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NEW VICTORIA, MANCHESTER

REMEDIATION VERIFICATION REPORT

VINCI Construction UK Limited

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1 Introduction

1.1 Background Information

Byrne Looby Partners (UK) Ltd (ByrneLooby) were commissioned by VINCI Construction UK Limited to prepare a Verification Report for the new part commercial / residential development named New Victoria, Manchester.

The report provides verification of site material, compares site conditions and soil chemical parameters to the specification for verification as agreed with Manchester City Council in the agreed Remediation Strategy.

This report has been devised to generally comply with the relevant principles and requirements of a range of guidance including:

- Part IIA of the Environment Protection Act, 1990;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (HCA, February 2019);
- BS5930:2015: "Code of practice for site investigations";
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites - Code of Practice";
- The Building Regulations 2010. Part C (HM Government 2013)
- Environment Agency (2011) Report GPLC1 "Guiding Principles for Land Contamination";
- Environment Agency (2017) "The Environment Agency's Approach to Groundwater Protection" November 2017 Version 1.1;
- Environment Agency Guidance (April 2021) Land Contamination Risk Management Land Contamination (LCRM); and,
- Manchester City Council Environmental Protection Group Contaminated Land Section (2016) Planning Guidance in Relation to Ground Contamination: Guidance Note for Applicants, Developers, Land Owners and Consultants, Version 6 September 2016

ByrneLooby's service constraints, report limitations and planning requirements are presented in **Appendix A**.

1.2 Development Proposals

The proposed development of the site is understood to comprise the following:

- Erection of two tower blocks part commercial (ground floor) and residential which are maximum 21No. and 26No. storeys to accommodate 520 apartments, comprising
    - 178 x 1 bed apartments,
    - 286 x 2 bed apartments.
    - 56 x 3 bed apartments)

1.2.1 The proposed site layout is shown in Figure 1.

Figure 1: Extract of VIC-PIE-EZ-ZZ-DR-L-00116_C05 – Planit IE Ltd showing development including soft landscaped areas

The findings and conclusions of the risk assessments have been set out and recommendations given for the proposed Public Open Space residential end use.

1.3 Planning Status & Requirements

The pre-commencement elements of condition 18 were previously discharged under application reference CDN/19/0245 (against condition 21 (part a) attached to planning permission 11777/FO/2016/C1 – prior to the submission and approval of planning permission 128667/JO/2020). There is one planning condition relating to the development of a Remediation Strategy and potential contaminated land which is required to be discharged. This is as follows:

Condition 18

a) *Before each phase (as agreed under Condition 3) of the development hereby approved commences, a report (the Preliminary Risk Assessment) to identify and evaluate all potential sources and impacts of any ground contamination, groundwater contamination and/or ground gas relevant to the site shall be submitted to and approved in writing by the City Council as local planning authority. The Preliminary Risk Assessment shall conform to City Council's current guidance document (Planning Guidance in Relation to Ground Contamination).*

   In the event of the Preliminary Risk Assessment identifying risks which in the written opinion of the Local Planning Authority require further investigation, the development shall not commence until a scheme for the investigation of the site and the identification of remediation measures (the Site Investigation Proposal) has been submitted to and approved in writing by the City Council as local planning authority.

   The measures for investigating the site identified in the Site Investigation Proposal shall be carried out, before each phase (as agreed under Condition 3) of the development commences and a report prepared outlining what measures, if any, are required to remediate the land (the Site Investigation Report and/or Remediation Strategy) which shall be submitted to and approved in writing by the City Council as local planning authority.

b) *When each phase (as agreed under Condition 3) of the development commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a Completion/Verification Report shall be submitted to and approved in writing by the City Council as local planning authority.*

   The verification report should demonstrate completion of works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved, in writing, by the local planning authority.

   The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the site remediation criteria have been met. It shall also include any plan (a "long-term monitoring and maintenance plan") for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action, as identified in the verification plan.

c) *In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before any phase (as agreed under Condition 3) of the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy.*

Condition 21(a) was satisfied through the submission of a previous reports. This report has been designed to fully discharge Condition 21(b and c) relating to the validation of the remediation strategy.

1.4 Scope of the Verification

The scope of works was to meet the requirements to provide information for final verification purposes for the proposed development as agreed with Manchester City Council. The specific activities carried out are as follows:

- Description of the works;
- Records of all imported topsoil, subsoil and soil conditioning material for the site complete with laboratory test certificates demonstrating that the material is suitable for use (if appropriate);
- Photographic Records;
- Description of how the use of materials links with the Remediation Strategy or Design Statement;
- Reference to site investigation data and risk assessments;
- Details of any unexpected contamination encountered and how it was dealt with;
- In order that regulatory compliance can be confirmed, a copy of all site licenses and consents shall be included.

It should be noted that the validation of the remediation and enabling works within residential building footprints plots 1 and 2 has already been carried out by others and detailed within E3P dated November 2021 (Ref: 14-284-R3-1).

1.5 Previous Investigations

A number of previous site investigations have been carried out at the site including the following information:

- Manchester New Victoria Ground Investigation Report prepared by AEG Ltd (April 2016)
- Earthworks and Remediation Performance Specification prepared by Arup (February 2018)
- Ground Investigation Report prepared by Bridgeway Consulting Limited (March 2012)
- Site Investigation Report Volume 1Fieldwork and Volume 2 Laboratory Testing report prepared by Soil Mechanics
- Geotechnical Desk Study prepared by Arup (Jun 2008)
- Site Investigation Report prepared by Vertase FLI Limited (April 2018)
- Ground Investigation Report prepared by Arup (May 2016)
- Foundation Works Risk Assessment Report prepared by Arup (April 2018) (Ref: VICARUP-ZZ-XX-RP-CG-001)
- Ground Investigation Addendum Report prepared by Arup (April 2018) (Ref: VICARUP-ZZ-XX-RP-CG-002)
- Performance Specification for Gas Protection Measures prepared by Arup (May 2018) (Ref: VIC-ARUP-ZZ-XX-SP-CG-002)
- Material Management Plan by E3P dated 02/10/2020 - (Ref: 14-284-r2.2)
- Remediation Strategy and Implementation Plan by E3P dated August 2020 – (Ref: 14-284-R1)
- Remediation and Enabling Works Validation Report by E3P dated November 2021 (Ref: 14-284-R3-1)

2 Site Location and Description

2.1 Site Location

The site is located in the City Centre of Manchester, adjacent to Victoria Railway Station. It is bounded by Victoria Station and Metrolink to the west, Cheetham Hill Road to the north and Corporation Street to the east. The site is centred at National Grid Reference (NGR) 384103, 399014, nearest postcode M3 1NX. The site location is shown in Figure 2.

Prior to the start of the construction phase, ground levels in the main area of the site range from 33.25m above Ordnance datum (AOD) in the south-west to 32.75m AOD in the north-east. There is an existing retaining wall which runs from Cheetham Hill Road in the north of the site and curves round in a southerly direction along Corporation Street and Long Millgate gradually reducing in height. The level difference between the main area of the site and Cheetham Hill Road is approximately 5m. Ground levels of the portion of the site bounded by the existing retaining wall and Corporation Street range from 33.25m AOD to 37m AOD; increasing towards the north-east.

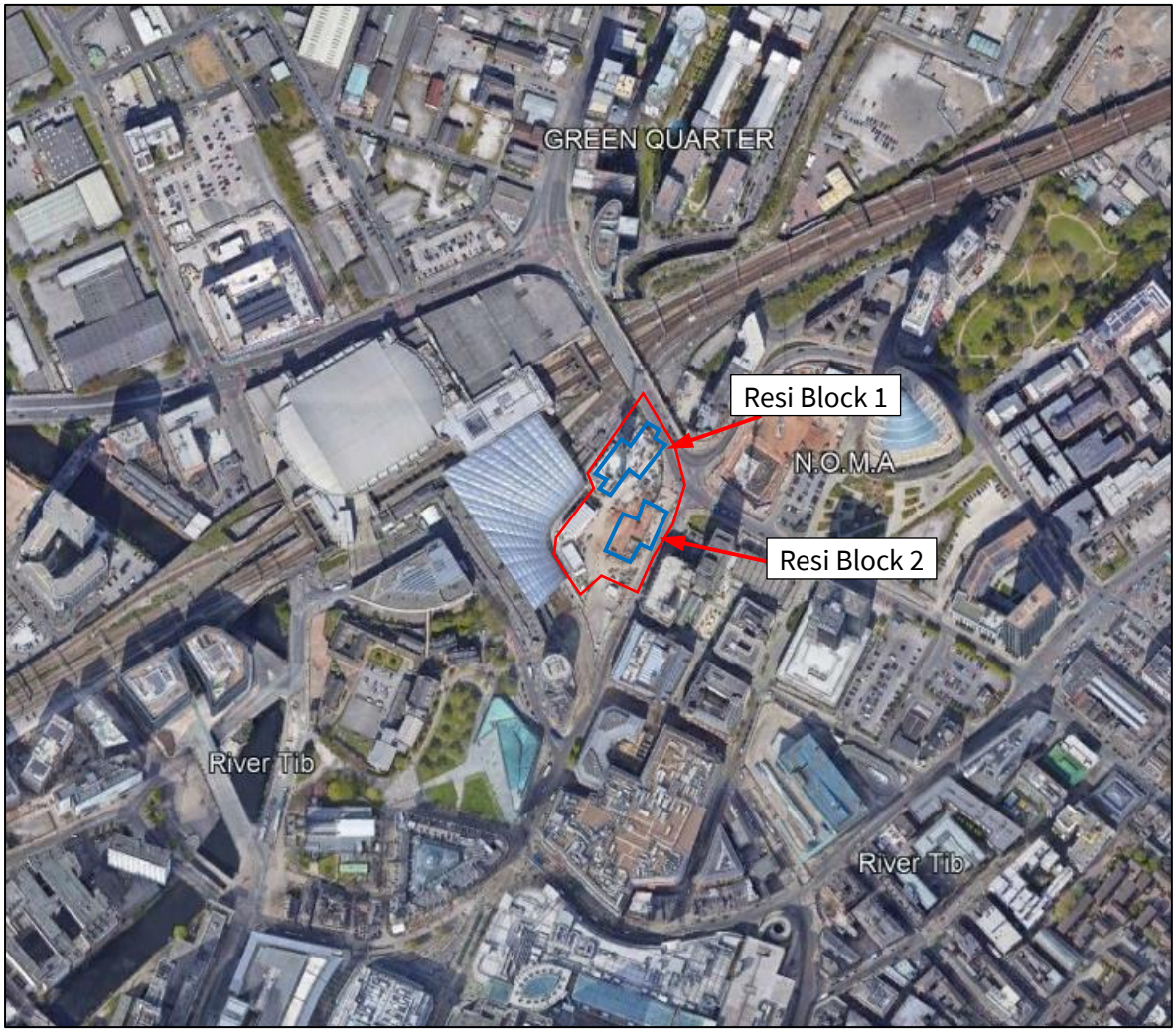


Figure 2: Site Location (Google Earth © 2021)

The construction of the two tower blocks have now been completed. The external areas surrounding the tower blocks comprise a combination of the access roads, block paving and small areas of soft landscaping.

2.2 Site Ownership

2.2.1 Site is understood to be owned by Muse Development.

3 Enabling Works and Verification

3.1 Site Works

E3P were appointed by PP O'Connor (Enabling Works Contractor) as independent Geo-Environmental Consultant to prepare the Remediation Implementation Plan, Material Management Plan (MMP) and Validation Report for the enabling works within blocks 1 and 2. The Validation Report (Ref: 14-284-R3-1) has produced a suitably detailed record to ensure the satisfaction of the relevant planning conditions and geotechnical engineering requirements for Building Control, warranty providers and the future adoption of infrastructure by the Highways Authority and statutory service providers.

The report should be read in conjunction with this report. A summary of the report is given below.

- The purpose of the enabling works was to remove any large buried obstructions and reuse the remaining (suitable) Made Ground within the development areas.
- 33 No verification samples (1 per 200m3) were gathered from Made Ground soils for suitability for re-use on site as per remediation strategy.
- Asbestos was detected within 3 of the 33 samples, however the quantification tests were all <0.001%. Due to the very low concentrations, soils were placed at depth in line with the agreed remediation strategy.
- During the works, Reassurance air testing was undertaken to demonstrate no airborne asbestos fibre were release.

The remediation elements identified within the approved Remediation and Enabling Works Strategy have been completed with validation testing confirming that the works have been completed to the required standard.

4 Gas Protection Verification

4.1 Introduction

The Arup Ground Investigation Addendum Report (VIC-ARUP-ZZ-XX-RP-CG-0002) was carried out to update to the ground contamination risk assessments and provide a remediation strategy.

Within the Arup Report it was considered that site's gas risk has been assessed as Characteristic Situation 2, as defined within CIRIA C665. Allowances were then made for gas protection measures to be installed within the new buildings on site.

A Ground Gas Protection review / design report was carried out by EPG in May 2022(EPG2022/VC/NV/Q2/L01). The report reviewed the risks from ground gases and the suitability of the proposed gas protection measures.

The EPG review of the ground gas risk to the development indicated that following the process defined in BS8485, the site would be classified as Characteristic Situation CS1 (i.e. no protection measures required). This conclusion was considered appropriate as within the CSM there are no sources of gas below the site that could generate volumes of gas large enough to pose a risk of hazardous emissions. In addition to this, much of the Made Ground encountered during the previous site investigations, had been removed during the enabling works.

Regardless of the conclusions of the risk assessment, Arup has specified that the gas protection are required and EPG reviewed the suitability of the proposed protection measures.

Building construction

Block 1 has a ground level slab and no basement (it has lift pits that are shallow).

Block 2 is on a sloping site and has a basement retaining wall around two elevations. The walls and slabs require waterproofing. The basement construction comprises contiguous piled walls with in an internal 200mm thick in situ concrete wall. The floor slabs are suspended 300mm thick insitu concrete. This type of construction has a high inherent resistance to ground gas ingress.

Ground Gas Protection

The waterproofing design also provides various levels of ground gas protection. The combinations of waterproofing systems that used are as follows:

- Waterproof concrete and RIW liquid gas membrane
- Waterproof concrete and RIW Structureseal
- Standard concrete slab and RIW gas seal black or RIW liquid gas membrane.

An assessment of the waterproofing to act as the gas protection system is provided in the Table below.

Table 1 – Acceptance Criteria for Re-use of Site Won Soils (Topsoil and Subsoil)

Structural Barrier (Table 5 BS8485)	Points	Membrane (Table 7 of BS8485)	Points	Total Points
Waterproof concrete (note BS8485 makes a distinction between Grade 2 and Grade 3 for waterproof concrete. No such distinction exists in practice and waterproof concrete can be assigned 2.5 points regardless of the Grade of waterproofing (which is an indication of the internal environment requirements and not the performance of the concrete.	2.5	RIW liquid gas membrane –a single component water based styrene-butadiene copolymer.	2.0	4.5
Waterproof concrete	2.5	RIW Structureseal –is a 1.5mm thick polyethylene membrane with a bonded geotextile for preapplied waterproofing applications. this has been assessed by EPG and meets the requirements for a gas membrane in this site application	2.0	4.5
Standard concrete slab 300mm thick suspended	1.5	RIW gas seal black or RIW liquid gas membrane	1.0	2.5

In all cases the concrete floor construction and the waterproofing/damp proofing membrane provided are adequate for the gas protection system.

The EPG assessment concluded that is no risk of ground gas emissions at this site, however gas protection has been provided in the form of a combination of reinforced concrete walls and floor slabs and waterproofing/gas membranes. The scope of protection is adequate for the level of risk on this site.

4.2 Verification of Protection Measures

Verification of the Gas Protection measures is required in accordance with CIRIA C735. Verification is defined within CIRIA C735 as:

The process of demonstrating that risk has been reduced to meet remediation criteria and objectives based on a quantitative assessment of remediation performance.

It was proposed to apply a 'Moderate Level' of validation processes on this project.

The installation of the gas protection measures were carried out by Mayo Civils. Independent inspection visits were carried out by RIW, Byrne Looby and Vinci to review different elements of the protection measures. A copy of the site inspections are given in Appendix C.

A final inspection of the membrane was carried out by Vinci prior to the pouring the concrete. Photography of the inspections throughout the installation is provided in Appendix C.

Based on the observations made during the site inspections conducted on both buildings, we concluded that an appropriate level of workmanship has been employed during the gas protection installation works, in accordance with the requirement of the design.

5 New water supply pipe

5.1 Introduction

A United Utilities risk assessment was carried out for the new water supply pipe in the two new developments. The TPH results from samples tested within 1.0m exceeded the EC10-16 and many exceed E16-E40 exceed PE threshold and therefore barrier pipe was recommended.

The installation of the new supply pipe was carried out by Ameon Utilities Ltd. The barrier pipe was installed as 110mm diameter pipe from Corporation Street before reducing to 63mm into the Building Blocks. The installation was signed off by United Utilities.

Documentation of the barrier pipe can be found in **Appendix H**.

6 Verification of Topsoil and Subsoil

6.1 Introduction

The remediation strategy outlined in the Arup Ground Investigation Addendum Report (VIC-ARUP-ZZ-XX-RP-CG-0002) indicated that a clean cover system shall be placed in all areas of soft landscaping to provide a barrier over any contaminated soils and provide a suitable growing medium for the proposed planting.

The depth of clean cover required in the soft landscaping areas were determined within drawing VIC-PIE-EZ-ZZ-DR-L-00202_C01. The depth of the cover system depended on the landuse i.e. deepest within the tree pits. The typical thickness within the different landscaped areas are as follows:

- Semi-mature Tree – 400mm Topsoil / 600mm subsoil
- Ornamental Shrub and Herbaceous Planting – 400mm Topsoil
- Hedge Planting – 600mm Topsoil

It should be noted that no unexpected contaminated material was encountered during the cover system installation.

The soft landscaping can be separated into 11No. separate areas on the site. Figure 3 below the location of the soft landscaped areas.

The Topsoil has been specifically imported to site by Tim O'Hare Associates in order to complete landscaped areas, from a greenfield source reference Rabbit Hill GT2. A Topsoil Analysis Report has been issued prior to delivery to site (Appendix G). The report and results indicates that the material is compliant with the British Standard for Topsoil (BS3882:2015).

Subsoil have been specifically imported to site by Tim O'Hare Associates reference Crown Farm Subsoil. A Subsoil Analysis Report has been issued prior to delivery to site (Appendix G). The report and results indicates that the material is compliant with the British Standard for Subsoil (BS8601:2013). It is understood that the subsoil is as greenfield source – as dug natural sand.

Figure 3: Extract of VIC-PIE-EZ-ZZ-DR-L-00116_C05 – Planit IE Ltd showing development including soft landscaped areas

6.2 Site Works

Once delivered to site, the topsoil and subsoil were stockpiled prior to chemical verification testing for use within the soft landscaped areas. Each stockpile was less than 50m3, therefore three samples per source were taken for verification testing. Two stockpiles for each topsoil and subsoil material were required to be used within the soft landscaped areas, therefore 12 samples (6 x topsoil and 6 subsoil) were taken in total.

Table 2 – Acceptance Criteria for imported (Topsoil and Subsoil) Public Open Space residential end use

Analyte	Soil Re-Use and Importation Criteria SGV / GAC / pC4SL / S4UL (mg/kg)	Reference	Analyte	Soil Re-Use and Importation Criteria SGV / GAC / pC4SL / S4UL (mg/kg)	Reference
Metals			**Petroleum Hydrocarbons**		
Arsenic	79	C4SL	Aliphatic C5-C6	570000	S4UL
Cadmium	220	C4SL	Aliphatic C6-C8	600000	S4UL
Chromium III	1500	S4UL	Aliphatic C8-C10	13000	S4UL
Chromium, Hexavalent	21	C4SL	Aliphatic >EC10-EC12	13000	S4UL
Copper	12000	S4UL	Aliphatic >EC12-EC16	13000	S4UL
Lead	630	C4SL	Aliphatic >EC16-EC35	250000	S4UL
Mercury	16	S4UL	Aliphatic >EC35-EC40	250000	S4UL
Nickel	230	S4UL	Aromatic C5-C7	56000	S4UL
Phenol - Monohydric	440	S4UL	Aromatic C7-C8	56000	S4UL
Selenium	1100	S4UL	Aromatic C8-C10	5000	S4UL
Zinc	81000	S4UL	Aromatic >EC10-EC12	5000	S4UL
			Aromatic >EC12-EC16	5100	S4UL
Inorganic			Aromatic >EC16-EC21	3800	S4UL
Sulphate	2400***		Aromatic >EC21-EC35	3800	S4UL
Phenol	120	S4UL	Aromatic >EC35-EC40	3800	S4UL
PAH			**Asbestos**	Not detected (<0.001%) for topsoil and subsoil	Lab LoD
Acenaphthene	15000	S4UL			
Acenaphthylene	15000	S4UL			
Anthracene	74000	S4UL			
Benzo(a)anthracene	29	S4UL			
Benzo(a)pyrene	10	S4UL			
Benzo(b)fluoranthene	7.1	C4SL			
Benzo(g,h,i)perylene	640	S4UL			

Analyte	Soil Re-Use and Importation Criteria SGV / GAC / pC4SL / S4UL (mg/kg)	Reference	Analyte	Soil Re-Use and Importation Criteria SGV / GAC / pC4SL / S4UL (mg/kg)	Reference
Benzo(k)fluoranthene	190	S4UL			
Chrysene	57	S4UL			
Dibenzo(a,h)anthracene	0.57	S4UL			
Fluoranthene	3100	S4UL			
Fluorene	9900	S4UL			
Indeno(1,2,3-c,d)pyrene	82	S4UL			
Naphthalene	4900	S4UL			
Phenanthrene	3100	S4UL			
Pyrene	7400	S4UL			

6.3 Verification of Topsoil and Subsoil – Sampling and Testing

Sampling of the imported material was conducted on the 27th March 2023 and 23rd April 2023 by ByrneLooby personnel.

A total of 6 no. samples of topsoil were analysed. From visual observation, the materials constituted topsoil comprising of "Soft dark brown sandy gravelly CLAY. Gravel is subrounded to rounded fine to medium mudstone, quartzite, and sandstone".

A total of 6 no. samples of subsoil were analysed. From visual observation, the materials constituted subsoil comprising of light brown fine to medium sand.

The soil samples were sent to Derwentside Environmental Testing Services Limited (DETS). This laboratory is UKAS accredited in accordance with ISO17025 and is also MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. The laboratory analysis results are presented in **Appendix E**.

The results of the samples collected were screened against Generic Assessment Criteria (GAC) for Human Health Risk Assessment (LQM/CIEH 2015) for a public open space - residential end-use, sandy soil with 1% SOM and pH 7.0 (presented in Table 3 and **Appendix F**).

All the topsoil and subsoil results passed the relevant screening criteria.

6.4 Description of Topsoil and Thickness

Inspection of the cover system installation has been carried out and Verification photographs are presented in **Appendix D.**

At the time of this report Area 4 and Area 7 were incomplete and will be verified at a later date.

All remaining areas have shown to have the required topsoil and subsoil (when required) therefore comply with the requirements detailed in the remediation strategy and detailed drawings.

7 Conclusions

7.1 Ground Gas Protection Measures

The installation of the gas protection measures were carried out by Mayo Civils and independent inspection has shown no non-conformities. It has been concluded that the installation of the gas protection system on the both buildings has been suitable.

7.2 Clean Cover Depth

The remediation strategy and architect drawings outlined the details of the required clean imported topsoil/subsoil within the soft landscaped areas at the proposed development.

Visual inspection visits were performed by ByrneLooby and photographs showing the verification of depth across selected areas were found to comprise a sufficient clean cover system in accordance with the agreed remedial strategy and Manchester City Guidance.

7.3 Import Material

Laboratory chemical analysis results of recovered samples show the samples do not exceed the agreed GACs (1% SOM). Therefore, the imported material are suitable for use and there is no risk to the future users of the site.

Laboratory analysis results of recovered samples show topsoil and subsoil are generally in compliance with BS3883:2015 and BS8601:2013.

7.4 Conclusions

The report indicates the site has met all the requirements of the remediation as outlined in the remediation strategy agreed with the Manchester City Council.

8 References

- BS 5930 : 2015 : Code of practice for site investigation. British Standards Institution.
- BS 3882: 2015 : Specification for topsoil and requirements for use. British Standards Institution.
- BS 8601: 2013 : Specification for subsoil and requirements for use. British Standards Institution.
- Building Research Establishment : 1994 : Performance of building materials in contaminated land. Author Paul, V
- CL:AIRE : 2016 : CAR-SOIL – Control of Asbestos Regulations 2012. Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials. Industrial Guidance. Contaminated Land: Applications in Real Environments
- Department for Communities and Local Government: 2012 : National Planning Policy Framework, 27th March 2012.
- Department for Environment, Food and Rural Affairs and the Environment Agency: 2002 : Toxicological Reports for Individual Soil Contaminants, Reports TOX 1-10.
- Department for Environment, Food and Rural Affairs and the Environment Agency : 2004: Contaminated Land Report 11 (CLR11): Model Procedures for the Management of Land Contamination. Sept 2004
- Department for Environment, Food and Rural Affairs : 2013 : Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 (December 2013).
- Environment Agency : 2005 : Environment Agency Guidance on Requirements for Land Contamination Reports. Version 1, July 2005.
- Environment Agency : 2008: Updated Technical Background to the CLEA model Science Report SC050021/SR3 and CLEA Model 1.071 (2014)
- Environment Agency : 2008: Human Health Toxicological Assessment of Contaminants in Soil SC050021/SR2
- Environment Agency : 2008: A review of Bodyweight and Height Data Used within the Contaminated Land Exposure Assessment model (CLEA) SC050021/Technical Review 1
- Environment Agency : 2008 : Guidance for the Safe Development of Housing on Land Affected by Contamination. EA/NHBC/CIEH R & D Publication 66.
- Environment Agency : 2010 : GPLC1 – Guiding principles for land contamination. GPLC2 – FAQs, technical information and references. GPLC3 – Reporting checklists.
- Health & Safety Executive : 2013 : Approved Code of Practice: Managing & working with asbestos. Control of Asbestos Regulations 2012.
- HMSO: 1995 : Part 2A of the Environmental Protection Act 1990, as inserted by Section 57 of the Environment Act 1995, was brought into force on 1 April 2000

- LQM/CIEH : 2009 Nathaniel CP, McCaffrey C, Ashmore MH, Cheng YY, Gillett A, Ogden R & Scott D : 2009 . The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd edition). Land Quality Press, Nottingham.
- MAFF : 1998 : Code of Good Agricultural Practice for the Protection of Soils
- Ministry of Housing, Communities & Local Government: 2019 : National Planning Policy Framework, February 2019.
- NHBC : 2018 : NHBC Standards.
- Statutory Instruments: 2012: Health and Safety. The Control of Asbestos Regulations 2012. No. 632 coming into force 6th April 2012.
- Statutory Instruments: 2012: Environmental Protection, England. Contaminated Land (England) (Amendment) Regulations 2012 No. 263 coming into force 6th April 2012.

9 Drawings

List of Drawings

- VIC-PIE-EZ-ZZ-DR-L-00202_C01 - Landscaped details
- VIC-PIE-EZ-ZZ-DR-L-00116_C05 - Garden areas

SOFTWORKS SCHEDULE

Code	Species	Common Name	Height	Girth/Size	Root	Habit/Form	Number
NOTE: All trees must be tagged by Landscape Architect prior to delivery to site.							
TREE PLANTING EVERGREEN							
Pn'A'	Pinus nigra 'Austriaca'	Austrian Pine	6m	20 to 25cm	RB	Standard Semi mature specimen, dense uniform canopy, 2m clear stem, underground guyed, 4-6x transplanted	1
Pc	Pinus cembra	Arolla Pine	6m	20 to 25cm	RB	Standard Semi mature specimen, dense uniform canopy, 2m clear stem, underground guyed, 4-6x transplanted	1
TREE PLANTING DECIDUOUS							
Ap'EC'	Acer platanoides 'Ebbens Column' (Feathered)	Maple	6m	250 to 300cm	RB	Standard semi mature, feathered from base, underground guyed, 4-6x transplanted	5
Ap'EC'	Acer platanoides 'Ebbens Column' (Clear Stem)	Maple	6m	250 to 300cm	RB	Standard semi mature, 2m clear stem, underground guyed, 4-6x transplanted	3

SHRUB AND HERBACEOUS PLANTING (Total Area of Shrub Planting 214m2)					
	Species	Height	Container	Spec	Density
	Achillea 'Moonshine'	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Alchemilla mollis	30-40cm	3L CG	Full Pot	5ltr @ 6/m2
	Agapanthus africanus 'Albus'	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Agastache 'Blackadder'	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Buxus sempervirens	60cm	10L CG	Full Pot, clipped to tight ball	10ltr @ 6/m2
	Calamagrostis acutiflora 'Overdam'	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Luzula nivea	30-40cm	5L CG	Full Pot	5ltr @ 9/m2
	Perovskia 'Little Spire'	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Polystichum munitum	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Pinus mugo 'Mops'	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Stipa tenuissima	30-40cm	5L CG	Full Pot	5ltr @ 6/m2
	Taxus baccata (hedge)	60cm	10L	Instant pre-grown hedging	4/linear m
	Vinca minor	20-30cm	5L CG	Full Pot	5ltr @ 6/m2

PLANTING

Semi-mature Tree Planting
Location: site wide
Size: 600cm height
Spec: 2m clear stem
Note: To be planted into 900mm min. deep substrate

Multi-stem Tree Planting
Location: site wide
Size: 300-500cm height
Spec: Min. 3 breaks
Note: To be planted into 900mm min. deep substrate

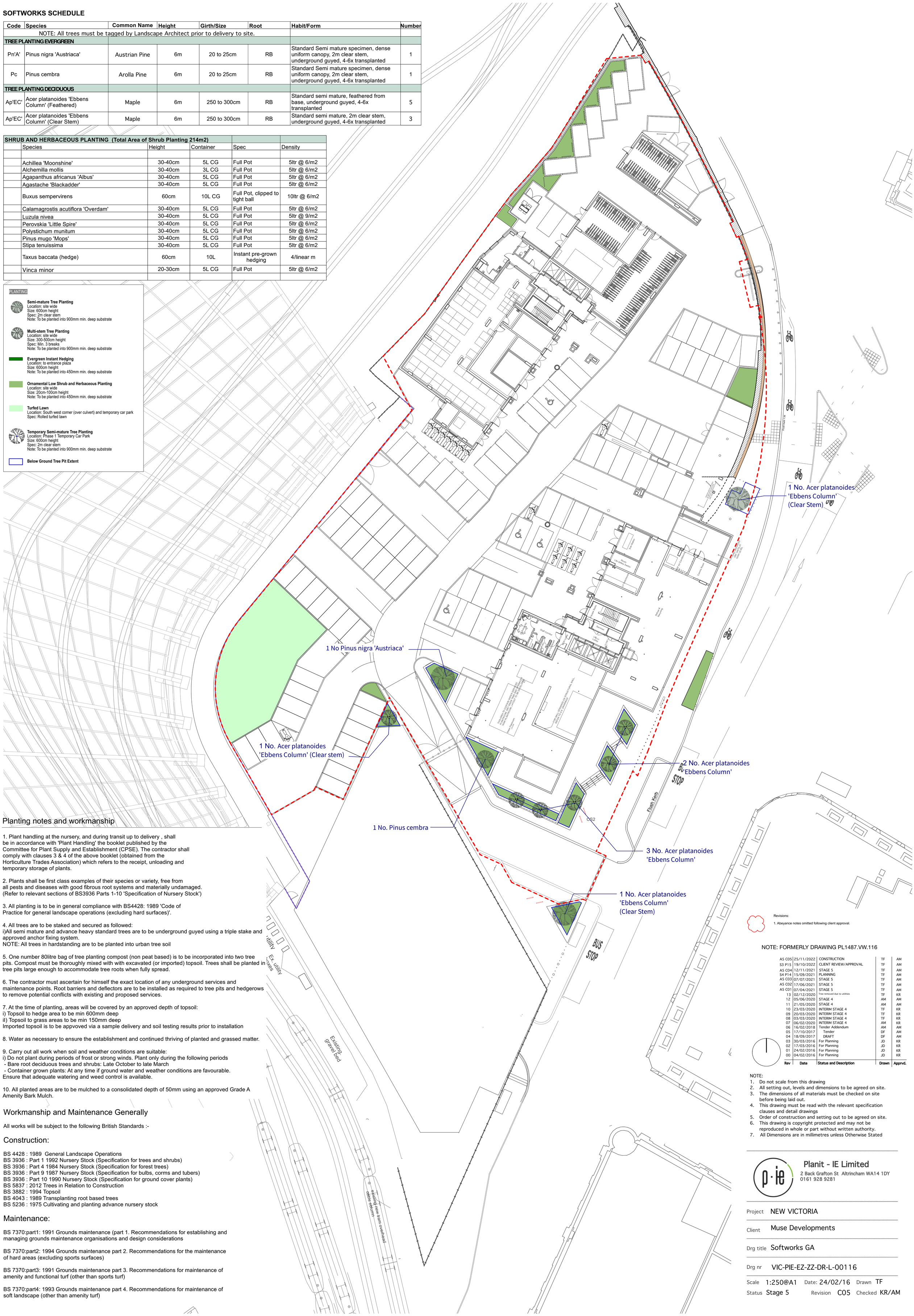
Evergreen Instant Hedging
Location: to entrance plaza
Size: 600cm height
Note: To be planted into 450mm min. deep substrate

Ornamental Low Shrub and Herbaceous Planting
Location: site wide
Size: 20cm-100cm height
Note: To be planted into 450mm min. deep substrate

Turfed Lawn
Location: South west corner (over culvert) and temporary car park
Spec: Rolled turfed lawn

Temporary Semi-mature Tree Planting
Location: Phase 1 Temporary Car Park
Size: 600cm height
Spec: 2m clear stem
Note: To be planted into 900mm min. deep substrate

Below Ground Tree Pit Extent



Planting notes and workmanship

1. Plant handling at the nursery, and during transit up to delivery , shall be in accordance with 'Plant Handling' the booklet published by the Committee for Plant Supply and Establishment (CPSE). The contractor shall comply with clauses 3 & 4 of the above booklet (obtained from the Horticulture Trades Association) which refers to the receipt, unloading and temporary storage of plants.

2. Plants shall be first class examples of their species or variety, free from all pests and diseases with good fibrous root systems and materially undamaged. (Refer to relevant sections of BS3936 Parts 1-10 'Specification of Nursery Stock')

3. All planting is to be in general compliance with BS4428: 1989 'Code of Practice for general landscape operations (excluding hard surfaces)'.

4. All trees are to be staked and secured as followed:
i)All semi mature and advance heavy standard trees are to be underground guyed using a triple stake and approved anchor fixing system.
NOTE: All trees in hardstanding are to be planted into urban tree soil

5. One number 80litre bag of tree planting compost (non peat based) is to be incorporated into two tree pits. Compost must be thoroughly mixed with with excavated (or imported) topsoil. Trees shall be planted in tree pits large enough to accommodate tree roots when fully spread.

6. The contractor must ascertain for himself the exact location of any underground services and maintenance points. Root barriers and deflectors are to be installed as required to tree pits and hedgerows to remove potential conflicts with existing and proposed services.

7. At the time of planting, areas will be covered by an approved depth of topsoil:
i) Topsoil to hedge area to be min 600mm deep
iI) Topsoil to grass areas to be min 150mm deep
Imported topsoil is to be appvoved via a sample delivery and soil testing results prior to installation

8. Water as necessary to ensure the establishment and continued thriving of planted and grassed matter.

9. Carry out all work when soil and weather conditions are suitable:
i) Do not plant during periods of frost or strong winds. Plant only during the following periods
- Bare root deciduous trees and shrubs: Late October to late March
- Container grown plants: At any time if ground water and weather conditions are favourable.
Ensure that adequate watering and weed control is available.

10. All planted areas are to be mulched to a consolidated depth of 50mm using an approved Grade A Amenity Bark Mulch.

Workmanship and Maintenance Generally

All works will be subject to the following British Standards :-

Construction:

BS 4428 : 1989 General Landscape Operations
BS 3936 : Part 1 1992 Nursery Stock (Specification for trees and shrubs)
BS 3936 : Part 4 1984 Nursery Stock (Specification for forest trees)
BS 3936 : Part 9 1987 Nursery Stock (Specification for bulbs, corms and tubers)
BS 3936 : Part 10 1990 Nursery Stock (Specification for ground cover plants)
BS 5837 : 2012 Trees in Relation to Construction
BS 3882 : 1994 Topsoil
BS 4043 : 1989 Transplanting root based trees
BS 5236 : 1975 Cultivating and planting advance nursery stock

Maintenance:

BS 7370:part1: 1991 Grounds maintenance (part 1. Recommendations for establishing and managing grounds maintenance organisations and design considerations

BS 7370:part2: 1994 Grounds maintenance part 2. Recommendations for the maintenance of hard areas (excluding sports surfaces)

BS 7370:part3: 1991 Grounds maintenance part 3. Recommendations for maintenance of amenity and functional turf (other than sports turf)

BS 7370:part4: 1993 Grounds maintenance part 4. Recommendations for maintenance of soft landscape (other than amenity turf)

Revisions:
1. Abeyance notes omitted following client approval.

NOTE: FORMERLY DRAWING PL1487.VW.116

Rev	Date	Status and Description	Drawn	Apprvd.
A5 C05	25/11/2022	CONSTRUCTION	TF	AM
S3 P15	19/10/2022	CLIENT REVIEW/APPROVAL	TF	AM
A5 C04	12/11/2021	STAGE 5	TF	AM
S4 P14	15/09/2021	PLANNING	TF	AM
A5 C03	07/07/2021	STAGE 5	TF	AM
A5 C02	17/06/2021	STAGE 5	TF	AM
A5 C01	07/04/2021	STAGE 5	TF	AM
13	02/12/2020	Tree removed due to utilities	TF	KR
12	05/06/2020	STAGE 4	AM	AM
11	21/05/2020	STAGE 4	AM	AM
10	23/03/2020	INTERIM STAGE 4	TF	KR
09	20/03/2020	INTERIM STAGE 4	TF	KR
08	03/03/2020	INTERIM STAGE 4	TF	KR
07	06/02/2020	INTERIM STAGE 4	AM	KR
06	16/02/2018	Tender Addendum	AM	AM
05	17/10/2017	Tender	DF	AM
04	18/09/2017	DRAFT	DF	AM
03	30/03/2016	For Planning	JD	KR
02	17/03/2016	For Planning	JD	KR
01	24/02/2016	For Planning	JD	KR
00	04/02/2016	For Planning	JD	KR

NOTE:
1. Do not scale from this drawing
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3. The dimensions of all materials must be checked on site before being laid out.
4. This drawing must be read with the relevant specification clauses and detail drawings
5. Order of construction and setting out to be agreed on site.
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7. All Dimensions are in millimetres unless Otherwise Stated

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Project NEW VICTORIA

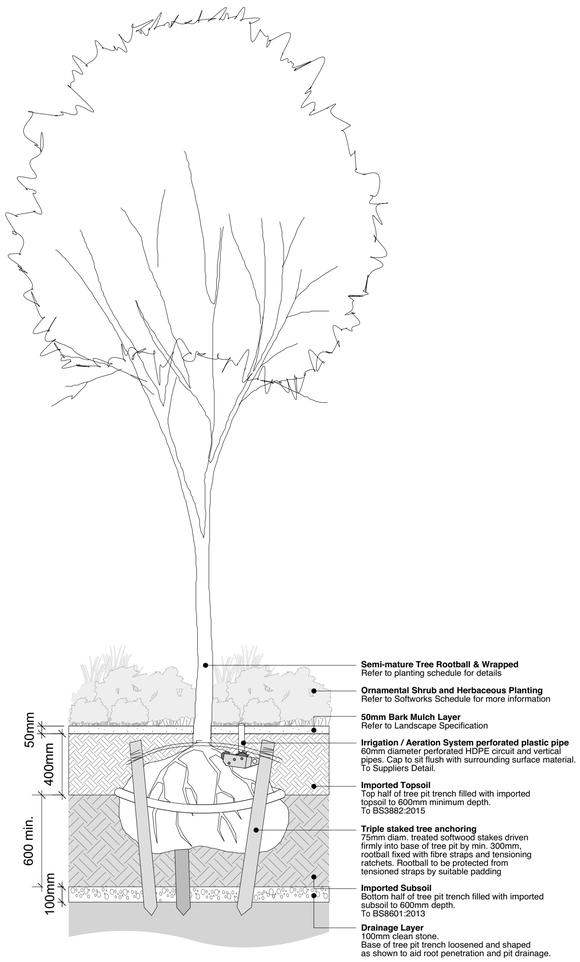
Client Muse Developments

Drg title Softworks GA

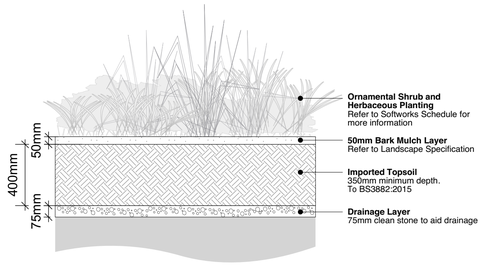
Drg nr VIC-PIE-EZ-ZZ-DR-L-00116

Scale 1:250@A1 Date: 24/02/16 Drawn TF

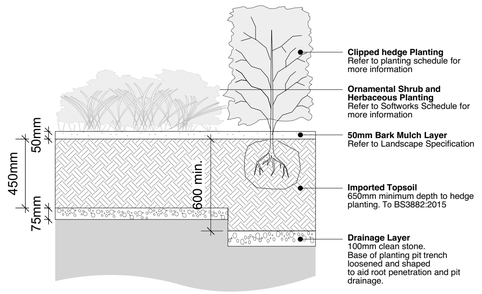
Status Stage 5 Revision C05 Checked KR/AM



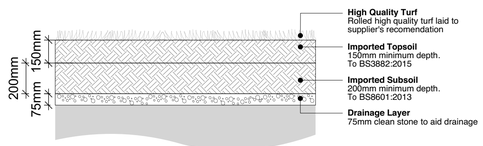
203 Typical Section through Tree Planting in Planting Beds
Section Scale 1:20@A1



204 Typical Section through Ornamental Shrub & Herbaceous Planting
Section Scale 1:20@A1



205 Typical Section through Hedge Planting
Section Scale 1:20@A1



206 Typical Section through Turf Lawn
Section Scale 1:20@A1

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3. All dimensions are in millimetres unless otherwise stated.
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5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

NOTE: FORMERLY DRAWING PL1487.VW.202

LOCATION PLAN

Revision	Date	Description	Drawn	Apprvd.
A5, C01	07-04-21	Stage 5	TF	AM
01	06-02-20	Issued for Interim Stage 4	SR	KR

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Client Muse Developments

Project New Victoria, Manchester

Drg Title Softworks Details

Created on	Created by	Approved by
17.10.2017	CL	DF

Scale	Size	Workstage
1:20	A1	Stage 5

Drg No.	Suitability	Revision
VIC-PIE-EZ-ZZ-DR-L-00202	A5	C01

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Appendix A – Service Constraints, Report Limitations & Planning Requirements

Service Constraints, Report Limitations & Planning Requirements

This consultancy contract, report, and the site investigation (together comprise the "Services") were compiled and carried out by ByrneLooby Partners UK Limited (ByrneLooby) for Anwyl Homes (the "client") on the basis of a defined programme and scope of works and the terms of a contract between ByrneLooby and the "client." The Services were performed by ByrneLooby with all reasonable skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by ByrneLooby taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between ByrneLooby and the client. ByrneLooby Partners UK Limited cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered out with the agreed scope of works.

Other than that, expressly contained in the above paragraph, ByrneLooby provides no other representation or warranty whether express or implied, is made in relation to the Services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of ByrneLooby. If a third party relies on this report, it does so wholly at its own and sole risk and ByrneLooby disclaims any liability to such parties.

It is ByrneLooby's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without ByrneLooby's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of ByrneLooby Partners UK Limited.

The report was written in June 2023 and should be read in light of any subsequent changes in legislation, statutory requirements, and industry practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of ByrneLooby. In the absence of such written advice of ByrneLooby, reliance on the report in the future shall be at the client's own and sole risk. Should ByrneLooby be requested to review the report in the future, ByrneLooby shall be entitled to additional payment at the then existing rate, or such other terms as may be agreed between ByrneLooby and the client.

The observations and conclusions described in this report are based solely upon the Services that were provided pursuant to the agreement between the client and ByrneLooby. ByrneLooby has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. ByrneLooby is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, ByrneLooby did not seek to evaluate the presence on or off the site of electromagnetic fields or materials in buildings (i.e., materials inside or as part of the building fabric) such as asbestos, lead paint, radioactive or hazardous materials.

The Services are based upon ByrneLooby's observations of existing physical conditions at the site gained from a walkover survey of the site together with ByrneLooby's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst ByrneLooby Partners UK Limited have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report. Further ByrneLooby was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. ByrneLooby is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to ByrneLooby and including the doing of any independent investigation of the information provided to ByrneLooby save as otherwise provided in the terms of the contract between the client and ByrneLooby.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and ByrneLooby based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.

Throughout the report the term ‘geotechnical’ is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term ‘geo-environmental’ is used to

describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation, and these two main aspects are inter-related. The geo-environmental sections are written in broad agreement with BS 10175:2011+A2 2017. For the geotechnical aspects of the report, the general requirements of Eurocode 7 (BS EN 1997-2:2007) are to produce a Ground Investigation Report (GIR) which shall form part of the Geotechnical Design Report (GDR). The geotechnical section of this report is intended to fulfil the general requirements of the GIR as outlined in BS EN 1997-2, Section 6. The GIR contains the factual information including geological features and relevant data, and a geotechnical evaluation of the information stating the assumptions made in the interpretation of the test results. This report shall not be considered as being a GDR.

Planning Requirements

The National Planning Policy Framework (NPPF, 2019) emphasises the presumption in favour of sustainable development. Paragraph 11, which defines the presumption in favour of sustainable development, has two similar clauses which related to potentially contaminated land and sensitive receptors:

11) Plans and decisions should apply a presumption in favour of sustainable development.

*For **plan-making** this means that:*

b) strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas, unless:

i) the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type or distribution of development in the plan area;

*For **decision-taking** this means:*

d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:

ii) the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed

In accordance with the NPPF, areas or assets of particular importance are defined as:

Habitats sites (and those sites listed in paragraph 176 – potential Special Protection Areas and Possible Areas of Conservation; listed or proposed Ramsar sites; and sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites) and/or designated as Sites of Special Scientific Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, a National Park (or within the Broads Authority) or defined as Heritage Coast; irreplaceable habitats; designated heritage assets

(and other heritage assets of archaeological interest referred to in footnote 63 (Non-designated heritage assets of archaeological interest, which are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.); and areas at risk of flooding or coastal change.

Paragraph 118 states that planning policies and decisions should:

- *give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;*

Paragraph 170 clarifies that enhancing the natural environment includes:

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- *maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- *minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

Paragraph 180 of NPPF states that planning policies and decisions should ensure the following:

- *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*

Paragraph 178 of NPPF states that planning policies and decisions for developments should also ensure that:

a) *a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);*

b) *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*

c) *adequate site investigation information, prepared by a competent person, is available to inform these assessments.*

Paragraph 179 states that where a site is affected by contamination or land stability issues, responsibility for securing a safe development rest with the developer and/or landowner.

This report has been prepared and authorised by staff that are competent as defined in the NPPF.

Unexploded Ordnance

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 (Stone et al 2009). A non-UXO specialist screening exercise has been carried out for the site by considering any evidence of UK defence activities on or near the site evident from the gathered desk study information and the unexploded aerial delivered bomb (UXB) regional risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experience in the desk study, field investigation and clearance of UXO/UXB.

Appendix B – EPG/2022/VC/NV/Q2/L01

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24 May 2022

Vinci Construction UK Limited

Ref: EPG/2022/VC/NV/Q2/L01

Dear Sirs

New Victoria Residential Development – Ground Gas Protection

We have reviewed the information relating to site history, ground conditions and the waterproofing reports for the site known as New Victoria in Manchester. Our gas risk assessment and review of the gas protection performance of the waterproofing that has been installed is provided below. This relates to methane, carbon dioxide and radon. This assessment and review can be considered to be the design report for the gas protection. It does not cover the verification of the gas protection which has been completed by others.

Author competence

This report has been prepared by Steve Wilson. He is a Chartered Civil Engineer and a UK Registered Ground Engineering Adviser (ROGEP). He is also a Society for Brownfield Risk Assessment Accredited Risk Assessor (ASoBRA) for ground gas and a CL:AIRE accredited Specialist in Gas Protection Verification (SGPV). Steve has 30 years experience of assessing ground gas risk and design of mitigation schemes for developments. This includes assessment of gas from sources such as various types of landfill sites, coal mines and leaking oil and gas wells.

Steve works on projects around the world but mainly in the UK and Australia. He has contributed to British Standards on ground gas assessment and design for developments and also CIRIA and CL:AIRE reports (bodies recognised for producing independent industry guidance on ground gas for developments). He advises local authorities on planning, Part IIA of the Environmental Protection Act 1990 and other issues relating to ground and landfill gas. He provides expert support to several licensed contaminated sites auditors in Australia and also acts as an expert witness in legal claims and planning.

The Site

The site under consideration is a new residential development at Victoria Station in Manchester, comprising two residential apartment blocks. The site is located immediately to the southeast of Manchester Victoria railway station. The site is bounded by Corporation Street to the southeast, Cheetham Hill Road to the north east, Manchester Victoria railway and Metrolink stations to the south east and west. Long Millgate bisects the east portion of the site. Immediately prior to development the site was used as a hard surfaced public car park.

Site history

The site history is summarised below. Only those aspects relevant to ground gas are discussed. The site history is summarised in the Arup 2016 Ground Investigation Report[1]. The site has a long history of changing urban land use since the 1800s. Most significantly it was part of the railway associated with Victoria Station since mid 1800s. Therefore, it is to be expected that Made Ground is present below the site, but that the age of the majority of the Made Ground is such that it contains negligible degradable material and does not pose a risk of hazardous gas emissions to the surface.

There are no high risk sources of ground gas below or near to the site (landfill sites, shallow coal workings or mine entries).

Geology and Ground Conditions

Several phases of ground investigation have been completed at the site. The ground conditions are summarized in the ARUP Specification for the gas protection measures[2]. A summary of the ground conditions is provided in Table 1.

Table 1. Summary of Ground Conditions

Material	Typical Description	Top of Stratum mbgl (mOD)	Proven thickness (m)
Made Ground	Variable in nature and generally described as loose black brown slightly clayey, gravelly sand with some areas described as a gravelly clay. The material contains occasional fragments of glass, wood, ceramic, plastic, brick, concrete, metal, slate, asphalt, coal,	Ground level (32.6 to 35.2)	0.91 to 10.00

[1] Arup, New Victoria, Ground Investigation Report, Reference REP/GEO/21828/01, May 2016
[2] Arup, New Victoria Manchester, Performance Specification for Gas Protection Measures, Reference VIC-ARUP-ZZ-XX-SP-CG-0002, May 2018

Material	Typical Description	Top of Stratum mbgl (mOD)	Proven thickness (m)
Glacial Deposits (localised areas)	Firm yellow brown slightly sandy gravelly clay with high cobble content.	1.5 (31.5)	0.9
Possible River Terrace Deposits (localised areas)	Loose light brown fine to medium sand and fine to coarse gravel.	9.6 (23.2)	0.8
Sherwood Sandstone bedrock	Very weak to medium strong fine to medium grained sandstone. Increasing strength with depth.	0.9 to 10.4 (22.4 to 34.1)	7.90 (max proven)

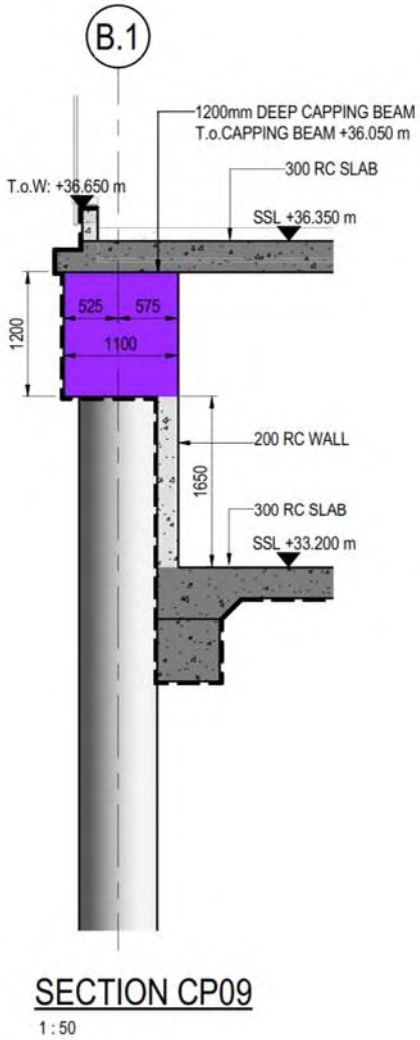
There is no evidence of domestic waste below the site. The TOC content of the finer fraction of the Made Ground varies between 0.5% and 6.8% with an average of 1.6%. This shows there is negligible potential to generate ground gas in large volumes so there is no risk of hazardous emissions.

Groundwater is present in the Sherwood Sandstone at around 8.18m and 9.5m below ground level.

Building construction

Block 1 has a ground level slab and no basement (it has lift pits that are shallow).

Block 2 is on a sloping site and has a basement retaining wall around two elevations. The walls and slabs require waterproofing. The basement construction comprises contiguous piled walls with in an internal 200mm thick in situ concrete wall. The floor slabs are suspended 300mm thick insitu concrete. This type of construction has a high inherent resistance to ground gas ingress. A typical section is shown in Figure 1. There is a section of insitu retaining wall with no piled wall.



The waterproofing for below ground elements has been designed to provide a Grade 2 waterproof environment[3]. Alan Johnston Partnership Drawing Nos VIC-AJP-01-00L-DR-S-00105 and VIC-AJP-02-00L-DR-S-00105 show that the lower ground floors are not used for habitable space and will be used as refuse and recycling areas, lift lobby, lift shafts, plant rooms, cycle stores, staff rooms and showers and similar. This means that the areas are under the control of the building owners/operators and not individual householders.

The waterproofing/dampproofing design is shown in Figures 2 and 3.

[3] Phil Hewitt Associates, Waterproofing Scheme for Development at New Victoria, Manchester, Reference PHA/GEN/L/446, 7/3/2022.

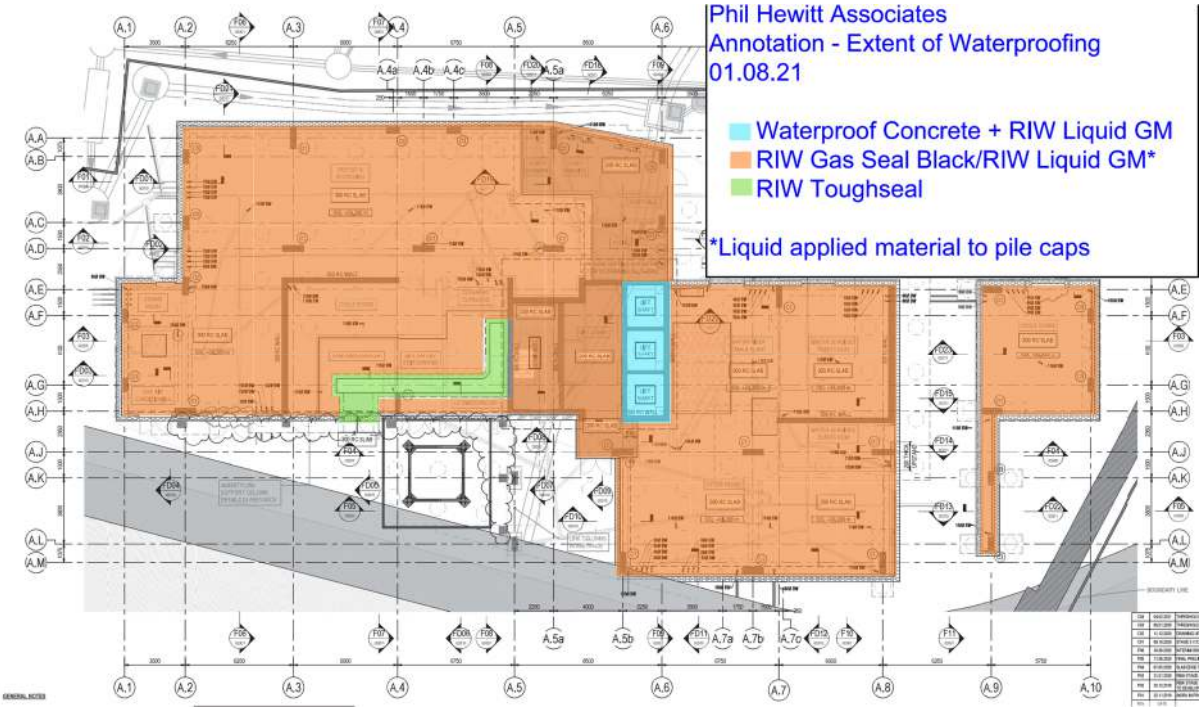


Figure 2 Waterproofing Block 01

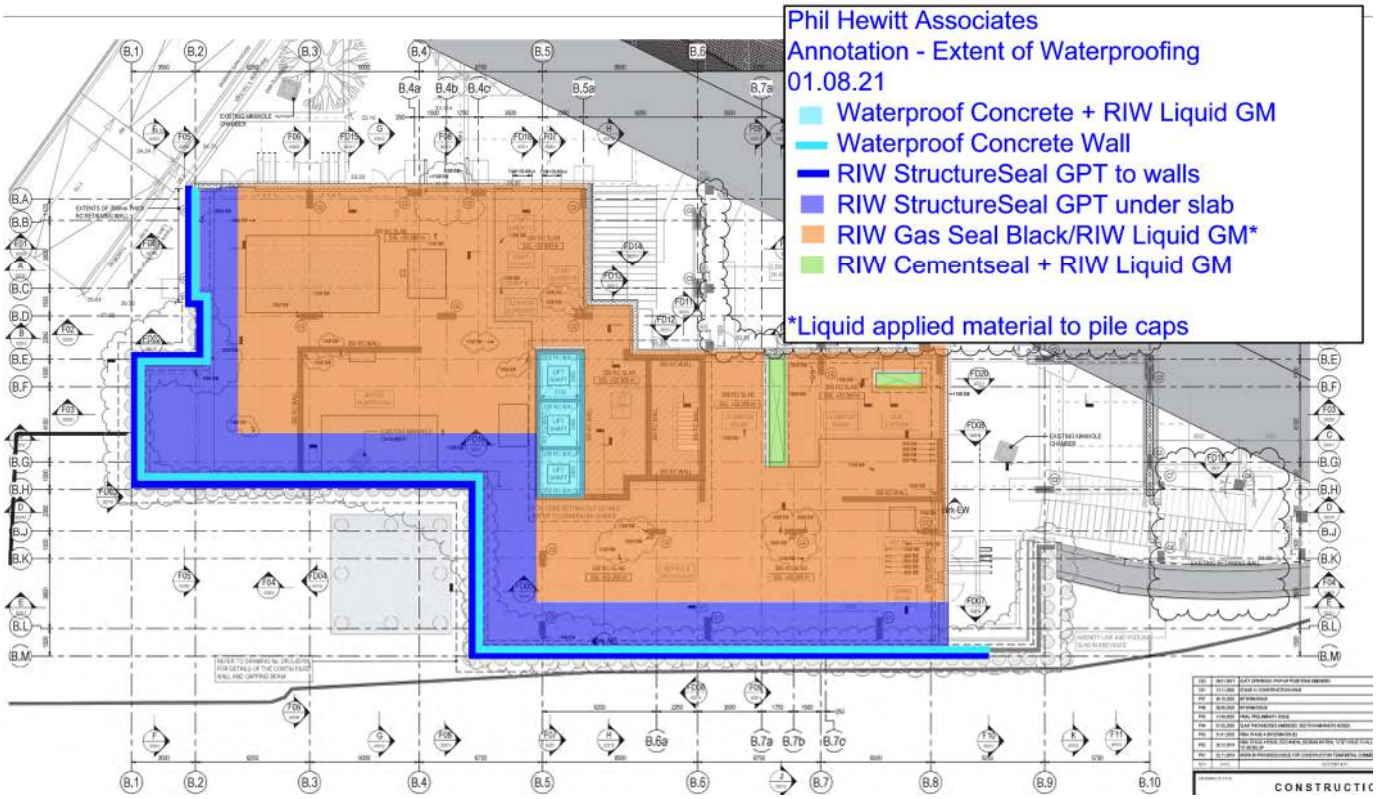


Figure 3 Waterproofing Block 02

Gas monitoring

Gas monitoring has been completed over several phases by ARUP and VertaseFLI Limited. Following the process in BS8485 correctly would classify the site as Characteristic Situation CS1. This is because when considering the CSM there are no sources of gas below the site that could generate volumes of gas large enough to pose a risk of hazardous emissions. Methane has not been detected at elevated concentrations in the wells and the main risk driver is carbon dioxide. This is shown in the ternary plot of results in Figure 4 to be cause by biological respiration. This is a natural process that occurs widely, and the generation rates are negligible (certainly insufficient to cause hazardous emissions into the buildings).

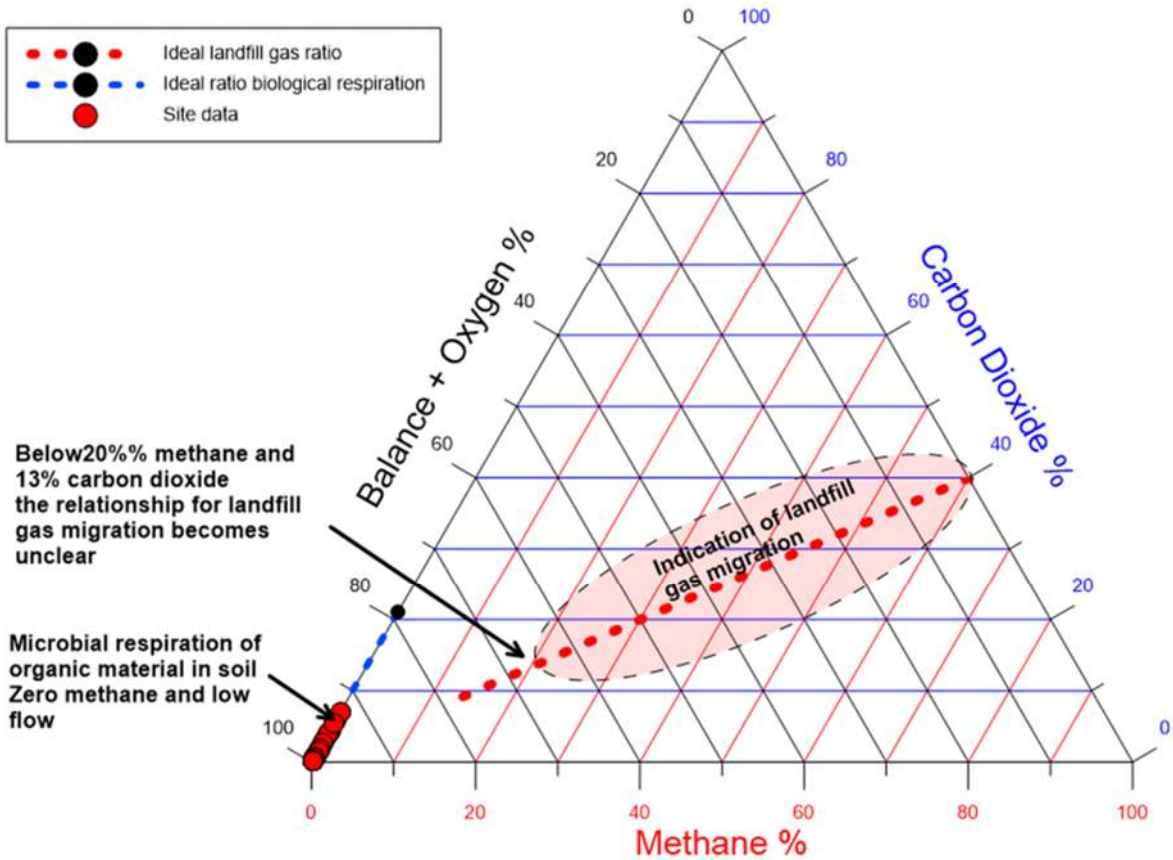


Figure 4 Ternary plot of gas monitoring results

Furthermore, a data quality check of the monitoring response zones shows that the wells in which higher flow rates were recorded are all likely to be influenced by air flow from the underlying sandstone:

- BHA01 – response zone extends close to sandstone. There is a short seal above the sandstone (0.7m) with a 19mm pipe that extends deeper which provides a high risk of connection to the sandstone.
- BHA02 – Extends to the sandstone with short seal (0.9m).
- BHA07 – Response zone extends to the top of the sandstone.

Such results should not be used to assess hazardous gas flow rates or determine gas screening values because they are not representative of diffuse gas flow through the overlying Made Ground.

Notwithstanding the above Arup has specified that gas protection should be provided to meet the requirements of Characteristic Situation CS2 as define in the screening approach in BS8485.

Ground Gas Protection

The waterproofing design also provides various levels of ground gas protection. The combinations of waterproofing systems that have been provided are as follows:

- Waterproof concrete and RIW liquid gas membrane
- Waterproof concrete and RIW Structureseal
- Standard concrete slab and RIW gas seal black or RIW liquid gas membrane.

An assessment of the waterproofing to act as the gas protection system is provided in Table 2.

Table 2 Gas protection system points

Structural Barrier (Table 5 BS8485)	Points	Membrane (Table 7 of BS8485)	Points	Total points
Waterproof concrete (note BS8485 makes a distinction between Grade 2 and Grade 3 for waterproof concrete. No such distinction exists in practice and waterproof concrete can be assigned 2.5 points regardless of the Grade of waterproofing (which is an indication of the internal environment requirements and not the performance of the concrete.	2.5	RIW liquid gas membrane –a single component water based styrene-butadiene copolymer. When applied correctly two coats should produce a dry film thickness of 1mm. The Gas Transmission Rate (as required by BS8485) is not stated. The "methane permeability" is stated on the data sheet but units and test method are not stated. From the value quoted it appears the value is in fact a diffusion coefficient. In any event this has been assessed by EPG and meets the requirements for a gas membrane in this site application	2	4.5
Waterproof concrete	2.5	RIW Structureseal –is a 1.5mm thick polyethylene membrane with a bonded geotextile for preapplied waterproofing applications. this has been assessed by EPG and meets the requirements for a gas membrane in this site application	2	4.5

Structural Barrier (Table 5 BS8485)	Points	Membrane (Table 7 of BS8485)	Points	Total points
Standard concrete slab 300mm thick suspended. The main floor slab does not require waterproofing. The slab is standard concrete and the membrane only acts a s a damp proof membrane.	1.5	RIW gas seal black or RIW liquid gas membrane. The RIW gas seal black is only 0.6mm thick overall. The product is not manufactured by RIW but it appears from inspection to be a rebranded product from a other manufacturer. Although not stated on the RIW data sheet the membrane is only 0.4mm thick between the reinforcing scrim. It contains an aluminum core layer from which it derives a very low gas transmission rate. However foil membranes are not normally considered suitable by EPG in below ground and below concrete applications such as this. This is because the foil layer is prone to rupture and/or corrosion (See Lucas and Wilson[4]) if the thin plastic layer is damaged. However in this site it is acceptable because of the minimal gas risk. It is assigned only one point because of the high risk of defects below this type of floor construction. This is based on an assessment of the likely gas migration through the membrane if the aluminum is corroded	1	2.5

The lower ground floors are considered to be Type C structures as defined in Table 3 of BS8485 (there is central building management of any alterations to the building or its uses). There is in effect single occupancy of the lower ground floor and there will be good ventilation. Therefore, the building gas protection system should provide a total of 2.5 points in accordance with table 4 of BS8485.

In all cases the concrete floor construction and the waterproofing/dampproofing membrane provided are adequate for the gas protection system. Therefore, the detailed design and the specification for the waterproofing also provides the gas protection and a separate design report and drawings are not necessary. The verification plan for the installation (which is required because the system is acting as a gas protection system, following BS8485) was prepared by TerraConsult[5]. The TerraConsult report also includes the design drawings in an Appendix.

The design drawings are considered adequate from a gas protection perspective.

Conclusion

There is no risk of ground gas emissions at this site. However gas protection has been provided in the form of a combination of reinforced concrete walls and floor slabs and waterproofing/gas membranes. The scope of protection is adequate for the level of risk on this site.

[4] Lucas J and Wilson S (2020) Corrosion and puncture resistance of aluminium foil gas membranes beneath concrete slabs. Geosynthetics International 27 4 August 2020

[5] TerraConsult, New Victoria, Manchester, Gas Remediation Strategy and Verification Plan.

Please do not hesitate to contact me if you have any questions.

Yours faithfully

Steve Wilson MSc BEng CEng MICE CEnv CSci CWEM MCIWEM FGS
UK Registered Ground Engineering Advisor
Society of Brownfield Risk Assessment Accredited Risk Assessor, Permanent Gas and Vapour Intrusion

Technical Director
On behalf of The Environmental Protection Group Limited
Tel 07971 277869

Appendix C– Gas Protection Surveillance Visits

Appendix C– Gas Protection Surveillance Visits

RIW

C

Project Name:	**New Victoria, Manchester**	
ITP reference:	**ITP050.2021**	
Project ITP Number:	**ITP050.002**	
Date of surveillance visit:	**7th April 2021**	
Surveillance visit by:	**Martin Radford**	**RIW Ltd**
	Aiden Quinn	**RIW Ltd**
Principle attendee(s):	**Dave Taylor**	**Mayo Civils**

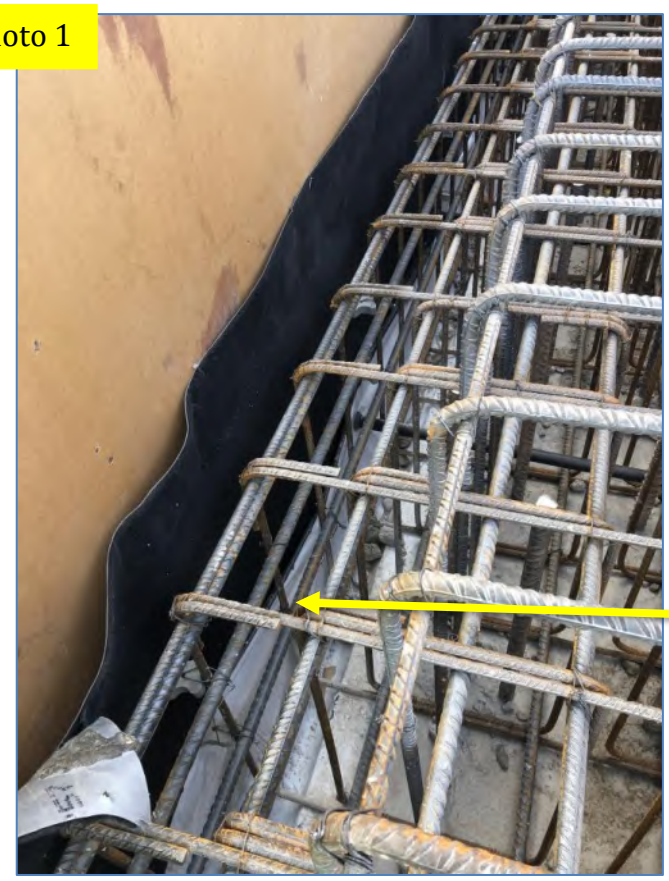
Principle areas inspected:

- **Piles heads & capping beam along gridline BM (between B6 & B9)**

Observations:

The RIW Structureseal GPT had been installed and was fully bonded to the poured concrete satisfactorily. There was an adaption to the base detail where the RIW Strutureseal GPT was bonded to the RIW Sheetseal GR at the pile head. This was discussed, and agreed as satisfactory provided;
The fleece layer on the back of the RIW Structureseal GPT was removed to ensure an intimate bond between the RIW Sheetseal GR which extended from the pile head detail, and returned up the inner face of the shutters, see photo 1.

Photo 1



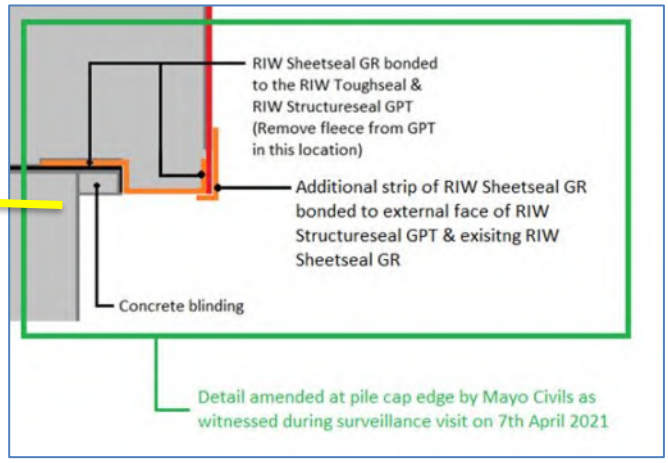


Photo 2

Photo 3

See photo's 2 & 3 above where Mayo Civils are being diligent in identifying and sealing penetrations, such as tie bolt holes and other defects at overlaps within the RIW Structureseal GPT system. Visual inspections should continue to identify other potential defects, such those shown in photo's 4 & 5, and these should be sealed accordingly as work proceeds.

Photo 4

Crease within the membrane and a tie wire penetration need sealing off.

Photo 5

Concrete over spill needs removing prior to completing the pile cap detail. Membrane integrity will need to be confirmed at this location to ensure continuity of water & gas proofing up to DPC.

Photo 6

Ensure RIW Sheesteal GR is applied tight to the substrate.

Ensure that the RIW Sheesteal GR is installed without any voids between the membrane and the substrate. The membrane needs to follow the contours of the substrate, see photo 6 as an example.

RIW Limited, Arc House, Terrace Road South, Binfield, Berkshire, RG42 4PZ
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www.riw.co.uk

Comments

- Please note, RIW do not sign off installations or workmanship, that is the responsibility of others. RIW will undertake surveillance visit and comment on their products. As such and as discussed on site, please supply regular digital photography of the installation for comment between surveillance visits.
- Please ensure that any changes to the agreed site specific drawings or manufacturer's instructions are discussed and agreed with the design team, manufacturer and approved by the designer who holds design responsibility.
- To date, we understand that the gas proofing installation has not been inspected by the independent validation consultant.

Date of next visit: TBC

Concrete over spill has been removed. Membrane was confirm to so show no damage
Penetration through crease has been sealed appropriately.

RIW Inspection & Test Plan

Project:	**Manchester New Victoria**	**Location:**	Todd Street, Manchester, M3 1WY
RIW ITP Reference:	**ITP.056.021**	**ITP Visit Requested By:**	**Mayo Civils**
Project ITP Number:	**ITP.056**	**Name:**	**Dave Taylor**
		Company:	Mayo Civils

Has a Benchmark Sample Panel Been Installed For Comparison? ☐ **NO**

Location of Inspection **(Include reference to relevant drawings):** Residential Block 1 (West side) area shown in GA plan attached at the bottom of report.

Construction Activity **(Description):** RIW Gas Seal Black – Sheetseal GR detailing around concrete upstands.

Hold / Witness Point **(Description):**

Inspection Date:	11/08/2021	Undertaken By:	Aiden Quinn (On behalf of RIW Limited)
Inspection Time:	10:30am		

	Principle Attendees	Company	Position
1	Aiden Quinn	RIW	Technical Advisor
2	Dave Taylor	Mayo Civils	Project Manager
3			

Comments / Observations:

Inspection of RIW Gas Seal Black applied underneath Residential Block 1 on the west side. Membrane was well applied and all laps sealed correctly and in accordance with the manufacture recommendations.

Membrane was in good condition with steel in place ready for concrete slab been poured. No damage or penetrations where spotted.

External application of Sheetseal GR all in accordance with manufacture recommendations and mark-ups. Membrane was applied well and all overlaps and corner details very well installed.

Non-Conformities Identified

NO ☐ ☐

(If yes, see over)

Gas seal black applied under steel reinforcement prior to slab been poured.

Typical Slab edge detail, Sheetseal GR linked to the Gas Seal Black membrane below slab.

Sheetseal GR applied with block work installed on top of upstand.

Use Sketch box above if required

Non-Conformities and Corrective Measures

Project:	Manchester New Victoria	Location:	Manchester
RIW ITP Reference:	RIW.ITP.056	Project ITP Number:	ITP.056.020

	Description of Non-Conformity 1	Non-Conformity 1 - Corrective Measure
1		

2		

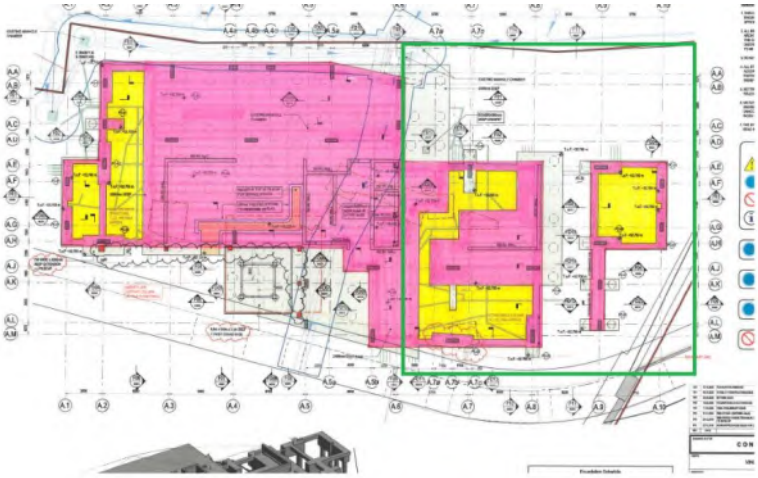
Location:

Additional Supportive Comments:

Non conformities to be rectified and record taken

Submitted By:	Aiden Quinn (On behalf of RIW Limited)	Date:	11.08.21

As part of the agreed Inspection & Test Plan RIW will undertake scheduled and unscheduled visits to inspect product installations at agreed hold, witness or surveillance points. RIW will provide comments and observations, with reference to 'benchmarks' (where applicable), and provide guidance on further corrective action if required. RIW do not provide an installation warranty as the application of the products is beyond our control, and the installer / contractor must therefore warrant the work carried out by them. If required, RIW can provide a list of specialist waterproofing contractors. These companies may be able to provide a company or insurance backed guarantee that covers the installation of the products. It is the responsibility of the contractor to ensure the areas inspected are protected from subsequent damage and notify RIW and / or the installer should any alterations be undertaken to the design or products in the above areas.



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Appendix C– Gas Protection Surveillance Visits

BYRNELOOBY

D

BYRNELOOBY

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sthelens@byrnelooby.com
www.byrnelooby.com

Tuesday 14 September 2021
Ref: 16-04865-000/GEO/LT/01

Theo Coleman <Theo.Coleman@vinciconstruction.co.uk>
VINCI Construction UK Limited
New Victoria Development
Long Millgate
Manchester
M3 1NX

Re: New Victoria, Manchester – 16-04865-000
Gas Protection inspection Site Visit – Pre- Verification Report

Dear Theo,

Byrne Looby Partners (UK) Limited (ByrneLooby) has been instructed to carry out an independent site inspection of the gas protection measures installed on residential building 1 at the New Victoria development in Manchester. The site visit

ByrneLooby (formerly TerraConsult Ltd) previously carried out ground gas risk assessment for the two proposed residential multi-storey apartment blocks. The conclusion of the gas risk assessment indicated that due to the carbon dioxide concentrations Characteristic Situation 2 gas protection measures should be adopted for the development in line with BS8485:2015+A1:2019.

Based on BS8485:2015 + A1:2019 Table 3 the new building can be classed as a Type C buildings (commercial/ Public buildings) and from Table 4 of this standard a Score of 2.5 points of protection will be required for Characteristic Situation 2 ground gas conditions.

- Cast in-situ, monolithic, reinforced ground-bearing raft or reinforced, cast in-situ, suspended floor slab with minimal penetrations cast in (up to 1.5 protection points if well-reinforced to control cracking – Table 5 of BS 8485:2015) or a cast in-situ, ground-bearing floor slab (with only nominal mesh reinforcement at 0.5 protection points);
- Basement floor and walls to BS 8102:2009, Grade 3 waterproofing - See notes in BS8485:2015+A1:2019 at 2.5 protection points
- Gas-resistant membrane meeting the criteria in Table 7 of BS 84585:2015 and meeting the criteria in BS ISO 15105-1. Independent verification of the installation of the membrane according to CIRIA C735 (2 protection points).

Verification is required in accordance with CIRIA C735. Verification is defined within CIRIA C735 as:

> *The process of demonstrating that risk has been reduced to meet remediation criteria and objectives based on a quantitative assessment of remediation performance.*

Following the installation of each component that contributes to the gas protection score, verification is required, in accordance with BS8485 and CIRIA document C735 'Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases' (2014).

BS8485 states that "The installation and verification report should present an accurate description of the measures actually applied and present the evidence gathered to confirm that installed measures are suitable for purpose.

The risk based approach identified within CIRIA C735 guides the verification plan to consider the following:

- Site specific gas regime
- No. of plots
- Complexity of the design and installation
- Qualifications and experience of the workforce (Construction Skills level 2 NVQ diploma)

The site is considered as the following:

- Well characterised as CS2 - Green
- Proposed commercial development is large - red
- The foundations and gas protections measures are relatively complex - red
- Gas protection measures will be installed by combination of general builders (sub-floor void etc) with the membrane installed by a specialist contractor, which have extensive experience at installing gas protection systems - orange

The factors above have shown a range of 'green' to red as identified in Figure 3.1 of CIRIA C735. Therefore, the role of the independent verification of the gas protection measures is important. It is proposed to apply a 'Moderate Level' of validation processes on this project.

Verification/validation of gas membrane installation

- inspection of the products being used (membrane, tape, propriety top hats etc.) to ensure they are as specified
- laps are sufficient in length with edges, seams, service penetrations all sealed.

A site visit was carried out on the 29th June 2021. The chosen gas membrane is the RIW – Gas seal black, which is a four-layer, low density polyethylene membrane reinforcing grid with an integral aluminium foil. The membrane was inspected and no tears or punctures in the membrane were found. There was sufficient overlap of at least 150mm between membrane sheets with RIW 50mm double sided butyl tape and RIW foil tape used to connect the membranes. The joins and seams were inspected by the Byrne Looby personnel and deemed suitable. However, at the time of the inspection, the gas protection measures were incomplete. It is understood further inspection of the gas protection measures have been carried out by others.

Photographic records of the site inspection are recorded in Appendix A. Records of the site visit are recorded in Appendix B on the has verification inspection sheet as per C735.

Yours sincerely
For ByrneLooby,

_____
J Thorburn
BSc FGS
Principal Geologist

APPENDIX A – SITE INSPECTION PHOTO RECORDS

DOCUMENT NO.	16-K4865-002
PROJECT	New Victoria, Manchester
JOB NUMBER	16-K4865

SITE VISIT RECORD

DOCUMENT CONTROL			
Revision	Date	Prepared by	Checked & Review by
00	29/06/2021	J Thorburn	Kourosh Azimi

VISIT DETAILS	
Client Name.	Vinci Construction
Site name	New Victoria, Manchester
Project description	Ground Gas Protection Verification site visit – Residential Building 1
Date of visit	29/06/2021
BL Engineer(s) in attendance	J Thorburn
Also in attendance	-
Weather	Dry, sunny intervals
Site Location	New Victoria, Manchester.

PHOTOGRAPHIC RECORD.

Figure 1: Photo showing the sand blinding layer prior to the membrane installation

Figure 2: Photo showing the extent of membrane installation at time of visit

Figure 3: Photo showing sand blinding and service penetrations and overlapping along membrane prior to sealing

Figure 4: Membrane installation along building edge and columns

Figure 5: Membrane installation along building edge and columns

Figure 6: Membrane installation along building edge, service penetrations and columns

Figure 7: Membrane installation with manhole penetrations prior to completion

Figure 8: Membrane installation with manhole penetrations

Figure 9: Membrane installation with manhole penetrations

Figure 10: Membrane installation with service penetrations completed

APPENDIX B – GAS PROTECTION VALIDATION RECORD

Copied directly from Appendix A5 CIRIA C735

VISUAL INSPECTION OF GAS PROTECTION MEASURES

Site name: New Vic, Resi Building 1		Gas characteristic situation: CS2
Job number: 16-04865-000		Type of development and building/block checked: Multi-storey resi apartment block
Date: 29/06/2021		Building description:
Visit by: J Thorburn		Foundation type: Basement / reinforced slab
Weather at time of inspection: Dry		Gas protection type: passive
No.	Item	Comments (installation measure were not complete at time of visit)
1 Gas Membrane		
1.1	Condition of sub-grade and underside of gas membrane	Single sized sand used as blinding layer to reduce chance of penetrations through membrane
1.2	Gas membrane type	RIW GAS SEAL BLACK - four-layer, low density polyethylene membrane reinforcing grid with an integral aluminium foil.
1.3	Gas membrane condition	No signs of heavy traffic, tears, rips or stretching
1.4	Joining tape product	RIW gas seal tape - double-sided self-adhesive butyl tape for sealing between overlaps in the membrane
1.5	Lapping design	min 150mm overlapping
1.6	Laps, welds and joints seals	appropriate joining/double sided tape
1.7	Service entries seals	appropriate top hat arrangement observed at various stages of completion during site visit
2 Passive Venting		
2.1	Sub-floor void :	N/A
2.2	External wall airbricks	N/A
2.3	Internal sleeper walls	N/A
2.4	External vent trenches/ducts	N/A
3 Active Venting		
3.1.	System details	N/A
Additional notes:		

Notes: inspection checklist

1.1	Underside of gas membrane	Check that the sub grade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.
1.2	Gas membrane type	Manufacturer and product specification, gauge, colour, brand/name, material batch/roll numbers, storage arrangements (protected from dirt / damage?)
1.3	Gas membrane condition	Open punctures, tears, rips, stretching? Excessive footprints/evidence of traffic? Presence of debris? Repairs? Signs of weakness such as raised or sunken indentations? Protection plan in place to restrict access to lain gas membrane?
1.4	Joining tape product	Product type, brand, thickness, material, width, colour? Use of double sided tape?
1.5	Lapping design	Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap insured? Sections taped twice?
1.6	Laps and joints sealed	Welds complete? Appropriate joining/double sided tape used?
1.7	Service entries sealed	Top hats seal arrangements fixed around service entries? Use of Jubilee clips?
2.1	Sub-floor void	Is a check possible? Void former? Gravel {type/specification)? Height of void space? Is it clear?
2.2	External wall airbricks	Numbers, size, positions as design drawing?
2.3	Internal sleeper walls	Ventilation holes (honeycomb brickwork/pipe crossings?)- size, spacing, location in accordance with design?
2.4	External vent trenches/ducts	Located and constructed In accordance with design drawings? If open-topped gravel - gravel type/presence of fines? If pipe or other vent, check position and construction for functionality and absence of blockages. Ability of void former to withstand bearing of the superstructure?
3.1	Active venting	Type of air supply: mechanical, natural, combined? Location /condition /number of fans and vents? Location and size of inlets? Provision of air-cleaning devices and air heaters? Supply and exhaust ductwork? Alarm provision/installation? Gas monitoring system in under-floor void?

Photographs

No.	**Description**
	See appendix A - Site Photo record

The gas protection measures inspected:	a Are acceptable and comply with the specification - **however incomplete at time of site visit**
	~~b Are acceptable but attention is drawn to issues related to item no.~~
	~~c Are not acceptable due to the issues related to item no. xxx~~

Name: J Thorburn **Signature:** J Thorburn **Date:29/06/21**

APPENDIX C – GAS RESISTANT MATERIALS DATA SHEETS

CI/SfB | | | Tn6 | L14143 |

June 2020

RIW GAS SEAL BLACK

Gas Seal Black is a four-layer, low density polyethylene membrane reinforcing grid with an integral aluminium foil.

BENEFITS

- Compliant with BS 8485: 2015
- Manufactured from virgin material, not recycled waste
- Separate damp proof membrane not required
- Robust jointing and sealing system
- Welded joints possible
- Single wound membrane with zero creases
- Two colour membrane for on-site quality control
- Suitable for use where radon, carbon dioxide, methane and hydrocarbon vapours are present
- Complies with latest codes of practice as published by CIRIA and BRE

APPLICATIONS

- Combined ground floor damp proof membrane and gas barrier

APPLIED TO

- Sand blinding
- Suspended floors
- Ground bearing slabs

REMEMBER IT'S waterproof RIW

RIW GAS SEAL BLACK

TYPICAL USES

Gas Seal Black is typically used as a low density, polyethylene gas barrier and damp proof membrane in concrete floors above and below the slab.
The installed product protects the structure against moisture, radon, methane, carbon dioxide and hydrocarbon vapours from the ground.
The product is suitable for use on ground bearing reinforced concrete slabs, suspended beam and block floors or precast concrete slabs.
When used for hydrocarbons, the product must be applied on top of the slab, with the ground below vented.

DURABILITY

Subject to normal conditions of use Gas Seal Black will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide and hydrocarbon vapours during the lifetime of the building.

SPECIFICATION

J40 Flexible sheet waterproofing / damp proofing
Clause 140 Loose laid polyethylene gas retardant damp proofing.

Please consult RIW for further information.

INDEPENDENT AUTHORITY

Gas Seal Black has been awarded a BBA Certificate No. 14/5156 covering its use as a low density, polyethylene gas barrier and damp proof membrane in concrete ground floors, above and below the slab not subject to hydrostatic pressure, to protect the building against moisture, radon, methane and carbon dioxide from the ground.

CE Marked to BS EN 13967 & A1. For Declaration of Performance see:

http://www.riw.co.uk/technical-downloads/ce-marking

PERFORMANCE & COMPOSITION

Form	loose laid composite sheet
Colour	black/white
Overall thickness	0.6mm
Roll size	2m wide x 50m long*
Weight	350g/m^2 = 35kg/roll
Laps	150mm
Tensile strength MD EN 12311-1 CD	600N/50mm 480N/50mm
Elongation EN12311-1	20%
Nail tear resistance MD EN 12311 -1 CD	330N 400N
Radon permeability K124/02/95	8.0 x 10^{-15} m$^{2.}$ s^{-1}
Methane gas permeability BS ISO 15105-1	<0.09ml·m^2·day^{-1}·atm^{-1}
Carbon dioxide permeability BS ISO 15105-1	<0.09ml·m^2·day^{-1}atm^{-1}

The above performance figures are typical values and should not be considered a product specification. *Other roll sizes available.

ANCILLARY PRODUCTS

RIW produce a range of ancillary products for use with Gas Seal Black which include:

Gas Seal Tape - double-sided self-adhesive butyl tape for sealing between overlaps in the membrane.
Lap Tape - single-sided self-adhesive PVC tape for sealing edges of lapped product.
Lap Tape RB - reinforced single-sided self-adhesive bitumen tape for sealing edges of lapped product and repairs to membrane.
Preformed pipe collars - flexible collar for sealing around pipe penetrations.
Preformed Gas cloaks - standard or bespoke cloak units to facilitate membrane application.
Geo-fleece - textile fleece for protection of applied gas membranes.
Sheetseal GR - self-adhesive sheet membrane for gas resistant waterproofing applications.
Gas Seal GR DPC - gas resistant damp proof course/cavity tray for building into masonry.
Geo-vent - cuspated HDPE venting geo-composite incorporating geotextile to one side.
Geo-vent T connectors - geo-vent end connector incorporating 25mm slot for geo-vent.
Peri-vent sets - periscopic vent complete with airbrick and geo-vent adaptor.
Venting bollards and ground level vent boxes are also available.

CONSTRUCTION

GENERAL

All construction should conform with the Building Regulations, Codes of Practice and British Standards in current use at the time the building is being constructed.

PREPARATION

The membrane should be laid on a smooth surface, free from voids, hollows and objects which may damage the membrane. If used below a ground bearing slab, the product may be laid on a sand blinding.

APPLICATION

The completed gas proofing system must cover the entire footprint of the building.

Gas Seal Black should be unrolled onto the prepared surface, and be smoothed out as necessary. The product must be installed with the black side uppermost.

Subsequent rolls should then be lapped onto the previous roll by 150mm, and be sealed using Gas Seal Tape placed centrally in the lap. Lap Tape should then be laid over the edge of the upper sheet, by 50mm, and be adhered down onto the lower sheet.

Pipe penetrations should be sealed using Preformed Pipe Collars; sealed to the membrane, and pipe using Gas Seal Tape and Lap Tape; see Pipe Penetration Detail.

Gas Seal GR DPC should be used to provide continuity through the walls, with Gas Seal Black lapped and sealed onto it using Gas Seal Tape and Lap Tape as before.

Damaged areas should be patch repaired as necessary, using similar lapping/sealing details.

Gas Seal Black will achieve 2 Points in accordance with BS 8485: 2015 when installed by qualified specialists and independently validated. Where additional points are required, our Passive Venting System may need to be incorporated.

SPECIFIC USES

Gas Seal Black should be installed with the ancillary products required, in accordance with current guidance for gas protection systems; including BRE211 / 414, CIRIA C665 & BS 8485: 2015.

SAFETY

Full health and safety instructions are contained on the product material safety data sheets, and these must be referred to before use.

SUPPLY

AVAILABILITY

All products can be obtained through Builders Merchants or approved stockists. A list of approved stockists is available from RIW's offices.

PACKAGING

Gas Seal Black	2m wide x 50m long rolls

STORAGE

The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

TECHNICAL SERVICES

The Technical Department is available to advise on individual projects and to prepare or assist in the preparation of specifications and drawings. We can also offer design guidance to satisfy the requirements of BS 8485:2015 and CIRIA C735.

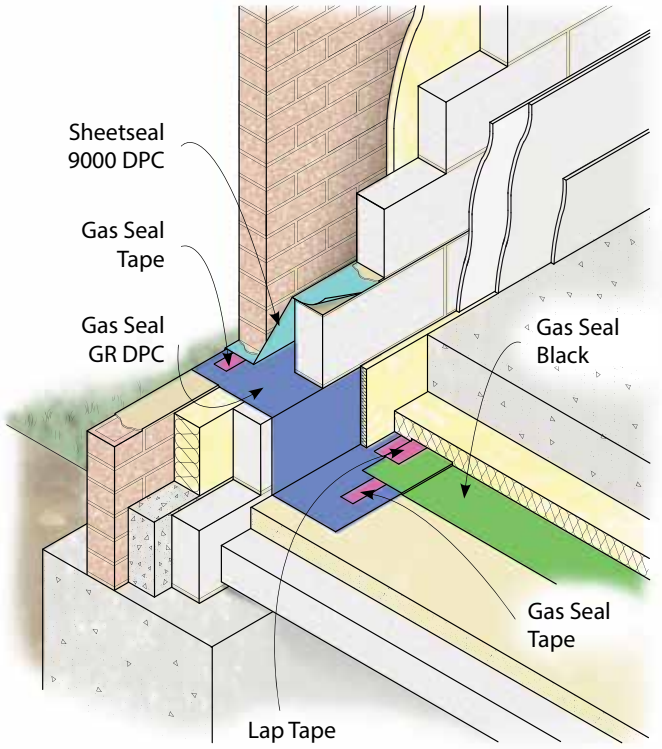
A list of experienced applicators of our materials is available from RIW's offices, along with a list of independent consultants providing validation and integrity testing services.

COMPATIBILITY TABLE

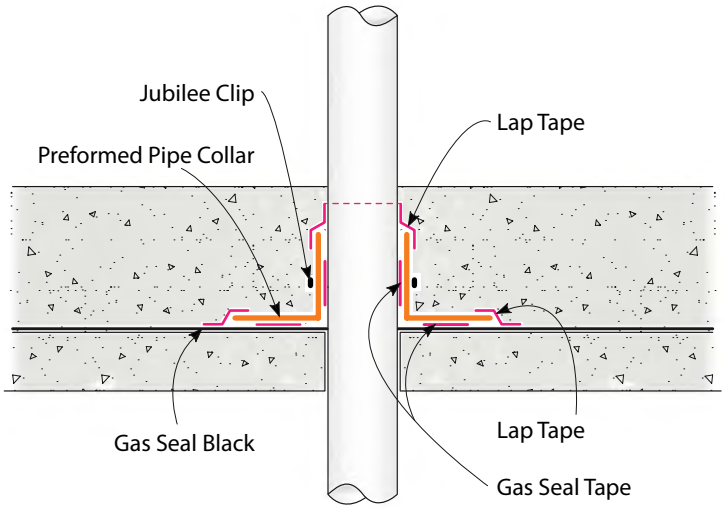
	BRE 211 Radon	CIRIA 665 Characteristic Situation 2	BS 8485: 2015 Characteristic Situation 2	CIRIA 665 Characteristic Situation 3-6	BS 8485: 2015 Characteristic Situation 3-6	NHBC Amber 1	NHBC Amber 2 & Red
Radon	YES	n/a	n/a	n/a	n/a	n/a	n/a
Carbon Dioxide	n/a	YES	YES	YES	YES	YES	YES
Methane	n/a	YES	YES	YES	YES	YES	YES
Hydrocarbon Vapours	n/a	YES*	YES*	YES*	YES*	YES*	YES*

* Suitable in some applications. Contact RIW Technical.

available from RIW's offices.



Typical Ground Bearing Slab



Pipe Penetration Detail

The information in this literature was correct at the time of going to press. However, we are committed to continually improving our products and reserve the right to change product specifications.

For the latest information, please consult RIW. Conditions of use are beyond our control, therefore we cannot warrant the results to be obtained.

RIW Limited
580-581 Ipswich Road, Slough, SL1 4EQ
Technical enquires tel: **01753 944200**
Commercial enquires tel: **01753 944210**
www.riw.co.uk

REMEMBER IT'S waterproof RIW

Appendix C– Gas Protection Surveillance Visits

VINCI

E

DOCUMENT NO.	16K4865-BLP-ST-R-004
PROJECT	New Victoria, Manchester
JOB NUMBER	16-K4865-000

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

General Photos showing membrane installation and showing detail around columns and pipe penetrations.

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

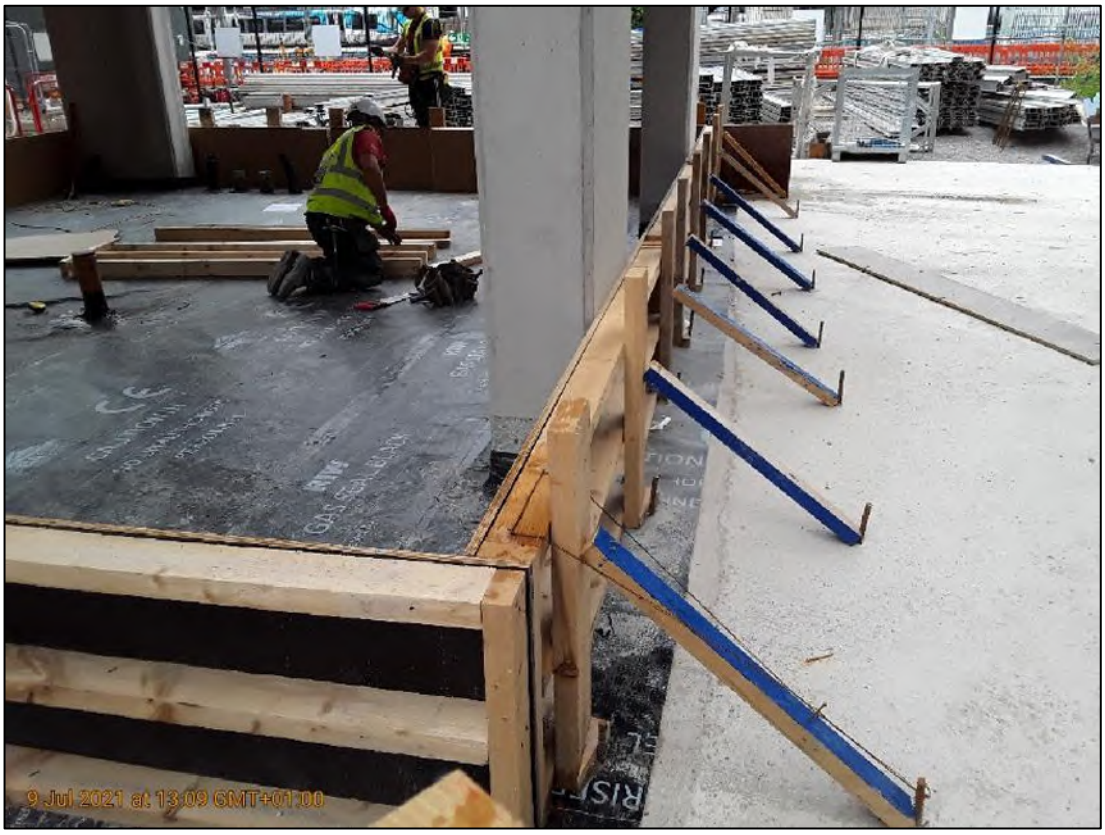


PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

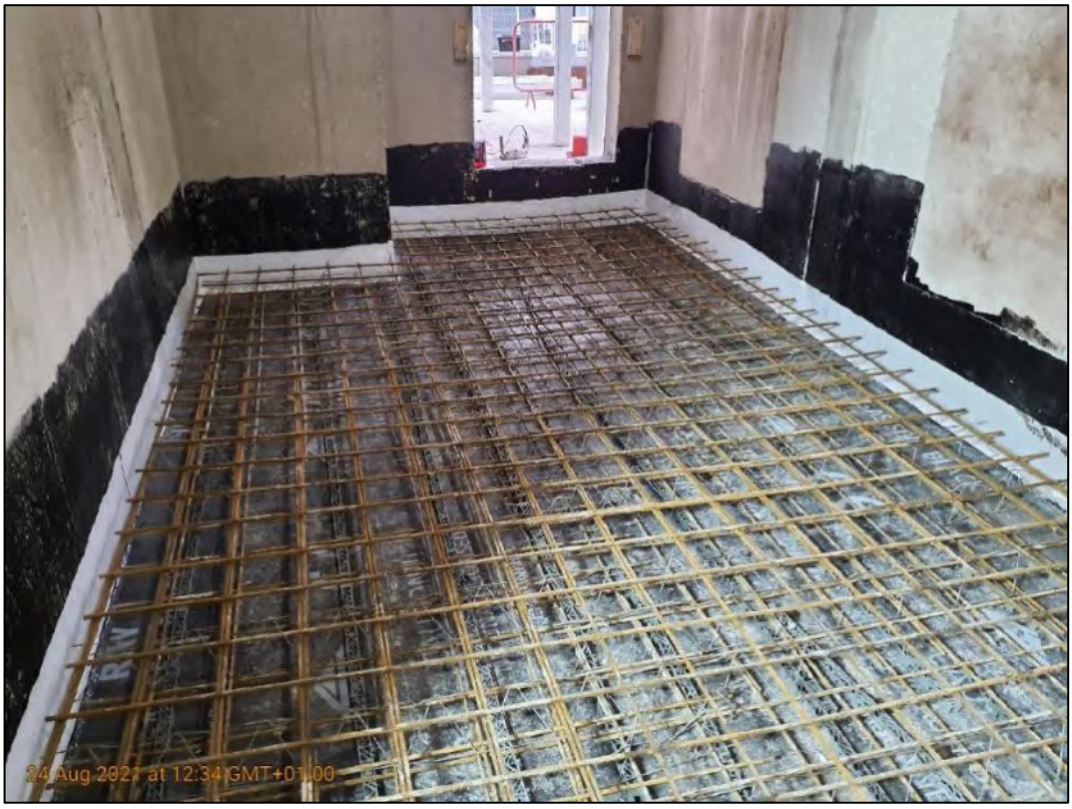
PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 1

General Photos prior to pouring concrete. No penetrations noted.



Appendix C– Gas Protection Surveillance Visits

RIW

C

RIW Inspection & Test Plan

Project:	**Manchester New Victoria**	**Location:**	**Todd Street, Manchester, M3 1WY**
RIW ITP Reference:	**ITP.055**	**ITP Visit Requested By:**	**Mayo Civils**
Project ITP Number:	**ITP055.003**	**Name:**	**Dave Taylor**
		Company:	**Mayo Civils**

Has a Benchmark Sample Panel Been Installed For Comparison? [ ] **NO**

Location of Inspection **(Include reference to relevant drawings):**
Residential Block 1
Shown at the bottom of the report.

Construction Activity **(Description):**
Installation of RIW Gas Seal Black onto sand blinding prior to slab been poured.

Hold / Witness Point **(Description):**

Inspection Date:	30/06/21	Undertaken By:	Aiden Quinn (On behalf of RIW Limited)
Inspection Time:	10:00		

	Principle Attendees	Company	Position
1	Aiden Quinn	RIW	Technical Advisor
2	Dave Taylor	Mayo Civils	Project Manager
3			

Comments / Observations:

RIW Gas seal Black membrane inspected on the residential block 1.

Detailing work around columns and pipe penetrations where applied with care and to a very high standard. There where still areas in which the membrane needed to be applied and some penetrations which hadn't yet been detailed.

The sand blinding which the membrane was applied to was very well compacted and there was no evidence of any sharp stones which could damage the Gas Seal Black.

General overview of the membrane was very good and all overlaps and joints where sealed very well.

Non-Conformities Identified

NO [ ] [ ]

(If yes, see over)

Column details applied very well.

Pipe penetration detail sealed with top hat.

General Overview of gas seal black application, all laps correct and sealed well.

Use Sketch box above if required

Non-Conformities and Corrective Measures

Project:	**Manchester New Victoria**	**Location:**	**Todd Street, Manchester, M3 1WY**
RIW ITP Reference:	**RIW.ITP.055**	**Project ITP Number:**	**ITP.055**

	Description of Non-Conformity 1	Non-Conformity 1 - Corrective Measure
1		

2		

Location:

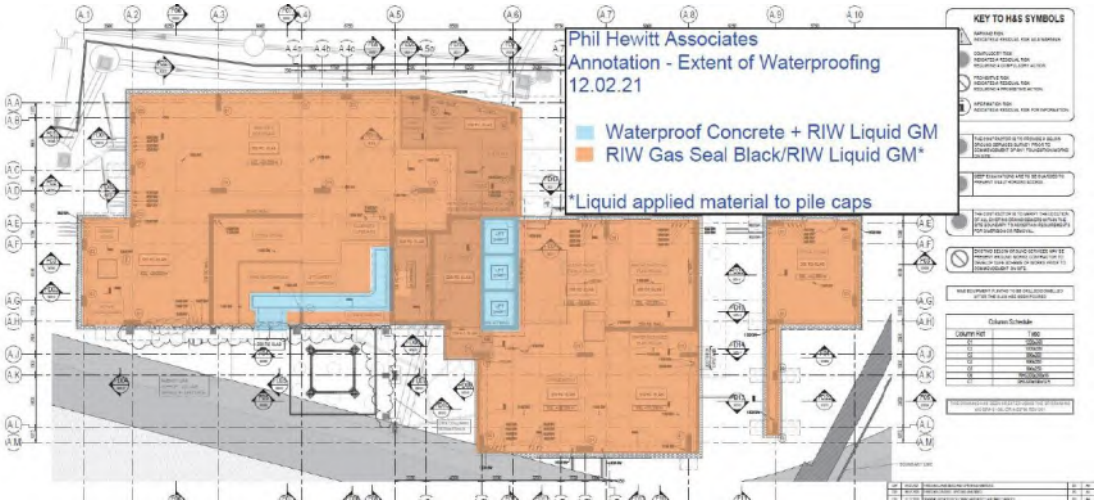
Additional Supportive Comments:

Non conformities to be rectified and record taken

Submitted By: Aiden Quinn **Date:** 05/07/2021

(On behalf of RIW Limited)

As part of the agreed Inspection & Test Plan RIW will undertake scheduled and unscheduled visits to inspect product installations at agreed hold, witness or surveillance points. RIW will provide comments and observations, with reference to 'benchmarks' (where applicable), and provide guidance on further corrective action if required. RIW do not provide an installation warranty as the application of the products is beyond our control, and the installer / contractor must therefore warrant the work carried out by them. If required, RIW can provide a list of specialist waterproofing contractors. These companies may be able to provide a company or insurance backed guarantee that covers the installation of the products. It is the responsibility of the contractor to ensure the areas inspected are protected from subsequent damage and notify RIW and / or the installer should any alterations be undertaken to the design or products in the above areas.



RIW Limited, Terrace Road South, Binfield, Berkshire RG42 4PZ
Technical: technical@riw.co.uk or 01344 397777 Sales: enquiries@riw.co.uk or 01344 397788

RIW Inspection & Test Plan

Project:	**New Victoria**	**Location:**	**Manchester**
RIW ITP Reference:	**ITP050.2021**	**ITP Visit Requested By:**	**Mayo Civils**
Project ITP Number:	**ITP050.004**	**Name:**	**Dave Taylor**
		Position:	**Project Manager**

Has a Benchmark Sample Panel Been Installed For Comparison? [ ] **NO**

Location of Inspection (Include reference to relevant drawings):
Ground bearing raft slab and liner wall in residential block 2

Construction Activity (Description):
Installation of RIW Structureseal GPT applied to the contiguous piled retaining wall and the RIW Gas Seal Black below the ground bearing raft slab

Hold / Witness Point (Description):
N/A

Inspection Date:	16th November 2021	Undertaken By:	Martin Radford (On behalf of RIW Limited)
Inspection Time:	9:30am		

	Principle Attendees	Company	Position
1	Martin Radford	RIW Limited	Commercial Sales Leader
2	Andrew Barker	RIW Limited	Technical Advisor
3	Dave Taylor	Mayo Civils	Project Manager

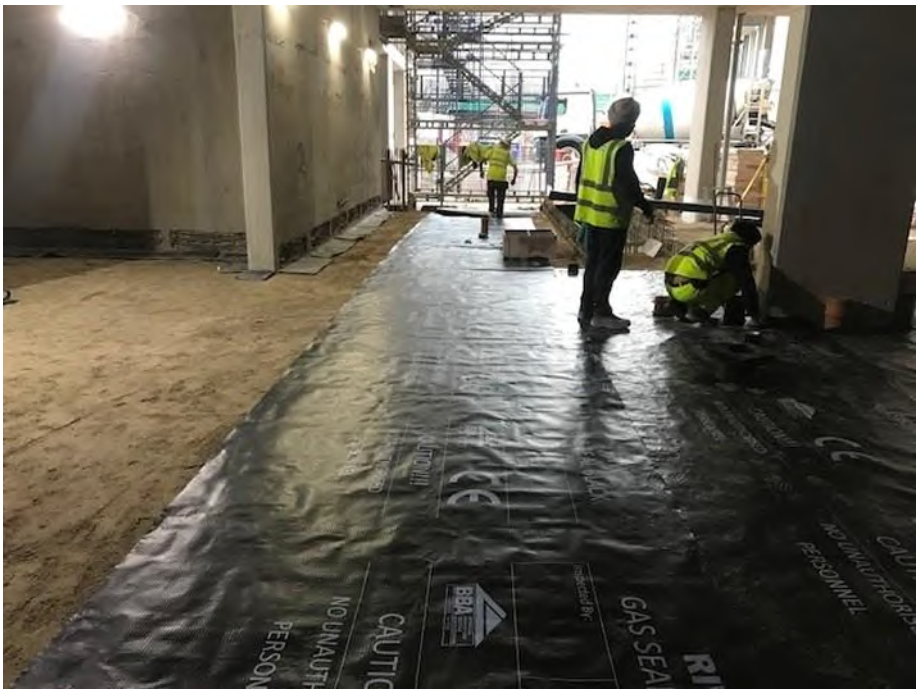
Comments / Observations:

No non-conformities were identified during the visit and the selection of photo's below show an acceptable installation of the RIW Gas Seal Black (below the ground bearing raft slab) and the RIW Structureseal GPT to the contiguous piled retaining wall.

RIW have not received any comments to the contrary from the Independent waterproofing design specialist employed on this project (Phil Hewitt & Associates), so we assume he has confirmed that the installation is aligned and in accordance with their design.

Non-Conformities Identified

[ ] NO
(If yes, see over)



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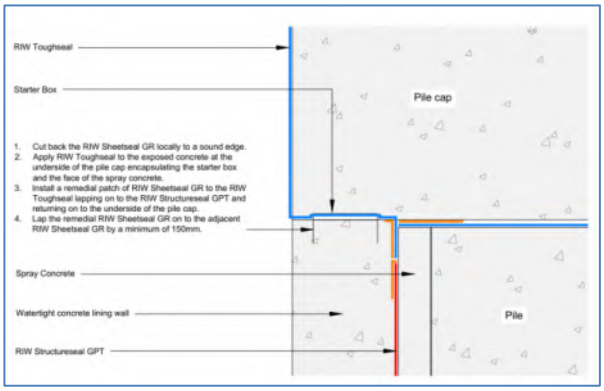
RIW Limited, Terrace Road South, Binfield, Berkshire RG42 4PZ
Technical: technical@riw.co.uk or 01344 397777 Sales: enquiries@riw.co.uk or 01344 397788

Small remedial work at gridline B4/B5 to the RIW Sheetseal GR
Undertaken post ITP050.004 visit and fully in accordance with RIW-NVM-007



RIW Limited, Terrace Road South, Binfield, Berkshire RG42 4PZ
Technical: technical@riw.co.uk or 01344 397777 Sales: enquiries@riw.co.uk or 01344 397788

Non-Conformities and Corrective Measures

Project:	**New Victoria**	**Location:**	**Manchester**
RIW ITP Reference:	**ITP050.2021**	**Project ITP Number:**	**ITP050.004**

	Description of Non-Conformity 1	Non-Conformity 1 - Corrective Measure
1		
Location:		**Corrected whist RIW on site?**

	Description of Non-Conformity 2	Non-Conformity 2 - Corrective Measure
2		
Location:		**Corrected whist RIW on site?**

	Description of Non-Conformity 3	Non-Conformity 3 - Corrective Measure
3		
Location:		**Corrected whist RIW on site?**

	Description of Non-Conformity 4	Non-Conformity 4 - Corrective Measure
4		
Location:		**Corrected whist RIW on site?**

	Description of Non-Conformity 5	Non-Conformity 5 - Corrective Measure
5		
Location:		**Corrected whist RIW on site?**

Additional Supportive Comments:

Continue on additional sheet if required

Submitted By:	Martin Radford	**Date:**	16th November 2021

(On behalf of RIW Limited)

As part of the agreed Inspection & Test Plan RIW will undertake scheduled and unscheduled visits to inspect product installations at agreed hold, witness or surveillance points. RIW will provide comments and observations, with reference to 'benchmarks' (where applicable), and provide guidance on further corrective action if required. RIW do not provide an installation warranty as the application of the products is beyond our control, and the installer / contractor must therefore warrant the work carried out by them. If required, RIW can provide a list of specialist waterproofing contractors. These companies may be able to provide a company or insurance backed guarantee that covers the installation of the products. It is the responsibility of the contractor to ensure the areas inspected are protected from subsequent damage and notify RIW and / or the installer should any alterations be undertaken to the design or products in the above areas.

Appendix C– Gas Protection Surveillance Visits

BYRNELOOBY

D

BYRNELOOBY

Suite 104, Mere Grange Business Park
St Helens
WA9 5GG

+44 (0) 1925 291 111
sthelens@byrnelooby.com
www.byrnelooby.com

Wednesday 1 December 2021
Ref: 16-04865-003/ENV/LT/01

Theo Coleman <Theo.Coleman@vinciconstruction.co.uk>
VINCI Construction UK Limited
New Victoria Development
Long Millgate
Manchester
M3 1NX

Re: New Victoria, Manchester – 16-04865-000
Gas Protection inspection Site Visit – Pre- Verification Report - Residential Building 2

Dear Theo,

Byrne Looby Partners (UK) Limited (ByrneLooby) has been instructed to carry out an independent site inspection of the gas protection measures installed on residential building 2 at the New Victoria development in Manchester.

ByrneLooby (formerly TerraConsult Ltd) previously carried out ground gas risk assessment for the two proposed residential multi-storey apartment blocks. The conclusion of the gas risk assessment indicated that due to the carbon dioxide concentrations Characteristic Situation 2 gas protection measures should be adopted for the development in line with BS8485:2015+A1:2019.

Based on BS8485:2015 + A1:2019 Table 3 the new building can be classed as a Type C buildings (commercial/ Public buildings) and from Table 4 of this standard a Score of 2.5 points of protection will be required for Characteristic Situation 2 ground gas conditions.

- Cast in-situ, monolithic, reinforced ground-bearing raft or reinforced, cast in-situ, suspended floor slab with minimal penetrations cast in (up to 1.5 protection points if well-reinforced to control cracking – Table 5 of BS 8485:2015) or a cast in-situ, ground-bearing floor slab (with only nominal mesh reinforcement at 0.5 protection points);
- Basement floor and walls to BS 8102:2009, Grade 3 waterproofing - See notes in BS8485:2015+A1:2019 at 2.5 protection points
- Gas-resistant membrane meeting the criteria in Table 7 of BS 84585:2015 and meeting the criteria in BS ISO 15105-1. Independent verification of the installation of the membrane according to CIRIA C735 (2 protection points).

Verification is required in accordance with CIRIA C735. Verification is defined within CIRIA C735 as:

> *The process of demonstrating that risk has been reduced to meet remediation criteria and objectives based on a quantitative assessment of remediation performance.*

Following the installation of each component that contributes to the gas protection score, verification is required, in accordance with BS8485 and CIRIA document C735 'Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases' (2014).

BS8485 states that "The installation and verification report should present an accurate description of the measures actually applied and present the evidence gathered to confirm that installed measures are suitable for purpose.

The risk based approach identified within CIRIA C735 guides the verification plan to consider the following:

- Site specific gas regime
- No. of plots
- Complexity of the design and installation
- Qualifications and experience of the workforce (Construction Skills level 2 NVQ diploma)

The site is considered as the following:

- Well characterised as CS2 - Green
- Proposed commercial development is large - red
- The foundations and gas protections measures are relatively complex - red
- Gas protection measures will be installed by combination of general builders (sub-floor void etc) with the membrane installed by a specialist contractor, which have extensive experience at installing gas protection systems - orange

The factors above have shown a range of 'green' to red as identified in Figure 3.1 of CIRIA C735. Therefore, the role of the independent verification of the gas protection measures is important. It is proposed to apply a 'Moderate Level' of validation processes on this project.

Verification/validation of gas membrane installation

- inspection of the products being used (membrane, tape, propriety top hats etc.) to ensure they are as specified
- laps are sufficient in length with edges, seams, service penetrations all sealed.

The chosen gas membrane is the RIW – Gas seal black, which is a four-layer, low density polyethylene membrane reinforcing grid with an integral aluminium foil.

Two site visits were carried out on the 8th November and 16th November 2021. During the two visits the gas protections measures were at different stages in different parts of the building.

On the first visit, the northern part of the building had already had the membrane installed and the concrete slab had been cast. The eastern boundary has been constructed using a contiguous pile wall. The protections measures along the eastern boundary were continuing. The protection measures were not started within the southern part of the building.

By the second visit, the membrane within the southern part of the building had been completed. Inspection of the membrane installation was carried out before the concrete was poured for the slab. No tears or punctures in the membrane were found. There was sufficient overlap of at least 150mm between membrane sheets with RIW 50mm double sided butyl tape and RIW foil tape used to connect the membranes. The joins and seams were inspected by the Byrne Looby personnel and deemed suitable.

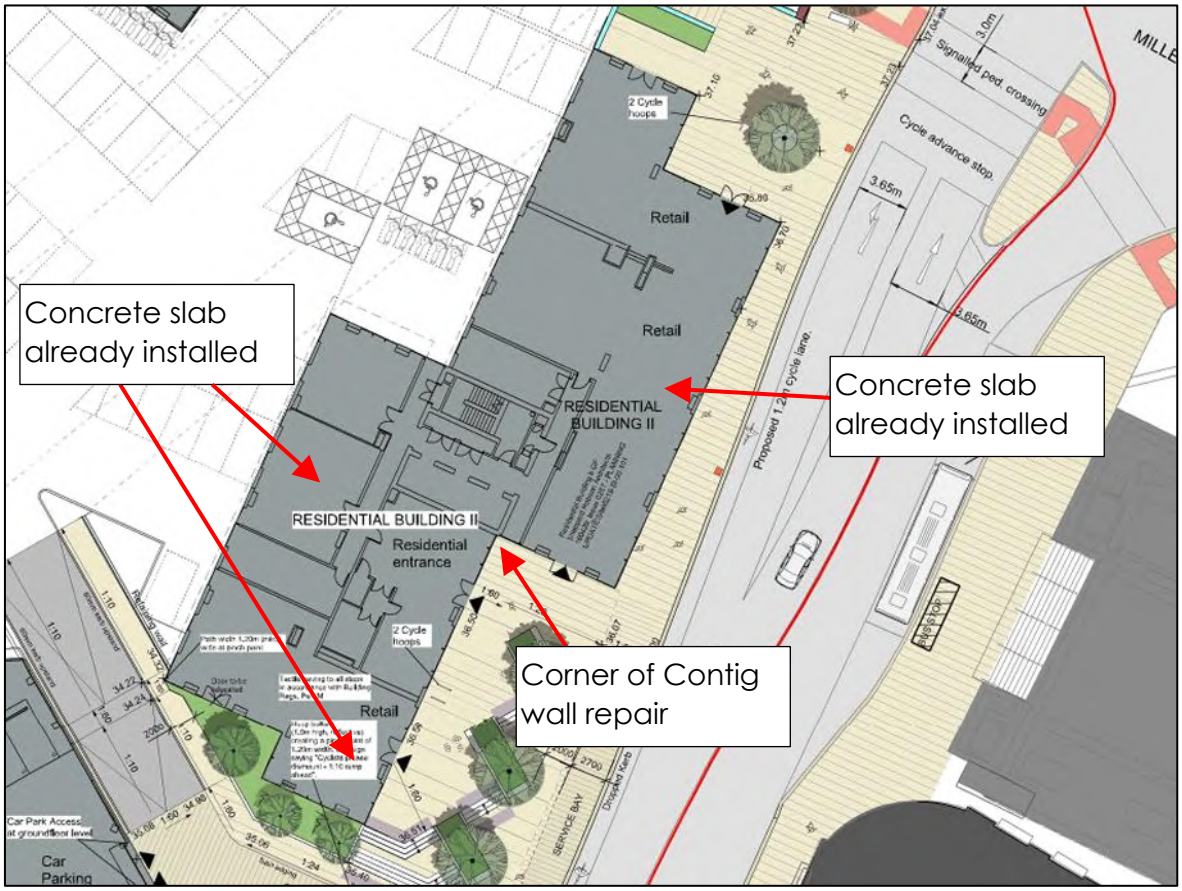


Figure 1: Extract of Development Plan (Planit – IE LLP – PL1487.106)

Figure 2: Photos showing defect and repair on corner of contiguous pile wall.

During both visits it was highlighted to BL by the client that was a defect on one of the corners of the contiguous pile wall. It is understood that the RIW liquid membrane and foil tape has been used to patch the damage. Details of the repair were designed by RIW and drawings will be provided with the completion report.

At the time of the inspection, the gas protection measures were incomplete. It is understood further inspection of the gas protection measures will be carried out by others.

Photographic records of the site inspection are recorded in Appendix A. Records of the site visit are recorded in Appendix B on the has verification inspection sheet as per C735.

Yours sincerely
For ByrneLooby,

_____
J Thorburn
BSc FGS
Principal Geologist

APPENDIX A – SITE INSPECTION PHOTO RECORDS

DOCUMENT NO.	16-K4865-003
PROJECT	New Victoria, Manchester
JOB NUMBER	16-K4865

SITE VISIT RECORD

DOCUMENT CONTROL			
Revision	**Date**	**Prepared by**	**Checked & Review by**
00	30/11/2021	J Thorburn	Kourosh Azimi

VISIT DETAILS	
Client Name.	Vinci Construction
Site name	New Victoria, Manchester
Project description	Ground Gas Protection Verification site visit – Residential Building 2
Date of visit	08/11/2021 & 16/11/2021
BL Engineer(s) in attendance	J Thorburn
Also in attendance	-
Weather	Dry, overcast
Site Location	New Victoria, Manchester.

PHOTOGRAPHIC RECORD – 08/11/2021

Figure 1: Photo showing SE area prior to installation

Figure 2: Photo showing southern area prior to installation

Figure 3: Photo showing area prior to installation

Figure 4: Service ducts prior to installation

Figure 5: Photo showing area prior to installation

Figure 6: Photo after concrete slab cast in eastern part of building

Figure 7: After concrete slab cast

Figure 8: Membrane along contig pile wall in NE part of the site.

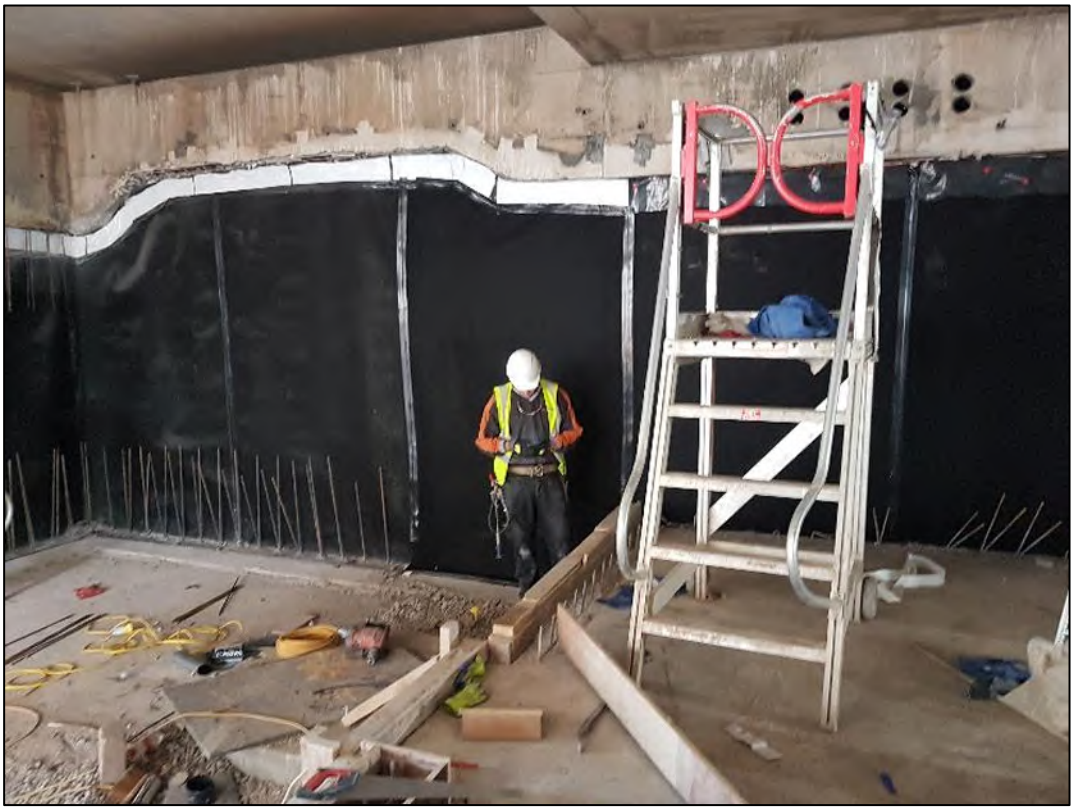


Figure 9: Membrane installation along contig pile wall

Figure 10: Membrane along contig pile wall

PHOTOGRAPHIC RECORD – 16/11/2021

Figure 11: Membrane installed prior to concrete slab casting (SE corner)

Figure 12: Membrane installed prior to concrete slab casting (SE corner)

Figure 13: Membrane installed prior to concrete slab casting (central west) – no sharp objects although membrane not completely clear. No tears were noted.

Figure 14: Membrane installed prior to concrete slab casting (central west)

Figure 15: Membrane installed prior to concrete slab casting (looking to SE corner)

Figure 16: Membrane installed prior to concrete slab casting (South west corner)

Figure 17: Membrane installed during concrete pour (central west area)

Figure 18: Membrane installed during concrete pour (central west)

Figure 19: Membrane installation on central corner of contig wall which needed repair.

Figure 20: Membrane installation on central corner needed repair

Figure 21: Photo showing the repair (23/11/21. It is understood that the RIW liquid membrane and foil tape has been used to patch the damage. Details of the repair were designed by RIW and drawings will be provided.

APPENDIX B – GAS PROTECTION VALIDATION RECORD

Copied directly from Appendix A5 CIRIA C735

VISUAL INSPECTION OF GAS PROTECTION MEASURES

Site name: New Vic, Resi Building 2		Gas characteristic situation: CS2
Job number: 16-K4865-003		Type of development and building/block checked: Multi-storey resi apartment block
Date: 08/11/2021 & 16/11/2021		Building description:
Visit by: J Thorburn		Foundation type: Basement / reinforced slab
Weather at time of inspection: Dry		Gas protection type: passive
No.	Item	Comments (installation measure were not complete at time of visit)
1 Gas Membrane		
1.1	Condition of sub-grade and underside of gas membrane	Single sized sand used as blinding layer to reduce chance of penetrations through membrane
1.2	Gas membrane type	RIW GAS SEAL BLACK - four-layer, low density polyethylene membrane reinforcing grid with an integral aluminium foil.
1.3	Gas membrane condition	No signs of heavy traffic, tears, rips or stretching Damage on one corner of the Contig wall. Repairs proposed and designed by RIW
1.4	Joining tape product	RIW gas seal tape - double-sided self-adhesive butyl tape for sealing between overlaps in the membrane
1.5	Lapping design	min 150mm overlapping
1.6	Laps, welds and joints seals	appropriate joining/double sided tape
1.7	Service entries seals	appropriate top hat arrangement observed at various stages of completion during site visit
2 Passive Venting		
2.1	Sub-floor void :	N/A
2.2	External wall airbricks	N/A
2.3	Internal sleeper walls	N/A
2.4	External vent trenches/ducts	N/A
3 Active Venting		
3.1.	System details	N/A
Additional notes:		

Notes: inspection checklist

1.1	Underside of gas membrane	Check that the sub grade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.
1.2	Gas membrane type	Manufacturer and product specification, gauge, colour, brand/name, material batch/roll numbers, storage arrangements (protected from dirt / damage?)
1.3	Gas membrane condition	Open punctures, tears, rips, stretching? Excessive footprints/evidence of traffic? Presence of debris? Repairs? Signs of weakness such as raised or sunken indentations? Protection plan in place to restrict access to lain gas membrane?
1.4	Joining tape product	Product type, brand, thickness, material, width, colour? Use of double sided tape?
1.5	Lapping design	Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap insured? Sections taped twice?
1.6	Laps and joints sealed	Welds complete? Appropriate joining/double sided tape used?
1.7	Service entries sealed	Top hats seal arrangements fixed around service entries? Use of Jubilee clips?
2.1	Sub-floor void	Is a check possible? Void former? Gravel {type/specification)? Height of void space? Is it clear?
2.2	External wall airbricks	Numbers, size, positions as design drawing?
2.3	Internal sleeper walls	Ventilation holes (honeycomb brickwork/pipe crossings?)- size, spacing, location in accordance with design?
2.4	External vent trenches/ducts	Located and constructed In accordance with design drawings? If open-topped gravel - gravel type/presence of fines? If pipe or other vent, check position and construction for functionality and absence of blockages. Ability of void former to withstand bearing of the superstructure?
3.1	Active venting	Type of air supply: mechanical, natural, combined? Location /condition /number of fans and vents? Location and size of inlets? Provision of air-cleaning devices and air heaters? Supply and exhaust ductwork? Alarm provision/installation? Gas monitoring system in under-floor void?

Photographs

No.	**Description**
	See appendix A - Site Photo record

The gas protection measures inspected:	a Are acceptable and comply with the specification - **however incomplete at time of site visit**
	~~b Are acceptable but attention is drawn to issues related to item no.~~
	~~c Are not acceptable due to the issues related to item no. xxx~~

Name: J Thorburn **Signature:** J Thorburn **Date:16/11/21**

APPENDIX C – GAS RESISTANT MATERIALS DATA SHEETS

CI/SfB | | | Tn6 | L14143 |

June 2020

RIW GAS SEAL BLACK

Gas Seal Black is a four-layer, low density polyethylene membrane reinforcing grid with an integral aluminium foil.

BENEFITS

- Compliant with BS 8485: 2015
- Manufactured from virgin material, not recycled waste
- Separate damp proof membrane not required
- Robust jointing and sealing system
- Welded joints possible
- Single wound membrane with zero creases
- Two colour membrane for on-site quality control
- Suitable for use where radon, carbon dioxide, methane and hydrocarbon vapours are present
- Complies with latest codes of practice as published by CIRIA and BRE

APPLICATIONS

- Combined ground floor damp proof membrane and gas barrier

APPLIED TO

- Sand blinding
- Suspended floors
- Ground bearing slabs

REMEMBER IT'S waterproof RIW

RIW GAS SEAL BLACK

TYPICAL USES

Gas Seal Black is typically used as a low density, polyethylene gas barrier and damp proof membrane in concrete floors above and below the slab.
The installed product protects the structure against moisture, radon, methane, carbon dioxide and hydrocarbon vapours from the ground.
The product is suitable for use on ground bearing reinforced concrete slabs, suspended beam and block floors or precast concrete slabs.
When used for hydrocarbons, the product must be applied on top of the slab, with the ground below vented.

DURABILITY

Subject to normal conditions of use Gas Seal Black will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide and hydrocarbon vapours during the lifetime of the building.

SPECIFICATION

J40 Flexible sheet waterproofing / damp proofing
Clause 140 Loose laid polyethylene gas retardant damp proofing.

Please consult RIW for further information.

INDEPENDENT AUTHORITY

Gas Seal Black has been awarded a BBA Certificate No. 14/5156 covering its use as a low density, polyethylene gas barrier and damp proof membrane in concrete ground floors, above and below the slab not subject to hydrostatic pressure, to protect the building against moisture, radon, methane and carbon dioxide from the ground.

CE Marked to BS EN 13967 & A1. For Declaration of Performance see:

http://www.riw.co.uk/technical-downloads/ce-marking

PERFORMANCE & COMPOSITION

Form	loose laid composite sheet
Colour	black/white
Overall thickness	0.6mm
Roll size	2m wide x 50m long*
Weight	350g/m^2 = 35kg/roll
Laps	150mm
Tensile strength MD EN 12311-1 CD	600N/50mm 480N/50mm
Elongation EN12311-1	20%
Nail tear resistance MD EN 12311 -1 CD	330N 400N
Radon permeability K124/02/95	8.0 x 10^{-15} m$^{2.}$ s^{-1}
Methane gas permeability BS ISO 15105-1	<0.09ml·m^2·day^{-1}·atm^{-1}
Carbon dioxide permeability BS ISO 15105-1	<0.09ml·m^2·day^{-1}atm^{-1}

The above performance figures are typical values and should not be considered a product specification. *Other roll sizes available.

ANCILLARY PRODUCTS

RIW produce a range of ancillary products for use with Gas Seal Black which include:

Gas Seal Tape - double-sided self-adhesive butyl tape for sealing between overlaps in the membrane.
Lap Tape - single-sided self-adhesive PVC tape for sealing edges of lapped product.
Lap Tape RB - reinforced single-sided self-adhesive bitumen tape for sealing edges of lapped product and repairs to membrane.
Preformed pipe collars - flexible collar for sealing around pipe penetrations.
Preformed Gas cloaks - standard or bespoke cloak units to facilitate membrane application.
Geo-fleece - textile fleece for protection of applied gas membranes.
Sheetseal GR - self-adhesive sheet membrane for gas resistant waterproofing applications.
Gas Seal GR DPC - gas resistant damp proof course/cavity tray for building into masonry.
Geo-vent - cuspated HDPE venting geo-composite incorporating geotextile to one side.
Geo-vent T connectors - geo-vent end connector incorporating 25mm slot for geo-vent.
Peri-vent sets - periscopic vent complete with airbrick and geo-vent adaptor.
Venting bollards and ground level vent boxes are also available.

CONSTRUCTION

GENERAL

All construction should conform with the Building Regulations, Codes of Practice and British Standards in current use at the time the building is being constructed.

PREPARATION

The membrane should be laid on a smooth surface, free from voids, hollows and objects which may damage the membrane. If used below a ground bearing slab, the product may be laid on a sand blinding.

APPLICATION

The completed gas proofing system must cover the entire footprint of the building.

Gas Seal Black should be unrolled onto the prepared surface, and be smoothed out as necessary. The product must be installed with the black side uppermost.

Subsequent rolls should then be lapped onto the previous roll by 150mm, and be sealed using Gas Seal Tape placed centrally in the lap. Lap Tape should then be laid over the edge of the upper sheet, by 50mm, and be adhered down onto the lower sheet.

Pipe penetrations should be sealed using Preformed Pipe Collars; sealed to the membrane, and pipe using Gas Seal Tape and Lap Tape; see Pipe Penetration Detail.

Gas Seal GR DPC should be used to provide continuity through the walls, with Gas Seal Black lapped and sealed onto it using Gas Seal Tape and Lap Tape as before.

Damaged areas should be patch repaired as necessary, using similar lapping/sealing details.

Gas Seal Black will achieve 2 Points in accordance with BS 8485: 2015 when installed by qualified specialists and independently validated. Where additional points are required, our Passive Venting System may need to be incorporated.

SPECIFIC USES

Gas Seal Black should be installed with the ancillary products required, in accordance with current guidance for gas protection systems; including BRE211 / 414, CIRIA C665 & BS 8485: 2015.

SAFETY

Full health and safety instructions are contained on the product material safety data sheets, and these must be referred to before use.

SUPPLY

AVAILABILITY

All products can be obtained through Builders Merchants or approved stockists. A list of approved stockists is available from RIW's offices.

PACKAGING

Gas Seal Black	2m wide x 50m long rolls

STORAGE

The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

TECHNICAL SERVICES

The Technical Department is available to advise on individual projects and to prepare or assist in the preparation of specifications and drawings. We can also offer design guidance to satisfy the requirements of BS 8485:2015 and CIRIA C735.

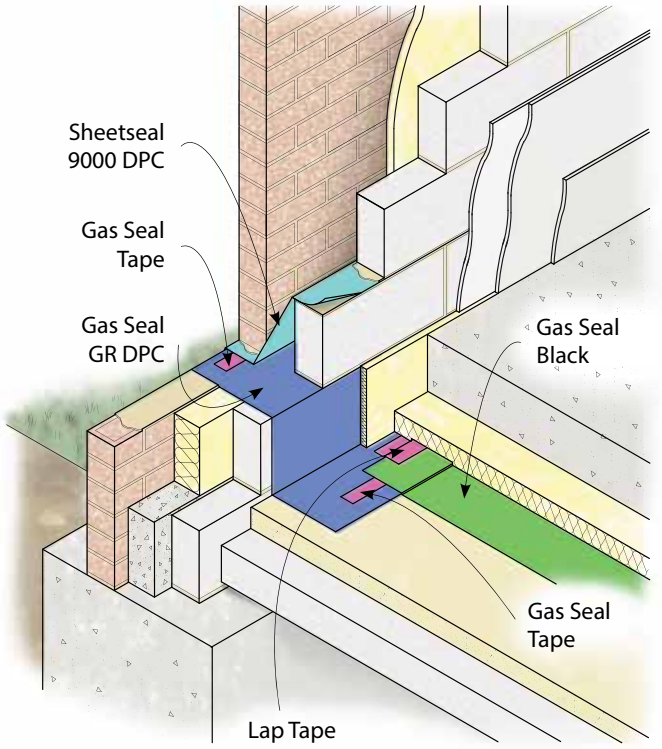
A list of experienced applicators of our materials is available from RIW's offices, along with a list of independent consultants providing validation and integrity testing services.

COMPATIBILITY TABLE

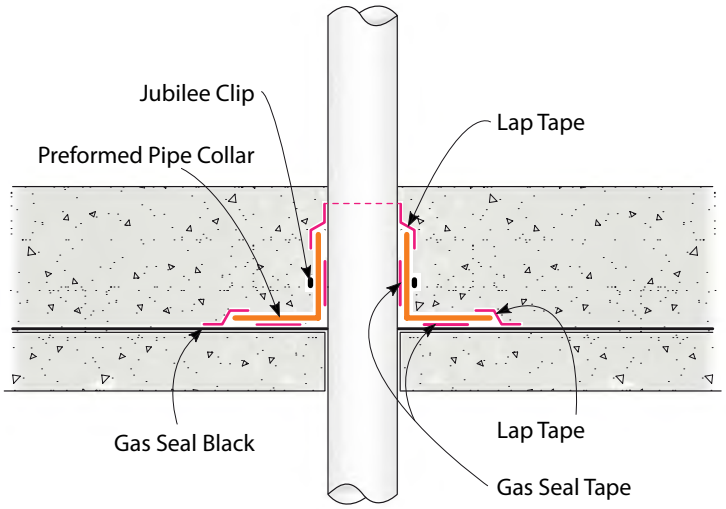
	BRE 211 Radon	CIRIA 665 Characteristic Situation 2	BS 8485: 2015 Characteristic Situation 2	CIRIA 665 Characteristic Situation 3-6	BS 8485: 2015 Characteristic Situation 3-6	NHBC Amber 1	NHBC Amber 2 & Red
Radon	YES	n/a	n/a	n/a	n/a	n/a	n/a
Carbon Dioxide	n/a	YES	YES	YES	YES	YES	YES
Methane	n/a	YES	YES	YES	YES	YES	YES
Hydrocarbon Vapours	n/a	YES*	YES*	YES*	YES*	YES*	YES*

* Suitable in some applications. Contact RIW Technical.

available from RIW's offices.



Typical Ground Bearing Slab



Pipe Penetration Detail

The information in this literature was correct at the time of going to press. However, we are committed to continually improving our products and reserve the right to change product specifications.

For the latest information, please consult RIW. Conditions of use are beyond our control, therefore we cannot warrant the results to be obtained.

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REMEMBER IT'S waterproof RIW

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December 2020

RIW LIQUID GM

Liquid GM is a single component water based compound, formulated on styrene-butadiene co-polymer.

BENEFITS

- Liquid applied, methane and carbon dioxide barrier
- Excellent adhesion; fully bonds to porous and non-porous substrates
- Easily applied by brush, roller or airless spray
- Can be applied to damp substrates
- Rapid drying and easily repaired
- Non-toxic and flexible when cured

APPLICATIONS

- Suppression of methane, carbon dioxide and high density hydrocarbon vapour
- Ground floors
- Basements and substructures
- Retaining walls

APPLIED TO

- Concrete
- Masonry
- Steel

REMEMBER IT'S waterproof RIW

RIW LIQUID GM

TYPICAL USES

Liquid GM is a high performance elastomeric liquid rubber membrane, specifically designed for a range of vertical and horizontal surfaces, generally as follows:

- Applied to walls, floors or soffits.
- As a retro applied gas proof membrane to concrete and masonry substrates.
- As an alternative to sheet membranes in new construction.

The product only requires stirring to form the ideal material for providing a waterproof and gas proof, methane and carbon dioxide barrier.
When designing Type A structures (as classified in BS 8102: 2009), the product applied correctly is capable of providing the levels of protection required for Grades 1, 2 & 3 basements.

DURABILITY

Subject to normal conditions of use, Liquid GM will provide an effective barrier to methane and carbon dioxide gases, water and water vapour for the life of the structure.

INDEPENDENT AUTHORITY

Tests carried out by the Technology Centre show that Liquid GM will provide a barrier to methane, carbon dioxide and high density hydrocarbon vapour.

A copy of the reports are available upon request.

SPECIFICATION

J30 – Liquid Applied Tanking / Damp Proofing in accordance with NBS Clauses.

Please consult RIW for further information.

ANCILLARY PRODUCTS

Cementfill FC – Cement based waterproof fairing coat and repair mortar for filling minor holes, voids and defects.
Cementfill HB – Cement based waterproof high build repair mortar for profiling and providing fillets.
GM Reinforcing Scrim – a material for embedding in the coating, used to reinforce joints, etc.
Sheetseal GR – Compatible self-adhesive sheet, for flat open areas, if preferred.

CONSTRUCTION

GENERAL

All construction should conform with the Building Regulations, Codes of Practice and British Standards in current use at the time the building is constructed.

PERFORMANCE & COMPOSITION

Form	Thixotropic liquid
Colour; when dry	Purple/Red
Specific gravity	1.4
Number of coats	Two (2)
Coverage for two coats	2kg/m²
DFT of coating	1.0mm for two coats
Curing time	Touch dry: 1-2 hours
	24 - 48 hours: full cure
Overcoating time	90 - 120 minutes after 1st coat
Application temperature limits	5 - 35°C
CURED PROPERTIES	
Adhesion to concrete	> 1.1 N/mm²
Elongation ASTM D2370	> 100%
Water penetration	3.0 bars – no penetration
Methane permeability	< 1.40 x 10-12
UV resistance	Good

The above performance figures are typical values and should not be considered a product specification.

PREPARATION

All surfaces: Should be clean, free from dust and loose material, oil, paint, fungal growth, etc.

Non-structural cracks, less than 0.5mm wide, must be filled. Structural cracks must first be repaired and filled. The substrate must be sound and ideally present a smooth face. Fill holes and re-point flush to the finish, using Cementfill FC or HB to suit.
Old repairs must be inspected and re-repaired if necessary. Remove fins and snots as necessary.
Newly laid concrete should have a clean textured surface with 45° fillets at internal angles. Use Cementfill HB to provide fillets where required.

MIXING

Liquid GM is supplied ready for use. The product requires agitation using a slow speed paddle mixer. Mix carefully for 5 minutes before use. If containers are stored for more than 2 hours after opening, re-agitate. Do not add water.

SURFACE PREPARATION

Pre-dampen (not wet) the substrate before applying the first coat.

Interface with other media

For expansion joints, ensure that Liquid GM is applied well into the rebate before the expansion media is applied.

Other gas membranes must be exposed and lapped with where present.

Dealing with cracks

Cracks must be stabilised as necessary, and filled. Apply Liquid GM along the line of the crack, at a rate of 0.3 litres/m^2, with the GM Reinforcing Scrim fully embedded within it. Then apply the main coating system, as stated below.

APPLICATION OF THE MAIN COATING SYSTEM

The product can be applied by stiff brush, roller or airless spray with a minimum 17/1000 of an inch (17 thou.) nozzle. The spray method is especially suitable for less accessible locations and uneven substrates.

The first coat is to be applied at the minimum rate of 0.5m^2/litre. Ensure that the coating is even and use a circular action when spraying.

Allow the primer coat to dry before applying the second coat.

Apply the second coat, which is to be applied at the rate of 0.7m^2/litre, at right angles to the first coat using a similar application method.

Do not apply over bitumen.

The total application thickness must not exceed 4mm if splitting or cracking is to be avoided.

CLEANING

All tools should be cleaned with water immediately after use.

SAFETY

Full health and safety instructions are contained on the product material safety data sheets and these must be referred to before use.

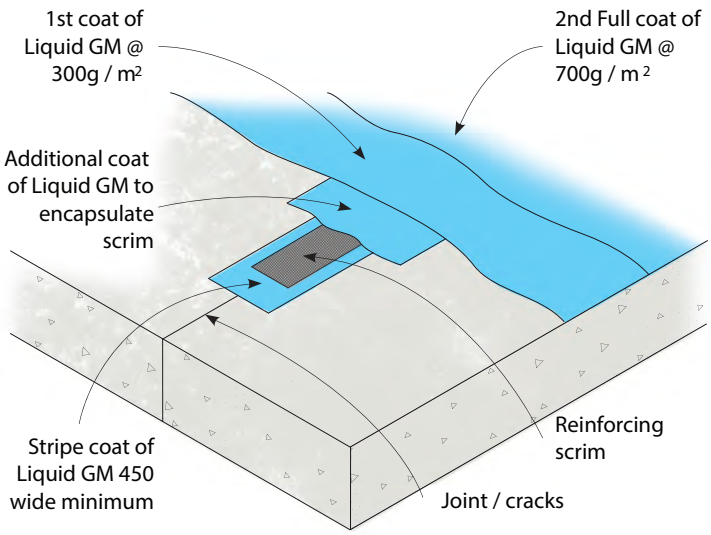
SUPPLY

AVAILABILITY

All RIW products can be obtained through Builders Merchants or approved stockists. A list of approved stockists is available from RIW's offices.

PACKAGING

Liquid GM	15kg container



Typical Joint Detail

STORAGE

Liquid GM must be stored at room temperature (minimum 10°C and max 30°C), and kept dry.

Protect from freezing and direct sunlight.

If these conditions are maintained, and the product packaging is unopened, then a shelf life of 12 months can be expected.

TECHNICAL SERVICES

The RIW Technical Department is available to advise on individual projects and to prepare or assist in the preparation of specifications and drawings. A list of experienced applicators of RIW materials is available from RIW's offices.

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June 2020

RIW SHEETSEAL GR

Sheetseal GR is a cold applied, high density polyethylene film bonded to aluminium foil and coated with a bitumen/rubber self adhesive layer with a removable reinforced silicone release paper.
Sheetseal Primer is a bitumen solution.

BENEFITS

- Compliant with BS 8485: 2015
- Methane and carbon dioxide barrier
- Water and water vapour barrier
- Factory controlled thickness
- Elastic and flexible
- Damage easily repaired
- No drying time
- Selvedge strip to improve lap sealing
- Complies with latest codes of practice as published by CIRIA & BRE

APPLICATIONS

- Combined tanking membrane and gas barrier
- Suppression of methane and carbon dioxide
- Ground floors
- Basements and sub-structures
- Retaining walls

APPLIED TO

- Concrete
- Masonry
- Steel
- Insulation boards / ICF systems

REMEMBER IT'S waterproof RIW

RIW SHEETSEAL GR

TYPICAL USES

Sheetseal GR protects the structure against methane, carbon dioxide and radon from the ground. In addition, Sheetseal GR provides a water and water vapour barrier. When designing a Type A (barrier) protection (as classified in BS 8102:2009), the product applied correctly is capable of providing the levels of protection required for grades 1, 2 & 3 basements.

Sheetseal Primer is used on all vertical or inclined surfaces, to aid adhesion of the Sheetseal GR membrane. Sheetseal Primer must however not be applied to ICF systems.

DURABILITY

Subject to normal conditions of use Sheetseal GR will provide an effective barrier to methane gas, water and water vapour for the life of the structure. The membrane is not designed for permanent exposure and must be protected by a screed, paving slabs, insulation etc.

INDEPENDENT AUTHORITY

Sheetseal GR has been tested by Wimpey Laboratories for methane gas resistance. The product was subsequently tested for compliance with BS 8485: 2015. The test results are included in the performance and composition table.

CE Marked to EN 13967. For Declaration of Performance see http://www.riw.co.uk/technical-downloads/ce-marking

PERFORMANCE & COMPOSITION

SHEETSEAL GR	
Form	Self adhesive sheet
Backing material	Cross orientated polyethylene with aluminium laminate
Overall thickness	1.60mm
Applied thickness	1.50mm
Roll size	1050mm x 19.05m long
Weight	1.7kg/m^2
Laps	150mm
Membrane strength	(ASTM D1000) 3.0N/mm^2
Elongation	(ASTM D1000) 40%
Puncture resistance	(ASTM E 154) 250N
Adhesion – 180° peel	(ASTM D1000) 2.0N/mm^2
Water vapour transmission	(ASTM E96) <0.1g/m^2/24 h
Methane gas permeability	<0.3ml/m^2/24 h
Minimum application temp.	5°C

SHEETSEAL PRIMER	
Form	Bitumen solution
Flash point	34°C
Coverage*	7m^2/litre/coat
Drying time	2–4 hours
Overcoating time	Minimum: when touch dry Maximum: 7 days

The above performance figures are typical values and should not be considered a product specification.

SPECIFICATION

J40 – Flexible Sheet Tanking/Damp proofing in accordance with NBS Clause 180.

Please consult RIW for further information.

ANCILLARY PRODUCTS

RIW produce a range of ancillary products for use with Sheetseal GR which include:

Cementfill FC - Cement based waterproof fairing coat and repair mortar for filling minor holes, voids and defects.

Cementfill HB - Cement based waterproof high build repair mortar for profiling and providing fillets.

Gas Seal GR DPC - Gas resistant damp proof course/cavity tray for building into masonry.

Gas Seal Black - 2000g loose laid damp proof/gas resistant membrane.

Double Drain - a drainage board which protects the membrane during backfilling operations, and also promotes drainage of water away from the structure.

Protection Board - a 3mm thick bitumen impregnated fibre board to prevent damage to the membrane during backfilling operations.

Adhesive Tape - a 150mm wide double sided tape for temporarily adhering Double Drain or Protection Board to the RIW membrane.

CONSTRUCTION

GENERAL

All construction should conform with the Building Regulations, Codes of Practice and British Standards in current use at the time the building is being constructed. In particular, it is recommended that reference is made to BS 8102: 2009 Code of Practice for Protection of Below Ground Structures Against Water from the Ground, and BS 8485: 2015 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Gases for New Buildings.

PREPARATION

All Surfaces: Should be smooth, clean, dry (to a depth of 1-2mm), sound and free from frost, oil, grease, condensation and other contamination. Any voids or hollows must be made good to a flush finish with a suitable filler. Any sharp edges or high points should be eliminated. Powdery or flaking surfaces should be removed by suitable means. Internal corners should be eased with a 50 x 50mm cement fillet (see ancillary products), to assist application, similarly, external corners should be chamfered or rounded where required.

Concrete Surfaces: Horizontal surfaces should preferably be smooth, however lightly tamped (3–4 mm peak to trough profile), brushed or floated surfaces may also be acceptable.

Masonry: Should be sound with joints flush pointed or 'bagged out' with Cementfill FC or similar before the membrane is applied. Open textured surfaces should be sealed with Cementfill FC or a sand/cement slurry or render to provide a suitable surface. If existing surfaces are very rough, they may require rendering.

APPLICATION

General: Application of Sheetseal GR and Sheetseal Primer should not be attempted in temperatures below 5°C. Apply one coat of Sheetseal Primer to all vertical or inclined surfaces. The primer should be applied, where required, by brush, roller or spray at a coverage of approximately 7m²/litre. The primer should dry in 2-4 hours depending on site conditions. The primer should be covered as soon as it is dry and should not be left exposed for longer than seven days.

Do not use Sheetseal Primer onto insulation boards or insulated concrete formwork (ICF) systems.

Vertical work should be supported immediately after application, or temporary support provided. **Maximum unsupported height of membrane should not exceed 200mm.**

To apply the Sheetseal GR, remove the separating paper progressively from one end of the roll, and press the adhesive coated surface firmly onto the prepared substrate. Smooth out the membrane working from the centre to the edges to remove air pockets. Any remaining bubbles should be slit with a sharp knife and re-adhered. Patches of sufficient size must then be applied over the slits or any other damaged areas to maintain a minimum overlap of 150 mm. A hard roller should then be used to firm down the whole area. The peel off selvedge strip should then be removed from the top edge to reveal a bitumen surface.

Subsequent rolls should then be lapped onto the previous roll. Edge laps should be a minimum of 150mm wide and end laps 150mm. The overlaps should not be primed, but should be rolled with a hard roller to ensure good adhesion. Sheetseal GR is not designed to be left exposed and should be protected from UV light within 28 days of application. Interior and exterior corners should be treated as illustrated in Detail 7 of this literature. The full membrane should then be applied.

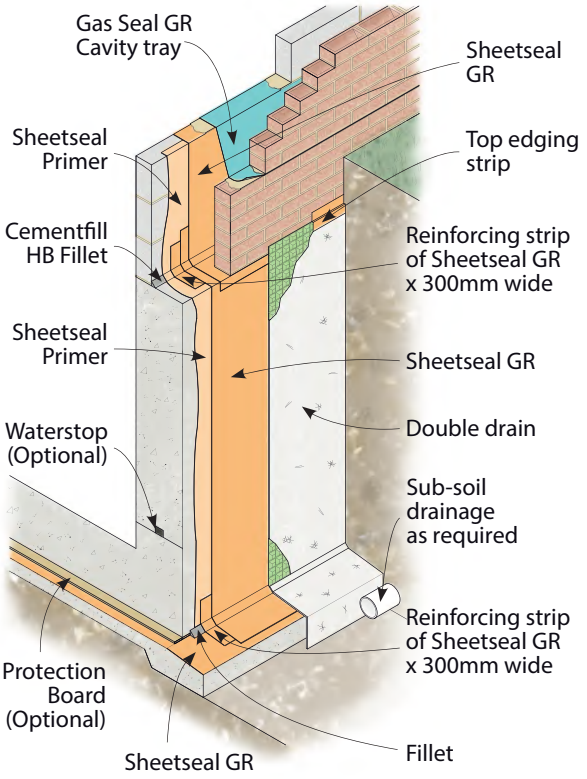
Internal angles and corners should be covered with a 300mm strip of Sheetseal GR applied into the angle. The full membrane should then be dressed into the angle to form a triple layer as illustrated in Detail 5 of this literature. External corners should be covered with a 300mm strip of Sheetseal GR. The full membrane is then applied ensuring that overlaps occur at the angle to give three layer protection as illustrated in Detail 6 of this literature.

SPECIFIC USES

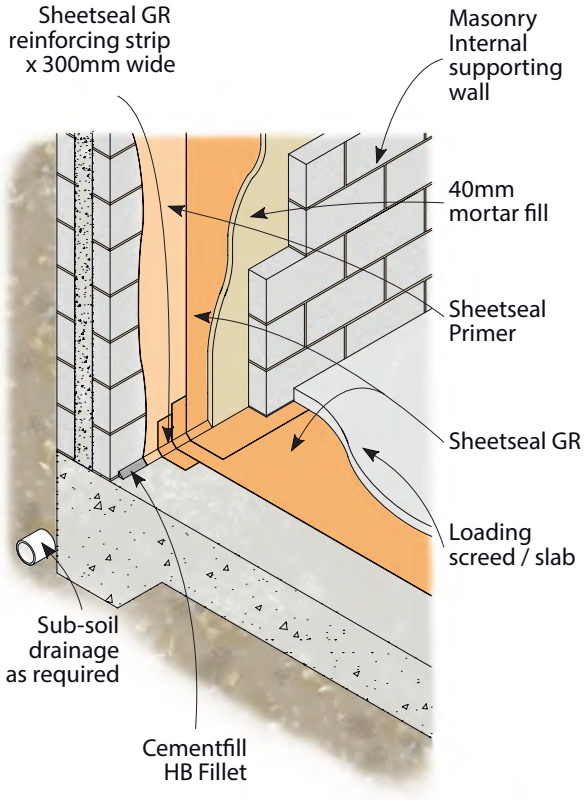
Sheetseal GR should be installed in accordance with the current guidance for gas protection systems, including BRE 211/414, CIRIA C665 & BS 8485: 2015.

Tanking: Sheetseal GR must always be fully supported, to resist hydrostatic pressure, when used for tanking.

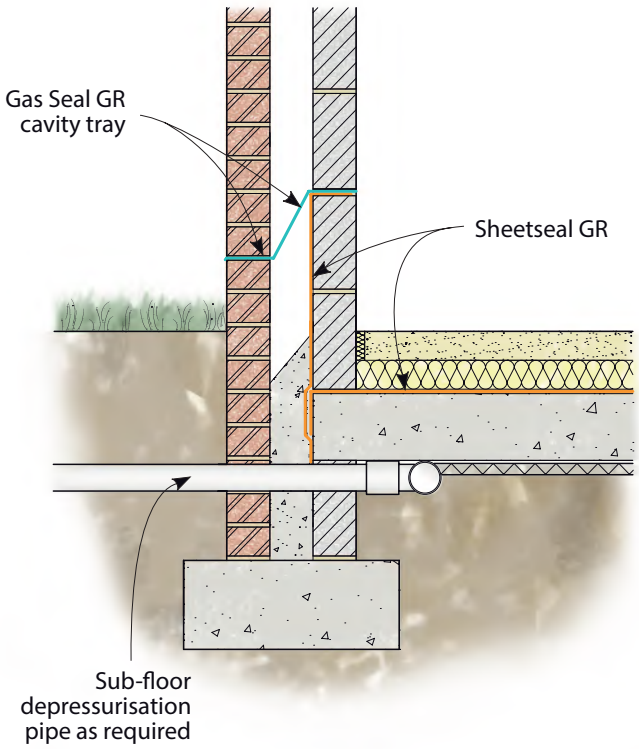
External Tanking: Should be carried out as illustrated in Detail 1 of this literature. The horizontal membrane should be laid on a concrete blinding to project at least 200mm beyond the outer face of the structure.



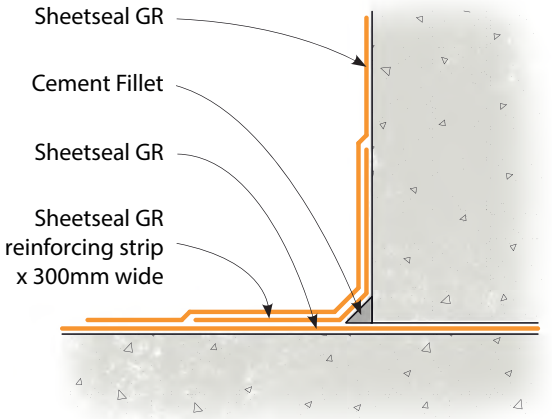
Detail 1 - External Tanking



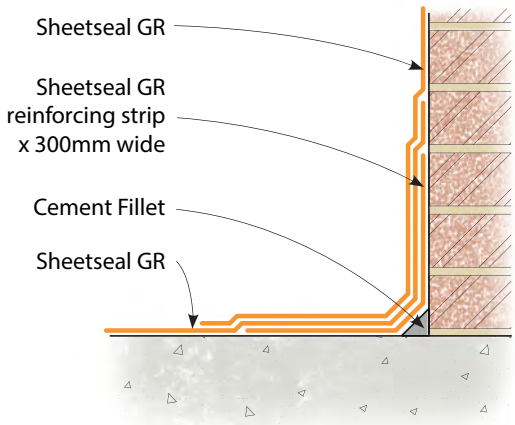
Detail 2 - Internal Tanking



Detail 3 - Ground Floor DPM/Gas Barrier



Detail 4 - External Continuity Detail



Detail 5 - Internal angle

SPECIFIC USES (CONTINUED)

The base structural slabs and the walls should be formed, incorporating a fillet at the external base of the wall, the angle should then be treated as illustrated in Detail 4 of this literature. The remainder of the vertical membrane should then be applied and protected from backfill material using Double Drain or Protection Board to suit.

Internal Tanking: Should be carried out as illustrated in Detail 2 of this literature. A loading coat of brick, block or concrete should be constructed immediately after the membrane has been placed. If brickwork or blockwork has been used a 40 mm minimum cavity should be left between the membrane and the loading skin. This cavity must be filled with a sand/cement mortar fill as the work proceeds.

Floating floor construction: Sheetseal GR can be used to provide a methane barrier under a floating floor system at ground floor level; see Detail 3. When used under insulation the following guidelines should be followed:

a) The insulation boards must be laid butt jointed, with corners and arises kept intact to ensure overall loading of the membrane.

b) The floor finish must not displace the insulation boards during laying.

SAFETY

Sheetseal Primer is flammable and should be used in well-ventilated areas away from sources of ignition. The product can effect sensitive skins. Gloves or barrier cream should always be used by operatives and hands thoroughly washed at the end of each working period. Do not allow the product to enter watercourses. Full health and safety instructions are contained on the product material safety data sheets, and these must be referred to before use.

SUPPLY

AVAILABILITY

All RIW products can be obtained through Builders Merchants or approved stockists. A list of approved stockists is available from RIW's offices.

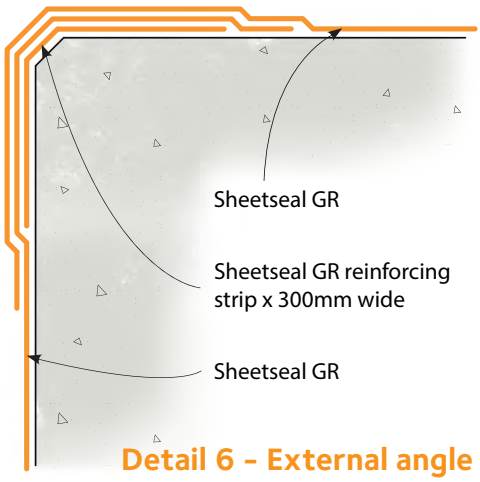
PACKAGING

Sheetseal GR	1050mm x 19.05m long rolls
Sheetseal Primer	5 & 25 litre containers

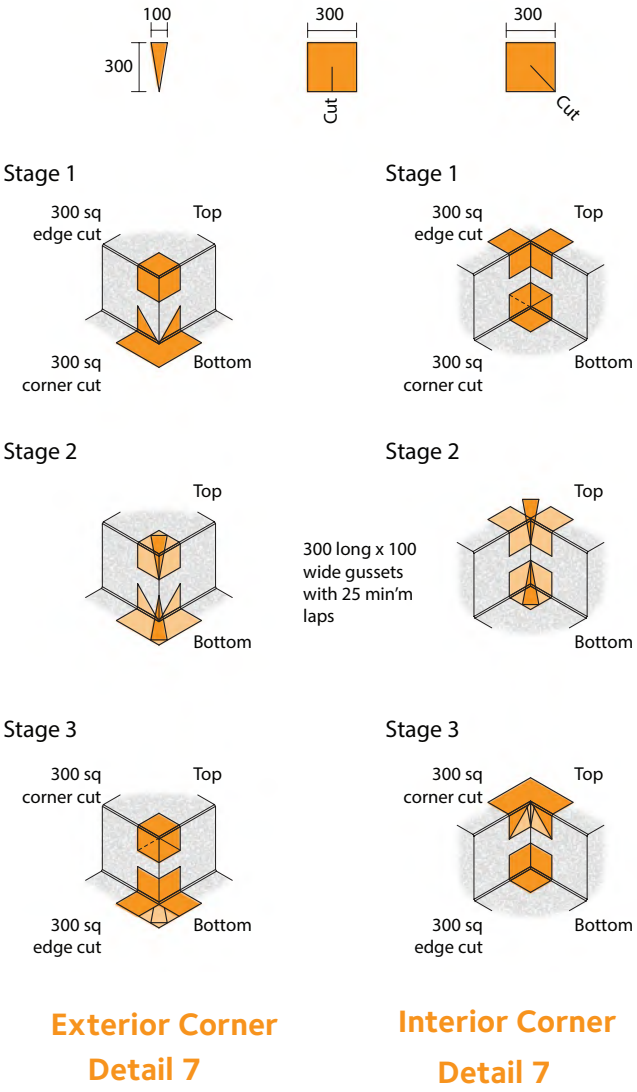
STORAGE

Sheetseal GR: There are no special requirements, but rolls should be kept upright, under cover and protected from extremes of temperature.

Sheetseal Primer: There are no special requirements. The material may be stored in severe winter environments without any detrimental effect.



Detail 6 - External angle



Exterior Corner Detail 7

Interior Corner Detail 7

TECHNICAL SERVICES

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June 2020

RIW STRUCTURESEAL GPT

Structureseal GPT is a 1.5mm thick, unique blended polyethylene membrane with a bonded geotextile for pre-applied waterproofing applications, where ground gas or VOC protection is also required.

BENEFITS

- Pre-applied tanking system
- Hydrocarbon, VOC, methane & carbon dioxide barrier
- Separate tanking or damp proof membrane not required
- Robust jointing and sealing system
- High puncture resistance
- Welded joints possible
- Compliant with BS 8485: 2015, BS8102:2009 & CIRIA C748

APPLICATIONS

- Basements and sub-structures
- Retaining walls
- Ground floors

APPLIED TO

- Concrete
- Formwork
- Blinding Layer
- Piling

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RIW STRUCTURESEAL GPT

TYPICAL USES

Structureseal GPT is typically used as a pre-applied Type A tanking membrane (as defined in BS8102:2009), where protection against the ingress of hazardous ground gases or VOCs and Hydrocarbons is required.

Pre-applied to basement structures, floor slabs at ground level, boundary line applications and concrete formwork.

The installed product protects the structure against water, moisture, hydrocarbons, methane, carbon dioxide and radon from the ground and complies with BS8485:2015 and CIRIA C748.

DURABILITY

Subject to normal conditions of use Structureseal GPT will remain effective against the ingress of water, water vapour and hydrocarbons, and will restrict the ingress of radon, methane and carbon dioxide during the lifetime of the building.

Where protection from hydrocarbons is required the laps in the product must be welded throughout.

SPECIFICATION

J40 Flexible sheet waterproofing / damp proofing
Clause 140 Loose laid polyethylene gas retardant damp proofing.
Clause 145 Loose laid weldable polyethylene gas retardant damp proofing.
Please consult RIW for further information.

INDEPENDENT AUTHORITY

CE Marked to BS EN 13967.

For Declaration of Performance see:

http://www.riw.co.uk/technical-downloads/ce-marking

PERFORMANCE & COMPOSITION

Form	Loose laid sheet
Colour	Grey
Overall thickness	1.5mm
Roll size	1.9m wide x 25m long
Weight	33kg/roll
Adjacent laps (welded or taped)	100mm wide (onto selvedge)
End of roll laps: Under taped using Sheetseal GR Welded	 300mm 100mm
Tensile Strength EN 12311-1: MD CD	 >550 N/50mm >400 N/50mm
Resistance to tearing EN 12310-1: MD CD	 300N 400N
Water vapour transmission rate BS EN 1931	0.14g/m^2/day
Radon permeability SP Method 3873	3.0 x 10^{-12} m^2. s
Methane gas permeability BS EN ISO 15105-1	0.13ml/m^2/day/atm
Carbon dioxide permeability BS EN ISO 15105-1	3.01ml/m^2/day/atm

The above performance figures are typical values and should not be considered a product specification.

ANCILLARY PRODUCTS

RIW produce a range of ancillary products for use with Structureseal GPT which include:
Structureseal GPT Corner Units - preformed corner units, available for both internal and external corners.
Structureseal GPT Corner Strips - 1m wide rolls of Structureseal GPT, supplied with selvedge strips on both sides, and used at wall/floor junctions and wall/wall corners.
Structureseal GPT Pipe Collars - flexible collar for sealing around pipe penetrations.
Gas Seal Tape HC - 100mm wide self-adhesive butyl tape for sealing laps, onto selvedge strips, where product is not welded.
Sheetseal GR - 300mm wide self-adhesive sheet, used outside at ends of rolls, and to patch over bolt holes, etc.
Gas Seal GR DPC - gas resistant damp proof course / cavity tray for building into masonry.

CONSTRUCTION

GENERAL

All construction should conform with the Building Regulations, Codes of Practice and British Standards in current use at the time the building is being constructed.

Wherever possible, services should enter the building above slab level to avoid penetrating the gas-resistant membrane. However, the water service and soil vent pipes will usually be required to enter the building through the slab and membrane.

PREPARATION

The membrane should be laid on a smooth surface, free from voids, hollows and objects which may damage the membrane.

Floors: Substrate should be smooth and compacted and free of any sharp protrusions which may damage the membrane.

Walls: Structureseal GPT should line the inside face of the concrete formwork before concrete is cast.

Boundary Line Construction: against pile walls a smooth, flat surface should be provided by 'back-blinding' or spray concrete lining the piles before the membrane application.

APPLICATION

The completed gas proofing system must cover the entire footprint of the building.

Starting in the corner, install pre-formed corner units, held in place using Gas Seal Tape HC. Followed by Structureseal GPT Corner Strips in right angle wall/floor junctions, taped or welded onto Corner Units. Laps at end of rolls are to be welded onto an adjacent selvedge by 100mm or butt jointed and taped underneath using a 300mm band of Sheetseal GR.

Structureseal GPT Corner Strips are then positioned vertically at internal and external corners. These strips are welded or taped onto the top selvedge strip of the wall/floor junction Corner Strip previously installed. Drawing numbers RIW/TD/854 & 855 are available for further guidance.

Starting again in the corner, Structureseal GPT should be unrolled onto the prepared surface with the geotextile surface facing towards the concrete to be waterproofed.

The product should be smoothed out as necessary, and be welded or taped onto the selvedge strip of the Corner Strips.

Subsequent rolls should then be lapped by welding or taping onto the 100mm wide selvedge strip of the adjacent roll. Laps at the end of the roll are to be welded or taped onto an adjacent selvedge by 100mm. When used horizontally, laps may be butt jointed and taped underneath using 300mm wide band of Sheetseal GR.

Pipe penetrations should be sealed using Structureseal GPT Pipe Collars, welded or taped to the underside of the main membrane.

Gas Seal GR DPC should be used to provide continuity through walls, with Structureseal GPT lapped and sealed onto it by welding or taping.

Bolt holes should be sealed with a suitable strength mortar, such as Cementfill HB, and patch repaired using a 300 x 300mm piece of Sheetseal GR.

SPECIFIC USES

Structureseal GPT will acheive 2 points according to BS8485:2015 when independently validated.

Structureseal GPT should be installed with the ancillary products required, in accordance with current guidance for waterproofing & gas protection systems; including BRE211/ 414, CIRIA C665, CIRIA C748 BS8102:2009 & BS 8485:2015.

SAFETY

Full health and safety instructions are contained on the product material safety data sheets, and these must be referred to before use.

SUPPLY

AVAILABILITY

All products can be obtained through Builders Merchants or approved stockists. A list of approved stockists is available from RIW's offices.

PACKAGING

Structureseal GPT	1.9m wide x 25m long rolls
Structureseal GPT Corner Units	Internal and External available
Structureseal GPT Corner Strips	1m wide x 25m long rolls
Gas Seal Tape HC	100mm wide x 15m long rolls
Structureseal GPT Pipe Collar	110mmØ 130mmØ 160mmØ

STORAGE

The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

TECHNICAL SERVICES

The Technical Department is available to advise on individual projects and to prepare or assist in the preparation of specifications and drawings. We can also offer design guidance to satisfy the requirements of BS8485:2015, BS8102:2009, CIRIA C748 and CIRIA C735.

A list of experienced applicators of our materials is available from RIW's offices, along with a list of independent consultants providing validation and integrity testing services.

The information in this literature was correct at the time of going to press. However, we are committed to continually improving our products and reserve the right to change product specifications.

For the latest information, please consult RIW. Conditions of use are beyond our control, therefore we cannot warrant the results to be obtained.

RIW Limited
580-581 Ipswich Road, Slough, SL1 4EQ
Technical enquires tel: **01753 944200**
Commercial enquires tel: **01753 944210**
www.riw.co.uk

REMEMBER IT'S waterproof RIW

Appendix C– Gas Protection Surveillance Visits

VINCI

E

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

General Photos prior to installation of membrane

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

General Photos showing membrane installation and showing detail around columns and pipe penetrations.

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

29/10/2021

29/10/2021

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

General Photos prior to pouring concrete. No penetrations noted.

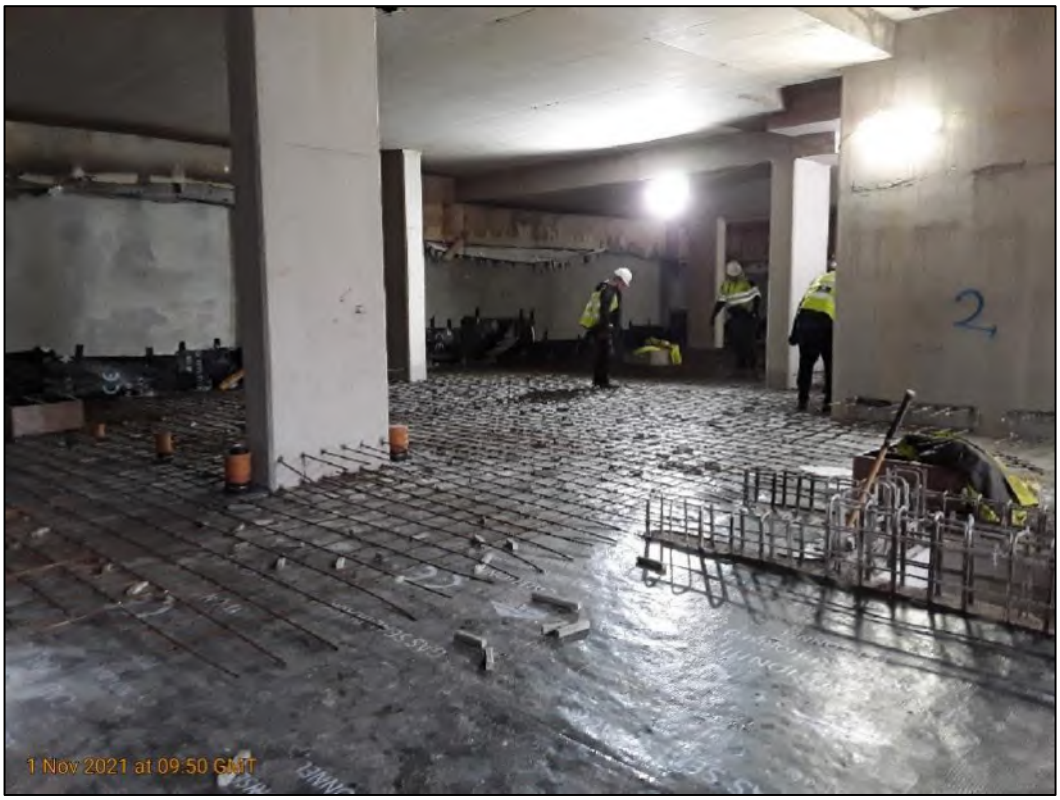

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

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PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

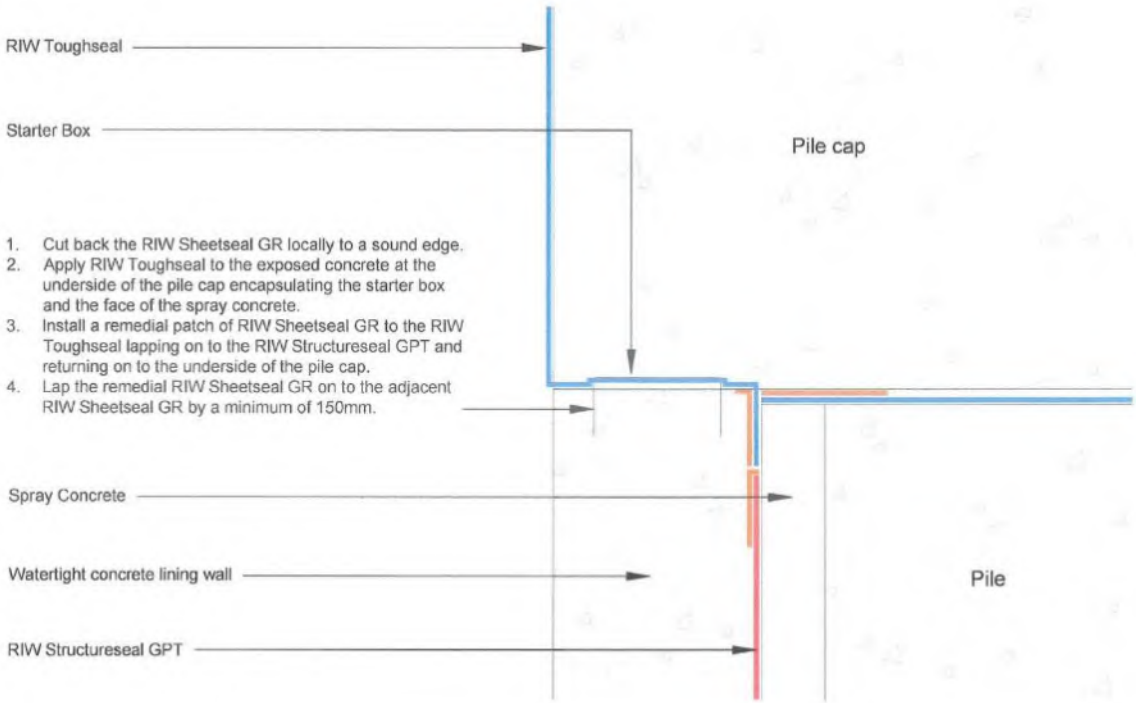


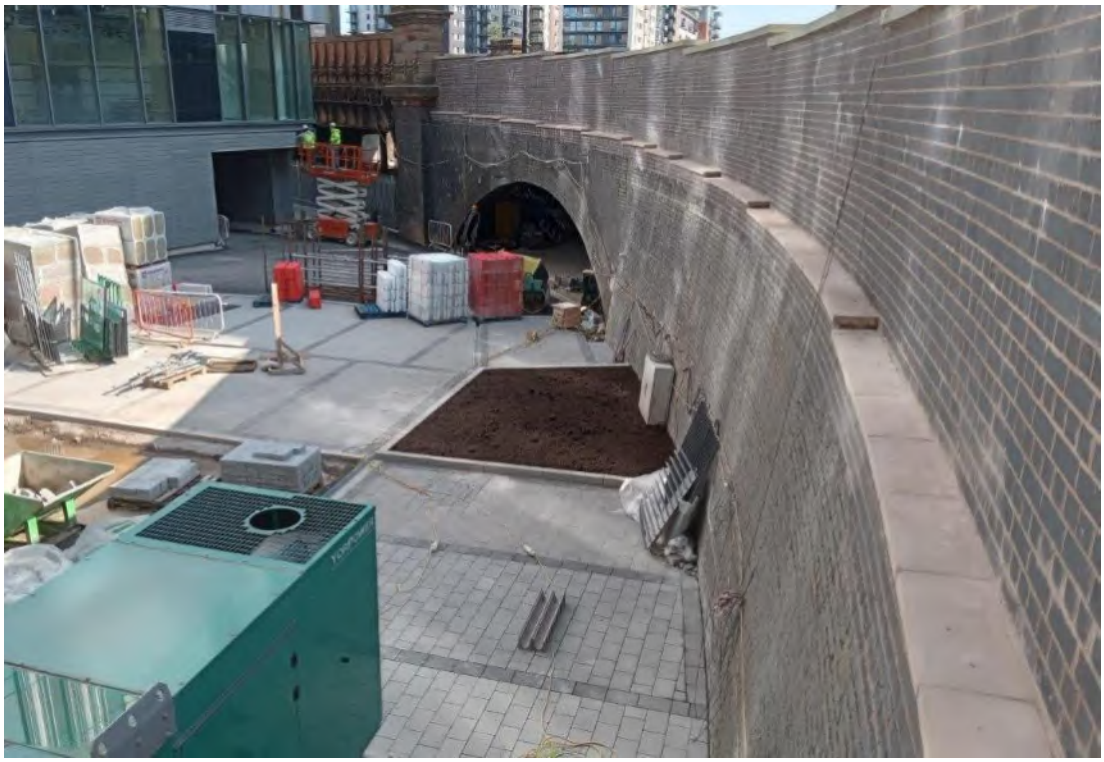
PHOTO RECORDS CARRIED OUT BY VINCI – RESIDENTIAL BLOCK 2

Repair on contig pile wall

Appendix D – Topsoil and Subsoil Depth Verification Photographs

Area 2

Area 2 before installation of topsoil



Area 2 after installation of topsoil

AREA 2

Photo after the planting within the soft landscaped areas

Area 3

Area 3 before installation of subsoil and topsoil

AREA 3

Plot 3 after topsoil installation

Plot3

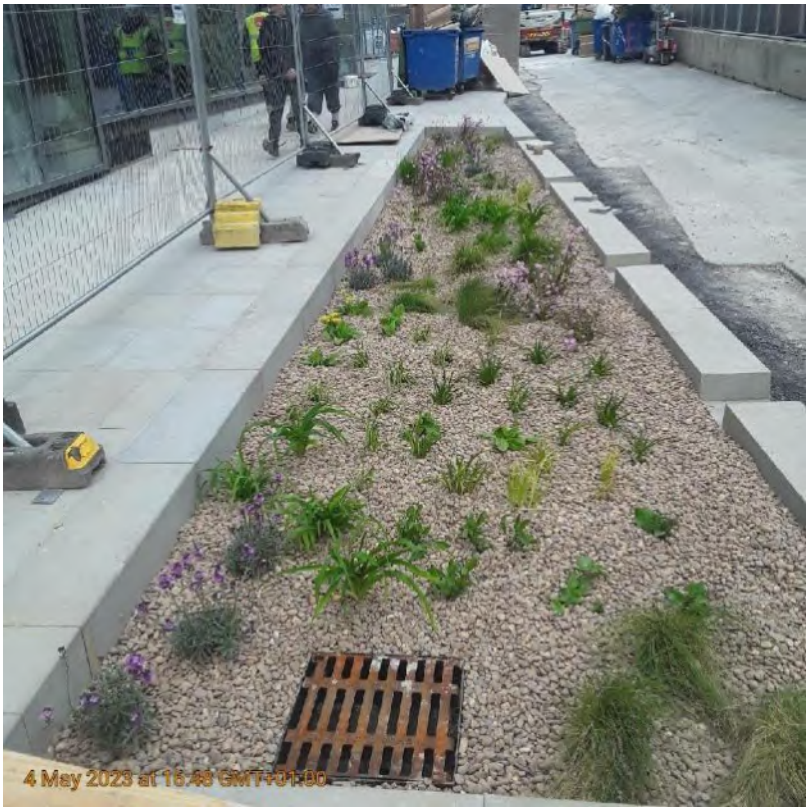


Photo after the planting within the soft landscaped areas

Area 6

Area 6 before installation of subsoil and topsoil

AREA 6

Plot 6 after instation of topsoil and semi-mature tree

Area 7

Area 7 before topsoil installation

Area 8

Area 9

Before topsoil installation

After topsoil and tree installation

Area 10

Before topsoil installation

After topsoil installation

4 May 2023 at 16:46 GMT+01:00

Area 11

Before topsoil installation

After topsoil installation

Appendix E – Topsoil and Subsoil Laboratory Analysis

Certificate of Analysis

Certificate Number	23-07691	*Issued:*	14-Apr-23
Client	GroundSolve Limited Unit 1 Well House Barns Bretton Flintshire FAO Adam Fenwick CH4 0DH		
Our Reference	23-07691		
Client Reference	(not supplied)		
Order No	(not supplied)		
Contract Title	New Victoria, Manchester		
Description	6 Soil samples.		
Date Received	31-Mar-23		
Date Started	31-Mar-23		
Date Completed	14-Apr-23		
Test Procedures	Identified by prefix DETSn (details on request).		
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.		

Approved By

Kirk Bridgewood
General Manager

Summary of Chemical Analysis
Soil Samples

Our Ref 23-07691
Client Ref
Contract Title New Victoria, Manchester

			Lab No	2149357	2149358	2149359	2149360	2149361	2149362
			.Sample ID	SP1 - TS01	SP1 - TS02	SP1 - TS03	SP1 - SS01	SP1 - SS02	SP1 - SS03
			Depth						
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	27/03/2023	27/03/2023	27/03/2023	27/03/2023	27/03/2023	27/03/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	3.8	3.5	3.5	0.5	0.5	0.5
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.5	1.4	1.6	< 0.2	< 0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.2	0.1	< 0.1	< 0.1	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	10	11	13	1.4	1.5	0.91
Chromium III	DETSC 2301*	0.15	mg/kg	10	11	13	1.4	1.5	0.91
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	17	15	3.6	3.9	2.2
Lead	DETSC 2301#	0.3	mg/kg	17	17	17	1.4	1.3	0.4
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	8.7	8.7	8.6	1.6	1.8	1.4
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	42	41	38	8.5	8.4	5.0
Inorganics									
pH	DETSC 2008#		pH	8.2	8.3	8.3	8.3	8.4	7.8
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.4	0.4	0.4	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	4.5	2.8	3.9	0.1	0.1	0.1
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	160	150	180	19	< 10	< 10
Sulphide	DETSC 2024*	10	mg/kg	84	48	180	12	16	20
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-07691
Client Ref
Contract Title New Victoria, Manchester

			Lab No	2149357	2149358	2149359	2149360	2149361	2149362
			.Sample ID	SP1 - TS01	SP1 - TS02	SP1 - TS03	SP1 - SS01	SP1 - SS02	SP1 - SS03
			Depth						
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	27/03/2023	27/03/2023	27/03/2023	27/03/2023	27/03/2023	27/03/2023
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.03	0.03	0.04	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.07	0.06	0.06	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.06	0.05	0.05	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.13	0.10	0.11	< 0.10	< 0.10	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.8	< 0.3	0.9	< 0.3	< 0.3	0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-07691
Client Ref
Contract Title New Victoria, Manchester

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2149357	SP1 - TS01	SOIL	NAD	none	Ben Rose
2149358	SP1 - TS02	SOIL	NAD	none	Ben Rose
2149359	SP1 - TS03	SOIL	NAD	none	Ben Rose
2149360	SP1 - SS01	SOIL	NAD	none	Ben Rose
2149361	SP1 - SS02	SOIL	NAD	none	Ben Rose
2149362	SP1 - SS03	SOIL	NAD	none	Ben Rose

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

Information in Support of the Analytical Results

Our Ref 23-07691
Client Ref
Contract New Victoria, Manchester

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2149357	SP1 - TS01 SOIL	27/03/23	GJ 250ml, GJ 60ml, PT 1L		
2149358	SP1 - TS02 SOIL	27/03/23	GJ 250ml, GJ 60ml, PT 1L		
2149359	SP1 - TS03 SOIL	27/03/23	GJ 250ml, GJ 60ml, PT 1L		
2149360	SP1 - SS01 SOIL	27/03/23	GJ 250ml, GJ 60ml, PT 1L		
2149361	SP1 - SS02 SOIL	27/03/23	GJ 250ml, GJ 60ml, PT 1L		
2149362	SP1 - SS03 SOIL	27/03/23	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

End of Report

Certificate of Analysis

Certificate Number	23-09854	*Issued:*	09-May-23
Client	GroundSolve Limited Unit 1 Well House Barns Bretton Flintshire FAO Adam Fenwick CH4 0DH		
Our Reference	23-09854		
Client Reference	NV2806		
Order No	(not supplied)		
Contract Title	(not supplied)		
Description	6 Soil samples.		
Date Received	25-Apr-23		
Date Started	25-Apr-23		
Date Completed	09-May-23		
Test Procedures	Identified by prefix DETSn (details on request).		
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.		

Approved By

Kirk Bridgewood
General Manager

Summary of Chemical Analysis
Soil Samples

Our Ref 23-09854
Client Ref NV2806
Contract Title

			Lab No	2161625	2161626	2161627	2161628	2161629	2161630
			.Sample ID	SP2 SS1	SP2 SS2	SP2 SS3	SP2 TS1	SP2 TS2	SP2 TS3
			Depth						
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	1.4	2.6	1.7	3.3	3.1	3.5
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	< 0.2	< 0.2	0.2	1.5	1.6	1.8
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	7.5	13	8.1	9.9	8.5	8.9
Chromium III	DETSC 2301*	0.15	mg/kg	7.5	13	8.1	9.9	8.5	8.9
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	4.5	8.1	5.0	19	19	18
Lead	DETSC 2301#	0.3	mg/kg	2.7	5.8	4.1	15	13	17
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	5.9	10	6.5	9.5	8.3	8.6
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	14	22	18	67	38	44
Inorganics									
pH	DETSC 2008#		pH	8.5	8.5	8.4	8.2	8.2	8.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.2	0.1	0.4	0.4	0.5
Organic matter	DETSC 2002#	0.1	%	< 0.1	< 0.1	0.3	4.4	4.0	3.9
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	19	21	27	140	100	100
Sulphide	DETSC 2024*	10	mg/kg	12	< 10	< 10	< 10	< 10	12
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg				< 1.5	< 1.5	< 1.5
Aliphatic >EC10-EC12	DETSC 3521#	1.5	mg/kg	2.02	1.99	2.18			
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg				< 1.2	< 1.2	< 1.2
Aliphatic >EC12-EC16	DETSC 3521#	1.2	mg/kg	2.18	2.29	2.61			
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg				< 1.5	< 1.5	< 1.5
Aliphatic >EC16-EC21	DETSC 3521#	1.5	mg/kg	3.03	3.15	2.92			
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg				< 3.4	< 3.4	< 3.4
Aliphatic >EC21-EC35	DETSC 3521#	3.4	mg/kg	6.80	5.49	4.59			
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg				< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg				< 10	< 10	< 10
Aliphatic C5-C35	DETSC 3521*	10	mg/kg	14.03	12.92	12.30			
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg				< 0.9	< 0.9	< 0.9
Aromatic >EC10-EC12	DETSC 3521#	0.9	mg/kg	< 0.90	< 0.90	< 0.90			
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg				< 0.5	< 0.5	< 0.5
Aromatic >EC12-EC16	DETSC 3521#	0.5	mg/kg	< 0.50	< 0.50	< 0.50			

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 23-09854
Client Ref NV2806
Contract Title

			Lab No	2161625	2161626	2161627	2161628	2161629	2161630
			.Sample ID	SP2 SS1	SP2 SS2	SP2 SS3	SP2 TS1	SP2 TS2	SP2 TS3
			Depth						
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg				< 0.6	< 0.6	< 0.6
Aromatic >EC16-EC21	DETSC 3521#	0.6	mg/kg	< 0.60	< 0.60	< 0.60			
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg				< 1.4	< 1.4	< 1.4
Aromatic >EC21-EC35	DETSC 3521#	1.4	mg/kg	< 1.40	< 1.40	< 1.40			
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg				< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg				< 10	< 10	< 10
Aromatic C5-C35	DETSC 3521*	10	mg/kg	< 10.00	< 10.00	< 10.00			
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg				< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3521*	10	mg/kg	14.03	12.92	12.30			
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03	0.15	0.04
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.07	0.31	0.07
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.05	0.27	0.05
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.09	0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03	0.13	0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.11	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.06	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.12	1.2	0.12
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 23-09854
Client Ref NV2806
Contract Title

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2161625	SP2 SS1	SOIL	NAD	none	Ben Rose
2161626	SP2 SS2	SOIL	NAD	none	Ben Rose
2161627	SP2 SS3	SOIL	NAD	none	Ben Rose
2161628	SP2 TS1	SOIL	NAD	none	Ben Rose
2161629	SP2 TS2	SOIL	NAD	none	Ben Rose
2161630	SP2 TS3	SOIL	NAD	none	Ben Rose

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

Information in Support of the Analytical Results

Our Ref 23-09854
Client Ref NV2806
Contract

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2161625	SP2 SS1 SOIL		GJ 250ml, GJ 60ml, PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Sulphur (free) (7 days), EPH/Aliphatic/Aromatic (14 days), Mercury (28 days), ICP WS Boron (182 days), Metals ICP (182 days), Metals ICP Prep (182 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2161626	SP2 SS2 SOIL		GJ 250ml, GJ 60ml, PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Sulphur (free) (7 days), EPH/Aliphatic/Aromatic (14 days), Mercury (28 days), ICP WS Boron (182 days), Metals ICP (182 days), Metals ICP Prep (182 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2161627	SP2 SS3 SOIL		GJ 250ml, GJ 60ml, PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Sulphur (free) (7 days), EPH/Aliphatic/Aromatic (14 days), Mercury (28 days), ICP WS Boron (182 days), Metals ICP (182 days), Metals ICP Prep (182 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2161628	SP2 TS1 SOIL		GJ 250ml, GJ 60ml, PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Sulphur (free) (7 days), Mercury (28 days), ICP WS Boron (182 days), Metals ICP (182 days), Metals ICP Prep (182 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	

Information in Support of the Analytical Results

Our Ref 23-09854
Client Ref NV2806
Contract

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2161629	SP2 TS2 SOIL		GJ 250ml, GJ 60ml, PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Sulphur (free) (7 days), Mercury (28 days), ICP WS Boron (182 days), Metals ICP (182 days), Metals ICP Prep (182 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2161630	SP2 TS3 SOIL		GJ 250ml, GJ 60ml, PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), Boron (365 days), BTEX (14 days), Chromium, Hexavalent (365 days), Sulphur (free) (7 days), Mercury (28 days), ICP WS Boron (182 days), Metals ICP (182 days), Metals ICP Prep (182 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

End of Report

Appendix F – Topsoil and Subsoil Screening Sheets

Project: 2806 - New Vic, Manchester
Residential with gardens (1% SOM)

GroundSolve Ltd

Metals & Non-Metals	SP1 - TS01	SP1 - TS02	SP1 - TS03	SP1 - SS01	SP1 - SS02	SP1 - SS03	SP2 - TS1	SP2 - TS2	SP2 - TS3	SP2 - SS1	SP2 - SS2	SP2 - SS3	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL							
Arsenic	3.8	3.5	3.5	0.5	0.5	0.5	3.3	3.1	3.5	1.4	2.6	1.7	0.5	3.8	2.33	12	37	C4SL	0
Cadmium	0.2	0.2	0.1	< 0.1	< 0.1	< 0.1	0.2	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.14	12	22	C4SL	0
Chromium III	10	11	13	1.4	1.5	0.91	9.9	8.5	8.9	7.5	13	8.1	0.91	13	7.81	12	910	S4UL	0
Chromium, Hexavalent	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1	1	12	21	C4SL	0
Copper	17	17	15	3.6	3.9	2.2	19	19	18	4.5	8.1	5	2.2	19	11.03	12	2400	S4UL	0
Lead	17	17	17	1.4	1.3	0.4	15	13	17	2.7	5.8	4.1	0.4	17	9.31	12	200	C4SL	0
Mercury	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	0.05	12	1.2	S4UL	0
Nickel	8.7	8.7	8.6	1.6	1.8	1.4	9.5	8.3	8.6	5.9	10	6.5	1.4	10	6.63	12	130	S4UL	0
Phenol - Monohydric	0.8	< 0.3	0.9	< 0.3	< 0.3	0.3	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.9	0.39	12	120	S4UL	0
Selenium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	0.5	12	250	S4UL	0
Zinc	42	41	38	8.5	8.4	5	67	38	44	14	22	18	5	67	28.83	12	3700	S4UL	0

Petroleum Hydrocarbons	SP1 - TS01	SP1 - TS02	SP1 - TS03	SP1 - SS01	SP1 - SS02	SP1 - SS03	SP2 - TS1	SP2 - TS2	SP2 - TS3	SP2 - SS1	SP2 - SS2	SP2 - SS3	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL							
Benzene	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	<0.01	0.01	6	0.87	C4SL	0
Toluene	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	<0.01	0.01	6	130	S4UL	0
Ethylbenzene	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	<0.01	0.01	6	47	S4UL	0
xylene	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	<0.01	0.01	6	-	S4UL	6
Aliphatic C5-C6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	0.01	12	42	S4UL	0
Aliphatic C6-C8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	0.01	12	100	S4UL	0
Aliphatic C8-C10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	0.01	12	27	S4UL	0
Aliphatic >EC10-EC12	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.02	1.99	2.18	< 1.5	2.18	1.64	12	130	S4UL	0
Aliphatic >EC12-EC16	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	2.18	2.29	2.61	< 1.2	2.61	1.49	12	1100	S4UL	0
Aliphatic >EC16-EC35	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	9.83	8.64	7.51	< 3.4	9.83	4.72	12	65000	S4UL	0
Aliphatic >EC35-EC40	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	<3.4	3.4	12	65000	S4UL	0
Aromatic C5-C7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	0.01	12	70	S4UL	0
Aromatic C7-C8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	0.01	12	130	S4UL	0
Aromatic C8-C10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	0.01	12	34	S4UL	0
Aromatic >EC10-EC12	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.90	< 0.90	< 0.90	< 0.9	<0.9	0.9	12	74	S4UL	0
Aromatic >EC12-EC16	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50	< 0.50	< 0.50	< 0.5	<0.5	0.5	12	140	S4UL	0
Aromatic >EC16-EC21	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.60	< 0.60	< 0.60	< 0.6	<0.6	0.6	12	260	S4UL	0
Aromatic >EC21-EC35	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.40	< 1.40	< 1.40	< 1.4	<1.4	1.4	12	1100	S4UL	0
Aromatic >EC35-EC40	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.40	< 1.40	< 1.40	< 1.4	<1.4	1.4	12	1100	S4UL	0

Polyaromatic Hydrocarbons (PAH	SP1 - TS01	SP1 - TS02	SP1 - TS03	SP1 - SS01	SP1 - SS02	SP1 - SS03	SP2 - TS1	SP2 - TS2	SP2 - TS3	SP2 - SS1	SP2 - SS2	SP2 - SS3	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL							
Acenaphthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	210	S4UL	0
Acenaphthylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	170	S4UL	0
Anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	0.03	12	2400	S4UL	0
Benzo(a)anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.09	0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.09	0.04	12	7.2	S4UL	0
Benzo(a)pyrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06	0.03	12	5	C4SL	0
Benzo(b)fluoranthene	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.11	0.04	12	2.6	S4UL	0
Benzo(g,h,i)perylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	320	S4UL	0
Benzo(k)fluoranthene	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	0.03	12	77	S4UL	0
Chrysene	< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03	0.03	0.13	0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.13	0.04	12	15	S4UL	0
Dibenzo(a,h)anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	0.24	S4UL	0
Fluoranthene	0.07	0.06	0.06	< 0.03	< 0.03	< 0.03	0.07	0.31	0.07	< 0.03	< 0.03	< 0.03	< 0.03	0.31	0.07	12	280	S4UL	0
Fluorene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	170	S4UL	0
Indeno(1,2,3-c,d)pyrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	27	S4UL	0
Naphthalene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	<0.03	0.03	12	2.3	S4UL	0
Phenanthrene	0.03	0.03	0.04	< 0.03	< 0.03	< 0.03	0.03	0.15	0.04	< 0.03	< 0.03	< 0.03	< 0.03	0.15	0.04	12	95	S4UL	0
Pyrene	0.06	0.05	0.05	< 0.03	< 0.03	< 0.03	0.05	0.27	0.05	< 0.03	< 0.03	< 0.03	< 0.03	0.27	0.06	12	620	S4UL	0

Other Contaminants / Testing	SP1 - TS01	SP1 - TS02	SP1 - TS03	SP1 - SS01	SP1 - SS02	SP1 - SS03	SP2 - TS1	SP2 - TS2	SP2 - TS3	SP2 - SS1	SP2 - SS2	SP2 - SS3	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL	TOPSOIL	TOPSOIL	TOPSOIL	SUBSOIL	SUBSOIL	SUBSOIL							
Organic Matter	4.5	2.8	3.9	0.1	0.1	0.1	4.4	4.0	3.9	< 0.1	< 0.1	0.3	< 0.1	4.5	2.03	12	-	-	-
pH	8.2	8.3	8.3	8.3	8.4	7.8	8.2	8.2	8.1	8.5	8.5	8.4	7.8	8.5	8.27	12	-	-	-
Sulphide	84	48	180	12	16	20	< 10	< 10	12	12	< 10	< 10	< 10	180	35.33	12	-	-	-
Cyanide, Total	0.4	0.4	0.4	< 0.1	< 0.1	< 0.1	0.4	0.4	0.5	< 0.1	0.2	0.1	< 0.1	0.5	0.27	12	-	-	-
Sulphur (free)	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	<0.75	0.75	12	-	-	-
Sulphate Aqueous Extract as SO4	160	150	180	19	< 10	< 10	140	100	100	19	21	27	< 10	180	78	12	-	-	-

Appendix G – Topsoil & Subsoil source reports

TIM O'HARE ASSOCIATES

SOIL & LANDSCAPE CONSULTANCY

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

18th August 2022
Our Ref: TOHA/22/7620/2/SS
Your Ref: PO 421478

Dear Sirs

Topsoil Analysis Report: Rabbit Hill Green Tree Topsoil

We have completed the analysis of the soil sample recently submitted, referenced *Rabbit Hill GT2,* and have pleasure reporting our findings.

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

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

SAMPLE EXAMINATION

The sample was described as a dark reddish brown (Munsell Colour 5YR 3/4), slightly moist, friable, very slightly calcareous LOAMY SAND with a single-grain structure*. The sample was virtually stone-free and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

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

Green-tech Ltd

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Registered in England No. OC324049 Registered Office: The Innovation Centre, Howbery Park, Wallingford, Oxfordshire OX10 8BA

ANALYTICAL SCHEDULE

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

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

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

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

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

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

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.9). This pH value would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

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

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

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

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

Green-tech Ltd

Potential Contaminants

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

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

Note analysis of hexavalent chromium in the some of the topsoil samples was not possible due to colouration in the sample affecting the efficacy of the test method (chromatography). The reason for this colouration is unknown.

Phytotoxic Contaminants

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

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for topsoil and requirements for use – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as an alkaline, non-saline, slightly calcareous loamy sand with a single grain structure and low stone content. The sample was well supplied with organic matter and all major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

Based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes provided only species tolerant of alkaline soil conditions are selected and the soil's physical condition is satisfactory.

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

General Landscape Environments

Rootballed Trees

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

The topsoil can be used as backfill in tree pits to a maximum depth of 400mm, provided the topsoil is kept dry and non-plastic during planting.

Shrubs

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

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Forestry Stock

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

Amenity Grass

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

Sports Pitches

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

Domestic Gardens

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

Soil Handling Recommendations

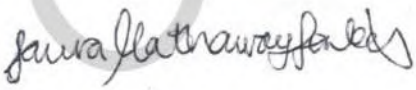
It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic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

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

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

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

Yours faithfully



Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci CSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Green-tech Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Green-tech Ltd**
Project	**Rabbit Hill Green Tree Topsoil**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**18/08/2022**
Job Ref No:	**TOHA/22/7620/2/SS**

Sample Reference			**Rabbit Hill GT2**
		Acreditation	
Clay (<0.002mm)	%	UKAS	11
Silt (0.002-0.05mm)	%	UKAS	8
Very Fine Sand (0.05-0.15mm)	%	UKAS	15
Fine Sand (0.15-0.25mm)	%	UKAS	26
Medium Sand (0.25-0.50mm)	%	UKAS	35
Coarse Sand (0.50-1.0mm)	%	UKAS	3
Very Coarse Sand (1.0-2.0mm)	%	UKAS	2
Total Sand (0.05-2.0mm)	%	UKAS	81
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	2
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	7.9
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1145
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	3078
Exchangeable Sodium Percentage	%	UKAS	4.2
Organic Matter (LOI)	%	UKAS	4.9
Total Nitrogen (Dumas)	%	UKAS	0.25
C : N Ratio	ratio	UKAS	11
Extractable Phosphorus	mg/l	UKAS	63
Extractable Potassium	mg/l	UKAS	1416
Extractable Magnesium	mg/l	UKAS	205
Total Arsenic (As)	mg/kg	MCERTS	5
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	14
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	U/S*
Total Copper (Cu)	mg/kg	MCERTS	31
Total Lead (Pb)	mg/kg	MCERTS	24
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	9
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	56
Water Soluble Boron (B)	mg/kg	MCERTS	0.9
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

U/S = Unsuitable Sample - *Unsuitable for analysis due to sample matrix

LS = LOAMY SAND

Visual Examination

The sample was described as a dark reddish brown (Munsell Colour 5YR 3/4), slightly moist, friable, very slightly calcareous LOAMY SAND with a single-grain structure. The sample was virtually stone-free and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci Csci
Senior Associate

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

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Green-tech Ltd

TIM O'HARE ASSOCIATES

SOIL & LANDSCAPE CONSULTANCY

Tarmac Trading Limited

Mr Steve Pidcock
Tarmac Trading Limited
Eaton Hall Quarry
Manchester Road
Congleton
Cheshire, CW12 2LU

11th April 2022
Our Ref: TOHA/22/7324/SS
Your Ref: PO 2002346662

Dear Sirs

Subsoil Analysis Report: Crown Farm Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Crown Farm Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil).*

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

SAMPLE EXAMINATION

The sample was described as a yellowish red (Munsell Colour 5YR 4/6), slightly moist, friable, non-calcareous LOAMY SAND with a single grain structure*. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

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

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Registered in England No. OC324049 Registered Office: The Innovation Centre, Howbery Park, Wallingford, Oxfordshire OX10 8BA

ANALYTICAL SCHEDULE

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

- detailed particle size analysis (% 5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- organic matter content;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

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

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class. Further detailed particle size analysis revealed the sample to have a relatively narrow particle size distribution and large proportion of sand falling into the *very fine sand* (0.05-0.15mm), *fine sand* (0.15-0.25mm) and *medium sand* (0.25-0.50mm) classes. This would be considered suitable for subsoil in general landscape applications.

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

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.4). This pH value would be considered suitable as subsoil for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

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

The electrical conductivity value by $CaSO_4$ extract (*BS8601* requirement) fell below the maximum specified value (2800 µS/cm) given in *BS8601:2013 – Table 1*.

Organic Matter Content

The organic matter content was low (<0.5%) and compliant with *BS8601:2013 – Table 1*.

Potential Contaminants

With reference to *BS8601:2013 – Section 4.2*: *Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with homegrown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

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

Tarmac Trading Limited

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS8601:2013 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil)*.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, non-calcareous loamy sand with a single grain structure and a very low stone content. The organic matter content was low and consistent with that of subsoil. Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

To conclude, based on our findings, the soil represented by this sample would be considered suitable as subsoil for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory.

The soil was fully compliant with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil)*.

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimise soil compaction."

Further guidance is provided in Clauses 6.1–6.5.

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

Yours faithfully

Rebecca Hollands
BSc MSc MISoilSci
Senior Soil Scientist

Ceri Spears
BSc MSc MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Tarmac Trading Limited

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Tarmac Trading Limited**
Project	**Crown Farm**
Job:	**Subsoil Analysis - BS8601:2013**
Date:	**11/04/2022**
Job Ref No:	**TOHA/22/7324/SS**

Sample Reference			**Crown Farm Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	5
Silt (0.002-0.063mm)	%	UKAS	9
Very Fine Sand (0.063-0.15mm)	%	UKAS	33
Fine Sand (0.15-0.25mm)	%	UKAS	21
Medium Sand (0.25-0.50mm)	%	UKAS	29
Coarse Sand (0.50-1.0mm)	%	UKAS	2
Very Coarse Sand (1.0-2.0mm)	%	UKAS	1
Total Sand (0.063-2.0mm)	%	UKAS	86
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	0
Stones (20-75mm)	% DW	GLP	1
Stones (>75mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	8.4
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	125
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2051
Organic Matter (LOI)	%	UKAS	<0.5
Exchangeable Sodium Percentage	%	UKAS	0.4
Total Arsenic (As)	mg/kg	MCERTS	3
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	9
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	19
Total Lead (Pb)	mg/kg	MCERTS	3
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	9
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	12
Water Soluble Boron (B)	mg/kg	MCERTS	< 0.2
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-oxylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos	--	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a yellowish red (Munsell Colour 5YR 4/6), slightly moist, friable, non-calcareous LOAMY SAND with a single grain structure. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Rebecca Hollands
BSc MSc MISoilSci
Senior Soil Scientist

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

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Tarmac Trading Limited

Appendix H – New Water Pipe Installation

Risk assessment for water pipes (RA)

United Utilities
Water for the North West

The risk assessment for water pipes will help you choose appropriate materials for your development. We are happy to deal with a risk assessment for water pipes in advance of any formal application for a new water supply.

If you need any help completing the form please call us on **0345 072 6067.**

Section 1: Development details	
Development name *(if it has one)*	New Victoria
Development address	New Victoria, Long Millgate, Manchester M3 1NY
OS Grid reference *(mid point)*	SJ841990
Developer's name	Muse Developments
UUW reference number *(for UU use only)*	

Please provide details below of the current and historical use of the site and adjacent sites.
If your supporting information has details of the current and historical site use, please reference below the relevant sections of your report.

The site is in Manchester City Centre. The site is directly adjacent to Manchester Victoria Station & Metrolink.
The site was previously a privately operated public pay and display car park.

the site was previously occupied by 18th/19th century buildings which have long been demolished.

Section 2: Preliminary risk assessment	
Has your desk study and site walkover identified any land potentially affected by contamination?	☑ Yes ☐ No

If the site is potentially affected by contamination but you have not completed any intrusive site investigation please provide details below of the rationale behind the intended pipe selection.
If your supporting information has details of the rationale behind the intended pipe selection, please reference below the relevant sections of your report.

Historical land uses indicate Made Ground to be between 7.0m to 8.0m thick comprising hetrogeneous material including demolition material of brick, concrete fragments with sand, ash and clinker matrix. Hydrocarbon impacted material was encountered during the ground investigation.

The Made Ground directly overlies the sandstone bedrock.

Section 3: Intrusive site investigation

Have you completed any intrusive site investigation?	☑ Yes ☐ No
Have you completed any none intrusive site investigation?	☑ Yes ☐ No
Date(s) when the site investigation(s) undertaken	12 04 2018 D D M M Y Y Y Y D D M M Y Y Y Y
At what level has groundwater been encountered?	9-9.7 metres below ground level or ☐ Not encountered

Table 1 (Pipeline Selection Risk Assessment Summary (PSRAS)) below classifies testing required where the preliminary risk assessment has identified land potentially affected by contamination. Please provide details below of any test groups which have not been tested and the rationale for not testing.

If your supporting information has details of the rationale behind not testing any particular test groups, please reference below the relevant sections of your report.

New Victoria Station SI - Vertase January 2018 - attached
no analysis for total VOC, SVOC, ether, nitrobenzene, ketones, aldehydes, amines as no evidence for their presence from previous site investigation report by Arup 2016. And during the 2017 investigation including visual and olfactory observations and lab data.

If the intrusive site investigation has identified concentrations above the PE threshold (see PSRAS) and your intended pipe selection is PE. Please provide details below of the rationale behind the intended pipe selection.

If your supporting information has details of the rationale behind the intended pipe selection, please reference below the relevant sections of your report.

TPH results and all the samples tested within 1.0m has exceeded the EC10-16 and many exceed E16-E40 exceed PE threshold and therefore barrier pipe is recommended

Section 4: Site remediation

Please provide details below of any site remediation (which may include a change in site levels) already completed.

If your supporting information has details of the site remediation already completed, please reference below the relevant sections of your report.

N/A

Has the PSRAS (Table 1) been completed using appropriate data after remediation?	☐ Yes ☐ No ☑ N/A

Please provide details below of any proposed site remediation and an analysis of whether this will affect your intended pipe selection.

If your supporting information has details of any proposed site remediation and whether this will affect your intended pipe selection, please reference below the relevant sections of your report.

N/A

Section 5: Final use of site

Please provide details below of any chemicals (including fuel) to be stored on site and any other future contamination risks which may affect your intended pipe selection.

If your supporting information has details of potential contamination risks which may affect your intended pipe selection, please reference below the relevant sections of your report.

Diesel required to supply plant during constructions phase, area to be bunded

What water pipe materials are intended to be used on site?	☐ PE ☑ PE Barrier Pipe Type A ☐ PE Barrier Pipe Type B Other *(please specify):* x

Section 6: Additional information

Please use the section below to provide any additional details to support your intended pipe selection.

Section 7: Risk assessor

Name and relevant qualifications of person directing the risk assessment for water pipes	J Thorburn FGS BSc Principal Geologist
Name and address of risk assessor's company	TerraConsult Unit 34 Bold Business Centre St Helens WA9 4TX
Date risk assessment performed	1 5 0 7 2 0 2 0

Section 8: Declaration

I confirm I have completed this form and provided supporting information in accordance with 'UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' and UUW's Supplementary Guidance. I also confirm that if any further site investigation is needed and carried out, I will be required to submit an additional Risk Assessment for Water Pipes with the relevant supporting information.
I understand that failure to supply any of the required information may delay my application being processed.

Name	Jimmy Thorburn	Company	TerraConsult Ltd
Telephone	01925 291 111	Date	1 5 0 7 2 0 2 0

Please email the completed form and supporting information to **DeveloperServicesWater@uuplc.co.uk** or post to us at United Utilities Water, Developer Services, Second floor Grasmere House, Lingley Mere, Warrington WA5 3LP.

United Utilities
Water for the North West

About us

United Utilities is the North West's water company. We keep the taps flowing and toilets flushing for seven million customers every day. From Crewe to Carlisle, we work hard behind the scenes to help your life flow smoothly.

United Utilities Water Limited, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Warrington WA5 3LP.
Registered in England and Wales. Registered Number 2366678.

Table 1 - Pipe selection risk assessment summary (PSRAS)

1. Testing must be undertaken on the materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials. Please use the appropriate testing data to complete Table 1 below.

2. If more than one pipe selection is being made, for example, for pipes in different areas of a large site, a completed PSRAS is required for each selection.

What materials have been tested to populate Table 1 below? ☑ Existing ground materials ☐ Remediated materials ☐ Imported capping materials

All concentrations in mg/kg

Test Group	Testing Required?	PE threshold	Metal Pipes/ Barrier Pipe	Laboratory Detection Limit	Testing UKAS accredited Y/N	Maximum concentration at proposed pipeline depth *See Note [2]*	Maximum site concentration *See Note [3]*	Locations and depths where concentrations exceed proposed pipeline threshold
Total VOCs	Where Preliminary Risk Assessment (PRA) has identified land potentially affected by contamination	0.5	Pass	N/A	N/A	N/A	N/A	N/A
Total BTEX & MTBE		0.1	Pass	<0.001	Y	0.08	0.08	No exceedance
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass	N/A	N/A	N/A	N/A	N/A
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass	0.0001	Y	6.8	6.8	SA7 @ 2.00m
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	2	Y	1244	1244	SA1 SA4 SA7 TP04 TT01
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	8	Y	9800	9800	SA1,SA3-4, SA6-8 TP04, TT01
Phenols* (from SVOC analysis)		2	Pass	N/A	N/A	N/A	N/A	N/A
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass	N/A	N/A	N/A	N/A	N/A
Ethers*	Only where identified	0.5	Pass	N/A	N/A	N/A	N/A	N/A
Nitrobenzene*		0.5	Pass	N/A	N/A	N/A	N/A	N/A
Ketones*		0.5	Pass	N/A	N/A	N/A	N/A	N/A
Aldehydes*		0.5	Pass	N/A	N/A	N/A	N/A	N/A
Amines		Fail	Pass	N/A	N/A	N/A	N/A	N/A
Corrosive	Conductivity, Redox and pH	Pass	*See Note [1]*	N/A	N/A	N/A	N/A	N/A

Note [1] Threshold: For wrapped steel, corrosive if pH<7 and conductivity > 400µS/cm. For wrapped ductile iron corrosive if pH<5, Eh not neutral and conductivity > 400µS/cm. For copper, corrosive if pH<5 or >8 and Eh positive.

Note [2] Water pipes are normally laid at 0.75-1.35m below finished ground level.

Note [3] Also state if liquid free product is present in soil or groundwater.

Project/Site name: New Victoria Site Investigation

Analytical Report Number:					17-69712	17-69712	17-69712	17-69712	17-69712	17-69712	17-69712	17-69712	17-69532	17-69532	17-69532	17-69532	17-69218	17-69218	17-69218	17-69218	17-69218	17-69218	17-69532	17-69532	17-69532	17-69532	17-69532	17-69532	17-69532	17-69532	17-69532	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-70279	17-68062	17-71026	17-71026
Lab Sample Number					869656	869657	869658	869659	869652	869653	869654	869655	868697	868698	868699	868700	867063	867064	867065	867066	867067	867068	868688	868689	868690	868691	868692	868693	868694	868695	868696	872960	872961	872962	872963	872964	872965	872966	872967	872968	872969	872970	860456	877700	877701
Sample Reference					SA1	SA1	SA1	SA1	SA2	SA2	SA2	SA2	SA3	SA3	SA3	SA3	SA4	SA4	SA4	SA4	SA4	SA4	SA5	SA5	SA5	SA5	SA6	SA6	SA6	SA6	SA6	SA7	SA7	SA7	SA7	SA7	SA7	SA8	SA8	SA8	SA9	SA9	TP04_2.1m	TT01	TT01
Sample Number					None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)					**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	8.00-9.00	9.00-10.00	**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	8.00-9.00	**0.00-1.00**	2.00-3.00	4.00-5.00	6.00-7.00	8.00-9.00	9.00-10.00	**0.00-1.00**	1.00-2.00	3.50-4.50	0.00-1.00	2.00-3.00	2.10	**0.00-0.50**	**0.50-1.10**
Date Sampled					01/12/2017	01/12/2017	01/12/2017	01/12/2017	01/12/2017	01/12/2017	01/12/2017	01/12/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017	06/12/2017	06/12/2017	06/12/2017	06/12/2017	06/12/2017	06/12/2017	07/12/2017	07/12/2017	07/12/2017	07/12/2017	07/12/2017	16/11/2017	13/12/2017	13/12/2017
Time Taken					None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	**SGV / CTEH S4ULs Generic Assessment Criteria (GACS) for minimal risk protective Of Human Health - *Residential without homegrown produce assuming 1% soil organic matter***																																											
Stone Content	%	0.1	NONE	N / A	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	34	22	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	51	< 0.1	< 0.1	< 0.1	19	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	N / A	9.0	17	18	17	11	12	11	14	19	17	13	9.3	12	14	17	15	17	19	9.3	8.3	14	16	13	15	17	16	17	15	17	14	16	19	19	9.4	9.0	17	9.7	10	22	13	21
Total mass of sample received	kg	0.001	NONE	N / A	0.56	0.61	0.59	0.57	0.54	0.52	0.53	0.52	0.51	0.51	0.50	0.57	0.52	0.50	0.47	0.47	0.51	0.54	0.56	0.47	0.53	0.52	0.48	0.59	0.53	0.56	0.51	0.45	0.43	0.40	0.43	0.42	0.45	0.45	0.44	0.45	0.47	0.47	0.52	0.52	0.62
Speciated PAHs																																													
Naphthalene	mg/kg	0.05	MCERTS	2.3	9.8	5	2.9	0.73	4.1	3.4	0.73	9.7	6.4	24	33	0.76	4.3	10	40	3.1	180	97	1.4	2.4	1.5	1.2	68	9.4	18	35	24	1.9	13	2.4	5.6	2.3	2.4	1.1	0.94	1.1	2.6	3.7	10.00	4.7	76
Acenaphthylene	mg/kg	0.05	MCERTS	2,900	2	0.83	0.61	0.2	0.7	1.3	0.24	0.27	1.6	5.8	6.5	0.17	0.94	2.7	8.5	0.38	< 0.05	< 0.05	0.76	0.67	0.91	0.45	9.7	1.6	2.7	5.2	4	0.69	2.4	0.25	1.1	0.93	0.8	2.1	0.93	1.4	0.27	0.47	1.4	1.6	4.6
Acenaphthene	mg/kg	0.05	MCERTS	3,000	13	6	2.3	0.32	1.1	0.82	0.55	8	2.1	4.3	4.8	0.31	3.3	7.6	3.1	0.99	100	62	1.7	1.5	1.3	0.81	13	4.3	5.7	13	6.6	13	6	1.2	2.3	1.9	1.8	1.8	1.6	0.67	2.6	5	2.9	0.9	2.8
Fluorene	mg/kg	0.05	MCERTS	2,800	13	5.8	2.6	0.46	1.7	1.9	0.76	7.7	3.3	9.3	11	0.37	4.2	11	11	1.1	110	71	2.4	1.9	2	1.1	25	5.4	7.3	17	10	12	7.4	1.3	3.1	2.1	2	1.9	1.7	0.71	2.3	4.2	4.8	1	5.4
Phenanthrene	mg/kg	0.05	MCERTS	1,300	90	33	20	3.3	12	13	5.4	33	25	63	68	2.8	26	50	58	7	480	300	16	11	14	7.2	150	35	52	110	65	41	40	9.7	19	15	15	29	24	9.5	10	22	21	11	26
Anthracene	mg/kg	0.05	MCERTS	31,000	21	8.4	4.5	0.65	2.2	2.6	1.2	9.1	4.8	12	13	0.51	5.9	11	14	1.3	120	70	3.5	2.5	3.1	1.6	33	7.5	11	22	13	11	9.1	1.7	4.6	3.4	3.4	8	6.2	2.4	2.4	4.9	5.6	4.4	6.9
Fluoranthene	mg/kg	0.05	MCERTS	1,500	86	32	16	3	9	11	5	23	25	51	46	2.5	31	52	53	6.7	260	160	17	9.3	14	7.2	110	26	39	84	49	23	30	7.8	17	15	16	66	44	26	9	18	17	37	33
Pyrene	mg/kg	0.05	MCERTS	3,700	89	33	16	3.2	9	12	5	23	26	54	48	2.7	30	52	51	6.8	300	180	16	9.5	14	7.3	110	27	43	85	51	17	29	7.6	17	15	17	58	39	24	7.8	16	19	41	33
Benzo(a)anthracene	mg/kg	0.05	MCERTS	11	42	19	7.9	1.6	5	6.7	2.3	11	14	28	23	1.4	17	25	29	3.9	130	82	8.5	4.8	7.2	3.8	57	14	21	41	29	8.3	16	4.3	11	8.1	8.5	40	25	18	4.2	7.7	11	21	14
Chrysene	mg/kg	0.05	MCERTS	30	39	19	8.1	1.6	3.8	5	2.5	9.9	13	24	21	1.5	13	23	28	3.2	130	71	7.7	4.6	6.7	3.3	42	12	17	41	25	5.8	15	3.7	8.7	9	9.4	36	21	13	3.7	7.3	7.9	19	13
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.9	45	19	7	1.5	4.3	5.8	2	10	14	22	20	1.7	15	22	33	3.1	98	61	9.6	4.8	6.9	3.7	52	14	19	36	22	5.3	14	3.7	9	9.1	8.8	39	24	19	4	6.8	9	30	15
Benzo(k)fluoranthene	mg/kg	0.05	A27D27:AF27	110	13	7.7	3.4	0.79	1.5	2.1	1.2	3.6	4.6	15	9.5	0.76	8.6	12	16	2.2	52	27	3	1.9	2.6	1.2	19	4.9	9.3	22	17	3.4	6.1	1.8	5.5	3	4.7	25	13	7	2.2	4.3	4.1	9.7	7.5
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.2	39	17	6.9	1.4	4.1	5.1	1.9	9	12	25	20	1.5	15	22	32	3.4	120	72	8	4.3	6.3	3.2	49	12	19	39	26	3.4	13	3.4	9.1	7.7	8.5	37	22	16	3.3	6.4	10	22	16
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	45	14	6.9	2.8	0.66	1.5	2.1	0.86	3.7	5.1	8.5	7.5	0.87	6.4	8.3	16	1.8	43	25	3.8	1.9	3.2	1.5	16	4.8	7.2	14	8.2	1.6	5.8	1.6	4.4	3.4	4.2	17	11	8.4	2	3.6	3.8	10	8.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.31	3.8	2	0.88	0.18	0.36	0.53	0.22	0.95	1.6	3.1	2.9	0.22	2.3	2.9	5.4	0.56	11	6	0.98	0.56	0.86	0.32	6.5	1.7	2.5	5.4	2.4	0.55	1.7	0.46	1.4	1	1.3	5.2	3.1	2.5	0.6	1	0.75	3.3	1.5
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	360	18	9.2	3.9	0.9	2.2	2.9	1.3	5.3	6.6	11	9.7	1.2	8.8	11	20	2.3	59	35	5	2.6	3.7	2	21	5.8	8.8	18	11	2	7.3	2	5.5	4.3	5	20	12	9.3	2.3	4.4	4.3	12	11
Heavy Metals / Metalloids																																													
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	40	29	11	16	19	14	16	11	25	24	36	18	37	30	20	17	35	22	16	15	10	47	44	18	23	28	26	21	46	14	12	18	18	22	15	11	23	13	16	33	36	30
Boron (water soluble)	mg/kg	0.2	MCERTS	11,000													0.8	1.2	2	0.9	2.2	1.6																					1.3	1.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	85	0.8	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	0.4	< 0.2	< 0.2	0.9	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.6	0.6	< 0.2	0.4	0.5	1.1	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	6	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	910	37	25	33	30	22	27	17	38	28	24	15	34	28	36	17	32	41	43	25	20	57	44	52	70	36	27	18	79	61	23	20	23	23	29	26	38	23	31	24	47	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	7,100	150	39	70	90	100	89	61	140	110	170	140	130	130	140	55	69	110	57	130	120	300	290	140	120	130	160	92	230	84	48	130	110	130	98	94	83	94	110	220	140	110
Lead (aqua regia extractable)	mg/kg	1	MCERTS	130	430	83	260	260	340	270	99	350	890	480	370	800	1200	440	85	140	160	150	300	130	290	390	240	350	370	270	220	1300	410	94	140	300	350	370	380	390	810	930	230	880	480
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	56	0.9	0.4	1.3	0.6	0.8	0.9	0.6	0.6	2.9	2.6	1.2	0.9	2.2	1	0.6	0.4	0.5	0.5	1.5	0.8	1.7	1.9	1	2	1.8	2.5	2.4	0.3	0.7	0.5	0.5	1	1.1	0.4	0.4	0.8	0.4	< 0.3	7	< 0.3	0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	180	46	29	29	33	23	26	19	34	26	34	20	36	44	38	18	29	47	19	19	16	26	28	25	59	42	34	24	70	31	28	63	32	38	29	27	36	25	33	16	62	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	430	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40,000	220	46	59	81	98	75	47	78	69	140	63	160	93	73	49	69	63	55	110	77	210	220	110	88	110	97	65	190	64	52	69	120	120	110	97	86	150	220	270	260	230
Monoaromatics																																													
Benzene	mg/kg	1	MCERTS	0.38	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	1	MCERTS	880	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	0.03	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	1	MCERTS	83	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	0.08	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	1	MCERTS	79	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	0.06	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	0.00	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	1	MCERTS	88	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	0.04	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	1	MCERTS		<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
				*Target for p-xylene as more conservative																																									
Petroleum Hydrocarbons																																													
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	42	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	100	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	27	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.14	0.077	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	130	3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.1	3.2	13	< 1.0	6.7	2.4	1.2	1.1	< 1.0	< 1.0	2.2	1.9	1.4	1	< 1.0	3.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	20	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	1,100	13	5.4	< 2.0	< 2.0	< 2.0	2.3	4	< 2.0	< 2.0	< 2.0	3.6	< 2.0	13	9.8	25	< 2.0	34	13	2.8	3.4	< 2.0	< 2.0	5.1	5.5	4.2	3.2	2.2	9	4.2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	4.3	< 2.0	3	6.6	720	17	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	N / A	34	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	26	11	32	< 8.0	73	23	13	9.3	< 8.0	< 8.0	19	15	13	< 8.0	< 8.0	47	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	16	13	< 8.0	15	24	700	56	11
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	N / A	210	29	< 8.0	< 8.0	83	13	22	17	15	11	8.1	< 8.0	130	43	200	< 8.0	110	37	89	99	< 8.0	< 8.0	67	120	79	8.7	< 8.0	420	40	< 8.0	< 8.0	< 8.0	9.2	83	110	45	220	300	2800	390	110
Total TPH-CWG - Aliphatic >EC16 - EC35	mg/kg			65,000	244.00	29.00	< 8.0	< 8.0	83.00	13.00	22.00	17.00	15.00	11.00	8.10	< 8.0	156.00	54.00	232.00	< 8.0	183.00	60.00	102.00	108.30	<8.0	<8.0	86.00	135.00	92.00	8.70	<8.0	467.00	40.00	<8.0	<8.0	<8.0	9.20	99.00	123.00	45.00	235.00	324.00	3500.00	446.00	121.00
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	N / A	260	42	< 10	< 10	92	17	33	22	18	16	14	< 10	180	67	270	< 10	220	75	110	110	< 10	< 10	94	150	97	17	< 10	480	52	< 10	11	< 10	12	99	120	52	240	330	4300	470	130
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	370	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	860	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.008	0.029	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.013	0.007	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	47	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.054	0.28	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6.8	< 0.001	< 0.001	< 0.001	< 0.001	0.008	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	250	20	5.4	3.2	5.1	5.9	7.8	< 1.0	17	11	50	32	< 1.0	12	20	20	6.7	150	91	3.5	9.7	5.9	3.1	55	18	22	45	27	1.9	20	3.1	11	4.4	3.6	1.9	< 1.0	2.3	3	6	44	5.1	99
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	1,800	120	51	21	14	16	22	5.6	59	40	120	78	2.5	44	84	87	19	750	570	26	31	25	7	160	52	59	160	97	65	72	13	33	22	23	18	15	9.9	16	27	1200	21	48
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	1,900	580	170	61	24	56	81	23	160	160	380	260	13	190	280	260	40	1600	1300	110

BH No	Depth (m)	TPH-CWG - Alliphatic / Aromatic >EC5 - EC10		TPH-CWG - Alliphatic / Aromatic >EC10 - EC16		TPH-CWG - Alliphatic / Aromatic >EC16 - EC35
SA1	0.00-1.00	0.001		156		1804
SA2	0.00-1.00	0.001		22		239
SA3	0.00-1.00	0.001		51		385
SA4	0.00-1.00	0.001		74		746
SA5	0.00-1.00	0.001		34		422
SA6	0.00-1.00	0.001		222		1576
SA7	0.00-1.00	0.001		79		897
SA8	0.00-1.00	0.021		20		839
SA9	0.00-1.00	0.14		22		972
TT01	0.00-0.50	0.001		43		1546
TT01	0.50-1.10	0.001		147		691
SA8	1.00-2.00	0.009		19		833
SA1	2.00-3.00	0.001		62		419
SA2	2.00-3.00	0.001		32		214
SA3	2.00-3.00	0.001		170		881
SA4	2.00-3.00	0.001		117		734
SA5	2.00-3.00	0.001		45		449
SA6	2.00-3.00	0.001		77		655
SA7	2.00-3.00	6.8		96		450
SA9	2.00-3.00	0.077		40		908
TP04	2.10	0.001		1984		13300
SA8	3.50-4.50	0.001		12		415
SA1	4.00-5.00	0.001		24		134
SA2	4.00-5.00	0.001		11		76
SA3	4.00-5.00	0.001		114		528
SA4	4.00-5.00	0.001		145		942
SA5	4.00-5.00	0.001		31		239
SA6	4.00-5.00	0.001		87		712
SA7	4.00-5.00	0.001		16		72
SA1	6.00-7.00	0.001		19		76
SA2	6.00-7.00	0.001		76		357
SA3	6.00-7.00	0.001		3		37
SA4	6.00-7.00	0.001		26		91
SA5	6.00-7.00	0.001		10		110
SA6	6.00-7.00	0.001		209		1089
SA7	6.00-7.00	0.001		44		270
SA4	8.00-9.00	0.062		941		3883
SA6	8.00-9.00	0.001		126		670
SA7	8.00-9.00	0.001		26		155
SA4	9.00-10.00	0.309		676		3160
SA7	9.00-10.00	0.001		27		196

exceedance of relavent test group from Table 1 PSRAS

TYPICAL SECTION DETAIL FOOTWAY & ROADWAY

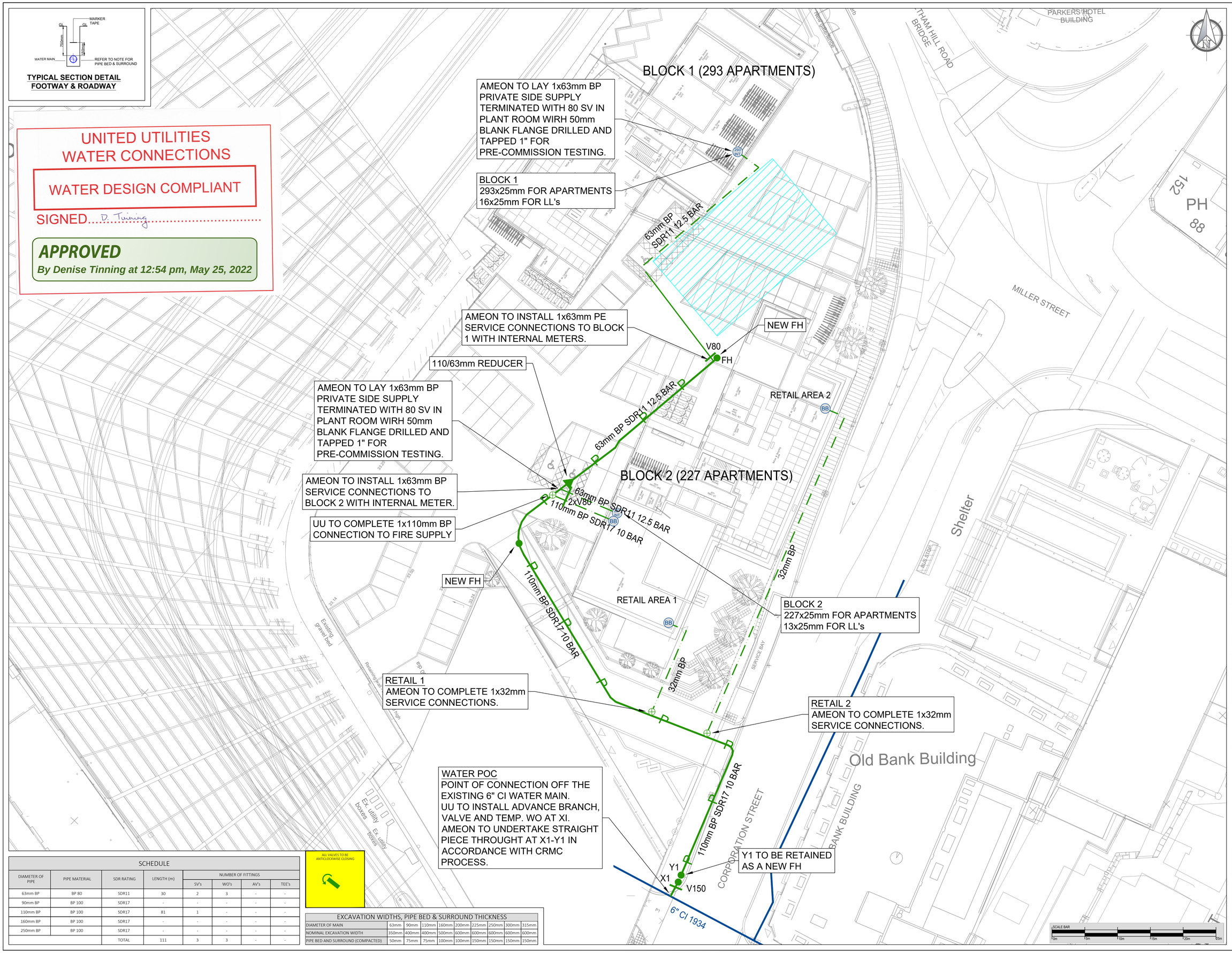
UNITED UTILITIES WATER CONNECTIONS

WATER DESIGN COMPLIANT

SIGNED...D. Tinning.....

APPROVED

By Denise Tinning at 12:54 pm, May 25, 2022



SCHEDULE							
DIAMETER OF PIPE	PIPE MATERIAL	SDR RATING	LENGTH (m)	NUMBER OF FITTINGS			
				SV's	WO's	AV's	TEE's
63mm BP	BP 80	SDR11	30	2	3	-	-
90mm BP	BP 100	SDR17	-	-	-	-	-
110mm BP	BP 100	SDR17	81	1	-	-	-
160mm BP	BP 100	SDR17	-	-	-	-	-
250mm BP	BP 100	SDR17	-	-	-	-	-
		TOTAL	111	3	3	-	-

ALL VALVES TO BE ANTICLOCKWISE CLOSING

EXCAVATION WIDTHS, PIPE BED & SURROUND THICKNESS									
DIAMETER OF MAIN	63mm	90mm	110mm	160mm	200mm	225mm	250mm	300mm	315mm
NOMINAL EXCAVATION WIDTH	350mm	400mm	400mm	500mm	600mm	600mm	600mm	600mm	600mm
PIPE BED AND SURROUND (COMPACTED)	50mm	75mm	75mm	100mm	100mm	150mm	150mm	150mm	150mm

Notes:

GENERAL
1. THIS DRAWING IS FOR PLANNING PURPOSES. CONSULT ALL UTILITY PLANS BEFORE ANY EXCAVATIONS.
2. THIS DRAWING DOES NOT INTEND TO IDENTIFY THE EXACT POSITION OF THE EXISTING APPARATUS. LOCATION OF THE EXISTING APPARATUS MUST IN ALL CASES BE IDENTIFIED BY CONSULTING THE RELEVANT NETWORK OWNERS IN THE AREA.

SERVICE CONNECTIONS
ALL SERVICE PIPES TO BE 25mm WITH 15mm METERS UNLESS STATED OTHERWISE.

METERING DETAILS
IT IS UU POLICY THAT ALL NEW DOMESTIC PROPERTIES MUST BE METERED USING AMR METERS AND THE METER SHOULD BE INSTALLED IN INTERNALLY.

CONTESTABLE WORKS
WATER MAIN LAYING TO BE PROVIDED BY AMEON UTILITIES LTD.
TEMPORARY HYDRANT AT Y1 AND CRMC CONNECTION AT X1 - Y1 TO BE COMPLETED BY AMEON UTILITIES LTD.
1x110mm PE TO BE CONNECTED OFF THE NEW WATER MAIN BY AMEON UTILITIES LTD.
2x63mm PE TO BE CONNECTED OFF THE NEW WATER MAIN BY AMEON UTILITIES LTD.

NON-CONTESTABLE WORKS
UU TO INSTALL ADVANCE BRANCH, VALVE AND TEMP WO AT X 1.

CONNECTIONS OFF EXISTING MAINS
N/A

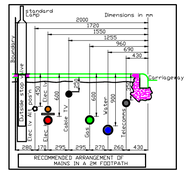
CONNECTIONS OFF NEW MAINS
BLOCKS 1-2, 2x LL's & RETAILS UNITS1-2 TO BE CONNECTED FROM NEW MAINS INSTALLED BY AMEON UTILITIES LTD.

METERS
BLOCKS 1-2, 29x LL's & RETAILS UNITS1-2 TO BE INSTALLED BY UU.

FIRE HYDRANTS
3xNEW FH ADDED.

CONTAMINATED LAND
AS THE SITE HAS BEEN SHOWN TO HAVE A DEGREE OF CONTAMINATION PRESENT, OUR PROPOSALS INVOLVE THE LAYING OF MAINS & SERVICES IN SUITABLE MATERIALS IN A MANNER, WHICH WILL PROTEKT WATER SUPPLIES FROM INGRESS OF SUCH CONTAMINANTS. AMEON UTILITIES LTD CONSTRUCTED SECTION TO ARRANGE UU REGULATIONS (BY LAWS INSPECTION WHILE THE SERVICE LAYING IN PROGRESS ALLOW THREE WORKING DAYS FOR UU TO ARRANGE)

SEWERAGE DETAILS
BLOCKS 1-2, 2x LL's & RETAILS UNITS1-2 TO BE CONNECTED TO UU FOUL AND SURFACE WATER SEWERS.



LEGEND

- EXISTING MAIN
- MAIN TO BE ABANDONED
- PROPOSED MAIN
- PROPOSED COMMUNICATION PIPE
- PROPOSED SUPPLY PIPE
- PROPOSED DUCT
- VALVE
- DIAMETER CHANGE
- IRRIGATION POINT
- POINT OF DELIVERY WITH AMR METER
- FIRE HYDRANT / WASH OUT
- AMR INTERNAL METER (IN WALL/CUPBOARD/PLANNED WITH INTERNAL METERS)
- AMR INTERNAL METER
- AMR WALL MOUNTED METER BOX
- AMR IN WALL METER BOX
- POINT OF DELIVERY WITH BOUNDARY BOX METER

REV.	DESCRIPTION:	BY:	STATUS:	DATE:
06	LL's METERS AMENDED	OR	UNAPP.	05/05/2022
05	LL's METERS ADDED	CA	UNAPP.	22/09/2021
04	NEW ROUTE PROVIDED	CA	UNAPP.	06/09/2021
03	3xNEW FH ADDED	OR	UNAPP.	13/08/2021
02	PRIVATE SUPPLY ROUTE AMENDED	OR	UNAPP.	24/06/2021
01	CONCRETE SLAB SHOWED	CA	UNAPP.	17/06/2021
00	FIRST DRAFT	CA	UNAPP.	08/06/2021

UU: 4100486480
-

DESIGNER:
DAVID CONDE
07853 441818

OS REFERENCE:
E: 384086 N: 399002

DEVELOPER DETAILS:
-
-
-
-

DACI
UTILITIES ENGINEERING CONSULTANCY

ameon
Utilities Engineering

SLO:
AMEON UTILITIES LTD
UNIT 9-10 OLYMPIC COURT
BOARDMANS WAY, WHITEHILLS BUSINESS PARK
BLACKPOOL
FY4 5GU

SITE:
New Victoria, Corporation Street
Manchester
M3 1WY

TITLE:
WATER CONSTRUCTION PLAN

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1:250	08/06/2021	CA	DCI
DRAWING NO:	SLO NO:	DAC NO:	REVISION:
DaCi-2383-W01	AU1032	2383	06

New water pipe installation

IRELAND | UK | UAE | BAHRAIN | KSA

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