



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

DOMIS CONSTRUCTION LTD

Victoria House, Great Ancoats Street, Manchester

Remediation Validation Report

NS/C4742/12869

February 2024

PROJECT QUALITY CONTROL DATA SHEET

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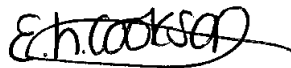
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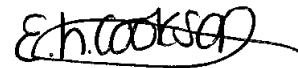
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DRAWINGS

Drawing Number	Rev	Title
10122-A-B5D9-G200-P-00-003	-	Proposed Ground Floor Plan
10122-A-B5D9-G200-P-B1-003	-	Proposed Basement Plan
RFM-XX-00-DR-L-8001	T02	Soft Landscape Details Plan
C4742/01	-	Site Location Plan
C4742/02	-	Site Features Plan
C4742/03	-	Exploratory Hole Location Plan
C4742/04		Pre-Remediation CSM
C4742/05		Post Remediation CSM
C4742/06	A	UXO Probe Location Plan
C4742/07		Validation Pit Location Plan

APPENDICES

Appendix	Title
Appendix A	Chemical Testing Results
Appendix B	UXO Clearance Reports
Appendix C	Waste Transfer Notes
Appendix D	Photographic Volume - Verification of Cover System

1.0 INTRODUCTION

1.1 Context

This Remediation Validation Report has been produced by Brownfield Solutions Limited (BSL) on behalf of Domis Construction Limited for a site off Great Ancoats Street, Manchester.

The remedial works described during this report were completed in February 2024.

1.2 Objectives

The objective of the validation works is to provide evidence demonstrating implementation of appropriate remediation measures. The remedial works were carried out in order to make the site suitable for the proposed residential end use, as per the BSL Remedial Strategy, reference NS/C4742/10446, dated September 2021, which is understood to have been accepted by the Local Planning Authority (Manchester City Council).

1.3 Proposed Development

The proposed development is for a part 25 storey, part 3 storey residential tower with ground floor commercial space above a partial basement level (north-west corner) and associated hard / soft landscaping as shown on the Proposed Ground Floor Development Plan, drawing No. 10122-A-B5D9-G200-P-00-003 provided to BSL by the client.

1.4 Previous Reports and Correspondence

The following reports and correspondence with regulators are applicable to the site and should be read in conjunction with this validation report:

-
- BSL, Desk Study Assessment Report, reference NS/C4742/10165 issued June 2021.
 - BSL, Geo-Environmental Assessment Report, reference JM/C4742/10165 Rev A, issued July 2021.
 - BSL, Remedial Strategy Report, reference NS/C4742/10446, issued September 2021.
-

It is assumed that the Local Planning Authority will have provided the above reports to the appropriate statutory consultees and the recommendations therein have been accepted.

1.5 Limitations

This report has been carried out based on information obtained from a number of areas, BSL have assumed that this information is correct.

There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this report and therefore not been taken into account by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, Domis Construction Ltd. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report, they rely on it at their own risk and BSL do not owe them any Duty of Care.

This report has been based on the proposed planning layouts provided. Any subsequent change to the planning layout may have an impact on the validity of recommendations made within this report.

Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Any recommendations made in this report should be confirmed with the Regulatory Authorities to ensure compliance.

2.0 GROUND MODEL SUMMARY

2.1 Description of Site

The site is located off Great Ancoats Street, Manchester, M4 7DB. It is situated within Manchester City Centre inner ring road, centred on National Grid Reference 385314, 398073 as shown on the Site Location Plan, Drawing No. C4742/01.

A site reconnaissance survey was carried out at the site on 14th April 2021. The main site features and potential issues identified during this survey are detailed below and are shown on the Site Features Plan, Drawing No. C4742/02.

Feature	Description
Site Area	The site is approximately 0.13 hectares.
Site Access	The site operates a one way system for vehicular access, access is therefore gained from Epworth Street to the south-east. Egress is onto Longacre Street to the north-west. Pedestrian access to the building is available from Great Ancoats Street to the north.
Current Land Use and Site Features	The site currently comprises a singular three storey brick building in the east with adjoining steel framed warehouse to the west. Associated car parking is present across the southern half of the site. The brick structure is utilised to house office space and meeting rooms, the warehouse is utilised for storage of valuables with vaults as part of The Manchester Safe Deposit Centre.
Potential Sources of Gross Contamination	No significant sources of contamination were identified onsite.
Vegetation	No vegetation is present within the site boundary.
Topography	The site is relatively flat, with a slight incline from Longacre Street to the west towards Epworth Street to the east.
Site Boundaries	The north-east of the site is enclosed by a brick wall with metal rails, a small metal pedestrian gate is present in the easternmost corner. The south-eastern site boundary is bound by a brick wall with metal rails, the eastern brick building gable end and a large electronic metal gate for vehicular access. The southernmost site boundary comprises the gable end of an adjacent warehouse, a gravel board fence, and a brick wall with metal fencing above. The north-western boundary is demarked by a brick wall, large electronic metal gate, the western gable end of the steel frame warehouse and a brick wall with metal railing.
Surrounding Area	The site is set within a mixed commercial and residential area, bordered by residential apartments to the west, Great Ancoats Street to the north / east with residential apartment buildings beyond. To the south-east of the site is an active construction site for a proposed hotel, and to the south is a warehouse and derelict brownfield land.

2.2 Environmental Setting

Site History

The site has been developed as a timber yard with associated chimney, residential properties and as Victoria House / a Warehouse. Mapping suggests there is potential for bomb strikes in the north-east of the site due to the presence of post second world war ruins on historical mapping.

The site is surrounded by a largely industrial heritage. The significant sources of offsite contamination includes numerous mills, grain stores, goods stations with railway sidings, factories, works, an electricity substation and more recently, warehouses.

Published Geology

From the Phase 1 Assessment and published geology, it was anticipated that ground conditions would comprise the following sequence of strata (top down):

- Made Ground; over
- Devensian Till; over
- Chester Formation (sandstone).

Hydrogeology

The Devensian Till beneath the site is classified by the Environment Agency as a Secondary 'Undifferentiated' Aquifer, whilst the Chester Formation is classified by the Environment Agency as a Principal Aquifer.

The site does not lie within 500m of a Source Protection Zone (SPZ).

There are no active groundwater abstraction licences within 1.4km of the site. There are no potable water abstraction licences within 2km of the site.

Hydrology

The nearest surface water feature to the site is the Ashton Canal & Peak Forest Canal which is located 69m north-west of the site (not considered to be a sensitive receptor). The nearest watercourse to the site is the River Medlock which lies at a distance of 278m south-east of the site and flow direction is indicated to be from north-east to south-west. There are no recorded active or historical surface water abstractions within 2km of the site.

Radon

Information from the environmental database report indicates the property is not in a radon affected area and therefore no radon protective measures are necessary in a basement or any other structures at the site in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2015 Edition.

UXO Risk

In accordance with CIRIA Report C681, BSL have reviewed non-specialist UXO data for the site using the online Zetica Bomb Risk Mapping data.

There is no indication of former military use from the desk study. The map indicates the site to be in an area where the bomb risk is moderate.

The 1948 OS mapping shows a number of "ruins" and areas of missing housing, suggesting bomb damage. This is most likely as a result of WWII bombing.

A Detailed Unexploded Ordnance Risk Assessment was undertaken by 1st Line Defence (ref. DA7333a-00, dated March 2021) revealed there to be a medium risk from German and anti-aircraft unexploded ordnance at the site. There is considered to be a negligible risk from all other types of allied ordnance. Based on the available information to date, specialist UXO advice and/or supervision will be required for all groundworks, including piling.

2.3 Ground Conditions

Observed Geology

The site is currently occupied by a singular three storey brick building in the east with adjoining steel framed warehouse to the west, belonging to the Manchester Safe Deposit Centre.

The ground conditions can be summarised as below (top down):

- Made ground generally comprising sand and gravel from ground level to between 2.00m and 2.85m bgl.
- Natural superficial deposits comprising slightly gravelly sandy CLAY over silty SAND proven to depths between 17.50m and 18.00m bgl.
- Solid geology comprising SANDSTONE proven to depths ranging between 31.10m and 33.00m bgl.
- No groundwater was detected during site works.
- Post site works monitoring levels ranging between 1.49m and 22.08m bgl.

Groundwater

Groundwater was not encountered during the ground investigation, although it was encountered in some of the standpipe installations during the monitoring period, and is therefore likely to be perched. The depths to groundwater and locations present are shown in the table below:

Location	Depth During Site Works (m)	Depth During Monitoring Period (range) (m)
BH1	NGW	22.01 – 22.08
BH2	NGW	9.03 – 11.44
WS01	NGW	1.49 – NGW
WS02	NGW	1.76 – NGW
WS03	NGW	1.53 – NGW
WS04	NGW	NGW
WS05	NGW	2.08 – NGW

Observations

During the works undertaken by BSL, observations for both visual and olfactory evidence of contamination were undertaken.

With the exception of ash and clinker observed as a minor constituent in the made ground soils, no other evidence of contamination was observed at the site.

3.0 SUMMARY OF RISK ASSESSMENTS

3.1 General

The site investigation works have confirmed the following:

- Localised heavy metal contamination within the made ground in the centre of the site.
- Asbestos (loose fibres) with the made ground soils in two exploratory hole location in the west of the site.
- Moderate risk of UXO in part of the site.

3.2 Human Health Risks

Testing of the made ground at the site did not reveal any exceedances of petroleum hydrocarbons, PCBs, BTEX or MTBE compounds.

Elevated lead was recorded within one location of the made ground (WS04 0.50-0.6m bgl at 4100mg/kg), however, the presence of hardstanding / building footprint across the majority of the development will mitigate the risk, with the exception of any proposed soft landscaping, where the potential for site end users to come into contact with the materials remain and thus presents a risk.

Chrysotile and amosite fibres (loose fibres) have been detected in two samples of made ground across the site (WS01 0.50-1.10 and WS03 0.30-0.80m bgl). On quantification analysis the asbestos level within the two samples was <0.001% mass and classified as being trace levels.

The localised exceedances are noted to be within proximity to proposed soft landscaping and is therefore considered to pose a moderate risk to end-users and mitigation in the form of a clean cover system is required.

3.3 Ground Gas and Vapours

A summary of the ground gas monitoring carried out by BSL is presented below:

- BSL conducted 6 monitoring visits over 3 months, in line with CIRIA C665 guidance.
- Methane concentrations ranged between 0.0% v/v and 0.1% v/v.
- Carbon dioxide concentrations ranged between 0.1% v/v and 13.6% v/v.
- Oxygen concentrations ranged between 11.7% v/v and 21.4% v/v.
- The maximum gas flow rate was 1.0 l/hr.

Slightly elevated concentrations of carbon dioxide were encountered during the gas monitoring, this is considered to be attributed to microbial activity and the site is therefore classified as Characteristic Situation 1.

It is therefore considered that in respect of ground gases and vapours, no specific remedial measures are required.

3.4 Risk to Controlled Waters

Whilst there are elevated concentrations of contaminants, based on the investigation works undertaken to date and subject to agreement with the Environment Agency, the site is not considered to pose a significant risk to controlled water for the following reasons:

- There is no indication under present conditions of pollution of controlled waters and conditions following development of the site will not be any worse, indeed they may improve with increased hard cover and water retaining imported soft landscaping soils.
- The concentrations of leachable substances that could emanate from the site will be subject to dilution and dispersal during transport and so the risks will reduce with distance from the site and into the identified surrounding water bodies.
- No significant contamination has been identified on site in soils based on the results obtained as a potential indicator of groundwater contamination.
- The nearest watercourse is over 250m away, which provides considerable distance for attenuation and contaminant degradation.
- The site is underlain by low permeability clays which will inhibit lateral and vertical contaminant migration.
- The site does not lie within 500m of an SPZ.
- There are no groundwater abstractions within 1500m.
- There are no potable (sensitive) water abstractions within 2000m.

Based on the above, the site is not considered to pose an unacceptable risk to controlled waters. Therefore, no specific remedial requirements for controlled waters are necessary.

3.5 Summary

A summary of the findings of the previous investigations and assessments where a risk is present (i.e. an unacceptable source-pathway-receptor linkage) which requires mitigation is presented in the table below.

Source	Receptor
<- Poses an unacceptable risk to ->	
Elevated concentrations of heavy metals compounds present in the centre of the site and asbestos present within the made ground in the west of the site.	Human health / construction workers (Residential with homegrown produce screening criteria adopted) Potable water supply pipelines
UXO	Human Health and Property

Based on the above, it was recommended that a Remedial Strategy was prepared that identifies the specific remediation requirements for the site.

The site Conceptual Site Model (CSM) to illustrate the above is presented on Drawing No. C4742/04.

4.0 REMEDIATION STRATEGY

4.1 Outline

Based on the site investigations undertaken at the site and the contaminant sources identified within the CSM, the following require appraisal to determine the most suitable remedial options:

- Utilise a cover system and hard dig layer/break layer over areas containing asbestos and a cover system in the areas of made ground.
- Importation of clean soils, excavation and re-use of suitable soils and/or removal of unsuitable materials under a declared Materials Management Plan.
- Adopt hand picking of ACMs, if required, with appropriate off-site disposal of any identified ACM.
- Utilise barrier pipe for main potable water feeds within the made ground.

4.2 Site Remediation Requirements

Following an options appraisal in the Remedial Strategy (NS/C4742/10446), remedial measures were selected for each of the identified sources and are detailed on the Post Development Conceptual Site Model (C4742/05). Full details are available within the Remedial Strategy, with the key requirements summarised in the table below.

Source	Contaminants of Concern	Remediation Method	Further Details / Remedial Requirements
1 – Made Ground	Lead, Asbestos	Installation of Clean Cover System	In soft landscaping areas, a cover system comprising “clean” validated topsoil/subsoil should be installed. A warning geo-membrane or 100mm hard dig layer should also be installed at the base of the clean cover system. In areas where trees and large shrubs are present, a tree pit with deeper soils should be placed to a depth sufficient to support growth and infilled with “clean” validated topsoil. A warning barrier/membrane should be incorporated into the tree pit, unless the pit created is greater than 1000mm.

In addition to the specific remedial requirements listed in the tables above which are intended to mitigate the risks from known sources, it was recommended that a watching brief be maintained during the groundworks and construction for any evidence of contamination and BSL consulted for advice.

5.0 SITE REMEDIATION AND VALIDATION

5.1 General

The remediation process was undertaken during several site visits were undertaken between the dates of 17th January 2022 and 12th February 2024.

A summary of the site works undertaken in accordance with the Remedial Strategy (report ref. NS/C4742/10446) is detailed below.

5.2 Source 1 – Made Ground: Installation of Clean Cover System / Break Layer

As detailed in the Remediation Strategy (ref. NS/C4742/10446), the clean cover system in soft landscaping areas should comprise (top down):

- A minimum over 150mm “clean” validated topsoil; over
- 300mm “clean” validated subsoil; over
- Warning barrier membrane/geotextile.

Chemical suitability of cover system components

The requirements for testing, as outlined within the approved Remedial Strategy, are detailed below:

Material	Source	Testing Suite	Sampling Frequency
Topsoil/Subsoil	Greenfield	BSL Default Suite: Metals and PAHs Asbestos Screen	1 sample* per 250m ³ (minimum of 3 samples per source)
Topsoil/Subsoil	Brownfield / Recycled	BSL Default Suite: Metals and PAHs TPH CWG Asbestos Screen	1 sample* per 100m ³ (minimum of 3 samples per source)

*Suite of analysis dependent on source of soil.

Testing Regime and Results

Original delivery notes for imported soils were unable to be supplied to BSL as they could not be located at the time of reporting. However, purchase order documents from the landscapers (Wrights Landscapes) have been supplied and are presented in Appendix C. These show that topsoil was supplied by Scott’s Landscape Supplies Ltd, Park Hall Farm, Eccles, M30 7RJ. It is understood this material has originated from SED Services Ltd at Landgate Farm, Bryn, WN4 0EJ of which pre-importation chemical testing and BS3882 testing certificates have been provided and are presented in Appendix A. From the certificates provided, the topsoil was tested for metals, PAHs and asbestos screen, as well as BS3882:2015 testing which demonstrated compliance with the Quality Control Specification outlined in Appendix A of our Remediation Strategy report (ref. NS/C4742/10446). A total of 45m³ of topsoil was imported to the site.

In accordance with the requirements of the Remedial Strategy, a total of 3 No. samples of topsoil were required. These were obtained during BSLs validation visit on 12th February 2024. The test results were compared with the Generic Risk Assessment Criteria Values for Residential without Plant Uptake, which are presented in Appendix A.

Assessment Summary

The concentrations of metals, asbestos and PAHs in the topsoil samples did not exceed the Human Health Remedial Targets and therefore are considered to be chemically suitable for use on site.

Depth Validation

BSL visited site to validate the depth of the clean cover system on 12th February 2024. The locations of the hand pits are shown on the Validation Pit Location Plan, Drawing No. C4742/07. Topsoil was encountered from ground level to depths between 350mm and 500mm during and was underlain by a geotextile membrane in every location, as shown in the table below:

Sample Location	Depth/ Strata	Pass / Fail
PV01	0-500mm Topsoil 500mm – Geotextile Membrane	Pass
PV02	0-450mm Topsoil 450mm – Geotextile Membrane Tree Cell	Pass
PV03	0-350mm Topsoil 350mm – Geotextile Membrane Tree Cell	Pass

BSL note that the cover system was required to be 450mm in thickness to fully comply with the Remedial Strategy, whereas the installed cover system was less than 450mm in thickness in one area of the planter in the southeast of the site (PV03), adjacent to Great Ancoats Street. In compliance with Detail 5 on the Soft Landscape Details drawing (ref. RFM-XX-00-DR-L-8001 T02), this area of the site has been underlain by Rootspace Tree Cells loaded with Rootsoil by GreenBlue Urban to a minimum thickness of 400mm which, when taking into account the measured 350mm of topsoil at the surface, exceeds the remedial requirement for 450mm clean cover.

It is therefore considered that all locations inspected are compliant with the remedial requirements.

A photographic record of the depth validations is presented in Appendix D.

5.3 UXO

BSL attended the site between 17th January to 18th January 2022, and 15th March to 16th March 2022 with Planit UXO and Brimstone Site Investigation for an intrusive investigation using a CPT rig with a magnetometer probe in order to safely clear pile locations and a small buffer area around each pile location in advance of piling at the site.

The clearance investigation comprised of 45 individual probe locations as shown on drawing C4742/06 Rev A. The test locations were surveyed in using coordinates from the geo-referenced pile layout plan. A summary from the Intrusive UXO Survey report is shown in the table below, the full report is included within Appendix B.

Probe Location	Depth (m)	Success (S) or Refusal (R)	Comments
DP01	11.73	S	Max tons applied
DP02A	7.10	S	Max tons applied
DP02B	9.80	S	Max tons applied
DP03A	11.07	S	Max tons applied
DP03B	11.35	S	Max tons applied
DP04	9.44	S	Max tons applied
DP05	11.09	S	Max tons applied
DP06	11.34	S	Max tons applied
DP07	11.05	S	Max tons applied
DP08	11.34	S	Max tons applied
DP09	0.04	R	Obstruction – Max tons applied
DP09A	10.90	S	Max tons applied

Probe Location	Depth (m)	Success (S) or Refusal (R)	Comments
DP10	10.15	S	Max tons applied
DP11	11.39	S	Max tons applied
DP12	11.29	S	Max tons applied
DP13	11.30	S	Max tons applied
DP14	11.45	S	Max tons applied
DP15	0.88	R	Obstruction – Max tons applied
DP15A	10.77	S	Max tons applied
DP16	10.00	S	Max tons applied
DP17	1.41	R	Obstruction – Max tons applied
DP17A	10.76	S	Max tons applied
DP18	0.05	R	Obstruction – Max tons applied
DP18A	8.40	S	Max tons applied
DP19	10.00	S	Max tons applied
DP20	0.25	R	Obstruction – Max tons applied
DP20A	8.61	S	Max tons applied
DP21	0.05	R	Obstruction – Max tons applied
DP21A	8.40	S	Max tons applied
DP22	11.35	S	Max tons applied
DP23	10.00	S	Max tons applied
DP24	10.00	S	Max tons applied
DP25	10.00	S	Max tons applied
DP26	10.00	S	Max tons applied
DP27	0.23	R	Obstruction – Max tons applied
DP27A	0.17	R	Obstruction – Max tons applied
DP27B	10.22	S	Max tons applied
DP28	10.45	S	Max tons applied
DP29	10.00	S	Max tons applied
DP30	0.29	R	Obstruction – Max tons applied
DP30A	5.58	S	Max tons applied
DP31	10.53	S	Max tons applied
DP32	0.43	R	Obstruction – Max tons applied
DP32A	0.84	R	Obstruction – Max tons applied
DP32B	10.64	S	Max tons applied
DP33	10.18	S	Max tons applied
DP34	0.74	R	Obstruction – Max tons applied
DP34A	10.00	S	Max tons applied
DP35	10.00	S	Max tons applied
DP36	10.29	S	Max tons applied
DP37	5.75	S	Max tons applied
DP38	10.00	S	Max tons applied
DP39	10.00	S	Max tons applied
DP40	10.03	S	Max tons applied
DP41	9.96	S	Max tons applied
DP42	10.08	S	Max tons applied
DP43	9.19	S	Max tons applied
DP44	8.47	S	Max tons applied
DP45	9.68	S	Max tons applied

Following the two rounds of investigation the 45No. probe locations successfully cleared all 155 pile locations.

5.4 Export of Materials Offsite

As part of the proposed development, waste soils were generated from a number of sources including basement excavation, pile arisings, general crush, and pile cap croppings. Based on the Waste Transfer Notes provided to us, the following have been reported:

Waste Type	Wagon Loads	Estimated Volume (m ³)
Inert / Muck Away	258	2,193
Non-Hazardous	36	306
Hardcore/6F2	34	289
Pile Caps / Concrete	18	153

Waste was removed from the site between 25th April 2022 and 14th March 2023 by J'Oshea & Sons and was removed to their Waste Transfer Station (Licence No. 50093) in Pendleton, Manchester. A total of 346 wagon loads were removed which is estimated to equate to approximately 2,950m³ of material.

A copy of the Waste Transfer Notes is presented in Appendix C.

6.0 CONCLUSIONS

6.1 General

The remedial works described within this report were carried out between the dates of 17th January 2022 and 16th March 2024 under the supervision of experienced BSL geo-environmental engineers.

6.2 Verification of Clean Cover System

Based on the chemical testing completed, BSL can confirm that the imported soils within the soft landscaping areas have been installed as per the Remedial Strategy.

6.3 Watching Brief

A watching brief was maintained by the Principal Contractor throughout the remediation and redevelopment of the site. To the best of BSL's knowledge, gross contamination was not identified, and the ground conditions were understood to be broadly consistent with those encountered during the earlier ground investigations. Therefore, no additional remedial measures were considered necessary at the site over and above those already stipulated within the approved Remedial Strategy

6.4 Long Term Monitoring and Other Requirements

BSL can confirm that there are no long-term monitoring requirements at the site and that there are no further requirements in respect to remediation and validation.

DRAWINGS



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All dimensions to be checked on site by contractor.
Contractor to report any dimensional discrepancies,
errors or omissions prior to commencing on site.

NOTE:

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NORTH

Rev	Date	Description
00	18-02-2020	Planning Issue

Project Title
VICTORIA HOUSE

Status
FOR PLANNING

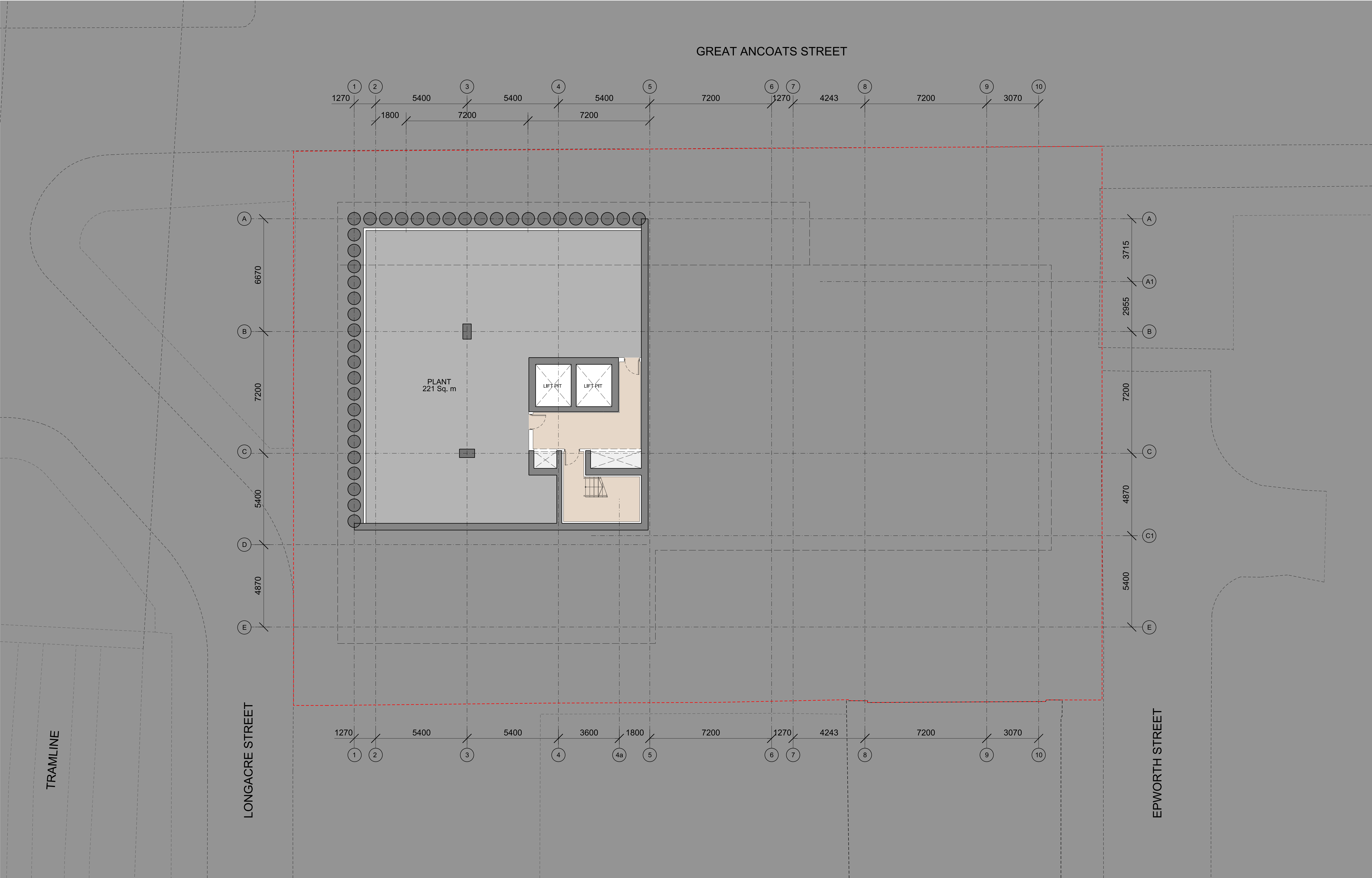
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GROUND FLOOR PLAN

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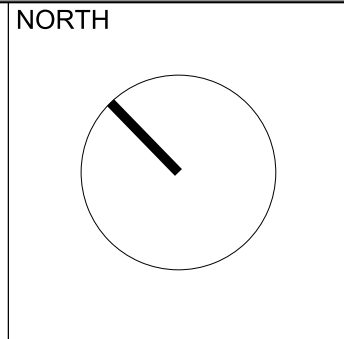
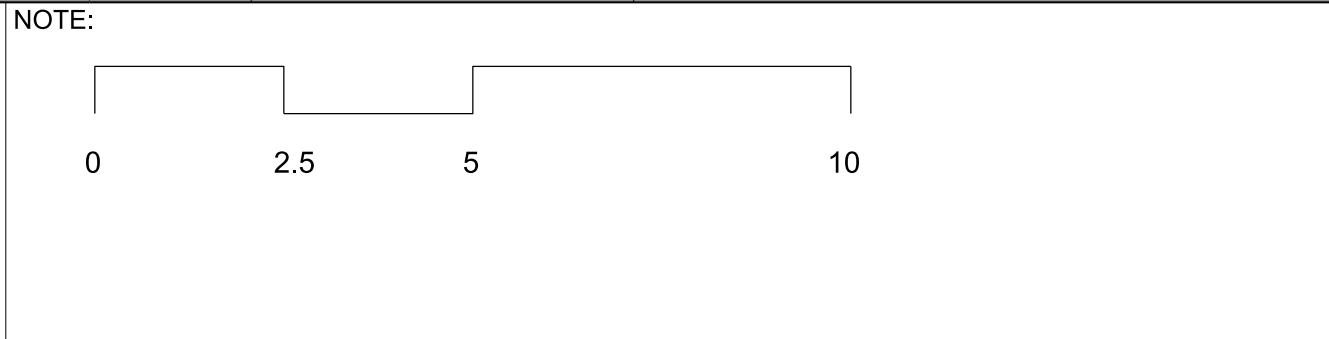
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Contractor to report any dimensional discrepancies,
errors or omissions prior to commencing on site.



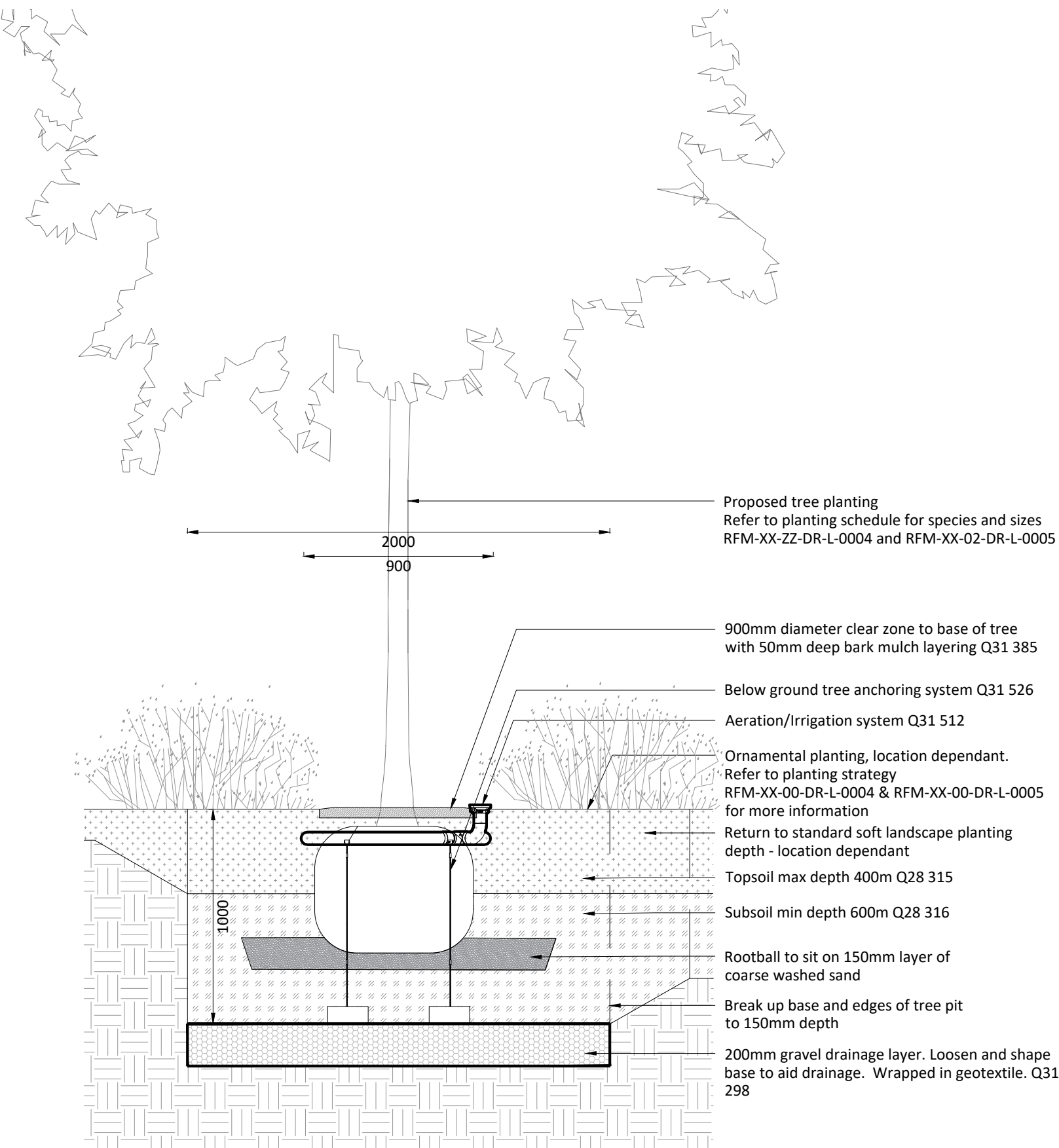
Rev	Date	Description
00	18-02-2020	Planning Issue

Project Title	VICTORIA HOUSE
Status	FOR PLANNING

Drawing Title			
BASEMENT PLAN			

MANCHESTER
Riverside, 4 Commercial St
Manchester M15 4RQ
+44 (0)161 835 2345
www.simpsonhaugh.com

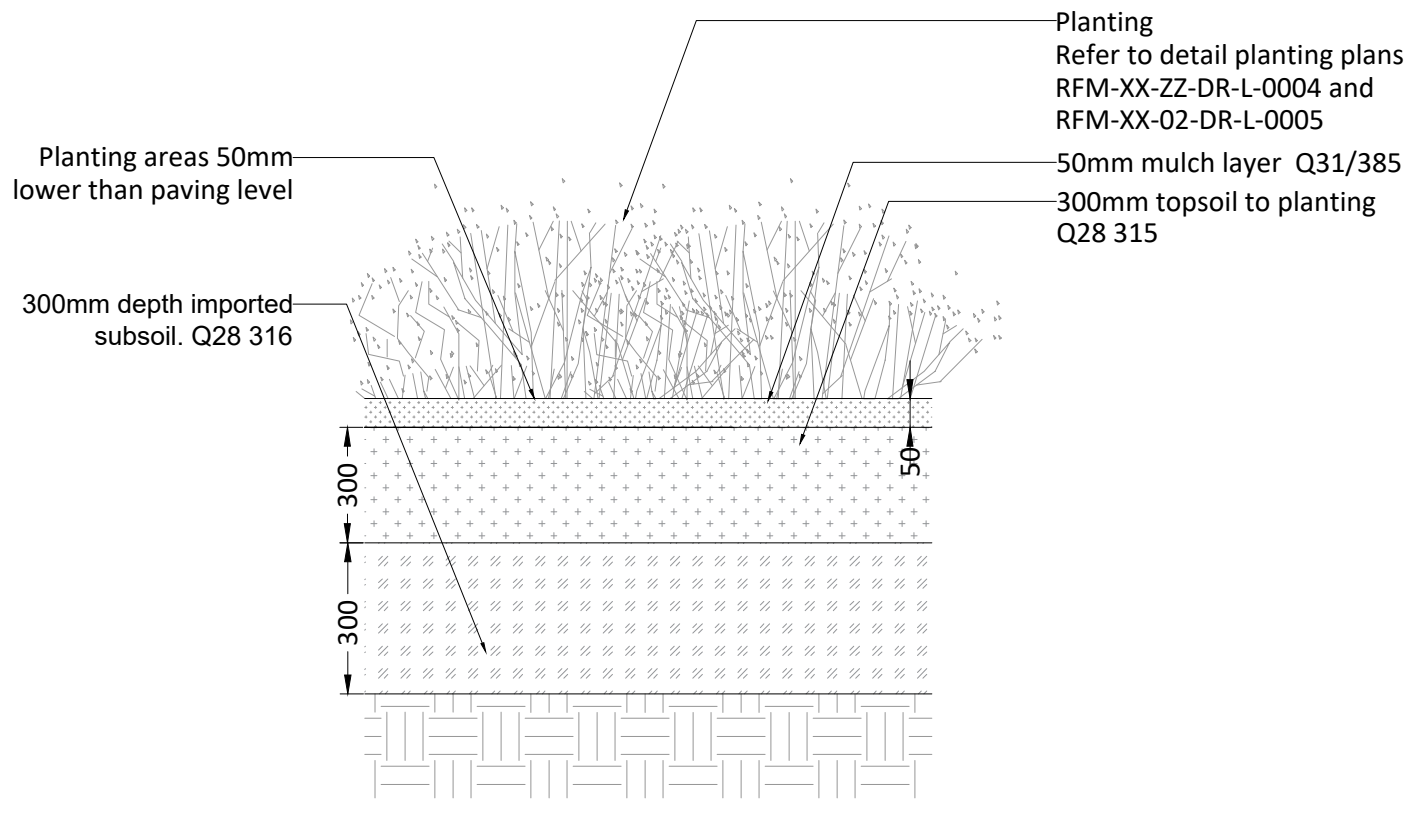
LONDON
5-8 Roberts Place
London EC1R 9SB
+44 (0)20 7549 4000
mail@simpsonhaugh.com



8001
01

Detail 01 - Tree in soft landscape- Underground guyed

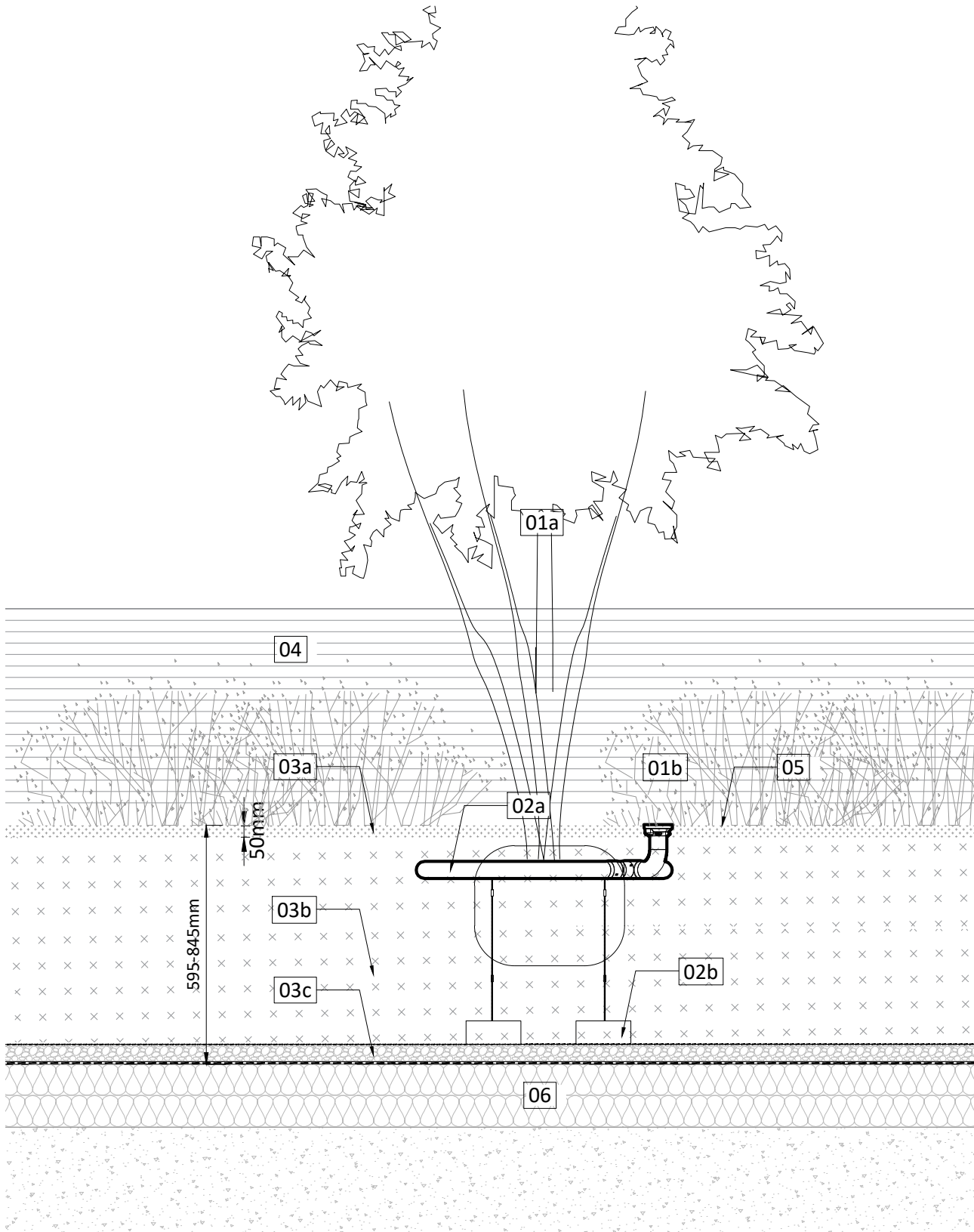
1:20



8001
02

Detail 02 - Typical planting bed

1:20



8001
03

Detail 03 - Typical roof terrace planter

1:20

01a Tree
See drawing RFM-XX-02-DR-L-0005 for species and spec

01b Planting
See drawing RFM-XX-02-DR-L-0005 for species and spec

02a Irrigation/aeration system
Roottrain Urban by Green Blue Urban or similar Q31 512

02b Underground guying
Arboguy strapped anchor Q31 526

02c Arborvent aeration pipe

02d Rootsace tree cells loaded with Rootsoil by GreenBlue Urban or similar Q31 520

02e Zeta Tree grille with resin bound gravel surround
Q50 262

03a Ornamental bark mulch Q31 385
50mm depth
Minimum 25mm below planter wall 'lip'

03b Growing Medium Q28 125
Intensive Roof Garden Substrate

03c Drainage and protection layer
Bauder DSE 60 - filter fleece on 60mm drainage layer infill with mineral drain. Protection layer followed by PE foil separation layer

03d Topsoil Q28 315

04 Metal Screen with timber horizontal slats
Q50 110
Height: 1500 - 1800mm

05 Raised Planters Q50 226
Height from top of paving level 500-750mm

06 Structural formation
Waterproofing, insulation and concrete slab to architects and engineers detail and spec

07 Resin bound gravel
See detail 05 drawing RFM-XX-00-DR-L-8002

08 Concrete paving
See detail 02 drawing RFM-XX-00-DR-L-8002

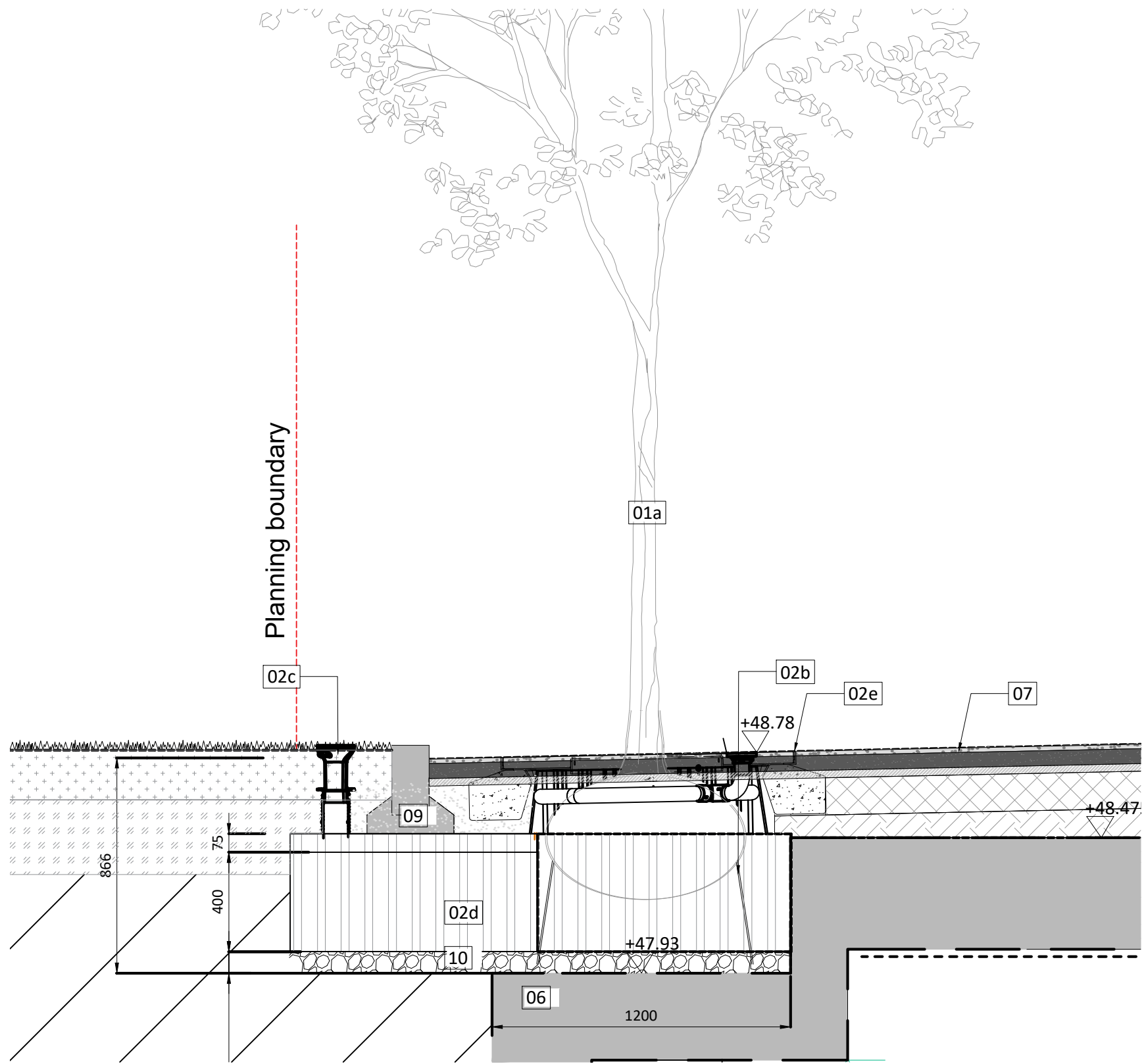
09 Concrete kerb Q10 120

10 Drainage layer with geotextile membrane layer

11 Existing pedestrian guardrail

12 Location of services unknown. Survey being undertaken.

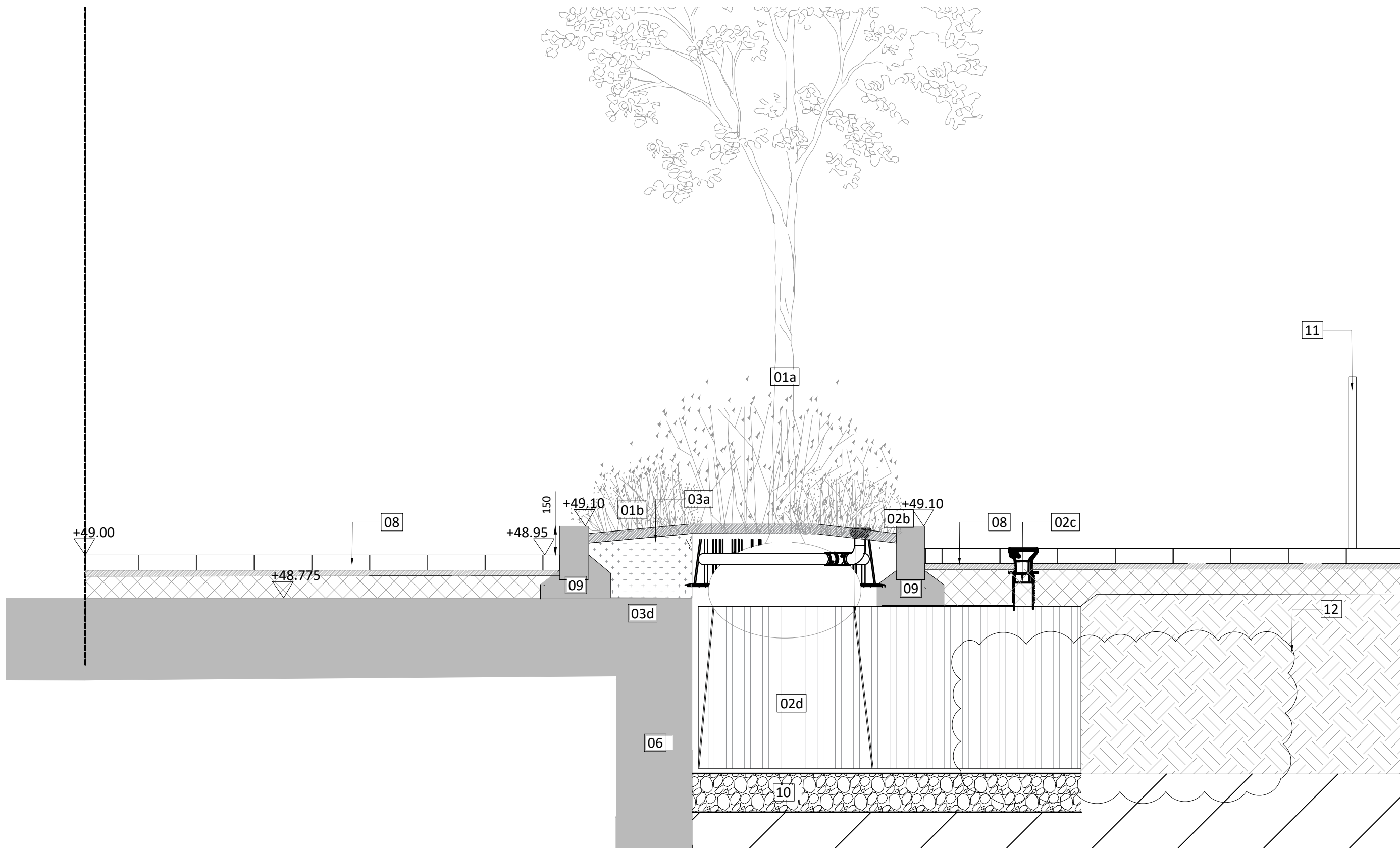
- Notes**
- All information shown outside of application boundary is to be considered indicative and subject to separate detailed planning applications.
 - All dimensions in mm, unless otherwise stated.
 - Scaling from drawing if printed incorrectly may lead to errors.
 - All information outside red line boundary shown for contextual purpose only.
 - All hatch patterns are indicative only unless stated otherwise.
 - This drawing is to be read in conjunction with the following re-form landscape architecture documentation:
 - RFM-XX-00-DR-L-0001-General Arrangement
 - RFM-XX-02-DR-L-0002-Roof Garden GA
 - RFM-XX-00-DR-L-0003 Illustrative Sections
 - RFM-XX-00-DR-L-0004 Planting Strategy 1 of 2
 - RFM-XX-00-DR-L-0005 Planting Strategy 2 of 2
 - RFM-XX-00-SP-L-0002 Landscape specificationAND all relevant documentation from the design team
 - Levels information on this drawing illustrates the design intent. The contractor is to check and verify all levels and dimensions against site survey information.
 - Any discrepancies in the design information are to be brought to the attention of re-form landscape architecture, in writing, prior to commencement of construction works.
 - All proprietary products shall be installed in strict accordance with manufacturers written instructions.
 - Refer to other consultants' drawings and specifications for the following design information:
 - Foundation details
 - Base course and/or sub bases design & specification
 - Waterproofing of any element
 - Levels & Drainage design and infrastructure
 - Lighting and ducting
 - Existing & proposed utilities
 - Plant quantities are to suit site areas in accordance with scheduled plant densities.
 - Any proposed plant substitution shall be agreed with the landscape architect prior to ordering.



8001
04

Detail 04 - Tree over basement in Square

1:20



8001
05

Detail 05: Tree pit on Great Ancoats St adjacent to basement

1:20



22.10.21	Basement levels updated	SW	SW	OL	T02
16.08.21	Stage 4 issue	SW	SW	OL	T01
Date	Description of revision	Drawn	Checked	Approved	Revision

re-form
landscape architecture

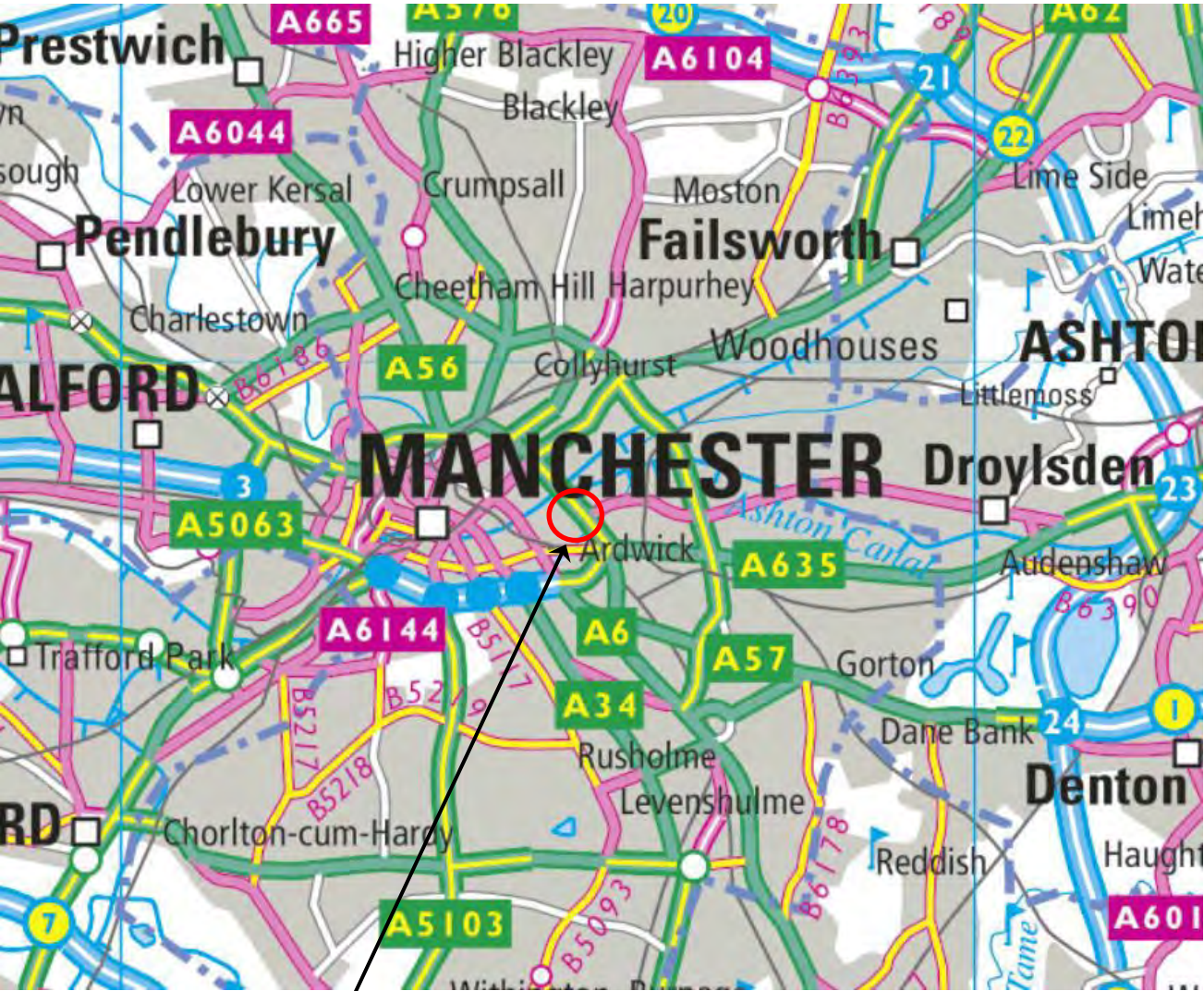
Beehive Mill, Jersey Street,
Manchester M4 6JG
T: +44 (0)161 397 4953
E: info@re-formlandscape.com
W: re-formlandscape.com

Project
VICTORIA HOUSE
RF18-601

Client
FORSHAW LAND AND PROPERTY

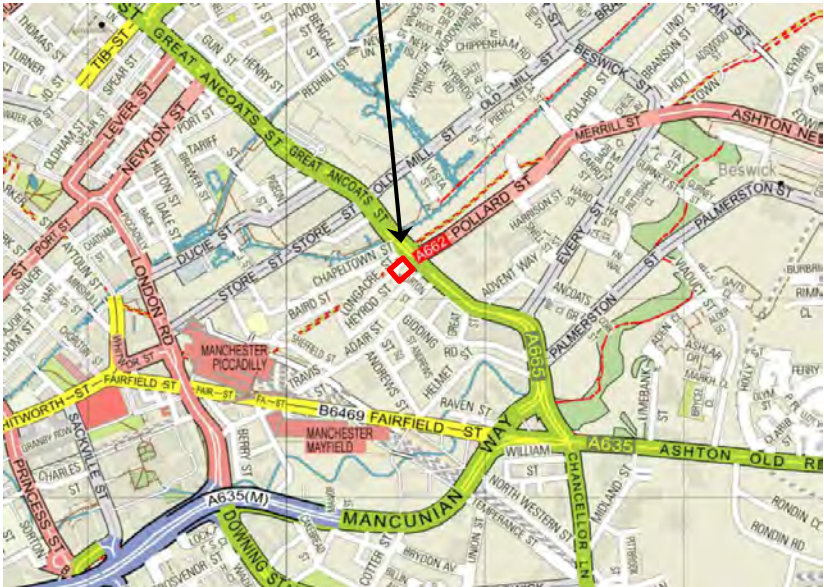
Document title
SOFT LANDSCAPE DETAILS

Paper size A1	Scale 1:20
Status FOR TENDER	D2
Drawing number RFM-XX-00-DR-L-8001	Revision T02
© re-form landscape architecture	

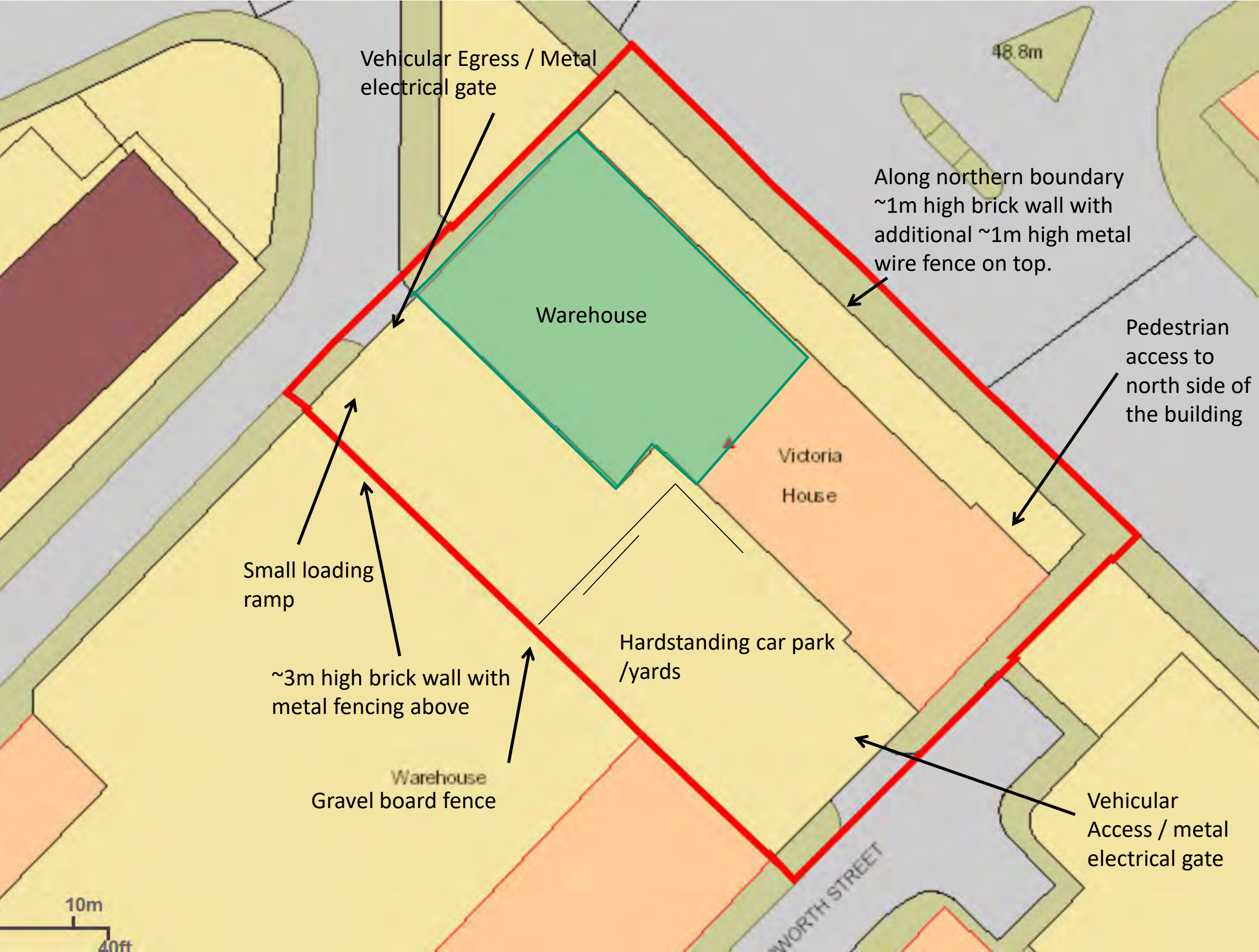


SITE LOCATION

NEAREST POSTCODE: M4 7DB



REV	DATE	DESCRIPTION	BY	CKD
 BROWNFIELD SOLUTIONS LTD CREATING ENVIRONMENTAL ENGINEERING CIRCULARITY				
CLIENT				
DOMIS CONSTRUCTION				
PROJECT TITLE				
VICTORIA HOUSE, GREAT ANCOAT STREET				
DRAWING TITLE				
SITE LOCATION PLAN				
DRAWING No.	REVISION	SCALE	DATE	
C4742/01	-	NTS	22/04/21	
DRAWN BY		CHECKED BY		
SD		DMG		



KEY

— APPROXIMATE SITE BOUNDARY

REV	DATE	DESCRIPTION	BY	CKD

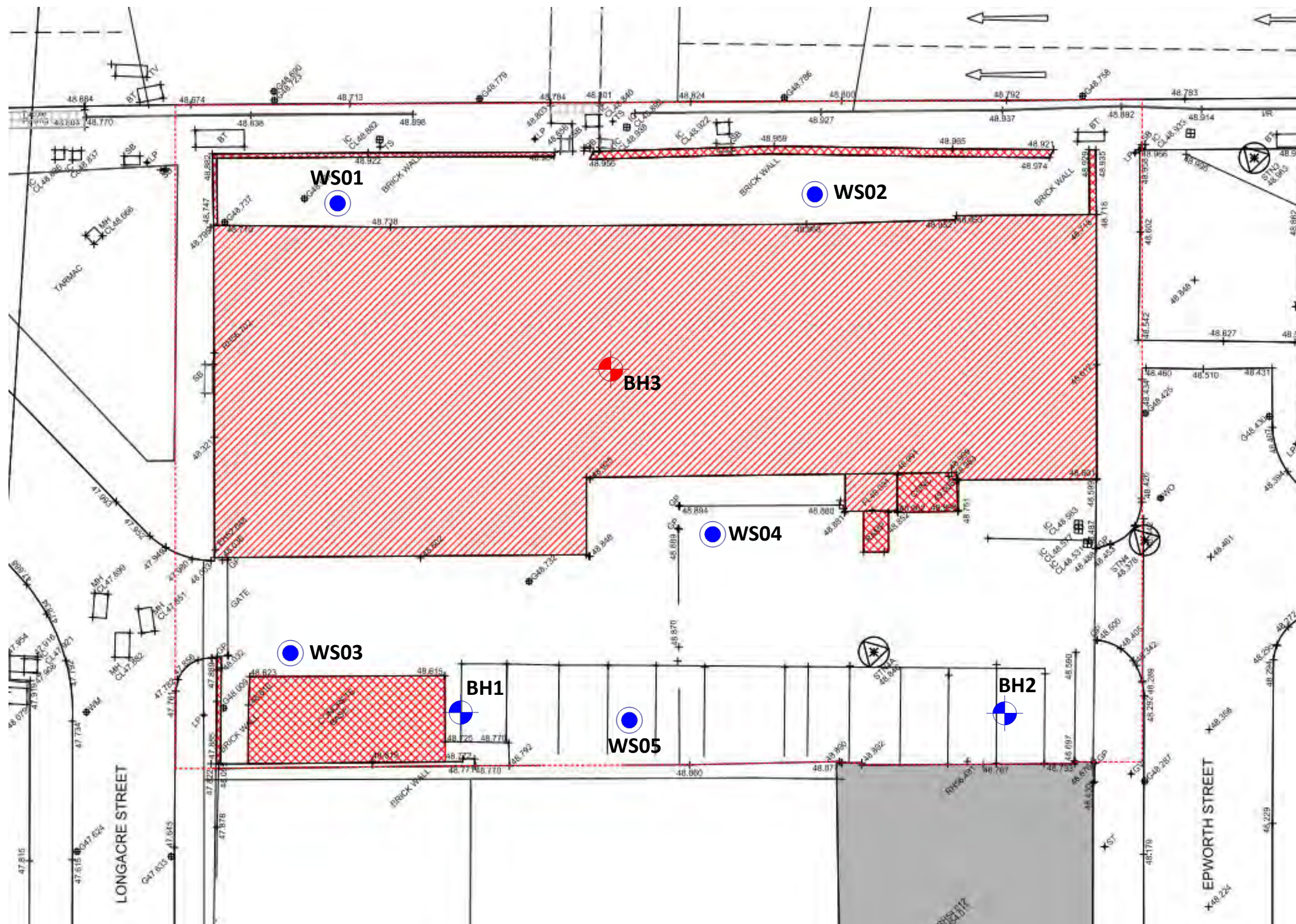


CLIENT
DOMIS CONSTRUCTION LTD

PROJECT TITLE
VICTORIA HOUSE, GREAT ANCOATS STREET, MANCHESTER

DRAWING TITLE
SITE FEATURES PLAN

DRAWING No. C4742/02	REVISION -	SCALE NTS	DATE 24/05/21
DRAWN BY NS		CHECKED BY DMG	



KEY

-  WINDOW SAMPLE BOREHOLE
-  CABLE PERCUSSIVE BOREHOLE (WITH ROTARY FOLLOW ON TO BE UNDERTAKEN)
-  CABLE PERCUSSIVE BOREHOLE TO BE UNDERTAKEN

REV	DATE	DESCRIPTION	BY	CKD



CLIENT		DOMIS CONSTRUCTION	
PROJECT TITLE		VICTORIA HOUSE, GREAT ANCOATS STREET, MANCHESTER	
DRAWING TITLE		EXPLORATORY HOLE LOCATION PLAN	
DRAWING No.	REVISION	SCALE	DATE
C4742/03	-	NTS	20/04/21
DRAWN BY		CHECKED BY	
JMJ		NS	



RISK JUSTIFICATIONS (SKY BLUE)

GL

Piles not considered to be a viable pathway provided they are installed correctly and subject to a Piling Risk Assessment.

REV	DATE	DESCRIPTION	BY	CKD
-	24/03/21	ORIGINAL	TM	XXX

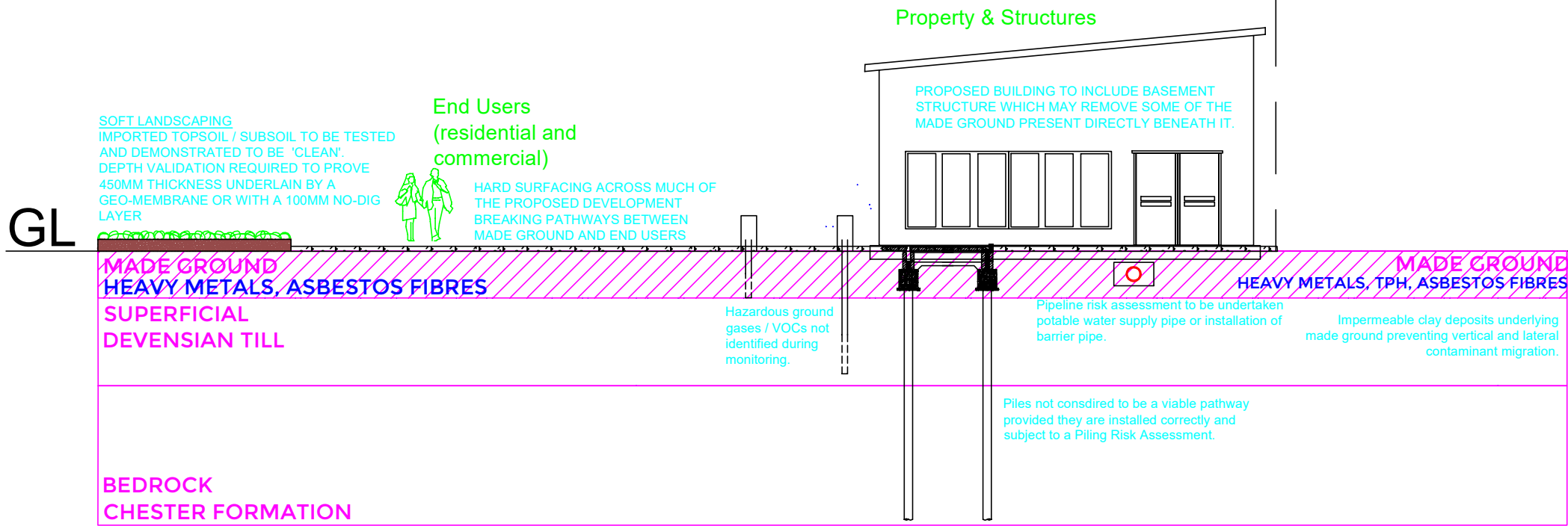




KEY

- POTENTIAL SOURCES (BLUE)
- POTENTIAL PATHWAYS (RED)
- POTENTIAL RECEPTORS (GREEN)
- RISK JUSTIFICATIONS (SKY BLUE)

ON-SITE | OFF-SITE



NOTES

- ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
- DRAWING NOT FOR CONSTRUCTION PURPOSES.

REV	DATE	DESCRIPTION	BY	CKD

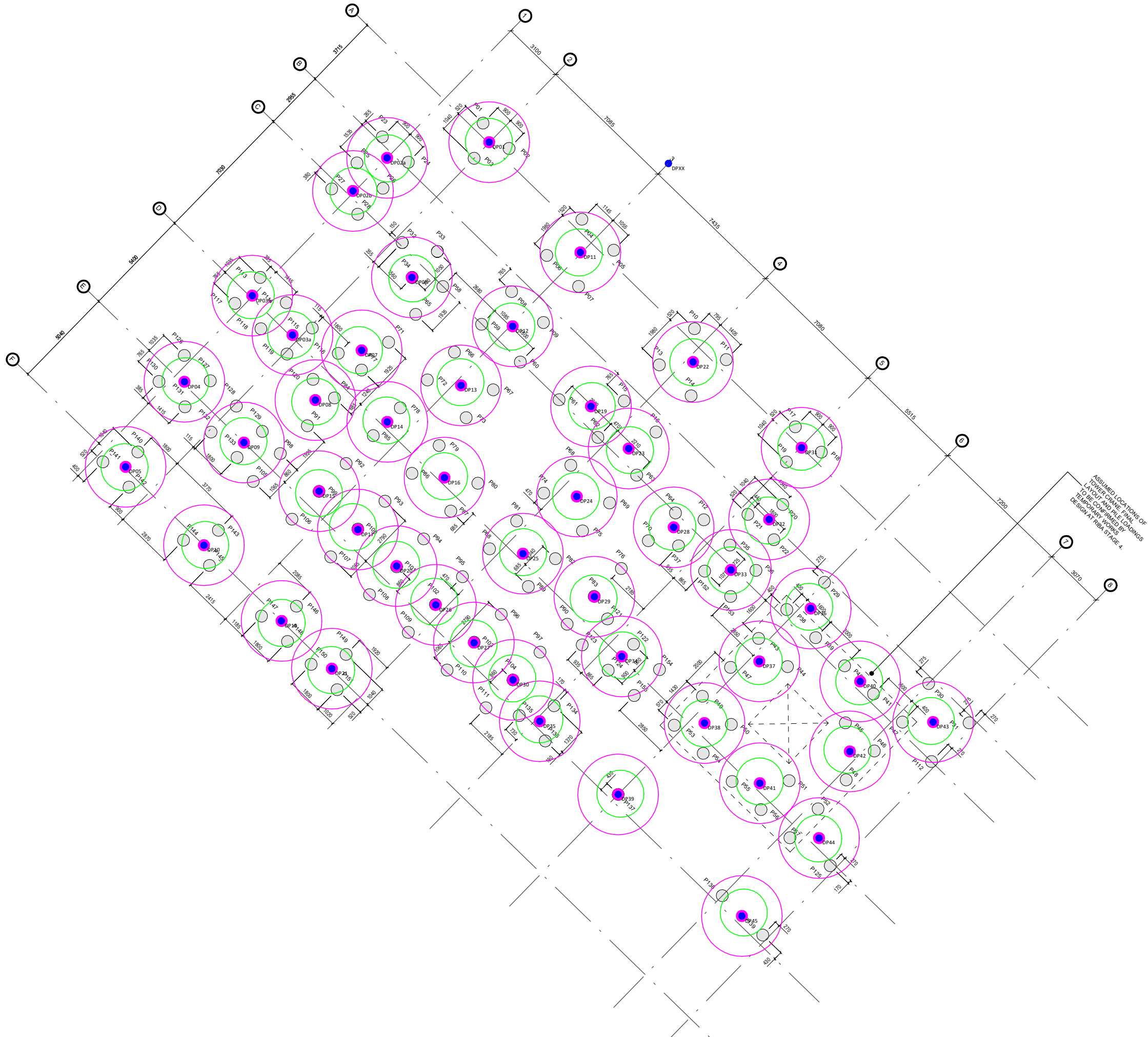


CLIENT
DOMIS CONSTRUCTION LTD

PROJECT TITLE
VICTORIA HOUSE, GREAT ANCOATS STREET, MANCHESTER

DRAWING TITLE
POST-DEVELOPMENT CONCEPTUAL SITE MODEL

DRAWING No.	REVISION	SCALE	DATE
C4742/05	-	NTS	15/09/21
DRAWN BY NS		CHECKED BY AJS	



KEY

- DP PROBE LOCATION
- C COMPLETED LOCATION

NOTES

- ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
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REV	DATE	DESCRIPTION	BY	CKD

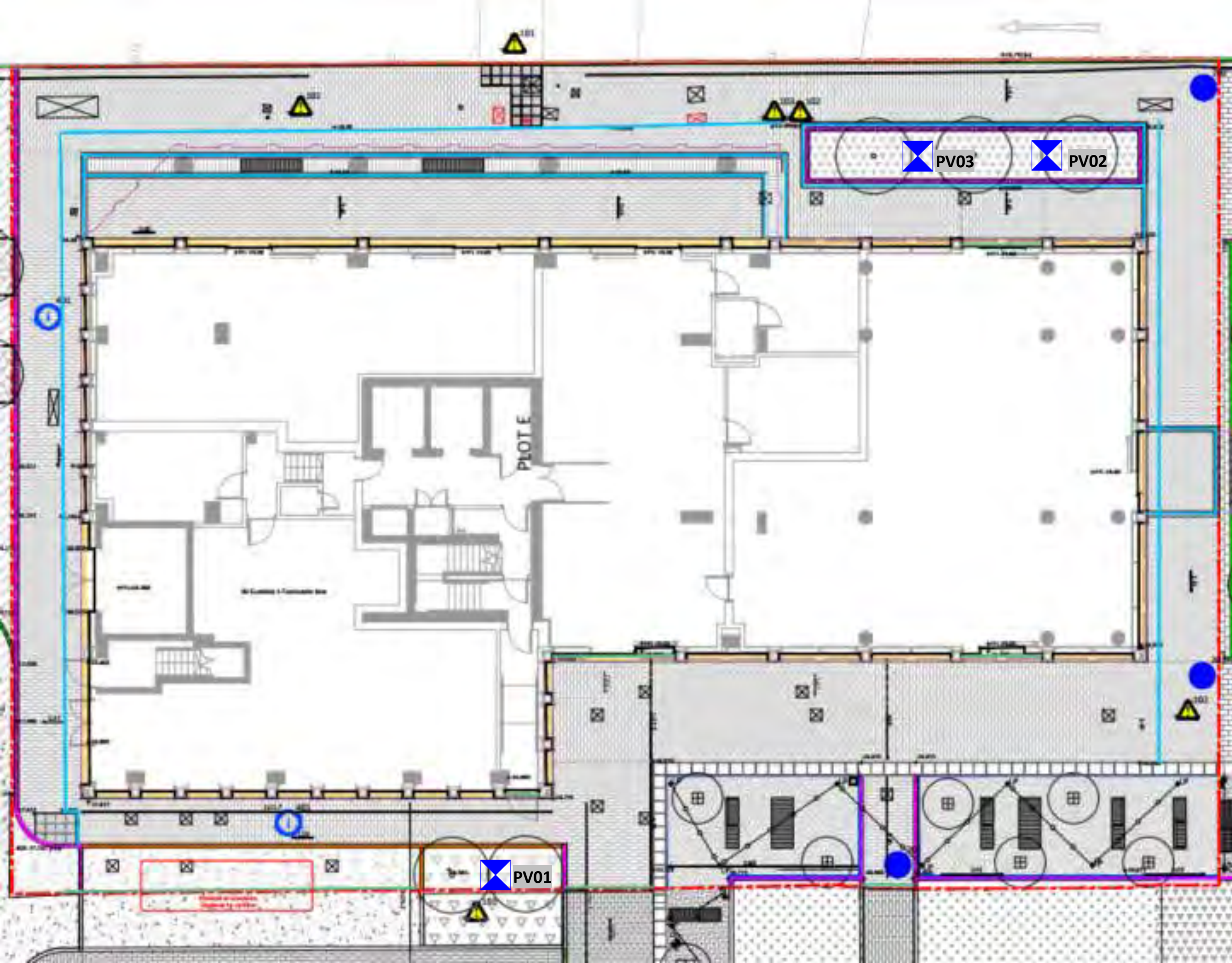


CLIENT
DOMIS CONSTRUCTION LTD

PROJECT TITLE
VICTORIA HOUSE, MANCHESTER

DRAWING TITLE
UXO PROBE LOCATION PLAN

DRAWING No.	REVISION	SCALE	DATE
C4742/06	A	NTS	24/03/22
DRAWN BY JM		CHECKED BY NS	



KEY

 PV03 VALIDATION PIT

REV	DATE	DESCRIPTION	BY	CKD



CLIENT
DOMIS
CONSTRUCTION LTD

PROJECT TITLE
VICTORIA HOUSE, GREAT ANCOATS
STREET, MANCHESTER

DRAWING TITLE
VALIDATION PIT LOCATION PLAN

DRAWING No. C4742/07	REVISION	SCALE NTS	DATE 21/02/24
DRAWN BY NS		CHECKED BY JEM	

APPENDIX A

Chemical Test Results

BSL Phase I & II Geo-Environmental Assessment Reports - Methodology and Guidance

Background

This Appendix provides information on the approaches, methods and guidance used by Brownfield Solutions Ltd in the preparation of this report.

The term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential soils and groundwater contamination). The term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements). It should be noted that this is an integrated investigation and these two main aspects are related, unless otherwise specified within the report.

Phase I reports are written in general accordance with the description of a Preliminary Investigation as defined in BS10175:2011+A2:2017 and are also produced in general accordance with the recommendations for a Tier 1 Preliminary Risk Assessment as described in LCRM guidance.

The first stage of the investigation and assessment of a site is the Preliminary Investigation/Tier 1 Preliminary Risk Assessment, often referred to as a Phase 1 Desk Study, comprising a desk study and walk-over survey and collation of desk-based searches, which culminates in the Preliminary Risk Assessment and the development of a preliminary/initial **Conceptual Site Model (CSM)**. From this are identified any potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. In the case of the geotechnical hazard identification, this is referred to as the **Ground Model**.

From the geo-environmental perspective, the hazard Identification process uses professional judgement to evaluate all the hazards in terms of possible contaminant linkages (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment as part of Phase II investigations and reports.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The Ground Investigation comprises field work and laboratory testing based on the findings of the Preliminary Risk Assessment, to reduce uncertainty in the geotechnical and geo-environmental hazard identification. This may include an exploratory, a detailed or/and supplementary Investigations as described in BS 10175:2011+A2:2017. Phase II Assessments are produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance and are also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

Contaminated Land - Legislative Background

Land contamination can be addressed in several ways, e.g. during planning, under Part 2A, following an incident, during an investigation into environmental damages, or during the application of an environmental permit, or its surrender.

For the planning process the key test is **as a minimum the site cannot be determined as contaminated land**, e.g. there is not significant harm, significant possibility of significant harm to human health or that there is not significant harm to, or the significant possibility that the pollution of controlled waters will occur.

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

-  The 1995 Environment Act.
-  The Contaminated Land Statutory Guidance, DEFRA – April 2012.
-  The Contaminated Land (England) Regulations 2006.
-  The Contaminated Land (England) Amendment Regulations 2012.
-  Water Resources Act.
-  Water Framework Directive.
-  Environmental Damage Regulations.
-  Environment Agency (EA) - Land Contamination Risk Management (LCRM) 2019.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

- 1) Significant harm is being caused or there is a significant possibility of such harm being caused.
- 2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

Source - substances that are potential contaminants or pollutants that may cause harm.

Pathway - a potential route by which contaminants can move from the source to the receptor, and the impact of that migration on the source e.g. attenuation.

Receptor - a receptor that may be harmed, for example the water environment, humans and water, considering the sensitivity of the receptor.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused.



Where any one of the “pollution linkages” between the above is absent there is deemed to be no risk.

The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the S-P-R approach is ‘suitable for use’ criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below, however the list is not exhaustive:

-  DETR: Circular 02/2000: Environmental Protection Act 1990: Part IIA: Contaminated land. 2012.
-  Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002.
-  BS 10175:2011+A2:2017.
-  Environment Agency (EA) - Land Contamination Risk Management (LCRM). 2019.
-  Groundwater Protection <https://www.gov.uk/government/collections/groundwater-protection>
-  UK Technical Advisory Group (UKTAG) - Water Framework Directive
-  Incidents and their classification: the Common Incident Classification Scheme (CICS) – Used by the Environment Agency to classify pollution incidents.

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

-  The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012).
-  The Environment Protection Act (1990).
-  The Water Resources Act (1991).
-  The Environment Act (1995).
-  The Contaminated Land (England) Act (2000).
-  The Pollution Prevention and Control (England and Wales) Regulations (2000).
-  The Landfill Regulations (England and Wales) Regulations (2002).
-  The Landfill (England and Wales) (Amendment) Regulations (2004).
-  Contaminated Land (England) Regulations (2012).
-  The Environmental Damage (Prevention and Remediation) Regulations (2009).
-  Environmental Permitting Regulations (England and Wales) Regulations (2010).
-  The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017).
-  Health and Safety at Work Act.
-  National Planning Policy Framework (NPPF) – latest version.

Contaminated Land Risk Assessment Approach

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:



LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process. Under LCRM, three tiers of risk assessment exist – Stage/Tier Preliminary Risk Assessment, Stage 2 Generic Quantitative and Stage 3 Detailed Quantitative.

Further information can be found at the below site:

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

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report if applied.

The likelihood of a given receptor being impacted is related to a number of factors, e.g. the geology which could inhibit contaminant migration. For example, a site with a significant thickness of clay between it and a receptor may reduce migration of contamination via the subsurface, which will reduce the likelihood of a given receptor being impacted. The geology or drainage for example could offer a preferential pathway e.g. mines shafts/faults increasing the likelihood and potential magnitude of an impact. The depth of contamination will also affect the exposure pathway, for example petroleum hydrocarbons at depth are unlikely to reach a receptor via dermal contact but could via vapour pathways which will influence the likelihood of an impact being felt e.g. if there are no buildings on site.

The terms and definitions used for the assessment of the likelihood are provided below:

High likelihood: There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.

Examples - Extensive areas with concentrations above saturation limits for mobile contamination e.g. petroleum hydrocarbons within the water table.

Likely: There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term.

Examples – Localised areas of contaminants with concentrations above saturation limits for mobile contamination e.g. localised petroleum hydrocarbons within the water table; shallow contamination above relevant human health generic assessment criteria is present with little or no hardstanding,

Low likelihood: There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term.

Examples - A thickness/distance of low permeability deposits preventing contaminant migration to a receptor is present; a site is mostly covered hard standing preventing exposure to soil contamination.

Unlikely: There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

Examples – A site is underlain by a substantial thickness of low permeability clays, between the source and potential receptors which will inhibit significantly, but not completely rule out migration to sensitive receptors.

The severity is also classified using a system based on CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report, if applied. The terms and definitions are:

Severe: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse.

Medium: Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve.

Mild: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment.

Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.

Minor: harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very Low	Very low
	Negligible	Negligible Risk / No Linkage			

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

Very high: There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required.

High: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term.

Moderate: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.

Low: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

Very Low: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Some linkages may be identified which constitutes a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled 'negligible risk' and 'no linkage' in the summary table, which give rise to an overall **negligible** risk category and no further action is required.

Contaminated Land Screening Values

In assessing the potential for contamination Brownfield Solutions Limited (BSL) follows UK guidance and current best practice.

General

The purpose of using generic Tier 1 screening levels is to have a simple means of assessing the potential contamination of a site and to inform decisions on whether further investigation is warranted or whether an option to undertake remedial action based on the data to hand is cost effective.

Human Health

Current UK guidance on risks to human health is provided by DEFRA and the Environment Agency (EA). Under the land use planning system where the aim is to demonstrate 'suitability for use' the key will usually be to confidently determine that the level of contamination of the land is low relative to some appropriate measure of risk at a particular critical connection.

Publications forming part of the guidance include the CLEA Model and toxicological reports collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values or Generic Assessment Criteria (GACs) for soils contamination based on standard land uses and soil assumptions. The critical concentrations referred to above can be the relevant GAC.

CLEA guidance has gone through a number of revisions over time. Tier 1 generic S4UL values (or GACs) have been published using the CLEA 1.06 Model by CIEH/LQM. These are the third set of generic assessment criteria generated by CIEH and replace the previous two sets of GACs. The revised S4UL values are based on greater knowledge of relevant toxicology and further consideration of exposure frequencies.

C4SL values for six determinands including lead were published by DEFRA/CL:AIRE in December 2014. Additional determinands were added in 2021. They represent a low risk as opposed to minimal risk, however they are still strongly precautionary. These screening values were published by DEFRA for Part 2A use, although DEFRA have also confirmed acceptability for use under planning. However, S4ULs remain the first reference point for BSL due to the broader range of end uses scenarios and the availability of a wide array of determinands with various soil organic contents.

As part of Tier 1 assessments, the following data sources are used in the order of preference given below, unless further justification is provided to adopt less conservative criteria:

-  CIEH S4UL values (derived by CIEH/LQM).
-  DEFRA/CL:AIRE C4SL's <https://www.claire.co.uk/projects-and-initiatives/category-4-screening-levels>
-  CL:AIRE GAC values.
-  Guidance from other European countries.
-  Guidance from the outside Europe.

Dependent on requirements, test results may be divided into representative data sets for assessment against the above referenced screening criteria, based on the conceptual model and taking into account such characteristics as variation in soil properties, historical, existing or proposed land uses. The soils in these areas are considered likely to form the ground cover in critical receptor areas (e.g. gardens, soft landscaping etc)

where pathways may exist. The critical part of the soil column is typically taken as the upper metre in terms of contact with end users of a development site for the purposes of initial assessment.

The screening criteria adopted by BSL are presented overleaf.

Further Assessment

When screening values are exceeded then further consideration is required. This could include further additional detailed investigation and assessment to further define the risk or to design appropriate remedial measures to either remove the source or break the pathway. In some cases, dependant on the Conceptual Site Model (CSM), no action may be required.

PAHs and B(a)P as a Surrogate Marker for Adoption of C4SLs

As stated above, S4ULs remain the first reference point as screening levels unless further justification is provided. In order to determine if the C4SL can be adopted, benzo(a)pyrene (B(a)P), the following guidance within SP1010 Appendix E for B(a)P and Public Health England (PHE) may be adopted with our assessments where appropriate.

Guidance states that benzo(a)pyrene is considered to be one of the most potent PAHs, and it would be appropriate to assume the cancer risk in a mixture is proportional to the concentration of a surrogate marker PAH (benzo(a)pyrene) in the mixture. The ratio of PAHs within the mixture can be assessed to ensure that the profile is similar to that seen for the test material (coal tar mixtures) in the toxicological study by Culp et al. The International Programme on Chemical Safety (IPCS) considered that the PAH profile of the soil sample may deviate from the average profile by about an order of magnitude (up or down).

A more recent study by Bull et al (2013) which analysed PAH concentrations in soil samples from 274 sites, showed that the levels of PAH relative to B(a)P showed little variability and were similar to that recorded for the coal tar mix used in the Culp et al study. Given this, it was concluded that benzo(a)pyrene is a suitable surrogate marker to represent mixtures of PAH in soil.

In order to risk assess the PAH mixture for site specific soil samples using human health guideline values, notably the C4SLs, as detailed in SP10101 the ratio of the seven genotoxic PAHs as shown below, relative to B(a)P, should be calculated to ensure it is similar to the test material used in the Culp study (PHE 2010). To be considered sufficiently similar, the ratio relative to B(a)P should fit within the upper and lower limits (representing an order of magnitude above and below the mean ratio to B(a)P of test material used in the Culp et al study). In such cases B(a)P is considered an adequate surrogate marker and the Low Level of Toxicological concern (LLTC) for B(a)P (i.e., the C4SL) may be used in the risk assessment.

Statistical Analysis on Soils

Guidance on the use of statistics is taken from the CL:AIRE publication “Comparing Soil Contamination Data with a Critical Concentration” 2020, the basis of which in statistics is termed Central Limit Theorem (CLT), which says “*The distribution of sample means converges to a normal distribution as the sample size increases*”.

If the critical concentrations have been exceeded, as part of a further assessment, statistical analysis may be undertaken on a dataset to demonstrate that the mean concentration on the site (or a particular area) is actually below the critical concentration. The true mean concentration of a contaminant is never known because all the site soil has not been tested. An estimation of the true mean can be obtained from the samples tested during the investigation. The greater the number of samples tested, the closer the mean of these values is to the true mean.

As discussed above, test results are typically divided into representative data sets for assessment and may be referred to as ‘averaging areas’ to which statistics can be applied, although several statements need to be satisfied before applying the guidance:

-  Averaging areas have been defined based on the CSM.
-  Sample locations – random/grid sampling adopted as opposed to targeted investigation.
-  Samples are evenly spread and not clustered.

-  Analysis do not suggest a hotspot/outlier or cluster established by histogram or other means.
-  Samples are of same/similar depth and taken from one population (e.g. just topsoil).
-  Analyses do not show a spatial trend or other spatial pattern across that zone.
-  The number of samples has been shown to be sufficient for statistical analysis.

Once the above have been satisfied, when undertaking statistical analysis, the question “*are mean soil concentrations within the averaging area equal to, or greater than, the GAC?*” is being asked. Typically, outliers or “hotspots” are treated as separate zones or averaging areas. The sampling strategy and assessment should also take into account uncertainty (for example, spatial heterogeneity) in contaminant concentrations. There is the assumption that sampling was random or stratified and systematic (e.g. on a grid) and not targeted at specific sources; data from such targeted areas should be omitted from the statistical analysis. Data should be from one population (i.e. the same materials).

The statistical test that is carried out is used to demonstrate that there is a certain probability that the true mean falls below the critical concentration (typically the GAC in a screening exercise). The main tool used to draw conclusions based on the 2020 guidance is a comparison of a 2-way confidence interval with the critical concentration. A confidence interval consists of two sets of numbers; an interval i.e. a range of values plus a pre-determined level of confidence e.g. 80%. A common interpretation of a confidence interval of say 80% is that “*there is an 80% chance that the true mean concentration level of the contaminant in a sampling zone lies between X concentration and Y concentration*”.

The current guidance for planning says that the site has to be “safe” which suggests we should use a large confidence interval such as 95% or higher to make a decision. This means that there is a 95% chance of the true mean concentration lying in this interval, there is also a 5% chance it lies outside this interval. One could then conclude that the requirements of planning have been met if the 95% confidence interval lies below the critical concentration.

The guidance recommends that at least two confidence levels are used such as 90% and 99% or 80% and 95%. By using two differing confidence intervals, we can use the smaller confidence interval (e.g. 80% confidence interval) to say “*we think the mean is most likely to be inside this range*” and the larger confidence interval (e.g. 95% confidence interval) to say “*we think the mean is most unlikely to be outside this range*”.

If the confidence interval extends to above the critical concentration, then further action may be required.

Controlled Waters

The European Water Framework Directive (WFD) became UK law in December 2003. It was created to ensure that European countries manage their rivers, groundwater and lakes so that they stay healthy for people and for wildlife.

This is achieved by the use of chemical standards (Water Quality Targets – WQTs) for surface waters and groundwater. These values describe concentrations of chemicals that are not expected to cause harm to environmental organisms or human health, provided they are not exceeded. The same chemical may have several standards for different environmental regimes, and for different protection objectives.

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 and The Private Water Supplies (England) Regulations 2016. SI 2016 / 618). In Scotland, the Public Water Supplies (Scotland) Regulations 2014 apply. The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

A number of non-statutory standards also exist, these are set by various organisations (including the EA) for chemicals that are considered to be of concern, but are not covered by any specific legislation.

The chemical standards used in the UK to control impact of contamination on controlled waters are Environmental Quality Standards (EQS). These cover a large number of compounds. EQS are available for inland surface waters (freshwater) and other surface waters (transitional and marine).

Several EQS are based on bioavailable metal proportions (i.e. copper, lead, manganese, nickel and zinc). A software tool (M-BAT) is available from the Water Framework Directive - UK TAG website for calculating the bioavailable fraction. Where this tool has been used, the bioavailability has been taken into account by calculating site-specific $PNEC_{dissolved}$ (Predicted No Effect Concentration) values. These enable the dissolved concentration data to be compared with the PNEC as if it were an EQS.

UK Drinking Water Standards (DWS) apply to waters abstracted for human consumption. Where no UK or EU drinking water standard exists, reference is made to the World Health Organisation criteria (2011).

The DWS apply to groundwater or to surface water used for abstraction and the EQS apply to surface water where the aquatic ecosystem is the receptor. Where the most appropriate water quality target cannot be determined with certainty, the lowest one is adopted in line with the precautionary principle.

In some instances, the laboratory detection limits (LODs) may be greater than the water quality target it is being screened against, but it should be noted that these comparisons are an initial screening assessment. It may be the case that lower LODs could be obtained using a more specialised technique, but it would be disproportionately expensive to adopt the more costly specialist technique for initial screening exercises.

The preference of BSL is to have testing carried out on actual samples of ground/surface water rather than theoretical values obtained from leachate testing, which is considered to often be highly conservative. Data from water samples obtained or from leachate analysis is then compared against the screening criteria adopted by BSL, which are presented overleaf.

When screening values are exceeded then further consideration is required. This could include further additional detailed investigation and detailed quantitative risk assessment (DQRA) to further define the risk or to design appropriate remedial measures to either remove the source or break the pathway.

Ground Gas Risk Assessment

BS8485:2015+A1:2019, BS 8576:2013, CL:AIRE RB17, and NHBC 'Hazardous Ground Gas - An essential guide for housebuilders' 2023, are the current guidance which gives up-to-date advice on all aspects of permanent ground gas risk. BS8576 alongside CIRIA C682 also provides guidance on assessment of hydrocarbon vapour intrusion.

The CL:AIRE publication 'Good Practice for Coal Mine Gas Emissions' 2021 provides guidance on the assessment of risks from mine gas sources.

The above all outline good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to ground gas contamination. The aim of the guidance is for a consistent approach to decision making, particularly relating to the scope of protective design measures on a site-specific basis.

Legislative Framework

BS8485:2015+A1:2019, BS 8576:2013 and CIRIA C665 provides technical guidance, however they also recognise the context into which the guidance has to be employed. Government policy is based upon a "suitable for use approach", which is relevant to both the current and proposed future use of land. When considering the current use of land, Part IIA of the Environment Protection Act 1990 provides the regulatory regime. The presence of hazardous ground gases could provide the "source" in a "pollutant linkage" which could lead the regulator to determine that considerable harm or there is a significant possibility of such harm being caused. Under such circumstances, the regulator would determine the land to be "contaminated land" under the provisions of the Act, setting out the process of remediation as described in the DETR Circular 02/2000 *Statutory guidance on contaminated land*.

Generation Potential of Sources

BS 8576:2013 Figure 6 provides a basis for assessing the generation potential from sources identified as part of the Phase I Assessment. These are summarised below:

Generation Potential	Typical Sources
Very Low	- Natural carbonate soil and strata, e.g. chalk and limestone. - Natural soil strata with a low degradable organic content, e.g. alluvium, peat. - In-filled pond less than 15 m diameter, in-filled before 1930s to 1940s. - Made ground with low degradable organic content (e.g. up to 5% organic material such as pieces of wood, pieces of paper, rags, etc. with a high proportion of ash and no food or other easily degradable waste). - Mine workings shallow or shaft (where there is clear evidence that they are flooded). - Inert landfill sites (and pre -1945 landfills).
Low	- Natural soil strata with a high degradable organic content (DOC). - Made ground with total organic carbon (TOC) up to 6% (e.g. dock silt, no food or other easily degradable waste). - Foundry sand (includes phenolic binders, rags and wood that decay, albeit at low rates). - Landfill 1945 to mid 1960s (see also Moderate below).
Moderate	- Sewage sludge. - Mine workings – unflooded, more than 50 years since last worked (gas is liberated from coal when mine workings are excavated; this continues for up to about 50 years). - Landfill 1945 to mid 1960s (this could also be “low” or, if disturbed, “high”).
High	- Landfill mid 1960s to early 1990s. - Mine workings – unflooded – less than 50 years since last worked.
Very High	- Municipal landfill sites. - Landfill early 1990s onward.

Frequency and Duration of Monitoring

BS8576 notes to determine where and how to monitor ground gases requires consideration of credible pathways of possible exposure of the receptors, taking into account what is known about the geology and hydrogeology, building construction and services layout, foreseeable events such as flooding, changes in groundwater level, climate change, extreme weather conditions, the closure of mines, and possible changes to the gas regime caused by future development.

The monitoring period for a specific site should cover the “worst case” scenario. A “worst case” scenario will typically occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall, frost and dry weather.

The benefits of additional information and whether it is likely to change the scope of gas protection should be considered, as are the consequences of failing to characterise adequately pollutant linkages. Investigations concerned with ground gas are required to provide monitoring data sufficient to allow prediction of worst case conditions enabling the confident assessment of risk and subsequent design of appropriate gas protection schemes. Monitoring programmes should not be an academic exercise in data collection. CL:AIRE publication TB17 “Ground Gas Monitoring and ‘Worst-Case’ Conditions” provides further guidance.

Below are matrices that will aid in determining an appropriate number of gas monitoring visits and the length of monitoring period.

Typical/idealised periods of monitoring

		Generation of Potential Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	1 month	2 months	3 months	6 months	12 months
	Moderate (Apartments)	2 months	3 months	6 months	12 months	24 months
	High (Low rise Residential)	3 months	6 months	6 months	12 months	24 months

Typical/idealised frequency of monitoring/Number of Visits Required

		Gas Generation of Potential Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	4	6	6	12	12
	Moderate (Apartments)	6	6	9	12	24
	High (Low rise Residential)	6	9	12	24	24

Notes

- 1 Generation potential of sources based on descriptions within BS 8576:2013.
- 2 At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

It is recommended that newly installed monitoring wells are left for 24 hours to allow the soil gas to reach equilibrium. It should be recognised, however, that some soil gas regimes could take considerably longer (up to seven days). Interpretation of any initial readings should take this equilibrium process into account.

Gas Risk Assessment

Within BS8485:2015+A1:2019 a semi-quantitative method is set out for the assessment of risk.

This method (Modified Wilson and Card) uses the concept of Gas Screening Values (GSVs) and typical threshold concentrations of carbon dioxide and methane to identify levels of risk. Sites are then classified into a 'Characteristic Situation' or 'CS' from CS1 where no mitigation is required and CS2 increasing up to CS6 where protection measures are required.

The NHBC guide 'Hazardous Ground Gas - An essential guide for housebuilders' 2023 provides further assessment tools for ground gas monitoring data, including the use of ternary plots to determine ground gas sources.

A separate approach to assessment without monitoring data is discussed under the RB17 header further below.

CIRIA C682 and BS 8576:2013 provide guidance on assessment of VOC intrusion risk.

Ground Gas Mitigation

Where a risk is determined to be present by assessment, BS8485:2015+A1:2019 provides guidance for the design of protection systems based on a points scoring system depending on the characteristic situation, structure type, structural barrier types, ventilation and a gas resistant membrane. Source removal can also be considered.

The design requires the structures to be categorised into one of four building types: Type A, Type B, Type C or Type D, related to the construction and end use of the building, together with the control of future structural changes and maintenance.

CIRIA C748 provides advice on the use of membranes as VOC vapour barriers.

CIRIA C735 sets out the approach for verification of installed mitigation measures. Note that if a membrane is installed it must be verified in accordance with CIRIA C735 or it will score zero points and assumed to not afford any protection.

RB17 Approach

CL:AIRE RB17 (Card et al 2012) is a pragmatic approach to ground gas risk assessment and was developed because gas concentration, pressure and flow rate measured in a well headspace may not be representative of the conditions in the surrounding formation.

In these low-risk situations, the approach is to use the conceptual site model and the estimation of the likely gas generation from a source to identify where or if gas monitoring is required to better define the risks.

Under this approach, for sites with natural soils only with no credible methane source, then no action is required (no monitoring or gas protection measures) as this represents Characteristic Situation 1 (CS1).

Radon

Advice on radon protection in England is provided by the UK Health Security Agency, <https://www.ukradon.org/information/ukmaps> and by the BRE (BR 211 (Scivyer 2023)).

Areas of the country can be categorised according to the percentage of existing homes where radon is present above the Action Level:

-  0-1% lower probability.
-  1-3% and 3-10% intermediate probability.
-  >10% higher probability.

Basic radon protection measures are required in new buildings and extensions in areas of England and Wales where 3-10% of properties exceed the Action Level and full radon protection measures where >10% exceed the Action Level.

Unexploded Ordnance (UXO) Guidance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA report C681.

BSL carry out non-specialist UXO screening exercises by considering any evidence of UK defence activities on or near the site evident from gathered desk study information and the unexploded aerial delivered bomb (UXB) online risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available online Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experienced and considered competent in the assessment of UXO.

Geotechnical Guidance

A preliminary risk assessment of geotechnical hazards is carried out at the desk study stage and confirmed (or amended) at the ground investigation stage.

The CD 622 'Managing Geotechnical Risk' guidance document defines the technical approval and certification procedures to be used to ensure that the risk associated with the geotechnical activities are appropriately managed.

The desk-based stage may also include the requirements for a Coal Mining Risk Assessment (CMRA) which specifically assesses the risks from mining induced instability and related issues in high risk development areas: <https://www.gov.uk/guidance/planning-applications-coal-mining-risk-assessments>.

In order to establish the requirements of a project, the Geotechnical Category which is based on a consideration of project complexity, proposed geotechnical activities, presence of geo-hazards and severity of geotechnical risks, shall also be considered. These range from Category 1 (small/simple structures) to Category 3 (very large, unusual or complex activities/structures, such as tunnels). It is envisaged most projects typically fall into Category 2, including conventional types of geotechnical structures, earthworks and activities.

In the case of the geotechnical hazard identification at the intrusive investigation stage, this is referred to as the **ground model**.

The geotechnical sections of the report contain the factual information on the geology and relevant site data, including both in situ and laboratory testing, with a geotechnical evaluation of the information stating the assumptions made in the interpretation of the data.

Derived values of geotechnical parameters are obtained from test results by theory (book values), correlation or empiricism in general accordance with BS EN 1997-2:2007 (EC7).

Where derived geotechnical parameters are to be used in designs in accordance with EC7, the selection of characteristic values for geotechnical parameters using the derived values is carried out by well-established experience.

The characteristic value is a cautious estimate of the value affecting the occurrence of the limit state. For any particular material type there may be more than one characteristic value for each parameter because there may be more than one limit state.

The second stage is the selection of design values. The design values are either derived from the characteristic value by applying the relevant partial factors or assessed directly. Similarly, there can be several design values for the same material type.

In the event that geotechnical designs are included in this report, selection of the characteristic and design values is included. Otherwise, it is the duty of the geotechnical designer to determine these within a separate design report (a GDR).

Where it has not been possible to reasonably use an EC7 compliant technique, a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

In addition to the above:

-  Assessments for highways designs are based on CD 622 Managing Geotechnical Risk.
-  The assessment of sustainable drainage is based on BRE365 and CIRIA C753 'The SuDS Manual'.
-  Earthworks Assessments are based on SHW Series 600 and BS6031.
-  Risks from mining (both at the desk based and intrusive stages) are assessed adopting guidance from CIRIA C758.

Re-Use of Waste Soils Guidance

Definition of Waste

The Environment Agency considers waste to be “...any material that is discarded, or intended to be discarded...” this includes any soil from drainage trenches, foundation arisings, site strips etc. It is no longer required in its original location, therefore it is considered to be waste. Without an appropriate materials management plan, permit or exemption in place, by law this material is defined as “illegally deposited waste”.

Landfill tax rules allow HM Revenue & Customs (HMRC) to recover landfill tax on illegally deposited waste on construction sites. This could lead to excessive costs without the correct documentation in place. In addition, a

person who makes, knowingly causes or knowingly facilitates a disposal to be made at an unauthorised site is also liable to pay Landfill Tax.

CL:AIRE: Code of Practice

Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. This can be implemented under the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE DoWCoP), also commonly referred to as a “Materials Management Plan”.

<https://www.claire.co.uk/projects-and-initiatives/dow-cop>

Developers and contractors are advised to complete all works under the DoWCoP where applicable.

To implement the DoWCoP (for Route A), there is a requirement to notify the Environment Agency and Local Authority of the intention to use the code of practice in principle, after which there is a 21-day notice period for their response.

In order to re-use soils under the DoWCoP, there are four key criteria that need to be met:

-  The aims and objectives of the project meet the requirements of the Waste Framework Directive (does not harm human health or the environment).
-  The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
-  There is certainty of use (planning consents are in place alongside materials tracking, which should be in place as part of good site practice in any case).
-  Quantity (the quantity of materials used should be known).

Potential scenarios where soils may be able to be re-used:

-  Material capable of being used in another place on the same site without treatment.
-  Material capable of being used in another place on the same site following ex-situ treatment on site.
-  Material capable of being used in another development site without treatment (Direct Transfer).
-  Material capable of being used in another development site following ex-situ treatment on another site e.g. Hub site.

In order to satisfy these requirements, the following are required:

- i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
- ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
- iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
- iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
- v) Volume calculations.
- vi) Planning permission for the development.
- vii) Contractual details to be clear, regarding who steps in if a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.

Soils which require treatment on site (e.g. bioremediation, stabilisation etc) may require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties are not generally regarded as waste treatment operations and do not require a permit.

Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

Any declared MMP should be amended as new import sources are added.

Regardless of implementing re-use under the code of practice or not, all sites should have some form of materials tracking in place in compliance with current legislation. Any re-use scheme should also be designed to minimise disposal costs. Note that for re-use of landfilled materials or mining wastes, the DoWCoP may not apply and a Waste Recovery Permit (or others) may be required. Liaison with the Environment Agency would be needed on a case by case basis to determine the best option.

Once the project is complete, a verification report detailing soils re-use/import will need to be produced and submitted to CL:AIRE, which may be subject to a random audit process. Sites found to be non-complaint with the CoP can be referred to the EA for further investigation.

Soils Re-use under Exemptions and Permits

Other potential options to allow the re-use and/or import of soils and aggregates on site are provided in the table below. Applies to England/Wales only – Scotland differs.

Re-use Mechanism	Description
U1 Exemption	Can be applied to re-use/import of soils and stones, but only up to 1000 tonnes or for brick and concrete up to 5000 tonnes. This is usually an efficient way to re-use small volumes of waste materials. However, only one U1 can be filled in per site in any 3-year period. Quick and free via online registration.
WRAP Quality Protocols	Describes how processed demolition arisings can be removed from regulatory waste regime. Requires a demonstration of appropriateness by: • Factory Production Control Manual. • Facility Permit (or Exemption). • Grading Analysis.
Waste Framework Directive (WFD) exclusion	In regard to “clean” naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion which is an EA regulatory position statement. So long as the project can prove the four criteria listed above for the DoWCoP, then permits or the DoWCoP are not required. However, many projects still use the CoP to ensure compliance.
T5 Screening and blending of waste	The T5 exemption allows you to temporarily treat waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site. The limit is 5,000 tonnes. This applies to: • Screening soil on a demolition site to remove wood and rubble. • Blending soil and compost that has been produced under an exemption on a construction site to produce better soil for landscaping on that site (e.g. peaty deposits). • Crushing waste (except bricks, tiles and concrete) before screening or blending • Grading waste concrete after it has been crushed to produce a certain type of aggregate.
T7 Exemption	The T7 allows treatment of waste bricks, tiles and concrete by crushing, grinding or reducing in size. This needs to be registered with the Local Authority.
Other Permitting Routes	Other options include use under an Environmental Permit (Standard or Bespoke Rules), however these may be a time consuming and costly route, where use of the other above options (if applicable) are likely to be more feasible in construction.

There are also potential non-enforcement positions for re-use e.g. a site has a large volume waste illegally deposited on it (not by landowner). The new owner is keen to re-use waste where possible to reprofile the site (planning condition granted). The DoWCoP could not be used as materials already excavated and deposited as a waste (illegally). The EA may agree that although the DoWCoP not applicable, they would take a non-enforcement position if the works were completed in accordance with the DoWCoP – this would need to be agreed in advance.

Waste Classification and Disposal Guidance for Soils

Introduction

As described in the 'Waste Duty of Care Code of Practice (2016)' any substance or object that the holder discards, intends to discard or is required to discard is a waste. Waste producers have a duty of care to classify the waste they are producing:

-  Before it is collected, disposed of or recovered.
-  To identify the controls that apply to the movement of the waste.
-  To complete waste documents and records.
-  To identify suitably authorised waste management options.
-  To prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site will also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

Background for Landfill Disposal

The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).

If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

Key Points:

-  Not all waste can be landfilled.
-  Landfills are classified according to whether they can accept hazardous, non-hazardous or inert wastes.
-  Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
-  Most wastes must be treated before you can send them to landfill.
-  There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

Classification

Wastes are listed in the European Waste Catalogue and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not i.e. the hazard assessment. The most common EWC waste codes related to soil are:

17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03

Soils may contain certain contaminants (e.g. asbestos, oil,) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on specific "hazardous properties" which include hazards such as carcinogenicity, flammability and toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations** and classified as either hazardous or non-hazardous waste. WAC analysis must not be used for waste classification.

Waste Definitions

Inert	- Will not undergo any significant physical, chemical or biological transformations. - Will not dissolve. - Will not burn. - Will not physically or chemically react. - Will not biodegrade. - Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. - Has insignificant total leachability and pollutant content. - Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).
Non-Hazardous	Is not inert (see above). Is not hazardous (see below).
Hazardous	Soil has hazardous properties as defined in WM3 (Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance).
Stable Non-reactive hazardous waste#	Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents either: in the waste alone (for example, by biodegradation), under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints) or by the impact of other wastes (including waste products such as leachate and gas).

This option allows hazardous waste that is stable and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. If the waste has any disposal route other than a landfill site (e.g. recycling facility, incineration etc) then WAC is not relevant. Furthermore, the WAC limits **cannot** be used to make an assessment of whether a waste is hazardous. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.

Classification based on Total Concentrations ¹	Non-Hazardous Waste		Hazardous Waste	
WAC testing	Below inert WAC limit values:	Above inert WAC limit values:	Below hazardous WAC limit values	> WAC limit values

Landfill requirements	INERT landfill	NON-HAZARDOUS landfill ²	HAZARDOUS landfill	PRE-TREATMENT ³
-----------------------	----------------	-------------------------------------	--------------------	----------------------------

- 1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).
- 2 Individual sites may have certain limit values pre-determined in their licence.
- 3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.
- 4 Possibility that wastes could be classified as stable Nonreactive HAZARDOUS waste in non-hazardous Landfill (e.g. soils containing low concentrations of asbestos, gypsum or sulphate bearing soils).

Waste classified as non-hazardous can be accepted into a non-hazardous landfill without having to pass any numerical WAC.

Soils above hazardous WAC limit values require pre-treatment prior to disposal. The effective pre-treatment, typically involving separation, sorting and screening, can offer cost savings through reducing the hazardous nature and volumes of soil. Costs for disposal of non-hazardous/hazardous soils are significant compared to the disposal of inert material.

Greenfield Sites and Inert Waste

The possibility of automatic inert classification naturally occurring “clean” soils should be explored in accordance with the requirements of paragraph 10 (wastes acceptable without testing at landfills for inert waste) of the Landfill (England and Wales) (Amendment) Regulations (2005). This is the case if:

- They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
- There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other classes of landfill (e.g. the waste producer can characterise the waste based on visual assessment and written description with supporting evidence such as a desk study, subject to agreement by the landfill operator).

Hydrocarbons in Soils

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However, hydrocarbons in soils are a mixture rather than a pure product and are therefore not absolute entries.

Known Oils

The simplest scenario is where the identity of the contaminating oil is known or can be identified. If the oil is known the manufacturer’s or supplier’s REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs to provide an interpretation of the chromatograph to determine if it is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Unknown Oils

Where hydrocarbons are contaminating soils, it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

For contaminated land specific consideration must be given to the following before proceeding:

- The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in WM3 example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
- The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of marker compounds is optional; however, it is recommended that where possible the marker compounds should be used. WM3 states:

If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:

- The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
- This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D of WM3, and
- The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

TPH Concentration (mg/kg)	Petrol or Diesel	BaP (mg/kg)	Classification
10,000	No	0.9	Non- Hazardous
1,000	No	Not available	Hazardous
1,000	Yes	Not relevant	Hazardous

References

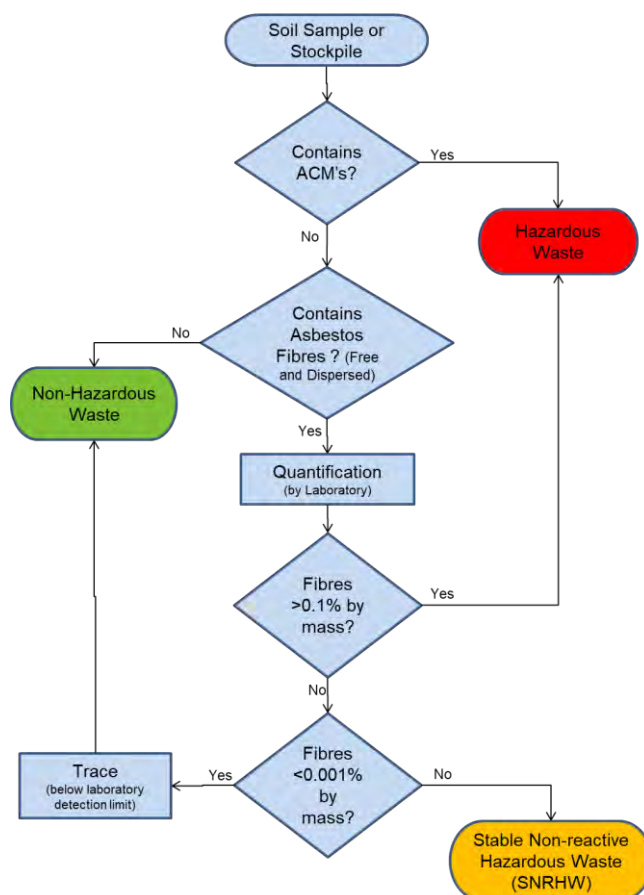
1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the subsequent Council Decisions.
2. Environment Agency Environmental Permitting Regulations: "Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land" 2009.
3. Environment Agency "Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria" Nov 2010.
4. Environment Agency "Guidance on the classification and assessment of waste (Technical Guidance WM3)".
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).
6. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.
7. 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament.
8. Environmental Permitting Guidance The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1.
9. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

Waste Containing Asbestos

The assessment of asbestos containing waste is dependent on whether the asbestos is present as:

- Fibres that are free and dispersed, or
- Identifiable pieces of asbestos containing materials (ACM's).

Identifiable pieces of asbestos are any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye. The result is that commonly soils with visible ACM's are sorted and the ACM's removed by hand picking and separate disposal.



Should soils contain asbestos, the concentration and type of asbestos identified, in addition to the chemical composition (i.e. hazardous or non-hazardous detailed above), will determine which waste code is applicable to the soils and which landfill will accept it as summarised below:

Waste	Conc. by Weight (%)	EWG 2002 Catalogue Entry Code	Waste Disposal Route
Non-hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 04 (soil and stones other than those mentioned in 17 05 03*)	Non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.
Non-hazardous soils containing asbestos fibres	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos.

Waste	Conc. by Weight (%)	EW C 2002 Catalogue Entry Code	Waste Disposal Route
Non-hazardous Soils containing ACM (Mechanically separable)	>0.1%	17 06 05 (construction material containing asbestos) 17 05 04 (soil and stones other than those mentioned in 17 05 03*)	ACMs disposed of at a hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos. Soils should be disposed of at a non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous soils containing ACM	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.

Asbestos concentrations below 0.001% by mass are below standard laboratory detection limits and are not currently regarded as containing asbestos for the purposes of disposal and may be disposed of to an inert landfill site¹. These levels are often termed “trace” by laboratories.

Asbestos concentrations between 0.001% and 0.1% are stable non-reactive hazardous waste (SNRHW)¹. Waste transfer stations where soil recycling takes place may be able to take SNRHW, but are unlikely to take soils containing asbestos above trace concentrations.

The following codes should be assigned to the asbestos waste as appropriate:

17 06	Insulation materials and asbestos-containing construction materials
17 06 01	Insulation materials containing asbestos
17 06 03	Other insulation materials consisting of or containing hazardous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05	Construction material containing asbestos

WM3 indicates that 17 06 05 would normally be used in preference to 17 06 01 for the asbestos in asbestos contaminated soil and stones.

Construction materials containing asbestos and “*other suitable materials*” may be landfilled at landfills for non-hazardous waste in accordance with the Landfill Directive without testing.

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials. The Landfill Directive requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste (for example organic material, household waste, paper etc..) and must meet the waste acceptance criteria set out in accordance with Annex II.

Construction

Health and Safety Executive (HSE) guidance on asbestos is not directly related to soil and much of the guidance focuses on the removal of asbestos from buildings. The overarching legislation is the Control of Asbestos Regulation (CAR 2012). However, where work involves (or is likely to involve) contact with asbestos then CAR 2012 requires a risk assessment including whether the work is licensed or notifiable non-licensed work and may require an Asbestos Management Plan. Work becomes notifiable if it is considered that the control limit could be exceeded.

Brownfield sites frequently have soils that contain asbestos and the presence of asbestos needs to be considered within the context of construction, particularly in relation to groundworks. The exposure of soils and the use of excavators and plant to move soil around increases the possibility of fibres becoming airborne. However, it is good site practice to not generate dusts and to employ dust suppression on all sites regardless of the presence of asbestos.

The legal control limit for asbestos is 0.1f/ml over a continuous four-hour period. The control limit is not a 'safe' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Clearly the higher the concentrations in the soil the greater potential there is for fibres to be released, however IOM publication TM/88/14 "the release of dispersed asbestos fibres from soil" 1988 concludes that:

- Mixtures of asbestos in dry soils with asbestos content as low as 0.001% can produce airborne respirable asbestos concentrations greater than 0.1f/ml in dust clouds where the respirable dust concentrations are less than 5mg/m³.
- An action limit is recommended of no higher than 0.001% asbestos in soils above which steps should be taken to minimise exposure to airborne fibres (e.g. by wetting).
- The addition of relatively small quantities (10%) of water can reduce the airborne fibre concentrations by an order of magnitude.

Where asbestos has been identified at concentrations above 0.001% as free and dispersed fibres in the soil precautions need to be adopted. Concentrations below this are considered to be normal background, although good site practice dictates that the generation of dusts should be avoided and therefore any fugitive fibre release from minor concentrations should be kept to a practical minimum.

End Use

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation.

Asbestos containing materials can remain in situ under a suitable cover system which may be hard surfacing or soft landscaping (with or without hard dig layers and markers).

There is a risk that future maintenance may compromise such systems and details of the presence of asbestos should be kept in the Health and Safety File.

Publications from the JIWG provide guides for decision making in relation to construction.

The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk. There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However, the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required. Re-use of soils containing asbestos should be as per CARSOILS.

The re-use of soils containing asbestos at concentrations above hazardous waste levels may be met with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

Asbestos in Soil as Free Fibres

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recycle	Inert	SNR	Haz		Suitable for re-use on site	Precautions
Not detected	✓	✓			No precautions necessary, however on a brownfield site asbestos not previously identified may be found during works and a statement within the contractor's method statement for how they will deal with this unforeseen asbestos would be good practice to ensure compliance with CAR2012.	Yes.	None.
Trace (<0.001%)		✓ ²			Precautions are unlikely to be required, however a detailed method statement may be required to ensure compliance with CAR2012. Basic asbestos management good practice will be required. Typically precautions would include: - Ensuring soils do not dry out to become dusty. - Site personnel have the risk communicated at induction stage.	Yes Soils can be re-used under CL:AIRE CoP with the correct precautions in place.	Generally clean cover or hardstanding cover required.
0.001% – 0.099%			✓		Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: - Site personnel have the risk communicated at induction stage. - Ensuring personnel have suitable training. - Task monitoring to inform PPE requirements. - Ensuring soils do not dry out to become dusty and that misting is available during groundworks. - Separate stockpiling. - Clean haulage routes.	Possibly. Soils may be able to be re-used under CL:AIRE CoP, subject to a satisfactory Risk Assessment and regulatory agreement with the correct precautions in place.	Clean cover with hard dig/demarcation layer or hardstanding cover required.
0.1+%				✓	Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: - Site personnel have the risk communicated at induction stage. - Ensuring personnel have suitable training. - Task monitoring to inform PPE requirements. - Site wide and or perimeter monitoring. - Ensuring soils do not dry out to become dusty and that misting is available during groundworks. - Separate stockpiling.	Unlikely ³ Re-use of soils containing asbestos within an earthworks scheme will involve significant engineering and the risk for generating dusts will be significantly	Clean cover and a hard dig / demarcation layer. A plan should be in place for future excavations as part of the Health and Safety File.

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recycle	Inert	SNR	Haz		Suitable for re-use on site	Precautions
					- Clean haulage routes. - Decontamination unit	increased with repeated handling and compaction.	

1. The standard laboratory detection limit is normally 0.001%. Below 0.001% is trace and currently regarded as not containing asbestos for the purposes of disposal off site. However the waste producer has a duty to fully classify the waste and the presence of trace asbestos should be declared. Consequently it is unlikely that a waste treatment site will take this soil and an inert landfill may make a commercial decision to only take it under some circumstances.
2. The re-use of soils containing asbestos at concentrations above hazardous waste is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be warranted where there a long program for implementation.

Quality Control Methodology for Imported and Re-used Soils

Prior to Importation and Re-use

Reliable testing results should be provided, or samples should be obtained at the source and tested prior to either importation to the subject site or re-use on site of origin as early as possible.

The frequency and scope of testing will vary depending on the source, the required testing for possible sources is provided below. These rates are based on professional judgement and acceptance of similar criteria used on similar sites to the satisfaction of the local regulatory authority. Results should be compared to the acceptance criteria also with this appendix.

Material Use	Testing Frequency*	Suite of Analysis					
		1	2	3	4	5	6
Topsoil							
Greenfield Source including Site Won (Top 600mm)	1 per 250m³						
Brownfield/Recycled Source including Site Won (Top 600mm)	1 per 100m³						
Subsoil							
Greenfield Source (Top 600mm)	1 per 250m³						
Brownfield/Recycled Source (Top 600mm)	1 per 100m³						
Site Won (Top 600mm)	1 per 250m³						
First Generation (i.e. quarried sand)	No testing required. Certificate of material provenance is required.						
Physical Stone Break Layer							
First Generation (i.e. quarried stone)	No testing required. Certificate of material provenance is required.						
Site Generated / Imported 6F2	1 per 500m³						
General Fill**							
Site Generated / Imported 6F2	1 per 1000m³						
Site Won Made Ground	1 per 250m³						
	1 per 1000m³						
Site Won Natural Arisings on Brownfield Site	1 per 1500m³						
Site Win Natural Arisings on Greenfield Site	1 per 2000m³						
Other							
Hydrocarbon Hotspot Validation	1 sample per 10m of linear excavation to sidewall and 50m² base.						

Notes

1 – BSL Default Suite - *Arsenic, Cadmium, Chromium (total and hex), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated polycyclic hydrocarbons (PAH 16), total phenol, free cyanide, water soluble sulphate (2:1 Extract), soil organic matter, and pH.*

2 – Asbestos ID (and Quantification if detected).

3 – TPH Analysis - *Speciated Total Petroleum Hydrocarbons (TPH CWG) including BTEX and MTBE.*

4 – VOC Analysis - *Volatile Organic compounds (VOCs) by GC-MS (ex TIC).*

5 – SVOC Analysis - *Semi-Volatile Organic compounds (SVOCs) by GC-MS (ex TIC).*

6 – Visual Inspection & on-site screening for VOC using calibrated PID.

* - Minimum of 3 samples per source.

** To be used at depths >450mm bgl or below building/hardstanding.

The testing should be undertaken at a UKAS accredited laboratory and be MCERTS accredited and all results should be below existing residential guideline values which are presented in Appendix A.

Topsoil/Subsoil

The above specification is to determine if material is chemically clean, for suitability as a growing medium reference should be made to BS3882:2015 Specification for Topsoil and BS 8601:2013 Specification for Subsoil and Requirements for Use.

In addition to the above sampling frequencies and testing, all imported topsoil/subsoil should also confirm to the following criteria:

-
- Have a maximum stone size of 75mm.
 - Be clean and free of foreign debris including building waste materials or contaminants e.g. brick, glass, asbestos and plasterboard, etc.
-

For imported soils, approval should be obtained from the Local Authority prior to importing to site.

Site Won Crushed Hardcore/Concrete (for use below building/hardstanding only)

In addition to the above sampling frequencies and testing; for re-use of hardcore/concrete (Grade 6) on the site of origin, BSL proposes the following inspection criteria:

-
- No visual contamination (oil staining etc).
 - Limited deleterious material (organics, wood, etc).
 - Limited metal.
 - No visible asbestos containing material (ACM).
 - Quantifiable Asbestos at or <0.001 w/w%.
-

Production of Grade 6 materials should be done under WRAP quality protocols or similar. Inspections and sampling would need to be carried out by a qualified geo-environmental engineer. For geotechnical performance, reference should be made to Series 600 Earthworks Guidance.

If the above criteria for asbestos is exceeded, then further consideration and assessment will be required. Works would need to be undertaken in compliance with the Control of Asbestos Regulations (CAR) 2012 and an Asbestos Plan of Works may be required.

Post Importation

The imported soils should be inspected on site to confirm it is the same material inspected at source and it is suitable for use. Once imported to site, tests should also be undertaken to confirm the batch is suitable prior to use and has not been contaminated in transit.

A management plan should be in place on site for storage and transportation. The material should be stockpiled separately and well segregated on site to prevent cross contamination in accordance with good site practice.

Accurate records of movement of soils should be kept in order to be incorporated in the final verification report.

Approval should be obtained from the Local Authority prior to use on site.

Validation and Verification Report

Site

A final verification report should be issued to the Local Authority/Warranty Provider (e.g. NHBC) detailing records of the re-use and importation of soils, alongside their use on the site.

Cover Layer

Once the chemical suitability of soils used for a cover system in soft landscaping and garden areas has been confirmed, the material can be placed in these areas.

The depth of the cover layer should be recorded, and photographs taken as evidence to be issued to the Local Authority/warranty provider in the verification report.

Approval for the placement of the cover layer should be obtained from the Local Authority/Warranty Provider.

Human Health Remediation Targets			Import and Re-use in Garden Areas <450mm; Based on human health without homegrown produce (1% SOM)	Import and Re-use in Garden Areas >450mm: based on Human health - Commercial (1%SOM)
Source	Contaminant	Unit		
LQM S4UL	Arsenic	mg/kg	40	640
LQM S4UL	Cadmium	mg/kg	85	190
LQM S4UL	Chromium (III)	mg/kg	910	8600
LQM S4UL	Chromium (VI)	mg/kg	6	33
LQM S4UL	Copper	mg/kg	7100	68000
C4SL	Lead	mg/kg	330	2300
LQM S4UL	Mercury, Elemental	mg/kg	1.2	58
LQM S4UL	Nickel	mg/kg	180	980
LQM S4UL	Selenium	mg/kg	430	12000
LQM S4UL	Zinc	mg/kg	40000	730000
LQM S4UL	Phenol (total)	mg/kg	750	760
LQM S4UL	Acenaphthene	mg/kg	3000	84000
LQM S4UL	Acenaphthylene	mg/kg	2900	83000
LQM S4UL	Anthracene	mg/kg	31000	520000
LQM S4UL	Benz(a)anthracene	mg/kg	11	170
LQM S4UL / DEFRA C4SL	Benzo(a)pyrene	mg/kg	3.2	35
LQM S4UL	Benzo(b)fluoranthene	mg/kg	3.9	44
LQM S4UL	Benzo(ghi)perylene	mg/kg	360	3900
LQM S4UL	Benzo(k)fluoranthene	mg/kg	110	1200
LQM S4UL	Chrysene	mg/kg	30	350
LQM S4UL	Dibenz(a,h)anthracene	mg/kg	0.31	3.5
LQM S4UL	Fluoranthene	mg/kg	1500	23000
LQM S4UL	Fluorene	mg/kg	2800	63000
LQM S4UL	Indeno(1,2,3,cd)pyrene	mg/kg	45	500
LQM S4UL	Naphthalene	mg/kg	2.3	190
LQM S4UL	Phenanthrene	mg/kg	1300	22000
LQM S4UL	Pyrene	mg/kg	3700	54000
LQM S4UL	TPH Aliphatic EC 5 - 6*	mg/kg	42	3200
LQM S4UL	TPH Aliphatic EC 6 - 8*	mg/kg	100	7800
LQM S4UL	TPH Aliphatic EC 8 - 10*	mg/kg	27	2000
LQM S4UL	TPH Aliphatic EC 10 - 12*	mg/kg	130	9700
LQM S4UL	TPH Aliphatic EC 12 - 16*	mg/kg	1100	59000
LQM S4UL	TPH Aliphatic EC 16 - 35*	mg/kg	65000	1600000
LQM S4UL	TPH Aliphatic EC 35 - 44*	mg/kg	65000	1600000
LQM S4UL	TPH Aromatic EC 5 - 7*	mg/kg	370	26000
LQM S4UL	TPH Aromatic EC 7 - 8*	mg/kg	860	56000
LQM S4UL	TPH Aromatic EC 8 - 10*	mg/kg	47	3500
LQM S4UL	TPH Aromatic EC 10 - 12*	mg/kg	250	16000
LQM S4UL	TPH Aromatic EC 12 - 16*	mg/kg	1800	36000
LQM S4UL	TPH Aromatic EC 16 - 21*	mg/kg	1900	28000
LQM S4UL	TPH Aromatic EC 21 - 35*	mg/kg	1900	28000
LQM S4UL	TPH Aromatic EC 35 - 44*	mg/kg	1900	28200
LQM S4UL	Benzene	mg/kg	0.38	27
LQM S4UL	Toluene	mg/kg	880	56000
LQM S4UL	Ethyl Benzene	mg/kg	83	5700
LQM S4UL	Xylene - o	mg/kg	88	6600
LQM S4UL	Xylene - m	mg/kg	82	6200
LQM S4UL	Xylene - p	mg/kg	79	5900
CL:AIRE 2010	MTBE (methyl tert-butyl ether)	mg/kg	49	7900
NA	Asbestos (No visual ACM)	% w/w	None Detected	<0.001%
pH	BS3882	pH Units	NA	5 - 8.2

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See LQM/CIEH S4ULs Human Health Risk Assessment document for notes regarding derivation.

Criteria for PAH and TPH assumes an SOM of 1%.

*Soil matrix should contain no free product.

All imported material to have chemical concentrations less than the above levels for the site, with the exception of pH which is a range.

Test results to be provided to the engineer prior to placing soils, where appropriate.

All tests result to be undertaken by a UKAS Laboratory holding accreditation for the relevant tests.

Also see drawing XXXX/XX Asbestos Re-use CSM.

APPENDIX B

UXO Clearance Report

The UXO Clearance Reports can be accessed via the link below:

[UXO Clearance Reports](#)

Should you have any issues accessing the above link, please contact Brownfield Solutions.

APPENDIX C

Waste Transfer Notes

The Waste Transfer Notes can be accessed via the link below:

[Waste Transfer Notes](#)

Should you have any issues accessing the above link, please contact Brownfield Solutions.

Victoria House BC212
Running Total - Muck Away

Date	Supplier	Ticket No	Description	Quantity		Running Totals
25/04/2022	J O'shea & Sons	522423	Hardcore	1		1
03/05/2022	J O'shea & Sons	523102	Muck Away	1		2
03/05/2022	J O'shea & Sons	523005	Non Haz	1		3
03/05/2022	J O'shea & Sons	520950	Muck Away	1		4
03/05/2022	J O'shea & Sons	523004	Non Haz	1		5
03/05/2022	J O'shea & Sons	523055	Non Haz	1		6
03/05/2022	J O'shea & Sons	523105	Muck Away	1		7
03/05/2022	J O'shea & Sons	523006	Non Haz	1		8
03/05/2022	J O'shea & Sons	520948	Muck Away	1		9
03/05/2022	J O'shea & Sons	523053	Non Haz	1		10
03/05/2022	J O'shea & Sons	523001	Non Haz	1		11
03/05/2022	J O'shea & Sons	523003	Non Haz	1		12
03/05/2022	J O'shea & Sons	520946	Muck Away	1		13
03/05/2022	J O'shea & Sons	523007	Non Haz	1		14
03/05/2022	J O'shea & Sons	523051	Non Haz	1		15
03/05/2022	J O'shea & Sons	517893	Non Haz	1		16
03/05/2022	J O'shea & Sons	520942	Muck Away	1		17
03/05/2022	J O'shea & Sons	517895	Non Haz	1		18
03/05/2022	J O'shea & Sons	523002	Non Haz	1		19
03/05/2022	J O'shea & Sons	520944	Muck Away	1		20
03/05/2022	J O'shea & Sons	517897	Non Haz	1		21
03/05/2022	J O'shea & Sons	517899	Non Haz	1		22
04/05/2022	J O'shea & Sons	523010	Non Haz	1		23
04/05/2022	J O'shea & Sons	523117	Muck Away	1		24
04/05/2022	J O'shea & Sons	523008	Non Haz	1		25
04/05/2022	J O'shea & Sons	523014	Non Haz	1		26
04/05/2022	J O'shea & Sons	523113	6f2	1		27
04/05/2022	J O'shea & Sons	523119	Muck Away	1		28

04/05/2022	J O'shea & Sons	523013	Non Haz	1		29
04/05/2022	J O'shea & Sons	523107	Muck Away	1		30
04/05/2022	J O'shea & Sons	523009	Non Haz	1		31
04/05/2022	J O'shea & Sons	523011	Non Haz	1		32
04/05/2022	J O'shea & Sons	523110	Muck Away	1		33
04/05/2022	J O'shea & Sons	523115	Muck Away	1		34
04/05/2022	J O'shea & Sons	523112	Muck Away	1		35
04/05/2022	J O'shea & Sons	523012	Non Haz	1		36
04/05/2022	J O'shea & Sons	523121	Muck Away	1		37
05/05/2022	J O'shea & Sons	523130	Muck Away	1		38
05/05/2022	J O'shea & Sons	523128	Muck Away	1		39
05/05/2022	J O'shea & Sons	523133	Muck Away	1		40
05/05/2022	J O'shea & Sons	523127	Muck Away	1		41
06/05/2022	J O'shea & Sons	523139	Muck Away	1		42
06/05/2022	J O'shea & Sons	522627	Non Haz	1		43
09/05/2022	J O'shea & Sons	523458	Non Haz	1		44
09/05/2022	J O'shea & Sons	523467	Concrete	1		45
09/05/2022	J O'shea & Sons	523708	Muck Away	1		46
09/05/2022	J O'shea & Sons	523018	Non Haz	1		47
09/05/2022	J O'shea & Sons	523149	Muck Away	1		48
09/05/2022	J O'shea & Sons	523460	Non Haz	1		49
09/05/2022	J O'shea & Sons	522748	Non Haz	1		50
09/05/2022	J O'shea & Sons	522750	Non Haz	1		51
09/05/2022	J O'shea & Sons	523469	Non Haz	1		52
09/05/2022	J O'shea & Sons	523145	Muck Away	1		53
09/05/2022	J O'shea & Sons	523471	Non Haz	1		54
09/05/2022	J O'shea & Sons	523703	Muck Away	1		55
09/05/2022	J O'shea & Sons	523017	Non Haz	1		56
09/05/2022	J O'shea & Sons	522906	Non Haz	1		57
09/05/2022	J O'shea & Sons	523706	Muck Away	1		58
09/05/2022	J O'shea & Sons	523016	Non Haz	1		59
09/05/2022	J O'shea & Sons	523701	Muck Away	1		60
09/05/2022	J O'shea & Sons	523465	Non Haz	1		61

09/05/2022	J O'shea & Sons	523147	Muck Away	1		62
09/05/2022	J O'shea & Sons	523015	Muck Away	1		63
09/05/2022	J O'shea & Sons	523463	Muck Away	1		64
11/05/2022	J O'shea & Sons	523723	Muck Away	1		65
11/05/2022	J O'shea & Sons	523521	Non Haz	1		66
11/05/2022	J O'shea & Sons	523722	Muck Away	1		67
11/05/2022	J O'shea & Sons	523523	Muck Away	1		68
12/05/2022	J O'shea & Sons	523498	Muck Away	1		69
12/05/2022	J O'shea & Sons	523904	Muck Away	1		70
12/05/2022	J O'shea & Sons	523725	Muck Away	1		71
12/05/2022	J O'shea & Sons	523906	Pile caps	1		72
12/05/2022	J O'shea & Sons	523499	Muck Away	1		73
12/05/2022	J O'shea & Sons	523727	Pile caps	1		74
12/05/2022	J O'shea & Sons	523911	Muck Away	1		75
12/05/2022	J O'shea & Sons	523905	Muck Away	1		76
12/05/2022	J O'shea & Sons	523730	Muck Away	1		77
12/05/2022	J O'shea & Sons	523851	Muck Away	1		78
12/05/2022	J O'shea & Sons	523908	Muck Away	1		79
12/05/2022	J O'shea & Sons	523726	Muck Away	1		80
12/05/2022	J O'shea & Sons	523729	Muck Away	1		81
12/05/2022	J O'shea & Sons	523910	Muck Away	1		82
12/05/2022	J O'shea & Sons	523500	Muck Away	1		83
12/05/2022	J O'shea & Sons	523912	Muck Away	1		84
12/05/2022	J O'shea & Sons	523724	Muck Away	1		85
12/05/2022	J O'shea & Sons	523852	Muck Away	1		86
12/05/2022	J O'shea & Sons	523728	Muck Away	1		87
12/05/2022	J O'shea & Sons	523497	Muck Away	1		88
13/05/2022	J O'shea & Sons	522875	Inert	1		89
13/05/2022	J O'shea & Sons	522876	Muck Away	1		90
13/05/2022	J O'shea & Sons	523919	Muck Away	1		91
13/05/2022	J O'shea & Sons	523918	Muck Away	1		92
13/05/2022	J O'shea & Sons	523920	Muck Away	1		93
13/05/2022	J O'shea & Sons	523924	Muck Away	1		94

16/05/2022	J O'shea & Sons	523748	Muck Away	1		95
16/05/2022	J O'shea & Sons	523861	Inert	1		96
16/05/2022	J O'shea & Sons	523859	Inert	1		97
16/05/2022	J O'shea & Sons	523735	Muck Away	1		98
16/05/2022	J O'shea & Sons	523747	Muck Away	1		99
16/05/2022	J O'shea & Sons	523860	Inert	1		100
16/05/2022	J O'shea & Sons	523865	Pile caps	1		101
16/05/2022	J O'shea & Sons	521642	Muck Away	1		102
16/05/2022	J O'shea & Sons	523862	Inert	1		103
16/05/2022	J O'shea & Sons	523749	Muck Away	1		104
16/05/2022	J O'shea & Sons	523930	Muck Away	1		105
16/05/2022	J O'shea & Sons	523863	Inert	1		106
16/05/2022	J O'shea & Sons	523750	Muck Away	1		107
16/05/2022	J O'shea & Sons	523929	Non Haz	1		108
16/05/2022	J O'shea & Sons	523928	Muck Away	1		109
16/05/2022	J O'shea & Sons	523926	Non Haz	1		110
16/05/2022	J O'shea & Sons	521641	Muck Away	1		111
16/05/2022	J O'shea & Sons	523864	Muck Away	1		112
16/05/2022	J O'shea & Sons	523925	Muck Away	1		113
17/05/2022	J O'shea & Sons	520697	Inert	1		114
17/05/2022	J O'shea & Sons	523866	Inert	1		115
17/05/2022	J O'shea & Sons	521648	Muck Away	1		116
17/05/2022	J O'shea & Sons	520696	Inert	1		117
17/05/2022	J O'shea & Sons	520700	Inert	1		118
17/05/2022	J O'shea & Sons	520698	Inert	1		119
17/05/2022	J O'shea & Sons	521643	Muck Away	1		120
17/05/2022	J O'shea & Sons	520699	Inert	1		121
17/05/2022	J O'shea & Sons	521649	Pile caps	1		122
17/05/2022	J O'shea & Sons	521647	Muck Away	1		123
17/05/2022	J O'shea & Sons	521646	Muck Away	1		124
17/05/2022	J O'shea & Sons	523867	Inert	1		125
17/05/2022	J O'shea & Sons	523869	Inert	1		126
17/05/2022	J O'shea & Sons	523868	Inert	1		127

17/05/2022	J O'shea & Sons	523870	Inert	1	128
17/05/2022	J O'shea & Sons	523871	Inert	1	129
17/05/2022	J O'shea & Sons	523872	Pile caps	1	130
17/05/2022	J O'shea & Sons	521645	Muck Away	1	131
17/05/2022	J O'shea & Sons	520695	Inert	1	132
17/05/2022	J O'shea & Sons	521644	Muck Away	1	133
18/05/2022	J O'shea & Sons	524304	Muck Away	1	134
18/05/2022	J O'shea & Sons	524301	Muck Away	1	135
18/05/2022	J O'shea & Sons	524125	Muck Away	1	136
18/05/2022	J O'shea & Sons	524126	Inert	1	137
18/05/2022	J O'shea & Sons	524305	Muck Away	1	138
18/05/2022	J O'shea & Sons	523304	Muck Away	1	139
18/05/2022	J O'shea & Sons	524128	Inert	1	140
18/05/2022	J O'shea & Sons	524127	Inert	1	141
18/05/2022	J O'shea & Sons	524303	Muck Away	1	142
18/05/2022	J O'shea & Sons	523527	Muck Away	1	143
18/05/2022	J O'shea & Sons	524306	Muck Away	1	144
18/05/2022	J O'shea & Sons	524129	Inert	1	145
18/05/2022	J O'shea & Sons	523305	Muck Away	1	146
18/05/2022	J O'shea & Sons	524131	Inert	1	147
18/05/2022	J O'shea & Sons	523528	Muck Away	1	148
18/05/2022	J O'shea & Sons	523531	Muck Away	1	149
18/05/2022	J O'shea & Sons	523530	Muck Away	1	150
18/05/2022	J O'shea & Sons	524307	Muck Away	1	151
18/05/2022	J O'shea & Sons	523308	Muck Away	1	152
18/05/2022	J O'shea & Sons	523529	Muck Away	1	153
18/05/2022	J O'shea & Sons	524130	Inert	1	154
18/05/2022	J O'shea & Sons	523310	Muck Away	1	155
18/05/2022	J O'shea & Sons	523306	Muck Away	1	156
18/05/2022	J O'shea & Sons	524302	Muck Away	1	157
18/05/2022	J O'shea & Sons	523307	Muck Away	1	158
18/05/2022	J O'shea & Sons	523525	Muck Away	1	159
18/05/2022	J O'shea & Sons	523526	Muck Away	1	160

19/05/2022	J O'shea & Sons	524180	Inert	1	161
19/05/2022	J O'shea & Sons	523533	Pile caps	1	162
19/05/2022	J O'shea & Sons	523312	Muck Away	1	163
19/05/2022	J O'shea & Sons	524184	Inert	1	164
19/05/2022	J O'shea & Sons	523534	Muck Away	1	165
19/05/2022	J O'shea & Sons	524314	Muck Away	1	166
19/05/2022	J O'shea & Sons	523313	Muck Away	1	167
19/05/2022	J O'shea & Sons	523317	Muck Away	1	168
19/05/2022	J O'shea & Sons	524310	Muck Away	1	169
19/05/2022	J O'shea & Sons	524183	Inert	1	170
19/05/2022	J O'shea & Sons	523316	Muck Away	1	171
19/05/2022	J O'shea & Sons	523532	Muck Away	1	172
19/05/2022	J O'shea & Sons	524179	Inert	1	173
19/05/2022	J O'shea & Sons	524309	Muck Away	1	174
19/05/2022	J O'shea & Sons	524313	Muck Away	1	175
19/05/2022	J O'shea & Sons	523311	Muck Away	1	176
19/05/2022	J O'shea & Sons	524308	Muck Away	1	177
19/05/2022	J O'shea & Sons	524178	Inert	1	178
19/05/2022	J O'shea & Sons	523315	Muck Away	1	179
19/05/2022	J O'shea & Sons	523538	Muck Away	1	180
19/05/2022	J O'shea & Sons	524311	Muck Away	1	181
19/05/2022	J O'shea & Sons	523537	Muck Away	1	182
19/05/2022	J O'shea & Sons	523536	Muck Away	1	183
19/05/2022	J O'shea & Sons	524312	Muck Away	1	184
19/05/2022	J O'shea & Sons	523314	Muck Away	1	185
19/05/2022	J O'shea & Sons	524181	Inert	1	186
19/05/2022	J O'shea & Sons	524182	Inert	1	187
19/05/2022	J O'shea & Sons	523523	Muck Away	1	188
no date	J O'shea & Sons	523309	Muck Away	1	189
20/05/2022	J O'shea & Sons	524188	Inert	1	190
20/05/2022	J O'shea & Sons	524189	Inert	1	191
20/05/2022	J O'shea & Sons	524319	Muck Away	1	192
20/05/2022	J O'shea & Sons	524191	Inert	1	193

20/05/2022	J O'shea & Sons	524320	Pile caps	1		194
20/05/2022	J O'shea & Sons	524187	Inert	1		195
20/05/2022	J O'shea & Sons	524317	Muck Away	1		196
20/05/2022	J O'shea & Sons	524186	Pile caps	1		197
20/05/2022	J O'shea & Sons	524190	Inert	1		198
20/05/2022	J O'shea & Sons	524316	Muck Away	1		199
20/05/2022	J O'shea & Sons	524318	Muck Away	1		200
20/05/2022	J O'shea & Sons	524321	Muck Away	1		201
20/05/2022	J O'shea & Sons	523542	Muck Away	1		202
23/05/2022	J O'shea & Sons	524325	Muck Away	1		203
23/05/2022	J O'shea & Sons	524326	Muck Away	1		204
23/05/2022	J O'shea & Sons	524327	Muck Away	1		205
23/05/2022	J O'shea & Sons	524324	Muck Away	1		206
23/05/2022	J O'shea & Sons	524328	Muck Away	1		207
24/05/2022	J O'shea & Sons	521257	Pile caps	1		208
24/05/2022	J O'shea & Sons	521255	Inert	1		209
24/05/2022	J O'shea & Sons	524335	Muck Away	1		210
24/05/2022	J O'shea & Sons	524805	Muck Away	1		211
24/05/2022	J O'shea & Sons	524806	Muck Away	1		212
24/05/2022	J O'shea & Sons	524330	Muck Away	1		213
24/05/2022	J O'shea & Sons	523550	Muck Away	1		214
24/05/2022	J O'shea & Sons	521251	Inert	1		215
24/05/2022	J O'shea & Sons	524329	Muck Away	1		216
24/05/2022	J O'shea & Sons	524801	Muck Away	1		217
24/05/2022	J O'shea & Sons	521252	Inert	1		218
24/05/2022	J O'shea & Sons	524331	Muck Away	1		219
24/05/2022	J O'shea & Sons	524804	Pile caps	1		220
24/05/2022	J O'shea & Sons	521253	Inert	1		221
24/05/2022	J O'shea & Sons	524802	Muck Away	1		222
24/05/2022	J O'shea & Sons	521256	Inert	1		223
24/05/2022	J O'shea & Sons	524803	Muck Away	1		224
24/05/2022	J O'shea & Sons	521254	Inert	1		225
24/05/2022	J O'shea & Sons	524334	Muck Away	1		226

25/05/2022	J O'shea & Sons	524333	Muck Away	1		227
25/05/2022	J O'shea & Sons	524332	Muck Away	1		228
25/05/2022	J O'shea & Sons	524809	Muck Away	1		229
25/05/2022	J O'shea & Sons	524339	Muck Away	1		230
25/05/2022	J O'shea & Sons	524337	Muck Away	1		231
25/05/2022	J O'shea & Sons	524338	Muck Away	1		232
25/05/2022	J O'shea & Sons	524808	Muck Away	1		233
25/05/2022	J O'shea & Sons	524336	Muck Away	1		234
25/05/2022	J O'shea & Sons	524807	Muck Away	1		235
25/05/2022	J O'shea & Sons	524810	Muck Away	1		236
25/05/2022	J O'shea & Sons	524811	Pile caps	1		237
25/05/2022	J O'shea & Sons	524340	Muck Away	1		238
30/05/2022	J O'shea & Sons	525306	Muck Away	1		239
30/05/2022	J O'shea & Sons	524822	Muck Away	1		240
30/05/2022	J O'shea & Sons	524823	Muck Away	1		241
30/05/2022	J O'shea & Sons	525310	Pile caps	1		242
30/05/2022	J O'shea & Sons	524642	Muck Away	1		243
30/05/2022	J O'shea & Sons	524825	Muck Away	1		244
30/05/2022	J O'shea & Sons	525304	Muck Away	1		245
30/05/2022	J O'shea & Sons	524641	Muck Away	1		246
30/05/2022	J O'shea & Sons	525307	Muck Away	1		247
30/05/2022	J O'shea & Sons	524638	Muck Away	1		248
30/05/2022	J O'shea & Sons	525305	Muck Away	1		249
30/05/2022	J O'shea & Sons	524821	Muck Away	1		250
30/05/2022	J O'shea & Sons	524637	Muck Away	1		251
30/05/2022	J O'shea & Sons	524820	Muck Away	1		252
30/05/2022	J O'shea & Sons	524824	Muck Away	1		253
30/05/2022	J O'shea & Sons	525308	Muck Away	1		254
30/05/2022	J O'shea & Sons	524639	Muck Away	1		255
30/05/2022	J O'shea & Sons	524640	Muck Away	1		256
30/05/2022	J O'shea & Sons	524826	Muck Away	1		257
30/05/2022	J O'shea & Sons	524643	Muck Away	1		258
30/05/2022	J O'shea & Sons	525309	Muck Away	1		259

31/05/2022	J O'shea & Sons	524828	Muck Away	1		260
31/05/2022	J O'shea & Sons	524649	Muck Away	1		261
31/05/2022	J O'shea & Sons	524830	Muck Away	1		262
31/05/2022	J O'shea & Sons	524827	Muck Away	1		263
31/05/2022	J O'shea & Sons	524646	Muck Away	1		264
31/05/2022	J O'shea & Sons	525311	Muck Away	1		265
31/05/2022	J O'shea & Sons	525251	Pile caps	1		266
31/05/2022	J O'shea & Sons	524831	Muck Away	1		267
31/05/2022	J O'shea & Sons	524648	Muck Away	1		268
31/05/2022	J O'shea & Sons	524829	Muck Away	1		269
31/05/2022	J O'shea & Sons	524832	Muck Away	1		270
31/05/2022	J O'shea & Sons	524650	Muck Away	1		271
31/05/2022	J O'shea & Sons	524647	Muck Away	1		272
01/06/2022	J O'shea & Sons	524839	Pile caps	1		273
01/06/2022	J O'shea & Sons	524835	Muck Away	1		274
01/06/2022	J O'shea & Sons	524836	Muck Away	1		275
01/06/2022	J O'shea & Sons	524838	Muck Away	1		276
01/06/2022	J O'shea & Sons	524837	Muck Away	1		277
06/06/2022	J O'shea & Sons	525008	Muck Away	1		278
06/06/2022	J O'shea & Sons	525007	Muck Away	1		279
06/06/2022	J O'shea & Sons	525003	Pile caps	1		280
06/06/2022	J O'shea & Sons	525004	Muck Away	1		281
06/06/2022	J O'shea & Sons	525002	Muck Away	1		282
07/06/2022	J O'shea & Sons	525012	Muck Away	1		283
07/06/2022	J O'shea & Sons	524845	Muck Away	1		284
07/06/2022	J O'shea & Sons	525338	Muck Away	1		285
07/06/2022	J O'shea & Sons	524847	Muck Away	1		286
07/06/2022	J O'shea & Sons	524846	Muck Away	1		287
07/06/2022	J O'shea & Sons	525339	Muck Away	1		288
07/06/2022	J O'shea & Sons	525337	Muck Away	1		289
08/06/2022	J O'shea & Sons	525129	Inert	1		290
08/06/2022	J O'shea & Sons	529951	Muck Away	1		291
08/06/2022	J O'shea & Sons	529952	Muck Away	1		292

08/06/2022	J O'shea & Sons	525130	Inert	1	293
25/07/2022	J O'shea & Sons	533378	Pile caps	1	294
01/09/2022	J O'shea & Sons	535767	Muck Away	1	295
01/09/2022	J O'shea & Sons	535933	Muck Away	1	296
01/09/2022	J O'shea & Sons	535766	Muck Away	1	297
01/09/2022	J O'shea & Sons	44392	Concrete Away	1	298
01/09/2022	J O'shea & Sons	534748	Muck Away	1	299
02/09/2022	J O'shea & Sons	536305	Muck Away	1	300
02/09/2022	J O'shea & Sons	534749	Muck Away	1	301
05/09/2022	J O'shea & Sons	536266	Concrete away	1	302
06/09/2022	J O'shea & Sons	536324	Muck Away	1	303
06/09/2022	J O'shea & Sons	536569	Muck Away	1	304
06/09/2022	J O'shea & Sons	534568	Muck Away	1	305
06/09/2022	J O'shea & Sons	536325	Muck Away	1	306
06/09/2022	J O'shea & Sons	536322	Muck Away	1	307
06/09/2022	J O'shea & Sons	534567	Muck Away	1	308
06/09/2022	J O'shea & Sons	536327	Muck Away	1	309
06/09/2022	J O'shea & Sons	534570	Mixed hardcore	1	310
06/09/2022	J O'shea & Sons	534571	Muck Away	1	311
06/09/2022	J O'shea & Sons	536323	Muck Away	1	312
07/09/2022	J O'shea & Sons	536333	Muck Away	1	313
07/09/2022	J O'shea & Sons	536334	Muck Away	1	314
07/09/2022	J O'shea & Sons	534576	Muck Away	1	315
07/09/2022	J O'shea & Sons	534574	Muck Away	1	316
07/09/2022	J O'shea & Sons	534575	Muck Away	1	317
09/09/2022	J O'shea & Sons	536346	Muck Away	1	318
09/09/2022	J O'shea & Sons	536357	Muck Away	1	319
14/09/2022	J O'shea & Sons	535791	Muck Away	1	320
20/09/2022	J O'shea & Sons	534419	Hardcore Away	1	321
21/09/2022	J O'shea & Sons	536048	Muck Away	1	322
27/09/2022	J O'shea & Sons	536934	Muck Away	1	323
21/10/2022	J O'shea & Sons	538409	Muck Away	1	324
21/10/2022	J O'shea & Sons	538410	Muck Away	1	325

[illegible]

APPENDIX C

Photographic Record – Clean Cover System



PHOTO 1



PHOTO 2



PHOTO 3



PHOTO 4

Photo Descriptions

PHOTO NO.	DETAILS
1	VP01 – 500mm topsoil over geomembrane
2	VP01 – 500mm topsoil over geomembrane
3	VP01 view northwest.
4	VP01 view northwest.

REV	DATE	DESCRIPTION	BY	CKD



CLIENT DOMIS CONSTRUCTION LTD	
PROJECT TITLE VICTORIA HOUSE, MANCHESTER	
TITLE PHOTOGRAPHIC VOLUME: CLEAN COVER SYSTEM	
Associated Document Ref No. NS/C4742/12869	PAGE 1 of 3
COMPLIED BY NS	CHECKED BY LC



PHOTO 5



PHOTO 6



PHOTO 7



PHOTO 8

Photo Descriptions

PHOTO NO.	DETAILS
5	VP02 – 450mm topsoil over geomembrane
6	VP01 – 450mm topsoil over geomembrane
7	VP02 view southeast.
8	VP02 & VP03 view northwest.

REV	DATE	DESCRIPTION	BY	CKD



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NS	LC



PHOTO 9



PHOTO 10

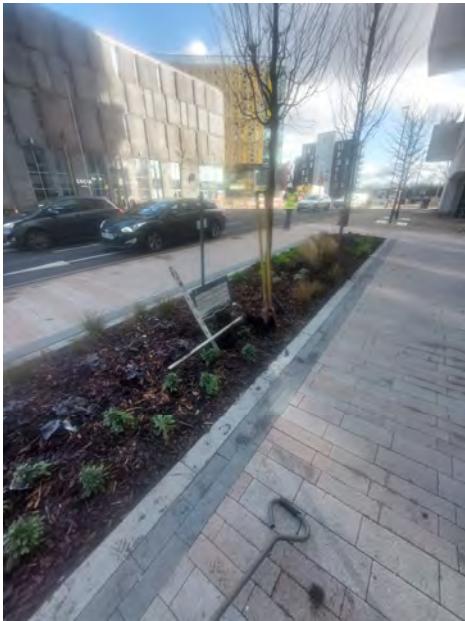


PHOTO 11



PHOTO 12

Photo Descriptions

PHOTO NO.	DETAILS
9	VP03 – 350mm topsoil over geomembrane
10	VP03 – 350mm topsoil over geomembrane
11	VP03 view southeast.
12	VP02 & VP03 view southeast of the tree cells being installed.

REV	DATE	DESCRIPTION	BY	CKD



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