely	Moderate to High
		Site workers (during development)	Likely	Low
Discussion of Risks				
Future residential end users represent the most sensitive receptor due to age profile (including children) and potential for exposure to impacted soils within a private garden setting. The confirmed exceedances of the residential screening criteria for lead and TPH presents a viable hazard to residential end users. Consequently, a Moderate to High risk has been deemed appropriate as contaminants are present and likely to have an unacceptable impact on the receptor. Site workers are likely to come into contact during the groundworks stage. The short exposure time and sensitivity of the receptor reduces this risk somewhat compared to residential end users; the receptor (site workers during development) is less vulnerable as it excludes children and the elderly.				

Table 10.5: Source 1 – CSM

11. GEO-ENVIRONMENTAL RECOMMENDATIONS

The following recommendations are based on the plans proposed at the time of writing this report and may be subject to change. With respect to this investigation, the proposals include the erection of a 3no bedroom dwelling at 17 Lyon Street. The design of the site investigation incorporated information from previous reports along with consideration of the preliminary development plans. Potential contamination sources were investigated as far as reasonably practicable and within the permitted timeframe.

Following the investigation to date, a Moderate to High risk has been identified to residential end users from the Made Ground identified on site. Consequently, remedial mitigation measures are recommended in order to reduce and/or eliminate these risks.

11.1 Outline of Remedial Options

The following remedial options have been designed based on the investigation to date. The methods set out should be treated as a guidance and not as a complete Stage 2: Remediation Options Appraisal, unless otherwise approved by the Local Authority. It should be noted that these remediation measures may be subject to change depending on the proposed development.

It has been deemed necessary to utilise a cover system within areas of proposed gardens included within the development. The purpose of this is to break the pathway from the identified Made Ground to residential end users. The cover system should comprise a suitable thickness of 'clean' certified soils. Proposed areas of building footprint and/or hardstanding will unlikely require any further attention, as the presence of concrete/hardstanding will break the pathway.

Site workers should be protected by tool box talks, site inductions, the use of PPE and appropriate wash facilities. Measures should be put in place during construction to restrict the release of nuisance dust in response to elevated levels of Lead and the presence of asbestos.

11.2 Proposed Areas of Soft Landscaping

A suitable minimum depth for private gardens of 'clean' material is 600mm, this should be adopted for the following reasons:

Root systems for shrubs are typically up to 600mm

Typical gardening excavations are unlikely to be deeper than 600mm

Bio-turbation is typically limited to top 600mm

Within proposed garden areas the following measures are considered necessary:

Excavation to a depth of 0.60m below proposed finished level or to the base of the Made Ground, whichever is shallower.

Installation of a geotextile membrane at the base of the excavation which should be overlain by a thickness of 50mm compacted TYPE 1 fill to act as a root / mixing barrier.

Importation of clean, certified subsoil to fill up to a level of minimum 150mm below finished level.

Importation of clean, certified topsoil to fill up to ground level with a minimum thickness of 150mm.

It is considered that existing Made Ground soils may remain in place below pavements and building footprints provided that they constitute a permanent feature, as the pathway to underlying Made Ground soils will be broken.

11.3 Watching Brief

A watching brief should be maintained on site, particularly during ground works. This must be undertaken as part of good working practices and in case there are any areas of unidentified contamination.

During any ground works, an appraisal of the exposed soils should be made by the on-site manager or developer's nominated person. If any material is noted to show visual and/or olfactory sign of contamination this material should be stockpiled separately and tested prior to its appropriate removal off site or re-use where necessary. A suitably qualified environmental specialist should be contacted to advise what further investigation is required.

The on-site manager/developer's nominated person should be able to display the relevant level of qualification and/or experience in managing construction works.

11.4 Services

It is recommended the services are situated within lined trenches. The trenches should be lined with a geotextile membrane and backfilled with clean fill, such as pea shingle, which will demarcate the services from the surrounding soils, protecting both the services and the future maintenance workers.

11.5 Record Keeping

Any remedial actions must be adequately documented in order that an accurate Validation/Verification Report may be issued to the statutory authorities upon request. The table below summarises actions currently identified as necessary, how and by whom the implementation of these should be recorded. Concise records of these actions must be kept for submission to the Local Authority within a Stage 3: Tier 2 Remediation Progress report, if required, and subsequently within a Stage 3: Tier 3 Verification Report.

Action Required	Detail Required for Validation	Party to Record Action
Watching Brief	Comprehensive photographic record of all excavation works, including images of all formation levels and new build-up. Records of all unexpected contamination, if encountered.	Signed watching brief report from Site manager / developer's nominated person.
Removal of appropriate thickness of Made Ground soil from proposed areas of soft landscaping.	Photographic record showing excavations, including depth detail.	Site manager / developer's nominated person.
Importation of a suitable thickness of cover system (clean certified material) to areas of proposed garden areas, and formation of permanent hard surfaces / building floor slabs	Test certificates to prove suitability. Photographic record including depth detail. Detailed drawings.	Site manager / developer's nominated person. Testing completed by Environmental Consultant.
Disposal of excess earth spoils from groundworks.	Waste classification testing, waste transfer notes / dockets.	Site manager / developer's nominated person.

Table 11.1: Record Keeping

11.6 Statutory Consultees

We would recommend that this report be forwarded to the relevant Statutory Consultees including the Local Council's Environmental Health and Planning Department to seek their comments and subsequent approval prior to works commencing on site.

The LCRM guidelines require Contaminated Land Risk Assessment to include for a Stage 2: Remediation Options Appraisal to inform the Stage 3: Tier 1 Remediation Strategy Report. These reports document the most suitable form of remediation techniques for the site and provide a methodology for how they are to be implemented.

Following their submission, the actual remedial works completed and an updated GQRA should be provided with the Stage 3: Tier 2 Remediation Progress and Stage 3: Tier 3 Verification Reports. These reports document the remedial works undertaken on site and provide necessary audit trails to prove works have been competed adequately, as well as identifying any need for ongoing monitoring/assessment. It is recommended that the specific requirements of the Local Planning authority are ascertained prior to any works commencing onsite.

APPENDIX A – SITE PLANS

Site Location Plan
AS PROPOSED
Scale 1:1250

N

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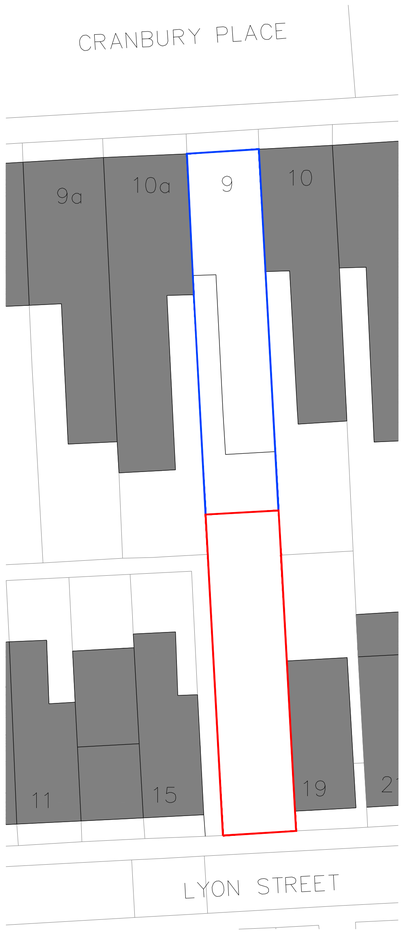

Site Plan
AS EXISTING
Scale 1:200

N

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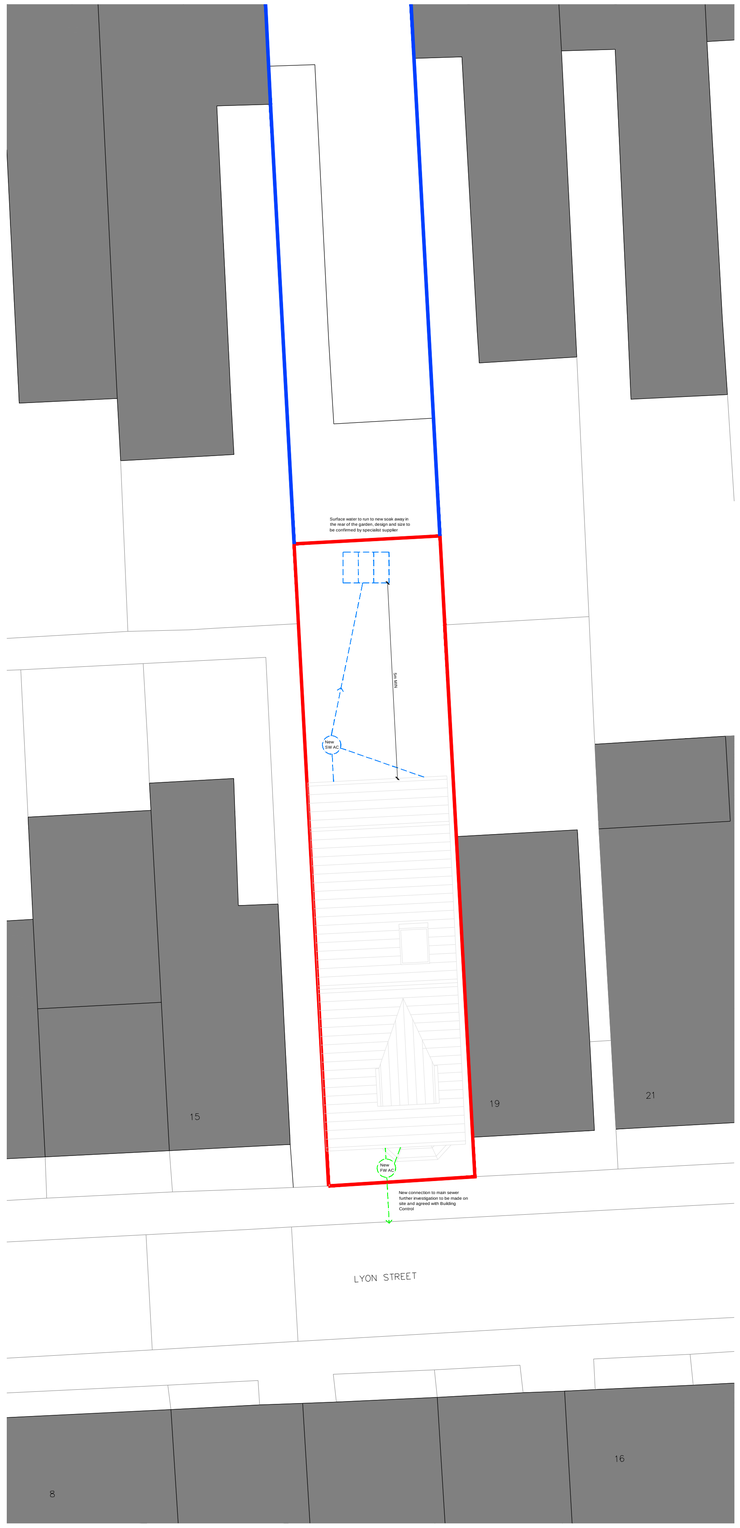

Site Plan
AS PROPOSED
Scale 1:100

N

0 1m 2m 3m 4m 5m

NOTES:

1) All dimensions to be checked on site. Any discrepancies to be reported to the CA, prior to manufacture/construction
2) Refer to Structural Engineers details/ drawings for all beam, column, padstone, masonry strength calculations
3) Finishes & decorations to Clients specification
4) Allow for cutting of tiles around switches, sockets and making good
5) Allow for boxing's to existing & new services
6) All fixings and installation to manufacturers specifications and detail requirements
7) Existing Walls/doors/ floors to be protected
8) All M&E fixtures/fittings/equipment is notional. Final positions to be checked and confirmed with client
9) Sanitary appliances are not images of actual products. They are for illustrative purposes only
10) Client's responsibility to ensure all works comply with Party Wall Act
11) If Build over consent is required, this should be obtained before works commence, with local water authority

No.	Description	Date
A	Client Amendments	05.03.24

rs studio

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Drawing Title:
LOCATION, EXISTING & PROPOSED SITE PLANS

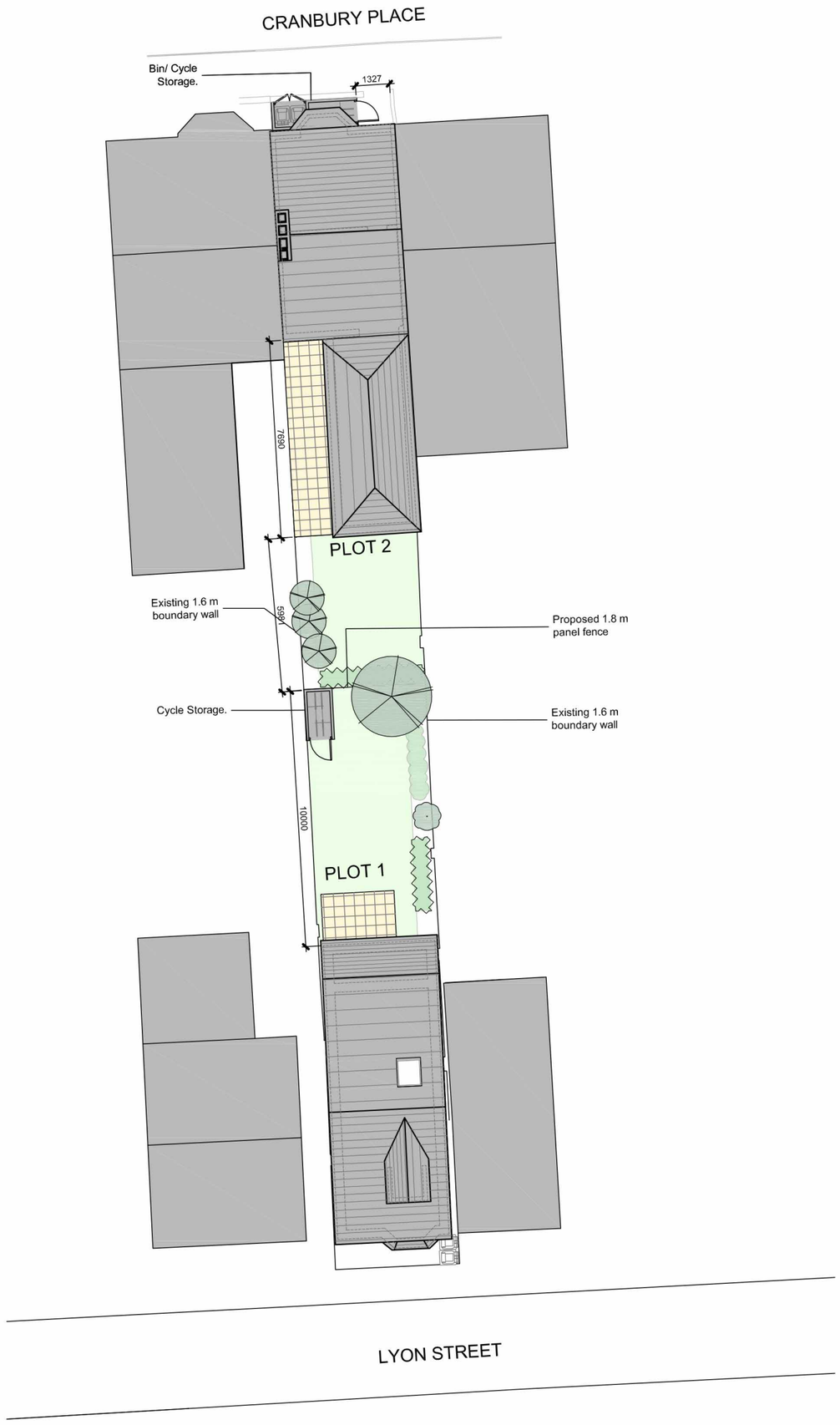
Project Title:
9 Cranbury Place,
Southampton,
S014 0LG

Drawing No.:
1703-BR-01

Date:	January 2024
Scale:	1:100
Drawn:	RJB
Checked:	RS

WORK IN PRO GRESS

Original Drawing Size: A1



NOTES

GENERAL NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONSULTANTS DRAWINGS.
2.ALL FINISHES ARE TO CONFORM TO THE CURRENT BUILDING REGULATIONS.
3. REFER TO A SEPARATE DOCUMENT FOR THE DESIGNERS RISK ASSESMENT.
4. ALL WORKS OR MATERIALS INDICATED ON THIS DRAWING ARE TO BE TO THE LATEST RELEVANT BRITISH STANDARDS AND CARRIED OUT IN ACCORDANCE WITH THE BRITISH STANDARDS CODES OF PRACTICE OR RECOGNIZED INSTITUTE OR TRADE ASSOCIATION RECOMMENDATIONS AND PUBLICATIONS.

ACCOMMODATION SCHEDULE

		GIA (m²)	Garden Area (m²)
PLOT 1	3B	91.4	47
PLOT 2 (FLAT 1)	1B1P	43	41
PLOT 2 (FLAT 2)	1B1P	47	-

KEY

Soft Landscaping

Indicates existing trees / shrubs.

Indicates new trees / shrubs to LA approval.

Hard Landscaping

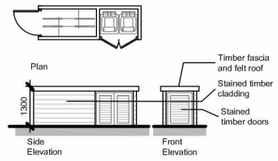
Tarmac.

Grass Landscaping

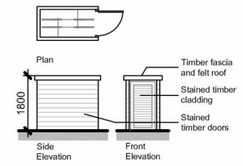
Block paving.

Boundary treatment details

Bin / Cycle store details



Cycle store details



1:200 scale

0 5m 10m

Revision	Date	Description	Dwn	Chkd
P2	Dec 2022	Planning	ST	
P1	Dec 2022	Planning	ST	

PLC ARCHITECTS
Lansdowne House
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Tel: (023) 92 755 333
E-Mail: admin@plcarchitects.com
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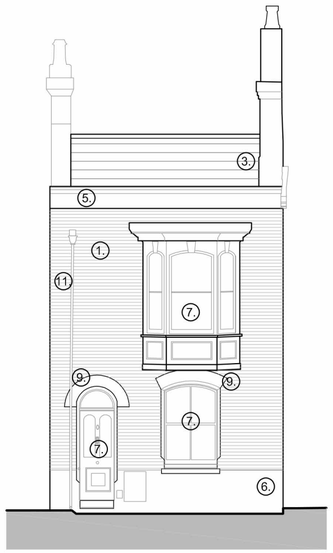
Client :

Project :
9
Cranbury Place, Southampton
SO14 0LG

Drawing Title :
Proposed Site Plan

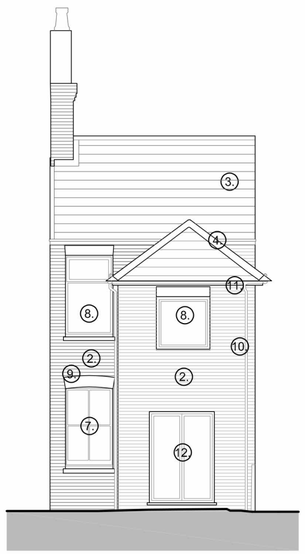
Drawn By	Date	Checked By	Date	Approved By	Date
ST	Dec'22				

Drawing No.	Revision:	Scale:
22.3391.101	P2	1:200@A3



Proposed North Elevation

Proposed West Elevation



Proposed South Elevation

Proposed Street Elevation (Cranbury Place)

NOTES

GENERAL NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONSULTANTS DRAWINGS.
2.ALL FINISHES ARE TO CONFORM TO THE CURRENT BUILDING REGULATIONS.
3. REFER TO A SEPARATE DOCUMENT FOR THE DESIGNERS RISK ASSESMENT.
4. ALL WORKS OR MATERIALS INDICATED ON THIS DRAWING ARE TO BE TO THE LATEST RELEVANT BRITISH STANDARDS AND CARRIED OUT IN ACCORDANCE WITH THE BRITISH STANDARDS CODES OF PRACTICE OR RECOGNIZED INSTITUTE OR TRADE ASSOCIATION RECOMMENDATIONS AND PUBLICATIONS.

External Materials

1. Yellow/ Brown facing brickwork (as existing).
2. Red facing brickwork(as existing).
3. Slate roof tiles (as existing).
4. Red ridge tiles (as existing).
5. Roof parapet (as existing).
6. White Render (as existing).
7. Painted timber windows and doors (as existing).
8. White UPVC windows and doors (as existing).
9. Brickwork lintel (as existing).
10. Black rainwater goods (as existing).
11. White painted timber fascias and soffits.
12. White UPVC windows and doors.

1:100 scale

0 1m 2m 3m 4m 5m

Revision	Date	Description	Dwn	Chkd
P3	Dec 2022	Planning	ST	
P2	Dec 2022	Planning	ST	
P1	Dec 2022	Planning	ST	

PLC ARCHITECTS
Lansdowne House
25-26 Hampshire Terrace
Portsmouth PO1 2QF
Hampshire England

Tel: (023) 92 755 333

E-Mail: admin@plcarchitects.com
Web: www.plcarchitects.com

Client :

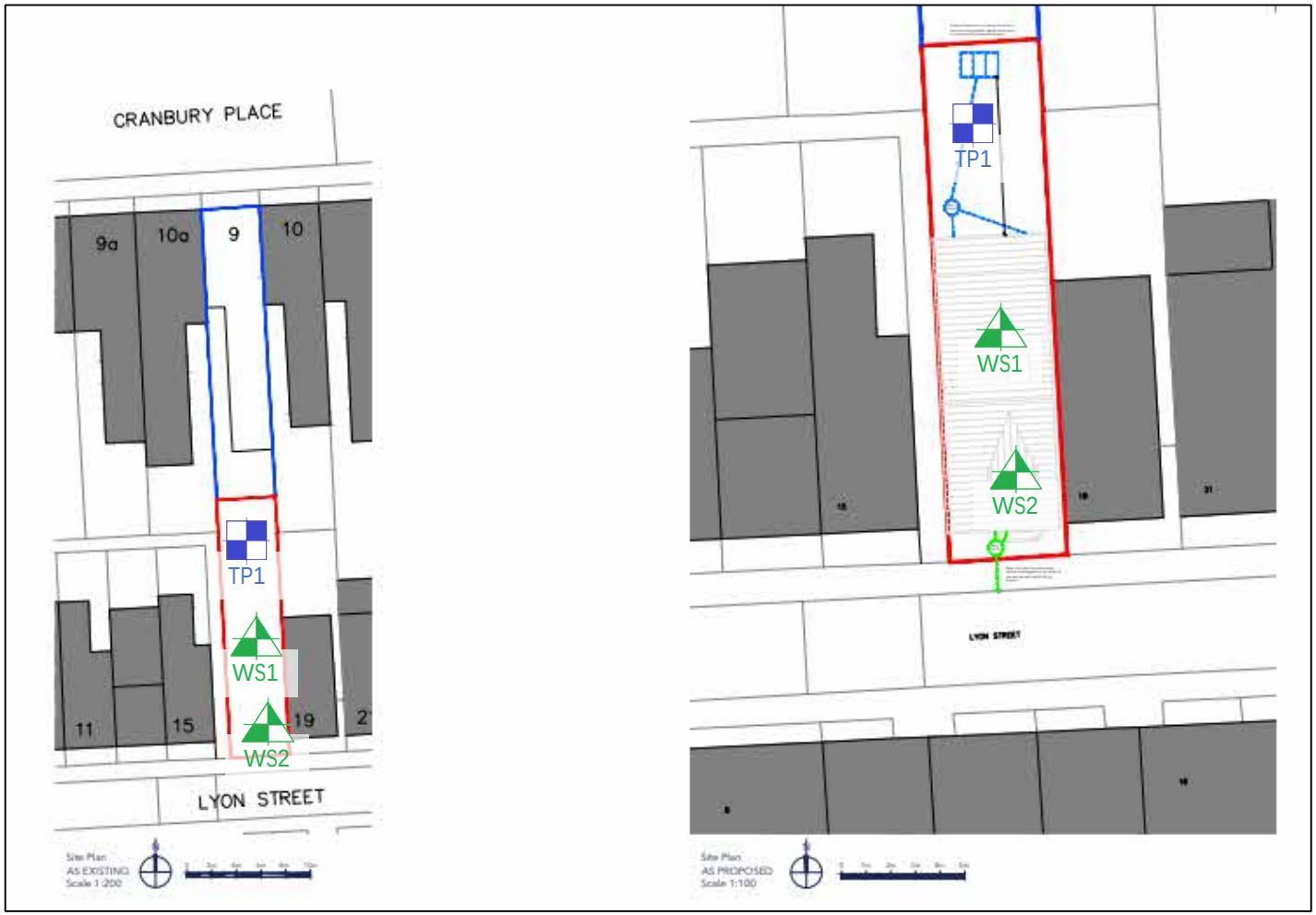
Project :
9
Cranbury Place, Southampton
SO14 0LG

Drawing Title :
Proposed Elevations
House Conversion

Drawn By	Date	Checked By	Date	Approved By	Date
ST	Dec' 22				

Drawing No.	Revision:	Scale:
22.3391.105	P2	1:100@A2

APPENDIX B – HOLE LOCATION PLAN



Project:	9 Cranbury Place	Title:	Hole Location Plan
Job Number:	P24.118	Client:	Roath Construction Ltd
Drawing:	P24.118/HLP	Revision:	-
Drawn:	RG	Date:	19/02/2024
Checked by:	SG	Scale:	NTS

Notes:
1. Do not scale from this drawing.
2. All dimensions must be checked on site prior to commencement of work.
3. Where applicable this drawing is to be read in conjunction with other consultants drawings.
4. This drawing is the copyright of Impact Geotechnical Ltd.

IMPACT GEOTECHNICAL

Impact Geotechnical Limited
www.impactgeo.co.uk

APPENDIX C – STRATIGRAPHIC LOGS


Well


Well


Well

APPENDIX D – PHOTOGRAPHS

1.

2.

3.

4.

Project:	9 Cranbury Place	Title:	Site Photographs
Job Number:	P24.118	1. Existing site 2. Existing site 3. Existing site 4. Existing site	IMPACT GEOTECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Roath Construction Ltd		
Produced by:	RG		
Checked by:	GC		

5.

6.

7.

8.

Project:	9 Cranbury Place	Title:	Site Photographs
Job Number:	P24.118	5. WS1 6. WS1 GL-1.00m 7. WS1 spoil 8. WS1 1.00-4.60m	IMPACT GEOTECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Roath Construction Ltd		
Produced by:	RG		
Checked by:	GC		

9.

10.

11.

12.

Project:	9 Cranbury Place	Title:	Site Photographs
Job Number:	P24.118	9. WS2 10. WS2 GL-1.00m 11. WS2 spoil 12. WS2 1.00-3.70m	IMPACT GEOTECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Roath Construction Ltd		
Produced by:	RG		
Checked by:	GC		

13.

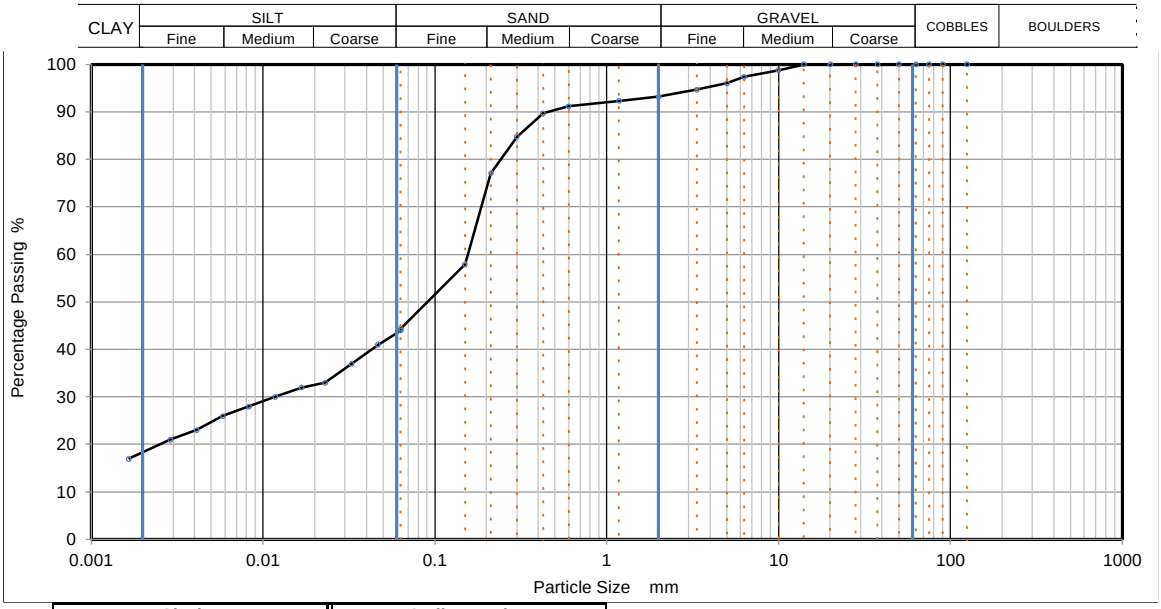
14.

Project:	9 Cranbury Place	Title:	Site Photographs
Job Number:	P24.118	13. TP1 14. TP1 GL-1.00m	IMPACT GEOTECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Roath Construction Ltd		
Produced by:	RG		
Checked by:	GC		

APPENDIX E – LABORATORY CERTIFICATES

PARTICLE SIZE DISTRIBUTION

				Job Ref	34927
				Borehole/Pit No.	WS1
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	1.20 m
Soil Description	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)			Depth Base	2.50 m
				Sample Type	B
				Samples received	22/02/2024
				Schedules received	28/02/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	29/02/2024
These results only apply to the items tested				Date tested	12/03/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	44
90	100	0.0466	41
75	100	0.0327	37
63	100	0.0230	33
50	100	0.0167	32
37.5	100	0.0118	30
28	100	0.0083	28
20	100	0.0058	26
14	100	0.0041	23
10	99	0.0029	21
6.3	97	0.0017	17
5	96		
3.35	95		
2	93		
1.18	92		
0.6	91	Particle density (assumed)	
0.425	90	2.70	Mg/m3
0.3	85		
0.212	77		
0.15	58		
0.063	44		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	6.8
Sand	48.8
Silt	26.0
Clay	18.4

Grading Analysis		
D100	mm	
D60	mm	0.156
D30	mm	0.0124
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

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

Email: james@k4soils.com

Tel: 01923 711288

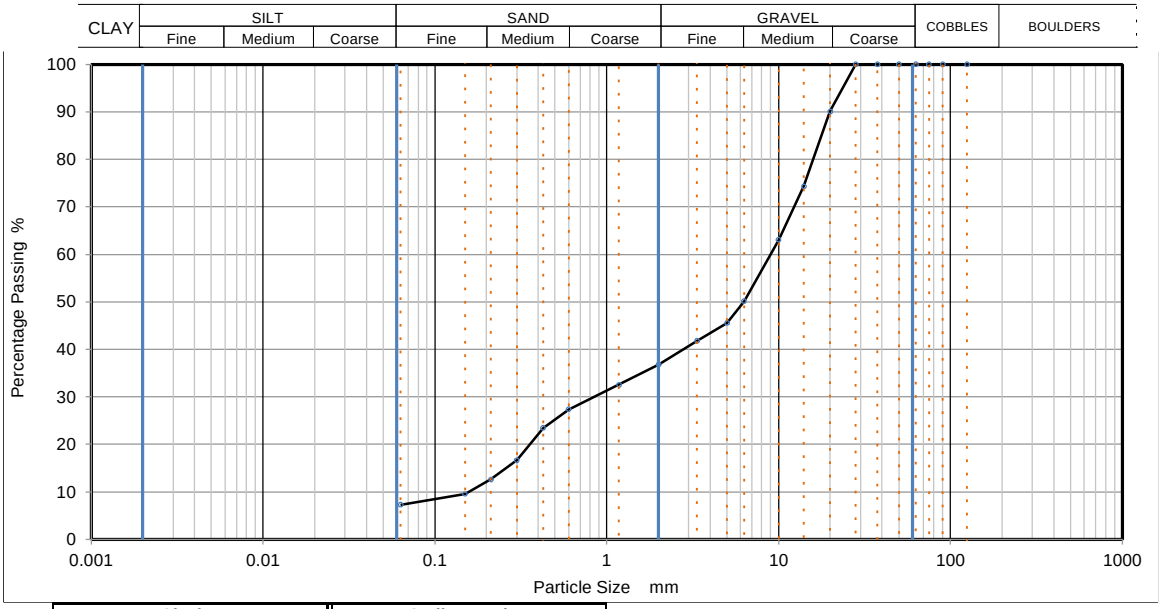
Checked and Approved

Initials: J.P

Date: 13/03/2024

PARTICLE SIZE DISTRIBUTION

				Job Ref	34927
				Borehole/Pit No.	WS1
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	2.50 m
Soil Description	Brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	3.50 m
				Sample Type	D
				Samples received	22/02/2024
				Schedules received	28/02/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	29/02/2024
These results only apply to the items tested				Date tested	12/03/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	90		
14	74		
10	63		
6.3	50		
5	46		
3.35	42		
2	37		
1.18	33		
0.6	27		
0.425	24		
0.3	17		
0.212	13		
0.15	10		
0.063	7		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	63.2
Sand	29.5
Fines <0.063mm	7.3

Grading Analysis		
D100	mm	
D60	mm	8.95
D30	mm	0.838
D10	mm	0.156
Uniformity Coefficient		57
Curvature Coefficient		0.5

Remarks

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Tel: 01923 711288

Checked and Approved

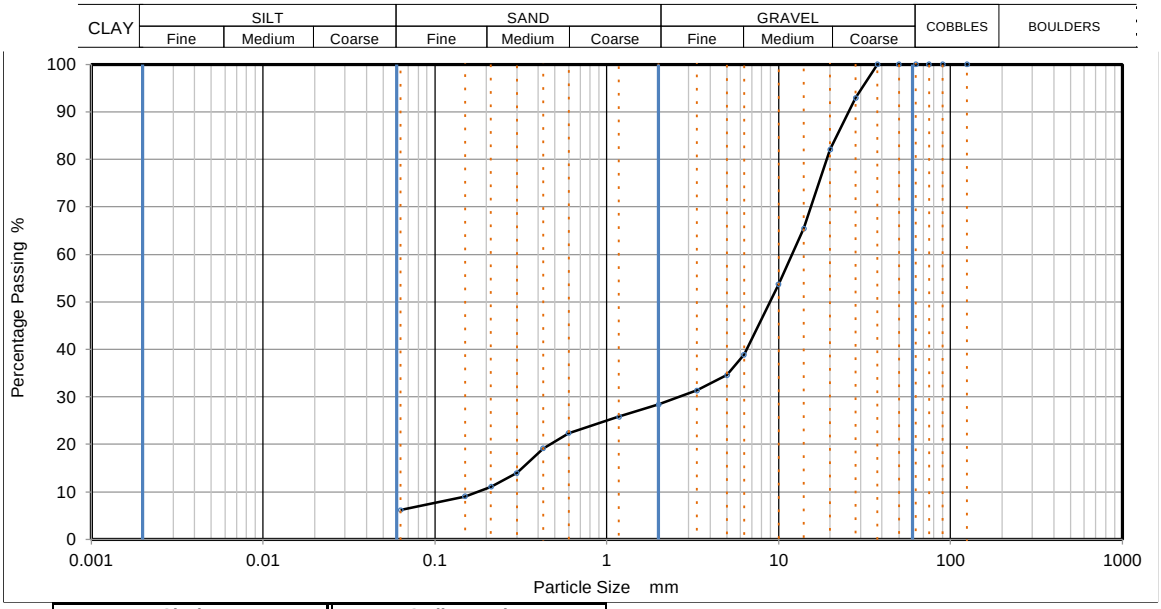
Initials: J.P

Date: 13/03/2024

PARTICLE SIZE DISTRIBUTION

				Job Ref	34927
				Borehole/Pit No.	WS2
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	2.50 m
Soil Description	Brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	3.40 m
				Sample Type	D
				Samples received	22/02/2024
				Schedules received	28/02/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	29/02/2024
				Date tested	12/03/2024

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	82		
14	65		
10	54		
6.3	39		
5	35		
3.35	31		
2	28		
1.18	26		
0.6	22		
0.425	19		
0.3	14		
0.212	11		
0.15	9		
0.063	6		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	71.6
Sand	22.1
Fines <0.063mm	6.2

Grading Analysis		
D100	mm	
D60	mm	12
D30	mm	2.64
D10	mm	0.175
Uniformity Coefficient		68
Curvature Coefficient		3.3

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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Tel: 01923 711288

Checked and Approved

Initials: J.P

Date: 13/03/2024

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
34927	9 Cranbury Place	Samples received	22/02/2024
		Schedule received	28/02/2024
Project No.	Client	Project started	29/02/2024
P24.118	Impact Geotechnical	Testing Started	12/03/2024

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
WS1	-	1.00	-	D	Brown and orangish brown slightly sandy slightly gravelly silty CLAY (gravel is fm and sub-angular to sub-rounded)	21	94	36	17	19	
WS1	-	1.20	2.50	B	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)	17	90	36	16	20	
WS2	-	1.00	-	D	Brown slightly sandy silty CLAY with rare fm sub-angular to sub-rounded gravel	20	96	43	17	26	
WS2	-	1.50	-	D	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)	19	92	39	15	24	
WS2	-	2.00	2.40	D	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)	17	93	33	14	19	

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3, 4.4 and 5.0
These results only apply to the items tested

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

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

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

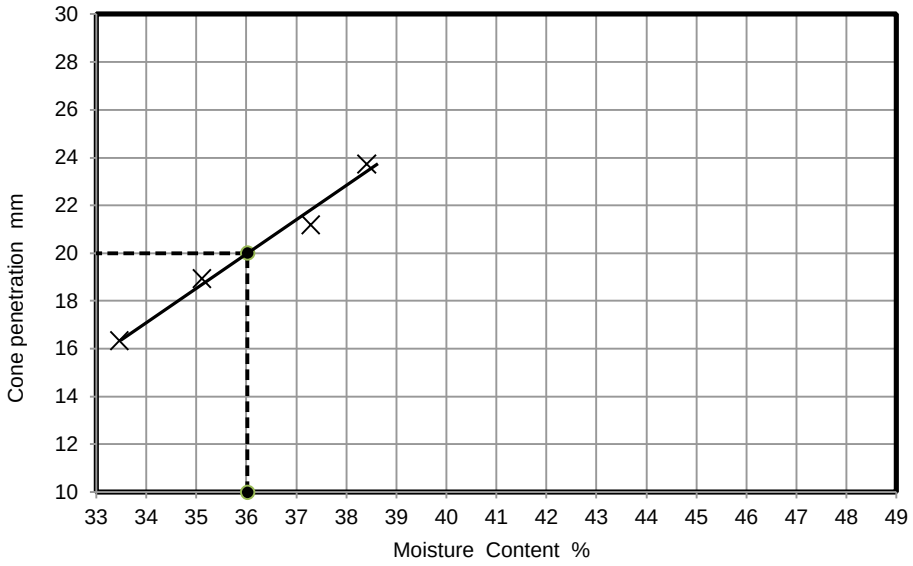
Checked and Approved

Initials J.P

Date: 13/03/2024

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

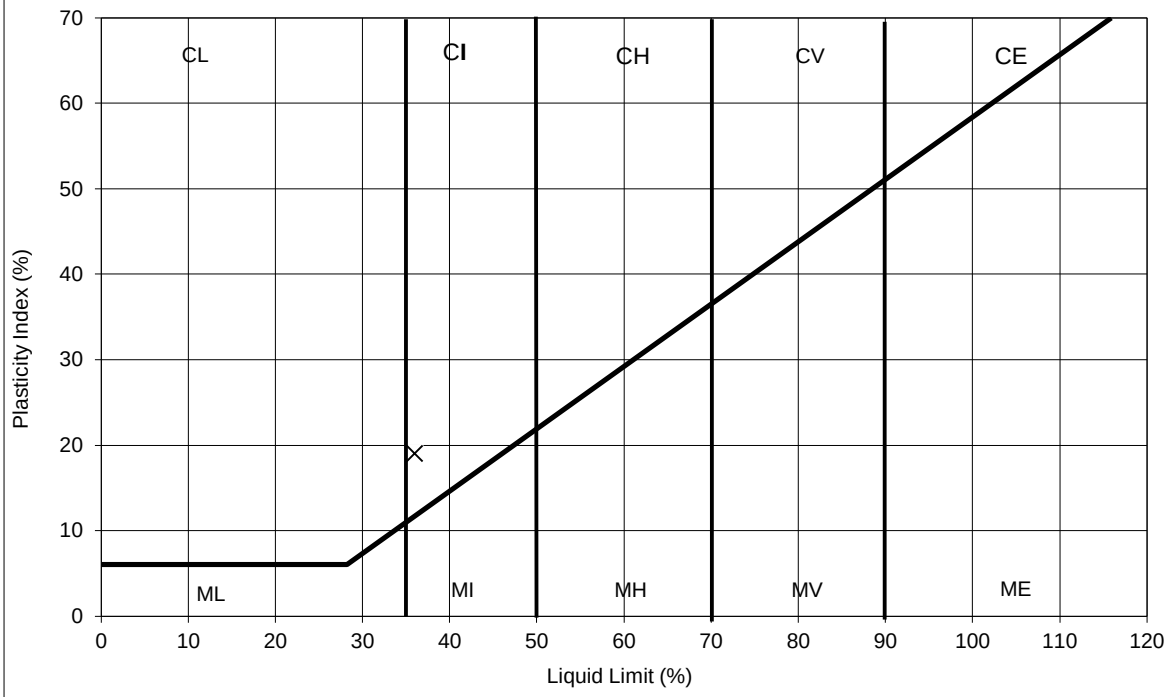
				Job No.	34927
				Borehole/Pit No.	WS1
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	1.00 m
Soil Description	Brown and orangish brown slightly sandy slightly gravelly silty CLAY (gravel is fm and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	22/02/2024
				Schedules received	28/02/2024
				Project Started	29/02/2024
				Date Tested	12/03/2024



NATURAL MOISTURE CONTENT	**21**	**%**
% PASSING 425µm SIEVE	**94**	**%**
LIQUID LIMIT	**36**	**%**
PLASTIC LIMIT	**17**	**%**
PLASTICITY INDEX	**19**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/03/2024

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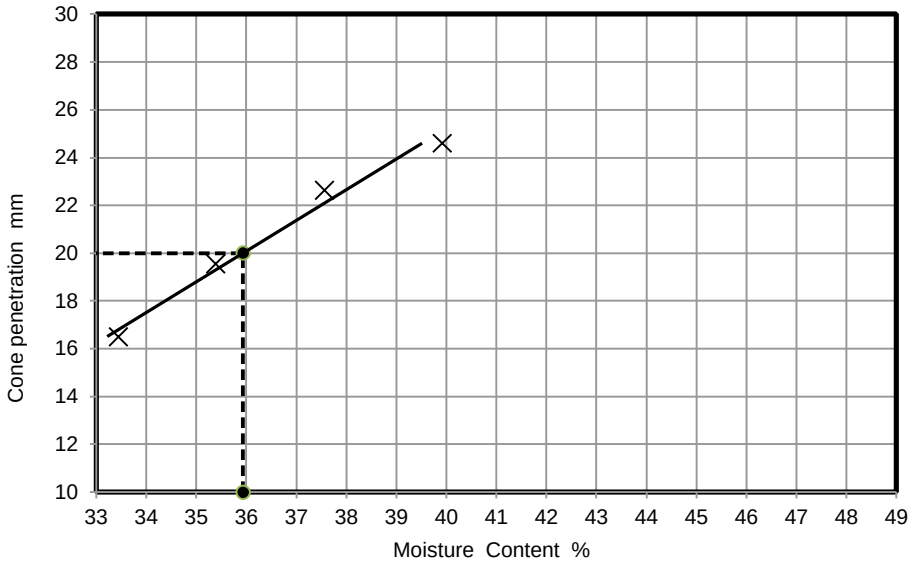
UKAS TESTING

2519

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

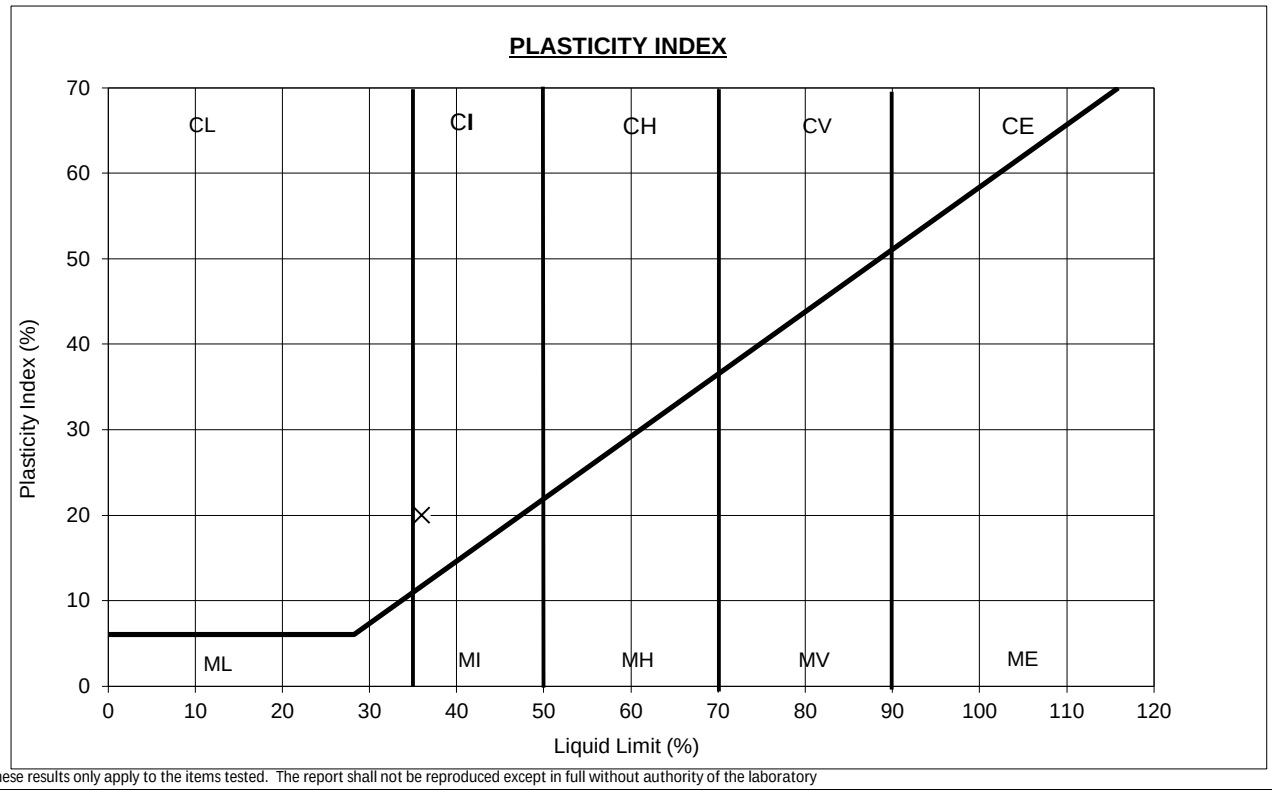
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

				Job No.	34927
				Borehole/Pit No.	WS1
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	1.20 m
Soil Description	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)			Depth Base	2.50 m
				Sample Type	B
				Samples received	22/02/2024
				Schedules received	28/02/2024
				Project Started	29/02/2024
				Date Tested	12/03/2024



NATURAL MOISTURE CONTENT	**17**	**%**
% PASSING 425µm SIEVE	**90**	**%**
LIQUID LIMIT	**36**	**%**
PLASTIC LIMIT	**16**	**%**
PLASTICITY INDEX	**20**	**%**

Remarks



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/03/2024

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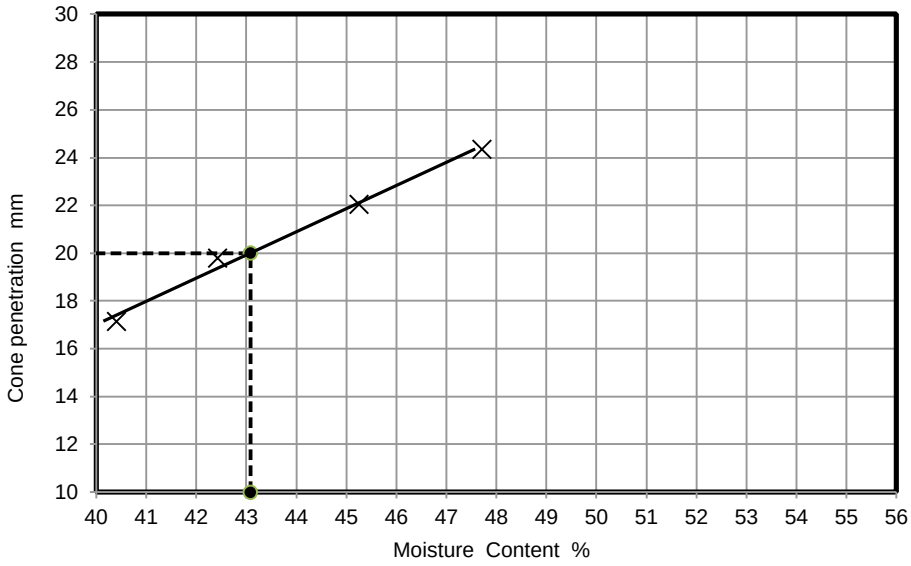
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

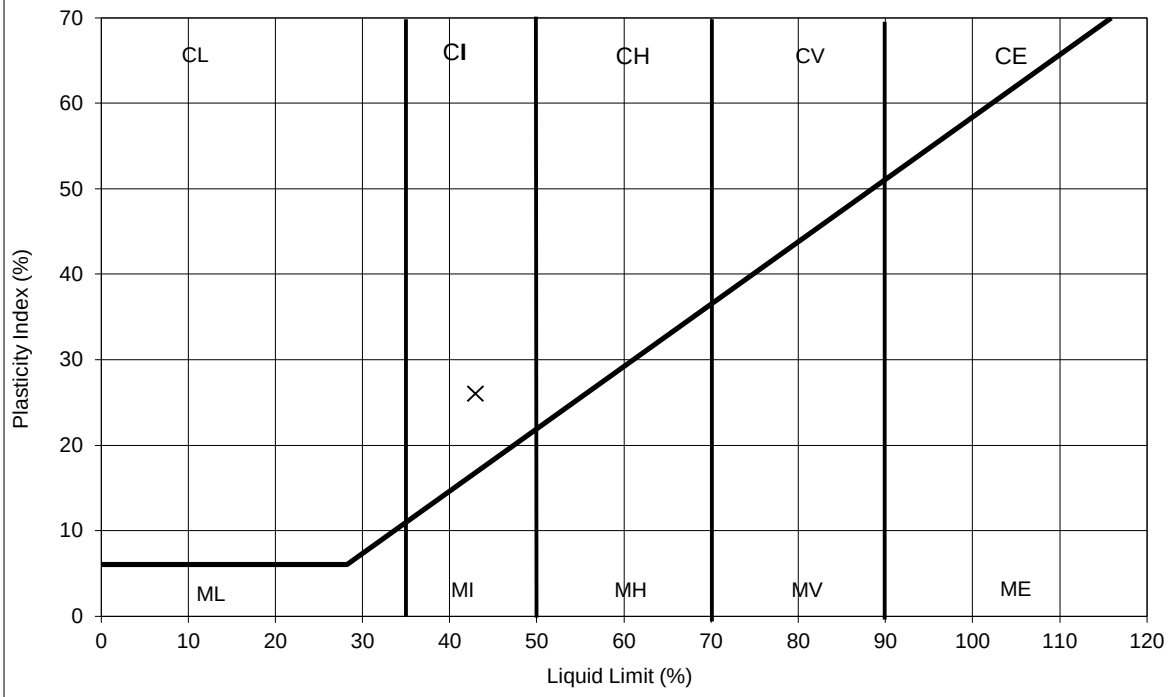
				Job No.	34927
				Borehole/Pit No.	WS2
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	1.00 m
Soil Description	Brown slightly sandy silty CLAY with rare fm sub-angular to sub-rounded gravel			Depth Base	- m
				Sample Type	D
				Samples received	22/02/2024
				Schedules received	28/02/2024
				Project Started	29/02/2024
				Date Tested	12/03/2024



NATURAL MOISTURE CONTENT	**20**	**%**
% PASSING 425µm SIEVE	**96**	**%**
LIQUID LIMIT	**43**	**%**
PLASTIC LIMIT	**17**	**%**
PLASTICITY INDEX	**26**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/03/2024

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

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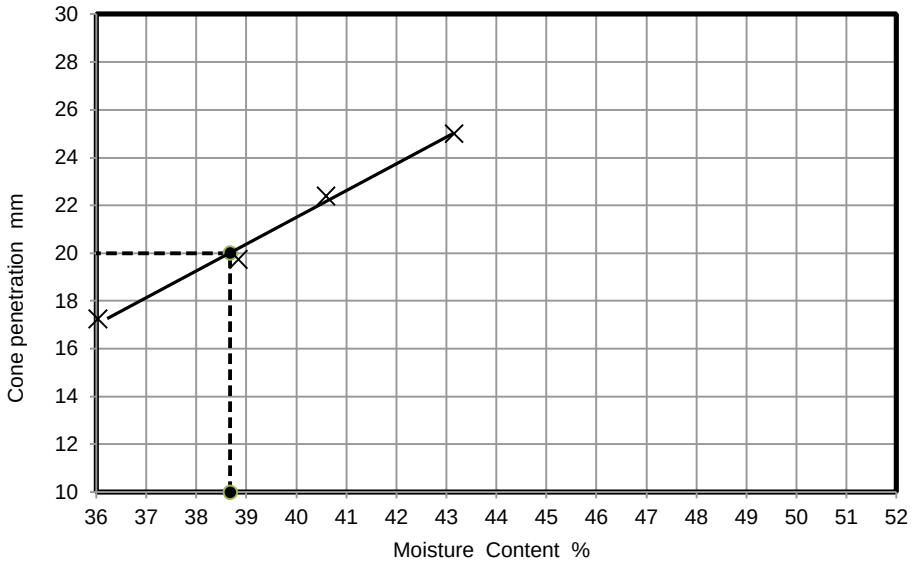
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

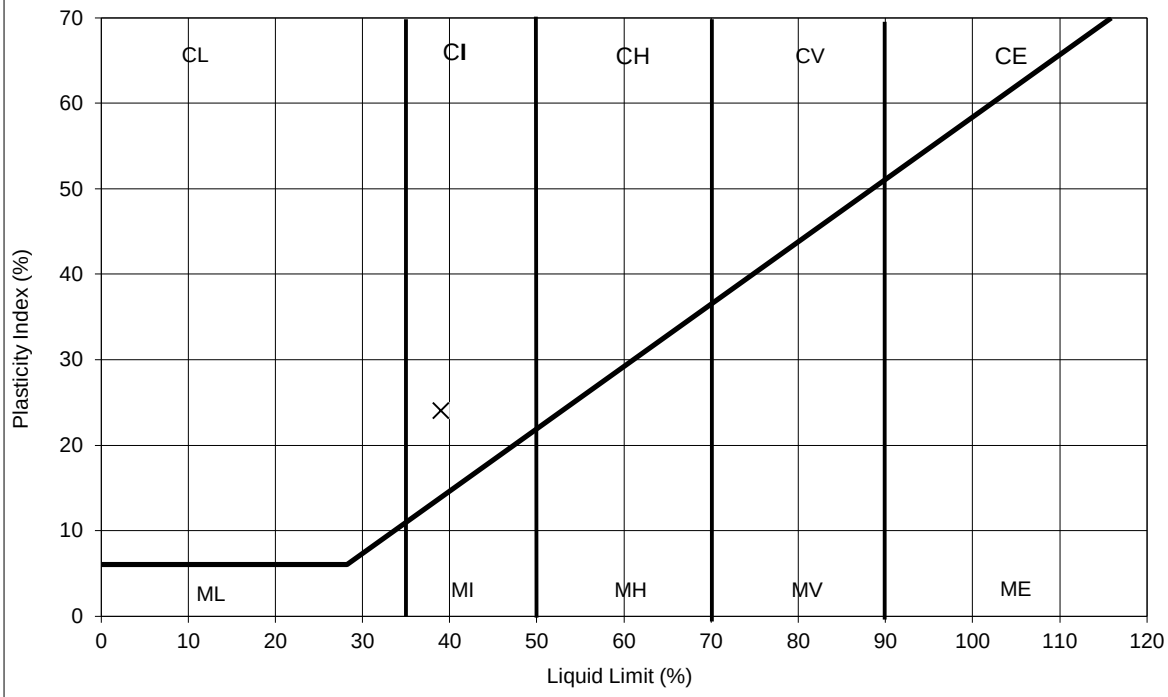
				Job No.	34927
				Borehole/Pit No.	WS2
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	1.50 m
Soil Description	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	22/02/2024
				Schedules received	28/02/2024
				Project Started	29/02/2024
				Date Tested	12/03/2024



NATURAL MOISTURE CONTENT	**19**	**%**
% PASSING 425µm SIEVE	**92**	**%**
LIQUID LIMIT	**39**	**%**
PLASTIC LIMIT	**15**	**%**
PLASTICITY INDEX	**24**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/03/2024

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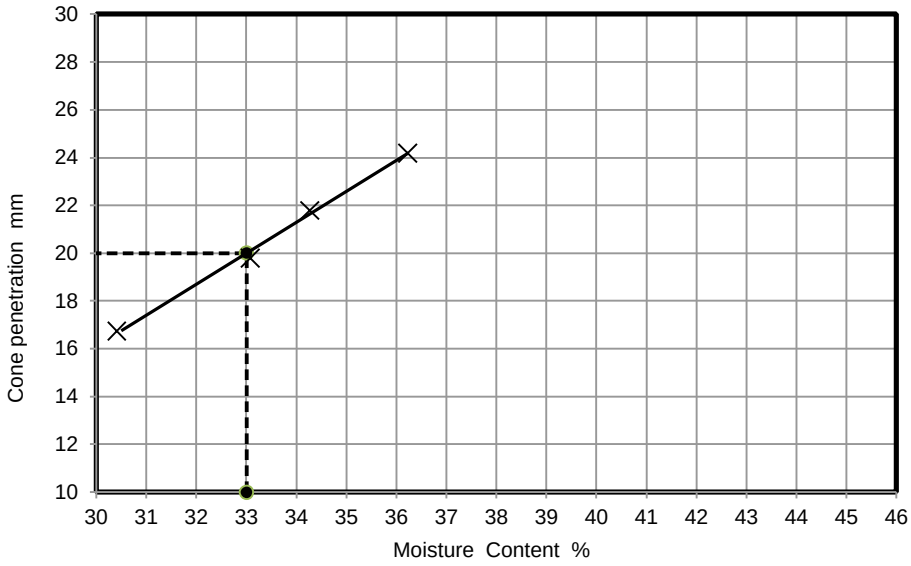
UKAS TESTING

2519

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

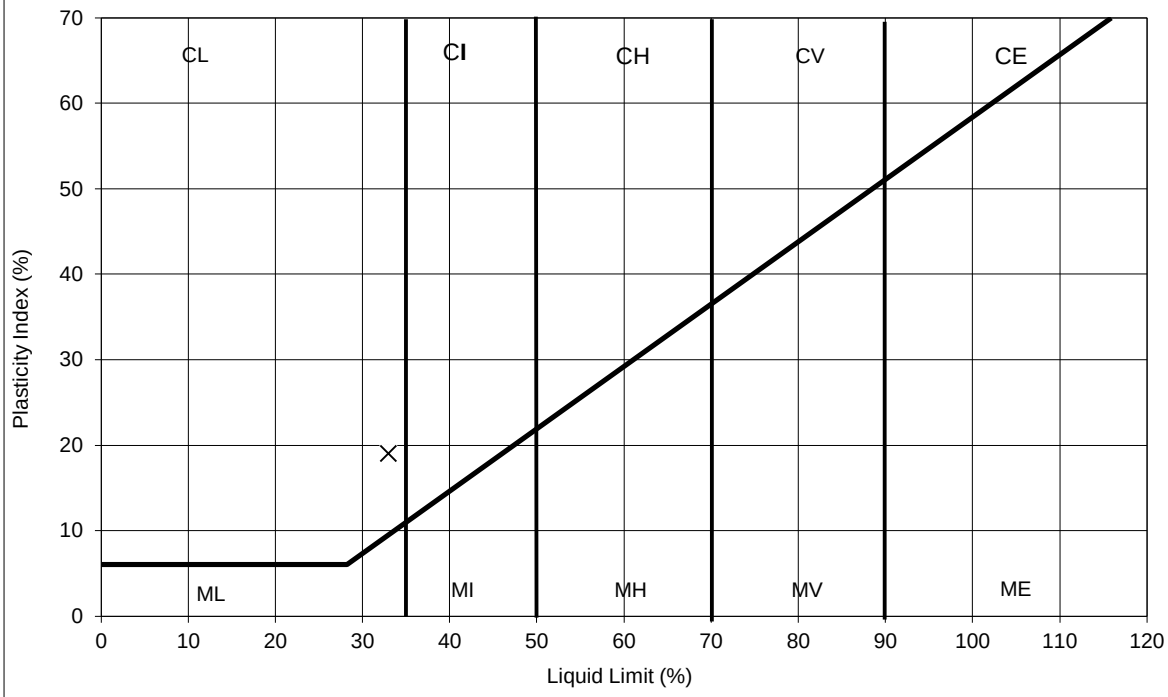
	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	34927
				Borehole/Pit No.	WS2
Site Name	9 Cranbury Place			Sample No.	-
Project No.	P24.118	Client	Impact Geotechnical	Depth Top	2.00 m
Soil Description	Orangish brown slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)			Depth Base	2.40 m
				Sample Type	D
				Samples received	22/02/2024
				Schedules received	28/02/2024
				Project Started	29/02/2024
				Date Tested	12/03/2024



NATURAL MOISTURE CONTENT	**17**	**%**
% PASSING 425µm SIEVE	**93**	**%**
LIQUID LIMIT	**33**	**%**
PLASTIC LIMIT	**14**	**%**
PLASTICITY INDEX	**19**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/03/2024

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

UKAS TESTING

2519

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

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DETS Report No: 24-01802

Site Reference:	9 Cranbury Place
Project / Job Ref:	P24.118
Order No:	P24.118
Sample Receipt Date:	21/02/2024
Sample Scheduled Date:	21/02/2024
Report Issue Number:	1
Reporting Date:	28/02/2024

[redacted]

Kevin Old
Operations Director

Dates of laboratory activities for each tested analyte are available upon request.

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Maidstone
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Soil Analysis Certificate						
DETS Report No: 24-01802	Date Sampled	19/02/24	19/02/24	19/02/24	19/02/24	19/02/24
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 9 Cranbury Place	TP / BH No	WS1	WS1	WS1	WS1	WS2
Project / Job Ref: P24.118	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: P24.118	Depth (m)	0.40	1.00 - 1.45	2.00 - 2.45	3.00 - 3.45	0.50
Reporting Date: 28/02/2024	DETS Sample No	700360	700361	700362	700363	700364

Determinand	Unit	RL	Accreditation					
						(n)		(n)
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected				Not Detected
pH	pH Units	N/a	MCERTS	8.0	7.7	8.0	8.1	7.6
Total Cyanide	mg/kg	< 1	NONE	< 1				< 1
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	47	< 10	< 10	16	190
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.05	< 0.01	< 0.01	0.02	0.19
Organic Matter (SOM)	%	< 0.1	MCERTS	4.5				5.9
Arsenic (As)	mg/kg	< 2	MCERTS	17				11
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.7				< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	16				21
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				< 2
Copper (Cu)	mg/kg	< 4	MCERTS	83				24
Lead (Pb)	mg/kg	< 3	MCERTS	948				188
Mercury (Hg)	mg/kg	< 1	MCERTS	1.6				1.9
Nickel (Ni)	mg/kg	< 3	MCERTS	16				15
Selenium (Se)	mg/kg	< 2	MCERTS	< 2				< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	477				37
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate						
DETS Report No: 24-01802	Date Sampled	19/02/24	19/02/24	19/02/24	19/02/24	19/02/24
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 9 Cranbury Place	TP / BH No	WS2	WS2	WS2	TP1	TP1
Project / Job Ref: P24.118	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: P24.118	Depth (m)	1.00 - 1.45	2.00 - 2.45	3.00 - 3.45	0.10	0.30
Reporting Date: 28/02/2024	DETS Sample No	700365	700366	700367	700368	700369

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Screen (S)	N/a	N/a	ISO17025				Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.8	7.8	7.8	7.4	7.4
Total Cyanide	mg/kg	< 1	NONE				5	4
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	37	25	< 10	< 10	< 10
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.04	0.02	< 0.01	< 0.01	< 0.01
Organic Matter (SOM)	%	< 0.1	MCERTS				6.1	6.2
Arsenic (As)	mg/kg	< 2	MCERTS				17	15
Cadmium (Cd)	mg/kg	< 0.2	MCERTS				1.9	2.6
Chromium (Cr)	mg/kg	< 2	MCERTS				32	47
Chromium (hexavalent)	mg/kg	< 2	NONE				< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS				176	137
Lead (Pb)	mg/kg	< 3	MCERTS				1680	1120
Mercury (Hg)	mg/kg	< 1	MCERTS				1.7	1.3
Nickel (Ni)	mg/kg	< 3	MCERTS				19	18
Selenium (Se)	mg/kg	< 2	MCERTS				< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS				1170	983
Total Phenols (monohydric)	mg/kg	< 2	NONE				< 2	< 2

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Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 24-01802	Date Sampled	19/02/24				
Impact Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: 9 Cranbury Place	TP / BH No	TP1				
Project / Job Ref: P24.118	Additional Refs	None Supplied				
Order No: P24.118	Depth (m)	0.80				
Reporting Date: 28/02/2024	DETS Sample No	700370				

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	7.4				
Total Cyanide	mg/kg	< 1	NONE	< 1				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	< 10				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	< 0.01				
Organic Matter (SOM)	%	< 0.1	MCERTS	1.6				
Arsenic (As)	mg/kg	< 2	MCERTS	10				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3				
Chromium (Cr)	mg/kg	< 2	MCERTS	21				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	27				
Lead (Pb)	mg/kg	< 3	MCERTS	152				
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	12				
Selenium (Se)	mg/kg	< 2	MCERTS	< 2				
Zinc (Zn)	mg/kg	< 3	MCERTS	252				
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 24-01802	Date Sampled	19/02/24	19/02/24	19/02/24	19/02/24	19/02/24
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 9 Cranbury Place	TP / BH No	WS1	WS2	TP1	TP1	TP1
Project / Job Ref: P24.118	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: P24.118	Depth (m)	0.40	0.50	0.10	0.30	0.80
Reporting Date: 28/02/2024	DETS Sample No	700360	700364	700368	700369	700370

Determinand	Unit	RL	Accreditation					
				(n)				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.28	< 0.1	0.55	0.27	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.68	< 0.1	1.41	0.52	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	0.61	< 0.1	1.25	0.48	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.32	< 0.1	0.65	0.28	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	0.41	< 0.1	0.82	0.29	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.44	< 0.1	0.99	0.50	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	0.25	0.12	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.35	< 0.1	0.68	0.40	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.26	< 0.1	0.43	0.13	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.23	< 0.1	0.40	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	3.8	< 1.6	7.4	3	< 1.6

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 24-01802	Date Sampled	19/02/24	19/02/24	19/02/24	19/02/24	19/02/24
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 9 Cranbury Place	TP / BH No	WS1	WS2	TP1	TP1	TP1
Project / Job Ref: P24.118	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: P24.118	Depth (m)	0.40	0.50	0.10	0.30	0.80
Reporting Date: 28/02/2024	DETS Sample No	700360	700364	700368	700369	700370

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	186	< 10	< 10
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21	186	< 21	< 21
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	3	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	17	< 2	< 2	< 2	< 2
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	12	< 3	< 3	3	< 3
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	< 10	< 10	1395	< 10
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	29	< 21	< 21	1401	< 21
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	< 42	< 42	186	1401	< 42

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 24-01802	Date Sampled	19/02/24	19/02/24	19/02/24	19/02/24	19/02/24
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 9 Cranbury Place	TP / BH No	WS1	WS2	TP1	TP1	TP1
Project / Job Ref: P24.118	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: P24.118	Depth (m)	0.40	0.50	0.10	0.30	0.80
Reporting Date: 28/02/2024	DETS Sample No	700360	700364	700368	700369	700370

Determinand	Unit	RL	Accreditation	(n)				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 24-01802	
Impact Geotechnical Ltd	
Site Reference: 9 Cranbury Place	
Project / Job Ref: P24.118	
Order No: P24.118	
Reporting Date: 28/02/2024	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
700360	WS1	None Supplied	0.40	14.5	Brown sandy clay with stones
700361	WS1	None Supplied	1.00 - 1.45	13.2	Light brown sandy clay
700362	WS1	None Supplied	2.00 - 2.45	4.5	Light brown sandy gravel with stones
700363	WS1	None Supplied	3.00 - 3.45	7.5	Light brown gravelly sand with stones
700364	WS2	None Supplied	0.50	4.4	Brown gravel with stones
700365	WS2	None Supplied	1.00 - 1.45	13.6	Light brown sandy clay
700366	WS2	None Supplied	2.00 - 2.45	13.4	Light brown sandy clay
700367	WS2	None Supplied	3.00 - 3.45	5.8	Light brown sandy gravel with stones
700368	TP1	None Supplied	0.10	17.1	Black sandy clay with stones
700369	TP1	None Supplied	0.30	17.3	Black sandy clay with stones
700370	TP1	None Supplied	0.80	15.6	Light brown sandy clay

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

Insufficient Sample I/S

Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 24-01802
Impact Geotechnical Ltd
Site Reference: 9 Cranbury Place
Project / Job Ref: P24.118
Order No: P24.118
Reporting Date: 28/02/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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List of HWOL Acronyms and Operators
DETS Report No: 24-01802
Impact Geotechnical Ltd
Site Reference: 9 Cranbury Place
Project / Job Ref: P24.118
Order No: P24.118
Reporting Date: 28/02/2024

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS