WATKIN JONES GROUP

Block A
Dalby Avenue, Bristol

Interim Validation Report (Construction Phase)

Job No: 223026

Report Date: February 2024

Environmental Consultants

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Report for
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BLOCK A
DALBY AVENUE
BEDMINSTER
BRISTOL

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Issue Date	**Issue**
9th February 2024	**FINAL**

Report Reference

223026/VAL/A/001

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Issue	Date	Description of status

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ATTACHMENTS (DIGITAL – AVAILABLE ON REQUEST)

Attachment 1	Plot A Earthworks Validation Report (Demolition Phase)

1.0 INTRODUCTION

Overview

1.1 AA Environmental Limited (AAe) has been commissioned by Watkin Jones Group (the Client) to undertake the contaminated land validation works required for the redevelopment of land at Dalby Avenue, Bristol, BS3 4DJ (hereafter referred to as the Site). The site is centred at National Grid Reference ST 58781 71574, as presented on the Site Location Plan (Figure 1).

1.2 The site comprises two land parcels divided by the River Malago and covers a total area of approximately 1.10 hectares, located 1 km to south of Bristol city centre. The River Malago flows in a south-north direction within an open channel through the centre of the site, before turning west and passing along the north-western boundary. The western land parcel (Block A) was formerly occupied by an open car park, with the eastern parcel (Block B) formerly occupied by a vehicle repair facility and associated parking. The site is accessed from Dalby Avenue to the west and Whitehouse Lane to the south-east.

1.3 This Interim Validation Report relates to Block A only. A standalone validation report will be prepared for Block B. The blue line boundary for Block A is presented on Figure 2.

Planning

1.4 Planning permission (Ref. 20/05811/F) was granted by Bristol City Council for the redevelopment of the site, including demolition works, to provide mixed use development comprising student accommodation (up to 82 cluster units and amenity spaces) and ground floor business space. The proposed site layout is shown on Figure 2. Condition 5 of the permission related to the identification, assessment and remediation of contaminated land risk at the site.

1.5 This validation report details the remedial and mitigation works completed during the redevelopment of Block A to enable the relevant pre-occupation conditions to be discharged.

Summary of Previous Works

1.6 The site has been subject to the following previous reports relating to the assessment of environmental risk and development of the remedial strategy, as set out in Table 1.1.

Table 1.1 Supporting reports and risk assessment

Company	Date of Issue	Report title and reference	Overview and Summary
Clarkebond	July 2018	Phase I Preliminary Risk Assessment (Desk-Study) Ref. WB04417/GR1	Desk-top report for the Phase 1 (western) site area. The earliest available historical map (1885) shows the western area of the site to have been developed as a smelting works. By the 1970's the smelting works had been demolished and replaced by a car park (current site layout). The preliminary CSM identified a risk to future users and controlled waters from potential residual contaminants and a ground investigation was recommended.
Clarkebond	July 2018	Phase I Preliminary Risk Assessment (Desk-Study) Ref. WB04417/GR2	Desk-top report for the Phase 2 (eastern) site area. The earliest available historical map (1885) shows the eastern area of the site to have been developed as terraced housing. By the 1970's the terraced houses had been demolished and replaced by a works/depot (current site layout). The preliminary CSM identified a risk to future users and controlled waters from potential residual contaminants and a ground investigation was recommended.

Table 1.1 Supporting reports and risk assessment			
Company	**Date of Issue**	**Report title and reference**	**Overview and Summary**
Clarkebond	November 2020	Phase 2 Ground Investigation Ref. B05135-CLK-00-XX-RP-GT-0001 (P04)	Ground investigation for the Phase 1 (western) site area. Investigation comprised boreholes and trial pits. Chemical results presented on a factual basis.
Clarkebond	November 2020	Phase 2 Ground Investigation Ref. B05135-CLK-00-XX-RP-GT-0002 (P02)	Ground investigation for the Phase 2 (eastern) site area. Investigation comprised boreholes only. Chemical results presented on a factual basis. Investigation was completed pre-demolition around the vehicle repair facility.
AAe Ltd	September 2020	Detailed Quantitative Risk Assessment (DQRA) and Outline Remediation Strategy 193370/DQRA/001	Quantitative assessment of significant pollution linkages and an overview of the CWRA. The report provides an outline of the remediation requirements for the development in the context of the conceptual site model.
McDonnell Cole	August 2020	Controlled Waters Risk Assessment (CWRA) 1755-01	Supporting risk assessment to determine risk to controlled waters and derive remedial target values for soils re-use. Assessment of solid, leachate and groundwater results.
AAe Ltd	September 2021	Detailed Quantitative Risk Assessment (DQRA) and Outline Remediation Strategy 193370/DQRA/001 (REV A)	Update to risk assessment following completion of additional investigation works on the east of the site.
AAe Ltd	September 2021	Remediation Implementation Plan (RIP) And Foundation Risk Assessment (REV A)	Update to remedial implementation plan, setting out the remediation works to be implemented and validation requirements.

1.7 The risk assessments and Remediation Implementation Plan (RIP) for the site were approved by Bristol City Council under application 22/00114/COND.

Site remediation and mitigation measures

1.8 Table 1.2 details the remediation and mitigation measures required to ensure the site is fit for purpose.

Enabling Works Validation Report

1.9 In June 2022, AAe produced an Earthworks Validation Report (Demolition Phase) for Plot A (Block A) (Ref. 213397/VAL/001) (Attachment 1), presenting the remediation works undertaken during the demolition and enabling works phase.

Scope of report

1.10 The purpose of this validation report is to demonstrate that the agreed construction phase design mitigation works have been completed to the required standard and that the site is suitable for the proposed end use, specifically:

Installation of certified ground gas membranes in the floorslab of the main buildings;
Installation of barrier pipe for potable water supply; and
Installation of a clean capping layer within areas of soft landscaping **[in progress].**

Table 1.2 Remediation and mitigation strategy		
Stage	**Item**	**Description/Requirements**
Enabling Works	Post-Demolition Investigation	Supplementary post-demolition investigation beneath the buildings on east of the site to verify findings of current risk assessments (human health and controlled waters), including further delineation and characterisation of the hydrocarbon hotspot recorded at WS208.
	Remediation (asbestos and hydrocarbon hotspot)	Subject to the findings of the supplementary post-demolition investigation, remedial works to be completed: Remediation (treatment/removal) of hydrocarbon hotspot at WS208. Remediation (treatment/removal) of asbestos fragment impacted Made Ground beneath building on east of site.
	Materials Management Plan (MMP)	A MMP should be prepared in accordance with *CL:AIRE 'Definition of Waste Guidance: Code of Practice'*, setting out the engineering and environmental requirements for materials import and re-use. The MMP will set out the verification testing requirements for all reused materials and the handover platform for the protection of human health and controlled waters.
	Watching brief during hardstanding/obstruction removal.	Requirement for a watching brief during the removal of the remaining slab and sub-surface obstructions to inspect for evidence of contamination/ACM.
	Decommissioning of boreholes.	The existing borehole network will be decommissioned as part of the enabling works in accordance with Environment Agency guidance.
Enabling Works & Construction Phase	Reduced excavation and waste disposal/recovery & Verification of re-used materials.	All soils and/or demolition wastes to be removed off-site as part of the enabling works or construction phase, should be suitably characterised in accordance with the waste regulatory regime and Duty of Care requirements. The Contractor will ensure hazardous, non-hazardous and inert wastes are segregated from one another and minimised as far reasonably practicable. Transfer Notes for all wastes disposed/recovered off-site should be maintained. Verification testing of all re-used materials in accordance with MMP.
	Unexpected contamination	If any unexpected contamination is encountered during the enabling works or construction phase of the development, then further testing and/or assessment should be completed as necessary.
	Unexploded Ordnance (UXO) risk	UXO control measures (as required) will be implemented for the reduced excavation, foundations and piling.
Construction Phase	Foundation Risk Assessment & Piling	Implement working controls to prevent harm to controlled waters, human health and the environment from piling/foundation works and maintain necessary records.
	Capping of Made Ground/Landscaping	All residual Made Ground to be capped by buildings, permanent hardstanding or clean imported soils over a geotextile marker layer. Within areas of soft landscaping, existing soils to be covered with a geo-grid, geotextile marker layer and suitable thickness of clean imported soil (topsoil/subsoil): 300 mm in shared amenity landscaping.
	Specification of imported soils.	Topsoil or subsoil required to be imported to complete the proposed landscaping should be from certified sources and comply with the specification. Chemical test results from suppliers should be reviewed before import and delivery tickets maintained for inclusion in the final validation report.
	Ground Gas Protection	Installation of suitable ground gas/radon protection measures (ventilation/membrane) within the floorslab of the proposed buildings.
	Protection of structures and services	Test results to be provided to Designer and Statutory Undertakers to ensure structures and services are suitably protected from ground conditions. Installation of barrier pipe for potable water supply to new development.

Validation Limitations

1.11 This validation report is partially reliant on third party data, specifications and certification. This validation report is based upon the information provided by the client (and/or their sub-contractors) being factually accurate and the remediation works having been implemented in accordance with the approved Remediation Strategy.

1.12 AAe endeavour to ensure third party data within our supply chain, such as laboratory analysis, meets the industry standards. In the event the data provided by the client (and/or their sub-contractors) does not reflect the site operations and materials used then this validation report cannot be relied on.

1.13 This interim validation Report does not fully validate the final soft landscaping capping for Block A. The landscaping (hard and soft) is in progress and on completion a final validation report will be issued.

2.0 VALIDATION OF DESIGN CONTROLS

2.1 The previous site investigations identified residual contaminants within the underlying strata which posed a risk to future residents from inhalation, dermal contact and ingestion. The proposed strategy for the mitigation of associated risks was to break the inhalation, dermal contact and ingestion pathways to receptors.

2.2 The site/residual Made Ground would need to be fully capped by buildings, hardstanding and/or a 300 mm capping layer of clean imported soils over a geo-grid (where necessary) and high-visibility geotextile marker layer. The softworks construction details are presented on Figure 3. *To note: soft landscaped 'Bio-Retention Areas' are underlain by clean stone, pea gravel and an impermeable membrane. This provides adequate 'no-dig' protection and a geo-grid is not required in these areas.*

2.3 The buildings would need to be installed with certified ground gas membranes and a barrier pipe for the potable water supply.

Final Inspection of Capping

2.4 The completed development will be fully capped by permanent buildings, hardstanding or soft landscaping capped with imported soils. The development includes shared landscaping and raised plant beds. There are no private enclosed residential gardens in the final site layout. The hard and soft landscaping works around Block A are in progress.

2.5 AAe attended site 31/01/24 to inspect the soft landscaping which has already been completed. The areas inspected are shown on Figure 2. Hand pits were excavated to check the capping thickness within the completed areas of soft landscaping. Photographs of the inspection and hand pits are presented in Appendix A.

2.6 The area inspected on 31/01/24 had been capped by at least 300 mm of imported soils (bio-retention topsoil), over a high-visibility geotextile marker. The inspected area is a 'Bio-Retention Area' are therefore no geo-grid was necessary beneath the geotextile marker due to the presence of an impermeable membrane and stone break layer.

2.7 On completion of the remaining soft landscaping areas further inspections will be undertaken and presented in the final validation report.

Source of Imported Topsoil & Compliance Testing

2.8 Topsoil is to be imported from the following supplier/source(s):

Table 2.1 Topsoil Sources		
Supplier	Bourne Amenity Limited The Wharf Rye Road Kent TN18 5QG	
Soil Specification	Bio-retention Soils (Manufactured)	BS3882 Multipurpose Range Topsoil (Manufactured)
Supplier Results	Appendix B	Appendix B
Delivery Tickets	Appendix B	*In progress - to be included in final validation report.*
Post-Importation Testing	Completed by AAe 31/01/24 Appendix C	*In progress - to be included in final validation report.*
Comply to specification?	Yes	*In progress - to be included in final validation report.*

2.9 The supplier test results (Tim O'Hare Associates Ltd/Bourne Amenity chemical analysis report) and delivery tickets provided by the Client for the imported topsoil are presented in Appendix B.

2.10 AAe attended the site on 31/01/24 to undertake post-importation sampling of the imported topsoil. Samples of the Bio-retention topsoil were submitted to Eurofins Chemtest, a UKAS accredited laboratory, for analysis. The certificates of analysis are presented in Appendix C. All results comply with the site specification (Tier 1 Soil Guideline Values for a Residential Without Homegrown Produce Land Use Scenario) and are therefore considered acceptable for end use.

2.11 Following import and completion of the remaining soft landscaping areas, testing of the BS3882 Multipurpose Range Topsoil source will be undertaken and presented in the final validation report.

Potable Supply Pipes

2.12 The Client has confirmed that a GPS Protecta-Line barrier pipe has been installed for the potable water supply to the development. The product specification sheet and design drawing are presented in Appendix D.

Ground Gas Membranes

2.13 The buildings have been installed with ground gas membranes in the floorslabs and independently verified and integrity tested by GeoShield. The membrane specification, inspection reports and certificate of conformity are presented in Appendix E.

Result: Acceptable

2.14 The buildings have been installed with certified ground gas membranes and barrier pipes for the potable water supply pipes.

2.15 Within the completed areas of soft landscaping, a suitable thickness of imported topsoil has been placed over a high-visibility geotextile marker to provide a clean capping layer in accordance with the remediation strategy. Post-importation testing has been undertaken to demonstrate that the soils comply to the site specification. On completion of the remaining areas of soft landscaping further inspections and testing will be undertaken and presented in the final validation report.

3.0 SUMMARY AND CONCLUSIONS

3.1 AA Environmental Limited (AAe) has been commissioned by Watkin Jones Group to validate the implementation of remediation and design mitigation works required for the redevelopment of land at Dalby Avenue, Bristol, BS3 4DJ.

3.2 This interim validation report presents the works which have been undertaken to meet the remediation and mitigation controls for Block A.

3.3 Within the completed areas of soft landscaping, a suitable thickness of imported topsoil has been placed over a high-visibility geotextile marker to provide a clean capping layer in accordance with the remediation strategy. Post-importation testing has been undertaken to demonstrate that the soils comply to the site specification. On completion of the remaining areas of soft landscaping further inspections and testing will be undertaken and presented in the final validation report.

3.4 The Client has confirmed that barrier pipe for the potable water supply to the development was installed.

3.5 The buildings have been installed with certified ground gas membranes in the floorslabs and independently inspected and integrity tested by GeoShield.

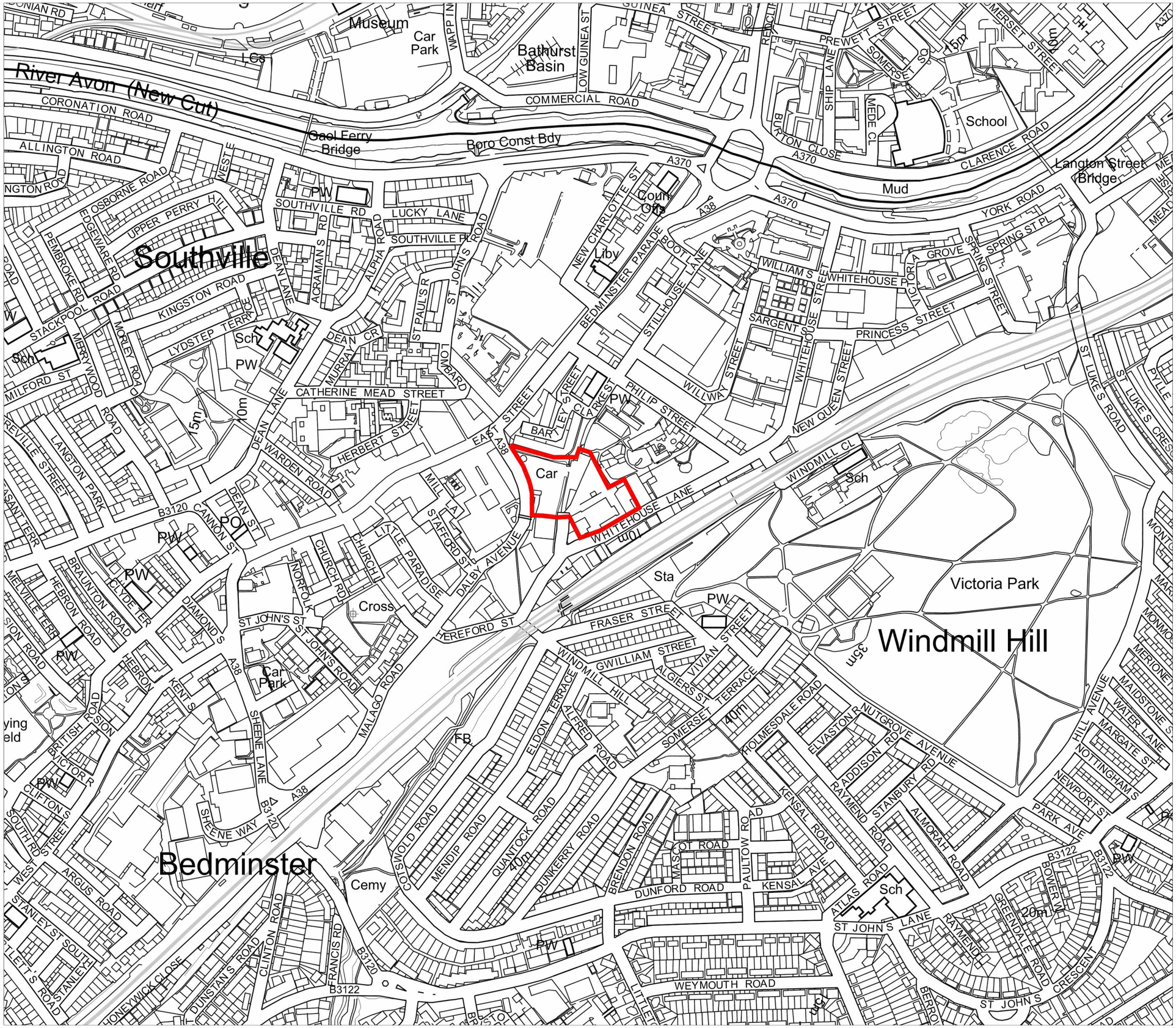
3.6 The inspections and testing by AAe and third-party information provided by Watkin Jones (and their sub-contractors) demonstrate that the validation steps undertaken for the development meet the requirements of the approved remedial and mitigation strategy for the site and have been completed to the required standard.

3.7 On completion of the hard and soft landscaping a final validation report will be issued for Block A.

223026/JNT AA ENVIRONMENTAL LIMITED

February 2024

FIGURES



Key:

Site Boundary

Rev.	Details	Drawn / Chkd.	Date

Project

193370
Dalby Avenue, Bedminster

Title

Site Location Plan

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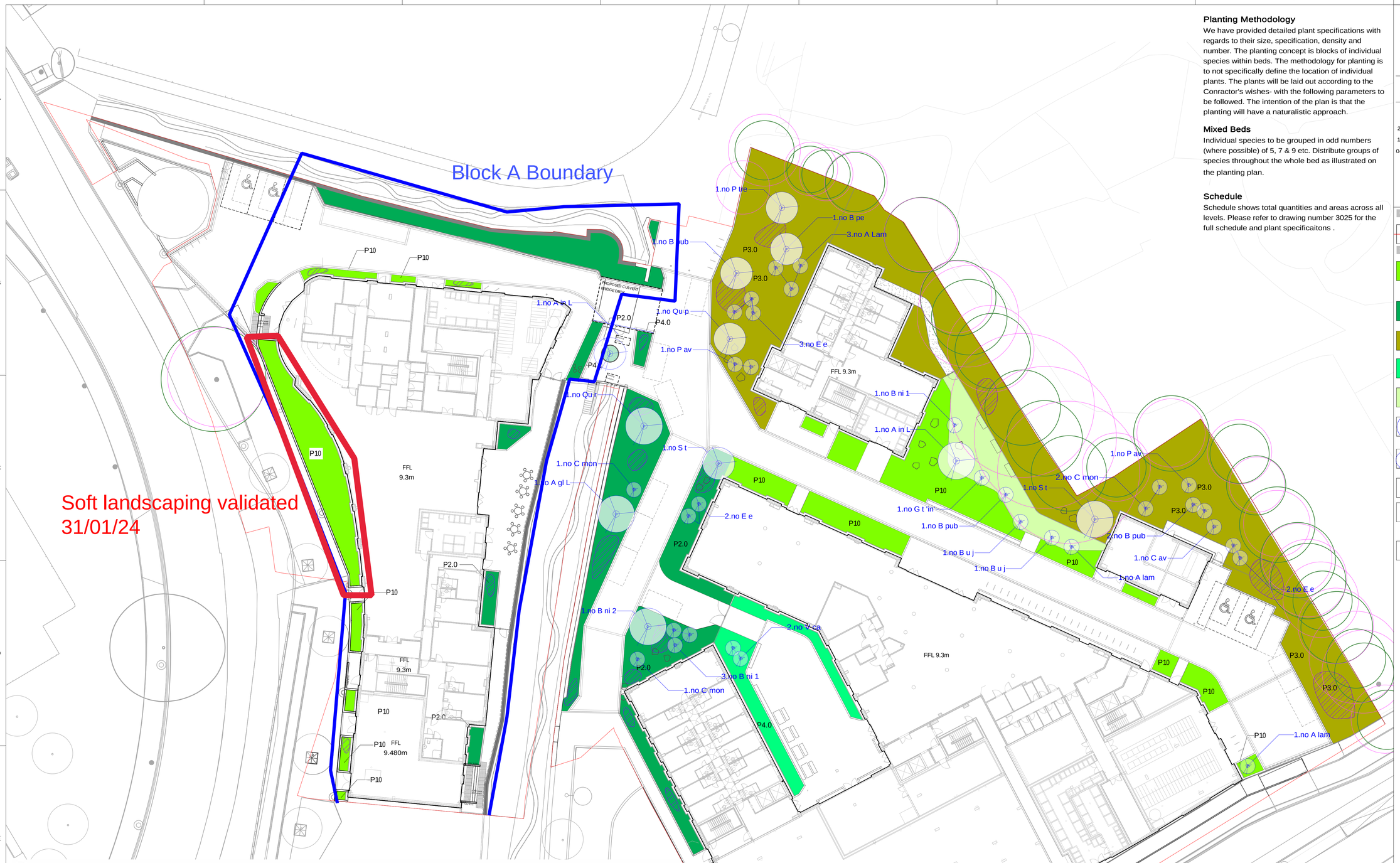
Environmental Consultants

Scale	Date	Drawn	Chkd.	Drg. No.	Rev.
1:5,000@A3	July '20	JM	JNT	193370/D/001	



Trees

Abbrev.	Botanical Name	Common Name	Girth/ Dia. cm	Height cm	Root Zone	Specification	Number
B ni 1	Betula nigra	River Birch	16-18	400-450	RB	3x; EHS; clear stem min. 200cm	4
C mon	Crataegus monogyna	Common Hawthorn	16-18	400-450	RB	3x; EHS; clear stem min. 200cm	4
E e	Euonymus europaeus	Common Spindle Tree		80-100	10L	Branched; 6 brks	7
Q r	Quercus robur	Common Oak	18-20	450-500	RB	3x; EHS; clear stem min. 200cm	1
V ca	Viburnum carlesii	Korean Spice		80-100	15L	Branched; 5 brks	2
A gl 'L'	Alnus glutinosa 'Laciniata'	Cut-leaf Alder	16-18	425-600	45-85L	EHS; clear stem min. 200cm	1
A in 'L'	Alnus incana 'Laciniata'	Cut-leaf Grey Alder	18-20	450-500	RB	3x; EHS; clear stem min. 200cm	1
B ni 2	Betula nigra	River Birch	25-30	550-600	150-350L	Semi-mature; clear stem min. 200cm	1
B pe	Betula pendula	Common Silver Birch	25-30	550-600	RB	4x; Semi-mature; clear stem min. 200cm	1
B u j	Betula utilis jacquemontii	White-barked Himalayan Birch	25-30	550-600	RB	4x; Semi-mature; clear stem min. 200cm	2
C av	Corylus avellana	Common Hazel		100-125	RB	Branched; 5 brks	1
G t 'in'	Gleditsia triacanthos 'Inermis'	Thornless Honey Locust 'Inermis'		25-30			1
A lam	Amelanchier lamarckii	Juneberry	25-30	min 450	RB	4x; Semi-mature; clear stem min. 200cm	5
B pub	Betula pubescens	Downy Birch	10-12	300-350	35-45L	SS; clear stem 175-200cm; 4 brks	4
P tre	Populus tremula	Aspen	14-16	425-600	RB	3x; EHS; clear stem 175-200cm; 5 brks	1
P av	Prunus avium	Wild Cherry	16-18	400-450	45-85L	EHS; clear stem min. 200cm	2
Qu P	Quercus pubescens	Downy Oak		300-350			1
S t	Sorbus torminalis	Wild Service Tree	16-18	400-450	RB	3x; EHS; clear stem min. 200cm	2

Planting Methodology

We have provided detailed plant specifications with regards to their size, specification, density and number. The planting concept is blocks of individual species within beds. The methodology for planting is to not specifically define the location of individual plants. The plants will be laid out according to the Conractor's wishes- with the following parameters to be followed. The intention of the plan is that the planting will have a naturalistic approach.

Mixed Beds

Individual species to be grouped in odd numbers (where possible) of 5, 7 & 9 etc. Distribute groups of species throughout the whole bed as illustrated on the planting plan.

Schedule

Schedule shows total quantities and areas across all levels. Please refer to drawing number 3025 for the full schedule and plant specificaitons .

NOTES:

1. DO NOT SCALE FROM THIS DRAWING. ALWAYS WORK TO NOTED DIME
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THIS DRAWING WAS PLOTTED ON:
04/01/2024

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
22/11/2023	P10		Aco/tree changes	MC
19/12/2023	A1		Construction Issue	OK
04/01/2024	A2		Information Update	MC

GENERAL INFORMATION

APPLICATION SITE BOUNDARY

SOFTWORKS

P10 — **RAIN GARDENS**
Refer to Planting Schedule
Refer to Engineer's drawing for Bio Retention Area

P2.0 — **RIPARIAN PLANTING**
Refer to Planting Schedule

P3.0 — **WOODLAND PLANTING**
Refer to Planting Schedule

P4.0 — **COURTYARD PLANTING**
Refer to Planting Schedule

P5.0 — **LAWN PLANTING**
Refer to Planting Schedule

CLEAR-STEM TREE PLANTING
Refer to Planting Schedule

MULTI-STEM TREE PLANTING
Refer to Planting Schedule

EXISTING TREE - RETAINED

ROOT PROTECTION AREA
Refer to Arboricultural Constraints Report, Nov. 2019 (doc ref: CSDA_Bdm_ACR_30112019_JP_v1)

BULB PLANTING

NOTE
For plant and shrub specifications please refer to planting schedule- sheet 3025

All soft landscapes areas require to be installed with a clean capping layer (min.300mm) over a geotextile marker layer and geo-grid.

All planting subject to relevant sections of NBS specification

to be read in conjunction with detailed planting plans sheets 3002-23

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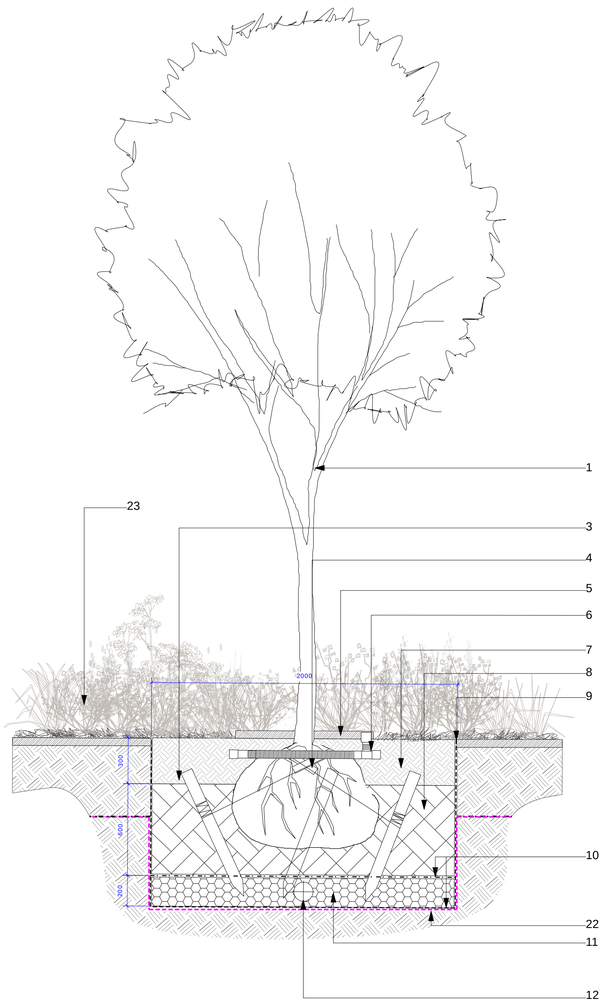
Project
Dalby Ave
Bristol

Drawing Title
Softworks

Created By	Checked By	Scale	Sheet Size
MC	OK	1:250	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
315	LYR	03-	00-	DW	G-	L-3001

Work Stage	Status	Revision
Stage 4	A1 Construction Issue	A2



D01 Tree Pit Detail
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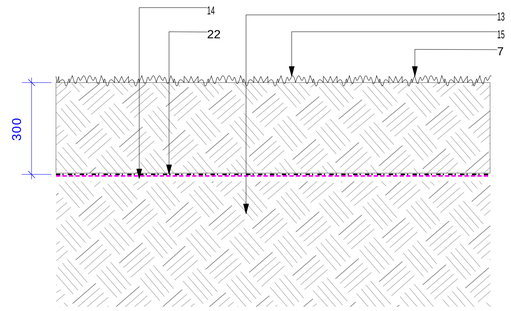

D02 Lawn Detail
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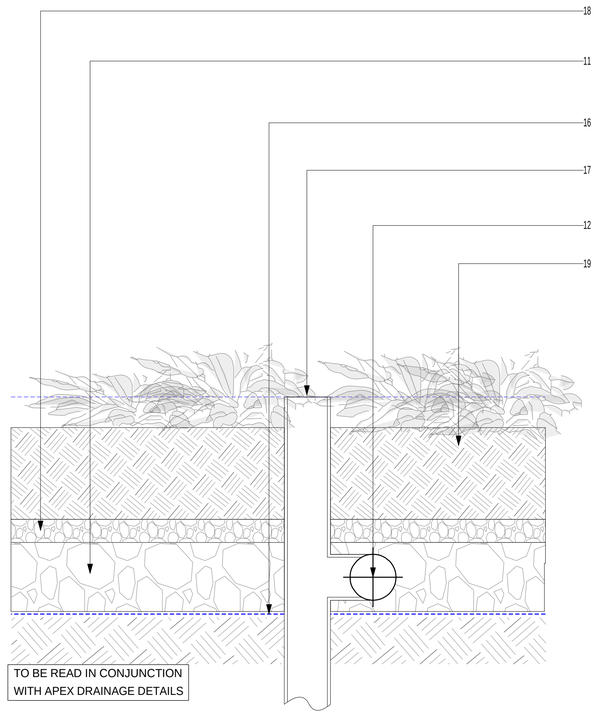

D03 Typical Bio retention area
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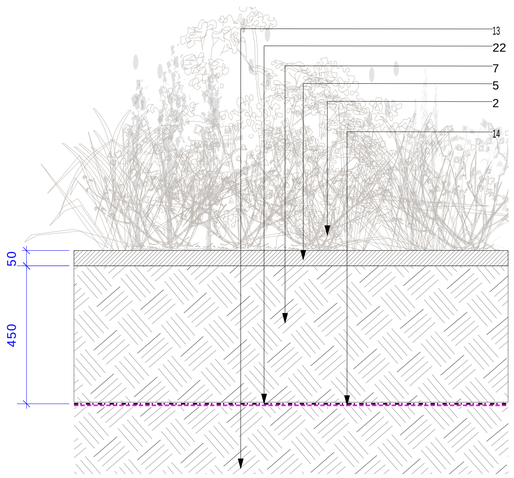
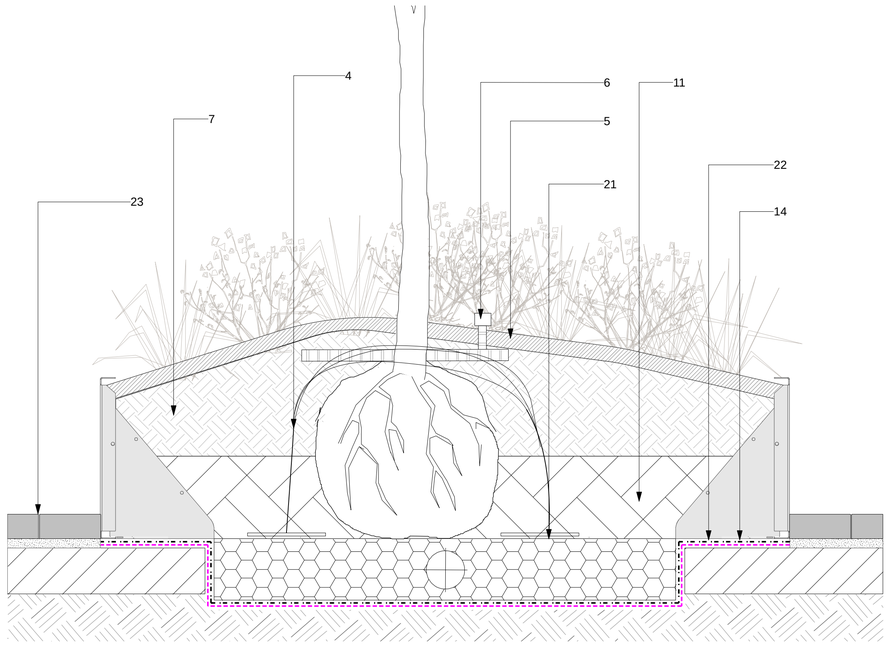


D04 Typical Planting Build Up
Scale: 1:10 @ A1



D05 Tree Planting in Raised Planter
Scale: 1:10 @ A1

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THIS DRAWING WAS PLOTTED ON:
20/12/2023

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
04/08/2023	P03		CAPPING CHANGES	MC
18/09/2023	P04		S4 ISSUE	MC
20/12/2023	A1		Construction Issue	OK

Key

1. SEMI-MATURE TREE - REFER TO SOFTWORKS 3000 SERIES
2. PLANTING - REFER TO SOFTWORKS 3000 SERIES
3. TRIPLE-STAKE UNDERGROUND GUYING SYSTEM
   TO NBS CLAUSE Q31/535
4. STRAPS UNDER WIRES FOR ROOTBALL PROTECTION
5. 50MM LAYER BARK MULCH
   TO NBS CLAUSE Q28/155
6. TREE IRRIGATION AND AERATION SYSTEM
   TO NBS CLAUSE Q31/512
7. CLEAN IMPORTED TOPSOIL
   TO NBS CLAUSE Q28/315
8. IMPORTED SUBSOIL
   TO NBS CLAUSE Q28/334
9. ROOT PROTECTION BARRIER WHERE ADJACENT TO PAVED SURFACES
   TO NBS CLAUSE Q31/212
10. GEO TEXTILE MEMBRANE
    TO NBS CLAUSE Q31/515A
11. CLEAN STONE
    TO NBS CLAUSE Q31/515
12. PERFORATED PLASTIC PIPE TO ACTIVELY DRAIN TREE PIT (IF REQUIRED)
    TO NBS CLAUSE Q31/515
13. EXISTING GROUND
14. GEOGRID - REFER TO 'DETAILED QUANTUTATIVE RISK ASSESSMENT AND OUTLINE REMEDIATION STRATEGY'
15. GRASS SEEDING- REFER TO SOFTWORKS SHEETS 3000 SERIES
16. IMPERMEABLE MEMBRANE (TO ENGINEERS DETAIL AND SPEC.)
17. OVERFLOW PIPE (SET BELOW TOP OF PLANTER) LEADING TO ATTENUATION OR OUTFALL POINT - TO ENGINEERS DETAIL AND SPEC.
18. PEA GRAVEL - TO ENGINEERS DETAIL AND SPEC.
19. BIO RETENTIVE SOILS - TO ENGINEERS DETAIL AND SPEC.
20. TIMBER GRAVEL BOARD AND GRAVEL SKIRT: REFER TO EDGING DRAWING 315- LYR- 03- 00- DR- L- 2002
21. UNDERGROUND GUYING SYSTEM
    TO NBS CLAUSE Q31/526
22. GEOTEXTILE MARKER- REFER TO 'DETAILED QUANTUTATIVE RISK ASSESSMENT AND OUTLINE REMEDIATION STRATEGY'
23. ADJACENT SURFACE - REFER TO HARDWORKS/SOFTWORKS SHEERS 2000/3000 SERIES

ORIGINATOR

Layer. studio

W layer.studio
T 01625 523 157
E manchester or newcastle@layer.studio

MANCHESTER
The Barn
One Hollin Lane
Styal
Cheshire
SK9 4JH

NEWCASTLE
Flintlab
1 Salters Road
Gosforth
Newcastle upon Tyne
NE3 1DH

Client
Watkin Jones

Project
Dalby Ave
Bristol

Drawing Title
Softworks | Typical Details 01

Created By	Checked By	Scale	Sheet Size
MC	HF	Varies	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
315	LYR	03- 00- DWG- L- 6007				

Work Stage	Status	Revision
Stage 4	A1 Construction Issue	A1

APPENDIX A
Interim Inspection Reports and Photographs

DAILY LOG & SAMPLING RECORD

Client	Watkin Jones	**Project Number**	223026
Project Address	Dalby Avenue	**Date**	31/01/24
AAe Operative	S.Philp	**Weather**	Overcast

Scope of works				
Description of works completed	Hand Pits Sampling		**Grid Squares Worked**	NA
OBSERVATIONS	Activities at Site Various construction			
Sample Locations	**Reference**	**X Co-ordinate**	**Y Co-ordinate**	**Comments**
	Block A, HP1	358738	171560	Topsoil Depth – 350mm, above orange geotextile
	Block A, HP2	358740	171583	Topsoil Depth – 400mm, above orange geotextile
	Block A, Topsoil, S1			
	Block A, Topsoil, S2			
	Block A, Topsoil, S3			
Comments	**Analysis:** AAe Soil Suite 1 + florsil clean up			

Comment Block A – HP1	**Project** 223026
	Photo Plate 1
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

Comment Block A – HP2	**Project** 223026
	Photo Plate 2
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

Comment
Block A, Topsoil – S1

Project
223026

Photo Plate
3

Date
31/01/24

Originator
SP

AA Environmental Limited
Units 4-8 Cholswell Court
Shippon, Abingdon
OX13 6HX
T: (01235) 536042
F: (01235) 523849
info@aae-ltd.co.uk
www.aae-ltd.co.uk

Comment Block A, Topsoil – S2	**Project** 223026
	Photo Plate 4
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

Comment Block A, Topsoil – S3	**Project** 223026
	Photo Plate 5
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

Comment Placed topsoil Block A. (Looking North) – Bioretention Area	**Project** 223026
	Photo Plate 6
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

Comment Placed topsoil Block A. (Looking South) – Bioretention Area	**Project** 223026
	Photo Plate 7
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

Comment Showing high-visibility geotextile placement beneath topsoil, underlain by impermeable membrane – Bioretention Area	**Project** 223026
	Photo Plate 8
	Date 31/01/24
	Originator SP
	AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk

APPENDIX B
Interim Topsoil Supplier Results and Delivery Tickets

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Jonathan Bourne
Bourne AmenityLtd
The Wharf
Rye Road
Newenden
Kent, TN18 5QG

22nd February 2023
Our Ref: TOHA/23/7818/1/SS
Your Ref: PO 114359

Dear Sirs

Soil Analysis Report:BioretentionSoil(South)

We have completed the analysis of the samplerecentlysubmitted referenced *Bioretention Soil(South)*, and have pleasure reporting our findings.

INTRODUCTION

The purpose of the analysis was to determine the suitability of the samplefor use as a bioretention soil. "Bioretention systems", including raingardens and swales, are shallow landscaped depressions that reduce run-off and treat pollution through the use of engineered soils and the vegetation that the soils support. In doing so they are a key element of many Sustainable Drainage Systems(SuDS).

A bioretention system usually has several components including a vegetation layer, a filter medium, a transition layer and a drainage layer, together with inlets, outlets and pipework. The *bioretention soil* represented by this sample is to be used as the "Filter Medium" of a bioretention system. The purpose of this analysis was therefore to determine the suitability of the sample for this use.

This report presents the results of analysis for the sample submitted to our office, and itshould be considered 'indicative' of the soil source. The report and results shouldtherefore not be used by third parties as a means of verification or validation testing, waste designation purposes, or for any project-specific applications, especially after the sample has left the Bourne AmenityLtdsite.

SAMPLE EXAMINATION

The sample was described as a brownish yellow (Munsell Colour 10YR 6/6), slightly moist, friable, non-calcareous SAND with a single grain structure. The sample was stone free and containeda low proportion of organic finesandoccasional woody fragments. No deleterious materials, unusual odours, roots or rhizomes of pernicious weeds were observed.

Bourne Amenity Ltd

Plate 1: Bioretention Soil (South) Sample

ANALYTICAL SCHEDULE

The samplewassubmitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical teststo confirm the composition, contamination and fertilityof the soil. The following parameters were determined:

- detailed particle size analysis(5 sand, silt, clay);
- saturated hydraulic conductivity and porosity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N,P,K,Mg);
- organic matter content;
- C:N ratio;
- visible contaminants(>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V,Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attachedCertificate of Analysis and an interpretation of the results isgiven below.

In the absence of site-specificassessmentcriteria, the concentrations of potential contaminants that affect human health have been compared with the *residentialwith homegrownproduce* land use inthe Suitable For Use Levels (S4ULs)presentedin *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).Levels of phytotoxic metalsdetermined(Cu, Ni, Zn) have also been compared against threshold values indicated in *BS3882:2015 Specification for Topsoil*.

Bourne Amenity Ltd

COMMENTS

A bioretention filter medium is normally sand-based with some source of organic matter and slow-release plant nutrients to maintain healthy plant growth, filter out pollutants and control the rate at which water filters through the system, which is a key influence on the effectiveness. The material should be sufficiently permeable and porous to allow water to be infiltrated, attenuated and drained through it so that the surface does not become waterlogged. It also needs to contain sufficient organic matter and plant nutrients to support the vegetation layer.

From the examination and laboratory analysis, the sample was described as a strongly alkaline, non-saline, non-calcareous sand. The sample was stone free and contained moderate reserves of organic matter and most major plant nutrients. The grading of this sample is largely within the desirable range, and the saturated hydraulic conductivity result is what would be expected for a bioretention soil. Of the potential contaminants determined, none exceeded their respective guideline values.

The sample was strongly alkaline in reaction (pH 8.7) with a low calcium carbonate (lime) content. Therefore, the high pH recorded is likely to be due to the very low buffering capacity of the material as a result of its very high sand content. As such, this pH value should not significantly restrict species selection, provided species are reasonably tolerant of alkaline soils.

The nutrient levels are largely acceptable for this specific end-use, although the total nitrogen level is slightly lower than what would be considered ideal. As such, application of an appropriate slow-release fertiliser is recommended at the time of planting. Furthermore, the high sand content of this type of material will increase risk of nutrient leaching over time and so incorporation of a suitable mineral soil conditioner (e.g. TerraCottem) is recommended to support nutrient retention in the longer term.

It is noted that the organic matter content is at the upper end of the range considered appropriate for this type of material. Migration of organic fines could potentially lead to a slight reduction in drainage performance over time.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid physical degradation during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting or seeding). As a consequence, soil handling operations should not be carried out in wet conditions.

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 compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction prior to any planting or seeding.

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

Harriet MacRae
BSc MSc
Graduate Soil Scientist

Matthew Heins
BSc (Hons) MISoilSci
Senior Soil Scientist

For and on behalf of Tim O'Hare Associates LLP

Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Limited**
Project:	**Bioretention Soil (South)**
Job:	**Physical and Horticultural Properties**
Date:	**22/02/2023**
Job Ref No:	**TOHA/23/7818/1/SS**

Sample Reference			**Bioretention Soil (South)**
		Accreditation	
Clay (<0.002mm)	%	UKAS	2
Silt (0.002-0.05mm)	%	UKAS	1
Very Fine Sand (0.05-0.15mm)	%	UKAS	2
Fine Sand (0.15-0.25mm)	%	UKAS	9
Medium Sand (0.25-0.50mm)	%	UKAS	53
Coarse Sand (0.50-1.0mm)	%	UKAS	27
Very Coarse Sand (1.0-2.0mm)	%	UKAS	6
Total Sand (0.05-1.0mm)	%	UKAS	97
Texture Class (UK Classification)	--	UKAS	S
Stones (2-20mm)	% DW	GLP	0
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
Saturated Hydraulic Conductivity	mm/hr	A2LA	146
Total Porosity	%	A2LA	47
Air-filled Porosity	%	A2LA	27
Water-filled Porosity	%	A2LA	20
pH Value (1:2.5 water extract)	units	UKAS	8.7
Calcium Carbonate	%	UKAS	< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	717
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2701
Exchangeable Sodium Percentage	%	UKAS	4.5
Organic Matter (LOI)	%	UKAS	3.5
Total Nitrogen (Dumas)	%	UKAS	0.10
C : N Ratio	ratio	UKAS	21
Extractable Phosphorus	mg/l	UKAS	24
Extractable Potassium	mg/l	UKAS	677
Extractable Magnesium	mg/l	UKAS	91
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0

S = SAND

Visual Examination

The sample was described as a brownish yellow (Munsell Colour 10YR 6/6), slightly moist, friable, non-calcareous SAND with a single grain structure. The sample was stone free and contained a low proportion of organic fines and occasional woody fragments. No deleterious materials, unusual odours, roots or rhizomes of pernicious weeds were observed.

[redacted]

Harriet MacRae
BSc MSc
Graduate Soil Scientist

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

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Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Limited**
Project:	**Bioretention Soil (South)**
Job:	**Chemical Properties**
Date:	**22/02/2023**
Job Ref No:	**TOHA/23/7818/1/SS**

Sample Reference			**Bioretention Soil (South)**
		Accreditation	
Total Antimony (Sb)	mg/kg	MCERTS	1
Total Arsenic (As)	mg/kg	MCERTS	7
Total Barium (Ba)	mg/kg	MCERTS	8
Total Beryllium (Be)	mg/kg	MCERTS	0.22
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	11
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	7
Total Lead (Pb)	mg/kg	MCERTS	8
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	9
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	27
Total Zinc (Zn)	mg/kg	MCERTS	23
Water Soluble Boron (B)	mg/kg	MCERTS	0.7
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Water Soluble Sulphate (SO4)	g/l	MCERTS	1.7
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	< 0.005
Toluene	mg/kg	MCERTS	< 0.005
Ethylbenzene	mg/kg	MCERTS	< 0.005
p & m-xylene	mg/kg	MCERTS	< 0.005
o-xylene	mg/kg	MCERTS	< 0.005
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.005
Asbestos Screen	ND/D	ISO 17025	Not-detected

[redacted]

Harriet MacRae
BSc MSc
Graduate Soil Scientist

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Bourne Amenity Ltd

Material: TS6 Topsoil
Source: Bourne Amenity Ltd
Date Tested: 07/08/2023
Tested Against: BS3882:2015 Multipurpose Grade
Tested By: TOHA/23/1045/SS

Parameter	Unit	BS3882:2015 Multipurpose Range	Result	Compliance
Texture:				
Clay (<0.002mm)	% w/w	5 - 30%	12	Yes
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	8	Yes
Sand (0.05 - 2.0mm)	% w/w	20 - 90%	80	Yes
Textual Class:	Sandy Loam			
Stones (2 - 20mm)	% w/w DW	0 - 30%	1	Yes
Stones (20-50mm)	% w/w DW	0 - 10%	0	Yes
Stones (>50mm)	% w/w DW	0%	0	Yes
Sand Fraction (USGA Sieve Sizes):				
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	4	--
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	4	--
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	10	--
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	21	--
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	41	--
Organic Matter (LOI)	% w/w	3.0 - 20.0	11.5	Yes
Ph		5.5 - 8.5	8.3	Yes
Exchangeable Sodium Percentage	%	< 15%	2.0	Yes
Phytotoxic Contaminants:39				
Total Zinc (BS3882:2015)	mg/kg	< 300	39	Yes
Total Copper (BS3882:2015)	mg/kg	< 200	16	Yes
Total Nickel (S4UL)	mg/kg	< 180	3	Yes
Available Nutrients:				
Nitrogen	mg/l	>0.15	0.48	Yes
Phosphorus	mg/l	16 - 140	53	Yes
Potassium	mg/l	121 - 1500	1004	Yes
Magnesium	mg/l	51 - 600	146	Yes
Carbon:Nitrogen Ratio	:1	< 20:1	14	Yes
Calcium Carbonate	% m/m	n/a		--
Additional Analysis:				
Electrical Conductivity (1:2.5 water extract)	µS/cm	1500	1246	Yes
Electrical Conductivity (1:2 CaSO4 extract)	µS/cm	3300	3160	Yes

Bourne Amenity Ltd

Bourne Amenity Ltd, The Wharf, Rye Road, Newenden, Kent TN18 5QG
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www.bourneamenity.co.uk
VAT No: 863 1196 22 • Registered in England No: 3453821

Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Arsenic (As)	mg/kg	S4UL	<37	7	Yes
Total Cadmium (Cd)	mg/kg	S4UL	<11	0.4	Yes
Total Chromium III (Cr)	mg/kg	S4UL	<910	5	Yes
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<1.8	Yes
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1.0	Yes
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	37	Yes
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	Yes
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	Yes
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	Yes
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.9	Yes
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	Yes
Acenaphthene	mg/kg	S4UL^	<510	<0.05	Yes
Anthracene	mg/kg	S4UL^	<5400	<0.05	Yes
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	Yes
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	Yes
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	Yes
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	Yes
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	Yes
Chrysene	mg/kg	S4UL^	<22	<0.05	Yes
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	Yes
Fluoranthene	mg/kg	S4UL^	<560	0.06	Yes
Fluorene	mg/kg	S4UL^	<400	<0.05	Yes
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	Yes
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	Yes
Phenanthrene	mg/kg	S4UL^	<220	<0.05	Yes
Pyrene	mg/kg	S4UL^	<1200	0.06	Yes
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.10	Yes
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.10	Yes
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.10	Yes
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	Yes
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	Yes
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<.8.0	Yes
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	Yes
Aliphatic TPH (C5 – C35)	mg/kg	S4UL^	<92000	<10	Yes
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.10	Yes
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.10	Yes
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.10	Yes
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	Yes
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	Yes
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	Yes
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	Yes
Aromatic TPH (C35 - C44)	mg/kg	S4UL^	<1500	<10	Yes
Benzene	mg/kg	S4UL^	<0.17	<0.005	Yes
Toluene	mg/kg	S4UL^	<290	<0.005	Yes
Ethylbenzene	mg/kg	S4UL^	<110	<0.005	Yes
O-xylene	mg/kg	S4UL^	<140	<0.005	Yes
M-xylene	mg/kg	S4UL^	<140	<0.005	Yes
P-xylene	mg/kg	S4UL^	<130		Yes
MTBE	mg/kg	Sail Guideline Values	<470	<0.005	Yes
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	Yes

Bourne Amenity Ltd

ABC

☎ 01932-569222 (4 lines) www.abcgrabs.co.uk

Registered Waste Carrier No. CBDU84768 VAT No. 527 9581 07 SIC Code: 49.41

DUTY OF CARE CONTROLLED WASTE TRANSFER NOTE No. 17857

Customer:	BOURNE C/O AFAN LANDSCAPES	Date:	30-1-24
Street Address:	DALBY AVE	Vehicle Reg:	RK13 GHH
Town:	BEDMINISTER BS3-4NA	Driver's Name:	

	EWC		SIC
☐	17.01.07	Clean Hardcore (Brick/Concrete)	43.11
☐	17.05.04	Soil & Stones (Inert)	43.12
☐	17.09.04	Mixed Construction (Rubbish)	43.12
☐	20.02.01	Garden/Park Waste (Biodegradable)	42.12

Time on Site: 12:05

Time off Site:

QUANTITY (As measured by customer)	
1 LOAD	

Tipper ☑

Grab ☐

WASTE DISPOSAL AUDIT	Tip Code	Tip Tkt. No.
Other Services		

SALE OF MATERIALS	VOLUME	WEIGHT	TONNES
MATERIAL DESCRIPTION:- BIO RETENTION SOIL	1X8	Gross Weight of Vehicle at Weighbridge	•
		Tare Weight of Vehicle	•
		Nett Weight	•

By signing below I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the (England and Wales) Regulations 2012

Signed By Producer/Site	Print Name:

Registered Waste Carrier No. CBDU84768 VAT No. 527 [illegible]

DUTY OF CARE CONTROLLED WASTE TRANSFER NOTE No. 17855

Customer:	BOURNE C/O AFAN LANDSCAPES	Date:	29-1-24
Street Address:	DALBY AVE	Vehicle Reg:	RK73GHH
Town:	BEDMINSTER BS3-4NA	Driver's Name:	Luke

	EWC		SIC
☐	17.01.07	Clean Hardcore (Brick/Concrete)	43.11
☐	17.05.04	Soil & Stones (Inert)	43.12
☐	17.09.04	Mixed Construction (Rubbish)	43.12
☐	20.02.01	Garden/Park Waste (Biodegradable)	42.12

Time on Site: 9:30

Time off Site: 11:00

QUANTITY (As measured by customer)
1 LOAD

Tipper ☑

Grab ☐

WASTE DISPOSAL AUDIT	Tip Code	Tip Tkt. No.
Other Services		

SALE OF MATERIALS	VOLUME	WEIGHT	TONNES
MATERIAL DESCRIPTION:- BIO RETENTION SOIL	1X8	Gross Weight of Vehicle at Weighbridge	•
		Tare Weight of Vehicle	•
		Nett Weight	•

By signing below I confirm that I have fulfilled my duty to apply the waste hierarchy

APPENDIX C
Interim Post-Importation Test Results

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	24-03180-1
Initial Date of Issue:	08-Feb-2024
Re-Issue Details:	
Client	AA Environmental Ltd
Client Address:	Units 4 to 8 Cholswell Court Shippon Abingdon Oxfordshire OX136HX
Contact(s):	Reporting
Project	223026 Dalby Ave, Plot 3 Bedminster

Quotation No.:		**Date Received:**	02-Feb-2024
Order No.:		**Date Instructed:**	02-Feb-2024
No. of Samples:	3		
Turnaround (Wkdays):	4	**Results Due:**	07-Feb-2024
Date Approved:	08-Feb-2024		

Approved By:

[redacted]

Details: Stuart Henderson, Technical Manager

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Soil

Project: 223026 Dalby Ave, Plot 3 Bedminster

Client: AA Environmental Ltd				**Chemtest Job No.:**		24-03180	24-03180	24-03180
Quotation No.:				**Chemtest Sample ID.:**		1761713	1761714	1761715
Order No.:				Client Sample Ref.:		Topsoil - S1	Topsoil - S2	Topsoil - S3
				Sample Location:		Block - A	Block - A	Block - A
				Sample Type:		SOIL	SOIL	SOIL
				Date Sampled:		31-Jan-2024	31-Jan-2024	31-Jan-2024
				Time Sampled:		11:00	11:00	11:00
				Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type		U	2192		N/A	-	-	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture		N	2030	%	0.020	12	12	12
Stones and Removed Materials		N	2030	%	0.020	< 0.020	< 0.020	< 0.020
Soil Colour		N	2040		N/A	Brown	Brown	Brown
Other Material		N	2040		N/A	Stones	Stones	Stones
Soil Texture		N	2040		N/A	Sand	Sand	Sand
pH at 20C		M	2010		4.0	9.0	9.0	9.1
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	0.64	0.98	0.94
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	< 0.010	0.018	0.022
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)		N	2325	mg/kg	0.50	2.8	3.2	2.3
Arsenic		M	2455	mg/kg	0.5	9.5	7.5	9.3
Cadmium		M	2455	mg/kg	0.10	0.14	< 0.10	< 0.10
Chromium		M	2455	mg/kg	0.5	19	13	16
Copper		M	2455	mg/kg	0.50	6.8	3.7	4.3
Mercury		M	2455	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Nickel		M	2455	mg/kg	0.50	11	8.2	10
Lead		M	2455	mg/kg	0.50	13	5.9	6.7
Selenium		M	2455	mg/kg	0.25	< 0.25	< 0.25	< 0.25
Vanadium		U	2455	mg/kg	0.5	49	32	42
Zinc		M	2455	mg/kg	0.50	29	19	23
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12 MC	EH_AL_2D_#1	M	2690	mg/kg	2.00	2.4	2.1	2.4
Aliphatic EPH >C12-C16 MC	EH_AL_2D_#1	M	2690	mg/kg	1.00	2.9	< 1.0	1.9
Aliphatic EPH >C16-C21 MC	EH_AL_2D_#1	M	2690	mg/kg	2.00	3.3	3.1	2.8
Aliphatic EPH >C21-C35 MC	EH_AL_2D_#1	M	2690	mg/kg	3.00	< 3.0	< 3.0	< 3.0
Aliphatic EPH >C35-C40 MC	EH_AL_2D_#1	N	2690	mg/kg	10.00	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35 MC	EH_AL_2D_#1	M	2690	mg/kg	5.00	11	8.6	9.4
Total Aliphatic EPH >C10-C40 MC	EH_AL_2D_#1	N	2690	mg/kg	10.00	11	< 10	< 10
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05

Results - Soil

Project: 223026 Dalby Ave, Plot 3 Bedminster

Client: AA Environmental Ltd				**Chemtest Job No.:**		24-03180	24-03180	24-03180
Quotation No.:				**Chemtest Sample ID.:**		1761713	1761714	1761715
Order No.:				Client Sample Ref.:		Topsoil - S1	Topsoil - S2	Topsoil - S3
				Sample Location:		Block - A	Block - A	Block - A
				Sample Type:		SOIL	SOIL	SOIL
				Date Sampled:		31-Jan-2024	31-Jan-2024	31-Jan-2024
				Time Sampled:		11:00	11:00	11:00
				Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12 MC	EH_AR_2D_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16 MC	EH_AR_2D_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0
Aromatic EPH >C16-C21 MC	EH_AR_2D_#1	U	2690	mg/kg	2.00	< 2.0	< 2.0	< 2.0
Aromatic EPH >C21-C35 MC	EH_AR_2D_#1	U	2690	mg/kg	2.00	54	99	71
Aromatic EPH >C35-C40 MC	EH_AR_2D_#1	N	2690	mg/kg	1.00	37	15	11
Total Aromatic EPH >C10-C35 MC	EH_AR_2D_#1	U	2690	mg/kg	5.00	54	99	71
Total Aromatic EPH >C10-C40 MC	EH_AR_2D_#1	N	2690	mg/kg	10.00	92	110	82
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35 MC	EH_Total_2D_#1	U	2690	mg/kg	10.00	65	110	81
Total EPH >C10-C40 MC	EH_Total_2D_#1	N	2690	mg/kg	10.00	100	120	92
Total Organic Carbon		M	2625	%	0.20	0.35	1.6	1.1
Naphthalene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection	
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)	
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

Water Sample Category Key for Accreditation

DW - Drinking Water
GW - Ground Water
LE - Land Leachate
NA - Not Applicable
PL - Prepared Leachate
PW - Processed Water

Report Information

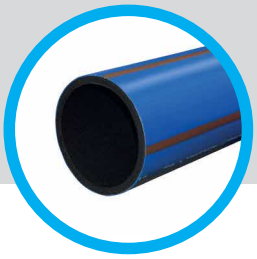
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

APPENDIX D
Barrier Pipe Information

PROTECTA-LINE PIPE

PRODUCT DATA SHEET



Protecta-Line pipe is a multi-layered PE pipe with an embedded aluminium barrier layer. It is designed to safely transport drinking water in land which is contaminated or has the potential to be contaminated in the future.

RANGE / PRESSURE RATING

OD (mm)	SDR	Pressure rating	Material
25	11	12.5 bar	PE80
32			
63			
90 to 180	11	16 bar	PE100
	17	10 bar	PE100
225 to 630	11	16 bar	PE100
	17	10 bar	PE100

COLOURS

Material	Description	Colour
PE80	Black core and light blue outer with brown stripes	
PE100	Black core and dark blue outer with brown stripes	

Pipe diameter 180mm pipe has four brown stripes; > 180mm pipe has eight brown stripes.

STANDARDS / APPROVALS

- The Water Supply Regulation 31/27/30
- BS EN 12201-2
- WRAS Approved
- WIS 4-32-19

CERTIFICATION

WRAS APPROVED PRODUCT

1606501
1511343
1505514
1302025

BS EN 12201-2
KM 508224

WIS 4-32-19
KM 514626

LENGTHS

Pipes 180mm in diameter are available in coiled lengths of 25m, 50m or 100m

Pipes 63mm –630mm in diameter are also available in straight lengths of 6 or 12m.

Other lengths may be produced at customer's request

MARKINGS

As a minimum requirement, the following information is marked indelibly and linearly at intervals along the pipe:

- Manufacturers identification: **GPS**
- System: **Protecta-Line**
- Pipe composition: **PE Pipe with AL Barrier**
- Standard and pipe type: **WIS 4-32-19 TYPE A**
- Material designation: **PE100 or PE80**
- Nominal size: **180mm (example)**
- SDR value: **SDR 17 (example)**
- Continuous pressure rating at 20°C **10 bar (example)**

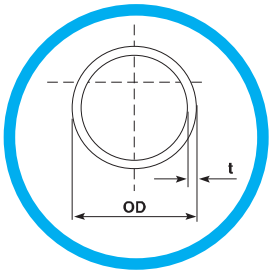
The pipes are marked with the following three times per metre:

- Application: **Water**

BATCH NUMBER FORMAT

8 Digit Code	Extruder Number 1 & 2	Shift Number 3 & 4	Week Number 5 & 6	Year 7 & 8
	01-23	01 - 14	01 - 52	01-99

PIPE DIMENSIONS



* The size is the nominal core pipe outside diameter. Other diameters, SDRs and lengths can be made subject to a minimum order value.

Size* (mm)	SDR	Min OD (mm)	Max OD (mm)	Mean Bore (mm)	Min t (mm)	Max t (mm)	Approx Weight (kg/m)
25	11	26.2	27.4	20.0	3.0	3.7	0.3
32	11	33.3	34.5	26.0	3.7	4.4	0.4
63	11	64.3	65.6	50.9	6.5	7.6	1.3
90	11	92.2	93.5	72.9	9.3	10.7	2.6
	17	92.2	93.5	78.8	6.5	7.5	1.9
110	11	112.2	113.5	89.2	11.1	12.7	3.7
	17	112.2	113.5	96.3	7.7	8.8	2.7
125	11	127.2	128.5	101.2	12.5	14.2	4.7
	17	127.2	128.5	109.6	8.5	9.8	3.4
160	11	163.2	165.1	130.4	15.8	17.9	7.6
	17	163.2	165.1	141.1	10.7	12.4	5.4
180	11	183.3	185.4	146.8	17.6	20.0	9.5
	17	183.3	185.4	158.8	11.9	13.7	6.8
225	11	227.3	229.5	182.5	21.7	24.4	14.5
	17	227.3	229.5	197.4	14.6	16.6	10.3
250	11	252.3	254.9	203.0	23.9	26.8	17.7
	17	252.3	254.9	219.6	16.0	18.3	12.4
280	11	282.3	285.1	227.4	26.6	29.8	22.0
	17	282.3	285.1	245.9	17.8	20.1	15.4
315	11	317.3	320.2	255.7	29.8	33.3	27.6
	17	317.3	320.2	276.6	19.9	22.4	19.3
355	11	357.3	360.6	288.3	33.4	37.3	34.8
	17	357.3	360.6	311.6	22.3	25.1	24.3
400	11	402.3	405.8	324.8	37.5	41.8	43.9
	17	402.3	405.8	351.3	24.9	27.9	30.4
450	11	452.3	456.1	365.4	42.1	46.8	55.3
	17	452.3	456.1	395.2	27.9	31.2	38.2
500	11	502.3	506.4	406.0	46.6	51.8	67.9
	17	502.3	506.4	439.0	30.9	34.5	46.9
560	11	562.3	566.8	454.9	52.0	57.7	84.7
	17	562.3	566.8	491.8	34.4	38.4	58.4
630	11	632.3	637.2	511.6	58.4	64.8	106.9
	17	632.3	637.2	553.2	38.6	43.0	73.6

APPENDIX E
Gas Membrane Information

GEOSHIELD

Verification Certificate

Date: 05 June 2023

Watkin Jones Group Limited

Blocks A and B
[incl. Lift Pits and District Heating]
Dalby Avenue
Bedminster
Bristol
BS3 4DL

The documentation in this handover package shows that the installation of the Gas Membrane and ancillaries was installed to specification.

Verified in accordance with BS 8485:2015+A1:2019 and CIRIA 735.

All areas were verified, and remediation issues corrected.

[redacted]

Paul Colbeck
Director of Site Services

GEOSHIELD Verification Report

PROJECT REFERENCE: GEO102776

REPORT NUMBER: 001 REPORT DATE: 22/08/2022

PROJECT: Dalby Avenue

PROJECT ADDRESS: Dalby Avenue,

Bedminster, Bristol

BS3 4

MEMBRANE SPECIFICATION:

FIS Hydroprufe 9000 gas barrier

FIS Hydroprufe LG

FIS Hydroseal FX

FIS HCR Double Sided Butyl Tape

FIS HCR Foil Girth Tape

FIS Hydroprufe 8000

GEOSHIELD Verification Report

VERIFICATION OFFICER: John Cornish

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07493769477

EMAIL ADDRESS: Jcornish@geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ☐ NO: ☐ PROJECT: YES: ☐ NO: ☐

GEOSHIELD Verification Report

MEMBRANE SPECIFICATION:

DESIGN DETAILS:

DQRA and ORS Rev A:-

3.37 - CS2 gas regime rating

Site Location Plan

Proposed Ground Floor Plan

Typical Section Through Service Pit

OP001942-PD-001

OP001942-GA-001

OP001942-PD-002

OP001942-PD-003

OP001942-TD-001

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location & (Map 2) Nearby Location

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Jason Woollaston
CONTACTS ROLE:	
MOBILE PHONE:	07392 091 605
EMAIL ADDRESS:	Jason.Woollaston@WatkinJones.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: Vilius

COMPANY: 4D Construction

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Block A - GL:AL-AU/A4-A9.

SITE CONDITIONS:

WEATHER: Sunny/overcast

TEMPERATURE: 19c

MEMBRANE TEMPERATURE: N/a

RELATIVE HUMIDITY: N/a

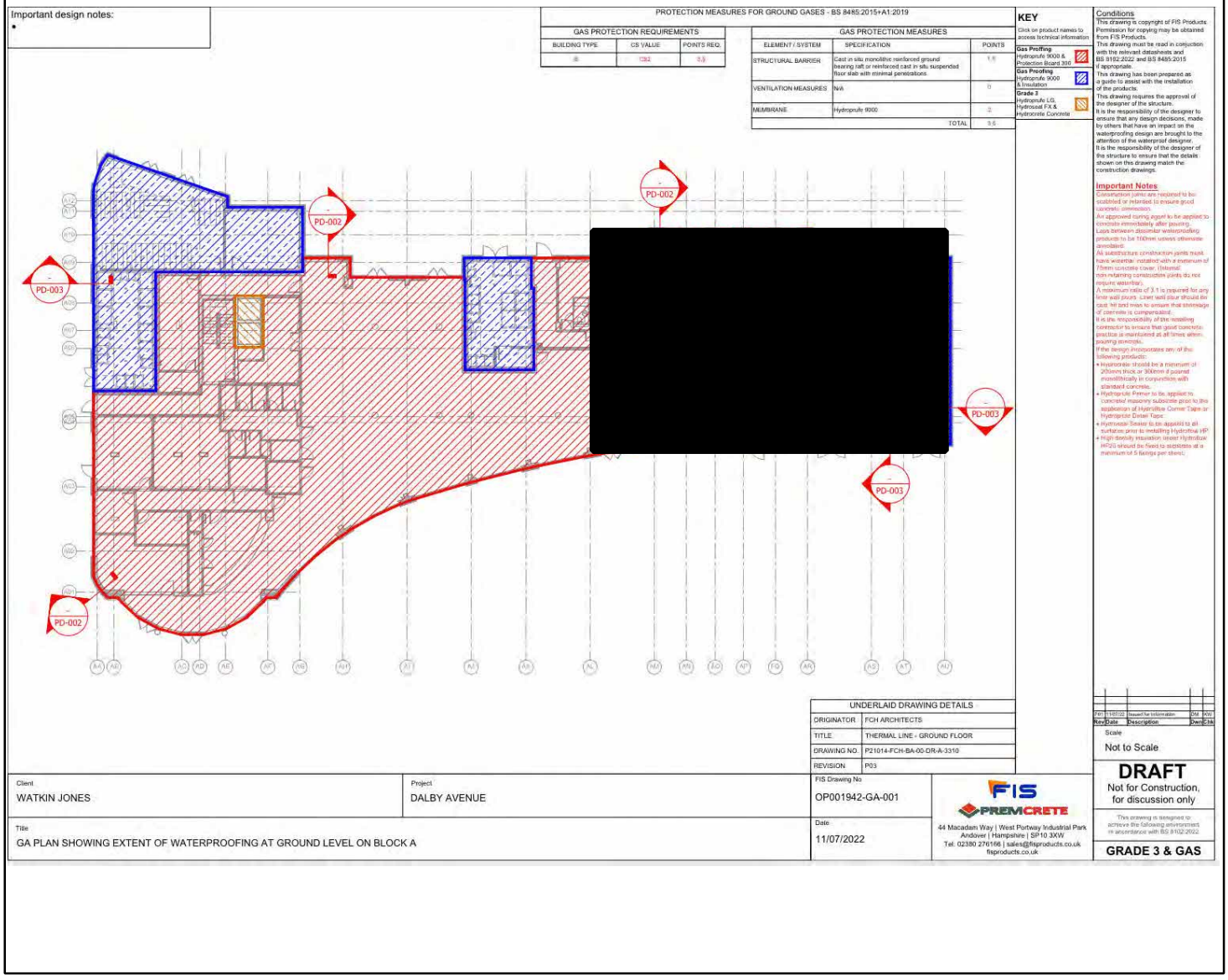
TIME: 10:00-15:00 REPORT NUMBER: 001

DATE: 22/08/2022

ACCOMPANIED Vilius - 4D Structures

GEOSHIELD Verification Report

VERIFICATION LAYOUT



The black hashed area above shows where the installers have installed the

Hydroprufe 9000 gas barrier and where verification took place during this visit.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

The photograph above shows an area of the slab where verification took place

during this visit.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

The photograph above shows an additional overview photograph of the installed

Hydroprufe 9000 gas barrier which was signed off during this visit.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

LOCATION/GRID LINE: Block A - GL:AL-AU/A4-A9.

NOTES: Installation of the Hydroprufe 9000 gas barrier.

The installers have first lapped the FIS Hydroprufe 9000 gas barrier a sufficient amount

before using double sided butyl tape and HCR girth lap tape. Pressure has been applied

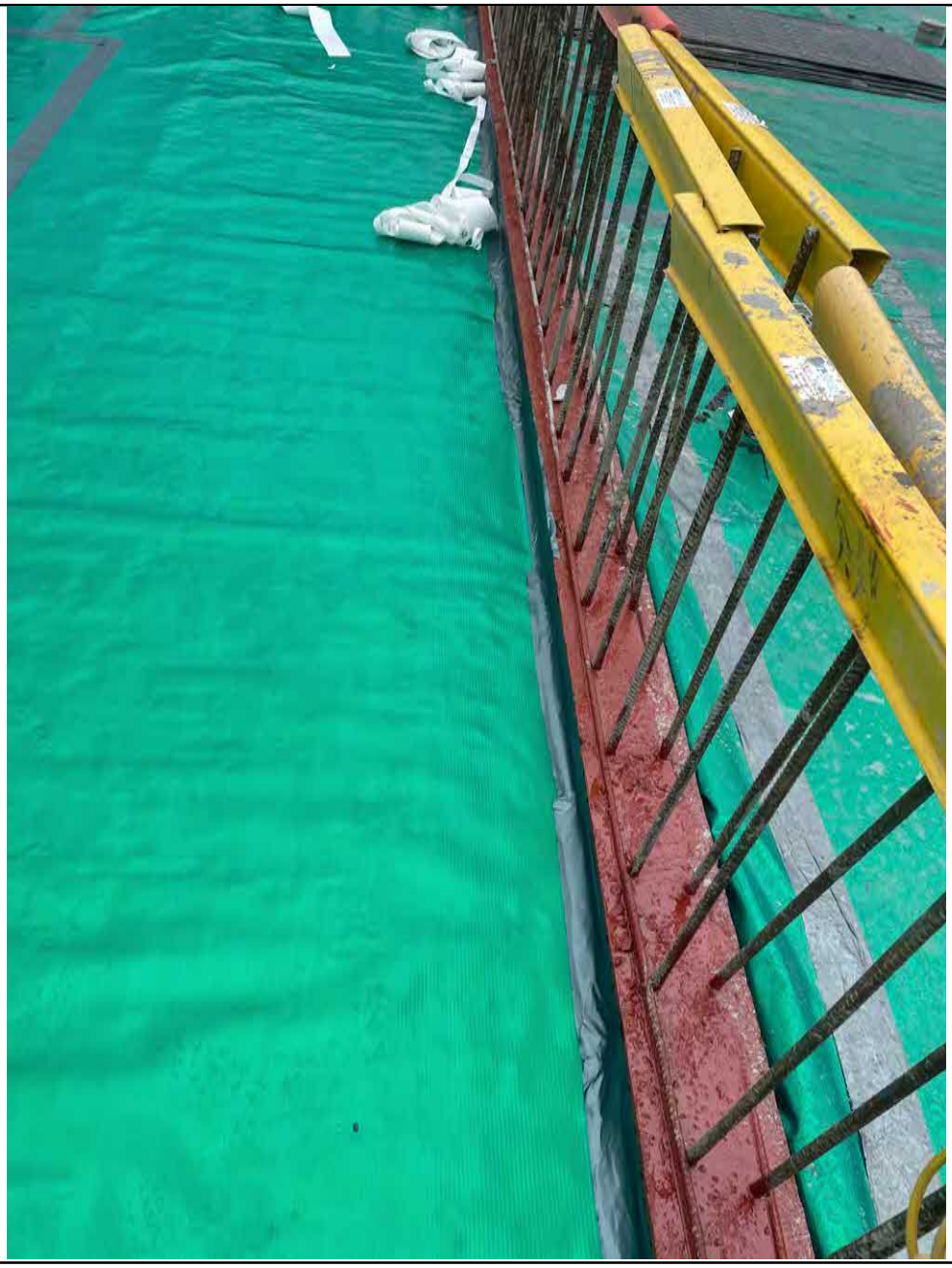
to aid in the adherence of the lap tapes.

The second photograph above shows a pick and probe test carried out to a sealed lap.

No faults or defects were identified during this visit. Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE



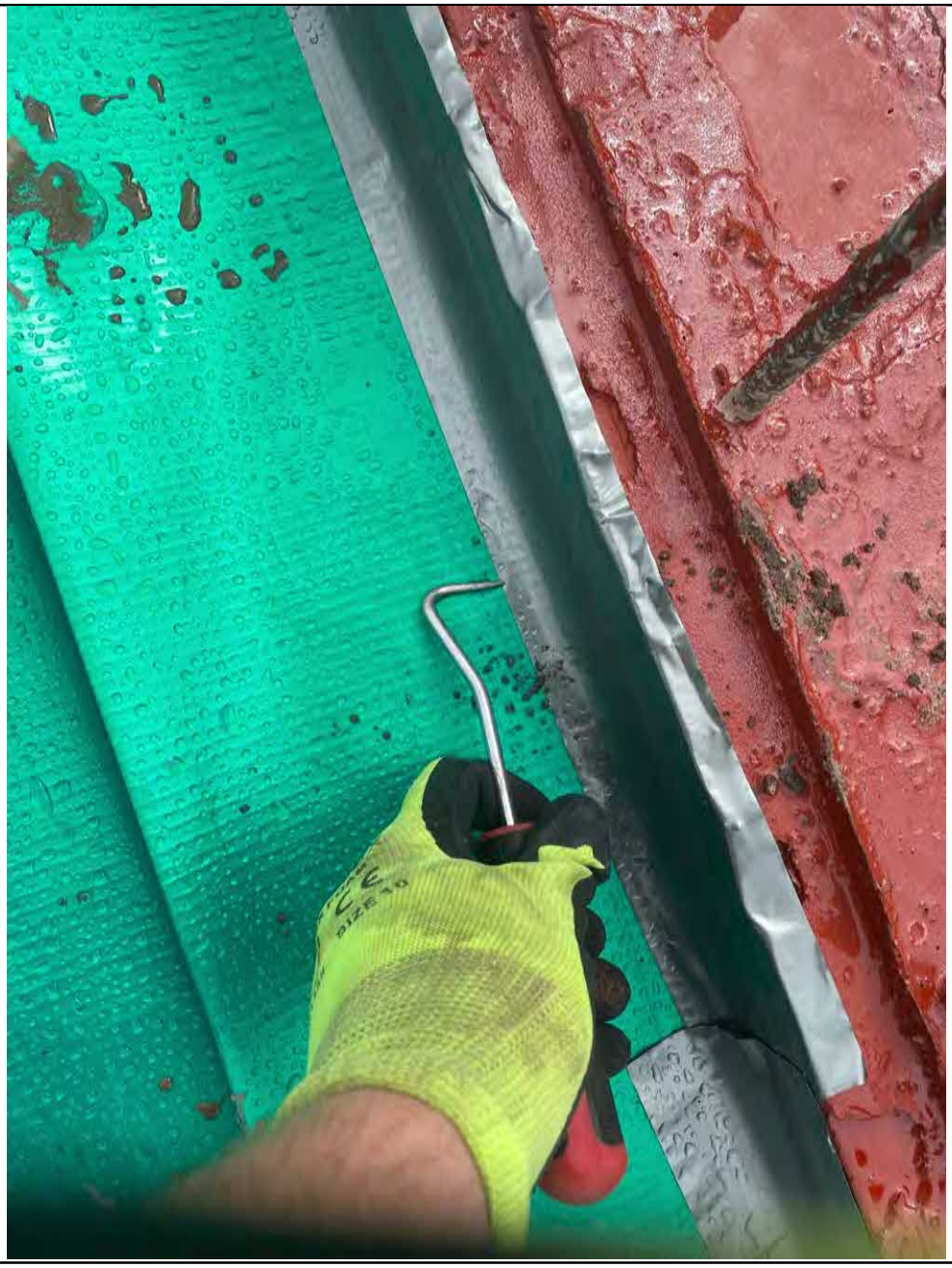
The photograph above shows the installers have sealed barrier to the beams and

upstands. Hydroprufe LG has first been applied to the exposed concrete before using

HCR detailing tape. A strong consistent seal has been achieved.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE



The photograph above shows a pick and probe test carried out to the seal achieved

between the LG and the gas barrier. A strong seal has been achieved.

Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Block A - GL:AL-AU/A4-A9.

NOTES: Pipe penetrations and piles sealed.

The first photograph below shows examples of pipe penetrations which have been sealed. The installers have first installed the top hats using double sided butyl tape and HCR Girth tape to seal the base of the top hats and the gas barrier.

HCR detailing tape has also been used to seal the sleeve of the top hats to the pipe penetration. The second photograph above shows a pipe sealed using HCR detailing tape. Installed in accordance with BS 8485:2019. Pick and probe testing carried out identified no faults or defects and a strong seal has been achieved.

Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

The photograph above shows a pipe which has been sealed in the same way as the

using Hydroprufe LG and detailing tape to create a continuous seal between the

piles and the FIS Hydroprufe 9000 gas barrier.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

LOCATION/GRID LINE: Block A - GL:AL-AU/A4-A9.

NOTES: Protection installed.

The two photographs below show examples of protection installed in top of the FIS

Hydroprufe 9000 gas barrier after installation was complete and verification was

Carrie out.

The first photograph below shows protection board which was installed to the higher

section of slab whereas the second photograph above shows the insulation installed

to the low we section of slab as per the FIS design.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

HCR Girth tape.

HCR double sided butyl tape.

Sufficient lap achieved and HCR tapes used to seal laps.

Additional overview of sealed laps.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Gas barrier sealed to perimeter beams.

Additional upstand detail sealed using LG and HCR tape.

Additional sealed pipe penetrations.

Lift pits still to be cleaned out and sealed using FX and LG.

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
22/08/2022	001	1. Two lift pits and district heating area still to be sealed using	
		Hydroseal FX and Hydroprufe LG.	

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block A - GL:AL-AU/A4-A9.	
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		

GEOSHIELD Verification Report

GAS MEMBRANE LAP TESTING

LAP I.D	WELDED/TAPED	TEST UNDERTAKEN	PASSED
1	Taped	Pick and Probe	Yes
2	Taped	Pick and Probe	Yes
3	Taped	Pick and Probe	Yes
4	Taped	Pick and Probe	Yes
5	Taped	Pick and Probe	Yes

GEOSHIELD Verification Report

VERIFICATION SUMMARY

This was the first visit to site where the installation of the FIS Hydroprufe 9000 gas barrier to Block A - GL:AL-AU/A4-A9 slab area was required. All laps of the FIS Hydroprufe 9000 gas barrier have been lapped 150mm and sealed using double sided butyl tape and HCR girth tape. All pipe penetrations have been sealed using top hats and HCR tapes or HCR detailing tape. Beams, upstands and piles have been sealed using Hydroprufe LG and HCR detailing tape. Protection and insulation boards have been sealed as per the FIS design. Two lift pits and heating district will need to be sealed using Hydroseal FX and Hydroprufe LG.

Installed in accordance with BS 8485:2019.

Verified in accordance with CIRIA 735.

GEOSHIELD SIGNATURE:

[redacted]

DATE:	22/08/2022

GEOSHIELD Verification Report

PROJECT REFERENCE:	GEO102776		
REPORT NUMBER:	002	REPORT DATE:	14/09/2022
PROJECT:	Dalby Avenue		
PROJECT ADDRESS:	Dalby Avenue,		

Bedminster, Bristol

BS3 4

MEMBRANE SPECIFICATION:

FIS Hydroprufe 9000 gas barrier

FIS Hydroprufe LG

FIS Hydroseal FX

FIS HCR Double Sided Butyl Tape

FIS HCR Foil Girth Tape

FIS Hydroprufe 8000

GEOSHIELD Verification Report

VERIFICATION OFFICER: John Cornish

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07493769477

EMAIL ADDRESS: Jcornish@geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ☐ NO: ☐ PROJECT: YES: ☐ NO: ☐

GEOSHIELD Verification Report

MEMBRANE SPECIFICATION:

DESIGN DETAILS:

DQRA and ORS Rev A:-

3.37 - CS2 gas regime rating

Site Location Plan

Proposed Ground Floor Plan

Typical Section Through Service Pit

OP001942-PD-001

OP001942-GA-001

OP001942-PD-002

OP001942-PD-003

OP001942-TD-001

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location & (Map 2) Nearby Location

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Jason Woollaston
CONTACTS ROLE:	
MOBILE PHONE:	07392 091 605
EMAIL ADDRESS:	Jason.Woollaston@WatkinJones.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: Vilius

COMPANY: 4D Construction

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Block A - GL:AI-AL/A3-A9.

SITE CONDITIONS:

WEATHER: Sunny

TEMPERATURE: 18°

MEMBRANE TEMPERATURE: N/a

RELATIVE HUMIDITY: N/a

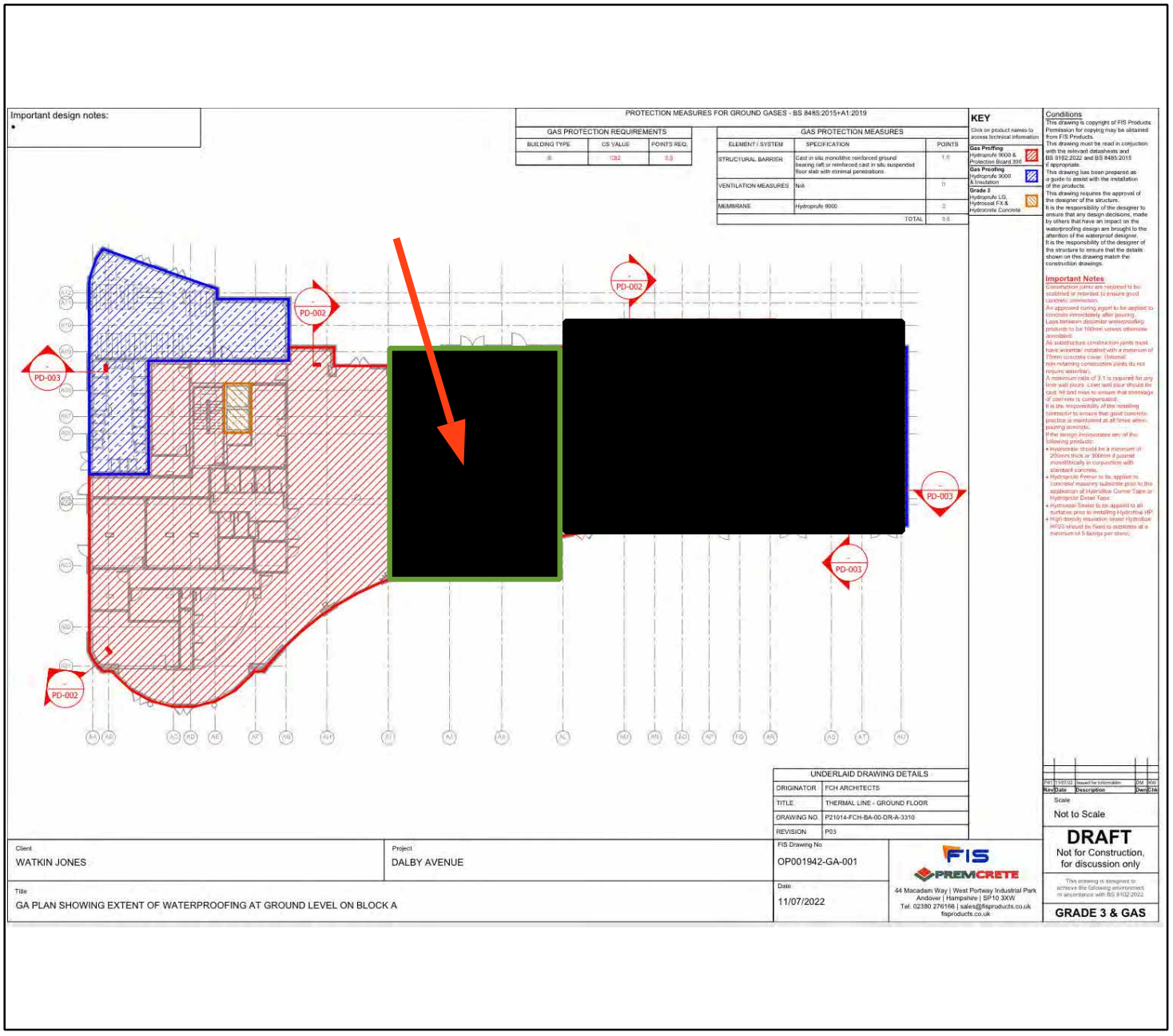
TIME: 14:00-16:00 REPORT NUMBER: 002

DATE: 14/09/2022

ACCOMPANIED Vilius - 4D Structures

GEOSHIELD Verification Report

VERIFICATION LAYOUT



The area highlighted within the red hashed area above shows where verification of

the FIS Hydroprufe 9000 gas barrier took place during this visit.

GEOSHIELD Verification Report

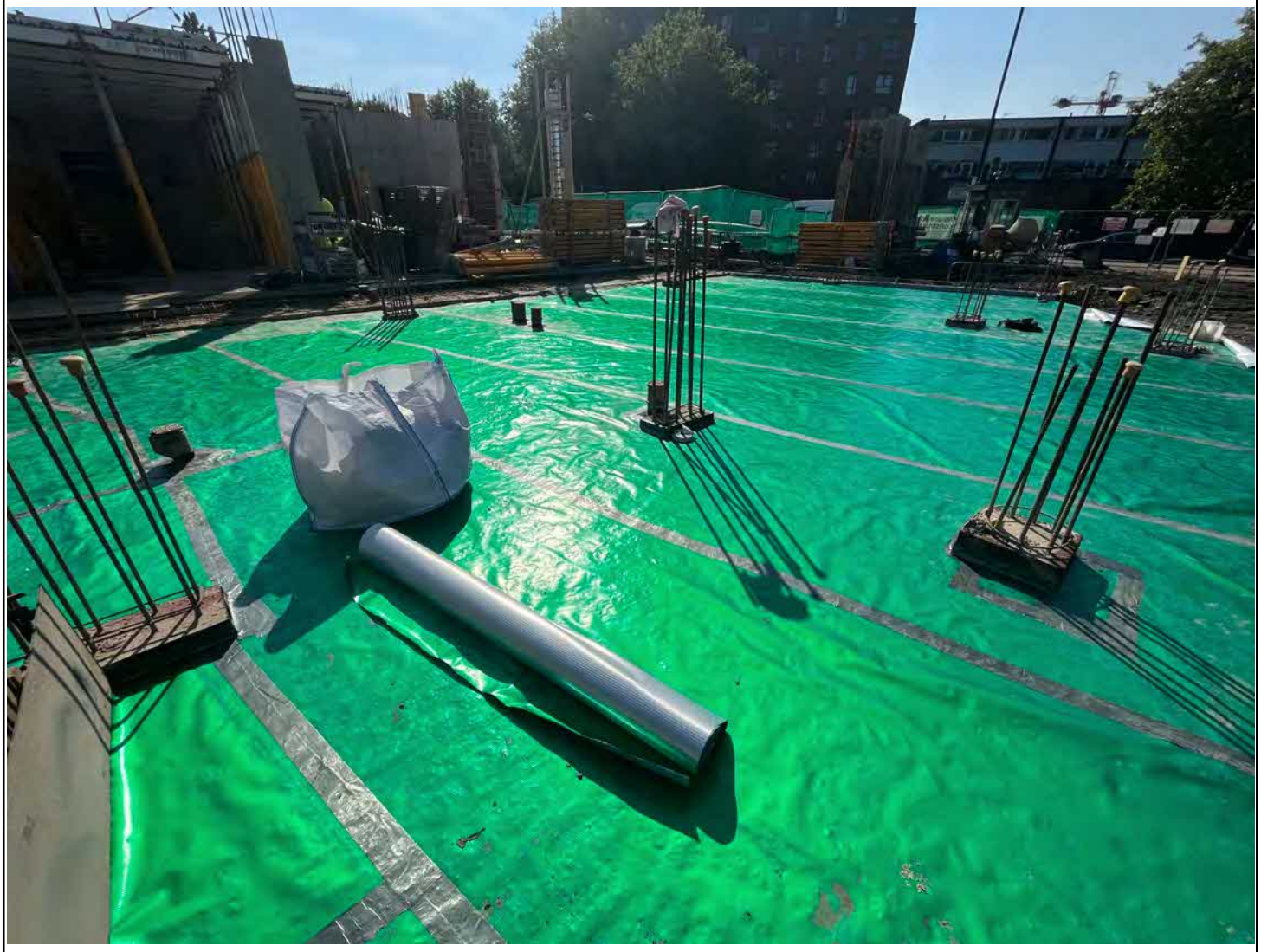
OVERVIEW PHOTOGRAPHS

The photograph above shows an overview of the Hydroprufe 9000 gas barrier

which was signed off during this visit.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS



The photograph above shows an additional overview photograph of the gas

barrier which was signed off during this visit.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

LOCATION/GRID LINE: Block A - GL:AI-AL/A3-A9.

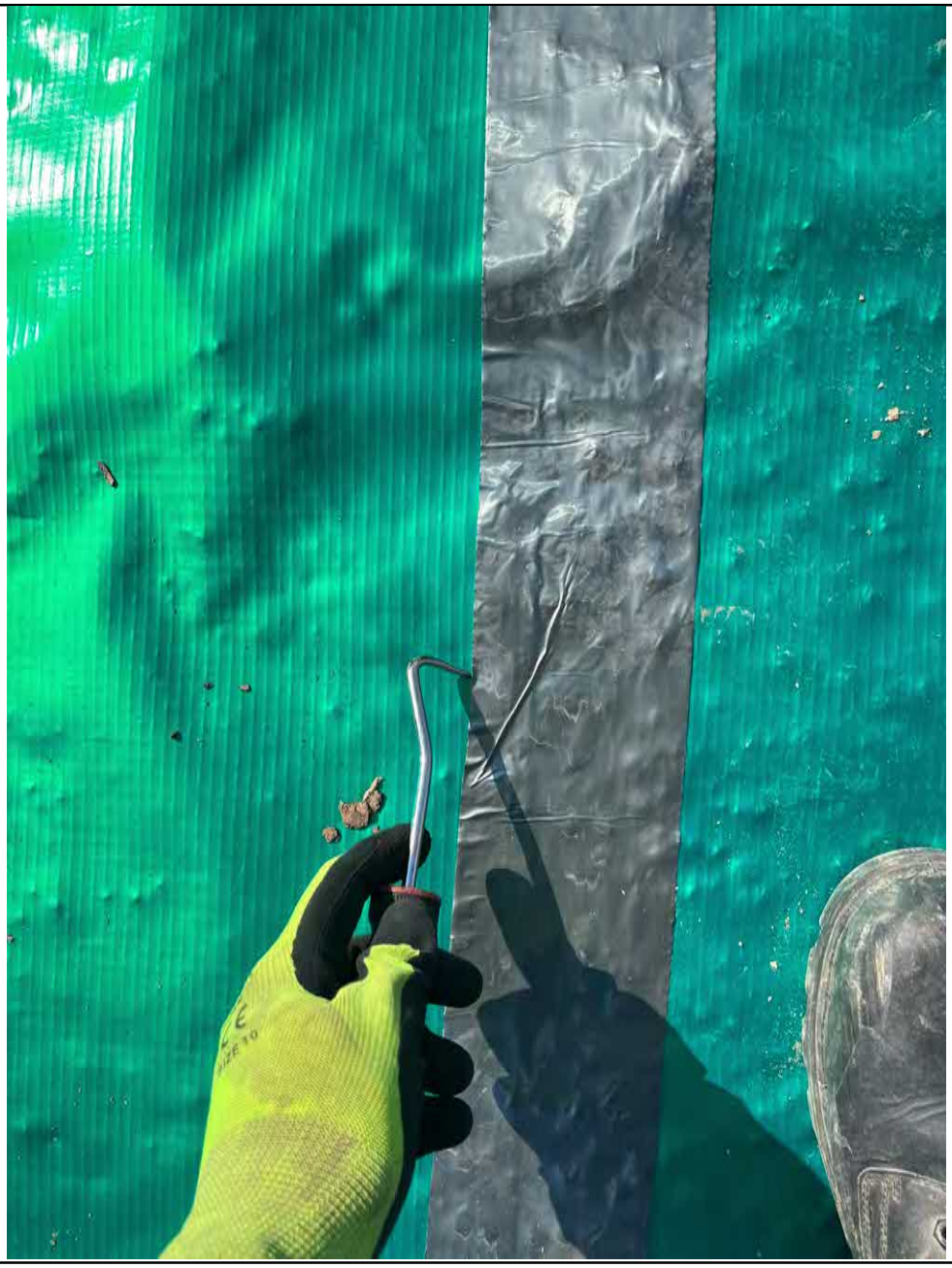
NOTES: Installation of the FIS Hydroprufe 9000 gas barrier.

The first photograph below shows the installers have first lapped the FIS Hydroprufe 9000 gas barrier 150mm before using double sided butyl tape and HCR Girth lap tape to seal each lap.

The second photograph above shows an overview of a sealed lap. Pressure has been applied to aid in the adherence of the lap tapes.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE



The photograph above shows a pick and probe test carried out to a sealed lap of the

FIS Hydroprufe 9000 gas barrier. No faults or defects were identified when inspecting

sealed laps. Verified in accordance with CIRIA 735.

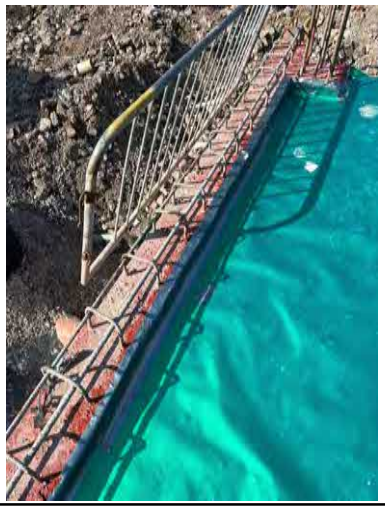
GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Block A - GL:AI-AL/A3-A9.

NOTES: Sealed details.

The first photograph below shows an example of a beam which the installers have sealed to the FIS Hydroprufe 9000 gas barrier. FIS Hydroprufe LG has first been applied to all piles and beams.



Next the FIS Hydroprufe 9000 gas barrier has been installed tight to the beams and piles to minimise any gaps. HCR detailing tape has then been used to seal the gas barrier to the LG. The second photograph above shows a pick and probe test carried to the seal achieved. A sufficient seal has been achieved.

Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

The photograph above shows examples of pipe penetrations which have been sealed

using double sided butyl tape, top hats and HCR detailing tape.

Installed in accordance with BS 8485:2019.

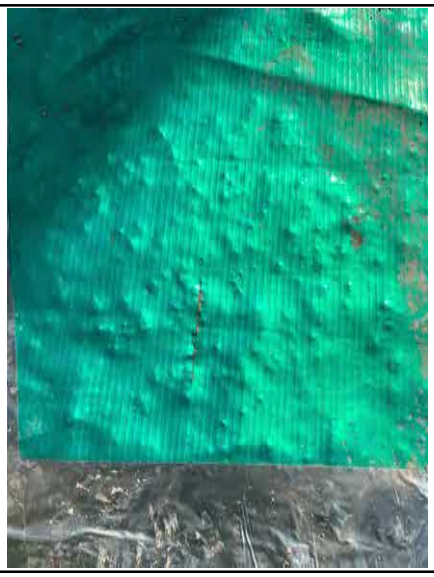
GEOSHIELD Verification Report

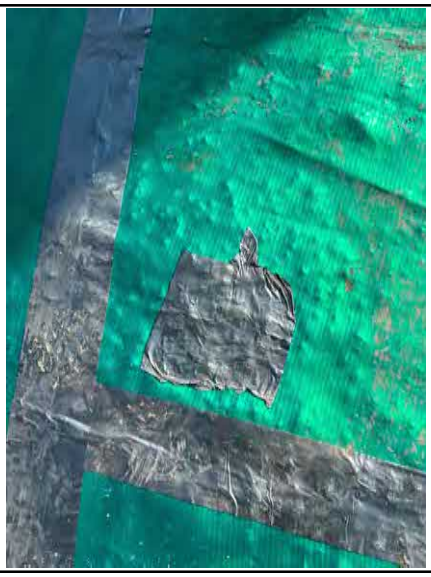
VERIFICATION ITEM THREE

LOCATION/GRID LINE: Block A - GL:AI-AL/A3-A9.

NOTES: Example of fault and patch repair.

The first photograph below shows an example of damage to the gas barrier. The installers have first cleaned the area of gas barrier around the damaged section of the FIS Hydroprufe 9000 gas barrier.





FIS HCR Detailing tape has been used to carry out patch repairs to any holes in the gas barrier which was verified during this visit. There are no outstanding remediations for the area of slab which was inspected during this visit.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Pick and probe test carried out to a sealed pipe penetration.

Sealed pile using LG and HCR tape.

Additional sealed perimeter detail.

Smooth concrete blinding below FIS Hydroprufe 9000 gas barrier.

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
22/08/2022	001	1.Two lift pits and district heating area still to be sealed using	
		Hydroseal FX and Hydroprufe LG.	
14/09/2022	002	1.Any holes in it the Hydroprufe 9000 gas barrier have been	✔
		patch repaired using HCR tape.	✔

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block A - GL:AL-AU/A4-A9.	
Gridline/Plot Sign off	Block A - GL:AI-AL/A3-A9.	✔
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		

GEOSHIELD Verification Report

GAS MEMBRANE LAP TESTING

LAP I.D	WELDED/TAPED	TEST UNDERTAKEN	PASSED
1	Taped	Pick and Probe	Yes
2	Taped	Pick and Probe	Yes
3	Taped	Pick and Probe	Yes
4	Taped	Pick and Probe	Yes
5	Taped	Pick and Probe	Yes

GEOSHIELD Verification Report

VERIFICATION SUMMARY

This was the second visit to site where verification of the installation of the FIS Hydroprufe 9000 gas barrier to an area of Block A GL:AI-AL/A3-A9 was required.

All laps have been lapped a sufficient amount and sealed using double sided butyl tape and HCR Girth Tape. All pipe penetrations have been sealed using HCR tapes and and top hats. Piles and beams have been sealed using Hydroprufe LG and HCR detailing tape. Any holes in the FIS Hydroprufe 9000 gas barrier have been patch repaired using HCR detailing tape. No outstanding remediations for the area of slab verified during this visit.

Installed in accordance with BS 8485:2019.

Verified in accordance with CIRIA 735.

GEOSHIELD SIGNATURE:

DATE: 14/09/2022

GEOSHIELD Verification Report

PROJECT REFERENCE: GEO102776

REPORT NUMBER: 007 REPORT DATE: 11/10/2022

PROJECT: Dalby Avenue

PROJECT ADDRESS: Dalby Avenue,

Bedminster, Bristol

BS3 4

MEMBRANE SPECIFICATION:

FIS Hydroprufe 9000 gas barrier

FIS Hydroprufe LG

FIS Hydroseal FX

FIS HCR Double Sided Butyl Tape

FIS HCR Foil Girth Tape

FIS Hydroprufe 8000

GEOSHIELD Verification Report

VERIFICATION OFFICER: John Cornish

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07493769477

EMAIL ADDRESS: Jcornish@geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ☐ NO: ☐ PROJECT: YES: ☐ NO: ☐

GEOSHIELD Verification Report

MEMBRANE SPECIFICATION:

DESIGN DETAILS:

DQRA and ORS Rev A:-

3.37 - CS2 gas regime rating

Site Location Plan

Proposed Ground Floor Plan

Typical Section Through Service Pit

OP001942-PD-001

OP001942-GA-001

OP001942-PD-002

OP001942-PD-003

OP001942-TD-001

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location & (Map 2) Nearby Location

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Jason Woollaston
CONTACTS ROLE:	
MOBILE PHONE:	07392 091 605
EMAIL ADDRESS:	Jason.Woollaston@WatkinJones.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: Vilius

COMPANY: 4D Construction

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Block A - GL: AM-AI/A02-A09.

SITE CONDITIONS:

WEATHER: Sunny/cloudy

TEMPERATURE: 14c

MEMBRANE TEMPERATURE: 13c

RELATIVE HUMIDITY: N/a

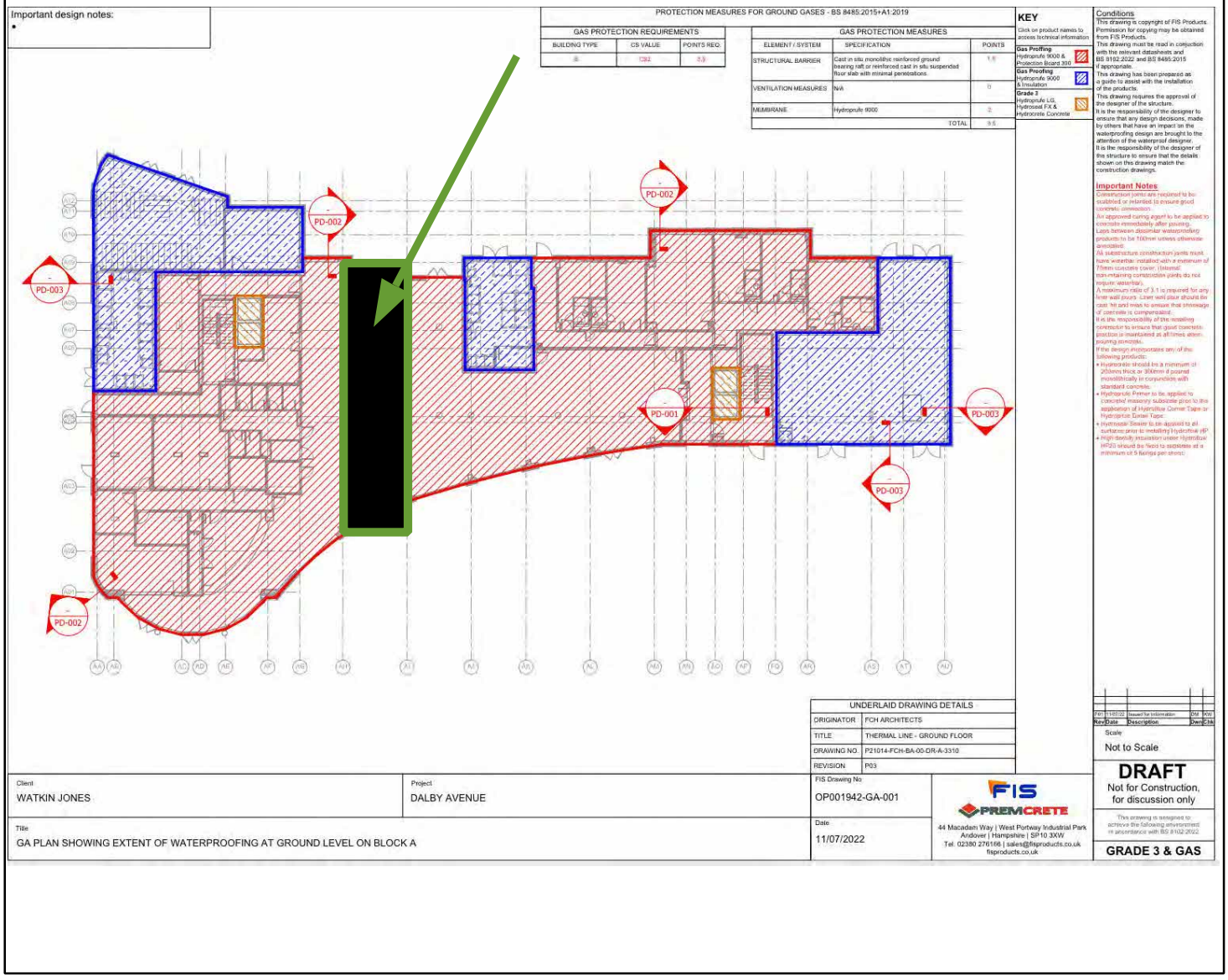
TIME: 10:30-12:00 REPORT NUMBER: 007

DATE: 11/10/2022

ACCOMPANIED Vilius - 4D Structures

GEOSHIELD Verification Report

VERIFICATION LAYOUT



The area highlighted in green above shows where the installers have installed the

FIS Hydroprufe 9000 gas barrier and where verification took place during this visit.

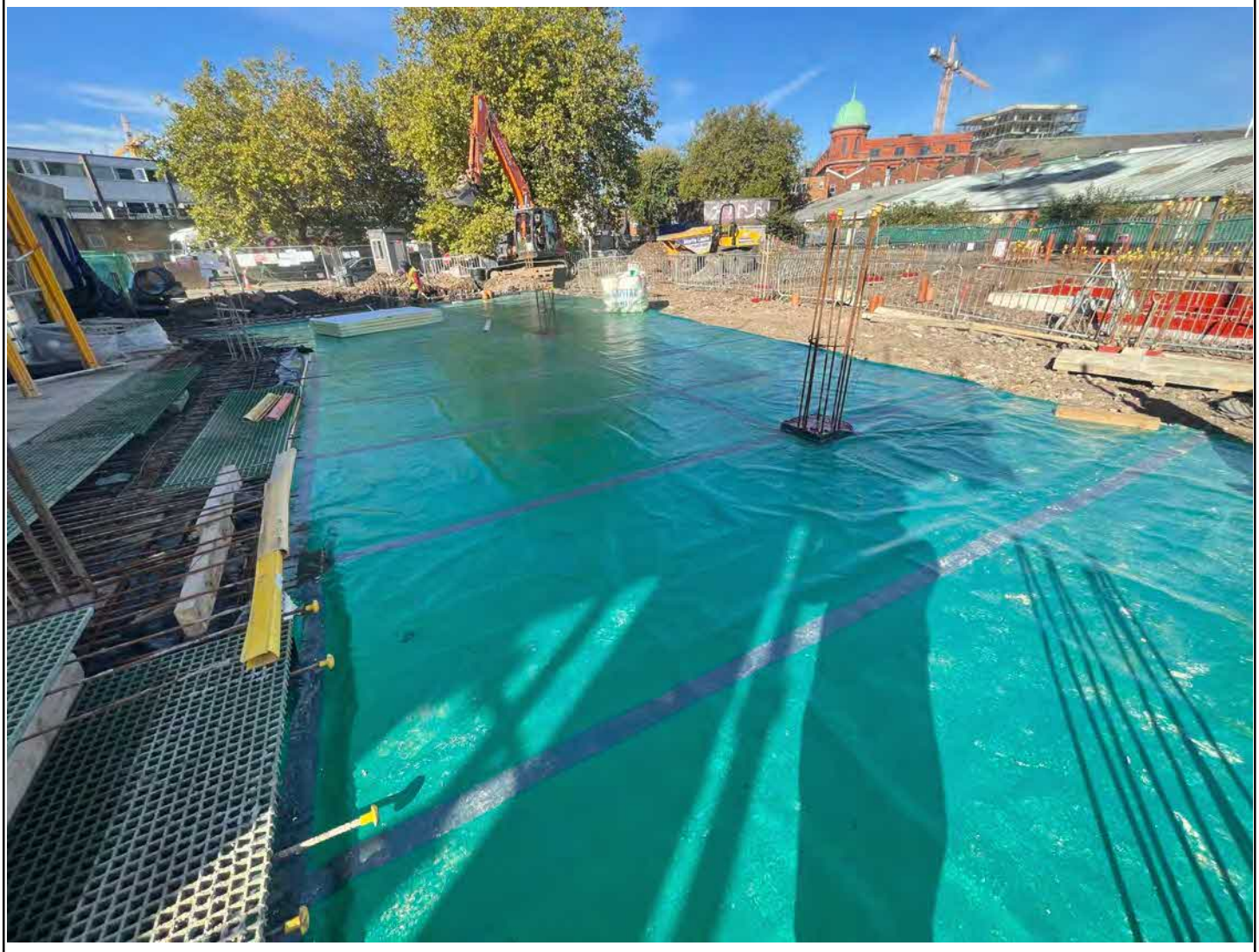
GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

The photograph above shows an overview of the area of Block A slab where verification took place during this visit.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS



The photograph above shows an additional overview of the FIS Hydroprufe

9000 gas barrier which has been installed and signed off during this visit.

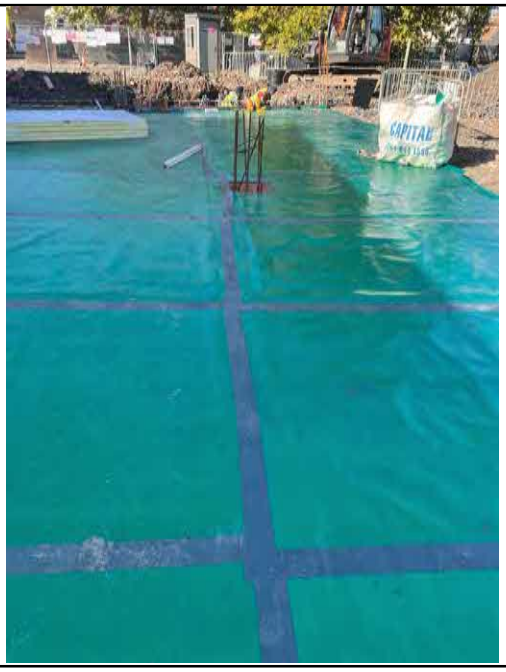
GEOSHIELD Verification Report

VERIFICATION ITEM ONE

LOCATION/GRID LINE: Block A - GL: AM-AI/A02-A09.

NOTES: Installation of the FIS Hydroprufe 9000 gas barrier.

The first photograph below shows the installers have used double sided butyl tape and HCR girth lap tape to seal each lap. Before sealing laps they have first lapped the lengths of gas barrier 150mm.



The second photograph above shows examples of sealed laps. The installers have applied pressure to aid in the adherence of the HCR tapes.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

The photograph above shows a pick and probe test carried out to a sealed lap of the

FIS Hydroprufe 9000 gas barrier. No faults or defects were identified during this visit.

Verified in accordance with CIRIA 735.

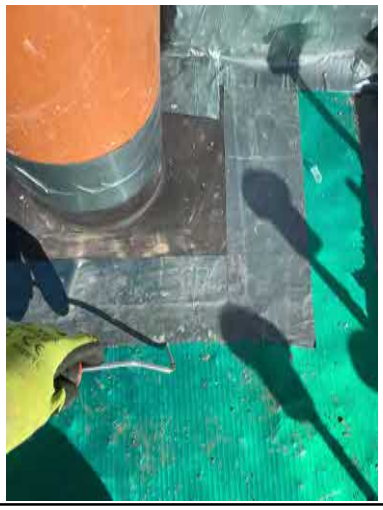
GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Block A - GL: AM-AI/A02-A09.

NOTES: Pipe penetrations and piles sealed.

The first photograph below shows examples of sealed pipe penetrations. The installers have first cut the FIS Hydroprufe 9000 gas barrier tight around each pipe penetration to minimise any gaps.



Next the installers have used double sided butyl tape and lap tape to seal the base of the top has to the gas barrier. Next the sleeve of the top hat has been sealed to the pipe using detailing tape. Installed in accordance with BS 8485:2019. The second photograph above shows a pick and probe test carried out. No faults or defects were identified during this visit. Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

The photograph above shows an example of a sealed pile. The Hydroprufe LG has

first been applied to the pile before the gas barrier is swelled to the pile using HCR

detailing tape.

GEOSHIELD Verification Report

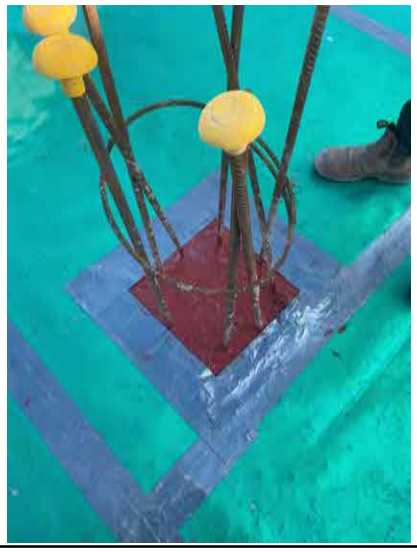
VERIFICATION ITEM THREE

The photograph above shows piles which have been painted using Hydroprufe

LG ready for the next section of Block A slab.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS



Additional sealed pile.

Additional overview of sealed lap.

Pick and probe test carried out a sealed beam.

Additional sealed beam and pipe penetration.

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
22/08/2022	001	1. Two lift pits and district heating area still to be sealed using	
		Hydroseal FX and Hydroprufe LG.	
14/09/2022	002	1. Any holes in it the Hydroprufe 9000 gas barrier have been	✔
		patch repaired using HCR tape.	✔
20/09/2022	003	1. District Heating and Riser needs to be sealed using Hydroseal	
		FX and Hydroprufe LG at a later date.	
23/09/2022	004	1. 2 x lift pits need to be sealed using Hydroseal FX and	
		Hydroprufe LG and verified in a future visit.	
28/09/2022	005	No faults or defects were identified during this visit.	✔
05/10/2022	006	1. 2 x lift pits need to be sealed using Hydroseal FX and LG before	
		being verified at a later date.	
		2. Small section of membrane had not been installed on arrival	✔
		this has now been sealed and is shown in verification of item 3	✔
		in report 6.	✔
11/10/2022	007	No faults or defects were identified during this visit.	✔

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block A - GL:AL-AU/A4-A9.	
Gridline/Plot Sign off	Block A - GL:AI-AL/A3-A9.	✔
Gridline/Plot Sign off	Block B - GL:B14-B23/BBO-BBU	
Gridline/Plot Sign off	Block B - GL:B11-B14/BAP-BAV + B19-B23/BBO-BBB….	
Gridline/Plot Sign off	… + B23/BBU-BBB.	
Gridline/Plot Sign off	Block B - GL:BAS-BAV/B08-B11 + BBA-BBB/B19-B22.	✔
Gridline/Plot Sign off	Block B - BAS-BAO/B08-B11.	
Gridline/Plot Sign off	Block A - GL: AM-AI/A02-A09.	✔
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		

GEOSHIELD Verification Report

GAS MEMBRANE LAP TESTING

LAP I.D	WELDED/TAPED	TEST UNDERTAKEN	PASSED
1	Taped	Pick and Probe	Yes
2	Taped	Pick and Probe	Yes
3	Taped	Pick and Probe	Yes
4	Taped	Pick and Probe	Yes
5	Taped	Pick and Probe	Yes

GEOSHIELD Verification Report

VERIFICATION SUMMARY

This was the seventh visit to site where verification of the installation of the FIS Hydroprufe 9000 gas barrier to Block A slab area was required. All laps of the FIS Hydroprufe 9000 gas barrier have been lapped 150mm before using double sided butyl tape and girth lap tape. All piles have been sealed using Hyrdroprufe LG before being sealed to the FIS Hydroprufe 9000 gas barrier using detailing tape. All pipe penetrations have been sealed using top hats, double sided butyl tape and detailing tape.

No faults or defects were identified during this visit.

Installed in accordance with BS 8485:2019.

Verified in accordance with CIRIA 735.

GEOSHIELD SIGNATURE:

DATE: 11/10/2022

GEOSHIELD Verification Report

PROJECT REFERENCE: GEO102776

REPORT NUMBER: 008 REPORT DATE: 17/10/2022

PROJECT: Dalby Avenue

PROJECT ADDRESS: Dalby Avenue,

Bedminster, Bristol

BS3 4

MEMBRANE SPECIFICATION:

FIS Hydroprufe 9000 gas barrier

FIS Hydroprufe LG

FIS Hydroseal FX

FIS HCR Double Sided Butyl Tape

FIS HCR Foil Girth Tape

FIS Hydroprufe 8000

GEOSHIELD Verification Report

VERIFICATION OFFICER: John Cornish

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07493769477

EMAIL ADDRESS: Jcornish@geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ☐ NO: ☐ PROJECT: YES: ☐ NO: ☐

GEOSHIELD Verification Report

MEMBRANE SPECIFICATION:

DESIGN DETAILS:

DQRA and ORS Rev A:-

3.37 - CS2 gas regime rating

Site Location Plan

Proposed Ground Floor Plan

Typical Section Through Service Pit

OP001942-PD-001

OP001942-GA-001

OP001942-PD-002

OP001942-PD-003

OP001942-TD-001

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location & (Map 2) Nearby Location

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Jason Woollaston
CONTACTS ROLE:	
MOBILE PHONE:	07392 091 605
EMAIL ADDRESS:	Jason.Woollaston@WatkinJones.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: Vilius

COMPANY: 4D Construction

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Block A - A01-A09/AF-1.5mx-AI.

Block B - B19-B23/BBC-B06.

SITE CONDITIONS:

WEATHER: Sunny/cloudy

TEMPERATURE: 12c

MEMBRANE TEMPERATURE: 13c

RELATIVE HUMIDITY: N/a

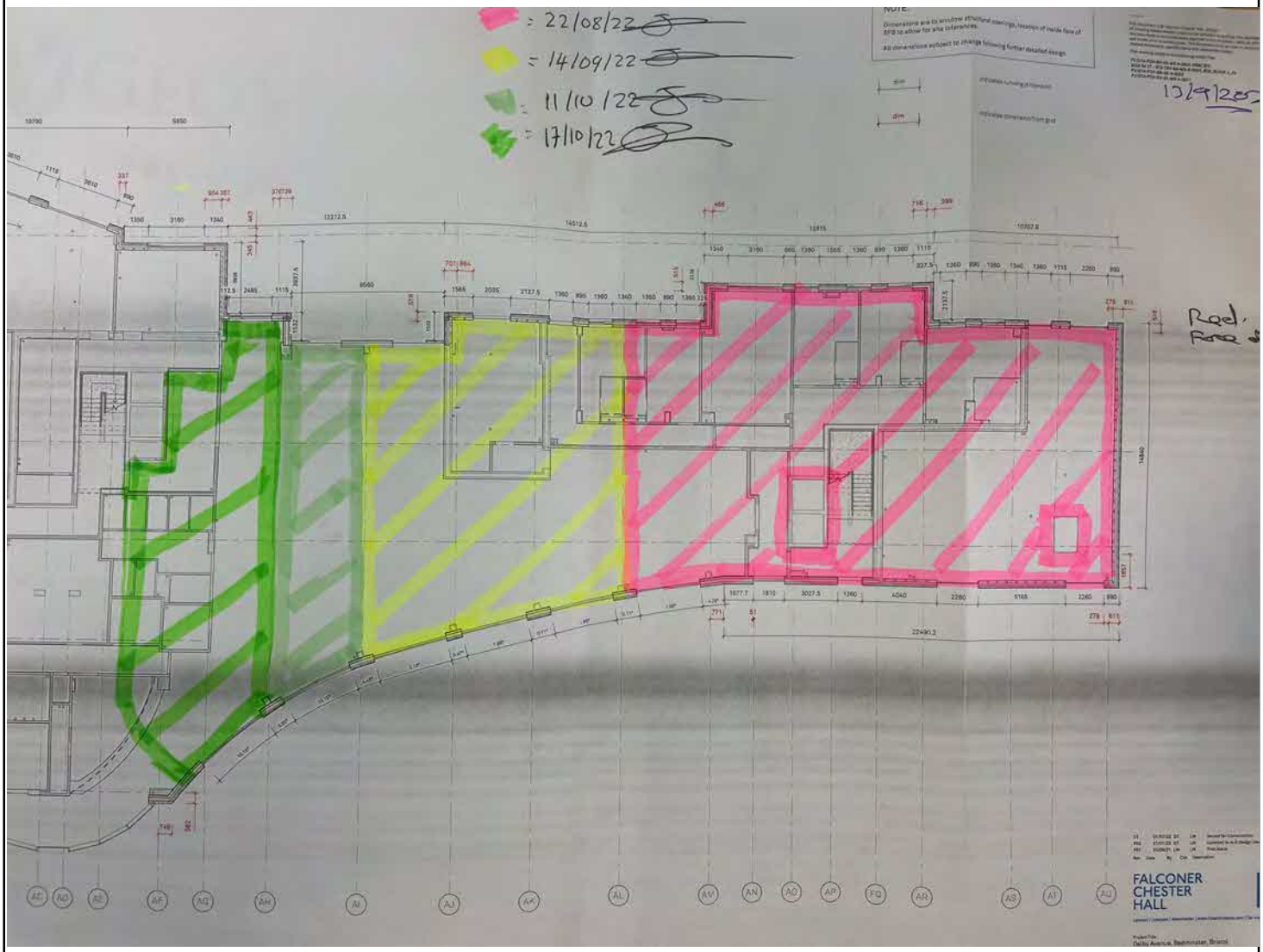
TIME: 1:30-3:30 REPORT NUMBER: 008

DATE: 17/10/2022

ACCOMPANIED Vilius - 4D Structures

GEOSHIELD Verification Report

VERIFICATION LAYOUT

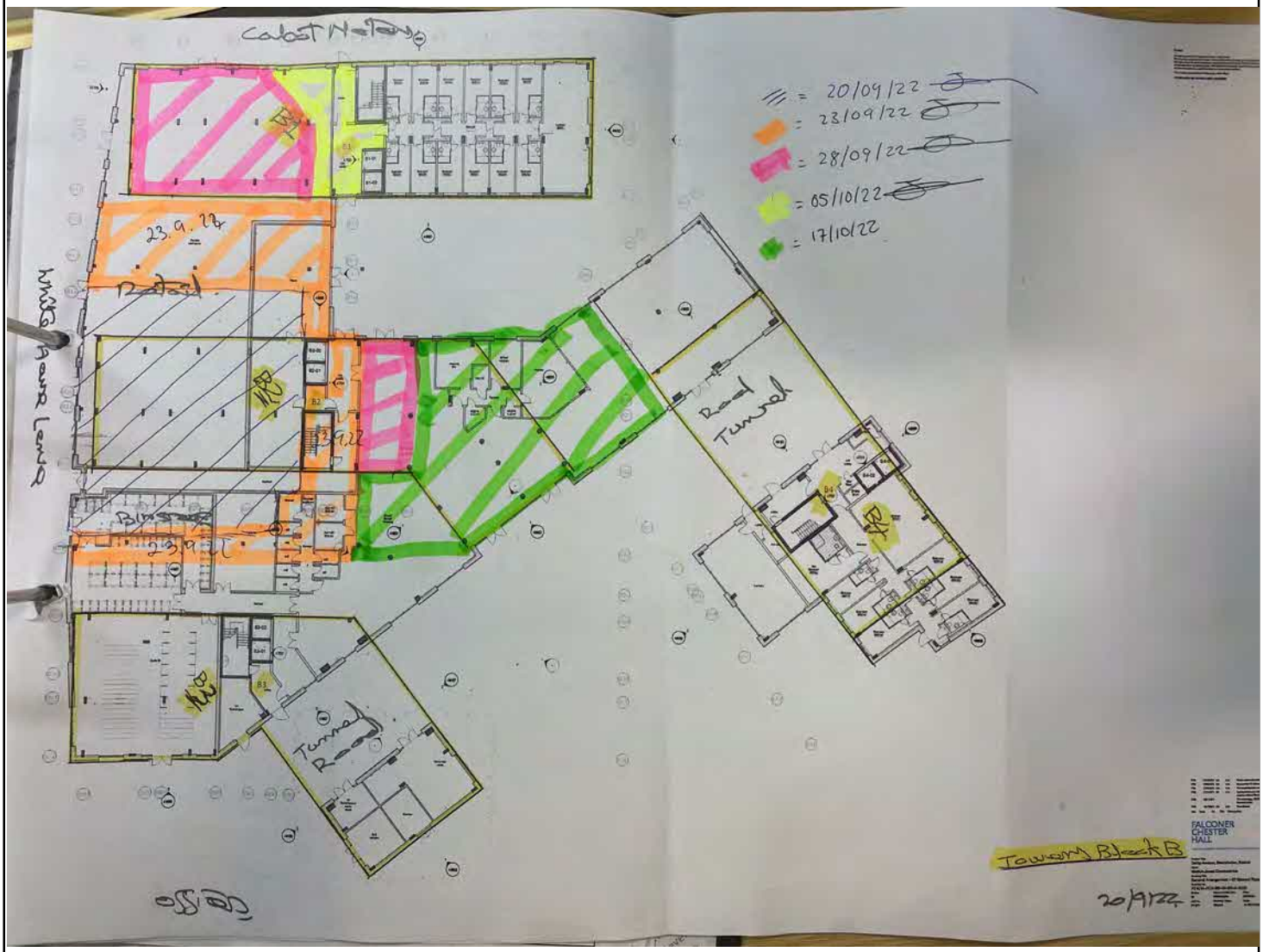


Overview photograph presenting the site plan area of

Block A - A01-A09/AF-1.5mx-AI.

GEOSHIELD Verification Report

VERIFICATION LAYOUT



Site plan overview of Block B - B19-B23/BBC-B06 which was verified upon

this site visit.

GEOSHIELD Verification Report

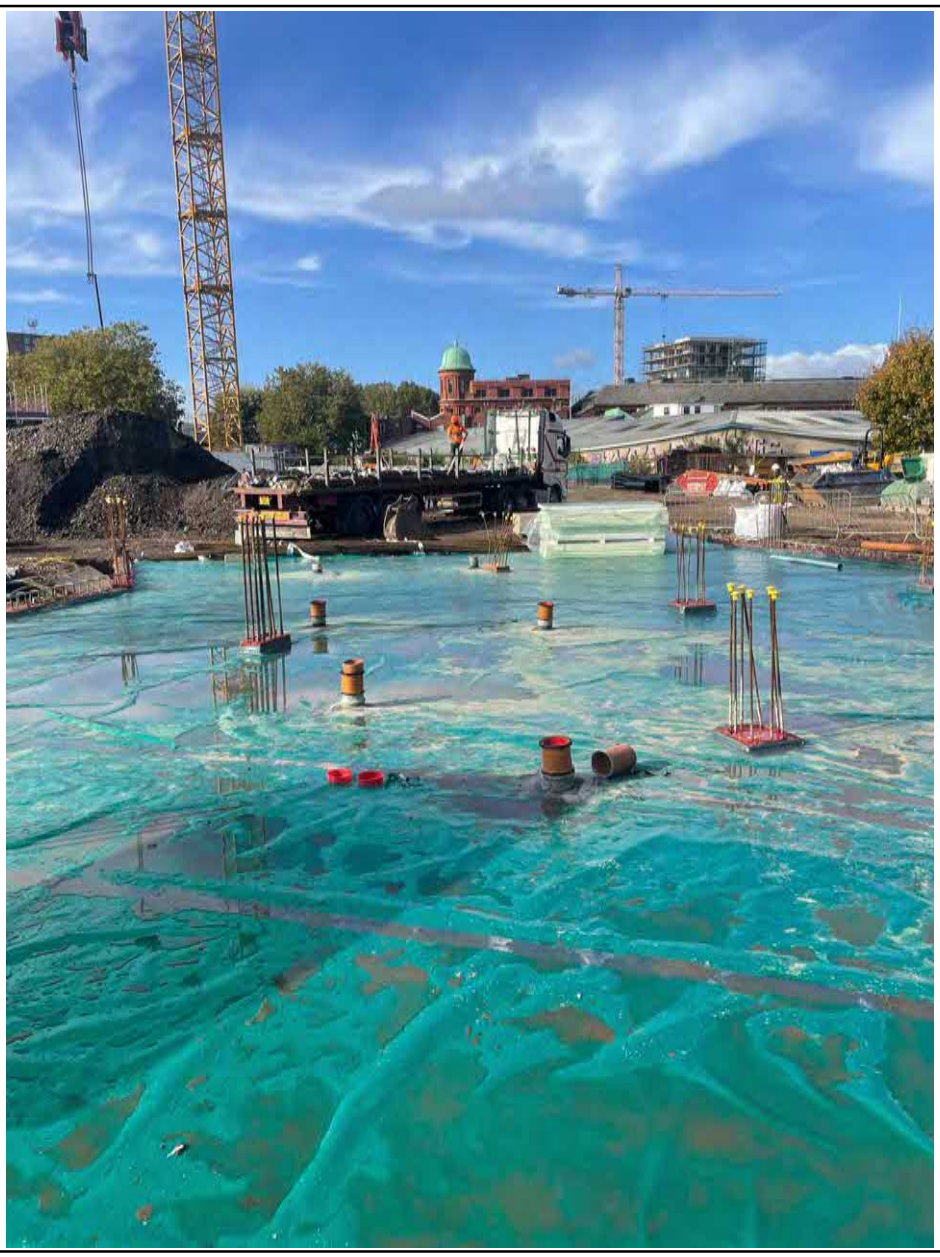
OVERVIEW PHOTOGRAPHS

Overview photograph of Block A - A01-A09/AF-1.5mx-AI, where the

FIS Hydroprufe 9000 gas barrier has been installed.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS



Overview photograph of Block B - B19-B23/BBC-B06 which has been signed

off during the visit.

GEOSHIELD Verification Report

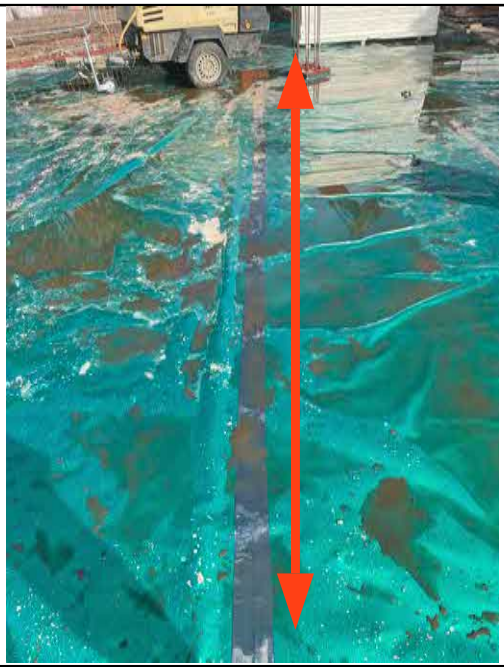
VERIFICATION ITEM ONE

LOCATION/GRID LINE: Block A and Block B slab areas shown in this report.

NOTES: Installation of FIS Hydroprufe 9000 gas barrier.

The first photograph below presents where the FIS Hydroprufe 9000 gas barrier has been lapped 150mm and sealed using HCR Double Sided Butyl Tape and HCR Foil Girth Tape.

The second photograph shows an overview of a lap of the FIS Hydroprufe 9000 gas …



…. barrier. The red arrow can be seen showing where the lap is, showing where the butyl tape has sealed the gas barrier.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

The photograph above shows a pick and probe test being carried out on a lap of the FIS Hydroprufe 9000 gas barrier, no faults were found along the sealed laps, which has been installed with a strong and consistent seal. Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Block A and Block B slab areas shown in this report.

NOTES: Pipe penetrations, beams and piles sealed.

The first photograph below presents an overview of a pipe penetration which was inspected during this visit. The pipes were sealed using the double sided butyl tape and girth tape at the base of the pipe penetration to achieve a strong seal, and ….

…. additional girth tape was used to seal the penetration to the pipe. Installed in accordance with BS 8485:2019. The second photograph above depicts a pick and probe test carried out on a pipe penetration to find any faults with the seal. Some pipe penetrations required remediation which can be found in the additional photos.

Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

The photograph above shows a pile which has been sealed by the installers by firstly

applying the hydroprufe LG, once dry HCR detailing tape has been used to seal

painted piles to the FIS Hydroprufe 9000 gas barrier.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

LOCATION/GRID LINE: Block A - A01-A09/AF-1.5mx-AI.

NOTES: Faults and remediations.

The first photograph below shows where a fault was found along the beam on block A.

The hydroprufe LG was too wet to seal the FIS Hydroprufe 9000 gas barrier to the beam.

The second photograph above presents where the installers have rectified where the fault was found. This was achieved by letting the hydroprufe LG dry and then using HCR detailing tape to create a strong seal to the beam.

Installed in accordance to BS 8485:2019.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

The photograph above shows a pile which has been rectified by again allowing

The LG to dry and reapply the HCR detailing tape so a seal could be achieved.

Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Additional photograph of an overview of Block A

Installation being installed over block B.

Intallers completing remediations to a pipe penetration

HCR detailing tape used to complete seal between the beam and membrane.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Additional photograph showing an installer completing remediations.

A photograph showing the smooth blinding on Block A.

FIS Hydroprufe 9000 gas barrier.

Another image of a pick and probe test being conducted to a pipe penetration.

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
22/08/2022	001	1. Two lift pits and district heating area still to be sealed using	
		Hydroseal FX and Hydroprufe LG.	
14/09/2022	002	1. Any holes in it the Hydroprufe 9000 gas barrier have been	✔
		patch repaired using HCR tape.	✔
20/09/2022	003	1. District Heating and Riser needs to be sealed using Hydroseal	
		FX and Hydroprufe LG at a later date.	
23/09/2022	004	1. 2 x lift pits need to be sealed using Hydroseal FX and	
		Hydroprufe LG and verified in a future visit.	
28/09/2022	005	No faults or defects were identified during this visit.	✔
05/10/2022	006	1. 2 x lift pits need to be sealed using Hydroseal FX and LG before	
		being verified at a later date.	
		2. Small section of membrane had not been installed on arrival	✔
		this has now been sealed and is shown in verification of item 3	✔
		in report 6.	✔
11/10/2022	007	No faults or defects were identified during this visit.	✔

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
17/10/2022	008	1. Two piles and beam needs to be dry before reselling, this has	✔
		been rectified and is shown in verification item 3.	✔
		2. Two Pipe penetrations needed additional tape, this has been	✔
		carried out during this visit.	✔
		3. Two lift pits need to be sealed with FX and LG and verified	
		during a future visit,	

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block A - GL:AL-AU/A4-A9.	
Gridline/Plot Sign off	Block A - GL:AI-AL/A3-A9.	✔
Gridline/Plot Sign off	Block B - GL:B14-B23/BBO-BBU	
Gridline/Plot Sign off	Block B - GL:B11-B14/BAP-BAV + B19-B23/BBO-BBB….	
Gridline/Plot Sign off	… + B23/BBU-BBB.	
Gridline/Plot Sign off	Block B - GL:BAS-BAV/B08-B11 + BBA-BBB/B19-B22.	✔
Gridline/Plot Sign off	Block B - BAS-BAO/B08-B11.	
Gridline/Plot Sign off	Block A - GL: AM-AI/A02-A09.	✔
Gridline/Plot Sign off	Block A - A01-A09/AF-1.5mx-AI.	
Gridline/Plot Sign off	Block B - B19-B23/BBC-B06.	✔
Gridline/Plot Sign off		
Gridline/Plot Sign off		

GEOSHIELD Verification Report

GAS MEMBRANE LAP TESTING

LAP I.D	WELDED/TAPED	TEST UNDERTAKEN	PASSED
1	Taped	Pick and Probe	Yes
2	Taped	Pick and Probe	Yes
3	Taped	Pick and Probe	Yes
4	Taped	Pick and Probe	Yes
5	Taped	Pick and Probe	Yes

GEOSHIELD Verification Report

VERIFICATION SUMMARY

This visit to site was to verify the slab areas of Block A and Block B as stated at the beginning of the report. All laps were sealed using HCR Double Sided Butyl tape and were lapped by 150mm, achieving a strong and consistent seal, HCR Foil Girth tape was also used to seal the surface of the laps. Pipe penetrations were sealed using butyl tape and girth at the base of the pipe penetration, and then more girth tape was used to seal to the pipe. Pick and probe tests were used to identity the faults with the pipe penetrations, piles and beam. These faults were rectified on site, leaving one outstanding remediation being the 2 x lift pits.

Installed in accordance with BS 8485:2019.

Verified in accordance with CIRIA 735.

GEOSHIELD SIGNATURE:

DATE: 17/10/2022

GEOSHIELD Verification Report

PROJECT REFERENCE: GEO102776

REPORT NUMBER: 009 REPORT DATE: 19/10/2022

PROJECT: Dalby Avenue

PROJECT ADDRESS: Dalby Avenue,

Bedminster, Bristol

BS3 4

MEMBRANE SPECIFICATION:

FIS Hydroprufe 9000 gas barrier

FIS Hydroprufe LG

FIS Hydroseal FX

FIS HCR Double Sided Butyl Tape

FIS HCR Foil Girth Tape

FIS Hydroprufe 8000

GEOSHIELD Verification Report

VERIFICATION OFFICER: John Cornish

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07493769477

EMAIL ADDRESS: Jcornish@geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ☐ NO: ☐ PROJECT: YES: ☐ NO: ☐

GEOSHIELD Verification Report

MEMBRANE SPECIFICATION:

DESIGN DETAILS:

DQRA and ORS Rev A:-

3.37 - CS2 gas regime rating

Site Location Plan

Proposed Ground Floor Plan

Typical Section Through Service Pit

OP001942-PD-001

OP001942-GA-001

OP001942-PD-002

OP001942-PD-003

OP001942-TD-001

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location & (Map 2) Nearby Location

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Jason Woollaston
CONTACTS ROLE:	
MOBILE PHONE:	07392 091 605
EMAIL ADDRESS:	Jason.Woollaston@WatkinJones.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: Vilius

COMPANY: 4D Construction

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Block A - AE-AF/ A01-A11.

Block A - AF-AG / A8-A11.

Block B - BAQ-BAM / B08-B11.

SITE CONDITIONS:

WEATHER: Sunny/cloudy

TEMPERATURE: 16c

MEMBRANE TEMPERATURE: N/a

RELATIVE HUMIDITY: N/a

TIME: 15:00-17:00 REPORT NUMBER: 009

DATE: 19/10/2022

ACCOMPANIED Vilius - 4D Structures

GEOSHIELD Verification Report

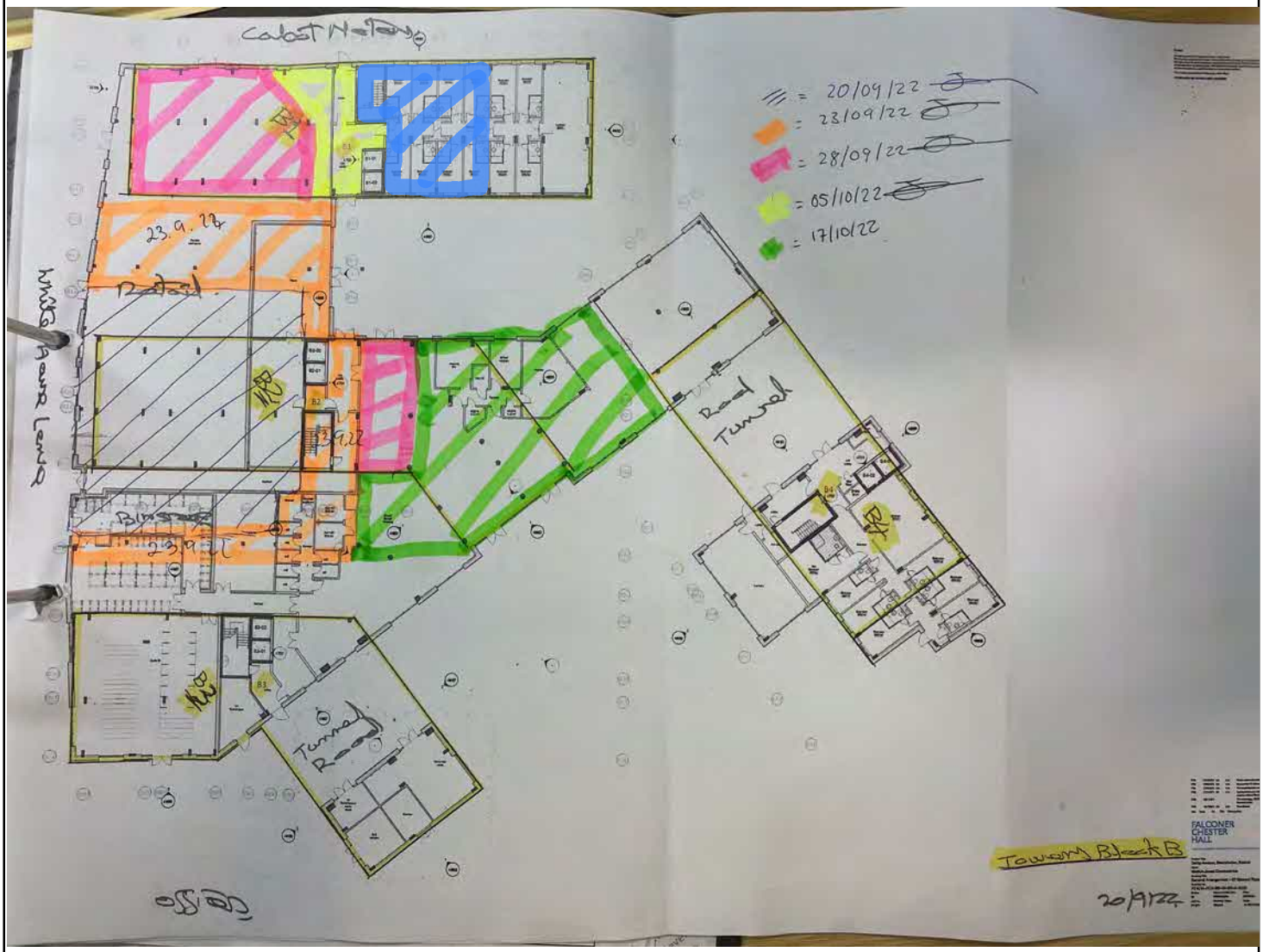
VERIFICATION LAYOUT

Overview of the site plan showing the block A grid lines as mentioned on page 6.

The area that was inspected is highlighted in blue.

GEOSHIELD Verification Report

VERIFICATION LAYOUT



Overview of the site plan showing the block B grid lines as mentioned on page 6.

The area that was inspected is highlighted in blue.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

An overview photograph of block B where the FIS Hydroprufe 9000 gas barrier has been installed.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

An overview photograph showing block A again showing the gas membrane

along with the piles and beam.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

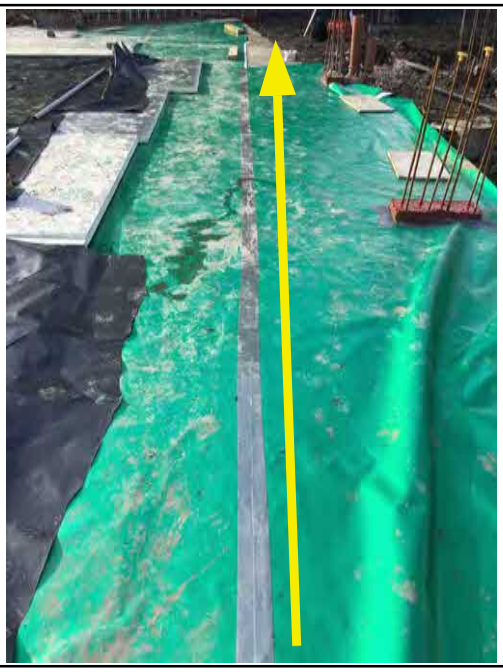
LOCATION/GRID LINE: Block A and block B gridlines mentioned on page 6.

NOTES: Installation of FIS Hydroprufe 9000 gas barrier.

The first photograph below presents the double sided butyl tape which is installed to seal

the gas membrane. The membrane is lapped over the tape and a strong seal is achieved.

This photograph aids in the visual representation of how a lap is installed, the tape is …



… highlighted by the red arrow. The second photograph shows a lap after completion of

installation, where the foil tape can also be seen. This is highlighted by the yellow arrow.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

The photograph above shows a close up image of the sealed lap joint and a pick and probe test being conducted to test the integrity of the lap. No faults were found along the lap joints on both block A and B. Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Block A and block B gridlines mentioned on page 6.

NOTES: Detailing to pipe penetrations, beams and piles.

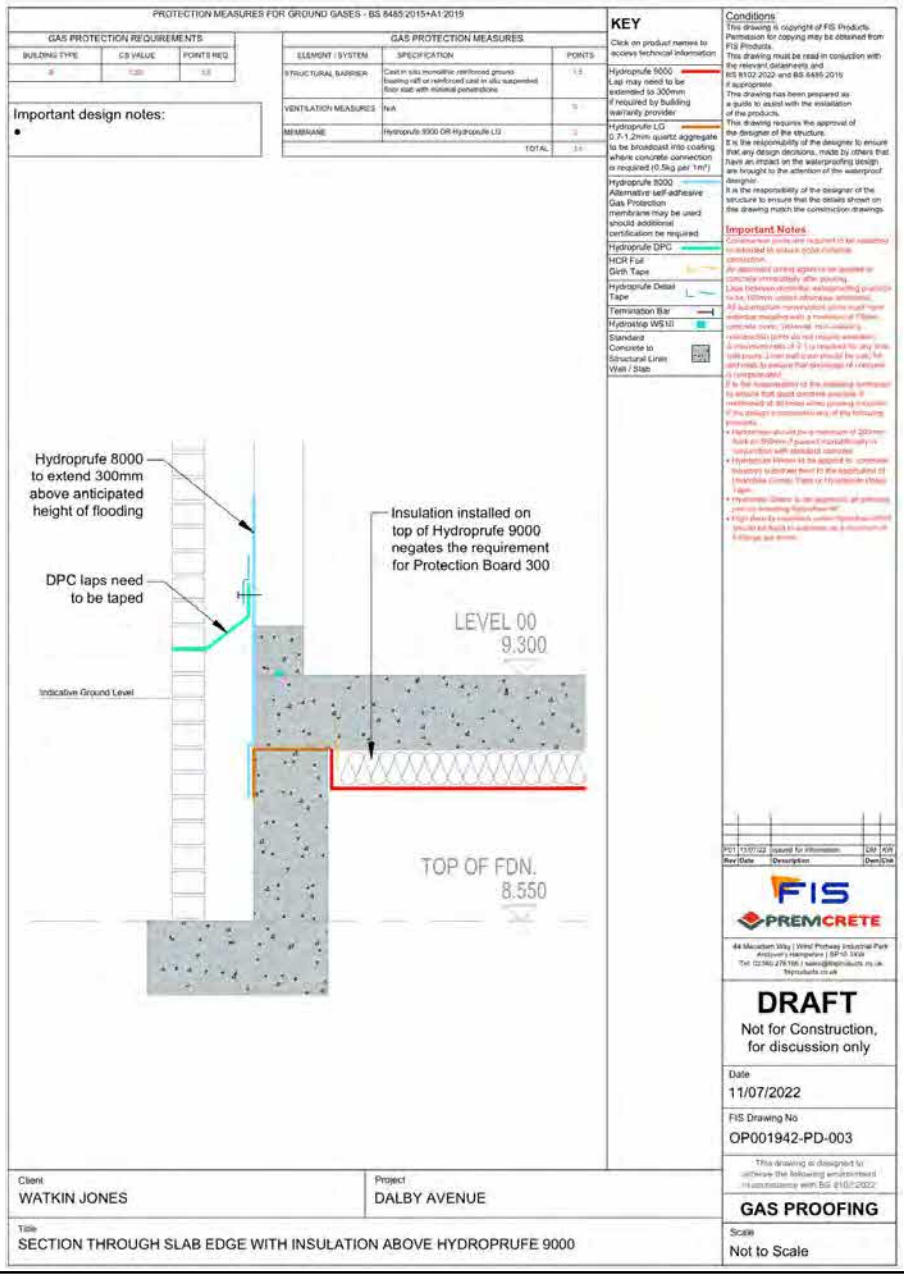
The first photograph below shows a pipe penetration and a pick and probe test being carried out on the HCR tape to test for a secure seal. There were two faults with pipe penetrations this visit, but remediations were made on site.

The second photograph above shows again another pick and probe test being carried out but this time along a beam on one of the plots. The tests found multiple faults with the seals, more detail on this issue can be found in item three of the verification report.

Verified in accordance with CIRIA 735.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO



The image above shows a more detailed plan of how the hydroprufe gas membrane should be fitted. Upon inspection the gas membrane, hydroprufe LG and the HCR detailing tape were fitted as per design. Termination to be carried out at later date.

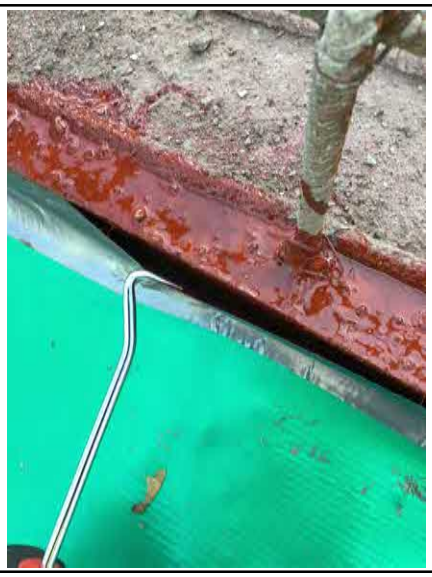
GEOSHIELD Verification Report

VERIFICATION ITEM THREE

LOCATION/GRID LINE: Block A and block B gridlines mentioned on page 6.

NOTES: Faults and remediations.

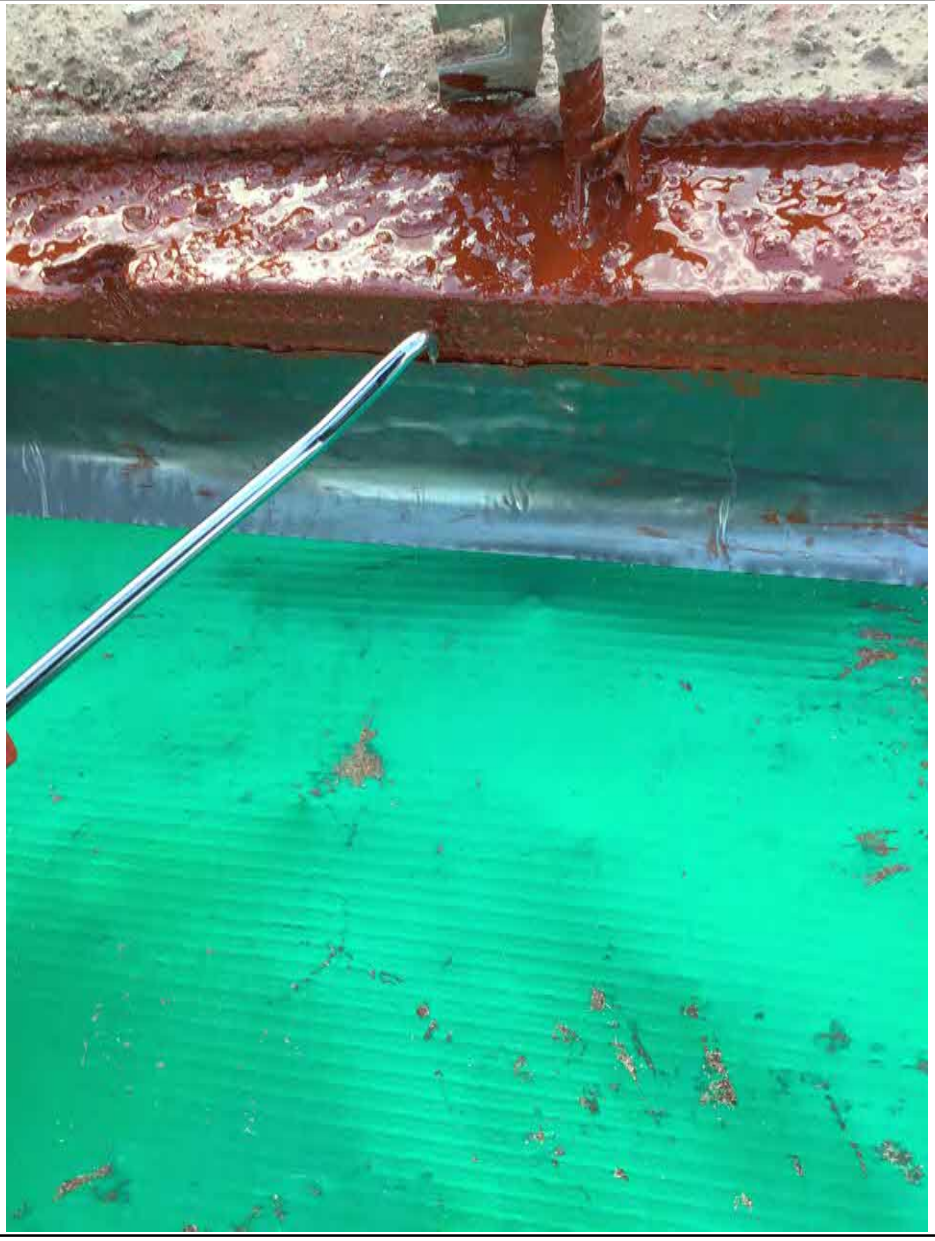
The first photograph below depicts where the installers tried to seal HCR tape to a beam , but the hydroprufe LG was too wet to secure a strong and consistent seal. The reason for this was because the HCR tape was sealing itself to the LG paint not the …



… concrete beam. The second photograph above shows one of the installers rectifying an issue identified with the sealing of a pile. Again, the hydroprufe LG was too wet to achieve a strong and consistent seal to the beam. But these issues were rectified on site. Installed in accordance with BS 8485:2019.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE



The photograph above depicts a pick and probe test being carried out on a seal

along one of the concrete beams. This test was completed after the installers

rectified the previously mentioned faults. No further faults were found.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

The photograph above shows where damage has occurred to the FIS

Hydroprufe 9000 gas barrier, and the installers have rectified the fault by patching

over it with HCR tape to ensure a seal.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Fault identified with a pipe penetration.

Faults rectified to the pipe penetration.

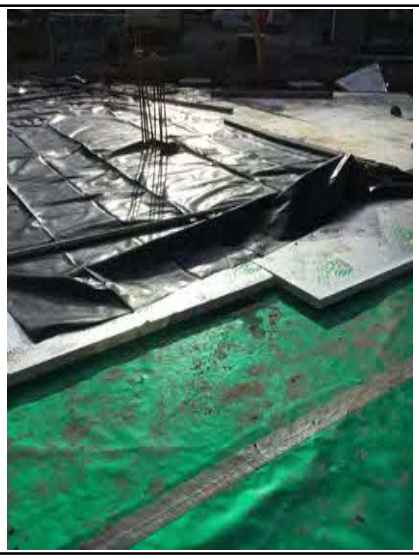
150mm lap of FIS Hydroprufe 9000

gas membrane.

Overview photo of block A.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS



Insulation being installed over the gas membrane that has been verified.

Steel work being completed to a previously verified slab area.

Additional HCR tape that has been applied to a pipe penetration.

Overview image showing HCR tape sealing a beam.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Fault with sealing of a pile.

Rectified pile with the propper application of HCR tape.

Fault found along a beam on block A.

Fault remediated on block A.

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
22/08/2022	001	1. Two lift pits and district heating area still to be sealed using	
		Hydroseal FX and Hydroprufe LG.	
14/09/2022	002	1. Any holes in it the Hydroprufe 9000 gas barrier have been	✔
		patch repaired using HCR tape.	✔
20/09/2022	003	1. District Heating and Riser needs to be sealed using Hydroseal	
		FX and Hydroprufe LG at a later date.	
23/09/2022	004	1. 2 x lift pits need to be sealed using Hydroseal FX and	
		Hydroprufe LG and verified in a future visit.	
28/09/2022	005	No faults or defects were identified during this visit.	✔
05/10/2022	006	1. 2 x lift pits need to be sealed using Hydroseal FX and LG before	
		being verified at a later date.	
		2. Small section of membrane had not been installed on arrival	✔
		this has now been sealed and is shown in verification of item 3	✔
		in report 6.	✔
11/10/2022	007	No faults or defects were identified during this visit.	✔

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
17/10/2022	008	1. Two piles and beam needs to be dry before reselling, this has	✔
		been rectified and is shown in verification item 3.	✔
		2. Two Pipe penetrations needed additional tape, this has been	✔
		carried out during this visit.	✔
		3. Two lift pits need to be sealed with FX and LG and verified	
		during a future visit,	
19/10/2022	009	1. Two pipe penetrations needed additional HCR tape.	✔
		2. LG too wet to apply HCR tape to create a seal, since remediated	✔
		3. Some additional HCR tape needed to be applied to the piles to..	✔
		…..secure a seal	✔

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block A - GL:AL-AU/A4-A9.	
Gridline/Plot Sign off	Block A - GL:AI-AL/A3-A9.	✔
Gridline/Plot Sign off	Block B - GL:B14-B23/BBO-BBU	
Gridline/Plot Sign off	Block B - GL:B11-B14/BAP-BAV + B19-B23/BBO-BBB….	
Gridline/Plot Sign off	… + B23/BBU-BBB.	
Gridline/Plot Sign off	Block B - GL:BAS-BAV/B08-B11 + BBA-BBB/B19-B22.	✔
Gridline/Plot Sign off	Block B - BAS-BAO/B08-B11.	
Gridline/Plot Sign off	Block A - GL: AM-AI/A02-A09.	✔
Gridline/Plot Sign off	Block A - A01-A09/AF-1.5mx-AI.	
Gridline/Plot Sign off	Block B - B19-B23/BBC-B06.	✔
Gridline/Plot Sign off	Block A - AE-AF/ A01-A11.	✔
Gridline/Plot Sign off	Block A - AF-AG / A8-A11.	✔

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block B - BAQ-BAM / B08-B11.	✔
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
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Gridline/Plot Sign off		
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Gridline/Plot Sign off		

GEOSHIELD Verification Report

GAS MEMBRANE LAP TESTING

LAP I.D	WELDED/TAPED	TEST UNDERTAKEN	PASSED
1	Taped	Pick and Probe	Yes
2	Taped	Pick and Probe	Yes
3	Taped	Pick and Probe	Yes
4	Taped	Pick and Probe	Yes
5	Taped	Pick and Probe	Yes

GEOSHIELD Verification Report

VERIFICATION SUMMARY

The purpose of this visit on site was to test and verify the gridlines on block A and block B as previously mentioned on page 6. The Hydroprufe 9000 gas barrier was sealed using double sided butyl and foil tape, achieving a 150mm lap. Pipe penetrations were sealed using HCR tape, piles and beams were also sealed with this, but a layer of Hyrdroprufe LG was painted on first. Faults were found upon thorough inspection. The Hyrdroprufe LG was too wet to achieve a seal with the HCR tape, installers were advised to let the LG dry before using the HCR tape.

All faults identified during this visit have been rectified.

Installed in accordance with BS 8485:2019.

Verified in accordance with CIRIA 735.

GEOSHIELD SIGNATURE:

DATE:	19/10/2022

GEOSHIELD Verification Report

PROJECT REFERENCE:	GEO102776		
REPORT NUMBER:	010	REPORT DATE:	28/11/2022
PROJECT:	Dalby Avenue		
PROJECT ADDRESS:	Dalby Avenue,		

Bedminster, Bristol

BS3 4

MEMBRANE SPECIFICATION:

FIS Hydroprufe 9000 gas barrier

FIS Hydroprufe LG

FIS Hydroseal FX

FIS HCR Double Sided Butyl Tape

FIS HCR Foil Girth Tape

FIS Hydroprufe 8000

GEOSHIELD Verification Report

VERIFICATION OFFICER: John Cornish

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07493769477

EMAIL ADDRESS: Jcornish@geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ☐ NO: ☐ PROJECT: YES: ☐ NO: ☐

GEOSHIELD Verification Report

MEMBRANE SPECIFICATION:

DESIGN DETAILS:

DQRA and ORS Rev A:-

3.37 - CS2 gas regime rating

Site Location Plan

Proposed Ground Floor Plan

Typical Section Through Service Pit

OP001942-PD-001

OP001942-GA-001

OP001942-PD-002

OP001942-PD-003

OP001942-TD-001

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location & (Map 2) Nearby Location

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Jason Woollaston
CONTACTS ROLE:	
MOBILE PHONE:	07392 091 605
EMAIL ADDRESS:	Jason.Woollaston@WatkinJones.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: Vilius

COMPANY: 4D Construction

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Block A - A01-A12/AA-AE.

Block B - B08-B11/BAK-BAM.

Block B - B23-B24/BAM-BAN.

SITE CONDITIONS:

WEATHER: Overcast/sunny

TEMPERATURE: 8c

MEMBRANE TEMPERATURE: N/a

RELATIVE HUMIDITY: N/a

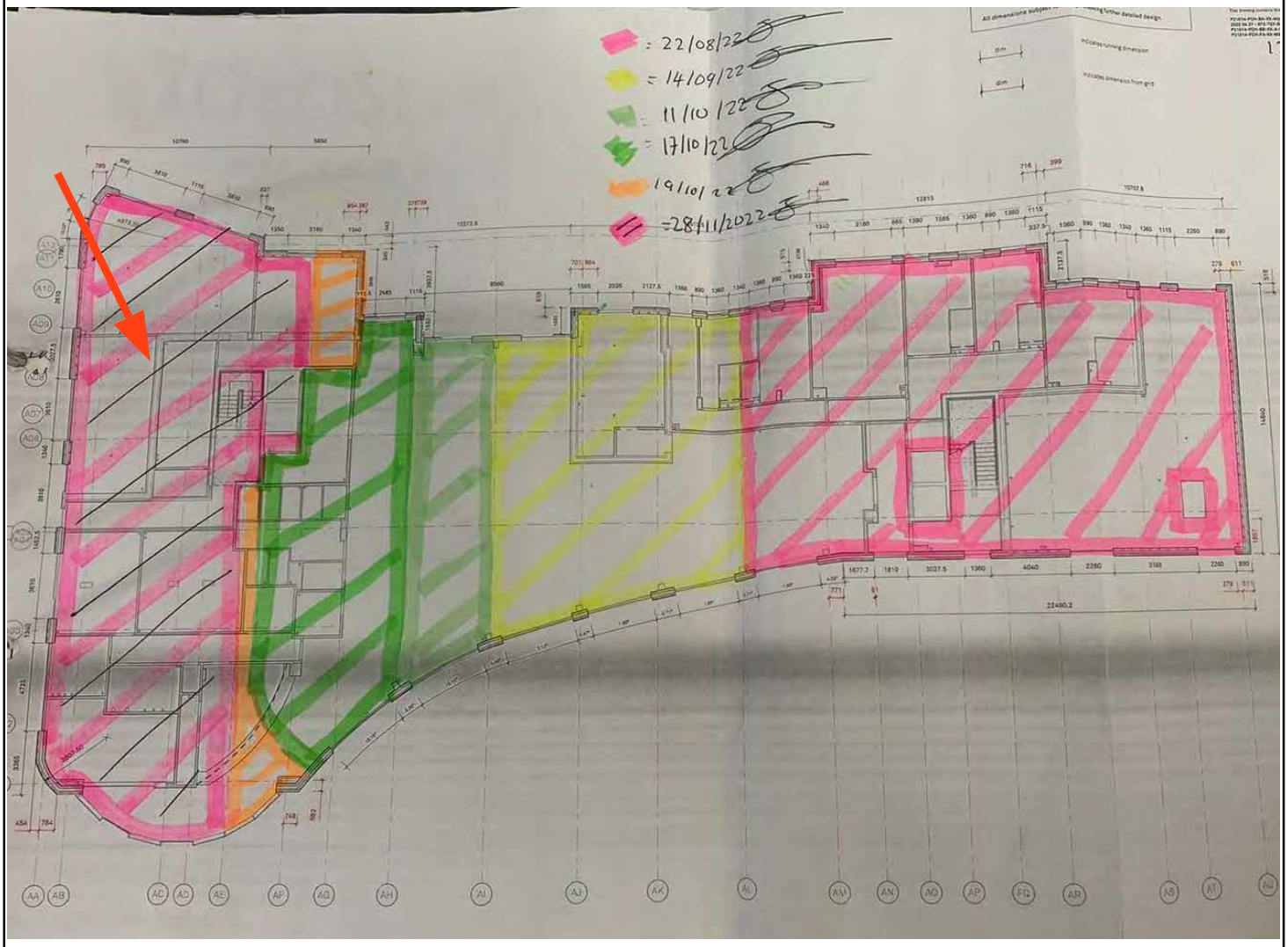
TIME: 13:00-15:00 REPORT NUMBER: 010

DATE: 28/11/2022

ACCOMPANIED Vilius - 4D Structures

GEOSHIELD Verification Report

VERIFICATION LAYOUT



The area of Block A highlighted in pink and annotated above shows where the

FIS Hydroprufe 9000 gas barrier has been installed.

GEOSHIELD Verification Report

VERIFICATION LAYOUT

The two orange hashed areas annotated above also shows where verification took

place during this visit.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

The photograph above shows an overview of a section of slab area which was

signed off during this visit.

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

The photograph above shows an additional overview photograph of the

installed FIS Hydroprufe 9000 gas barrier.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

LOCATION/GRID LINE: Block A and B - Slab Areas.

NOTES: Installation of the FIS Hydroprufe 9000 gas barrier.

The first photograph below shows an example of a sealed lap of the FIS Hydroprufe 9000 gas. All laps have been lapped 150mm and sealed using double sided butyl tape and girth lap tape.

The second photograph above shows the installers have sealed the previously installed gas barrier to the newly installed section in the same way.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

The photograph above shows a close up of a sealed lap detail. The installers have applied pressure to both the double sided butyl tape and girth lap tape to ensure that a strong and sufficient seal has been achieved. No faults or defects were identified from the evidence provided to GeoShield.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Block A and B - Slab Areas.

NOTES: Pipe penetrations.

The two photographs below shows examples of pipe penetrations sealed in different ways. The first have been sealed using double sided butyl tape and detailing tape to seal the base of the top hats to the FIS Hydroprufe 9000 gas barrier. Then a strip…

…of the detailing tape has been used to seal the sleeve of the top hat to the pipes.

The second photograph shows pipe penetrations which are to close together to be sealed using top hats, instead HCR Detailing tape has been used to achieve a sufficient seal. Installed in accordance with BS 8485:2019 and as per manufacturers specification.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

LOCATION/GRID LINE: Block A and B - Slab Areas.

NOTES: Beams and piles.

The two photographs below shows examples of concrete details which have been sealed using FIS Products. The installers have first applied two even coats of the Hydroprufe LG to all exposed concrete.

Once dry the FIS Hydroprufe 9000 gas barrier has then been installed tight to the sealed concrete and the two have been sealed using detailing tape as per the design. Pressure has been applied to aid in the adherence of the tapes.

No faults or defects were identified.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

The photograph above shows a pile which has been sealed in a similar fashion to the concrete beams shown in the previous page. Hydroprufe LG has been applied and allowed to cure before using detailing tape to seal the concrete piles to the FIS Hydroprufe 9000 gas barrier.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Additional sealed pipe penetration.

Additional sealed pipe penetration.

Additional overview photograph.

Additional sealed concrete detail.

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Additional sealed pipe penetrations and piles.

Additional sealed perimeter concrete detail.

Additional sealed details.

Additional sealed piles and pipe penetrations.

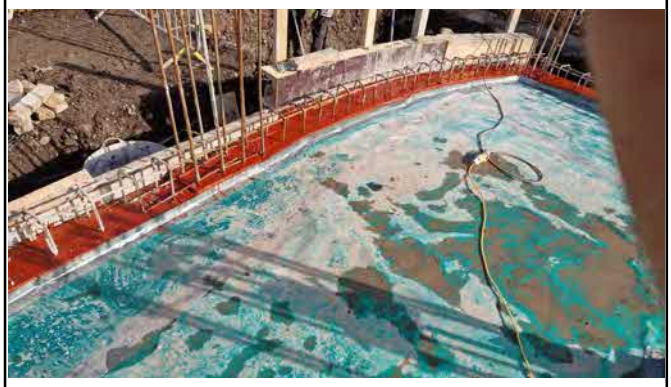
GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Additional overview photograph.

Strong seal achieve between the gas barrier and sealed concrete.

Additional overview photograph.



Additional overview photograph.

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
22/08/2022	001	1. Two lift pits and district heating area still to be sealed using	
		Hydroseal FX and Hydroprufe LG.	
14/09/2022	002	1. Any holes in it the Hydroprufe 9000 gas barrier have been	✔
		patch repaired using HCR tape.	✔
20/09/2022	003	1. District Heating and Riser needs to be sealed using Hydroseal	
		FX and Hydroprufe LG at a later date.	
23/09/2022	004	1. 2 x lift pits need to be sealed using Hydroseal FX and	
		Hydroprufe LG and verified in a future visit.	
28/09/2022	005	No faults or defects were identified during this visit.	✔
05/10/2022	006	1. 2 x lift pits need to be sealed using Hydroseal FX and LG before	
		being verified at a later date.	
		2. Small section of membrane had not been installed on arrival	✔
		this has now been sealed and is shown in verification of item 3	✔
		in report 6.	✔
11/10/2022	007	No faults or defects were identified during this visit.	✔

GEOSHIELD Verification Report

REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
17/10/2022	008	1. Two piles and beam needs to be dry before reselling, this has	✔
		been rectified and is shown in verification item 3.	✔
		2. Two Pipe penetrations needed additional tape, this has been	✔
		carried out during this visit.	✔
		3. Two lift pits need to be sealed with FX and LG and verified	
		during a future visit,	
19/10/2022	009	1. Two pipe penetrations needed additional HCR tape.	✔
		2. LG too wet to apply HCR tape to create a seal, since remediated	✔
		3. Some additional HCR tape needed to be applied to the piles to..	✔
		…..secure a seal	✔
28/11/2022	010	No faults or defects were identified.	✔

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES	✔	NO		DILECTIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES ✔ NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Block A - GL:AL-AU/A4-A9.	
Gridline/Plot Sign off	Block A - GL:AI-AL/A3-A9.	✔
Gridline/Plot Sign off	Block B - GL:B14-B23/BBO-BBU	
Gridline/Plot Sign off	Block B - GL:B11-B14/BAP-BAV + B19-B23/BBO-BBB….	
Gridline/Plot Sign off	… + B23/BBU-BBB.	
Gridline/Plot Sign off	Block B - GL:BAS-BAV/B08-B11 + BBA-BBB/B19-B22.	✔
Gridline/Plot Sign off	Block B - BAS-BAO/B08-B11.	
Gridline/Plot Sign off	Block A - GL: AM-AI/A02-A09.	✔
Gridline/Plot Sign off	Block A - A01-A09/AF-1.5mx-AI.	
Gridline/Plot Sign off	Block B - B19-B23/BBC-B06.	✔
Gridline/Plot Sign off	Block A - AE-AF/ A01-A11.	✔
Gridline/Plot Sign off	Block A - AF-AG / A8-A11.	✔