

**Preliminary Ground
Investigation Report**

Project Name: 49-51 George Street, Reading

Location: 49-51 George Street Reading,
Berkshire (RG1 7NT)

Client: Mr Andrew Rosser

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SUMMARY

The site comprises a small, broadly rectangular parcel of land occupied by single-storey commercial offices and storage buildings and two storey terraced housing, occupying approximately 0.05Ha in extent. The site is accessed via a square-shaped archway; situated between two terraced low rise dwellings (no. 49 and 51 George Street) immediately to the west.

It is proposed to retain the existing housing, demolish the existing commercial units and redevelop them as ground floor apartments with associated surrounds.

Geological records indicate the site to be underlain by the Taplow Gravel Member over the White Chalk Subgroup.

A Phase 1 Geoenvironmental Assessment report (desk study) ref 1CO107010/P1/R0, carried out in March 2019 has been produced for the site by REC. The findings of the report indicate that the site has a history of residential use since 1877. The findings also indicated that made ground may be present upon site.

An Unexploded Ordnance (UXO) risk assessment was not included in our brief.

There were areas of the site that were inaccessible during the fieldwork phase due to existing buildings and current on site activities which will require further investigation once access is available.

The soils encountered comprised Made Ground, over River Terrace Deposits overlying the White Chalk Subgroup.

Groundwater was not encountered during our investigative work.

A piled foundation would be the safest option for this site. However a strip foundation solution could be pursued but due to the near surface River Terrace Deposits encountered, exhibiting extremely low undrained shear strengths accordingly only a very modest allowable bearing pressure in the region of 25kN/m² can be assumed at 1m bgl.

Based on the results of this investigation an allowable bearing capacity of 70kN/m² could be adopted for foundations set upon the chalk strata at circa 2.0m bgl.

NHBC Low Volume Change Potential precautions will apply. The underlying strata should be assumed frost susceptible.

The sulphate content for the natural River Terrace Deposits was found to fall within Class DS-2. The ACEC classification for the site is AC-1s. At the time of preparing this report, sulphate test results are still pending for the underlying chalk deposits upon site; however the report will be updated and reissued once these results have been received. The Design Sulphate for the underlying chalk deposits upon site is DS-1, ACEC site classification is AC-1s.

No significant groundwater conditions requiring de-watering of excavations are anticipated.

Suspended floor slabs (with passive ventilation, and incorporation of a hydrocarbon vapour resistant membrane) are advised.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

There is evidence of some soil contamination in the form of Heavy Metals Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons within the Made Ground. The presence of contamination may affect the classification of waste soils, or the potential for their re-use.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

As with any site, areas of contamination not identified during investigation works may come to light during the course of redevelopment. Accordingly, a discovery strategy must be in place during the redevelopment to ensure that any hitherto unknown contamination is identified and dealt with in an appropriate manner. Depending on the nature of any such contamination, it may prove necessary to reassess the remedial strategy for the site. The presence of contamination may affect the classification of waste soils, or the potential for their re-use.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Mr Andrew Rosser and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

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For and on behalf of Southern Testing Laboratories Limited

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in our completed Project Order Form Q20-1633-2 rev. 1, signed and dated by Mr Andrew Rosser on 3rd November 2020.

2 Location

The site is located approximately 0.9km north-west of Reading town-centre. The approximate National Grid Reference of the site is SU 70599 73652 (470599e, 173652n). The site location is indicated on **Figure 1** within Appendix A.

3 Proposed Construction

We understand that the site is currently occupied by two attached houses and a series of commercial buildings/offices. It is proposed to retain the existing housing, demolish the existing commercial units and redevelop them as ground floor apartments with associated surrounds.

A Phase 1 Geoenvironmental Assessment report ref 1CO107010/P1/R0, and dated March 2019 has been produced for the site by REC. The findings of the report indicate that the site has a history of residential use since 1877. The site is shown to be underlain by a Secondary A Aquifer of Taplow Gravel (superficial deposit) and a Principal Chalk Aquifer. No significant off-site sources of contamination were identified in the report however Made Ground is anticipated to be present on site. The desk study also identified an area that was used for vehicle maintenance on site.

Ground loadings have not been given for the proposed development.

For the purposes of the contamination risk assessment, the proposed development land use is classified as Residential without home-grown produce consumption CLEA Model Ref [1] / C4SL Report Ref [2].

The gas sensitivity of the proposed development is rated as High (CIRIA C665 Ref [3].)

4 Object

This is a preliminary geotechnical and contamination (risk estimation and evaluation) investigation (Tier 1).

The object of the investigation was to assess foundation bearing conditions and other soil parameters relevant to the proposed development, and to assess the likely nature and extent of soil contamination on the site.

5 Scope

This report presents our, exploratory hole logs and test results and our interpretation of these data.

A UXO risk assessment was not requested within our brief for the investigation in advance of the investigation works being undertaken at the site.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The ground investigation has been completed with reference to BS 5930 Ref [4] and BS 10175 Ref [5].

Waste Classification of soils has been included within our scope for the investigation.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Mr Andrew Rosser and his appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

5.1 Geology

The British Geological Survey Map No 268 (Reading) indicates that the site geology consists of the Taplow Gravel Member (River Terrace Deposits) mapped at surface, overlying the Upper Chalk.

5.1.1 Taplow Gravel Member

The Taplow Gravel Member comprises deposits of sands and gravels with subordinate layers of finer grained clayey and silty sands. Lenses of silt, clay or peat may also be present. This is one of a sequence of River Terrace Deposits associated with the Thames. These gravels were laid down in a large braided river channel and can be quite variable in their composition.

River Terrace Deposits were commonly worked in the past, often on a piecemeal basis in 'borrow pits' as well as larger mineral workings. Old pits may have been infilled with poor quality or waste materials, and can contain contamination.

5.1.2 Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)

The Seaford Chalk Formation comprises a fairly homogeneous white chalk with regular and conspicuous flint bands. These flints are commonly laterally very continuous and traceable over large distances. Some of the flints can be very large. A few marl seams are present within the lower parts of the formation.

The Newhaven Chalk Formation is characterised by firm white chalk with common marl seams and widely spaced flint bands, and by numerous inclined conjugate shear fractures, normally slickensided and frequently containing sheet flint. In eastern Kent an overlying secondary unit, the Margate Chalk Member, is typically homogenous with no marl seams and few flints.

The White Chalk outcrop in particular is frequently highly fractured and highly permeable, and usually has good infiltration characteristics. On the other hand, Chalk Head, highly weathered Chalk and Chalk under a low permeability superficial cover may have very poor infiltration characteristics.

Chalk is slightly soluble in water and, while it has excellent bearing properties when unweathered, this solubility can lead to deep weathering and softening, and the upper layers of chalk often have an irregular boundary with overlying strata

The Chalk may be softened by solution to a depth of 5 to 15 metres and bearing capacities and engineering properties improve with depth. Where there is an outcrop of impermeable soil overlying the chalk there may be a dramatically increased solution effect due to concentrated surface water flow to the Chalk close to the outcrop boundary.

Solution features are common in the Chalk, and these can present significant difficulties to development on affected sites.

Man has also worked the chalk for flints, and for other purposes, for thousands of years and any signs of old workings should be carefully investigated.

5.2 General Site Description and Boundaries

The site consists of a small, broadly rectangular parcel of land occupied by commercial offices, storage and terraced housing, occupying approximately 0.05Ha in extent. The site is accessed via a square-shaped archway; situated between two terraced low rise dwellings (no. 49 and 51 George Street) immediately to the west.

An external parking area surfaced with blacktop materials and other hardstanding surfacing, lies beyond the archway toward the site centre. Upon the eastern half of the site, a number of small single-storey flat roofed commercial offices and storage rooms of brick construction are present.

The site borders residential dwellings and associated gardens on all sides, apart from George Street to the west.

5.3 Topography and Drainage

The site lies topographically between 40 and 45m AOD according to available Ordnance Survey mapping. Though the topography of the site was noted as relatively flat; it is assumed natural falls in levels are broadly northward towards the River Thames some 1.1km away.

5.4 Vegetation

Due to the current site usage and generally urban nature of the site surrounds, there is little vegetation on site. However a large, deciduous tree approximately 5-7m in height was noted approximately 6-8m north of the northern site boundary.

5.5 Inaccessible Site Areas

Generally the site was fully accessible, however a single office was still currently in use at the time of the investigation.

It should be noted our exploratory hole positions were predominantly governed by areas that had suitable working space for our site investigation equipment and machinery.

5.6 Site Photographs

A series of photographs showing the site and material arisings is included in **Appendix F**.

B GROUND INVESTIGATION

6 Strategy and Method

The strategy adopted for the intrusive investigation comprised the following:

Activity / Method	Purpose	Max Depth Range (mbgl)	Installations / Notes
WLS1-2 Dynamic Windowless Sampling	Boreholes to investigate the shallow ground conditions within external areas. To allow SPT's and collection of samples for geotechnical and contamination testing.	3.45	Exploratory hole backfilled with material arisings upon completion, with surface reinstatement.
WLS3 Hand-Auger	Hand augering to investigate shallow ground conditions, internally. To allow Perth Penetrometer testing and collection of samples for geotechnical and contamination testing.	1.5	Exploratory hole backfilled with material arisings upon completion, with surface reinstatement.

Exploratory hole locations as set out by ST Consult are shown in Figure 2 in **Appendix A**.

In-situ test and sampling methods descriptions are given in **Appendix B** together with the test results.

7 Weather Conditions

The fieldwork was carried out on 26th November 2020, at which time the weather was generally dry with clear, sunny weather conditions.

8 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (**Appendix A**), but in general comprised a covering of Blacktop or Concrete over Made Ground, over River Terrace Deposits over Chalk. A summary is given below.

Depth to base (m)	Thickness (m)	Soil Type	Description
0.02	0.02	Blacktop	Blacktop – hardstanding.
0.08 – 0.20	0.8 – 0.18	Concrete	Concrete – hardstanding.
0.20 – 0.40	0.12 – 0.38	Made Ground	Loose, dark red mottled brown, very gravelly, slightly clayey, medium to coarse SAND. Gravels consisted of fine to coarse, subrounded to angular, red brick, concrete and rare flint.
1.8 – 2.5	1.4 – 2.1	River Terrace Deposits	Soft, light brown, very sandy, silty CLAY (or clayey silty sand). Or; Loose becoming very dense, dark brown, very gravelly, clayey fine to coarse SAND.
3.45m+	0.95 – 1.65+	Chalk	Stiff, white mottled light brownish yellow, slightly gravelly, slightly sandy, clayey SILT. [CIRIA Chalk Grade Dm]

The soils found are generally in accordance with those anticipated.

8.1 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was noted during the course of the investigation on site.

9 Groundwater Observations

No groundwater was encountered within 3.45m beneath the existing ground level on site.

C DISCUSSION OF GEOTECHNICAL TEST RESULTS AND RECOMMENDATIONS

10 Geotechnical Laboratory Tests

The following geotechnical laboratory testing was carried out on selected samples in order to aid material classification and characterise soil properties. The test method references and results are given in **Appendix C**.

Laboratory Test	Number of Samples Tested	Stratum
Moisture Content	3	River Terrace Deposits/ Chalk
Atterberg Limit	3	River Terrace Deposits/ Chalk
Particle Size Distribution (Wet Sieve)	2	River Terrace Deposits
BRE SD1 Suite B	3	River Terrace Deposits/ Chalk
Saturation Moisture Content	1	Chalk

11 Soil Classification and Properties

11.1 River Terrace Deposits

These deposits were seen to be highly variable with soils ranging from sandy clays to very gravelly sand (both cohesive and non-cohesive soils). The distribution of individual soil types across the site is not predictable and rapid changes in soil type should be anticipated both vertically and laterally.

Two Atterberg tests have been undertaken within a sandy clay which indicated a clay of low plasticity, with a Liquid Limit ranging from 28-34%, a Plastic Limit of 15-20% and a Plasticity Index of 13-14%, indicating a Low Volume Change Potential.

The soft and very soft cohesive materials encountered, recorded SPT N values of 2 and 8. Handheld penetrometer results recorded an approximate Unconfined Compressive Strength of 10 and 20kPa initially, rising to 90kPa at approximately 1.5m bgl.

SPT N values in the predominately granular materials indicate the material density as loose, however at 1.5m bgl in WLS3 one handheld Perth penetrometer derived an equivalent N value of 84, classifying the material as very dense.

The predominately granular materials had the following range of particle size distribution results.

Hole ID / Depth (m)	Clay/Silt (%)	Sand (%)	Gravel (%)	Cobbles (%)
WLS1 (1.5m)	8.40	39.50	52.10	0
WLS3 (1.0m)	5.6	13.0	81.30	0

Two of the tested samples had very low fines content and are likely to be fairly free-draining. However, their observed vertical and lateral distribution may be anticipated to be lenticular or 'channelized'. Other more clayey materials may have substantially lower permeabilities.

The more cohesive soils within the terrace deposits are likely to have high to medium compressibility characteristics, the dense sandy gravels will have low compressibility.

11.2 Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)

The chalk materials encountered at depth beneath the site were generally seen as a slightly gravelly, slightly sandy, clayey silt.

The one Atterberg limit test result for this material indicates a clay of low plasticity. The sample tested had a Liquid Limit of 34%, a Plastic Limit of 23% and Plasticity Index of 11%, indicating a Low Volume Change Potential.

Bulk density measurements of the chalk obtained by Saturation Moisture Content derived a Bulk Density of 1.98Mg/m³ and Maximum Dry Density of 1.61Mg/m³ with a Saturation Moisture Content of 25%. This would indicate a chalk of Medium Density (CIRIA C574 classification).

A Summary of Geotechnical Parameters

Soil Type: River Terrace Deposits

Parameters	Range	Suggested Design Value
SPT (N Value)	2-8	4
Plasticity Index (%)	13-14	4
Effective Angle of Friction, ϕ' (degrees)	Not measured	Cohesive soils: 28° Granular soils: 27°

Soil Type: Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)

Parameters	Range	Suggested Design Value
Plasticity Index (%)	11	11
Bulk Density (Mg/m ³)	1.98	2.0

12 Groundwater Levels

Groundwater was not encountered during the investigation to a maximum depth of 3.45m bgl. However, groundwater levels vary considerably from season to season and year to year, often rising close to the ground surface in wet or winter weather, and falling in periods of drought.

13 Swelling and Shrinkage

Shrinkable soils are subject to changes in volume as their moisture content is altered. Soil moisture contents vary from season to season and can be influenced by a number of factors including the action of roots. The resulting shrinkage or swelling of the soil can cause subsidence or heave damage to foundations, the structures they support and services.

The designer should be aware that precautions regarding swelling and shrinkage are applicable, and in this respect NHBC precautions provide a helpful guide with respect to minimum foundation depths and deepening particularly within the zone of influence of trees.

Assessment of foundation depths should take into account trees, hedgerow and shrubs which are to be removed, remaining or are proposed which may be allowed to reach maturity.

We would recommend that on balance a NHBC Low Volume Change Potential site classification be adopted for design purposes covering both the River Terrace Deposit and Chalk materials.

Full details of protective measures are given in NHBC Standards Ref [6], Chapter 4.2 to which the reader is referred.

14 Sulphates and Acidity

Given the sample numbers tested the characteristic value for sulphate concentration has been determined from the highest measured concentration of the samples tested.

The recorded pH values are in the range of 7.5 to 8.2 within the River Terrace Deposits upon site.

The Design Sulphate Class is DS-2 within the River Terrace Deposits and groundwater should be assumed to be immobile. The ACEC site classification is AC-1s.

The Design Sulphate for the underlying chalk deposits upon site is DS-1, ACEC site classification is AC-1s.

15 Foundation and Bearing Capacity

Though a traditional foundation solution had been envisaged for the proposed development, from the intrusive works undertaken, a piled foundation solution would be the lower risk option.

However considering the assumed lightly loaded structures associated with the proposed development a traditional strip foundation could be utilised; though with a level of enhanced risk, that lower bearing capacity areas are present in other locations on the site.

The potential enhanced level of risk associated with pursuit of a traditional foundation option would have to be accepted by the designer.

Strip Foundations

All loadings should be transferred beneath any fill or made ground, topsoil, soft or disturbed soils and be placed within the underlying naturally soils in excess of 1.5m bgl.

The near surface River Terrace Deposits encountered extremely low undrained shear strengths and accordingly a very modest allowable bearing pressure of up to 25kN/m² can be assumed at 1m bgl. Based on the results of this investigation an allowable bearing capacity of 70kN/m² could be adopted for foundations set upon the chalk strata at circa 2.0m bgl.

Allowance should be made for nominal mesh reinforcement in all foundations to cater for differential movement where they span differing materials.

A minimum foundation depth of 900mm is anticipated for NHBC Low Volume Change Potential soils. However, the designer should be aware that precautions regarding swelling and shrinkage are applicable and in this respect NHBC precautions provide a helpful guide with respect to minimum foundation depths and deepening particularly within the zone of influence of trees hedgerows or shrubs; existing, proposed or removed.

Subject to the Engineers final design excessive foundation deepening may be required. Based on NHBC guidance, foundations below 2.5m must be designed individually by an engineer on an individual property basis taking into account soil desiccation, heave, lateral pressure, trench stability and workmanship. At depths in excess of 2.5m a piled foundation is usually the most appropriate foundation option.

Given the inherent variability of soil conditions, it is recommended that foundation inspections be undertaken during construction by a suitably qualified engineer to confirm that the recommendations within this report are appropriate to the foundations.

Piled Foundation Solution

A piled foundation, such as pre-cast or CFA pile, seated into competent chalk strata at depth, would be a lower risk option for the proposed development.

16 Floor Slabs

Allowance should be made for fully suspended ground floor slabs with a hydrocarbon resistant membrane.

17 Settlement

Based on the recommendations given above, settlement for the proposed structure should be within tolerable limits.

18 Excavations and Dewatering

Statutory support will be required in all excavations where personnel must work.

An allowance should be made for breaking out sub-surface obstructions associated with existing and past developments.

The clay materials will be prone to instability in open excavations during wet weather or where seepages are encountered and will soften rapidly if exposed to moisture or the elements. The sand materials will run and be highly unstable in excavations or boring operations below the water table.

Where excavation is proposed in close proximity to existing structures care will need to be taken to avoid undermining existing foundations.

Hard ground, such as rock bands may be encountered, and where necessary allowance should be made for breaking these using hydraulic hammers or the like mounted on the excavation plant, to facilitate excavation.

Significant inflows of groundwater into excavations would not be anticipated nor would the requirement for specialist de-watering activities.

D DISCUSSION OF GEOENVIRONMENTAL TEST RESULTS AND RECOMMENDATIONS

19 Analytical Framework

There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source – Pathway – Receptor linkages.

The CLEA model Ref [1], provides a methodology for quantitative assessment of the long-term risks posed to human health by exposure to contaminated soils. Toxicological data is used to calculate a Soil Guideline Value (SGV) for an individual contaminant, based on the proposed site use; these represent minimal risk concentrations and may be used as screening values.

In the absence of any published SGVs for certain substances, Southern Testing have derived or adopted Tier 1 screening values for initial assessment of the soil, based on available current UK guidance including the LQM/CIEH S4UL's Ref [7] and CL:AIRE Soil Generic Assessment Criteria Ref [8]. In addition, in 2014, DEFRA Ref [9] published the results of a research programme to develop screening values to assist decision making under Part 2A of the Environmental Protection Act. Category 4 screening levels were published for 6 substances, with reference to human health risk only. This guidance includes revisions of the CLEA exposure parameters, presenting parameters for public open space land use scenarios, and also of the toxicological approach. The screening levels represent a low risk scenario, based on a 'Low Level of Toxicological Concern' rather than the 'Minimal Risk' of CLEA, and the analytical results of this investigation may be considered relative to these levels.

Site-specific assessments are undertaken wherever possible and/or applicable.

CLEA requires a statistical treatment of the test results to take into account the normal variations in concentration of potential contaminants in the soil and allow comparisons to be made with published guidance.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based upon them. Their validity should be confirmed at the time of site development.

20 Site Investigation – Soils

20.1 Sampling Regime

The number of sample locations was limited to site access restrictions but intended to provide general site coverage. Access was restricted by the presence of buildings and buried services, and the operational needs of the on-site business and numerous parked cars on the upon the site.

20.2 Testing

The potential for contamination by Made Ground was identified in the preliminary conceptual model by others. Therefore, the following tests were selected.

Test Suite	Number of Samples	Soil Tested
STL Key Contamination Suite	4	Made Ground / Naturally Occurring Strata
Asbestos Screen	6	Made Ground / Naturally Occurring Strata
TPH CWG	2	Made Ground / Naturally Occurring Strata
TPH C6 – C40	2	Made Ground / Naturally Occurring Strata
WAC (Single State Leachate)	2	Made Ground / Naturally Occurring Strata

The test results are presented in full in **Appendix E**. A summary and discussion of the significance of the results and identified contamination sources is given below.

20.3 Test Results and Identified Contamination Sources

Generally the testing undertaken was to target made ground deposits and the immediately naturally occurring underlying strata for evidence of contamination.

20.3.1 General Contaminants

The results of the key contaminant tests have been analysed in accordance with the CLEA methodology. The samples have been grouped into one population comprising made ground and natural soil. For each parameter in each population the sample mean is calculated and compared to a Tier 1 screening value. If the sample mean exceeds the screening value, the soil may be regarded as contaminated and further assessment may be required. If neither the sample mean nor any single value exceeds the screening value, the soil may be regarded as not contaminated, though further confirmatory assessment may be required. Where any single parameter value exceeds the screening value but the sample mean does not, further statistical analysis may be applied to that parameter if the available data is suitable. Such analysis would include an assessment of the Normality of the distribution of the data, consideration of the presence of outliers, and the calculation of a UCL estimate of the mean.

Summary data is presented in the tables below and the laboratory analysis is included in **Appendix E**. The screening values and source notes are presented in Table 1 “Tier 1 Screening Values” at the front of **Appendix E**.

Soil Type: Made Ground

Contaminants	Units	No of Samples Tested	Range	Sample Mean	Residential without Homegrown Produce Consumption Tier 1 Screening Values
Arsenic (As)	mg/kg	3	8.1 – 25	18.7	40
Cadmium (Cd)	mg/kg	3	<0.2	–	85
Trivalent Chromium (CrIII)*	mg/kg	3	17 – 55	32	910
Hexavalent Chromium (CrVI)	mg/kg	3	<4.0	–	6
Lead (Pb)	mg/kg	3	51 – 970	403.66	310
Mercury (Hg)	mg/kg	3	<0.3 – 0.4	0.4	9.2 – 15
Selenium (Se)	mg/kg	3	<1.0	–	430
Nickel (Ni)	mg/kg	3	10 – 27	19.66	180
Copper (Cu)	mg/kg	3	15 – 140	74	7,100
Zinc (Zn)	mg/kg	3	64 – 410	190	40,000
Phenol	mg/kg	3	<1.0	–	440 – 1300
Benzo(a)pyrene (BaP)	mg/kg	3	0.23 – 65	21.83	2.6
Naphthalene	mg/kg	3	<0.05 – 0.4	0.4	2.3 - 13
Total Cyanide (CN)	mg/kg	3	<1.0 – 1.0	1.0	–
Acidity (pH values)	pH Units	3	9.3 – 10.7	9.96	–
Soil Organic Matter	%	3	0.3 – 2.0	1.13	–

* Assumed as Total Cr minus CrVI

With the exception of Lead and Benzo(a)pyrene, the contaminants tested above fall below the specified Tier 1 Screening values for the proposed development. In both instances the majority of samples tested fell below the Tier 1 screening value, however one outlier drove the mean averages for both contaminants above their respective thresholds.

For this assessment Benzo(a)pyrene is used as a surrogate marker for all genotoxic PAH's, in line with HPA guidance Ref [10]. The test data has been compared with the concentration limits reported for the Culp study, as recommended by HPA

Soil Type: Natural Soil

Contaminants	Units	No of Samples Tested	Value	Sample Mean	Residential without Homegrown Produce Consumption Tier 1 Screening Values
Arsenic (As)	mg/kg	1	15	–	40
Cadmium (Cd)	mg/kg	1	<0.02	–	85
Trivalent Chromium (CrIII)*	mg/kg	1	21	–	910
Hexavalent Chromium (CrVI)	mg/kg	1	<4.0	–	6
Lead (Pb)	mg/kg	1	20	–	310
Mercury (Hg)	mg/kg	1	<0.30	–	9.2 – 15
Selenium (Se)	mg/kg	1	<1.0	–	430
Nickel (Ni)	mg/kg	1	20	–	180
Copper (Cu)	mg/kg	1	13	–	7,100
Zinc (Zn)	mg/kg	1	52	–	40,000
Phenol	mg/kg	1	<1.0	–	440 – 1300
Benzo(a)pyrene (BaP)	mg/kg	1	1.5	–	2.6
Naphthalene	mg/kg	1	<0.05	–	2.3 - 13
Total Cyanide (CN)	mg/kg	1	<1	–	–
Acidity (pH values)	pH Units	1	8.3	–	–
Soil Organic Matter	%	1	0.3	–	–

* Assumed as Total Cr minus CrVI

The contaminants tested for in natural soils upon site fell below their respective Tier 1 Screening values.

Benzo(a)pyrene is used as a surrogate marker for all genotoxic PAH's, in line with HPA guidance Ref [10]. The test data has been compared with the concentration limits reported for the Culp study, as recommended by HPA

20.3.2 Asbestos Containing Materials

No asbestos containing materials were detected in the samples analysed and none were observed in the exploratory holes. However, it should be noted that the exploratory holes are of small size relative to the area investigated and the investigation was constrained by existing buildings and areas of restricted access. Therefore, the samples obtained may not reflect the full composition of the soils on the site, and there is always the potential for pockets of asbestos or for asbestos containing materials to be present, which have not been detected in the sampling.

It is also our experience that asbestos containing materials are quite often encountered in buried pockets and beneath slabs (sometimes adhering to the concrete) on older sites. It is, therefore, advised that further examination is carried out in trial pits, when suitable access is available.

No assessment for the presence of asbestos within the fabric of the existing buildings has been made.

20.3.3 Organic Contaminants

The following table summarises the results of the analysis for TPH and BTEX on site. The following samples tested were to provide general coverage on site; but also target the vehicle maintenance area; identified by the Phase 1 Geoenvironmental Assessment report (desk study) by REC.

Hydrocarbon Substance or Fraction	Measured Concentrations in mg/kg (µg/kg)				Residential without Homegrown Produce Consumption Tier 1 Screening Value
	WLS1 0.2m	WLS3 0.1m	WLS1 0.7m	WLS2 0.3m	
BTEX					
Benzene	<1.0	<1.0	–	–	0.38
Toluene	<1.0	<1.0	–	–	880
Ethylbenzene	<1.0	<1.0	–	–	83
Xylenes	<1.0	<1.0	–	–	79
MTBE	<1.0	<1.0	–	–	79
Aliphatics					
EC5-EC6	<0.001	<0.001	–	–	42
>EC6-EC8	<0.001	<0.001	–	–	100
>EC8-EC10	<0.001	<0.001	–	–	27
>EC10-EC12	<1.0	2.7	–	–	130
>EC12-EC16	<2.0	5.6	–	–	1100
>EC16-EC35	<8.0	161	–	–	65000
Aromatics					
EC5-EC7 (Benzene)	<0.001	<0.001	–	–	370
>EC7-EC8 (Toluene)	<0.001	<0.001	–	–	860
>EC8-EC10	<0.001	<0.001	–	–	47
>EC10-EC12	<1.0	<1.0	–	–	250
>EC12-EC16	<2.0	<2.0	–	–	1800
>EC16-EC21	<10	10	–	–	1900
>EC21-EC35	<10	52	–	–	1900
Hazard Index					
TPHC10-C40			32	640	

The measured concentrations of the petroleum hydrocarbon fractions are less than the assessment criteria for residential without home-grown produce land use scenario.

21 Waste Acceptance Criteria (WAC) Testing

Two retained soil samples were subject to Single stage leachate WAC testing; the results of which are included within **Appendix E**.

22 Summary of Identified Contamination

Generally no significant, contaminant concentrations have been reported in the soil samples analysed. However Benzo(a)pyrene and Lead associated with the made ground on site exceed their respective Tier 1 Screening Values.

22.1 Revised Conceptual Model

The preliminary site model has been refined in light of the findings of this investigation and is summarised below.

Metals	Petroleum Hydrocarbons	Polycyclic Aromatic Hydrocarbons	Asbestos	Pathways	Receptors
N	N	N	N	Ingestion and inhalation of contaminated soil and dust	Human Health
N	N	N	n/a	Dermal contact with contaminated soil and dust	
N	N	N	n/a	Inhalation of vapours or gases	
n/a	n/a	n/a	n/a	Uptake into edible fruit and vegetables	
n/a	n/a	n/a	n/a	Surface water run-off into surface water features	Water Environment
N	N	N	n/a	Migration through ground into surface water or groundwater	
N	N	N	n/a	Off-site migration of contaminated groundwater	
N	N	N	n/a	Vegetation on site growing in contaminated soil	Flora and Fauna
n/a	n/a	n/a	n/a	Aquatic life in affected waters	
N	N	N	n/a	Contact with contaminated soils	Building materials / buried services
N	N	N	n/a	Fire or explosion	

Key:

- Y Pollutant linkage likely
- N Pollutant linkage not likely
- P Pollutant linkage possible
- n/a Pathway not applicable to contaminant

22.2 Relevant Pollutant Linkages

A number of Relevant Pollutant Linkages for which remedial action will be required have been identified in the revised conceptual model, as follows.

Contaminant / Source	Pathways	Receptor
Metals, Petroleum Hydrocarbons and PAH's in Made Ground	Soil/dust dermal exposure Soil/dust ingestion/inhalation	Site/construction workers Structures/services Future residents

One site-wide potential source of contamination has been identified pertaining to the site. However, it is unlikely that future residents will come into contact with the soils considering the proposed development.

However in the construction phase, there is a residual risk to the groundworker handling deposits of the made ground as part of the proposed development. This risk can be mitigated by the use of suitable PPE and good hygiene practices for site operatives such as regular washing hands before eating.

With regard to services, such as drinking water supplies, the use of Protectaline pipes should be utilised for water supply to mitigate contaminants migrating through buried utility pipes upon site.

23 Soil Waste Management

It is anticipated that the arisings from groundworks on this site will comprise made ground and natural soils.

Clean natural arisings from groundworks may be re-used on site without further testing, where there is a definite use for such materials, e.g. raising levels or construction of landscaping layers as set out in the approved plans for the development.

The limited number of chemical analysis carried show no contamination in the natural soils and as such could be reused on site to raise levels. Due to the presence of anthropogenic materials within the Made Ground, these materials could not be reused in soft landscaping areas.

Treated contaminated soils may be reused on site under an appropriate Materials Management Plan, where certain criteria are met, in accordance with the CL:AIRE Definition of Waste Code of Practice, Ref [26].

23.1 Re-use of Soils

It is anticipated that the arisings from groundworks on this site will comprise both natural soils and made ground deposits on site.

Clean natural arisings from groundworks may be re-used on site without further testing, where there is a definite use for such materials, e.g. raising levels or construction of landscaping layers or bunds as set out in the approved plans for the development.

Treated contaminated soils may be reused on site under an appropriate Materials Management Plan, where certain criteria are met, in accordance with the CL:AIRE Definition of Waste Code of Practice, Ref [11].

23.2 Disposal of Soils

Some soils will require removal from site and disposal to suitably licensed landfills. Different guidelines and charges will apply to different waste classifications. As waste producers, the Developer holds responsibilities under the various governing regulations, particularly the Waste Duty of Care Code of Practice under the Environmental Protection Act 1990, Ref [12].

There are strict requirements in place for the accurate description of wastes using EWC codes and, therefore, it is essential that materials that would be given different descriptions (e.g. blacktop, made ground and natural soils), as well as those with different classifications, are carefully segregated during excavation and storage on site. This will

also ensure the most cost effective disposal. Mixing these materials can give rise to significant difficulties in disposal and also substantially increase costs.

Soil arisings may be transferred to other development sites under a Materials Management Plan, where certain criteria are met, in accordance with the CL:AIRE Definition of Waste Code of Practice Ref [11].

All soils leaving site will need to be pre-treated. Waste minimisation by selective excavation is a recognised form of pre-treatment.

24 General Guidance

Allowance should be made for experienced verification of any remedial works required.

It may be that specific local requirements apply to this site, of which we are not aware at this time.

In general terms, the workforce and general public should be protected from contact with contaminated material. There is a range of relevant documents published by the Health and Safety Executive, and organisations such as CIRIA, and the BRE.

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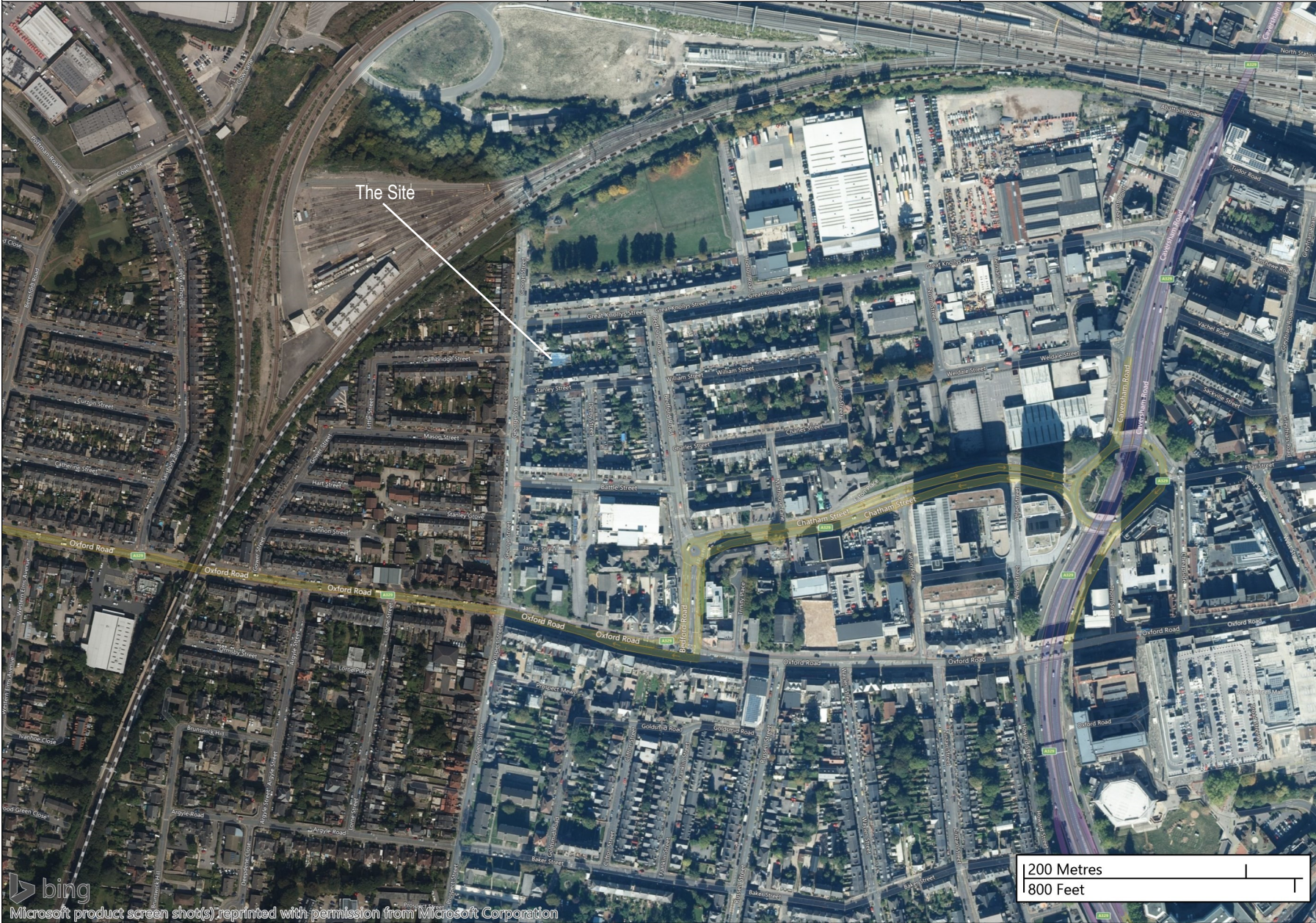
A collage of six small images related to geotechnical engineering: a large pipe, a soil profile with a probe, a worker in a yellow safety suit, a red truck with 'Southern' on the side, a blue container, and a person working with soil.

APPENDIX A

Site Plans and Exploratory Hole Logs



Project Name:	49-51 George Street, Reading	Project ID:	JT0353
Location:	George Street Reading Berkshire	Engineer:	CJB
Client:	Mr A Rosser	Scale:	1:5000



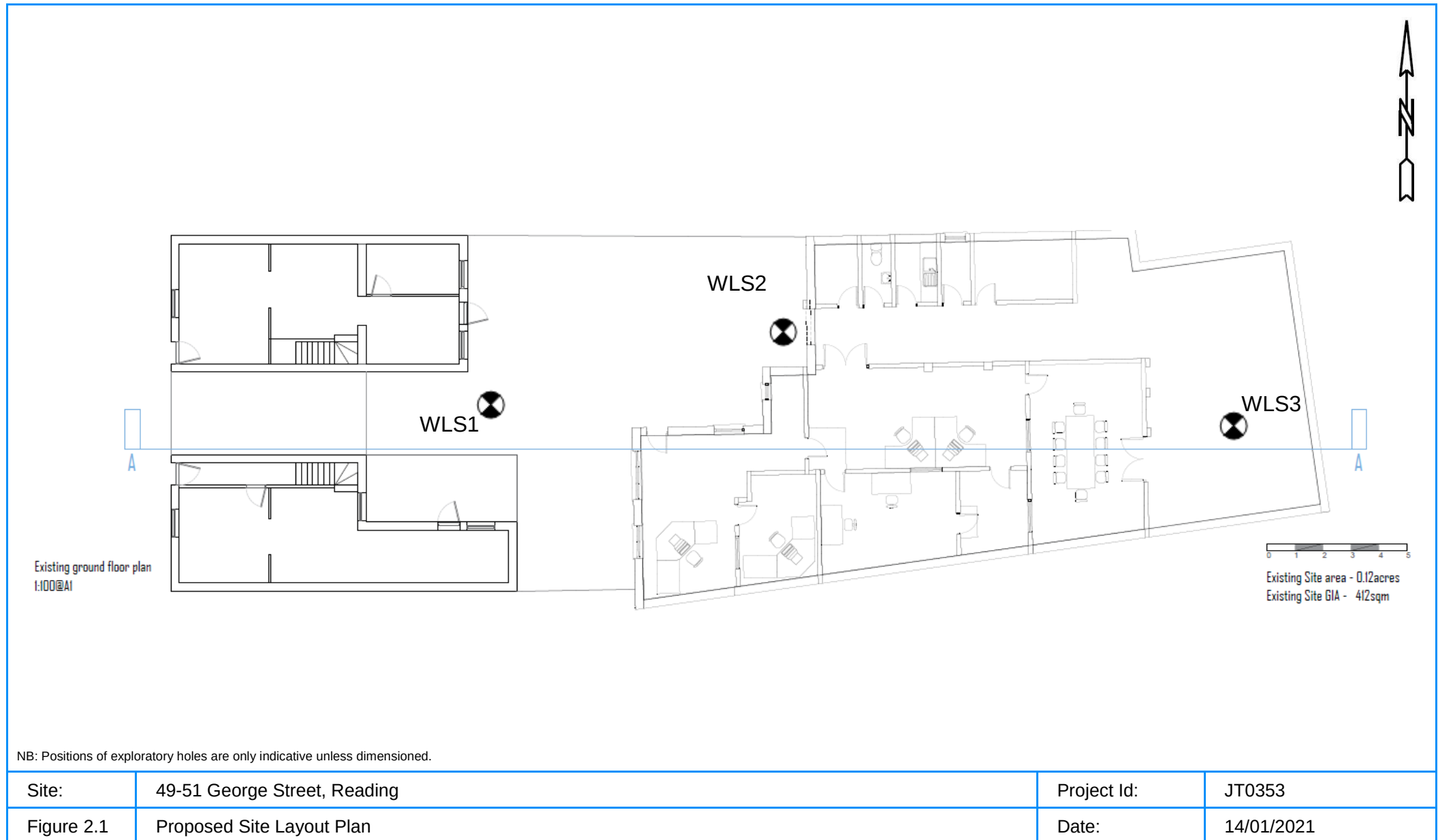
Project Name:	49-51 George Street, Reading	Project ID:	JT0353
Location:	George Street Reading Berkshire	Engineer:	CJB
Client:	Mr A Rosser	Scale:	1:500

Figure 2 - Exploratory Hole Location Plan



Windowless Sampler Location

Note: WLS3 - undertaken by Hand Auger



Key to Exploratory Hole Logs, Plans and Sections

Backfill Symbols		Pipe Symbols		Principal Soil Types		Principal Rock Types		Drilling Records	
Arisings		Plain Pipe		Topsoil		Mudstone		Water Strike	
Concrete		Slotted Pipe		Made Ground		Claystone		Depth Water Rose	
Blacktop		Piezometer		Clay		Siltstone		Total Core Recovery (%) [TCR]	
Bentonite		Piezometer Tip		Silt		Sandstone		Solid Core Recovery (%) [SCR]	
Gravel Filter		Filter Tip		Sand		Limestone		Rock Quality Index (%) RQD]	
Sand Filter		Extensometer		Gravel		Chalk		Fracture Index (fractures / m) [FI]	
		Inclinometers		Peat					

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

Location / Method Identifiers		In-situ Test Location / Method	
BH	Borehole (undefined)	DP	Dynamic Probe
CP	Cable Percussive	CPT	Cone Penetration Test
RC	Rotary Core	CBR	In-situ CBR Test
RO	Rotary Open Hole	DCP	CBR using Dynamic Cone Penetrometer
ODC	Rotary Odex/Symmetrix drilling cased	CBRT	CBR using TRL Probe
CP+RC	Cable Percussive to Rotary Core	PB	Plate Bearing Test
SNC	Sonic	SPT (S)	Standard Penetration Test (Split Barrel Sampler)
CFA	Continuous Flight Auger	SPT (C)	Standard Penetration Test (Solid Cone)
FA	Flight Auger	N	SPT Result
VC	Vibro Core	-/-	Blows/Penetration (mm) after seating drive
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core	-*/-	Total Blows / Penetration (mm)
WLS	Windowless Sampler	()	Extrapolated Value
WS	Window Sampler	PPT	Perth Penetration (In-House Method - Equivalent N Value)
HA	Hand Auger	HP / UCS	Strength from Hand Penetrometer (kN/m ²)
C	Road / Pavement Core	IVN	Strength from Hand Vane ((kN/m ²) P = peak, R = residual
IP	Inspection Pit (Hand Excavation)	PID	Photo Ionisation Detector (ppm)
TP	Trial Pit (Machine Excavated)	MEXE	Mexi-Cone CBR (%)
OP	Observation Pit (Supported Excavation Hand or Machine)		

Samples / Test Type	
B	Bulk Sample
BLK	Block Sample
C	Core Sample
CBRS	CBR Mould Sample
D	Small Disturbed Sample
ES	Environmental Sample (Soil)
EW	Environmental Sample (Water)
GS	Environmental Sample (Gas)

Samples / Test Type	
SPTLS	Standard Penetration Test Split Barrel Sample
TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
U	Undisturbed Open Drive Sample (blows to take)
UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
W	Water Sample (Geotechnical)
SP	Sample from Stockpile
P	Piston Sample
AMAL	Amalgamated Sample

Logger:

CJB

1) National grid reference inferred from OS mapping 2) Elevation not stated. 3) Groundwater not encountered. 4) Exploratory hole backfilled with material arisings completed with surface reinstatement.

parisings completed with surface reinstatement.

1 —
—
—
2 —
—
—
3 —
—
—
4 —
—
—
5 —

[illegible]

[illegible]

A collage of six small images showing various field sampling and testing activities: a large pipe, a worker in a high-visibility suit, a soil sample in a sieve, a pressure gauge, a red truck, and a worker using a tool.

APPENDIX B

Field Sampling and In-Situ Test Methods and Results

B

Soil and Rock Descriptions

All soil and rock descriptions are in general accordance with BS5930 Ref [4].

Anthropogenic soils ('made ground' or 'fill') describe materials which have been placed by man and can be divided into those composed of reworked natural soils and those composed of or containing man-made materials. 'Fill' is used to describe material placed in a controlled manner and 'made ground' is used to describe materials placed without strict engineering control.

The classification of materials such as topsoil is based on visual description only and should not be interpreted to mean that the material complies with criteria used in BS 3882 Ref [13].

Chalk descriptions are based on CIRIA C574 Ref [14] and Mortimore Ref [15].

The geology code is only provided on logs where a positive identification of the sample strata has been made.

Dynamic Sampling - Window or Windowless

Window sampling is carried out by driving hollow steel tubes incorporating a longitudinal access slot (window) and a cutting shoe into the ground using a percussive 'breaker'. This enables recovery of a continuous soil sample for examination and sub-sampling.

Windowless samplers are designed for taking disturbed, continuous soil samples to depths up to 10 metres (depending on ground conditions). The samplers comprise steel tubes of about 50-100mm diameter with a rigid plastic liner (no window) and are driven into the ground with a sliding hammer mounted on a tracked purpose-designed soil sampling rig. After driving and extracting the sampler from the ground, the plastic liner is extracted together with the enclosed soil sample. The sample can then either be extracted, split and sub-sampled or plastic end caps may be fitted, the tube labelled and transported for future examination and sub-sampling.

Soil samples are disturbed by the driving process with both techniques and can be regarded as being between Class 5 up to Class 3 samples at best (in favourable ground).

The major advantage of using windowless samplers is that the plastic liner greatly reduces the possibility of cross-contamination between successive samples.

An equivalent in-situ test to the Standard Penetration Test can be carried out with the windowless sampler rig.

Both processes involve flushing out rock fragments from the borehole with a mixture of compressed air and/or water or drilling foam. For this operation a separate air compressor is required to power the hammer along with a bowser for water/foam. The flush created will normally be contained within bunds and then pumped into a suitable container for disposal.

Due to the hammering action of the drilling process the sample recovery is very poor and restricted to flush returns.

Standard Penetration Test (SPT)

The Standard Penetration Test (SPT) is specified in BS EN ISO 22476-3 Ref [16]. In this test, an open-ended tube is driven into the ground by blows from a free-falling hammer (with specified sizes, weights and distances).

The tube is seated by driving to a penetration of 150mm, or by 25 blows, whichever occurs first. It is then driven for a maximum of a further 300mm and the number of blows is termed the penetration resistance (N). If 300mm penetration cannot be achieved in 50 blows, the test drive is terminated and penetration depth is recorded.

When testing in gravels, a conical end piece is attached to the tube. The test is then called an SPT(C).

A classification of relative density descriptions as used on borehole logs, based upon uncorrected SPT N values, is given within BS5930 Ref [4] and set out as follows:

Classification based on uncorrected SPT N Value	Term
0 - 4	Very Loose
4 - 10	Loose
10 – 30	Medium Dense

Classification based on uncorrected SPT N Value	Term
30 – 50	Dense
Over 50	Very Dense

Perth Penetrometer Test

The Perth Penetrometer is a non-standard test used for assessing the relative density of sands. It consists of a 16 mm diameter hardened steel probe, which is driven into the soil by successive blows of a 9.09 kg weight, which freely falls over a distance of 600 mm. The number of blows required for each 50 mm of penetration is recorded, and the test is continued for a total depth of 450 mm, according to soil type.

The energy input is roughly the same as that from the Standard Penetration Test (SPT), and experience by this laboratory indicate that in sand the Perth Penetrometer readings correlate fairly well with SPT blow counts (this relationship does not hold for coarse or cohesive soils). A classification of relative density descriptions as used on trial pit logs is given below.

Perth Correlation with uncorrected SPT N Value	Term
0 - 4	Very Loose
4 - 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Over 50	Very Dense

Hand Penetrometer Test

The handheld soil penetrometer consists of a spring loaded and calibrated plunger which is forced into cohesive soil. A reading of unconfined compression strength (equal to twice cohesion) is given on a calibrated scale. The average of a set of three readings shall be recorded.

In common with other hand methods of strength assessment it does not give an accurate indication of bearing capacity in stiff or fissured soils, because of the small test area.

Disturbed Samples

Disturbed samples were taken from exploratory holes in general accordance with BS 5930 [4] and BS EN ISO 22475-1 Ref [17] as required and stored in appropriately labelled containers. Details of the type, size and depth of sample will be recorded within the exploratory hole record. Such samples can be regarded as being between Class 5 up to Class 3 quality depending upon their method of sampling.

Environmental Samples

Environmental samples were taken from the boreholes at regular intervals in the made ground and natural soils as indicated on the exploratory hole logs. The sampling strategy was in general accordance with BS10175 Ref [5] and BS ISO 18400 Refs [18], [19], [20], [21] & [22].

These samples were collected and stored in glass jars or plastic pots and transferred to the laboratory in cool boxes as appropriate to the proposed laboratory testing.

Gas monitoring is carried out via the gas tap. Water sampling/purging can be undertaken by removing the gas tap and bung.

The well is usually completed at the surface with a flush cast iron cover or raised lockable cover.

TEST DATE AND CONDITIONS			
Date	14/04/2020		
Atmospheric Pressure	1011	mB	
Ambient Temperature	21.2	°C	
EnviroNics Serial No.	5089		

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311

Fax 02476307711



Customer	Southern Testing Laboratories
Certificate Number	121723
Order Number	325643

Serial Number	13164
Software Version	G436-00.0027/0010

Recalibration DUE Date
14/04/21

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	Accept > 200 cc/min	Pump Flow @ -200mB	300	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	59.6	60	39.7	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5	5	4.9	5	6	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0	0	0	0	0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	998	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	30		998		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		1011	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200mb	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30	Accept ± 3.0	-283	-283	Accept ± 50
-3	-3	Accept ± 1.0	-15	-15	Accept ± 6.0
0	0	Accept ± 0.0	0	0	Accept ± 0.5
3	3	Accept ± 0.5	15	15	Accept ± 3.0
30	29.7	Accept ± 3.0	333	327	Accept ± 50
60	59.8	Accept ± 6.0	1005	1003	Accept ± 130
90	89.8	Accept ± 9.0	1974	1979	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10	Accept ± 2.0
0	0	Accept ± 1.0
30	30	Accept ± 1.0
60	60	Accept ± 1.0
100	100	Accept ± 1.0

Technician:
<i>Jack Rutland</i>

Date Tested:
<i>15/04/2020</i>

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

TEST DATE AND CONDITIONS	
Date	14.4.20
Atmospheric Pressure	1011 mB
Ambient Temp	21.2 °C
EnviroNics Serial No.	5089

GAS DATA LTD
Unit 4, Fairfield Court
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LJ
Tel 02476303311 Fax 02476307711



GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
325643	GFM436	13164 G436-27/10	121723

Calibration Technician *J. P.*

Date 14.4.20

Inspection Technician *GA*

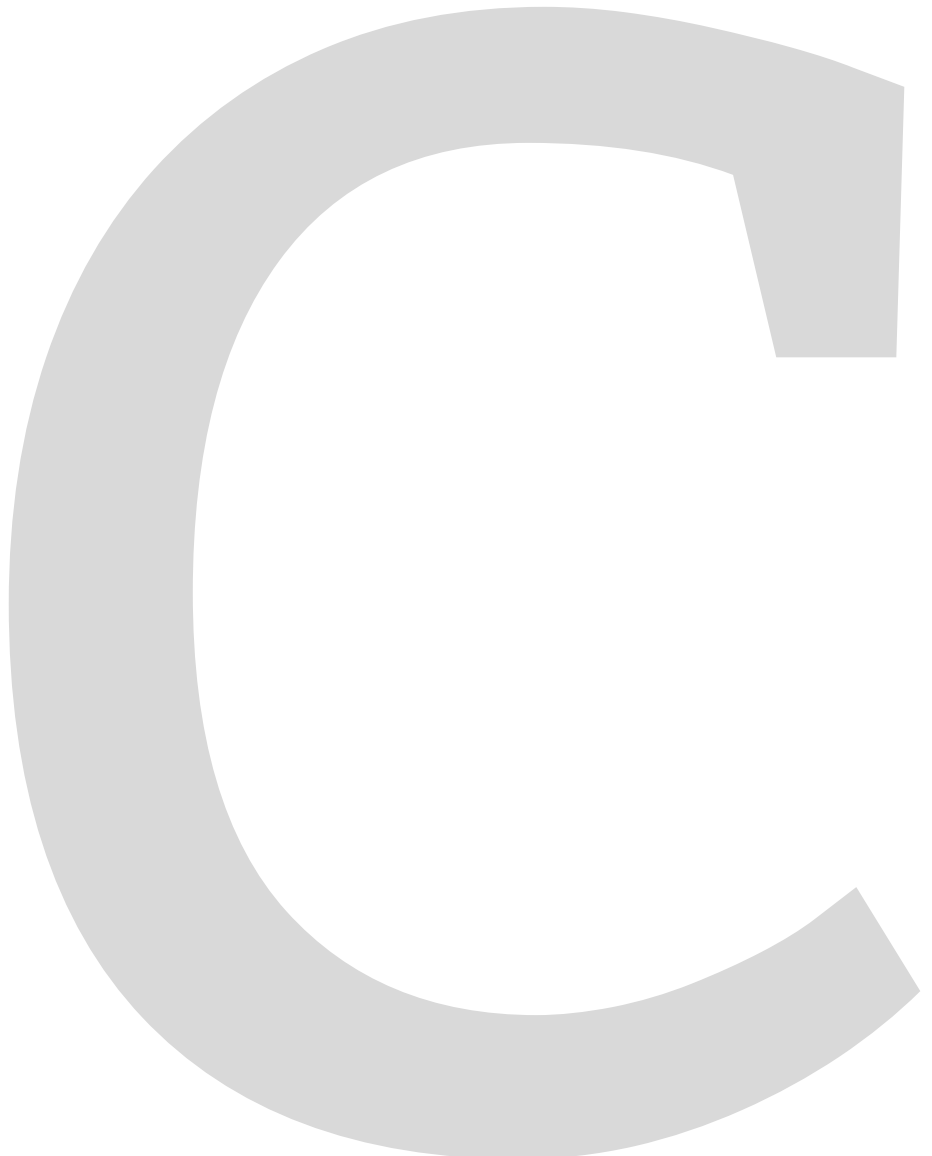
Date 15.4.20

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All Keys)	P	Leather Case		✓
	Backlight	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		✓
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		x
	Overall Leak Test (30mB)	n/a	AC Battery Charger (AUS)		x
	Battery Charge Test	P	Gas Sample Pipe - (new issue)		✓
	Service Date set to?	14.4.21	Flow Sample Pipe - (new issue)		✓
Channel Tests	Data Logging Enabled?	P	Hard Carry Case		✓
	Verify CH4/LEL/Hexane/PID	P	Allen Key		✓
	Verify CO2	P	Spares Pot		✓
	Verify O2	P	Temperature Probe		x
	Verify H2S	P	Vane Anemometer		x
	Verify CO	P	USB Cable		✓
	Verify LEL	P	USB Memory stick		✓
	Verify 1 st Option Gas	N/A	SM V5 Software	Ver 6.05	x
	Verify Atmospheric pressure	P	Internal Filter Pack	Qty	x
	Verify differential pressure	P	External Filter Pack	Qty	x
	Verify flow	P	Field Guide		x
	Verify temperature probe input	P	Extra Items: <i>Sample Tubes</i>		
	Verify vane anemometer input	P			
	Jobcard(s) completed and signed	P			
DataBase Checks	Jobcard(s) booked off database	P	Comments:		
	Calibration certificate completed	P			
	Complete & print QI record	n/a			
Label Checks	No. of Calibration label fitted	GDC 08859			
	MCERTS label displayed	n/a			
	Warranty label fitted	P			
H2S Range	H2S Range from Sales Order	5000 ppm			
	H2S Range from Cal Cert	5000 ppm			
	Over-range value correct?	P			



APPENDIX C

Geotechnical Laboratory Test Methods and Results





TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: ST Consult Ltd
Client Address: Unit 5, Hannington Farm,
Hannington, Kingsclere,
Hampshire, RG 26 5TZ
Contact: Chris Beech
Site Address: 59-51 George Street, Reading

Client Reference: JT0353
Job Number: 20-45207
Date Sampled: 26/11/2020
Date Received: 01/12/2020
Date Tested: 10/12/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

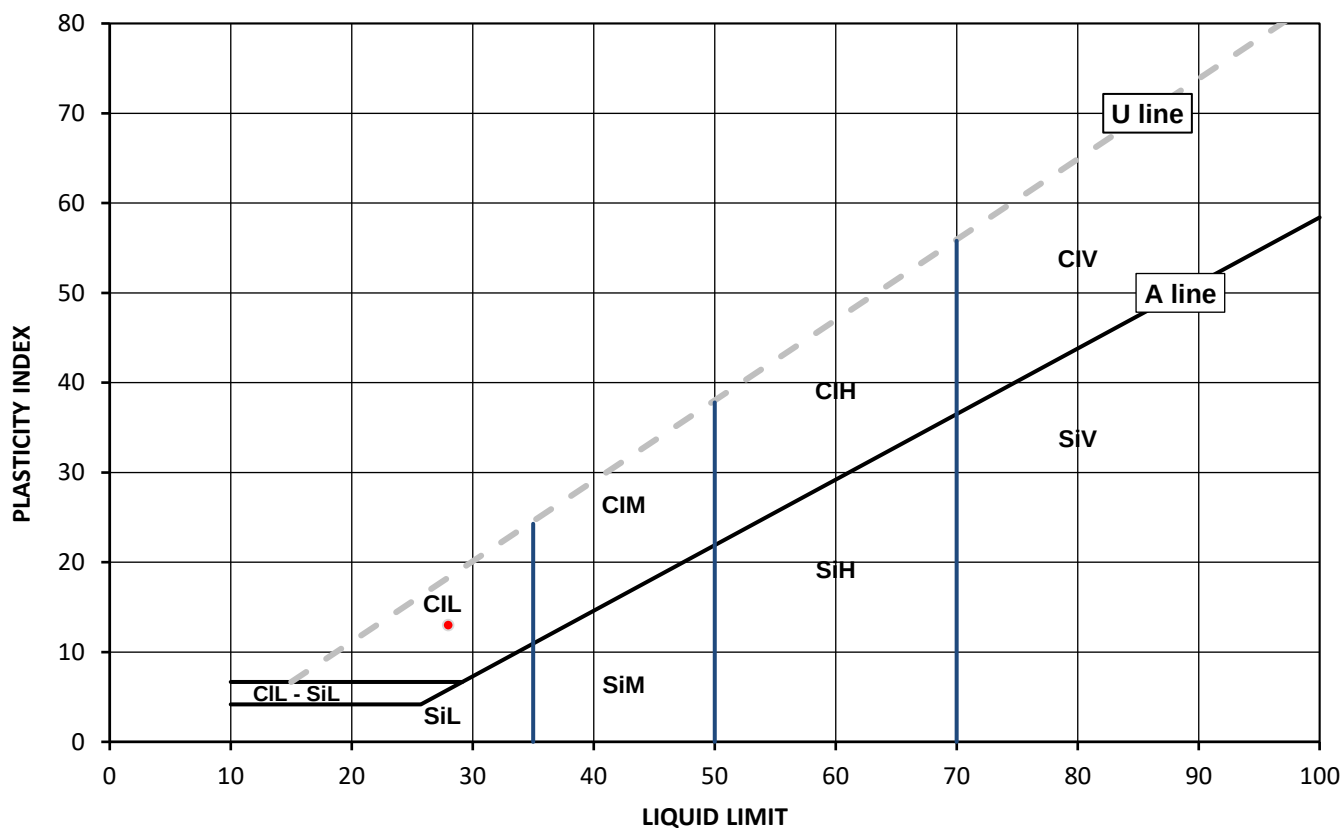
Test Results:

Laboratory Reference: 1705322
Hole No.: WLS1
Sample Reference: Not Given
Soil Description: Bluish grey slightly gravelly very sandy CLAY

Depth Top [m]: 1.00
Depth Base [m]: Not Given
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
15	28	15	13	80



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	Liquid Limit
Si	Silt	L Low	below 35
		M Medium	35 to 50
		H High	50 to 70
		V Very high	exceeding 70
		O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 15/12/2020

GF 236.10



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: ST Consult Ltd
Client Address: Unit 5, Hannington Farm,
Hannington, Kingsclere,
Hampshire, RG 26 5TZ
Contact: Chris Beech
Site Address: 59-51 George Street, Reading

Client Reference: JT0353
Job Number: 20-45207
Date Sampled: 26/11/2020
Date Received: 01/12/2020
Date Tested: 10/12/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

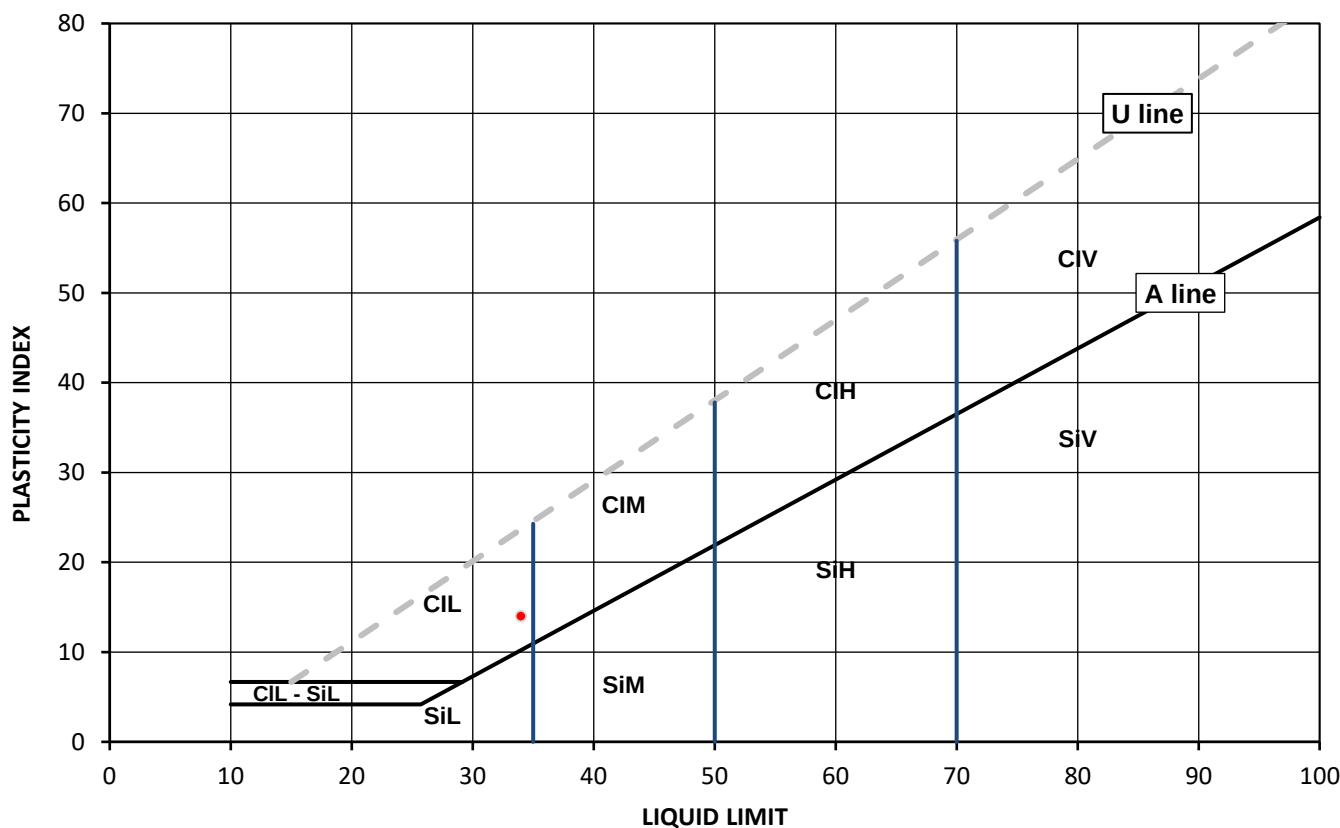
Test Results:

Laboratory Reference: 1705323
Hole No.: WLS2
Sample Reference: Not Given
Soil Description: Cream colour gravelly very sandy CLAY

Depth Top [m]: 1.50
Depth Base [m]: Not Given
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
20	34	20	14	49



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 15/12/2020

GF 236.10



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: ST Consult Ltd
Client Address: Unit 5, Hannington Farm,
Hannington, Kingsclere,
Hampshire, RG 26 5TZ
Contact: Chris Beech
Site Address: 59-51 George Street, Reading

Client Reference: JT0353
Job Number: 20-45207
Date Sampled: 26/11/2020
Date Received: 01/12/2020
Date Tested: 10/12/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

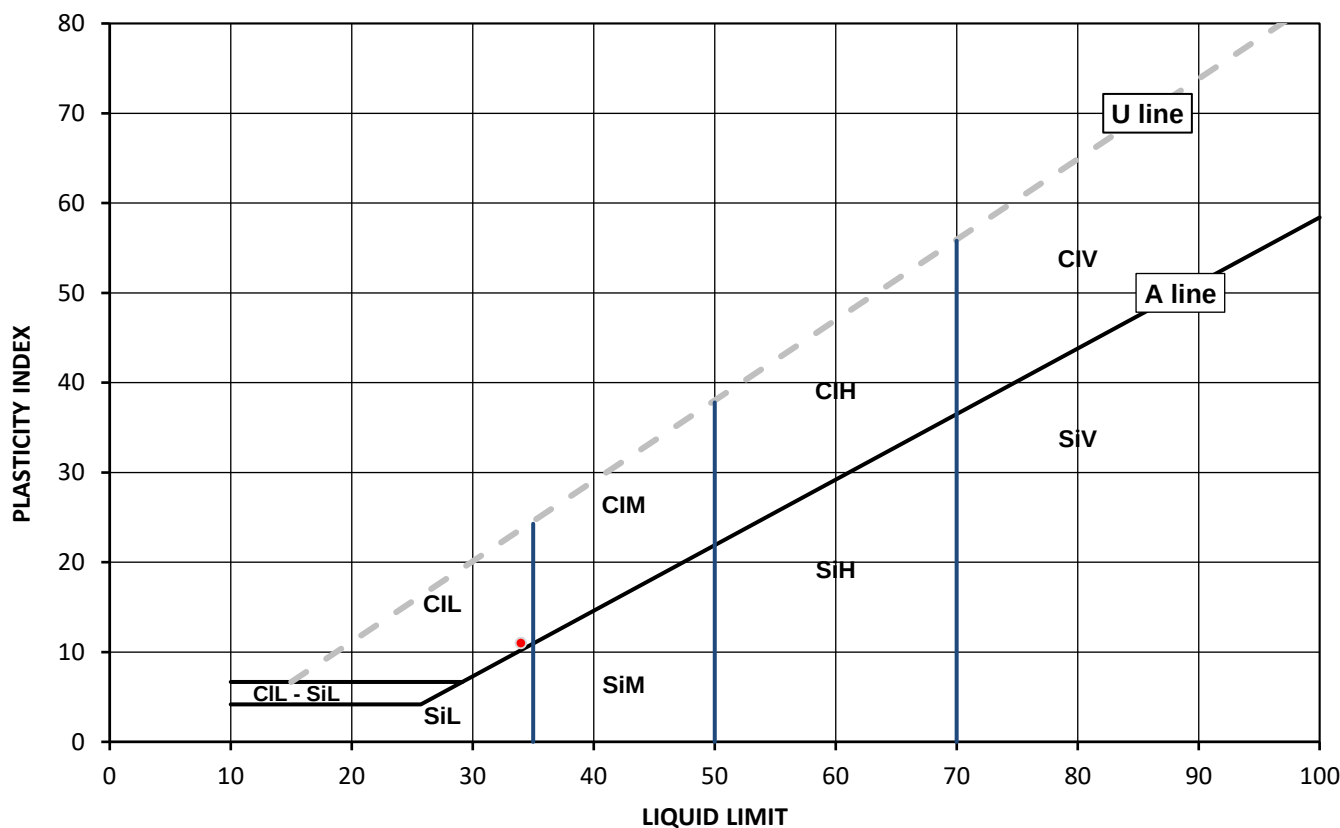
Test Results:

Laboratory Reference: 1705324
Hole No.: WLS2
Sample Reference: Not Given
Soil Description: Cream colour slightly gravelly very sandy CHALK

Depth Top [m]: 2.00
Depth Base [m]: Not Given
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
25	34	23	11	80



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 15/12/2020

GF 236.10



SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with:

Client: ST Consult Ltd
Client Address: Unit 5, Hannington Farm,
Hannington, Kingsclere,
Hampshire, RG 26 5TZ
Contact: Chris Beech
Site Address: 59-51 George Street, Reading

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN
17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test),
Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: JT0353
Job Number: 20-45207
Date Sampled: 26/11/2020
Date Received: 01/12/2020
Date Tested: 10/12/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
1705322	WLS1	Not Given	1.00	Not Given	B	Bluish grey slightly gravelly very sandy CLAY	Atterberg 4 Point	15		80	28	15	13						
1705323	WLS2	Not Given	1.50	Not Given	B	Cream colour gravelly very sandy CLAY	Atterberg 4 Point	20		49	34	20	14						
1705324	WLS2	Not Given	2.00	Not Given	B	Cream colour slightly gravelly very sandy CHALK	Atterberg 4 Point	25		80	34	23	11						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

4041

Client: ST Consult Ltd
Client Address: Unit 5, Hannington Farm,
Hannington, Kingsclere,
Hampshire, RG 26 5TZ
Contact: Chris Beech
Site Address: 59-51 George Street, Reading

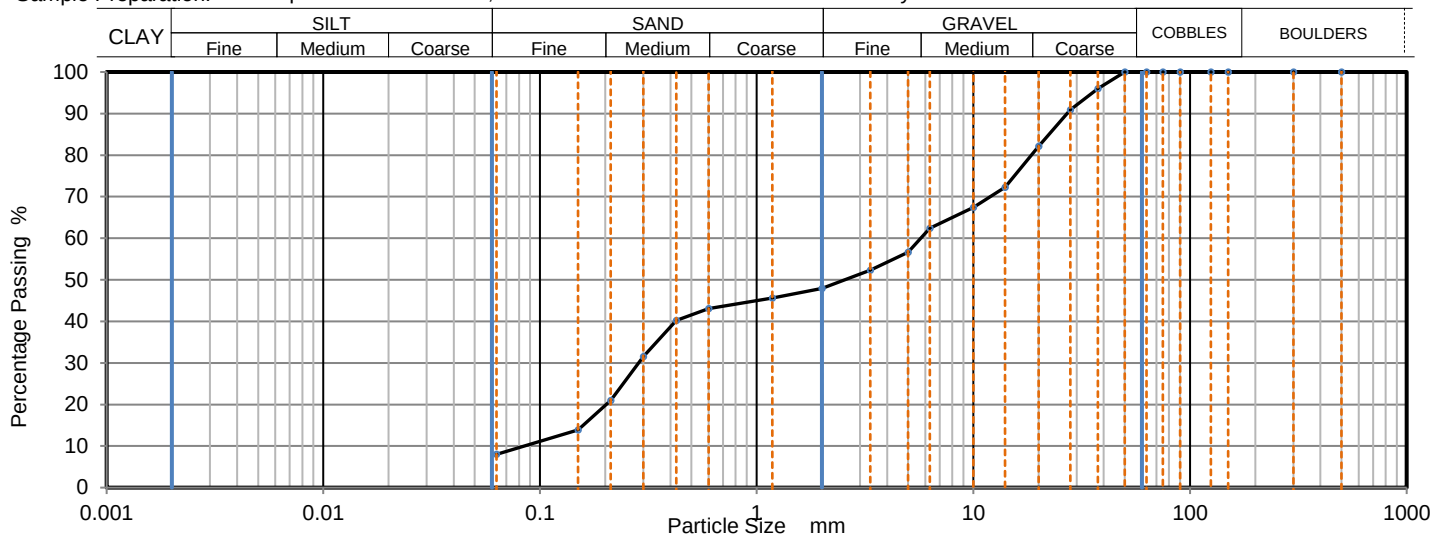
Client Reference: JT0353
Job Number: 20-45207
Date Sampled: 26/11/2020
Date Received: 01/12/2020
Date Tested: 10/12/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1705325
Hole No.: WLS1
Sample Reference: Not Given
Sample Description: Brown very sandy slightly clayey GRAVEL
Sample Preparation: Sample was whole tested, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 1.50
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	91		
20	82		
14	72		
10	67		
6.3	62		
5	57		
3.35	52		
2	48		
1.18	46		
0.6	43		
0.425	40		
0.3	32		
0.212	21		
0.15	14		
0.063	8		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	52.10
Sand	39.50
Fines <0.063mm	8.40

Grading Analysis	
D100	mm 50
D60	mm 5.72
D30	mm 0.285
D10	mm 0.0811
Uniformity Coefficient	71
Curvature Coefficient	0.18

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

4041

Client: ST Consult Ltd
Client Address: Unit 5, Hannington Farm,
Hannington, Kingsclere,
Hampshire, RG 26 5TZ
Contact: Chris Beech
Site Address: 59-51 George Street, Reading

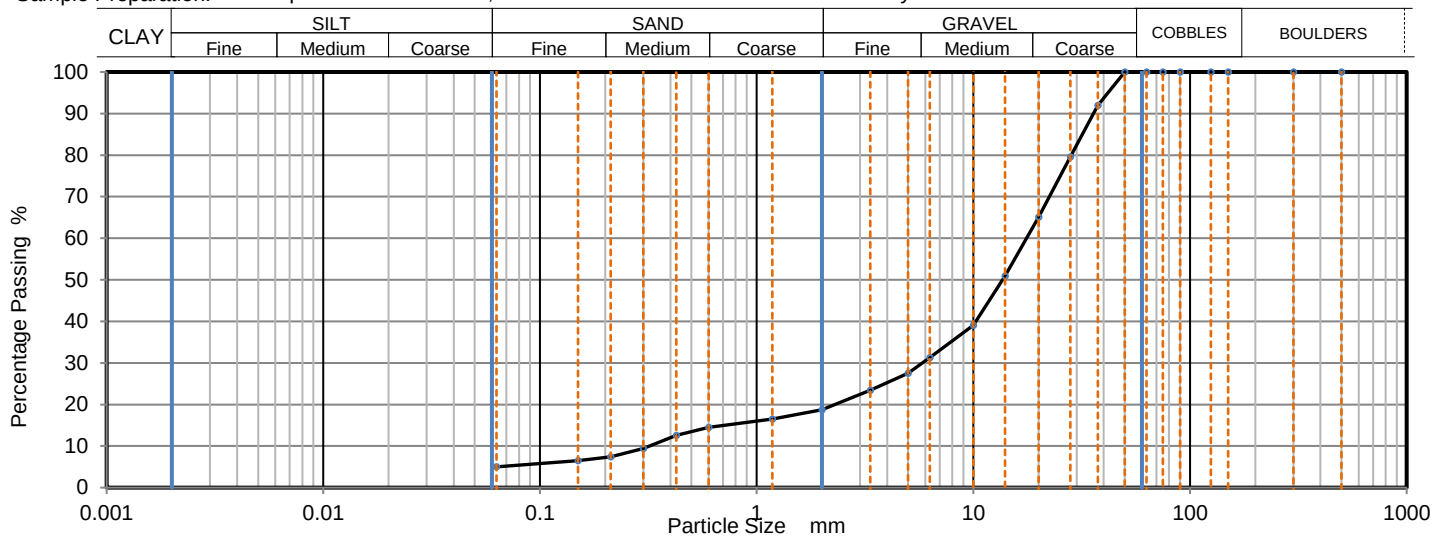
Client Reference: JT0353
Job Number: 20-45207
Date Sampled: 26/11/2020
Date Received: 01/12/2020
Date Tested: 10/12/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1705326
Hole No.: WLS3
Sample Reference: Not Given
Sample Description: Brown sandy slightly clayey GRAVEL
Sample Preparation: Sample was whole tested, oven dried at 106.2 °C and broken down by hand.

Depth Top [m]: 1.00
Depth Base [m]: Not Given
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	92		
28	80		
20	65		
14	51		
10	39		
6.3	31		
5	28		
3.35	23		
2	19		
1.18	17		
0.6	15		
0.425	13		
0.3	9		
0.212	7		
0.15	7		
0.063	6		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	81.30
Sand	13.00
Fines <0.063mm	5.60

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

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

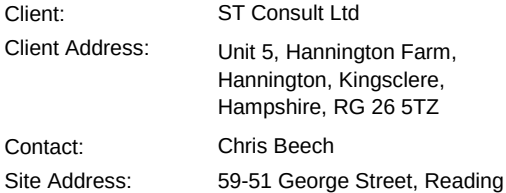
Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Summary of Saturation Moisture Content Test Results

Tested in Accordance with: BS 1377-2: 1990: Clause 3.3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client Reference: JT0353

Job Number: 20-45207

Date Sampled: 26/11/2020

Date Received: 01/12/2020

Date Tested: 10/12/2020

Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

[illegible]

Note: SMC - Saturation Moisture Content; MC - Moisture Content

Comments:

Signed:

Sergius
Bildta

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Chris Beech
ST Consult Ltd
Unit 5
Hannington Farm
Hannington
Kingsclere
Hampshire
RG3 2G 5TZ

t: 01635 600 950

e: cbeech@stconsult.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD16 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 20-45243

Project / Site name: 49-51 George Street, Reading

Samples received on: 01/12/2020

Your job number: JT0353

**Samples instructed on/
Analysis started on:** 01/12/2020

Your order number:

Analysis completed by: 11/12/2020

Report Issue Number: L

Report issued on: 14/12/2020

Samples Analysed: 2 soil samples

Signed: *Karolina Marek*

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 20-45243

Project / Site name: 49-51 George Street, Reading

Lab Sample Number					1705510	1705511
Sample Reference					WLS2	WLS3
Sample Number					None Supplied	None Supplied
Depth (m)					1.00	0.70
Date Sampled					26/11/2020	26/11/2020
Time Taken					None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	
Moisture Content	%	0.01	NONE	13	1.5	
Total mass of sample received	kg	0.001	NONE	1.7	2	

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	8.2
Total Sulphate as SO ₄	%	0.005	MCERTS	0.049	0.299
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.16	1.2
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	156	1190
Total Sulphur	%	0.005	MCERTS	0.023	0.109

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-45243

Project / Site name: 49-51 George Street, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1705510	WLS2	None Supplied	1	Brown clay and loam with gravel.
1705511	WLS3	None Supplied	0.7	Brown clay and loam with gravel.

Analytical Report Number : 20-45243

Project / Site name: 49-51 George Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

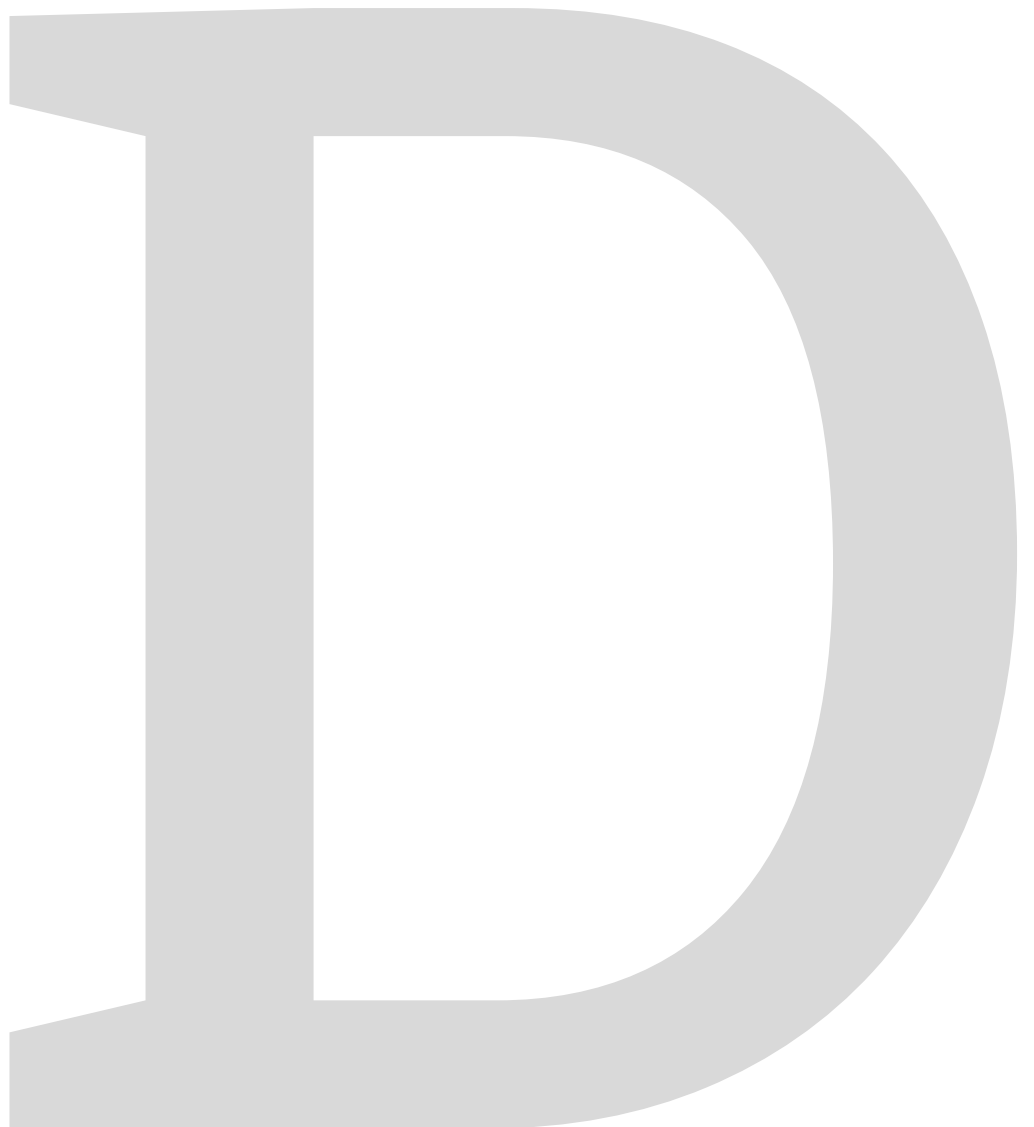
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

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

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

APPENDIX D

**Geotechnical Figures and
Tables**



Project Name: 49-51 George Street, Reading

Location: George Street Reading Berkshire

Client: Mr A Rosser

Project Number: JT0353

Engineer: CJB

STANDARD PENETRATION TEST RESULTS

Location ID	Test Depth (m bgl)	Test Type	Seating Blows/Penetration				Main Test Blows/Penetration								N Value	Reported Result
			SB1	SP1	SB2	SP2	MB1	MP1	MB2	MP2	MB3	MP3	MB4	MP4		
WLS1	1	S	1	75	1	75	2	75	1	75	3	75	2	75	8	N=8 (1,1/2,1,3,2)
WLS1	2	S	2	75	2	75	3	75	2	75	1	75	1	75	7	N=7 (2,2/3,2,1,1)
WLS1	3	S	2	75	2	75	5	75	4	75	5	75	4	75	18	N=18 (2,2/5,4,5,4)
WLS2	1	S	1	75	0	75	0	75	1	75	0	75	1	75	2	N=2 (1,0/0,1,0,1)
WLS2	2	S	2	75	3	75	4	75	4	75	5	75	5	75	18	N=18 (2,3/4,4,5,5)
WLS2	3	S		75	3	75	2	75	1	75	2	75	1	75	6	N=6 (,3/2,1,2,1)

APPENDIX E

**Contamination Laboratory
Test Methods and Results**



These screening values are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

Table 1 – Tier 1 Screening Values

Contaminant	Units	Proposed Land Use					
		Residential with home grown produce consumption	Residential without home grown produce consumption	Open Space * (Residential)	Open Space * (Park)	Allotments	Commercial / Industrial
Arsenic (As) [2]	mg/kg	37	40	79	170	43	640
Cadmium (Cd) [2]	mg/kg	11	85	120	555	1.9	190
Trivalent Chromium (CrIII) [2]	mg/kg	910	910	1,500	33,000	18,000	8600
Hexavalent Chromium (CrVI) [2]	mg/kg	6	6	7.7	220	1.8	33
Lead (Pb) [3]	mg/kg	200	310	630	1300	80	2330
Mercury (Hg) [1,2,7]	mg/kg	7.6-11	9.2-15	40	68-71	6.0	29-320
Selenium (Se) [2]	mg/kg	250	430	1,100	1,800	88	12,000
Nickel (Ni) [2,4]	mg/kg	130	180	230	800	53	980
Copper (Cu) [2,4]	mg/kg	2,400	7,100	12,000	44,000	520	68,000
Zinc (Zn) [2,4]	mg/kg	3,700	40,000	81,000	170,000	620	730,000
Phenol [1,2]	mg/kg	120-380	440-1200	440-1300	440-1300	23-83	440-1300
Benzo[a]pyrene [1,5]	mg/kg	1.7-2.4	2.6	4.9	10	0.67-2.7	36
Naphthalene [1,2]	mg/kg	2.3-1.3	2.3-13	77-430*	77-430*	4.1-24	77-430*
Total Cyanide (CN) [6]	mg/kg	/	/	/	/	/	/
Free Cyanide [6]	mg/kg	/	/	/	/	/	/
Complex Cyanides [6]	mg/kg	/	/	/	/	/	/
Thiocyanate [6]	mg/kg	/	/	/	/	/	/

Notes:

* Open Space levels calculated on the basis of the exposure modelling developed in the C4SL research.

+ Screening values constrained to saturation limit. Higher values may be acceptable on a site specific basis.

[1] Where ranges of values are given for organic contaminants the screening value is dependent on the Soil +Organic Matter.

[2] LQM/CIEH S4UL (2014). Copyright Land Quality Management Ltd. reproduced with permission; Publication Number S4UL 3116. All rights reserved.

[3] C4SL (DEFRA 2014).

[4] Copper, Zinc and Nickel may have phototoxic effects at the given concentrations. Alternative criteria should be adopted for importation of Topsoil or other soils for cultivation. BS3882:2015 and BS8601:2013 suggest values of 200 to 300mg/kg for Zn, 100 to 200mg/kg for Cu, and 60 to 110mg/kg for Ni, for topsoil and subsoil, depending on pH.

[5] Based on the Surrogate Marker approach and modelled using the modified exposure parameters of C4SL but retaining 'minimal risk' HCV.

[6] Screening criteria derived on a site specific basis if test results indicate.

[7] S4UL for Methyl Mercury, higher concentrations may be tolerable if inorganic mercury is the only species present. Lower concentrations apply for elemental Mercury.

Chris Beech
ST Consult Ltd
Unit 5
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Kingsclere
Hampshire
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Analytical Report Number : 20-44634

Project / Site name:	49-51 George Street, Reading	Samples received on:	01/12/2020
Your job number:	JT0353	Samples instructed on/ Analysis started on:	01/12/2020
Your order number:		Analysis completed by:	10/12/2020
Report Issue Number:	1	Report issued on:	10/12/2020
Samples Analysed:	6 soil samples		

Signed:



Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 20-44634
Project / Site name: 49-51 George Street, Reading

Lab Sample Number				1702140	1702141	1702142	1702143
Sample Reference				WLS1	WLS1	WLS2	WLS2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.70	0.15	0.30
Date Sampled				26/11/2020	26/11/2020	26/11/2020	26/11/2020
Time Taken				0915	0925	1400	1405
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status	
Stone Content				%	0.1	NONE	< 0.1
Moisture Content				%	0.01	NONE	12
Total mass of sample received				kg	0.001	NONE	0.9

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.9	8.3	9.3	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.085	0.063	0.16	-
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	5.8	-
Organic Matter	%	0.1	MCERTS	0.3	0.3	2	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.4	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.3	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2	-
Phenanthrene	mg/kg	0.05	MCERTS	0.53	0.99	19	-
Anthracene	mg/kg	0.05	MCERTS	0.1	0.41	13	-
Fluoranthene	mg/kg	0.05	MCERTS	0.79	2.7	88	-
Pyrene	mg/kg	0.05	MCERTS	0.74	2.4	78	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.31	1.8	62	-
Chrysene	mg/kg	0.05	MCERTS	0.32	1.6	62	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.25	1.6	76	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.1	1.2	36	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.23	1.5	65	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.89	41	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	9.7	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.95	44	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.37	16.2	599	-
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Analytical Report Number: 20-44634
Project / Site name: 49-51 George Street, Reading

Lab Sample Number	1702140	1702141	1702142	1702143
Sample Reference	WLS1	WLS1	WLS2	WLS2
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20	0.70	0.15	0.30
Date Sampled	26/11/2020	26/11/2020	26/11/2020	26/11/2020
Time Taken	0915	0925	1400	1405
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.1	15	25	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	21	24	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	13	67	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	20	190	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	20	22	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	64	52	410	-

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	-	32	-	640
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TPH2 (C6 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1
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TPH C6 - C40	mg/kg	10	NONE	-	32	-	640
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TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-44634
Project / Site name: 49-51 George Street, Reading

Lab Sample Number				1702144	1702145
Sample Reference				WLS3	WLS1
Sample Number				None Supplied	None Supplied
Depth (m)				0.10	0.90
Date Sampled				26/11/2020	26/11/2020
Time Taken				1255	0930
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	-
Moisture Content	%	0.01	NONE	2.4	-
Total mass of sample received	kg	0.001	NONE	0.9	-

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	10.7	-
Total Cyanide	mg/kg	1	MCERTS	1	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.8	-
Sulphide	mg/kg	1	MCERTS	26	-
Organic Matter	%	0.1	MCERTS	1.1	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	0.28	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	0.53	-
Pyrene	mg/kg	0.05	MCERTS	0.54	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.34	-
Chrysene	mg/kg	0.05	MCERTS	0.3	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.27	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.25	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.27	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.21	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.26	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.25	-
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Analytical Report Number: 20-44634
Project / Site name: 49-51 George Street, Reading

Lab Sample Number				1702144	1702145
Sample Reference				WLS3	WLS1
Sample Number				None Supplied	None Supplied
Depth (m)				0.10	0.90
Date Sampled				26/11/2020	26/11/2020
Time Taken				1255	0930
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	23	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	55	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	970	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	27	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	190	-

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	-	-
TPH2 (C6 - C10)	mg/kg	0.1	MCERTS	-	-
TPH C6 - C40	mg/kg	10	NONE	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	2.7	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	5.6	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	11	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	150	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	170	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	52	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	62	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-44634
Project / Site name: 49-51 George Street, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1702140	WLS1	None Supplied	0.2	Brown loam and sand with gravel and brick.
1702141	WLS1	None Supplied	0.7	Brown clay and loam with gravel.
1702142	WLS2	None Supplied	0.15	Brown loam and sand with gravel and vegetation.
1702143	WLS2	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
1702144	WLS3	None Supplied	0.1	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 20-44634
Project / Site name: 49-51 George Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH2 (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS

Analytical Report Number : 20-44634
Project / Site name: 49-51 George Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method.	L076-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
 For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
 Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-44638

Project / Site name:	49-51 George Street, Reading	Samples received on:	01/12/2020
Your job number:	JT0353	Samples instructed on/ Analysis started on:	01/12/2020
Your order number:		Analysis completed by:	10/12/2020
Report Issue Number:	1	Report issued on:	10/12/2020
Samples Analysed:	2 10:1 WAC samples		

Signed:



Will Fardon
Technical Reviewer (CS Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

i2 Analytical

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Waste Acceptance Criteria Analytical Results									
Report No:		20-44638							
						Client: STCONSULT			
Location		49-51 George Street, Reading							
Lab Reference (Sample Number)		1702161 / 1702162				Landfill Waste Acceptance Criteria			
Sampling Date		26/11/2020				Limits			
Sample ID		WLS2				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Depth (m)		0.30							
Solid Waste Analysis									
TOC (%)**		0.90				3%	5%	6%	
Loss on Ignition (%) **		2.3				--	--	10%	
BTEX (µg/kg) **		< 10				6000	--	--	
Sum of PCBs (mg/kg) **		< 0.007				1	--	--	
Mineral Oil (mg/kg)		42				500	--	--	
Total PAH (WAC-17) (mg/kg)		237				100	--	--	
pH (units)**		8.2				--	>6	--	
Acid Neutralisation Capacity (mol / kg)		15				--	To be evaluated	To be evaluated	
Eluate Analysis		10:1			10:1	Limit values for compliance leaching test			
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)		mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *		< 0.0010			< 0.0100	0.5	2	25	
Barium *		0.0144			0.128	20	100	300	
Cadmium *		< 0.0001			< 0.0008	0.04	1	5	
Chromium *		0.0039			0.035	0.5	10	70	
Copper *		0.0067			0.059	2	50	100	
Mercury *		< 0.0005			< 0.0050	0.01	0.2	2	
Molybdenum *		< 0.0004			< 0.0040	0.5	10	30	
Nickel *		< 0.0003			< 0.0030	0.4	10	40	
Lead *		0.0050			0.044	0.5	10	50	
Antimony *		< 0.0017			< 0.017	0.06	0.7	5	
Selenium *		< 0.0040			< 0.040	0.1	0.5	7	
Zinc *		0.0045			0.040	4	50	200	
Chloride *		1.4			12	800	15000	25000	
Fluoride		0.43			3.8	10	150	500	
Sulphate *		8.6			77	1000	20000	50000	
TDS*		53			470	4000	60000	100000	
Phenol Index (Monohydric Phenols) *		< 0.010			< 0.10	1	-	-	
DOC		4.76			42.4	500	800	1000	
Leach Test Information									
Stone Content (%)		< 0.1							
Sample Mass (kg)		1.0							
Dry Matter (%)		92							
Moisture (%)		8.0							
Results are expressed on a dry weight basis, after correction for moisture content where applicable.									
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation									
* = UKAS accredited (liquid eluate analysis only)									
** = MCERTS accredited									
Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.									
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.									

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Waste Acceptance Criteria Analytical Results									
Report No:		20-44638							
						Client: STCONSULT			
Location		49-51 George Street, Reading							
Lab Reference (Sample Number)		1702163 / 1702164				Landfill Waste Acceptance Criteria			
						Limits			
Sampling Date		26/11/2020				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID		WLS1							
Depth (m)		0.90							
Solid Waste Analysis									
TOC (%)**		0.20				3%	5%	6%	
Loss on Ignition (%) **		1.9				--	--	10%	
BTEX (µg/kg) **		< 10				6000	--	--	
Sum of PCBs (mg/kg) **		< 0.007				1	--	--	
Mineral Oil (mg/kg)		< 10				500	--	--	
Total PAH (WAC-17) (mg/kg)		< 0.85				100	--	--	
pH (units)**		8.3				--	>6	--	
Acid Neutralisation Capacity (mol / kg)		4.4				--	To be evaluated	To be evaluated	
Eluate Analysis									
		10:1			10:1	Limit values for compliance leaching test			
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)		mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *		< 0.0010			< 0.0100	0.5	2	25	
Barium *		0.0052			0.0451	20	100	300	
Cadmium *		< 0.0001			< 0.0008	0.04	1	5	
Chromium *		< 0.0004			< 0.0040	0.5	10	70	
Copper *		0.0020			0.017	2	50	100	
Mercury *		< 0.0005			< 0.0050	0.01	0.2	2	
Molybdenum *		< 0.0004			< 0.0040	0.5	10	30	
Nickel *		< 0.0003			< 0.0030	0.4	10	40	
Lead *		0.0033			0.029	0.5	10	50	
Antimony *		< 0.0017			< 0.017	0.06	0.7	5	
Selenium *		< 0.0040			< 0.040	0.1	0.5	7	
Zinc *		0.0047			0.040	4	50	200	
Chloride *		2.3			20	800	15000	25000	
Fluoride		0.23			2.0	10	150	500	
Sulphate *		4.1			36	1000	20000	50000	
TDS*		33			290	4000	60000	100000	
Phenol Index (Monohydric Phenols) *		< 0.010			< 0.10	1	-	-	
DOC		4.50			38.9	500	800	1000	
Leach Test Information									
Stone Content (%)		< 0.1							
Sample Mass (kg)		0.90							
Dry Matter (%)		86							
Moisture (%)		14							
Results are expressed on a dry weight basis, after correction for moisture content where applicable.									
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation									
* = UKAS accredited (liquid eluate analysis only)									
** = MCERTS accredited									
Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.									
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.									

Analytical Report Number : 20-44638

Project / Site name: 49-51 George Street, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1702161	WLS2	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
1702163	WLS1	None Supplied	0.9	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 20-44638
Project / Site name: 49-51 George Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance"	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025

Analytical Report Number : 20-44638
Project / Site name: 49-51 George Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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Analytical Report Number : 21-49579

Project / Site name:	49-51 George Street, Reading	Samples received on:	05/01/2021
Your job number:	JT0353	Samples instructed on/ Analysis started on:	05/01/2021
Your order number:	JT0353-2	Analysis completed by:	12/01/2021
Report Issue Number:	1	Report issued on:	12/01/2021
Samples Analysed:	1 soil sample		

Signed: *Karolina Marek*

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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

Analytical Report Number: 21-49579
 Project / Site name: 49-51 George Street, Reading
 Your Order No: JT0353-2

Lab Sample Number				1730383
Sample Reference				WLS1
Sample Number				None Supplied
Depth (m)				2.50
Date Sampled				26/11/2020
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	13
Total mass of sample received	kg	0.001	NONE	1.7

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.9
Total Sulphate as SO ₄	%	0.005	MCERTS	0.041
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0064
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	6.4
Total Sulphur	%	0.005	MCERTS	0.015

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-49579

Project / Site name: 49-51 George Street, Reading

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1730383	WLS1	None Supplied	2.5	Beige clay and loam.

Analytical Report Number : 21-49579
Project / Site name: 49-51 George Street, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

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

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

Sample Deviation Report



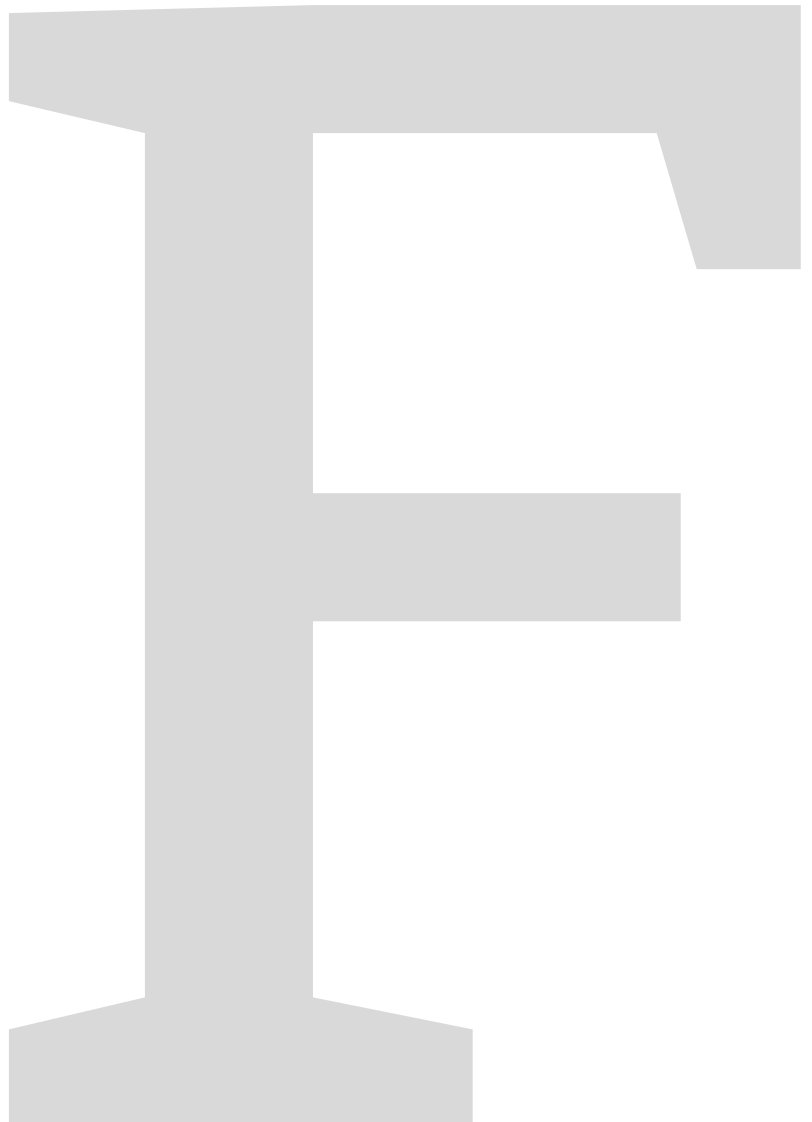
Analytical Report Number : 21-49579
Project / Site name: 49-51 George Street, Reading

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WLS1	None Supplied	S	1730383	c	pH in soil (automated)	L099-PL	c



APPENDIX F

Photographs





Photograph 1 – Facing broadly east at the entrance to the site.



Photograph 2 – Facing broadly west at the archway present upon site.



Photograph 3 – Facing broadly west from the centre of the site.



Photograph 4 – Facing broadly west from the centre of the site.



Photograph 5 – Facing east toward commercial storage building entrance.



Photograph 6 – Broadly facing south-east within the commercial office building.



Photograph 5 - Facing east within commercial storage room.



Photograph 6 - Facing south-east within commercial storage room.



Photograph 7 - Looking down at near surface material arisings within WLS2 [surface to 1m bgl].



Photograph 8 - Looking down at material arisings from WLS2 [1m - 3.45m bgl].



Photograph 9 - Looking down at near surface material arisings within WLS3 [surface to 1m bgl].



Photograph 10 - Looking down at material arisings from WLS3 [1m - 3.45m bgl].



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