

School of Digital Arts (SODA), Manchester Metropolitan University

Verification Report – Part B

044214-BHE-XX-XX-RP-GE-0006

044214

8 February 2023

Revision P04

Revision	Description	Issued by	Date	Checked
P01	Verification Report Part B	LR	06.04.21	GM
P02	Including General Landscape Filling Results and Assessment	LR	15.09.21	GM
P03	Including S278 works	LR	07.04.2022	GM
P04	Section 4 updated to include 4.5 – Imported Topsoil	LR	08/02/23	PH

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date **08/02/2023**

approved **Pip Hunsworth**

signature 

date **8/02/2023**

Contents

1	Introduction	4
2	Conceptual Site Model and Planned Remediation Actions	6
3	Verification Plan – Lines of Evidence	10
4	Verification of Imported Material for the Backfilling of Temporary Excavations for Foundations	13
5	Conclusions	16
6	Bibliography	21

Table of Tables

Table-1-1	Summary of responsibility	5
Table 2-1	Summary of pollutant linkages.	7
Table 4-1	Imported backfilling temporary excavations for foundations materials.	13
Table 4-2:	Imported general filling material	14

1 Introduction

1.1 Report scope and objectives

This Verification Report was prepared by Buro Happold (BH) in general accordance with the Model Procedures [1] and its replacement government guidance [2] on behalf of Kier Group Limited (Kier). It forms the second part (Part B) of the verification process, providing evidence of the successful completion of the final elements of the approved Remediation Strategy [3] for the SODA development. The completion of the initial elements of the Remediation Strategy was reported in Verification Report Part A – Groundworks [4]. This report therefore presents the information and evidence necessary to fully satisfy Planning Condition 4b (see Section 1.2).

The particular objectives of this report with respect to Part B are to:

- i. Describe the verification activities that have been carried out; and
- ii. Present supporting information on the remedial measures undertaken to mitigate the risks identified in the previous investigations.

The works covered by this report is the verification of soil chemical suitability of imported materials for:

- The backfilling of temporary excavation for foundations;
- Areas <600 mm beneath ground floor slab;
- Areas <600 mm beneath hard landscaping; and
- Build-ups to hardstanding associated with the S278 works. The S278 works involved the stopping up and pedestrianisation of an adopted highway to the immediate east of the site (Higher Chatham Street).
- Imported topsoil for soft landscaping and planters

1.2 Relevant planning conditions

This report has been prepared to address the requirements of the Local Planning Authority with respect to land affected by contamination, set out in the particular Conditions of the planning permission. The Condition relevant to this Verification Report is presented below for ease of reference:

Planning Condition 4b

b) When the development commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a Completion/Verification Report shall be submitted to and approved in writing by the City Council as local planning authority. In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy.

In order to enable the discharge of Condition 4b, a Verification Report is required that demonstrates how the risks from contamination have been mitigated by the implementation of the Remediation Strategy [5]. As described above, the previous report (Verification Report – Part A) [4] formed the first part of a two-part verification process. This Verification Report – Part B is submitted on the completion of the remaining enabling works/groundworks within the site development area.

1.3 Responsible parties

The parties with responsibility for various elements of the verification activities are summarised below.

The Remediation Strategy [3] was prepared by Buro Happold (BH). The works relevant to this report were carried out by the Works Contractor (WC) PP O'Connor Ltd (PPOC) under the instruction of the Main Contractor (MC) Kier. The main groundworks across the majority of the site comprised the placement of imported material for the backfilling of temporary excavations for foundations in accordance with the Buro Happold Earthworks Specification [6].

Table-1-1 Summary of responsibility

Name	Role	Description of activities	Contact information
Kier	Main Contractor	Overall responsibility for all activities related to the redevelopment	Tempsford Hall, Sandy, Bedfordshire, SG19 2BD 01767 355000
Buro Happold Engineering	Consultant/ Consultant to Kier	Investigation, assessment and preparation of the Remediation Strategy. Management of verification and preparation of Verification Report.	Buro Happold Engineering, 3 Wellington Place, Leeds, LS1 4AP 0113 204 2200
Socotec	Works Contractor	Site Investigation	SOCOTEC UK Limited, SOCOTEC House, Bretby Business Park, Ashby Road, Burton upon Trent, DE15 0YZ 01283 554400
PP O'Connor	Works Contractor	Earthworks specialist (including remediation)	61 Mosley Rd, Stretford, Manchester M17 1NR 0161 776 0333
Weststone Construction	Works Contractor	Earthworks specialist	Unit 6, Whitworth Court, Manor Farm Road, Runcorn, WA7 1WA +44 (0)788 005 2037
Van Elle	Main Contractor	Substructure Contractor	Summit Close, Kirkby in Ashfield, Nottinghamshire, NG17 8GJ. 01773 580580

2 Conceptual Site Model and Planned Remediation Actions

2.1 General

Three phases of ground investigation (GI) have been undertaken. Reference should be made to the following available reports; IF 2012 GI [7], Buro Happold Desk Study Addendum (BH DSA [8]), Socotec Ground Investigations (SL 2018 GI [9] and SL 2019 GI [10]) and Buro Happold Verification Report – Part A. A brief summary is provided in the following sections.

2.2 Ground Conditions

The published geology (BGS Sheet 85) indicates the site to be underlain by superficial deposits of Glaciofluvial Sheet Deposits (sand and gravel), underlain by the Triassic Chester Formation (CF) within the Sherwood Sandstone Group.

The general sequence of strata encountered beneath the site comprises Made Ground (MG) which is underlain by clay, sand & gravel (Glaciofluvial Deposits ranging between 0.30mBGL and 5.30mBGL), overlying sandstone bedrock (CF - recorded between 4.50mBGL and 5.30mBGL). The upper CF is highly weathered becoming more competent with depth.

The Glaciofluvial Deposits are classified as a 'Secondary A Aquifer' and the Chester Formation as a 'Principal Aquifer'.

2.3 Conceptual Site Model

2.3.1 Human Health

27 No. soil chemical tests have been undertaken across the 3 No. ground investigations. The results identify that of the 27 No. samples, 26 No. were below the relevant 'commercial' thresholds for all determinands. Elevated PAHs were recorded in 1 No. soil sample (SL 2019 GI, WS212 at 0.20mBGL [10]). This 'hotspot' was removed from site during the Part A enabling works.

16 No. soil samples were screened for asbestos containing material (ACM) across all 3 No. ground investigations. Of the 16 No. samples, 5 No. recorded the presence of ACM in the form of 'Amosite', 'Chrysotile' and 'Crocidolite'. The asbestos quantification results recorded concentrations ranging from 0.001% to 0.017% which is classified as 'very low' to 'low' in accordance with CL:AIRE guidance [11]. One sample (BH101 at 0.50 m BGL) recorded a concentration of 0.056% which is classified as 'moderate'.

As part of the IF 2012 GI, 3 No. ground gas monitoring wells were installed and 1 No. historic borehole monitored. During the Socotec 2018 investigation three ground gas monitoring wells were installed. A maximum CO₂ concentration of 5% was recorded in one of the monitoring wells on one visit (BH101 on 18/4/2019, characteristic situation 1 (CS1)). The site was classified as characteristic situation 1 (CS1) during all monitoring visits across all monitoring wells in all GIs.

The enabling works as described in the Buro Happold Verification Report – Part A [4] comprised the excavation of Made Ground deposits beneath the site to remove contaminated soils (if any) and obstructions from historical substructure and the import of suitable material for the S278 works (changes to existing highways). The Main Contractor (MC) was responsible for the earthworks spoil management strategy and undertaking any proposed sampling and testing regime for waste classification. All excavated material was transferred offsite to an appropriate waste disposal or transfer facility.

2.3.2 Controlled Waters

No groundwater was anticipated to be encountered during any of the excavations therefore, groundwater management was not recommended [5] although if encountered, treatment for reuse or discharge under consent of foul sewer was required (see Sections 4.6.2 and 4.6.3 of Buro Happold Report [4]).

2.3.3 Summary of pollutant linkages

In the UK, the assessment of risk from contamination follows the source-pathway-receptor approach. Site-specific pollutant linkages relevant to this development were identified with respect to the identified sources and future commercial use. This is summarised in Chapter 3 of the Verification Report Part A [4] but those relevant to this Part B report are reproduced in Table 2-1 for ease of reference.

Table 2-1 Summary of pollutant linkages.

Source	Pathway	Receptor
Imported material for backfilling temporary excavations.	Temporary - Direct contact during construction.	Construction workers.
	Temporary - Dust generated during construction	General public
	Temporary – Migration of contaminants (if any).	Secondary A Aquifer – Superficial Deposits (Glacial Deposits) Principal Aquifer – Bedrock (Chester Formation)
Imported material for general filling.	Temporary - Direct contact during construction.	Construction workers.
	Temporary - Dust generated during construction	General public
	Temporary – Migration of contaminants (if any).	Secondary A Aquifer – Superficial Deposits (Glacial Deposits) Principal Aquifer – Bedrock (Chester Formation)
Imported material for S278 works.	Temporary - Direct contact during construction.	Construction workers.
	Temporary - Dust generated during construction	General public
	Temporary – Migration of contaminants (if any).	Secondary A Aquifer – Superficial Deposits (Glacial Deposits) Principal Aquifer – Bedrock (Chester Formation)

2.4 Remedial objectives

The remediation objectives are set out in the approved Remediation Strategy prepared by Buro Happold [3]. The text below summarises the approved remediation design measures and / or actions. The overall aim of the strategy was to ensure that potential risks from land contamination at the site to future site users, neighbours, controlled waters, infrastructure and ecological systems are appropriately mitigated. It also aimed to ensure that the development itself could be carried out safely without unacceptable risks to workers, neighbours and other off-site receptors, in accordance with the National Planning Policy Framework.

The specific aims of the strategy are summarised as follows:

- To ensure any potentially significant risks to people or the environment are mitigated in both the short and long term;
- To meet specific planning conditions put in place by the Local Authority;
- To avoid regulatory intervention;
- To ensure both client and stakeholder expectations are satisfied; and
- To minimise long-term liabilities.

These aims formed the following objectives:

Contamination related

- (i) Prevent exposure of future site users to contaminated soils;
- (ii) Minimise the potential for the mobilisation of contaminants into groundwater;
- (iii) Ensure that demolition and construction activities do not cause secondary contamination;

Engineering related

- (iv) Ensure ground conditions are suitable for proposed development;
- (v) Protect plantings, building structures and underground services from the effects of contaminated soils;

Management related

- (vi) Use a set of remedial design features which are simple, robust and provide long-term protection requiring minimal maintenance and causing minimum inconvenience to site occupiers; and
- (vii) Ensure off-site residents are not subject to nuisance, dust, noise or odour.

2.5 Critical performance characteristics

2.5.1 Principles and preferred option

Risks from contamination can only exist if there is a source of contamination present, a receptor to be impacted upon and a plausible pathway by which the two may be linked. Breaking the pollutant linkages can be achieved by one or more of the following methods:

- (i) Source control (e.g. removal), and/or
- (ii) Pathway control or receptor control.

Minor contamination (from Asbestos Containing Material - ACM) was encountered within Made Ground deposits in the former student's union car parking area. In addition, 1 No. location, namely WS212, located in the south of site on Higher Chatham Street, identified elevated concentrations of PAHs. Accordingly, the preferred remediation option comprised:

- i. Removal of material during the enabling works package. The extent of the enabling works excavation within the development proposals meant that a significant amount of the source was removed, thus the source-pathway-receptor linkage was broken. The remaining pathways are blocked by the presence of hardstanding. It is therefore anticipated that upon completion of the proposed development risks to future site users from the identified site contamination will have been suitably mitigated (refer to Buro Happold Remediation Strategy [3]).

- ii. Preventing or at least minimising the potential for construction workers and future site users to come into direct contact with contaminants in the Made Ground or imported soils during construction.

2.5.2 Control measures for direct contact

The detail of these control measures was set out by Buro Happold in the Remediation Strategy [3] and is repeated below for ease of reference.

The majority of the site (approximately 90%) has undergone enabling works to remove below ground obstructions for foundation installation (CFA piling). As such, the removal of material from site has resulted in the majority of contaminated Made Ground being removed from the site with the remaining materials being located beneath hardstanding (refer to Part A [4]).

In addition, appropriate hazard identification should be undertaken prior to and during the works. Toolbox talks should be completed during the site induction regarding the existing ground conditions to communicate any risks. The use of personal protective equipment (PPE) should be used where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately.

Each source of imported material needs to be adequately tested prior to placement on the designated areas and must comply with the requirements set out in Enclosure 6, Tables A1 and A2 within the remediation strategy [3]. Where the consistency of the source is of doubt, additional testing may be required. Sample preparation, testing and reporting procedure shall comply with current best practice.

2.5.3 Control measures for gas migration

Ground gas monitoring classified the site as Characteristic 1 (CS1) and as such ground gas protection was not considered to be required in accordance with the relevant guidance [12] and British Standards [13].

3 Verification Plan – Lines of Evidence

3.1 General

BH have been contracted by Kier to prepare the consolidated Verification Report relevant to the Local Planning Authority condition 4b. This work includes periodic site inspection, recording of relevant works and provision for response in the event of encountering unexpected contamination. Whilst the primary responsibility for collection of the verification data was held by the main contractor (Kier), on occasion, Kier employed the services of specialist consultants (Buro Happold) to assist in obtaining the necessary data.

The overall objective of verification activity is to demonstrate that the remedial works were carried out in accordance with the agreed remediation strategy [3] and that the works have not given rise to any unacceptable impacts upon people or the environment. Accordingly, verification activities will provide evidence that:

- Planning/permit/licence conditions have been met; and
- Environmental management goals have been met.

3.2 Construction workforce - Health safety and hygiene regime

The Contractor's HSE/CCoC Plan has been implemented and recorded (by site staff (Contractor and project Manager) with periodic inspection by Buro Happold. There is a strategy within the BH Excavation & Filling Specification [6] (included as Appendix A) which details the approach if unforeseen contamination is encountered. In particular anything that could give rise to particular risks to the health and safety of the workforce are encountered (e.g. unusual vapours etc.).

3.3 Backfilling Temporary Excavations for Foundations

3.3.1 Imported soil materials

The Remediation Strategy [3] stipulates that the upper part of the clean-cover system be comprised of a maximum depth of 600mm of hardcore under ground bearing slabs, in accordance with the Buro Happold Earthworks Specification [6]. It also states that material imported from off-site sources can be tested at source to ensure conformity prior to transport and site and placement. Backfilling material shall also be tested in-situ for verification purposes. The testing requirements set out in the Remediation Strategy [3] are at a frequency of one sample per 50m³ for unknown or brownfield source or 1 test per 200m³ for greenfield source. For imported topsoil, a frequency of 1 test per 100 m³ was required.

Each source of material must comply with the requirements set out in Enclosure 6, Tables A1 and A2 within the remediation strategy [3]. Where the consistency of the source is of doubt, additional testing may be required. Sample preparation, testing and reporting procedure shall comply with current best practice.

3.4 General Landscape Filling

3.4.1 Imported soil materials

The Remediation Strategy [3] stipulates that the upper part of the clean-cover system be comprised of a maximum depth of 600mm of hardcore under hardstanding, in accordance with the Buro Happold Earthworks Specification [6]. It also states that material imported from off-site sources can be tested at source to ensure conformity prior to transport

and site and placement. Backfilling material shall also be tested in-situ for verification purposes. The testing requirements set out in the Remediation Strategy [3] are at a frequency of one sample per 50m³ for unknown or brownfield source or 1 test per 200m³ for greenfield source.

Each source of material must comply with the requirements set out in Enclosure 6, Tables A1 and A2 within the remediation strategy [3]. Where the consistency of the source is of doubt, additional testing may be required. Sample preparation, testing and reporting procedure shall comply with current best practice.

3.5 Non compliance

If in-situ testing indicates that some of the imported soil materials fail to meet the criteria (i.e. average concentrations exceed thresholds), the Contractor will be required to either carry out further testing to demonstrate compliance or to excavate and remove the non-compliant soils and replace them with fresh imported materials with further sampling of the fresh imported material to confirm suitability. Non-compliant material will be determined on the basis of the average values (mean or US95 as appropriate) for each batch/source of soil. Exceedance of this average would either result in rejection of that material and its removal and replacement by compliant material or in further testing to confirm non-compliance and/or delineate any particular contaminant 'hotspot'.

3.6 Groundwater

There is no planned groundwater treatment.

3.7 Gas protection system

Ground gas monitoring results classified the site as Characteristic 1 (CS1) and as such ground gas protection was not considered to be required in accordance with the relevant guidance [12] and British Standards [13].

3.8 Unexpected contamination

Upon encountering any unforeseen contamination, appropriate investigation / remedial action will be instigated and recorded by Contractor (and/ or their consultant) in accordance with Appendix A of the BH Excavation & Filling Specification (Appendix A; [6]). The following discovery strategy/procedure is to be compiled with;

- a) Cease and make safe all excavations in this location and report observations to the Site Manager.
- b) The Site Manager is to notify Buro Happold, acting as the Engineer.
- c) Re-commence the work following agreement of appropriate procedures with Buro Happold.
- d) The Local Authority environmental health officer (EHO) and if relevant, the Environment Agency are to be kept fully informed of any such occurrences.

A record of all such instances will be taken by the contractor, reviewed by Buro Happold and included in the Verification Report.

3.9 Environmental monitoring

In order to protect the site workers and nearby land-users / residents, the MC (Kier) have and will continue to ensure that hazards from the above processes and operations are kept to a minimum.

3.10 Independent Inspection

Buro Happold will be responsible for the provision of a watching brief comprising three main elements;

- i. **Periodic site inspections as required.** When no below ground works are underway, no site visits are anticipated.
- ii. **Ad hoc responses** to requests for advice (e.g. if unexpected contamination is encountered).
- iii. **Liaison with the local authority** associated with the reports required for discharge of the Conditions and also if unforeseen contamination is encountered.

The provision of this support is important because the Environment Agency strongly advise that verification includes a measure of independence [14]. This is to ensure that potential conflicts of interest are avoided (i.e. the contractor verifying their own work).

4 Verification of Imported Material for the Backfilling of Temporary Excavations for Foundations

4.1 Introduction

The following text describes the lines of evidence obtained to show that the measures set out in the approved Remediation Strategy [3] were implemented. This information is presented in a series of Appendices to this report:

- Appendix B – Kier Supporting Documentation
- Appendix C – Chemical Results

The Remediation Strategy [3] was published in July 2019 and issued by Buro Happold to Kier for submission to the Local Authority.

4.2 Backfilling Temporary Excavations for Foundations (<600 mm below slab)

4.2.1 Imported materials

Two types of material were imported to satisfy the requirements of Part B: backfilling temporary excavations for foundations (>600 mm BGL). The different material types were sampled offsite at the source location. The material references and volumes (calculated from import certificates) are tabulated in Table 4-1 below. Example import certificates are included in the Kier Summary provided in Appendix B. The offsite sampling data showed all determinands for all samples to be satisfactory with respect to the thresholds agreed in the Remediation Strategy [3]. The chemical test results for the imported materials are included in Appendix C. Both the material types (6F5 and Type One) were used beneath the footprint of the building as subbase material, as stated in Clause 605 of the BH Earthworks Specification [6].

Table 4-1 Imported backfilling temporary excavations for foundations materials.

Material reference	Supplier	Volume imported (m ³)
6F5 (Greenfield)	Marchington Stone Limited, Stockport, SK6 8DX	324
Type One Sub Base – Limestone (MOT) (Greenfield)	Marchington Stone Limited, Stockport, SK6 8DX	108
		Total: 432

4.3 General Filling (Hard Landscaped areas)

4.3.1 Imported materials

The fill material used beneath ground bearing slab onsite was imported Type One, as recommended in Clause 605 of the BH Earthworks Specification [6]. Type One material was imported from Marchington Stone Limited, to satisfy the requirements of Part B: general filling (<600 mm BGL) beneath hardstanding. The material was sampled offsite at the source location. The material reference and volume is provided in Table 4-1 below. A selection of import certificates are included in the Kier Summary provided in Appendix B. The sampling data showed all determinands for all samples to be satisfactory with respect to the thresholds agreed in the Remediation Strategy [3]. The chemical test results for the imported materials are included in Appendix C.

Table 4-2: Imported general filling material

Material reference	Supplier	Volume imported (m ³)
Type One Sub Base – Limestone (MOT) (Greenfield)	Marchington Stone Limited, Stockport, SK6 8DX	80
		Total: 80

4.4 General Filling (S278 works)

The fill material used beneath the adopted S278 boundary was imported Type One, as recommended in Clause 605 of the BH Earthworks Specification [6]. Type One material was imported from Marchington Stone Limited, to satisfy the requirements of Part B: general filling beneath hardstanding (S278 works). The material was sampled on site from the stockpile. The material reference and volume is provided in Table 4-3 below. A selection of import certificates are included in the Kier Summary provided in Appendix B. The sampling data showed all determinands for all samples to be satisfactory with respect to the thresholds agreed in the Remediation Strategy [3]. The chemical test results for the imported materials are included in Appendix C.

Table 4-3: Imported general filling material for S278 works

Material reference	Supplier	Volume imported (m ³)
Type One Sub Base – Limestone (MOT) (Greenfield)	Marchington Stone Limited, Stockport, SK6 8DX	30
		Total: 30

4.5 Soft Landscaping – Imported topsoil

The material used for the 5 No. areas of soft landscaping across the site is imported topsoil from Green-tech Limited and is certified to be manufactured to BS 3882:2015 (Specification for Topsoil). The depths of topsoil range between 350 and 400 mm deep. Please refer to Appendix B for a plan of the soft landscaped areas. This material is considered to perform to the requirements stated in Clause 850* of the BH Earthworks Specification [6]. The material was not sampled for chemical testing on site due to the limited volumes of material used and it's certification in accordance with BS 3882:2015. The material reference and imported volume are provided in Table 4-4 below. A selection of import certificates/proof of purchase are included in the Kier Summary provided in Appendix B. It is considered that the topsoil material imported to site performs satisfactorily with respect to the thresholds agreed in the Remediation Strategy [3].

Table 4-4: Imported topsoil material for soft landscaping planters

Material reference	Supplier	Volume imported (m ³)
Topsoil (BS 3882:2015 certified)	Green-tech Ltd, Rabbit Hill Business Park, Great North Road, Arkendale, HG5 0FF	~14
		Total: 14

4.6 Environmental monitoring

In order to protect the site workers and nearby land-users / residents, Kier and PPOC ensured that the potential environmental hazards from the material placement activities were appropriately managed. Monitoring was

undertaken onsite and provided the following information: time, wind speed and weather conditions, noise levels (minimum and maximum), odours, and real-time dust observations.

4.6.1 Construction workforce – health, safety and hygiene regime

Good standard practice and standard health, safety and hygiene measures were carried out by the contractors in accordance with the Construction Management Plan [15]. During the final filling works that formed this phase, there was good control of site plant (cordoned off with appropriate fencing) and there was no evidence of environmental nuisance (or hazard) associated with the material placement activities. These measures ensured that the potential risks to construction workers and site neighbours associated with the potential for hazardous materials to be released into air as dust during construction was appropriately mitigated.

4.6.2 Controlled waters

There was no requirement for groundwater treatment as detailed within the Remediation Strategy [3]. Groundwater was not encountered during the backfilling of excavations and as such no groundwater measures were required.

4.6.3 Surface water and run-off control

Buro Happold observed some minor areas of standing water during inspection visits during the Part A [4] works. The water was only present after periods of heavy rainfall. During periods of dry weather the water drained away naturally, therefore no specialist measures were put in place for this aspect.

4.6.4 Gas protection system

Ground gas monitoring classified the site as Characteristic 1 (CS1) and as such ground gas protection was not considered to be required in accordance with the relevant guidance [12]; [13].

4.6.5 Dust, fibres and particulates

Kier's risk assessment and method statement (RAMS) states the implementation of dust suppression on-site when required. Dampening down of the haul routes occurred frequently.

4.6.6 Asbestos

No asbestos was encountered in the imported material.

4.6.7 Gases and vapours

No significant gases and odours were observed during any of the monitoring visits undertaken by Socotec or by Kier during the Part A [4] works. Imported natural material was used for the backfilling of temporary excavations, thus no source of gases or vapours was introduced during the works.

4.6.8 Noise

There were no issues or complaints with regards to noise during the material placement activities on-site.

4.6.9 Soils

To restrict mud / soils being transferred onto roads, on-site vehicle movements were kept to a minimum and restricted to defined haul routes within the site. Access to the site was via Rosamond Street West and egress was via Boundary Street West. A water bowser with jet wash lance at each site gate was utilised and a road sweeper was as required.

5 Conclusions

5.1 Achievement of remedial objectives

The Remediation Strategy ([3] - summarised in Section 2) has been successfully delivered with respect to the Part B works by meeting the contamination, engineering and management objectives.

The specific aims of the strategy were:

- To ensure any potentially significant risks to people or the environment are mitigated in both the short and long term;
- To meet specific planning conditions put in place by the local authority;
- To avoid regulatory intervention;
- To ensure both client and stakeholder expectations are satisfied; and
- To minimise long-term liabilities.

These aims formed the following objectives:

Contamination related

- (i) Prevent exposure of future site users to contaminated soils;
- (ii) Minimise the potential for the mobilisation of contaminants into groundwater;
- (iii) Ensure that demolition and constructions activities do not cause secondary contamination;

Engineering related

- (iv) Ensure ground conditions are suitable for proposed development;
- (v) Protect plantings, building structures and underground services from the effects of contaminated soils;

Management related

- (vi) Use a set of remedial design features which are simple, robust and provide long-term protection requiring minimal maintenance and causing minimum inconvenience to site occupiers; and
- (vii) Ensure off-site residents are not subject to nuisance, dust, noise or odour.

5.2 Compliance with Remediation Strategy

5.2.1 Earthworks and contamination

Successful compliance with the Remediation Strategy [3] with respect to earthworks and contamination during the enabling works was reported in the Verification Report Part A [4]. The data presented here provides adequate evidence to demonstrate compliance with the Remediation Strategy in terms of importing material for the backfilling of temporary excavations for foundations, general filling, soft landscaping / planters and S278 works for Part B.

5.2.2 Long-term monitoring

No further on-going monitoring of the Part B works is required.

5.3 Status of site at completion of works

This report (Verification Report – Part B) forms the second part of a two-stage Verification Report that has been prepared following the completion of backfilling temporary excavations for foundations and earthworks, general filling and S278 works. It presents the evidence demonstrating the effective implementation of the final remedial measures for Part B.

Based on the above, it is concluded that the provisions of Planning Condition 4b have been met, reflecting the implementation of the Remediation Strategy and there being no requirement for any long-term monitoring. Accordingly, this report should be submitted to the Local Authority for their consideration with respect to the full discharge of Planning Condition 4b.

Appendix A Excavation and Filling Specification

**School of Digital Arts (SODA), Manchester
Metropolitan University, Manchester**
Excavation and Filling Specification – Construction

044214

10 September 2019

1341B-BHE-XX-XX-SP-O-0003

Revision 02

Revision	Description	Issued by	Date	Checked
01	Excavation and Filling Specification – Construction (DRAFT)	LR	19/08/19	PH
02	Excavation and Filling Specification – Construction	LR	10/09/19	PH

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author **Louise Richards**

date **10/09/19**

approved **Philippa Hunsworth**

signature

date **10/09/19**

SUBMISSIONS TO BE MADE BY CONTRACTOR

Clause No.	Submission	When Required (Minimum)
101	Traffic management	As soon as available
103	Accommodation works	10 days before start
104	Temporary fencing	As soon as available
206	Temporary works	14 days before start
208	Excavation of chemically contaminated materials (Method Statements)	14 days before start
510	Tests on fill	As soon as available
605	Suitability of fill	As soon as available
620	Compacted general fill	Before starting work
630	Compacted structural fill	Before starting work

BH D20 EXCAVATING AND FILLING

Contents

Reference Documents	iv
British Standards Institution (BSI)	iv
Building Research Establishment (BRE) Digests:	iv
Department of Environment, Transport and the Regions	iv
National House-Building Council (NHBC)	v
100 General Requirements/Information	1
110 The Site	4
205 Excavating	8
400 Disposal of Materials	12
500 Filling	14
605 Acceptance of Suitable Fill	19
620 Compacted General Filling	21
630 Compacted Structural Filling	24
700 Backfilling to Temporary Excavations for Foundations	26
800 Topsoil Areas	28
Appendix A Contamination Procedures & Documentation	1

Reference Documents

British Standards Institution (BSI)

BS 1377: 1990	Methods of test for soils for civil engineering purposes.
BS EN 1997-2:2007	Eurocode 7 Geotechnical design. Part 2 – Ground Investigation and testing.
BS 3882: 2007	Recommendations and classification for topsoil.
BS 4428: 1989	Code of practice for general landscape operations (excluding hard surfaces).
BS 6031: 2009	Code of practice for earthworks.
BS 8000:	Workmanship on building sites. Part 1: 1989 Code of practice for excavating and filling.
BS EN 1997-1:2004	Eurocode 7 General design. Part 1 General rules.
BS 8103:	Structural design of low-rise buildings. Part 1: 1986 Code of practice for stability, site investigations, foundations and ground floor slabs for housing.
BS EN 1992-1-1:2004	Eurocode 2 Design on concrete structure. General rules and rules for buildings.
BS EN 1097-2	Tests for mechanical and physical properties of aggregates.

Building Research Establishment (BRE) Digests:

Special Digest 1	Concrete in aggressive ground. (2005)
427	Parts 1, 2 and 3: Low rise buildings on fill.
276	Hardcore.

Department of Environment, Transport and the Regions

Specification for Highway Works 1998 and Notes for Guidance (separate document).

National House-Building Council (NHBC)

NHBC Standards (operative from January 1992).

NBS	Specifications
Q20	Bases of roads and pavings
P30	Water, gas, electricity etc. services
R12	Building drainage
R13	Land drainage

100 General Requirements/Information

TO BE READ WITH THE WORKS INFORMATION/GENERAL CONDITIONS

100* General

- The Main Contractors (MC) attention is drawn to the nature and extent of material on site. It is anticipated that some proportion of the materials excavated may be suitable for re-use as part of the permanent works construction. The MC shall be responsible for the selection, separation and processing as appropriate for re-use in the permanent works or temporary works as appropriate. The MC is also responsible for the disposal of all unsuitable materials.
- The MC is responsible for the inspection and acceptance of materials, contract drawings and workmanship.
- The works to be executed as specified and in accordance with good practice. No changes are permitted without written approval.
- The MC is to review the detail of this specification and consider the times required for testing, preparation of samples and production of fabrication drawings. This information to be included in the contract programme.
- The MC to include in the price as necessary, the costs for all necessary test pieces, testing, trials and attendance to demonstrate compliance with the requirements of this Specification.
- All publications referred to hereafter are to be the issues current at the date of invitation to tender.
- The following materials are specifically precluded from all specifications pertaining to works carried out under this contract:-
 - a) High alumina cement or concrete.
 - b) Woodwool slabs as permanent shuttering.
 - c) Calcium chloride in admixtures for use in reinforced concrete.
 - d) Asbestos in any form.
 - e) Sea dredged aggregates for use in reinforced concrete unless otherwise instructed by the client.
 - f) Calcium silicate bricks.
 - g) Urea formaldehyde.

The MC is required to ensure that all efforts be made, and using the best information available to him, that these substances are not incorporated into the Works. In the event that he is unwilling or unable to comply with these requirements he is to submit in writing in sufficient time for consultations to be held and alternatives to be considered.

101 Traffic Safety and Control

Controls: Provide, erect and maintain all such traffic signs, barriers and control signals as may be necessary in accordance with the recommendations of Chapter 8 of the Traffic Signs Manual or such other General Directions as are current at the time of execution of the Works.

- Where the particular circumstances are not covered by these recommendations submit proposals for approval.
- Compliance with this clause does not relieve the MC of any other obligations under the Contract or under the relevant provision of the Highway Acts.

Co-ordination: For works on the Public Highway the MC is to co-ordinate his activities with the Highway Authority and to be responsible for obtaining all necessary permits and approvals. Any charges for reinstatement of the Highway are to be met by the MC.

Submission by the MC: After consultations with the appropriate authority submit a programme showing the scheme of traffic management. Thereafter provide such further details and information as required to facilitate the Works.

- No work affecting the public highway is to be started until all traffic control measures are agreed as being fully operational.

Equipment: Unless otherwise specified all traffic signs to comply with BS 873 and danger lamps with BS 3143. In addition:

- All traffic signs to be kept clean and legible at all times and to be repositioned, covered, or removed as required.
- All adjacent public highways and trafficked/pedestrian routes to be kept clear of all construction debris. Tracked vehicles are not to travel over public highways without permission of the MC.

Making Good: Any damage caused to public highways and trafficked/pedestrian routes to be made good as directed by the MC.

102 Temporary Diversion of Traffic

Construct temporary diversion ways wherever:

- The works interfere with existing public or private roads or where there is a public or private right of way.
- The standard of construction and lighting and the width of the diversion route to be agreed with the MC.
- Construct diversion ways in advance of any interference with existing ways. Maintain in such a way as to provide adequately for traffic flows.

- Where any temporary diversion works affect Public Highways the MC is responsible for obtaining all necessary Statutory Authority approvals.

The provisions of this clause do not apply to any temporary access or other works that the MC may construct for his sole usage.

103 Services

Privately Owned Services: If any privately owned service (water, electricity, drainage etc.) passing through the site is affected by the Works the MC is to provide a satisfactory alternative service and notify the interested parties of the measures proposed.

Statutory Undertakers' Services: Verify the positions of all mains, sewers etc and take all measures required by the Statutory Undertaker or Public Authority for the support and full protection of all items concerned.

Liability: The MC is responsible for any costs of breakage, damage and interruption of supply. Confirmation will be required that appropriate insurance is held.

Accommodation Works: The relocation and/or replacement of fences, walls, accesses etc. to properties bounding the site to be completed in an expeditious manner and within a time as approved by the MC. At least 10 days notice before starting the works will be required.

104 Noise, Security

Noise: Comply with the general recommendations of BS 5228 together with any specific requirements described in the Contract Documents.

Security: Erect and maintain temporary fencing as required by the MC. Access in the fencing to be agreed by the MC and/or occupiers of adjacent properties.

- Temporary fencing is to remain in position until it is replaced by permanent fencing or completion of the Works. Submit proposals to the MC.
- Regularly inspect all temporary fencing and make good any defects.
- If temporary fencing must be removed for any part of the Works reinstate it as soon as possible. In the interim provide patrols so as to preclude unauthorised entry into the site.

110 The Site

110* Site Investigation: Refer to the site investigation reports in the Site Information:

- Dr Peter Arrowsmith report entitled 'An Archaeological Desk Based Assessment, Manchester Metropolitan University Students Union', dated November 2012.
- Oxford Archaeological North report entitled 'MMU Students Union, Higher Chatham Street, Manchester, Archaeological Evaluation', (ref: L10588), dated April 2013.
- Oxford Archaeological North report entitled 'MMU Students Union, Higher Chatham Street, Manchester, Archaeological Excavation', (ref: L10556), dated June 2013.
- Oxford Archaeological North report entitled 'MMU Students Union, Higher Chatham Street, Manchester, Archaeological Excavation' (ref: L10614), dated September 2014.
- Ian Farmer Associates report entitled 'Manchester Metropolitan University, MMU Students Union, Higher Chatham Street Manchester, Report on Phase 2 Site Investigation' (ref: 41076-2a), dated February 2012.
- Ian Farmer Associates report entitled 'Higher Chatham Street, Manchester Metropolitan University, Report on Preliminary Investigation' (ref:41076-1), dated October 2012.
- Planit report entitled 'Explosive Ordnance Threat Assessment, The Junction of Higher Chatham Street & Rosamond Street SW, Manchester M15 6BR' (ref: EOTA MMU 27/03/18), dated March 2018.
- Socotec report entitled 'Manchester Metropolitan University, International Screen School, Manchester, Factual Report on Ground Investigation' (Report No. A8008-18), dated August 2018.
- BuroHappold report entitled 'School of Art & Design (SODA), Manchester Metropolitan University, Manchester, Ground Engineering Desk Study Addendum (ref: 040872-BHE-XX-XX-RP-GE-0001-FINAL R02), dated October 2018.
- Socotec report entitled 'Manchester Metropolitan University Screen School, Higher Chatham Street, Manchester. Factual Report on Ground Investigation' (Report No. A9006-19), dated June 2019.
- BuroHappold design note entitled 'Ground Engineering design note (GE_DN_001), dated June 2019.

The output reports from these investigations are provided to the MC by the Employer for information. The Employer offers no warranty, guarantee or undertaking of any kind as to the accuracy of the investigation and none should be inferred.

Attention is drawn to the ground conditions of the Site. The general sequence of strata encountered based on the GI data comprises Made Ground (>0.30 – 3.10 m BGL) which is underlain by superficial Glacio-fluvial sheet deposits (clay, sand and gravel) to depths varying between >4.50-5.30 m BGL. The superficial deposits are in turn underlain by weathered Chester Pebble Beds (CPB – former Sherwood Sandstone Group, highly weathered to a brown/red sand at the top). The CPB bedrock was only encountered in BH101 at a depth of 4.50 m BGL (32.19 m AOD). It should be noted that the CPB is a Principal Aquifer. Two groundwater regimes are recorded on site,

namely: a perched regime ~2.50 m BGL (34.00 m AOD) within Made Ground/superficial sand and gravel deposits (Glaciofluvial) and a deeper regime in the CPB at ~10.30 m BGL (26.45 m AOD).

It is worthy of note that Asbestos Containing Material (ACM) has been recorded within the Made Ground comprising:

Socotec Ground Investigation 2018:

- WS102 at 0.25 m BGL (0.005% - amosite & chrysotile sprayed coating).
- BH101 at 0.50 m BGL (0.056% - amosite & chrysotile fibres).

Socotec Ground Investigation 2019:

- WS210 at 0.40 m BGL (0.017% - chrysotile)
- WS216 at 1.00 m BGL (0.002% - crocidolite).

Appropriate measures should be taken to prevent dust generation and migration during construction.

Attention is also drawn to the various ground constraints present below/adjacent to the development site, including the existing buildings/infrastructure. Due to the site history, existing basements/foundations/obstructions may be encountered on site. It should be noted, that it is critical that the selection of plant/equipment is suitable to the working area and the site constraints (size, access, phasing etc).

140* Groundwater Level: Details of the groundwater levels are included in the site investigation reports.

150* Existing Services: The existing services must be maintained at all times. The MC shall be responsible for verifying the position of any buried services on the site. A CCTV drainage survey was undertaken by Sub Group during April 2018 (ref: ISSM Manchester University Drainage Plan). A full GPR utilities survey was also carried out by Plowman Craven during April 2018 (ref: S15660-T).

As such, the MC should familiarize himself with this below ground services survey/report and any other available information prior to commencement on Site.

The MC's attention is drawn to the presence of known services throughout the site, in particular:

- The presence of a 150 mm combined sewer within Higher Chatham Street – to be diverted/abandoned.

The MC should familiarize himself with all available historical reports and any associated services information detailed therein.

151 UXO: The MC's attention is drawn to the site risk associated with UXO as highlighted in the Zetica bomb map for Manchester and the Planit UXB report (Clause 110 refers). The MC should familiarize himself with all available UXO reports and associated information detailed therein.

The Zetica regional unexploded bomb risk map identifies the entire site to be in an area of potential risk from UXO. As such an Explosive Ordnance Threat Assessment (EOTA) has been undertaken by Planit UXB Limited in

School of Digital Arts (SODA), Manchester Metropolitan University, Manchester

order to establish the requirement for supervision and clearance of intrusive works by a UXO Engineer. The findings from the EOTA indicate that the site and surrounding area were bombed heavily during WWII, and as such there is a risk that UXO could remain onsite. The EOTA recommends that a UXO mitigation strategy should be undertaken by an UXB engineer either prior to or during construction – please see the report for full details.

The MC should familiarize himself with all available UXO reports and associated information detailed therein.

160* Site Features to be Retained: Refer to the Architect's drawings.

161 Site Features of Archaeological Interest: refer to the Archaeological reports (Clause 110 refers).

162 Site Features: Before starting work the MC shall verify which existing fences, gates, walls, roads, paved areas and other site features are to be removed. Materials arising are to be removed from site.

170* Trees: Before starting work the MC shall verify which trees, shrubs and hedges are to be removed. Cut down, grub up main roots and fill voids with approved material. Dispose of all wood.

180* Undergrowth: Clear site of bushes, scrub and undergrowth. Grub up and dispose of large roots.

181* Japanese Knotweed:

None envisaged: Japanese Knotweed is an invasive, non-native plant species. The Wildlife and Countryside Act (1981) made it illegal to spread Japanese Knotweed and guidance on the management of Japanese Knotweed on development sites is given in the Environment Agency's (EA) code of practice, 2001.

The MC is responsible for ensuring that Japanese Knotweed is not spread across the site. There are a variety of methods available for treating infested areas including spraying with herbicides or digging, spraying and removal to landfill. The Client is responsible for selecting a method of treatment and obtaining approval for the selected method from the Local Authority.

182* Site Clearance: Clear site of all rubbish, debris and vegetation before stripping topsoil. The compaction of topsoil should be avoided.

190* Cultivated Turf: Before starting work the MC shall verify any areas of turf to be retained. At the MC's discretion, cost and/or profit, other turf may be either:

- lifted and sold, or
- left to be incorporated with the existing topsoil.

200* Site Access and Working Area: Access to the site and the MC's working area will be shown on the drawings. The MC shall provide:

- All necessary signs, safety measures and watchmen to ensure security and safe operation of his traffic.
- All necessary servicing for his own offices, stores, workshops, etc.

- Access routes for the Employer and other contractors as shown on the drawings.

The Site (working area) is highly constrained. As such, there is very limited space for working plant and machinery within the proposed development footprint. It is critical that the selection of plant/equipment is suitable to the working area and the site constraints (size, access, phasing etc).

The MC should be aware that detailed phasing / sequencing of the works will need to be considered at an early stage in the procurement process due to the limited working space on Site. Early liaison with the WC should be undertaken prior to commencement of works.

205 Excavating

205* Basic Workmanship for Excavating: Comply with BS 8000: Part 1, Sections 3.1, 3.2 and 3.3.

206* Temporary Works: The MC is responsible for the design of such works, details of these to be submitted for review at least 14 days before commencing work on site.

208* Excavation of Chemically Contaminated Materials: Where contaminated materials are to be excavated the MC shall be responsible for all Health and Safety precautions required to protect the site personnel and the local environment and shall provide method statements covering these issues.

210* Materials Arising: From the excavations and surplus to requirements for filling are to remain the property of the Employer unless the MC:

- Is instructed to remove them from the site, or
- Purchases them at a price to be agreed.

220* Stripping Topsoil: Before beginning general excavation or filling excavate topsoil from required areas to an average depth of 200 mm and keep separate from excavated subsoil. At the time of excavation the topsoil must be reasonably dry.

221* Treating Topsoil: Not less than two weeks before excavating topsoil treat with a suitable herbicide.

225* Handling Topsoil: The following requirements shall be complied with:

- Where aggressive weeds as included in the Weeds Act – Section 2 or the Wildlife and Countryside Act – Schedule 9 – Part 2 are encountered, instructions should be obtained prior to moving topsoil.
- Earthmoving equipment shall be selected and used to minimize disturbance, trafficking and compaction of topsoil.
- On no account should topsoil be mixed with:
 - a) Subsoil, stone, hardcore, rubbish or material from demolition work.
 - b) Oil, fuel, cement or other substances harmful to plant growth.
 - c) Other grades of topsoil.
- Multiple handling should be kept to a minimum. Where practicable topsoil should be used immediately after stripping.
- Topsoil handling should be undertaken in the driest condition possible. It should not be handled during or after heavy rainfall or when it is wetter than the plastic limit defined by BS 3882 Annex N2.

230* Benching: Surfaces of excavations with a gradient greater than 1 in 5 which are to receive filling must have horizontal benches cut to match the depths of compacted layers of filling.

240* Adjacent Excavations: Where an excavation encroaches below a line drawn at an angle of 45° from the horizontal from the nearest formation level of another higher excavation, the lower excavation, all work within it and backfilling thereto must be completed before the higher excavation is made.

250* Accuracy: Permissible deviations from formation levels:

- Beneath mass concrete foundations: ±25 mm.
- Beneath ground bearing slabs and r.c. foundations: -15 mm, +0 mm.
- Embankments and cuttings: ±50 mm.
- Ground abutting external walls: ±50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

260* Formations Generally:

- MC shall undertake inspection of formations for the following:
 - a) Mass Concrete Pad and Strip Foundations.
 - b) Reinforced Concrete Pad and Strip Foundations.
 - c) Basement and Ground Floor Slabs.
 - d) Basement slabs/lift pits
 - e) Roads, Footpaths or other Pavements.
 - f) Retaining Walls.
- Remove the last 50 mm of excavations just before inspection. Trim excavations to required profiles and levels and remove all loose material.
- When preparing formations, all soft spots shall be removed and replaced with suitable fill materials. Any obstructions encountered shall also be removed. The final surface of all formations shall be well rolled, smooth, and free from movement under compaction plant and from ridges, cracks, loose material, ruts or other defects.
- Unless otherwise instructed seal formations within 4 hours of inspection with concrete or other specified fill.
- Where structural requirements dictate, the allowable bearing characteristics of the formation should be demonstrated by the WC by means of plate bearing tests (BS 1377: Part 9 1990: Part 4: Method 4.1 updated by BS EN 1997-2 – Part 2 Ground Investigation and Testing) at locations and frequencies agreed with the MC.

270* Foundations Generally: Obtain instructions if:

- A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings.

- The formation contains soft or hard spots or highly variable material.

280* Trench Fill Foundations:

- Excavate the whole depth of the trench down to formation by machine in one operation. The MC shall undertake inspection of the formation as soon as it is exposed.
- Unless otherwise instructed place concrete immediately after inspection.

290* Foundations in Made Up Ground: Excavate down to a natural formation of undisturbed subsoil. Obtain instructions if this is at a lesser depth than that shown on the drawings.

310* Unstable Ground: The MC shall satisfy himself that any newly excavated face will remain unsupported sufficiently long to allow the necessary earthwork support to be inserted. If unexpected unstable conditions are encountered which are likely to affect adjacent structures or roadways, appropriate emergency action should be undertaken until the instability can be rectified.

320* Recorded Features: Break out old foundations, beds, drains, etc. where and to the extent stated on the drawings. Seal off drain ends, remove contaminated earth and disinfect as required by local authority. Backfill as specified on the drawings.

The proposed development is located adjacent to existing buildings and bordered by a large retaining wall to the north, east and west. It is the responsibility of the MC/WC to enter into dialogue with the appropriate Statutory Consultees to agree an acceptable methodology of working when in close proximity to the associated buildings and their infrastructure. Surcharging of the adjacent retaining wall from plant and equipment will need to be considered along with associated health and safety issues when working adjacent to these structures.

The MC's attention is drawn to the presence of known services throughout the site, in particular, those within Higher Chatham Street (Clause 150 refers).

The MC's attention is also drawn to the site risk associated with UXO as highlighted in the Explosive Ordnance (EO) Threat Assessment (EOTA) (Section 110 & Clause 151). It should be noted that the report states the threat level is "Medium - High". The MC should familiarize himself with all available UXO reports and associated information detailed therein.

330* Unrecorded Features: Where old foundations, beds, basements, filling, tanks, service pipes, drains, hotspots of soil contamination etc. not shown on the drawings are encountered, obtain instructions before proceeding. See also Clause 406.

350* Existing Watercourses which have been diverted and are to be filled must be cleared of all vegetable growths and soft deposits before filling.

The MC's attention is drawn to the presence of foul and surface water drainage within Higher Chatham Street (to be diverted/abandoned. Please see ISSM Manchester University Drainage Plan (Sub Group, April 2018) for full details.

360* Excess Excavation: Backfill any excavations taken:

- Wider than required with the material specified for backfilling.
- Deeper than required with well graded granular material or lean mix concrete.

370* Hauling: Hauling of material from excavation and spoil heaps to fill areas to proceed only where sufficient spreading and compacting plant are operated at the place of deposition.

380* Slopes: Slopes of cuttings to be cleared of all loose material. The MC is responsible for safety and stability.

390* Use of Plant: Do not use plant at the surface of the bottom of the excavation unless:

- The excavation is in rock and contains no soft material, or
- The level of the bottom surface is maintained at least 300 mm above formation level.

Any damage to the subgrade to be made good at the MC's expense and using material having the same characteristics as that which has been damaged.

395* Temporary Stockpiles: Allowance shall be made for the possible deterioration of the stockpiled material due to weathering. Precautions shall be taken to ensure stability, taking into account the strength of the underlying ground and the effect on drainage. It may be necessary to carry out partial compaction of stockpiles and/or to provide additional protection to maintain the quality of the stockpiled material.

Where temporary stockpiles of contaminated soils are required i.e. either arisings of made ground or any unexpected contamination hot spots, then protective measures will be required to minimize run-off/leachates and washing of fines.

400 Disposal of Materials

400* General: 'Suitable material' comprises all that which is acceptable to the MC in accordance with this specification. "Unsuitable material" is defined in Clause 510.

- No excavated suitable material to be removed from the site unless this suits the MC's operational procedure and then the MC is to make good any subsequent deficit at his own expense.
- Where the excavation reveals a combination of suitable and unsuitable materials the MC is to propose the methods by which suitable material may be excavated without contamination by unsuitable materials.

405* Contaminated Soils: Where surplus soils for disposal are chemically contaminated, the MC shall be responsible for disposal of these materials at a suitably licensed landfill and all associated issues such as consignment notes and Environmental Protection Act Section 34 Duty of Care documentation. The MC shall be deemed the producer and holder of the waste and shall be responsible for classifying the materials for disposal to landfill. The MC shall be responsible for carrying out any further soil contaminant testing and Waste Acceptance Criteria testing to enable classification of the waste in accordance with current regulatory guidance and the requirements of the receiving landfill.

The MC shall prepare an earthworks spoil management strategy which shall take account of the range of waste types expected to be encountered and set out any proposed sampling and testing regime for waste classification. The strategy shall include consideration of stockpile management, measures and working methods to protect site worker health and safety and the environment, and working methods to minimize the degree of intermixing of wastes of different classes and to minimize disposal costs.

406* Unrecorded Contaminated Soils: Where materials that appear to be contaminated (either visually or on the basis of odour) are encountered during the excavation works the MC shall be responsible for carrying out laboratory testing to enable the materials to be classified for hazard assessment and waste disposal purposes, for disposal to suitably licensed tip as appropriate, and all associated issues such as consignment notes and Environmental Protection Act Section 34 Duty of Care documentation.

420 Topsoil Spoil Heaps: To be not more than 2m high. Treat with a suitable herbicide at appropriate times to prevent seeding of weeds. Prevent compaction and contamination.

431* Surplus Excavated Topsoil: Remove from site.

443* Surplus Subsoil: Remove from site surplus excavated material not specified to be spread and levelled or stockpiled.

- 451 Water:** Keep all excavations free from water until the construction of basements and retaining walls is able to resist leakage, water pressure and flotation. The MC shall be responsible for obtaining all discharge licenses for disposal of water via sewer or to surface water.
- 454* Running Water:** The MC shall inform the Engineer immediately if any springs or running water are encountered during the Works.
- 457* Pumping:** Any pumping undertaken shall comply with the following requirements:
- Excavated faces or stability of adjacent ground or structures shall not be disturbed.
 - Pumped water shall be discharged without flooding the site or adjoining property.
 - Any sumps shall be constructed clear of excavations and filled on completion.

500 Filling

510* Unsuitable Materials:

- Do not import or use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling.
- Fill materials used at depths **greater than 0.60 m BGL** must not contain any contaminant in the suite listed below that is in excess of its Specified Trigger Concentration:

Determinand	Soil Concentration (mg/kg)	Soil Leachate Concentration
Arsenic	640	-
Cadmium	410	-
Chromium (total)	8,600	-
Chromium (VI)	49	-
Lead	2,330	-
Mercury (inorganic)	58	-
Selenium	12,000	-
Copper	68,000	-
Nickel	980	-
Zinc	730,000	-
TPH [See Note 1]	See Table A1	-
Polycyclic Aromatic Hydrocarbons (USEPA 16)	See Table A2	-
Phenol Index	1,300	-
Free Cyanide	760	-
Sulphate	2000	-
pH	5<pH<9	-
Asbestos	See Note 3	-

Note 1: Materials exceeding these thresholds shall be subject to speciated analysis and comparison with Table A1.

Note 2: Values used are all C4SL's or S4UL's (Commercial) with the exception of cyanide (BH Generic Assessment Criteria - GAC).

Note 3: Free fibres <0.1%. Cement-bound asbestos <0.1% of total material volume.

- Fill materials used at depths **less than 0.60 m BGL** (including material within 0.60 m of the proposed final ground level below hardstanding) must not contain any contaminant in the suite listed below that is in excess of its Specified Trigger Concentration:

Determinand	Soil Concentration (mg/kg)	Soil Leachate Concentration
Arsenic	40	-
Cadmium	149	-
Chromium (total)	910	-
Chromium (VI)	21	-
Lead	310	-
Mercury (inorganic)	56	-
Selenium	430	-
Copper	7100	-
Nickel	180	-
Zinc	40,000	-
TPH [See Note 1]	490	-
Polycyclic Aromatic Hydrocarbons (USEPA 16)	See Table A2	-
Phenol Index	1,200	-
Free Cyanide	760	-
Sulphate	2000	-
pH	5<pH<9	-
Asbestos*	None detectable	-

Note 1: Materials exceeding these thresholds shall be subject to speciated analysis and comparison with Table A1.

Note 2: Values used are all C4SL's or S4UL's (residential without plant uptake) with the exception of free cyanide (BH Generic Assessment Criteria - GAC).

*No free fibres and no cement bound asbestos.

- Any materials arising or imported that appear suspect in terms of contamination based on either appearance or smell shall be stockpiled separately and tested for the contaminant suite listed above in addition to any other appropriate contaminant as indicated by appearance or by smell and accepted into the Works or disposed of off site as appropriate.
- Soluble sulphate content (SO₄) of imported materials for filling under concrete slabs or within 1 m of substructures must not exceed >0.5 g/litre when tested BS 1377:Part 3, Clause 5 using a 2:1 water-soil extract.

- Other unsuitable materials include: material from marshes or bogs, peat, logs, stumps, slurry, mud and perishable material, material susceptible to spontaneous combustion, material in a frozen condition, clays of liquid limit exceeding 80% and/or plasticity index exceeding 55, material with excessive moisture content.
- See also Clause 100.

Table A1. Threshold concentrations for risk banded hydrocarbons and BTEX (SOM 1%).

Determinand		>0.60 m BGL (mg/kg)	<0.60 m BGL (mg/kg)	Topsoil (mg/kg)
Aliphatic	EC5 – EC7	3,200	42	42
	EC7 – EC8	7,800	100	100
	EC8 – EC10	2,000	27	27
	EC10 – EC12	9,700	130	130
	EC12 – EC16	59,000	1,100	1,100
	EC16 – EC35	160,000	65,000	65,000
Aromatic	EC8 – EC10	3,500	47	34
	EC10 – EC12	16,000	250	74
	EC12 – EC16	36,000	1,800	140
	EC16 – EC21	28,000	1,900	260
	EC21 – EC35	28,000	1,900	1,100
Benzene		27	0.38	0.087
Ethylbenzene		518	83	47
Toluene		869	869	130
Xylene		576	79	56

Note 1: More than (>) 0.60 m BGL - Values used are all S4UL's (Commercial).

Note 2: Less than (<) 0.60 m BGL - Values used are all S4UL's (Residential without Plant Uptake).

Note 3: Topsoil - Values used are all S4ULs (Residential with Plant Uptake)

Table A2. Threshold concentrations for Poly Aromatic Hydrocarbons (USEPA 16)

Determinand	>0.60 m BGL (mg/kg)	<0.60 m BGL (mg/kg)	Topsoil (mg/kg)
Naphthalene	190	2.30	2.3
Acenaphthylene	83,000	2,900	170
Acenaphthene	84,000	3,000	210
Fluorene	63,000	2,800	170
Phenanthrene	22,000	1,300	95
Anthracene	520,000	31,000	2400
Fluoranthene	23,000	1,500	280
Pyrene	54,000	3,700	620
Benzo(a)anthracene	170	11	7.2
Chrysene	350	30	15
Benzo(b)fluoranthene	44	3.9	2.6
Benzo(k)fluoranthene	1,200	110	77
Benzo(a)pyrene	35	3.2	2.2
Indendo(123-cd)pyrene	500	45	27
Dibenzo(ah)anthracene	3.5	0.31	0.24
Benzo(ghi)perylene	3,900	360	320

Note 1: More than (>) 0.60 m BGL - Values used are all S4UL's (Commercial).

Note 2: Less than (<) 0.60 m BGL - Values used are all S4UL's (Residential without Plant Uptake).

Note 3: Topsoil - Values used are all S4ULs (Residential with Plant Uptake)

520 Frost Susceptibility: Except as allowed below, fill must be non frost-susceptible as defined in Highways Agency 'Specification for Highway Works', Clause 801.17. If the following fill materials are proposed, a laboratory report shall be obtained confirming they are non-frost-susceptible:

- Fine grained soil with a plasticity index less than 20%.
- Coarse grained soil or crushed granite with more than 10% retained on a 0.063 mm sieve.
- Crushed chalk.
- Crushed limestone fill with average saturation moisture content in excess of 3%.
- Burnt colliery shale.

Frost-susceptible fill: May only be used if:

- It is to be placed within the external walls of buildings below spaces that will be heated.
- It is placed in excess of 500 mm beneath the proposed final ground level.
- Any frost-susceptible fill shall be protected from frost at all times during construction.

530* Placing Fill Generally:

- Ensure that excavations and areas to be filled are free from loose soil, rubbish and standing water.
- Do not use frozen materials or materials containing ice. Do not place fill on frozen surfaces.
- Take all necessary precautions to ensure stability of adjacent structures. Place and compact fill against structures, membranes or buried services in a sequence and manner which will ensure stability and avoid damage.
- Plant employed for transporting, laying and compacting must be suited to the type of material.
- Lay differing materials separately so that only one type of material occurs in each layer.

540 Benching in Fill: Where, during the progress of the work, the difference in level between adjacent areas of filling exceeds 600 mm, cut into edge of higher filling to form benches having a minimum width of 600 mm and a height equivalent to the depth of a layer of compacted filling. Spread and compact new filling to ensure maximum continuity with the previous filling.

605 Acceptance of Suitable Fill

605 Acceptance of Suitable Fill

For all imported fill from an unknown, mixed or brownfield source, testing shall be carried out to demonstrate that no contaminant listed in the suite given in Clause 510 is in excess of its Trigger Concentration. This testing shall be carried out at a rate of 1 test per 50 m³ of placed fill material.

For all naturally site won derived as-dug soils or imported soils from a Greenfield source, testing shall be carried out to demonstrate that no contaminant listed in the suite given in Clause 510 is in excess of its Trigger Concentration. This testing shall be carried out at a rate of 1 test per 200 m³ of placed fill material.

In addition, any materials arising or imported that appear suspect in terms of contamination based on either appearance or smell shall be stockpiled separately and tested for the contaminant suite listed in Clause 510 in addition to any other appropriate contaminant as indicated by appearance or by smell and either accepted into the Works or disposed of off-site as appropriate.

During placement of **General Fill** the MC is also required to provide daily records of testing of the material placed to show compliance with the Specification. The minimum requirements are:

Grading (BS1377: Part 2, Method 9.2): At least once a day or one test for every 100 m³ placed.

Moisture Content and undrained remoulded shear strength (cohesive materials) (BS1377: Part 2, Method 3.2; and Part 7, Method 8): Three times a day or one test for every 500 m³ placed.

Plasticity Tests (BS1377: Part 2, Methods 4.3 and 5): One test per day for each source or for every 100 m³ placed.

During placement of **Structural Fill** the MC is also required to provide daily records of testing of the material placed to show compliance with the Specification. The minimum requirements are:

Grading (BS1377: Part 2, Method 9.2): At least once a day or one test for every 50 m³ placed.

Moisture Content and undrained remoulded shear strength (cohesive materials) (BS1377: Part 2, Method 3.2; and Part 7, Method 8): Three times a day or one test for every 20 m³ placed.

Plasticity Tests (BS1377: Part 2, Methods 4.3 and 5): One test per day for each source or for every 50 m³ placed.

Los Angeles Test (BS EN 1097-2): One test per source and for every 50 m³ placed.

End product (BS1377: Part 9, Method 2.2): One sand replacement density test for each compacted layer or each 20 m³ placed.

Note: For each element cited above the option giving the greatest number of tests shall apply.

610* General Landscape Filling:

Definition: Fill to soft landscape areas only (excluding sports pitches).

- Materials arising from the excavations or imported, but excluding unsuitable materials as defined in Clause 510, with a maximum particle size of 150 mm.
- Lay in layers not more than 200 mm thick and consolidate each layer with the earthmoving plant.

620 Compacted General Filling

620 Compacted General Filling:

Definition: Fill to hard landscape areas, sports pitches, beneath drainage runs, and other areas as specified on the drawings (see also Clause 630).

- Materials arising from the excavations (or, where instructed, imported) complying with the groups as defined below. If both suitable and unsuitable material is excavated, select and keep separate sufficient suitable material. If there is insufficient suitable excavated material the MC shall provide details and obtain confirmation, as appropriate, regarding the importation of material.

- **Group 1: Wet Cohesive Materials:**

Clays or marls with the following properties:

Grading: 100% passing 125 mm BS sieve.
80 to 100% passing 2 mm BS sieve.
15 to 100% passing 63 µm BS sieve.

Moisture Content: Lower Limit: Plastic Limit – 4%*
Upper Limit: Plastic Limit + 2%*

Liquid Limit: The fraction passing the 425 µm sieve shall have a Liquid Limit of <50%

Undrained shear strength of remoulded material: > 50 kN/m².

- **Group 2: Dry Cohesive Materials:**

Clays or marls with the following properties:

Grading: 100% passing 125 mm BS sieve.
80 to 100% passing 2 mm BS sieve.
15 to 100% passing 63 µm BS sieve.

Moisture Content: Lower Limit: Plastic Limit – 7%*
Upper Limit: Plastic Limit – 4%*

Liquid Limit: the fraction passing the 425 µm sieve shall have a Liquid Limit of <50%

Undrained shear strength of remoulded material: > 50 kN/m²

* Contractor to confirm suitability parameters for method compaction by means of sand replacement tests to confirm fill is placed at greater than 95 % Maximum Dry Density.

➤ **Group 3: Stony Cohesive Materials:**

Clays or marls with the following properties:

Grading: 100% passing 125 mm BS sieve.
15 to 80% passing 2 mm BS sieve.
15 to 80% passing 63 µm BS sieve.

Moisture Content: Lower Limit: Plastic Limit – 4%*
Upper Limit: Plastic Limit + 2%*

Liquid Limit: the fraction passing the 425 µm sieve shall have a Liquid Limit of <50%

Undrained shear strength of remoulded material: > 50 kN/m².

➤ **Group 4: Silty Cohesive Materials:**

Clays or marls with the following properties:

Grading: 100% passing 125 mm BS sieve.
80-100% passing 63 µm BS sieve.
0-20% passing 2 µm BS sieve.

Moisture Content: Lower Limit: Plastic Limit – 4%*
Upper Limit: Plastic Limit + 2%*

Liquid Limit: the fraction passing the 425 µm sieve shall have a Liquid Limit of <50%

Undrained shear strength of remoulded material: > 50 kN/m².

➤ **Group 5: Well Graded Granular Materials:**

Sands and gravels, crushed hard rock or quarry waste (other than chalk), crushed concrete, crushed brick or tile, sound blast furnace slag (other than from steel making foundries) or well burnt non plastic shale with the following properties:

Grading: 100% passing 125 mm BS sieve.
<10% passing 63 µm BS sieve.

Uniformity Coefficient (D_{60}/D_{10}): >10

➤ **Group 6: Uniformly Graded Granular Materials:**

Sands and gravels, crushed hard rock or quarry waste (other than chalk), crushed concrete, crushed brick or tile, sound blast furnace slag (other than from steel making foundries) or well burnt non plastic shale with the following properties:

Grading: 100% passing 125 mm BS sieve.
<10% passing 63 µm BS sieve.

Uniformity Coefficient (D_{60}/D_{10}): <10

The table given below gives requirements for compaction of the materials cited above. The figures given alongside each type of plant, and for each material group, are:

125 (8) – Maximum depth of the compacted layer in mm (Minimum number of passes)

Types of plant (alternatives)	Gp. 1 Materials	Gp. 2, 3 and 5 Materials	Gp. 4 and 6 Materials
Smooth wheeled roller:			
Tonnes per m width of roll			
2.1 - 2.7	125(8)	125(10)	125(10)
2.7 - 5.4	125(6)	125(8)	125(8)
Over 5.4	150(4)	150(8)	unsuitable
Vibrating roller:			
Static load in tonnes per m width of roller			
0.7 - 1.3	100(12)	125(10)	150(6)
1.3 - 1.8	125(8)	150(8)	200(10)
1.8 - 2.3	150 (4)	150 (4)	225(12)
2.3 - 3.6	175(4)	175(4)	250(10)
Over 3.6	225(4)	225(4)	300(8)
Vibrating plate compactor:			
Static load in tonnes per m ² of base plate			
1.2 - 1.4	-	75(6)	150(6)
1.4 - 1.8	100(6)	125(6)	150(4)
Over 1.8	150(6)	150(5)	200(4)
Vibro-tamper:			
Static load in kg			
50 - 75	100(3)	100(3)	150(3)
Over 75	150(3)	150(3)	225(3)
Power rammer:			
Static load in kg			
Over 100	150(4)	150(6)	unsuitable

NOTE: In areas of general filling, the density of placed fill shall be checked twice daily by means sand replacement density tests to ensure suitable compaction is achieved and to avoid excessive settlement in areas of substantial fill.

630 Compacted Structural Filling

630 Compacted Structural Filling:

Definition: Fill used to support structural loads, i.e. foundations and ground bearing slabs, and adjacent to structures and retaining walls, but see also Clauses 700 and 720 (if used).

- Well-graded granular material, as defined below, arising from the excavations or imported. If both suitable and unsuitable material is excavated, select and keep separate sufficient suitable material. If there is insufficient suitable excavated material the Contractor shall provide details and obtain confirmation, as appropriate, regarding the importation of material.
- Well graded sands and gravels with a uniformity coefficient of more than 10.
- Crushed hard rock or quarry waste (other than chalk).
- Crushed concrete, crushed brick or tile, free from plaster, wood, organic material and rubbish.
- Sound blast furnace slag (other than from steelmaking foundries).
- Well burnt non-plastic shale.

Properties (suitability is required to be demonstrated for each proposed source of Structural Fill):

Grading: 100% passing 75 mm BS sieve.
<10% passing 63 µm BS sieve.

Uniformity Coefficient (D_{60}/D_{10}): >10.

Los Angeles Test: < 50 (BS EN 1097-2)

Effective angle of internal friction: 35° minimum.

Plasticity: the fraction passing the 425 µm sieve shall be non-plastic.

Soluble sulphate content (SO_4): <0.5 g/l.

The acceptability of the structural fill as compacted shall be assessed based on achieving an **End Product Compaction** of 95% of maximum dry density of BS1377: Part 4, Method 3.7 (Vibrating hammer method).

640 First Layer of Compacted Filling:

To be of suitable hard granular material thoroughly compacted to 150 mm thickness.

650 Protection of Compacted Filling:

Do not allow construction traffic on compacted cohesive soil filling until the level has been raised not less than 150 mm above formation level by properly compacted temporary protective filling.

Remove temporary protective filling from site before beginning permanent construction.

The MC shall be responsible for making good any damage to the compacted fill.

660 Deterioration of Fill Materials:

If the material to be deposited as fill subsequently reaches a condition where it cannot be compacted to the requirements of this specification the MC shall:

- make good by removing the material from site until it is in a suitable condition for reuse and/or replace with suitable material, or
- make good the material by mechanical or chemical means, or
- cease work until the physical condition of the material is such that it can be compacted as described in this specification.

700 Backfilling to Temporary Excavations for Foundations

700* Backfilling to Temporary Excavations for Foundations:

Under ground-bearing slabs: hardcore (Clause 710) up to a maximum depth 600 mm, underlain by structural fill (Clause 630) where a greater thickness is required.

Under external oversite concrete and pavings: Hardcore as Clause 710.

Under suspended slabs, and external grassed or landscaped areas: Material excavated from the trench, laid and compacted in layers not exceeding 300 mm thick.

710* Hardcore:

Clean granular material, free from harmful or compressible matter, well graded, passing a 75 mm BS sieve and not more than 10% passing a 63 μ m sieve, and in any one layer only one of the following:

- Crushed hard rock or quarry waste (other than chalk).
- Crushed concrete, crushed brick or tile, free from old plaster.
- Gravel.
- Sound blast furnace slag (other than from steelmaking foundries).
- Unburnt colliery spoil (minestone).
- Soluble sulphate content (SO_4) <0.5 g/l.

Spread and level in layers not exceeding 150 mm. Thoroughly compact each layer with a vibratory roller, vibrating plate compactor, vibrotamper, power rammer or other suitable means.

720* Hardcore Under Concrete Slabs:

To be as Clause 710 and not less than 200 mm thick. Excavate extra material as necessary. Increase thickness of hardcore as necessary to make up levels from stripped site levels to underside of slabs. See also Clause 721 (if used). The requirements of Clause 260* should also be noted.

721 Hardcore Under Ground Bearing Slabs:

To be as Clause 710 to a maximum thickness of 600 mm. Where a greater thickness of material is necessary to make up the levels then the fill below the 600 mm of hardcore shall comprise structural fill (Clause 630).

730* Blinding:

Surfaces to receive sheet overlays or concrete to have sufficient sand, fine gravel, PFA or other approved fine material applied to fill interstices and provide a close smooth surface.

- Permissible deviations on surface level: ± 25 mm.

800 Topsoil Areas

800 General:

Refer to Landscape Architect's drawings and specifications for details of subsoil preparation and topsoiling operations but the following requirements in respect of chemical suitability should also be complied with.

810* Grade Subsoil

Grade topsoil to smooth flowing contours and to achieve the specified finished levels of the topsoil. Excavate locally as necessary for areas of thicker topsoil. Small planting beds located in general landscape areas may be excavated separately at a later date.

820* Loosen Subsoil:

Loosen subsoil consisting of light, non-cohesive material with a 3 tine ripper, drawn 300 mm deep at 600 mm centres.

821* Loosen Subsoil:

Loosen subsoil consisting of stiff clays or other cohesive material with a single tine ripper driven 450 mm deep at 1 m centres and drawn by a crawler tractor.

830* Undisturbed Topsoil which is to be Landscaped:

Prepare as necessary to ensure that the topsoil is in a suitable state for the cultivation operations specified in sections Q30 and/or Q31. In particular:

- Where the ground is hard, break up with ripper operated in transverse directions, removing any roots and boulders.
- Where the ground is covered with turf or a thick sward plough or dig over to the full depth of the topsoil.
- After any such cultivation leave fallow for not less than 1 month. During this period treat with a suitable herbicide at appropriate times to prevent seeding of weeds.

841* Imported Topsoil:

Provide as necessary to make up any deficiency of topsoil existing on site and to complete the work.

850* Contamination:

Do not use topsoil contaminated with subsoil, rubbish, oil-based products or other materials toxic to plant life.

Dispose of contaminated topsoil as instructed.

Imported topsoil for use as fill to the top metre (if required) on the site will be tested for the contaminant suite listed below to ensure that contaminant threshold levels are not exceeded.

Site won topsoil for use as fill to the top metre shall also be tested for the contaminant suite defined below to ensure that contaminant threshold levels are not exceeded.

Maximum permissible contaminant concentrations in **imported and site won topsoil** (soil concentrations only will be determined):

Determinand	Soil Concentration (mg/kg)	Soil Leachate Concentration
Arsenic	37	-
Cadmium	26	-
Chromium (total)	910	-
Chromium (VI)	21	-
Lead	200	-
Mercury (inorganic)	40	-
Selenium	250	-
Copper	2,400	-
Nickel	130	-
Zinc	3,700	-
TPH [See Note 1]	490	-
Polycyclic Aromatic Hydrocarbons (USEPA 16)	See Table A2	-
Phenol Index	380	-
Cyanide	4.60	-
Sulphate	2000	-
pH	5<pH<9	-
Asbestos	None detectable	-

Note 1: Materials exceeding these thresholds shall be subject to speciated analysis and comparison with Table A1.

Note 2: Values used are all C4SL's or S4UL's (Residential with Plant Uptake) with the exception of cyanide (BH Generic Assessment Criteria - GAC).

The rate of validation testing on **imported topsoil** will be 1 sample per 100 m³ of backfill.

The rate validation testing on **site won** topsoil will be 10 No. representative samples from stockpile.

860* Spread Topsoil

Spread topsoil over prepared subsoil layers not exceeding 150 mm and firm each layer before spreading the next. At the time of laying, both the material and the weather must be reasonably dry. Overall minimum depths after firming and settlement to be 150 mm but locally increased with tree pits as necessary in accordance with the Architects requirements.

880* Finished Levels of Topsoil:

After settlement, unless otherwise stated, to be:

- 30 mm above adjoining paving or kerbs
- Not less than 150 mm below dpc of adjoining buildings
- 30 mm higher for shrub areas than for adjoining grass areas.
- Married in with adjoining soil areas.

Appendix A Contamination Procedures & Documentation

A1 Validation Strategy

As soon as practicable after the removal of any anticipated or unexpected 'hot spots' a **Validation Report** shall be prepared and submitted by the MC and agreed with the relevant Local Authority Planning Development Department.

The validation strategy shall be as follows:

- Anticipated areas of elevated concentrations or 'hot spots' shall be excavated and removed to at least 1.00 m beyond any visual or olfactory (odorous) indication of contamination.
- Samples of the surrounding soil will be taken from the excavation formed and tested for the suite of determinands listed in Clause 510 in addition to any other appropriate contaminant as indicated by appearance or by smell.
- If the chemical concentrations of the soil samples are less than the concentrations recorded in Clause 510 or other appropriate guidance in respect of other appropriate contaminant, the elevated concentrations or 'hot spot' can be considered to have been removed and no further remedial action is required.
- If the chemical concentrations of the soil samples are greater than the concentrations recorded in Clause 510, further excavation is required and the sequence of sampling and testing should be repeated. Incremental excavation and testing should continue until the chemical concentrations encountered are less than the concentrations recorded in Clause 510 or other appropriate guidance in respect of other appropriate contaminant.
- During this procedure, the following information should be collected and recorded:
 - The exact extent of each phase of excavation should be recorded using 3D topographical surveying techniques.
 - The exact position and depth of each sample taken should be recorded using 3D topographical surveying techniques.
 - The samples should be given a unique reference number.
 - The laboratory testing results for each unique sample shall be recorded.
 - A photographic record of each phase of excavation and sampling will be collected and recorded.
- A general photographic record of the works should also be collected and recorded to provide a general record of the nature and characteristics of the materials encountered and/or laid to form formations etc. Where practicable, the photographic record should be cross referenced with any chemical testing available for the material type.

A validation report should be prepared, comprising substantiating completion documentation to include type of documentation listed above and photographic records in addition to Environmental Protection Act 1990 Section 34 Duty of Care documentation relating to waste disposal of the material removed from site.

A2 Validation Documentation Requirements

The following documentation shall be prepared by the MC and submitted to the relevant Local Authority Planning Development Department.

- Plan or plans showing earthworks movement of materials on site (cut and fill) and imported if appropriate.
- Plan or plans showing the location of any 'hot spots' located, if any, or confirmation that none were encountered.
- Plan or plans showing location of chemical testing undertaken as appropriate plus supporting information.
- Plan or plans showing surface finishes and thickness of build-ups, topsoil or clean cover as appropriate.
- Plan or plans showing the location of any hotspots encountered during service trench excavation, if any, and plan sections of remedial measures undertaken for water pipe provision.
- Appropriate records of material removed from site including testing records.
- Appropriate records of material imported to site including testing records.
- Appropriate records of topsoil imported to site including testing records.
- Appropriate photographic records of the earthworks plus any specific areas of interest ('hotspots', tanks etc).
- Records of any water control of groundwater that may have been contaminated, if any, or confirmation that none were encountered.
- Other records, if appropriate, not included in above summary.
- A statement confirming the earthworks was undertaken in accordance with this specification.

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Appendix B Supporting Documentation

Imported soils - Backfilling Temporary
Excavations for Foundations
($<600\text{mm}$ beneath ground floor slab)

Imported fill build up from top of pile mat to u/s ground floor slab

6f5 – 03.02.20 – 28.02.20
MOT – 10.02.20 – 13.03.20

Description of material –

February / March 2020

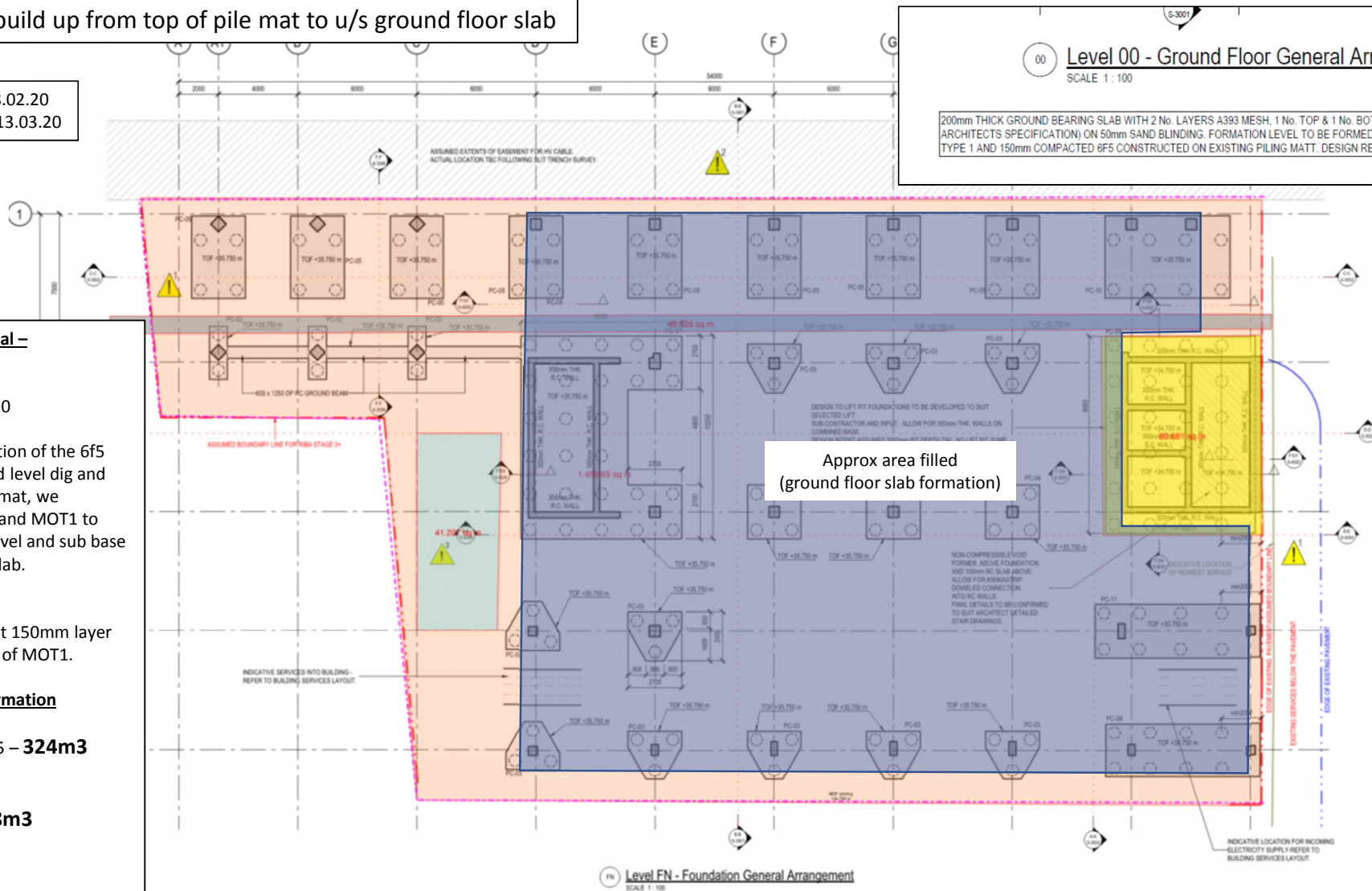
Following the installation of the 6f5 backfill to the reduced level dig and formation of the pile mat, we imported further 6f5 and MOT1 to form the formation level and sub base for the ground floor slab.

Formation designed at 150mm layer 6f5 and 150mm layer of MOT1.

Top of pile mat to formation

Imported quarried 6f5 – **324m3**

Imported MOT1- **108m3**



Level FN - Foundation General Arrangement
SCALE 1:100

6f5 - 3 x 150mm layers – total 450mm thick
MOT1 – 150mm layer to u/s slab



Min 300mm 6f5 quarried material and
150mm MOT1 forming sub base to ground floor slab



Grading cert 6f5

Refer to i2 ltd analytical report No 20-89943



GRADATION ANALYSIS TEST REPORT

for Product: 10003359/ 0/31.5 Type 1 Sub Base

Supplier/ source: (01) MSDH

Material type: BS EN 12597 & SHW 803 Test method: Wash grading to BS EN 933: Part 1: 2012

SAMPLE INFORMATION

Sample number: DD0806121
Job Location: -
Hauler Registration: -
Sampled by: sb
Product Spec: -
Time of Inspection: 0700
Weather Conditions: cold dry
Aggregate type: Limestone
Air Content: -
Sampled/ tested: Tue 04 February 2020/ 06:02:30 at 0700 hrs

SAMPLE ANALYSIS

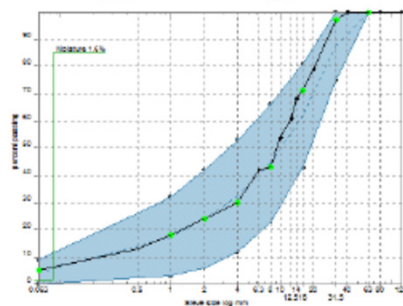
Sieve size	Percent passing	Specification limits	Complies ?
125mm	100	-	-
80mm	100	-	-
20mm	100	100 - 100	yes
40mm	100	-	-
31.5mm	97	75 - 100	yes
20mm	78	-	-
16mm	71	43 - 81	yes
14mm	68	-	-
12.5mm	61	-	-
10mm	54	-	-
8mm	43	23 - 66	yes
6.3mm	42	-	-
4mm	30	12 - 53	yes
2mm	24	8 - 42	yes
1mm	18	3 - 32	yes
0.500mm	13	-	-
0.063mm	5	0 - 9	yes

Moisture content %: 1.6
Additional grading req. Type 1 GSB table 8/5
passing 16mm, ret 6mm: 29
passing 6mm, ret 4mm: 13

Parameters are evaluated to the accuracy of spec. limits

REMARKS

Compliance status ok
Category A of A-C includes secondary parameters



Signed _____ Technical _____ Date ____/____/2020

Grading cert mot1

Refer to i2 ltd analytical report No 20-90725



GRADATION ANALYSIS TEST REPORT

for Product: 10003357/ 6F5 Capping Material Lst

Supplier/ source: (01) MSDH

Material type: Drystone aggregate Test method: Wash grading to BS EN 922: Part 1: 2012

SAMPLE INFORMATION

Sample number: DD0806053
Job Location: -
Hauler Registration: -
Sampled by: -
Product Spec: -
Time of Inspection: -
Weather Conditions: -
Aggregate type: Limestone
Air Content: -
Sampled/ tested: Mon 06 January 2020/ 09:01:20 at 1000 hrs

SAMPLE ANALYSIS

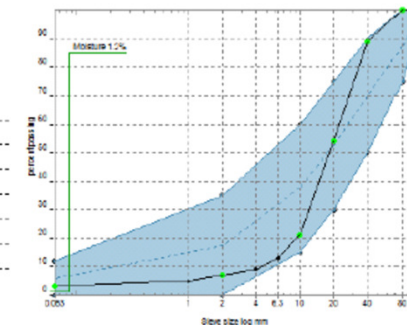
Sieve size	Percent passing	Specification limits	Complies ?
125mm	100	100 - 100	yes
80mm	100	75 - 100	yes
40mm	89	50 - 90	yes
20mm	54	30 - 75	yes
10mm	21	15 - 60	yes
6.3mm	13	-	-
4mm	9	-	-
2mm	7	0 - 35	yes
1mm	5	-	-
0.063mm	3	0 - 12	yes

Moisture content %: 1.2
Additional grading req. 6F5 EN 13285 Table 8 GE
passing 40mm, ret 20mm: 35
passing 20mm, ret 10mm: 33

Parameters are evaluated to the accuracy of spec. limits

REMARKS

Compliance status ok
Category A of A-C includes secondary parameters



Signed _____ Technical _____ Print date 14 Feb 2020

Imported fill ticket samples

9/3/20 Ground floor slab build up.

P.P. O'CONNOR Committed to Excellence		Conveyance Note No 165583	
61 Mosley Road, Trafford Park Manchester M17 1GJ This material has been produced in accordance with P.P. O'Connor's Protocol for the production of Recycled Aggregates			
Waste Carriers Licence Number CB0U101751		Contract No:	
Customers Name: <u>HAMPSEYS</u>			
Drivers Name <u>Colm</u>	Vehicle Registration <u>MV19UC</u>	Signature <u>Colm</u>	
Delivery/Collection Address <u>Higuer Chatnam St</u>		Date and Time <u>9-3-20</u>	
Off Site Material Category		Weight	Tonne
Spoil - inert		GROSS WEIGHT OF VEHICLE	32100
Spoil - Non Hazardous		TARE WEIGHT OF VEHICLE	12100
Spoil - Hazardous		NETT WEIGHT	20000
Other - State			
Imported Materials			
- Material	Description		
Recycled Aggregate	<u>MOT</u>		
Unwashed Aggregate			
Other State			
TIME ON SITE	STATE REASON FOR WAITING TIME		
TIME OFF SITE			
WAITING TIME			
DAYWORK			
CUSTOMERS SIGNATURE <u>[Signature]</u>	PRINT NAME <u>DUANSON</u>		

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note once signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

P.P. O'Connor's Terms and Conditions prevail at all times

W/c 09/03/20. LOADS OFF - 0
MOT IN - 6.
GROUND FLOOR SLAB BUILD UP.

P.P. O'CONNOR Committed to Excellence		Conveyance Note No 167201	
61 Mosley Road, Trafford Park Manchester M17 1GJ This material has been produced in accordance with P.P. O'Connor's Protocol for the production of Recycled Aggregates			
Waste Carriers Licence Number CB0U101751		Contract No:	
Customers Name: <u>HAMPSEYS</u>			
Drivers Name <u>B CRANE</u>	Vehicle Registration <u>MK67 NHL</u>	Signature <u>BC</u>	
Delivery/Collection Address <u>HIGHER CHATHAM ST.</u>		Date and Time <u>6-3-20</u>	
MCR			
Off Site Material Category		Weight	Tonne
Spoil - inert		GROSS WEIGHT OF VEHICLE	32
Spoil - Non Hazardous		TARE WEIGHT OF VEHICLE	12700
Spoil - Hazardous		NETT WEIGHT	19300
Other - State			
Imported Materials			
- Material	Description		
Recycled Aggregate	<u>MOT</u>		
Unwashed Aggregate			
Other State			
TIME ON SITE	STATE REASON FOR WAITING TIME		
TIME OFF SITE			
WAITING TIME			
DAYWORK			
CUSTOMERS SIGNATURE <u>[Signature]</u>	PRINT NAME <u>[Signature]</u>		

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note once signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

P.P. O'Connor's Terms and Conditions prevail at all times

Customer: <u>Hampsey / Cont</u>		 MARCHINGTONSTONE Buxton Road, High Lane, Stockport SK6 8DX Tel: 01663 765000 Fax: 01663 763777	
Site Address: <u>Higher Chatham ST</u> <u>Manchester</u>			
Material Description: <u>6F5</u> MRAP Recycled Aggs Protocol Compliant		Delivery Date: <u>2.3.20</u>	Order No:
Tonnes Gross <u>31.70</u>		Tonnes Tare <u>12.04</u>	Tonnes Nett <u>19.66</u>
This vehicle may leave the road on your instruction and at the driver's discretion, providing you accept responsibility for damage to your own or third party property. Customer Agreed ☐ Signed: _____		Cash Sales: VAT Reg No. 157 8860 29 Goods VAT Total	It is agreed with our Terms & Conditions a charge for excessive waiting time may be made. Waiting Time Agreed By: _____ Print: _____ Signed: _____
Lost / Accepted on behalf of Customer BY: <u>[Signature]</u> SIGNED: _____		Time On Site Time Off Site Waiting Time Agreed	Place of Loading <u>Ashburys</u> Registration No. <u>KX11</u> Weightbridge Ticket No. <u>1054335</u> Marchington Ticket No. <u>374580</u> Customer Copy

Customer: <u>Hampsey / Cont</u>		 MARCHINGTONSTONE Buxton Road, High Lane, Stockport SK6 8DX Tel: 01663 765000 Fax: 01663 763777	
Site Address: <u>Higher Chatham ST</u> <u>Manchester</u>			
Material Description: <u>6F5</u> MRAP Recycled Aggs Protocol Compliant		Delivery Date: <u>3.3.20</u>	Order No:
Tonnes Gross <u>30.86</u>		Tonnes Tare <u>12.04</u>	Tonnes Nett <u>18.82</u>
This vehicle may leave the road on your instruction and at the driver's discretion, providing you accept responsibility for damage to your own or third party property. Customer Agreed ☐ Signed: _____		Cash Sales: VAT Reg No. 157 8860 29 Goods VAT Total	It is agreed with our Terms & Conditions a charge for excessive waiting time may be made. Waiting Time Agreed By: _____ Print: _____ Signed: _____
Lost / Accepted on behalf of Customer BY: <u>[Signature]</u> SIGNED: _____		Time On Site Time Off Site Waiting Time Agreed	Place of Loading <u>Ashburys</u> Registration No. <u>KX11</u> Weightbridge Ticket No. <u>1054400</u> Marchington Ticket No. <u>374589</u> Customer Copy

20/02/20

Ground Floor Slab Build up.

P.P. O'CONNOR
 Committed To Excellence

 61 Mosley Road, Trafford Park
 Manchester M17 1GJ

 This material has been produced in accordance with P.P. O'Connor's
 Protocol for the production of Recycled Aggregates

N° 158979

Delivery Code

P33

Waste Carriers Licence Number CBDU101751		Contract No:	
Customers Name: <u>HAMPSEY CONSTRUCTION</u>			
Drivers Name	Vehicle Registration	Signature	
<u>GRAYSON S</u>	<u>MX17ER</u>	<u>[Signature]</u>	
Delivery/Collection Address		Date and Time	
<u>Higher Chatham Street</u> <u>MANCHESTER</u>		<u>20/02/2020</u>	
Off Site Material Category		Weight	Tonne
Spoil - Inert Spoil - Non Hazardous Spoil - Hazardous Other - State		GROSS WEIGHT OF VEHICLE	<u>31970</u>
Imported Materials		TARE WEIGHT OF VEHICLE	<u>12200</u>
Material Description Recycled Aggregate Quarried Aggregate Other State		NETT WEIGHT	<u>19770</u>
Material Description		<u>MOT</u>	

TIME ON SITE	STATE REASON FOR WAITING TIME
TIME OFF SITE	
WAITING TIME	
DAYWORK	
CUSTOMERS SIGNATURE	
PRINT NAME <u>[Signature]</u>	

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note once signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

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34.

Conveyance Note

N° 157823

 61 Mosley Road, Trafford Park
 Manchester M17 1GJ

 This material has been produced in accordance with P.P. O'Connor's
 Protocol for the production of Recycled Aggregates

Delivery Code

Waste Carriers Licence Number CBDU101751		Contract No:	
Customers Name: <u>HAMPSEY CONST.</u>			
Drivers Name	Vehicle Registration	Signature	
<u>DAVID HOLMES</u>	<u>ML19YXS</u>	<u>[Signature]</u>	
Delivery/Collection Address		Date and Time	
<u>HIGHER CHATHAM ST</u> <u>MANCHESTER</u>		<u>20/2/20</u>	
Off Site Material Category		Weight	Tonne
Spoil - Inert Spoil - Non Hazardous Spoil - Hazardous Other - State		GROSS WEIGHT OF VEHICLE	<u>32000</u>
Imported Materials		TARE WEIGHT OF VEHICLE	<u>12000</u>
Material Description Recycled Aggregate Quarried Aggregate Other State		NETT WEIGHT	<u>20000</u>
Material Description		<u>MOT</u>	
TIME ON SITE	STATE REASON FOR WAITING TIME		
TIME OFF SITE			
WAITING TIME			
DAYWORK			
CUSTOMERS SIGNATURE			
PRINT NAME <u>[Signature]</u>			

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note once signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

P.P. O'Connor's Terms and Conditions prevail at all times

①N 19/02/20 - 3 loads

MOT
slab build up

P.P. O'CONNOR
Committed To Excellence

61 Mosley Road, Trafford Park
Manchester M17 1GJ

This material has been produced in accordance with P.P. O'Connor's
Protocol for the production of Recycled Aggregates

Waste Carriers Licence Number **CBDU101751** Contract No: **20**
Customers Name: **HAMPSEY**

Drivers Name: **Colin** Vehicle Registration: **MV17 ABX** Signature: **Colin**

Delivery/Collection Address: **SODA** Date and Time: **19-2-20**

Off Site Material Category: **Higher Chertown**

Material	Weight	Tonne
Spill - Inert		
Spill - Non Hazardous		
Spill - Hazardous		
Other - State		
GROSS WEIGHT OF VEHICLE		31900
TARE WEIGHT OF VEHICLE		12100
NETT WEIGHT		19800

Imported Materials

Material	Description
Recycled Aggregate	MOT
Quarried Aggregate	
Other State	

TIME ON SITE

TIME OFF SITE

WAITING TIME

DAYWORK

CUSTOMERS SIGNATURE: **[Signature]** PRINT NAME: **D JACOBSON**

STATE REASON FOR WAITING TIME

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note once signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

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P.P. O'CONNOR
Committed To Excellence

61 Mosley Road, Trafford Park
Manchester M17 1GJ

This material has been produced in accordance with P.P. O'Connor's
Protocol for the production of Recycled Aggregates

Waste Carriers Licence Number **CBDU101751** Contract No: **20**
Customers Name: **HAMPSEY CONST**

Drivers Name: **Phil Duce** Vehicle Registration: **MV17 ABX** Signature: **Phil Duce**

Delivery/Collection Address: **FLETCHER BANK** Date and Time: **17/2/20**

HIGHER CHERTOWN STREET
MLR

Material	Weight	Tonne
Spill - Inert		
Spill - Non Hazardous		
Spill - Hazardous		
Other - State		
GROSS WEIGHT OF VEHICLE		32,000
TARE WEIGHT OF VEHICLE		12,500
NETT WEIGHT		19,500

Imported Materials

Material	Description
Recycled Aggregate	MOT
Quarried Aggregate	
Other State	

TIME ON SITE

TIME OFF SITE

WAITING TIME

DAYWORK

CUSTOMERS SIGNATURE: **[Signature]** PRINT NAME: **P.C.P.**

STATE REASON FOR WAITING TIME

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note once signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

P.P. O'Connor's Terms and Conditions prevail at all times

P.P. O'CONNOR
Committed To Excellence

61 Mosley Road, Trafford Park
Manchester M17 1GJ
This material has been produced in accordance with P.P. O'Connor's
Protocol for the production of Recycled Aggregate

Conveyance Note
No 159427

Delivery Code
84

Waste Carriers Licence Number CB061001751		Contract No:	
Customers Name: <u>HAMPSEY CONST</u>			
Drivers Name	Vehicle Registration	Signature	
<u>PHIL DICE</u>	<u>MV17 ABX</u>	<u>[Signature]</u>	
Delivery/Collection Address		Date and Time	
<u>HIGHER CHATHAM ST</u> <u>MCR.</u>		<u>17/2/20</u>	
Off Site Material Category		Weight	Tonne
Spill - inert		GROSS WEIGHT OF VEHICLE	<u>32000</u>
Spill - Non Hazardous			
Spill - Hazardous			
Other - State			
Imported Materials		TARE WEIGHT OF VEHICLE	<u>12500</u>
- Material	Description	NETT WEIGHT	<u>19500</u>
Recycled Aggregate			
Quarried Aggregate	<u>KM 6FS</u>		
Other State			
TIME ON SITE	STATE REASON FOR WAITING TIME		
TIME OFF SITE			
WAITING TIME			
DAYWORK			
CUSTOMER'S SIGNATURE			
PRINT NAME			<u>D. Spencer</u>

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note here signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.
P.P. O'Connor's Terms and Conditions prevail at all times

IN 10/02/20 - 2 loads

MOT.

Slab build up

P.P. O'CONNOR
Committed To Excellence

61 Mosley Road, Trafford Park
Manchester M17 1GJ
This material has been produced in accordance with P.P. O'Connor's
Protocol for the production of Recycled Aggregate

Conveyance Note
No 158028

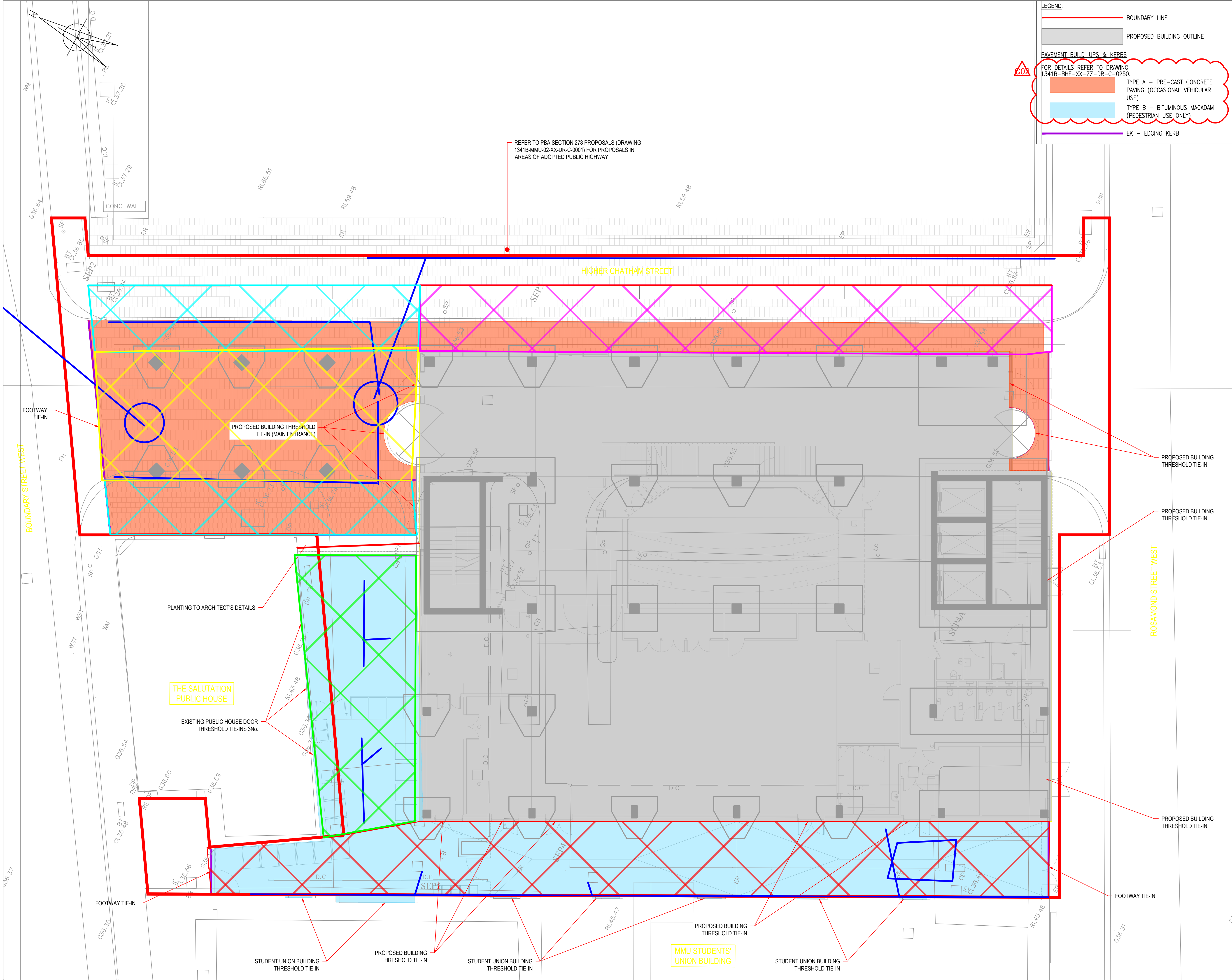
Delivery Code

Waste Carriers Licence Number CB061001751		Contract No:	
Customers Name: <u>Hampsey Const</u>			
Drivers Name	Vehicle Registration	Signature	
<u>Cheney</u>	<u>MV17 AGO</u>	<u>[Signature]</u>	
Delivery/Collection Address		Date and Time	
<u>Soda</u> <u>Higher Chatham St MCR.</u>		<u>10 02 20.</u>	
Off Site Material Category		Weight	Tonne
Spill - inert		GROSS WEIGHT OF VEHICLE	<u>31980</u>
Spill - Non Hazardous			
Spill - Hazardous			
Other - State			
Imported Materials		TARE WEIGHT OF VEHICLE	<u>12600</u>
- Material	Description	NETT WEIGHT	<u>19480</u>
Recycled Aggregate			
Quarried Aggregate	<u>MOT.</u>		
Other State			
TIME ON SITE	STATE REASON FOR WAITING TIME		
TIME OFF SITE			
WAITING TIME			
DAYWORK			
CUSTOMER'S SIGNATURE			
PRINT NAME			<u>CC. Spence</u>

Conditions of Sale: It is essential that all of the written particulars entered above should be checked by the consignee note here signed by the consignee represents formal acceptance of the materials in good order and condition, and/or the removal off site of the waste produced, and subsequent complaints and or claims cannot be accepted by P.P. O'Connor. All complaints, whatever in nature must be made to the driver of the vehicle and be confirmed in writing to P.P. O'Connor immediately.

P.P. O'Connor's Terms and Conditions prevail at all times

General Filling
($<600\text{mm}$ beneath hardstanding)



LEGEND:

BOUNDARY LINE

PROPOSED BUILDING OUTLINE

PAVEMENT BUILD-UPS & KERBS

FOR DETAILS REFER TO DRAWING 1341B-BHE-ZX-ZZ-DR-C-0250.

TYPE A – PRE-CAST CONCRETE PAVING (OCCASIONAL VEHICULAR USE)

TYPE B – BITUMINOUS MACADAM (PEDESTRIAN USE ONLY)

EK – EDGING KERB

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DO NOT SCALE THIS DRAWING.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDOUS RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION:

- WORKS IN PROXIMITY TO LIVE SERVICES INCLUDING LARGE DIAMETER SEWERS
- WORKS IN PROXIMITY TO EXISTING BUILDINGS
- WORKS IN PROXIMITY TO PEDESTRIAN AND VEHICULAR AREAS

• NONE

• NONE

MAINTENANCE/CLEANING/OPERATION:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.

2. REFER TO DRAWING 1341B-BHE-ZX-ZZ-DR-C-0001 FOR GENERAL ENGINEERING NOTES AND BUROHAPPOLD INFRASTRUCTURE DRAWING LIST.

3. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:

- FDG LANDSCAPE LAYOUT (1341B-FDG-ZX-ZZ-M3-A-0001 - LANDSCAPE PLAN) (09.08.2019)

• **PBA S278 LAYOUTS**

Notes (1341B-MMU-02-XX-DR-C-0101 - EXTENT OF WORKS) (30.04.2019)

PAVEMENT LAYOUT AND DETAILS SUBJECT TO FINAL REVIEW FOLLOWING EXTERNAL LEVELS DESIGN AND PAVING SPECIFICATION BY OTHERS.

- AREA 1
- AREA 2
- AREA 3
- AREA 4
- AREA 5

C02 ISSUED FOR COMMENT	12.05.20	SE	SE
C01 ISSUED FOR COMMENT	03.01.20	SE	PB
Rev	Description	Date	Appr/Om

CONSTRUCTION (DRAFT)

Status/Subtitle of Drawing

Client

2nd Floor Eastgate,
2 Castle Street,
Manchester, M3 4LZ,
UK

Tel: +44 (0)161 233 5000
Fax: +44 (0)870 787 4143
Email: 0044214@burohappold.com
Web: www.burohappold.com

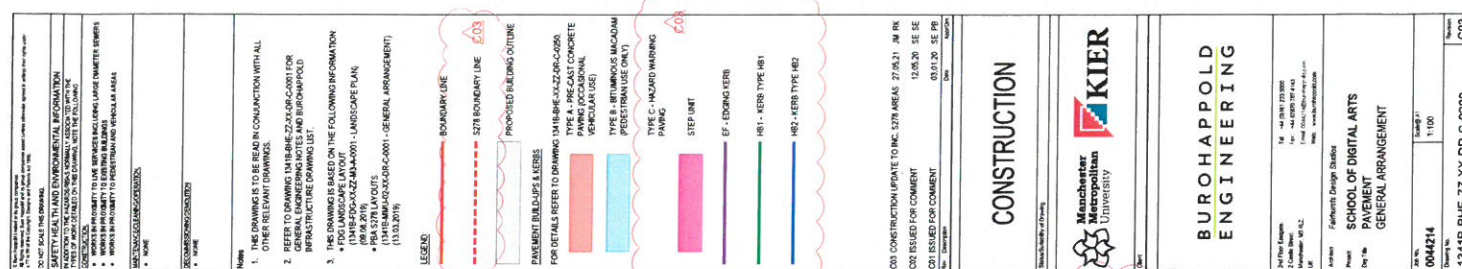
Architect Fairhursts Design Studios

Project **SCHOOL OF DIGITAL ARTS**

Dwg Title **PAVEMENT GENERAL ARRANGEMENT**

Job No.	Scale @ A1
0044214	1:100
Drawing No.	Revision
1341B-BHE-ZX-ZZ-DR-C-0200	C02

General Filling
S278 works



REF: 2654/SM/001

Raj de Fonseka
Weststone Construction
Unit 6
Whitworth Court
Manor Farm Road
Runcorn WA7 1WA

18th February 2022

Dear Raj,

RE; SODA, MANCHESTER: FILL MATERIALS VALIDATION

We are pleased to present our final summary of the validation testing undertaken as part of the above project.

Weststone Construction (WC) have instructed GroundSolve Ltd (GSL) to carry out testing on backfill material to be used for areas of hard landscaping at the above site. The testing was requested by WC to confirm materials compliance with Buro Happold (BH) Specification 044214 Rev 2 section 620 Compacted General Filling, see **Appendix A**.

- Particle Size distribution Testing (PSD Testing),
- Chemical Testing to meet requirements of Table 510 (BH Specification).

The material in question was a combination of Type 1 GSB material supplied by Breedon Aggregates Ltd and site won granular material recovered during excavations. Samples were taken from a stockpile of both the imported material and the site won granular material by an engineer from GroundSolve Ltd (GSL).

The physical testing comprised particle size distribution testing (PSD) see **Appendix B**, which confirmed the material to be consistent with the requirements for Group 5 Well graded granular materials, as per section 620 in the BH specification.

Chemical testing of both samples was also undertaken, the results of which are included in **Appendix C**. The results were compared with the specified trigger concentrations identified in section 500 of the BH specification all of which were identified as below the required limits. In addition, no asbestos was detected in any of the samples.

The chemical and physical test results confirm that the material complies with the BH specification.

We trust this is satisfactory, should you have any queries, please call Sam Fishburne on 01244 661361.

Yours sincerely

Sam Fishburne

APPENDIX B

Geotechnical Testing Results

LABORATORY RESULTS - Particle Size Distribution

Project: WESTSTONE

Project No: PC218391

Hole B2-FILL

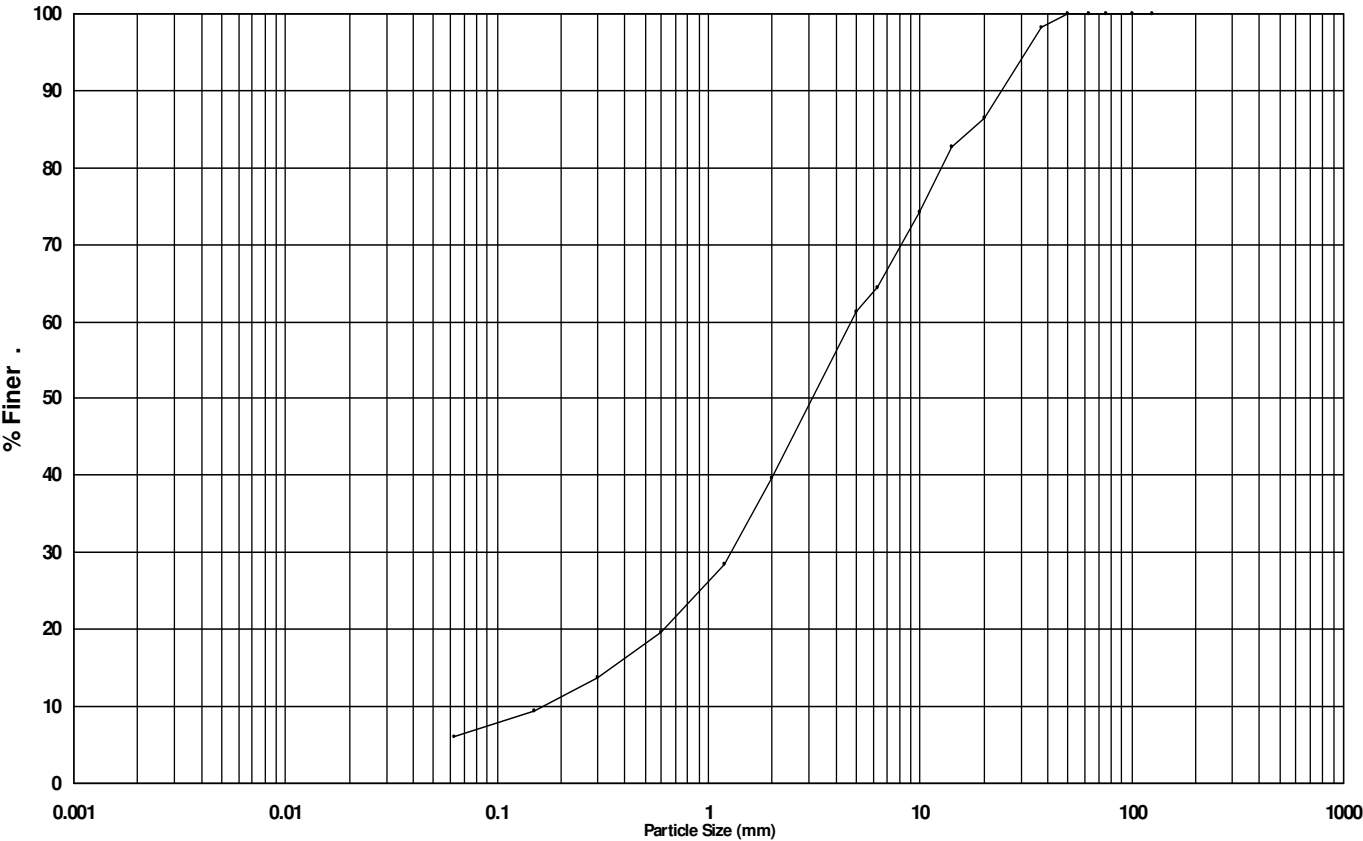
Sample Depth 0.00m

Sample Type B

Sample Ref C77615

Sample Description

FILL - Dark grey slightly silty sandy gravel



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	6
SAND	34
GRAVEL	60
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
20 mm	87
14 mm	83
10 mm	74
6.3 mm	64
5 mm	61
2 mm	40
1.18 mm	29
600 μ m	20
300 μ m	14
150 μ m	9

Size	% Finer
63 μ m	6

Uniformity Coefficient	
28.90	
Sieving Method	
Wet sieve	
Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016

04/09/2020

APPENDIX C

Chemical Testing Results



Certificate of Analysis

Certificate Number 21-01251

Issued: 17-Jan-22

Client GroundSolve Limited
Unit 1
Well House Barns
Bretton
Flintshire
FAO Adam Fenwick
CH4 0DH

Our Reference 21-01259

Client Reference 2654

Order No (not supplied)

Contract Title SODA Manchester

Description 2 Soil samples.

Date Received 17-Dec-21

Date Started 22-Dec-21

Date Completed 16-Jan-21

Test Procedures Identified by prefix DETSn (details on request).

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

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 21-01251
 Client Ref 2654
 Contract Title SODA Manchester

Lab No	1790456	1790461
Sample ID	B1 - MG	B2-Fill
Depth	N/a	N/a
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	13/12/2021	13/12/2021
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	17	14
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.3
Chromium	DETSC 2301#	0.15	mg/kg	26	28
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Lead	DETSC 2301#	0.3	mg/kg	33	37
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.06
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Copper	DETSC 2301#	0.2	mg/kg	27	28
Nickel	DETSC 2301#	1	mg/kg	31	26
Zinc	DETSC 2301#	1	mg/kg	96	78
Inorganics					
pH	DETSC 2008#		pH	7.6	7.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	0.1
Organic matter	DETSC 2002#	0.1	%	2.3	2.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	12	14
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03

Summary of Chemical Analysis

Soil Samples

Our Ref 21-01251
 Client Ref 2654
 Contract Title SODA Manchester

Lab No	1790456	1790461
Sample ID	B1 - MG	B2-Fill
Depth	N/a	N/a
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	13/12/2021	13/12/2021
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Summary of Asbestos Analysis

Soil Samples

Our Ref 21-01251

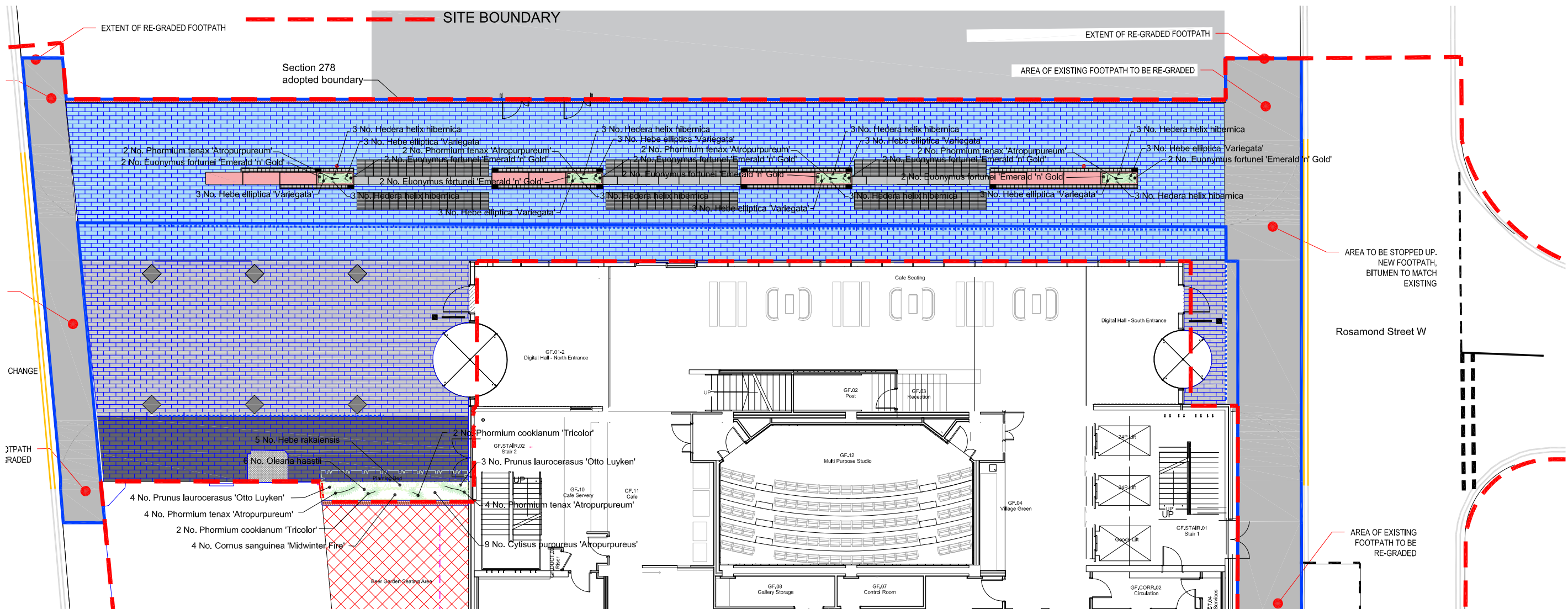
Client Ref 2654

Contract Title SODA Manchester

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1790456	B1 - MG	SOIL	NAD	none	A Christodoulou
1790458	B2-Fill	SOIL	NAD	none	A Christodoulou

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Soft Landscaping
Imported Topsoil



Planting Schedule

Shrubs					
Number	Species	Pot Size	Specification	Density	Height
4 -	Cornus sanguinea 'Midwinter Fire'	3L	Branched :C	3/m ²	30-40cm
9 -	Cytisus purpureus 'Atropurpureus'	3L	Bushy :C	5/m ²	40-60cm
8 -	Euonymus fortunei 'Emerald 'n' Gold'	3L	Bushy :C	20/m ²	20-30cm
8 -	Euonymus fortunei 'Emerald 'n' Gold'	3L	Bushy :C	22/m ²	20-30cm
24 -	Hebe elliptica 'Variegata'	3L	Bushy :C	Counted	20-30cm
5 -	Hebe rakaiensis	3L	Bushy :CE :C	6/m ²	20-30cm
6 -	Olearia haastii	3L	Bushy :RB	4/m ²	30-40cm
4 -	Phormium cookianum 'Tricolor'	10L	RB	Counted	60-80cm
16 -	Phormium tenax 'Atropurpureum'	3L	Several shoots :C	Counted	30-40cm
7 -	Prunus laurocerasus 'Otto Luyken'	3L	Bushy :RB	4/m ²	30-40cm

Climbers			
Number	Species	Specification	Density/Height
12 -	Hedera helix hibernica	Several Shoots :Caned	20/m ² 40-60cm
12 -	Hedera helix hibernica	Several Shoots :Caned	22/m ² 40-60cm

KEY:



ORNAMENTAL SHRUB PLANTING
350mm depth of imported topsoil over minimum 300mm free draining subsoil
Cultivate formation levels and place imported subsoil if necessary
Place mixed compost and organic fertilisers as per specification
75mm depth of ornamental bark mulch required for all shrub and herbaceous planting

PLANTING NOTES:

- Plant handling at the nursery, and during transit up to delivery, shall be in accordance with 'Plant Handling', the booklet published by the Committee for Plant Supply and Establishment (CPSE). The contractor shall comply with clauses 3 & 4 of the above booklet (obtained from the Horticulture Trades Association, 19 High Street, Theale, Reading, Berks RG7 5H) which refers to the receipt, unloading and temporary storage of plants.
- Plants shall be first class examples of their species or variety, free from all pests and diseases, with good fibrous root systems and materially undamaged (refer to relevant sections of BS3936 Parts 1-4 'Specification of Nursery Stock').
- All planting is to be in general compliance with BS4428: 1989 'Code of Practice for general landscape operations (excluding hard surfaces)'.
- The contractor must ascertain for himself/herself the exact location of underground services and maintenance points.
- All areas of planting are to be mulched to a depth of 50mm with premium grade tree bark. Bark levels at the end of the 12 month defects period are to be topped up to 50mm.
- Water as necessary to ensure the establishment and continued thriving of all planted matter. Responsibility for timing irrigation remains with the Contractor at planting until Practical Completion, and for a minimum of 12 months post PC.
- Carry out all work while soil and weather conditions are suitable.
 - Do not move, spread or cultivate soil for planting areas in unsuitable weather conditions; when it is wetter than the plastic limit, when the ground is frozen or covered by snow.
 - Do not plant during periods of frost or strong winds. Plant only during the following periods:
 - Container grown plants: At any time if ground and weather conditions are favourable. Ensure that adequate watering and weed control is provided
- For full details of Planting and Maintenance refer to the Landscape Specification.
Clauses include reference to good horticultural and sustainable practices, including the use of peat free composts, bark mulch to all planting areas and the use of non-residual herbicide treatments.

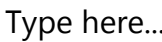
The Contractor is to check all dimensions and conditions on site before commencing. Do not scale from this drawing. When issued in DWG format it is an uncontrolled version that is current at time of issue and Fairhursts Design Group accepts no liability for alterations or additions or consequential discrepancies that occur after it is issued.

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Rev	Status	Description	Date	Job/Drawing No	Revision
P01	D2	Issued for Tender	29/07/19	1341B-FDG-01-00-DR-A-7004	C03
P02	S2	Issued for Construction review	18/09/20		
P03	S2	Section 278 planting added	23/02/21		
P04	S2	Section 278 planters added back in S278 area adjusted to avoid services	22/04/21		
P05	S2	S278 hazard warning paving revised	10/05/21	1341B-FDG-01-00-DR-A-7004	S4
C01	S4	Issued for construction	11/05/21		
C02	S4	Final Construction Issue	02/08/21		
C03	S4	Construction Issue	13/09/21		

Scale	1:100@A1	Drawn	EF
Date	01/06/20	Checked	FDG
Do not scale		All dimensions to be checked on site	



DELIVERY 9/10/21
0458

**J. PALMER
LANDSCAPES LTD.**

HIGH STREET NURSERIES
FARSLEY, PUDSEY, YORKS. LS28 5LH.
Telephone: Pudsey (0113) 2578586
Fax No: (0113) 2571058
Email: info@palmerstld.co.uk
Reg. No. 972782 VAT Reg. No. 180 5247 71

Date. 9/10/21

Contract No.

Liel, Sood

Address of Supplier

GREENTECH
RABBIT HILL
WARRINGTON

Please Supply:

167 G/T TOPSOIL

(27 STILL ON WAGG
WAGG)

TERMS

DELIVERY ADDRESS

SIGNATURE

BANDON ST
WEST
MANCHESTER

SEAN
RUEL



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Mark Wood
Green-tech Ltd
Rabbit Hill Business Park
Great North Road
Arkendale
Knaresborough
North Yorkshire HG5 0FF

3rd August 2021
Our Ref: TOHA/20/9569/3/SS
Your Ref: PO 403815

Dear Sirs

Topsoil Analysis Report: Barnsdale Landscape Grade Topsoil

We have completed the analysis of the soil sample recently submitted, referenced *Barnsdale Landscape Grade Topsoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left the Green-tech Ltd site.

SAMPLE EXAMINATION

The sample was described as a brown (Munsell Colour 7.5YR 3/4), slightly moist, friable, moderately calcareous LOAMY SAND with a weakly developed, fine granular structure*. The sample was virtually stone-free, with a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Tim O'Hare Associates LLP
Howbery Park Wallingford Oxfordshire OX10 8BA
T:01491 822653 E:info@toha.co.uk
www.toha.co.uk

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The sample was virtually stone-free and, as such, stones should not restrict the use of the soil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.0) and moderately calcareous. This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline, moderately calcareous soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by CaSO₄ extract (BS3882 requirement) fell below the maximum specified value (3300 µS/cm) given in BS3882:2015 – Table 1.

Organic Matter and Fertility Status

The sample was adequately supplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to BS3882:2015 - Table 1: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been assessed for *residential with homegrown produce* end-use against the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels (C4SLs) for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, moderately calcareous loamy sand with a weakly developed granular structure and a low stone content. The sample contained sufficient reserves of organic matter and all major plant. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided only species tolerant of alkaline, moderately calcareous soil conditions are selected and the physical condition of the soil is satisfactory.

The sample was fully compliant with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for topsoil and requirements for use – Table 1, Multipurpose Topsoil*).

General Landscape Environments

Rootballed Trees

The most demanding planting environment is semi-mature, pit planted trees. Trees of this size and age have grown accustomed to optimum growing conditions in the nursery, and these need to be replicated when the rootballed or containerised tree is planted in the pit. In particular, aeration and drainage around the rootball are critical. Without these properties, trees will very quickly suffer and possibly die during their first few growing seasons after planting.

The topsoil can be used as backfill in tree pits to a maximum depth of 400mm (or 300mm if heavier soil or broad PSD), provided the topsoil is kept dry and non-plastic during planting.

Shrubs

Containerised shrubs are generally more tolerant of a wider range of soil-types, and they require less topsoil to root into than trees. The topsoil would be suited to a range of shrubs typically used in commercial and domestic landscaping.

Forestry Stock

Less demanding planting habitats include indigenous woodland planting, planted as small whips and feathered trees. The topsoil would be suitable for such planting environments.

Amenity Grass

This soil would be considered suitable for amenity grass seeding and turfing

Sports Pitches

This soil is suited for sports pitch construction given its high sand content. However, all materials to be used for sports pitch construction, including topsoil, should be carefully considered in relation to the required performance and standard of the sports pitch.

Domestic Gardens

The horticultural properties of the soil would be suitable for domestic garden applications. In addition, of the potential contaminants determined, none was found at levels that would be considered elevated. However, permissible levels for potential contaminants do vary from site to site. Therefore, the suitability of topsoil represented by this sample for any particular project or development should be confirmed by comparing the results against the site's specific assessment criteria.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, resspreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

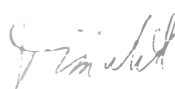
Further details on soil handling are provided in Annex A of *BS3882:2015*.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Aaron Cross
BSc MSc
Graduate Soil Scientist



Tim White
BSc MSc M/SoilSci CSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP



TIM O'HARE ASSOCIATES
LANDSCAPE CONSULTANCY

Client:	Green-tech Ltd
Project:	Barnsdale Landscape Grade
Job:	Topsoil Analysis - BS3882:2015
Date:	03/08/2021
Job Ref No:	TOHA/20/9569/3/SS

Sample Reference		
		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.05mm)	%	UKAS
Very Fine Sand (0.05-0.15mm)	%	UKAS
Fine Sand (0.15-0.25mm)	%	UKAS
Medium Sand (0.25-0.50mm)	%	UKAS
Coarse Sand (0.50-1.0mm)	%	UKAS
Very Coarse Sand (1.0-2.0mm)	%	UKAS
Total Sand (0.05-2.0mm)	%	UKAS
Texture Class (UK Classification)		UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP

Landscape Grade	
	8
	13
	15
	25
	28
	6
	5
	79
	LS
	1
	1
	0

pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Electrical Conductivity (1:2 CaSO ₄ extract)	uS/cm	UKAS
Exchangeable Sodium Percentage	%	UKAS
Organic Matter (LOI)	%	UKAS
Total Nitrogen (Dumas)	%	UKAS
C : N Ratio	ratio	UKAS
Extractable Phosphorus	mg/l	UKAS
Extractable Potassium	mg/l	UKAS
Extractable Magnesium	mg/l	UKAS

	8.0
	745
	2687
	3.4
	6.4
	0.22
	17
	50
	698
	152

Total Arsenic (As)	mg/kg	MCERTS
Total Cadmium (Cd)	mg/kg	MCERTS
Total Chromium (Cr)	mg/kg	MCERTS
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS
Total Copper (Cu)	mg/kg	MCERTS
Total Lead (Pb)	mg/kg	MCERTS
Total Mercury (Hg)	mg/kg	MCERTS
Total Nickel (Ni)	mg/kg	MCERTS
Total Selenium (Se)	mg/kg	MCERTS
Total Zinc (Zn)	mg/kg	MCERTS
Water Soluble Boron (B)	mg/kg	MCERTS
Total Cyanide (CN)	mg/kg	MCERTS
Total (mono) Phenols	mg/kg	MCERTS

	3
	0.3
	7
	< 4.0
	21
	22
	< 0.3
	6
	< 1.0
	41
	1.1
	< 1
	< 1.0

Naphthalene	mg/kg	MCERTS
Acenaphthylene	mg/kg	MCERTS
Acenaphthene	mg/kg	MCERTS
Fluorene	mg/kg	MCERTS
Phenanthrene	mg/kg	MCERTS
Anthracene	mg/kg	MCERTS
Fluoranthene	mg/kg	MCERTS
Pyrene	mg/kg	MCERTS
Benzo(a)anthracene	mg/kg	MCERTS
Chrysene	mg/kg	MCERTS
Benzo(b)fluoranthene	mg/kg	MCERTS
Benzo(k)fluoranthene	mg/kg	MCERTS
Benzo(a)pyrene	mg/kg	MCERTS
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS
Dibenz(a,h)anthracene	mg/kg	MCERTS
Benzo(g,h,i)perylene	mg/kg	MCERTS
Total PAHs (sum USEPA16)	mg/kg	MCERTS

	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.05
	< 0.80

Aliphatic TPH >C5 - C6	mg/kg	MCERTS
Aliphatic TPH >C6 - C8	mg/kg	MCERTS
Aliphatic TPH >C8 - C10	mg/kg	MCERTS
Aliphatic TPH >C10 - C12	mg/kg	MCERTS
Aliphatic TPH >C12 - C16	mg/kg	MCERTS
Aliphatic TPH >C16 - C21	mg/kg	MCERTS
Aliphatic TPH >C21 - C35	mg/kg	MCERTS
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS
Aromatic TPH >C5 - C7	mg/kg	MCERTS
Aromatic TPH >C7 - C8	mg/kg	MCERTS
Aromatic TPH >C8 - C10	mg/kg	MCERTS
Aromatic TPH >C10 - C12	mg/kg	MCERTS
Aromatic TPH >C12 - C16	mg/kg	MCERTS
Aromatic TPH >C16 - C21	mg/kg	MCERTS
Aromatic TPH >C21 - C35	mg/kg	MCERTS
Aromatic TPH (C5 - C35)	mg/kg	MCERTS

	< 0.001
	< 0.001
	< 0.001
	< 1.0
	< 2.0
	< 8.0
	< 8.0
	< 10
	< 0.001
	< 0.001
	< 0.001
	< 1.0
	< 2.0
	< 10
	< 10
	< 10

Benzene	mg/kg	MCERTS
Toluene	mg/kg	MCERTS
Ethylbenzene	mg/kg	MCERTS
p & m-xylene	mg/kg	MCERTS
o-xylene	mg/kg	MCERTS
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS

	< 0.001
	< 0.001
	< 0.001
	< 0.001
	< 0.001
	< 0.001

Asbestos Screen	ND/D	ISO 17025
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Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a brown (Munsell Colour 7.5YR 3/4), slightly moist, friable, moderately calcareous LOAMY SAND with a weakly developed, fine granular structure. The sample was virtually stone-free with a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Aaron Cross
BSc MSc
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

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Appendix C Chemical Testing Results

**Karl Monks**

James Fisher Testing Services
Ruby House
40A Hardwick Grange
Warrington
Cheshire
WA1 4RF

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: K.monks@james-fisher.co.uk

Analytical Report Number : 20-89943

Project / Site name:	Hamsey	Samples received on:	27/02/2020
Your job number:	SODA	Samples instructed on:	27/02/2020
Your order number:	11797	Analysis completed by:	09/03/2020
Report Issue Number:	1	Report issued on:	09/03/2020
Samples Analysed:	2 soil samples		


Signed:

Rachel Bradley

Deputy Quality Manager
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.

Iss No 20-89943-1 Hamsey SODA

Analytical Report Number: 20-89943

Project / Site name: Hamsey

Your Order No: 11797

Lab Sample Number				1458479	1458480			
Sample Reference				45393 G/L - K1	45393 G/L - D4/D5			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				19/02/2020	20/02/2020			
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	%	N/A	NONE	4.3	5.0			
Total mass of sample received	kg	0.001	NONE	2.0	2.0			

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	8.2	8.5			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Total Sulphate as SO ₄	mg/kg	50	MCERTS	230	260			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	37	79			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018	0.040			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	18.3	39.5			

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
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Analytical Report Number: 20-89943

Project / Site name: Hamsey

Your Order No: 11797

Lab Sample Number				1458479	1458480			
Sample Reference				45393 G/L - K1	45393 G/L - D4/D5			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				19/02/2020	20/02/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1.1	1.3			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	20			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	5.2	8.8			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	14			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	18			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	30	41			

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			

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



Analytical Report Number : 20-89943

Project / Site name: Hamsey

* 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 *
1458479	45393 G/L - K1	None Supplied	None Supplied	Brown loam and sand with gravel.
1458480	45393 G/L - D4/D5	None Supplied	None Supplied	Brown loam and sand with gravel.

Analytical Report Number : 20-89943

Project / Site name: Hamsey

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
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
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
Free cyanide in soil	Determination of free 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
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	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
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
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
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
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
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
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	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

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 ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
45393 G/L - D4/D5		S	20-89943	1458480	bc	Free cyanide in soil	L080-PL	c
45393 G/L - D4/D5		S	20-89943	1458480	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
45393 G/L - D4/D5		S	20-89943	1458480	bc	Monohydric phenols in soil	L080-PL	b
45393 G/L - D4/D5		S	20-89943	1458480	bc	Speciated EPA-16 PAHs in soil	L064-PL	b
45393 G/L - D4/D5		S	20-89943	1458480	bc	TPHCWG (Soil)	L088/76-PL	b
45393 G/L - K1		S	20-89943	1458479	bc	Free cyanide in soil	L080-PL	c
45393 G/L - K1		S	20-89943	1458479	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
45393 G/L - K1		S	20-89943	1458479	bc	Monohydric phenols in soil	L080-PL	b
45393 G/L - K1		S	20-89943	1458479	bc	Speciated EPA-16 PAHs in soil	L064-PL	b
45393 G/L - K1		S	20-89943	1458479	bc	TPHCWG (Soil)	L088/76-PL	b

**Karl Monks**

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Analytical Report Number : 20-90725

Project / Site name:	Hampsey	Samples received on:	04/03/2020
Your job number:	SODA	Samples instructed on:	04/03/2020
Your order number:	11832	Analysis completed by:	13/03/2020
Report Issue Number:	1	Report issued on:	13/03/2020
Samples Analysed:	2 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.

Iss No 20-90725-1 Hampsey SODA



Analytical Report Number: 20-90725

Project / Site name: Hampsey

Your Order No: 11832

Lab Sample Number				1462464	1462465			
Sample Reference				45393	45393			
Sample Number				GI J1/J2	GI J1			
Depth (m)				None Supplied	None Supplied			
Date Sampled				28/02/2020	27/02/2020			
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	%	N/A	NONE	1.0	0.38			
Total mass of sample received	kg	0.001	NONE	1.9	1.7			

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

pH - Automated	pH Units	N/A	NONE	8.9	8.6			
Free Cyanide	mg/kg	1	NONE	< 1	< 1			
Total Sulphate as SO ₄	mg/kg	50	NONE	180	150			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	NONE	37	23			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	NONE	0.018	0.012			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	NONE	18.3	11.6			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	NONE	< 1.0	< 1.0			
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Speciated PAHs

Naphthalene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05	< 0.05			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	< 0.80	< 0.80			
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0			
Cadmium (aqua regia extractable)	mg/kg	0.2	NONE	0.9	0.8			
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2			
Chromium (aqua regia extractable)	mg/kg	1	NONE	6.1	5.0			
Copper (aqua regia extractable)	mg/kg	1	NONE	4.4	3.9			
Lead (aqua regia extractable)	mg/kg	1	NONE	21	8.0			
Mercury (aqua regia extractable)	mg/kg	0.3	NONE	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	NONE	1.9	3.7			
Selenium (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	NONE	9.9	22			



Analytical Report Number: 20-90725

Project / Site name: Hampsey

Your Order No: 11832

Lab Sample Number				1462464	1462465			
Sample Reference				45393	45393			
Sample Number				GI J1/J2	GI J1			
Depth (m)				None Supplied	None Supplied			
Date Sampled				28/02/2020	27/02/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/kg	1	NONE	< 1.0	< 1.0			
Toluene	µg/kg	1	NONE	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	NONE	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	NONE	< 1.0	< 1.0			
o-xylene	µg/kg	1	NONE	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	NONE	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	NONE	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	NONE	< 8.0	< 8.0			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10			



Analytical Report Number : 20-90725

Project / Site name: Hampsey

* 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 *
1462464	45393	GI J1/J2	None Supplied	Non Soil**
1462465	45393	GI J1	None Supplied	Non Soil**

** NON MCERTS MATRIX

Analytical Report Number : 20-90725

Project / Site name: Hampsey

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	NONE
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
Free cyanide in soil	Determination of free 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	NONE
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	NONE
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	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	NONE
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	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
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	NONE
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	NONE
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	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.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
45393	GI J1	S	20-90725	1462465	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
45393	GI J1	S	20-90725	1462465	b	Monohydric phenols in soil	L080-PL	b
45393	GI J1	S	20-90725	1462465	b	Speciated EPA-16 PAHs in soil	L064-PL	b
45393	GI J1	S	20-90725	1462465	b	TPHCWG (Soil)	L088/76-PL	b
45393	GI J1/J2	S	20-90725	1462464	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
45393	GI J1/J2	S	20-90725	1462464	b	Monohydric phenols in soil	L080-PL	b
45393	GI J1/J2	S	20-90725	1462464	b	Speciated EPA-16 PAHs in soil	L064-PL	b
45393	GI J1/J2	S	20-90725	1462464	b	TPHCWG (Soil)	L088/76-PL	b

Metals & Non-Metals	Sample 1	Adopted Guideline (mg/kg)	Source	Exceedances
	N/A			
Arsenic	2	640	C4SL	0
Boron, Water Soluble	< 0.2	240000	S4UL	0
Cadmium	0.5	410	C4SL	0
Chromium III	3.7	8600	S4UL	0
Chromium, Hexavalent	< 1.0	49	C4SL	0
Copper	6.1	68000	S4UL	0
Lead	210	2300	C4SL	0
Mercury	< 0.05	58	S4UL	0
Nickel	3.5	980	S4UL	0
Phenol - Monohydric	< 0.3	440	S4UL	0
Free Cyanide	< 0.1	760	GAC	0
Selenium	< 0.5	12000	S4UL	0
Zinc	18	730000	S4UL	0

No exceedances of the SGV values for commercial end use.

Petroleum Hydrocarbons	Sample 1				
	N/A	Adopted Guideline (mg/kg)	Source	Exceedances	
	Aliphatic C5-C6	< 0.01	3200	S4UL	0
	Aliphatic C6-C8	< 0.01	7800	S4UL	0
	Aliphatic C8-C10	< 0.01	2000	S4UL	0
	Aliphatic C10-C12	< 1.5	9700	S4UL	0
	Aliphatic C12-C16	< 1.2	59000	S4UL	0
	Aliphatic C16-C21	< 1.5	1600000	S4UL	0
	Aliphatic C21-C35	< 3.4	1600000	S4UL	0
	Aliphatic C35-C40	< 3.4	26000	S4UL	0
Aromatic C5-C7	< 0.01	56000	S4UL	0	
Aromatic C7-C8	< 0.01	3500	S4UL	0	
Aromatic C8-C10	< 0.01	16000	S4UL	0	
Aromatic C10-C12	< 0.9	36000	S4UL	0	
Aromatic C12-C16	< 0.5	28000	S4UL	0	
Aromatic C16-C21	< 0.6	28000	S4UL	0	
Aromatic C21-C35	< 1.4	28000	S4UL	0	

No exceedances of the SGV values for commercial end use.

Polyaromatic Hydrocarbons (PAH)	Sample 1	Adopted Guideline (mg/kg)	Source	Exceedances
	N/A			
Acenaphthene	< 0.03	84000	S4UL	0
Acenaphthylene	< 0.03	83000	S4UL	0
Anthracene	< 0.03	520000	S4UL	0
Benzo(a)anthracene	< 0.03	170	S4UL	0
Benzo(a)pyrene	< 0.03	77	C4SL	0
Benzo(b)fluoranthene	< 0.03	44	S4UL	0
Benzo(g,h,i)perylene	< 0.03	3900	S4UL	0
Benzo(k)fluoranthene	< 0.03	1200	S4UL	0
Chrysene	0.11	350	S4UL	0
Dibenzo(a,h)anthracene	< 0.03	3.5	S4UL	0
Fluoranthene	0.1	23000	S4UL	0
Fluorene	< 0.03	63000	S4UL	0
Indeno(1,2,3-c,d)pyrene	< 0.03	500	S4UL	0
Naphthalene	< 0.03	190	S4UL	0
Phenanthrene	< 0.03	22000	S4UL	0
Pyrene	0.1	54000	S4UL	0

No exceedances of the SGV values for commercial end use.

In addition, no asbestos was detected in any of the samples.

The chemical and physical test results confirms that the material complies with the BH specification.

We trust this is satisfactory, should you have any queries, please call Elizabeth Smith on 01244 661361.

Yours sincerely



Elizabeth Smith
BSc GMICE



DETS

Certificate of Analysis

Certificate Number 21-15437

Issued: 02-Aug-21

Client GroundSolve Limited
Unit 1
Well House Barns
Bretton
Flintshire
FAO Adam Fenwick
CH4 0DH

Our Reference 21-15437

Client Reference (not supplied)

Order No (not supplied)

Contract Title Westone Construction

Description One Soil sample.

Date Received 22-Jul-21

Date Started 22-Jul-21

Date Completed 02-Aug-21

Test Procedures Identified by prefix DETSn (details on request).

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

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 21-15437

Client Ref

Contract Title Westone Construction

Lab No	1880138
Sample ID	Sample 1
Depth	
Other ID	
Sample Type	SOIL
Sampling Date	15/07/2021
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic	DETS 2301#	0.2	mg/kg	1.6
Boron, Water Soluble	DETS 2311#	0.2	mg/kg	< 0.2
Cadmium	DETS 2301#	0.1	mg/kg	0.5
Chromium	DETS 2301#	0.15	mg/kg	3.7
Chromium III	DETS 2301*	0.15	mg/kg	3.7
Chromium, Hexavalent	DETS 2204*	1	mg/kg	< 1.0
Copper	DETS 2301#	0.2	mg/kg	6.1
Lead	DETS 2301#	0.3	mg/kg	210
Mercury	DETS 2325#	0.05	mg/kg	< 0.05
Nickel	DETS 2301#	1	mg/kg	3.5
Selenium	DETS 2301#	0.5	mg/kg	< 0.5
Zinc	DETS 2301#	1	mg/kg	18
Inorganics				
pH	DETS 2008#		pH	8.4
Cyanide, Total	DETS 2130#	0.1	mg/kg	< 0.1
Cyanide, Free	DETS 2130#	0.1	mg/kg	< 0.1
Organic matter	DETS 2002#	0.1	%	0.3
Sulphate Aqueous Extract as SO4	DETS 2076#	10	mg/l	18
Sulphide	DETS 2024*	10	mg/kg	32
Sulphur (free)	DETS 3049#	0.75	mg/kg	< 0.75
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETS 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETS 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETS 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETS 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETS 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETS 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETS 3072#	3.4	mg/kg	< 3.4
Aliphatic C35-C40	DETS 3072*	3.4	mg/kg	< 3.4
Aliphatic C5-C35	DETS 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETS 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETS 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETS 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETS 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETS 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETS 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETS 3072#	1.4	mg/kg	< 1.4
Aromatic C35-C40	DETS 3072*	1.4	mg/kg	< 1.4
Aromatic C5-C35	DETS 3072*	10	mg/kg	< 10

Summary of Chemical Analysis

Soil Samples

Our Ref 21-15437

Client Ref

Contract Title Westone Construction

Lab No	1880138
Sample ID	Sample 1
Depth	
Other ID	
Sample Type	SOIL
Sampling Date	15/07/2021
Sampling Time	n/s

Test	Method	LOD	Units	
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.10
Pyrene	DETSC 3303#	0.03	mg/kg	0.10
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.11
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.32
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3



Summary of Asbestos Analysis

Soil Samples

Our Ref 21-15437

Client Ref

Contract Title Westone Construction

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1880138	Sample 1	SOIL	NAD	none	D Wilkinson
Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.					

Information in Support of the Analytical Results

Our Ref 21-15437

Client Ref

Contract Westone Construction

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1880138	Sample 1 SOIL	15/07/21	GJ 250ml, GJ 60ml x2		

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

6 Bibliography

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