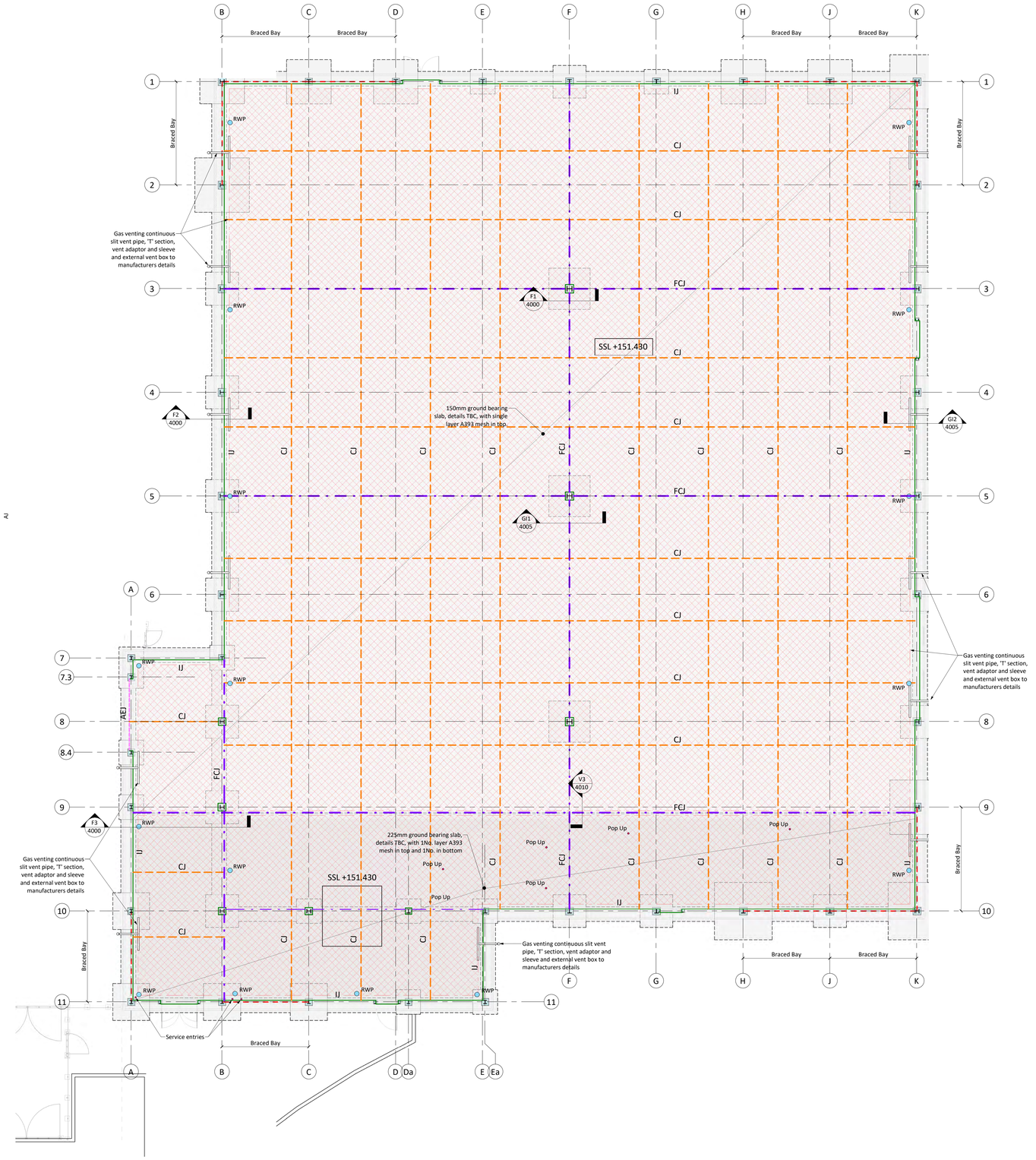


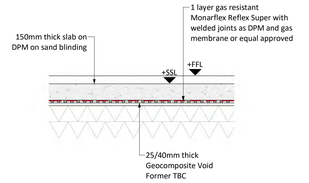
GF Ground Floor Slab Plan
1 : 100

Ground Floor Slab Key

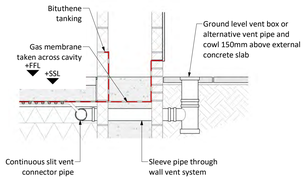
Denotes area of 25/40mm thick Geocomposite Void Former TBC

Slab Joint Key:

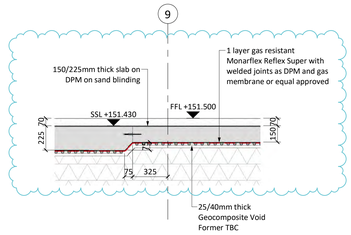
- Free Contraction Joint (FCJ)
- Isolation Joint (IJ)
- Cut Joint (CJ)
- Armoured Edge Joint (AEJ)



V1 Section Through Venting Geogrid
1 : 20



V2 Section Through Geogrid External Vent
1 : 20



V3 Section at 150/225 Slab Deepening
1 : 20

Do Not Scale

Drawing Notes

1. For general notes refer to Adept drawings 0151 & 0152.
2. This drawing is to be read in conjunction with all Architect's drawings from which all setting out details, dimensions, levels & waterproofing should be confirmed.
3. The Contractor is to check all drawings and report any discrepancies immediately.
4. All work is to be carried out in accordance with current edition of The Building Regulations and to the satisfaction of the Local Authority Building Inspector.
5. The symbols represented on Adept drawings should be read in conjunction with BS8541-2.
6. DPM and insulation to architects details.
7. All levels are in metres to ordnance datum.
8. Ground gas protection measures in accordance with BS8485:2019 to the below CS4 ground protection scores [TBC pending testing].
   - 150mm Slab, Type D = 3.5 pts
   - 225mm Slab, Type C = 4.5 pts
9. All gas protection details indicative and to be designed by a specialist.

Date	Description	By	Chk	Rev
06.02.26	Floor slab joints added	GJH	VM	P6
03.02.26	RWPs added and slab level updated to suit revised finishes	GJH	VM	P5
15.01.26	Slab thickened between grids 9-11, gas venting system added	GJH	VM	P4
12.12.25	Pop up locations added	GJH	VM	P3
08.12.25	Grid 10-11 floor area extended, gable columns added, steelwork and grids updated to suit	GJH	VM	P2
14.11.25	Initial issue	GJH	VM	P1

ADEPT
Web www.adeptcsce.com
Email inbox@adeptcsce.com
Tel 0113 239 4518
Office 1912 Mill, Sunny Bank Mills, Farsley, Leeds LS28 5UJ

Project
Proposed Retail Unit
Birstall, Bankwood Way

Title
Ground Floor Slab Layout

Client
Cookridge Estates

Scale @ A0	Initial author	Initial checker	Approver	Initial Date
As indicated	JW	VM	GS	Nov. '25

Status	Purpose	Adept Project Number
S2	Preliminary	00.20321

Project-Originator-Functional Breakdown-Spatial Breakdown-Form-Discipline-Number: 00.20321-ACE-ZZ-00-D-S-4010 | Rev: P6

Preliminary Drawing
This is a preliminary drawing to provide high level design intent. All sizes, setting out, and details are subject to change following further design and coordination within the design team.
DRAWING NOT TO BE USED FOR CONSTRUCTION.

NOTE: TEMPORARY WORKS MAY BE REQUIRED TO GABION RETAINING WALLS TO AVOID UNDERPINNING DURING FOUNDATION AND DRAINAGE WORKS

Drainage shown alongside gridlines A and B is indicative and subject to site survey; final position to be confirmed

Pad foundations where service entry ducts are to be cast, to be reinforced top and bottom

Service entries

Braced Bay

Pop Up

Vegetation

Unable to Survey

Drainage Channel

Fence/Metal Hrl 1.80

FORKLIFT CHARGING BAYS

P

FN Foundation Layout

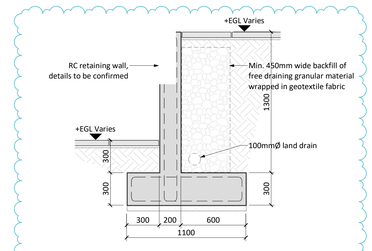
1 : 100 TOF Level +150.900 unless noted otherwise

Preliminary Drawing

This is a preliminary drawing to provide high level design intent. All sizes, setting out, and details are subject to change following further design and coordination within the design team.

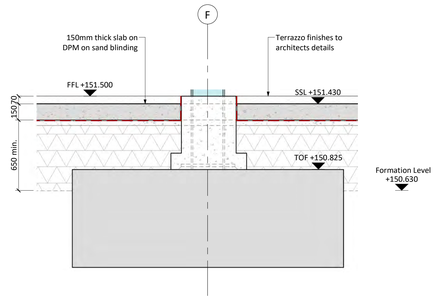
DRAWING NOT TO BE USED FOR CONSTRUCTION.

Pad Foundation Schedule					
Pad Ref	Count	Volume	Length	Width	Depth
P01	10	20.25 m³	1500	1500	900
P02	16	57.60 m³	2000	2000	900
P03	1	3.38 m³	2500	1500	900
P04	4	18.23 m³	2250	2250	900
P05	3	16.88 m³	2500	2500	900
P06	5	32.81 m³	2700	2700	900
P07	4	39.20 m³	3300	3300	900
P08	2	29.40 m³	3500	3500	1200
Grand total: 45	45	217.73 m³			



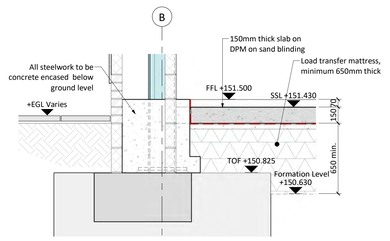
R1 Section at External Retaining Wall

1 : 20



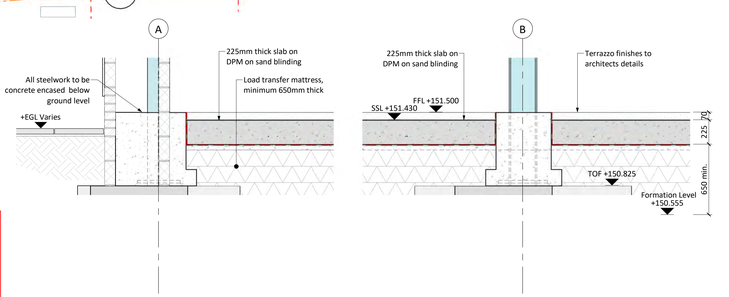
F1 Typical Internal Pad Footing

1 : 20



F2 Typical External Pad Footing

1 : 20



F3 Typical Foundations At Extended

1 : 20

Do Not Scale

Drawing Notes

1. For general notes refer to Adept drawings 0151 & 0152.
2. This drawing is to be read in conjunction with all Architect's drawings from which all setting out details, dimensions, levels & waterproofing should be confirmed.
3. The Contractor is to check all drawings and report any discrepancies immediately.
4. All work is to be carried out in accordance with current edition of The Building Regulations and to the satisfaction of the Local Authority Building Inspector.
5. The symbols represented on Adept drawings should be read in conjunction with BS8541-2.
6. All levels are in metres to ordnance datum.
7. All excavations to be inspected on site by engineer/ building control officer before placing concrete.
8. All columns to be encased below ground level with min. 100mm mass concrete.
9. All concrete pad foundations to be positioned centrally on grid/under column U.N.O.
10. All concrete strip footings/ground beams to be positioned centrally under wall construction over unless noted otherwise.
11. All pad foundations in braced bays to have 1 layer A393 mesh in top.
12. All pad foundations where service entry ducts are to be cast within to have reinforced cage.
13. Installed drainage survey provided by SDS overlaid on foundation plan, final drainage design pending confirmation of siphonic pop-up locations and surveyed foul water levels.

Provisional estimates of reinforcement provided are subject to change until construction stage reinforcement and detailing issued:-

R.C. pad footings & strip footings: 75kg/m³

R.C. retaining walls: 110kg/m³

Date	Description	By	Chk	Rev
06.02.26	Retaining wall to external yard added	GJH	VM	P8
03.02.26	RWPs added and slab level updated to suit revised finishes	GJH	VM	P7
15.01.26	Site layout and drainage added, notes added	GJH	VM	P6
12.12.25	Door frame added to grid 10	GJH	VM	P5
08.12.25	Columns added to gable ends, footings updated to suit, sections added	GJH	VM	P4
26.11.25	Grid 10-11 floor area extended	GJH	VM	P3
20.11.25	Pad sizes reviewed, strips reduced to suit wall setting out	GJH	VM	P2
14.11.25	Initial issue	GJH	VM	P1

ADEPT

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Tel 0113 239 4518

Office 1912 Mill, Sunny Bank Mills, Farsley, Leeds LS28 5UJ

Project
Proposed Retail Unit
Birstall, Bankwood Way

Title
Foundation Plan

Client
Cookridge Estates

Scale @ A0	Initial author	Initial checker	Approver	Initial Date
As indicated	JW	VM	GS	Nov. '25

Status	Purpose	Adept Project Number
S2	Preliminary	00.20321

Project-Originator-Functional Breakdown-Spatial Breakdown-Form-Discipline-Number: 00.20321-ACE-ZZ-FN-D-S-4000 | Rev: P8

NOTES:

GENERAL:

DO NOT SCALE, USE WRITTEN AND SITE DIMENSIONS ONLY. ALL DIMENSIONS TO BE TAKEN ON SITE PRIOR TO MANUFACTURE OF ANY ELEMENT OR COMPONANT. ALL WORKS TO BE IN ACCORDANCE WITH ALL CURRENT EDITIONS AND RELEANT CLAUSES OF BUILDING REGULATIONS, BRITISH STANDARDS, CODES OF PRACTICE AND HSE DIRECTIVES EVEN IF UNSTATED. ALL PIPES, DRAINS, CABLE, DUCTS, SERVICES, ETC TO BE ACCURATLY LOCATED ON SITE . MATERIALS SHOULD COMPLY WITH APPROPRIATE BRITISH STANDARDS OR BBA AGREEMENT CERTIFICATES.

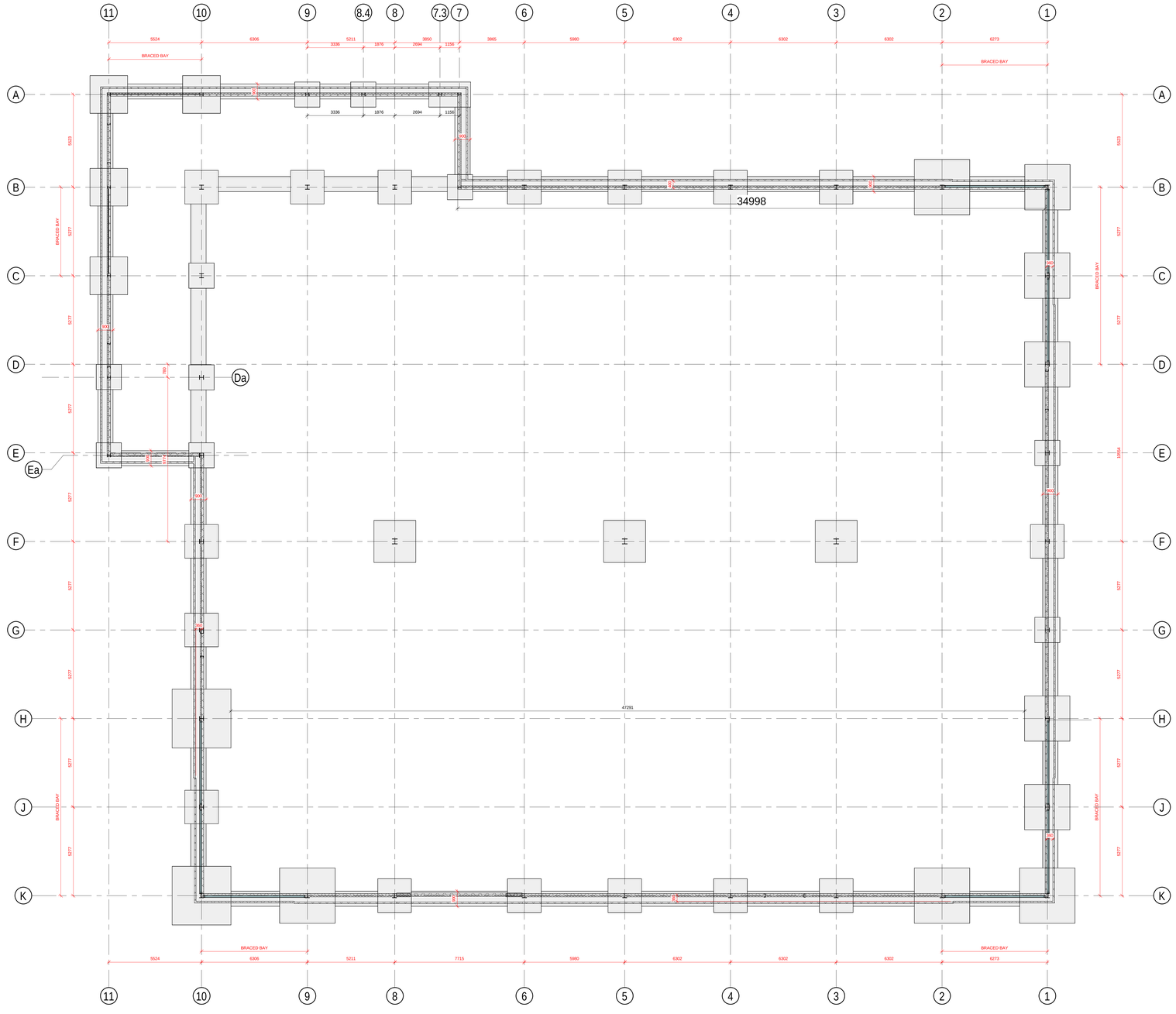
SUBSTRUCTURE DRAWING BASED ON FOLLOWING DRAWINGS BY ADEPT ENGINEERS:

00.20321-ACE-ZZ-FN-D-S-4000-P6-Foundation Plan
00.20321-ACE-ZZ-00-D-S-4010-P4-Ground Floor Slab Layout

Do not scale this drawing.
Architects are to be notified of any discrepancies.
Contractors must check all dimensions on site.
This drawing is subject to copyright laws and is for use on this project only.
It must not be loaned, copied or passed to a third person as titled only.
For other information refer to the latest revision of any cross referenced drawings.
To be read in conjunction with relevant design standards/protocols

This is a colour drawing. In order to ensure any subsequent reproduction is viewed correctly it should be printed in full colour.

1 0 1 2 3 4 5
SCALE 1:100 m



Rev	Description	Date	Drn	Ckd
P4	UPDATED FOR TENDER	16.01.26	MWC	NP
P3	WALLS AMENDED	24.10.25	MWC	NP
P2	DIMS ADDED	24.10.25	MWC	NP
P1	FIRST ISSUE	23.10.25	MWC	NP

Status
TECHNICAL DESIGN

SMR
SMALLEY MARSEY RISPIN
ARCHITECTS
The Exchange Station Parade Harrogate HG1 1TS
01423 707 757 admin@smrarchitects.co.uk

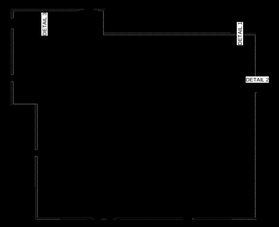
Project
BIRSTALL, BANKWOOD WAY

Client
COOKRIDGE

Drawing Title
GA SUB STRUCTURE PLAN - RETAIL UNIT

Proj Ref	Origin	Zone	Level	Type	Role	Num	Status	Rev
8061 -	SMR -	00 -	ZZ -	DR -	A -	3102 -	S2 -	P4

SMR Job Ref	Sheet	Scale	Drawn
8061-00-3102	A0	1 : 100	MWC





DETAIL 1
1 : 20

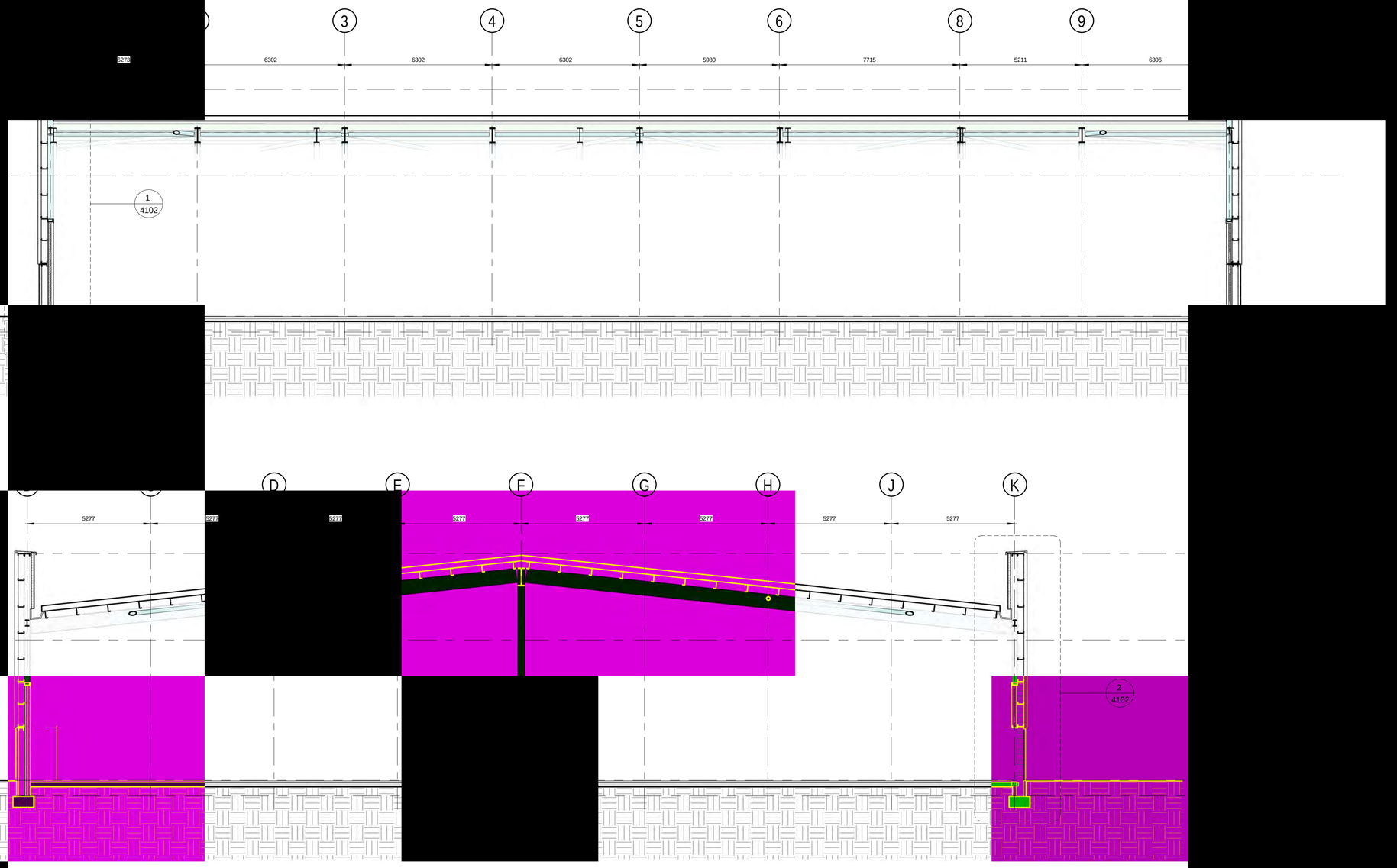
DETAIL 2
20

DETAIL 3
1 : 20

50C 0 50C 40C 20C 30C 100C
SCALE 1:20 @A1

SMR
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07423 707 757 admin@smrarchitects.co.uk

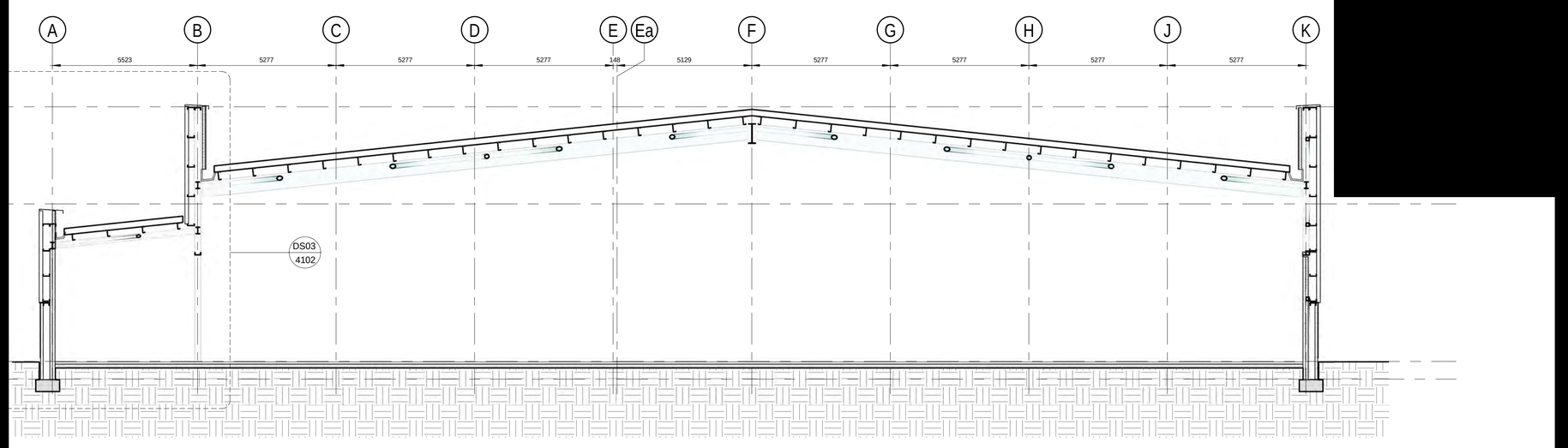
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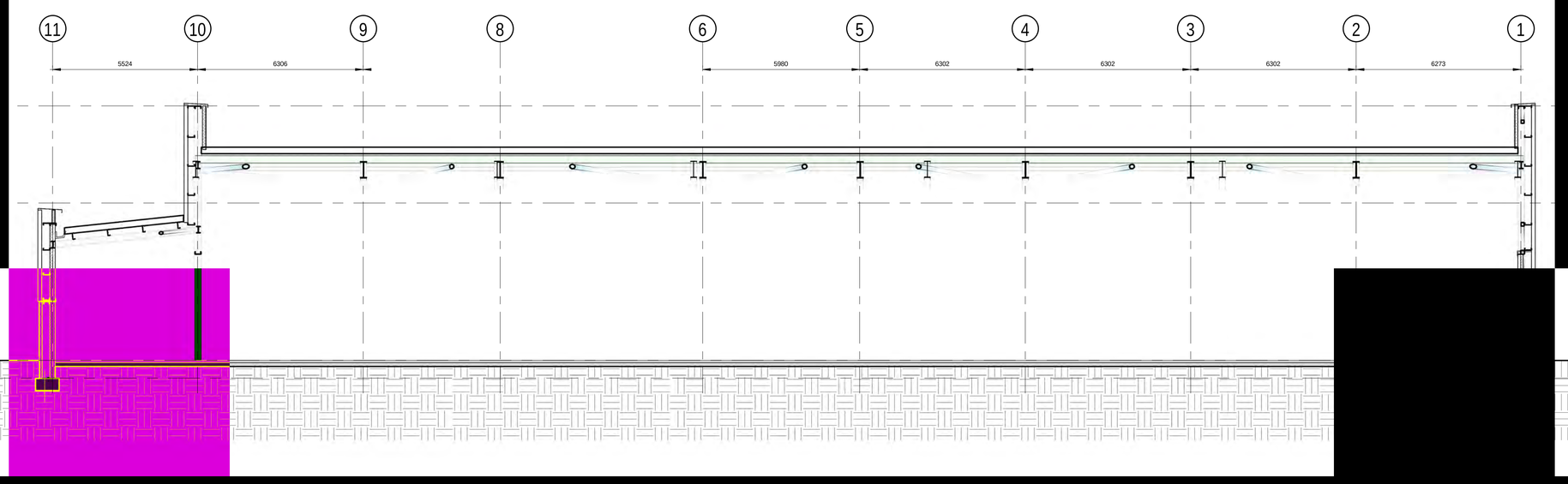


SECTION B-B

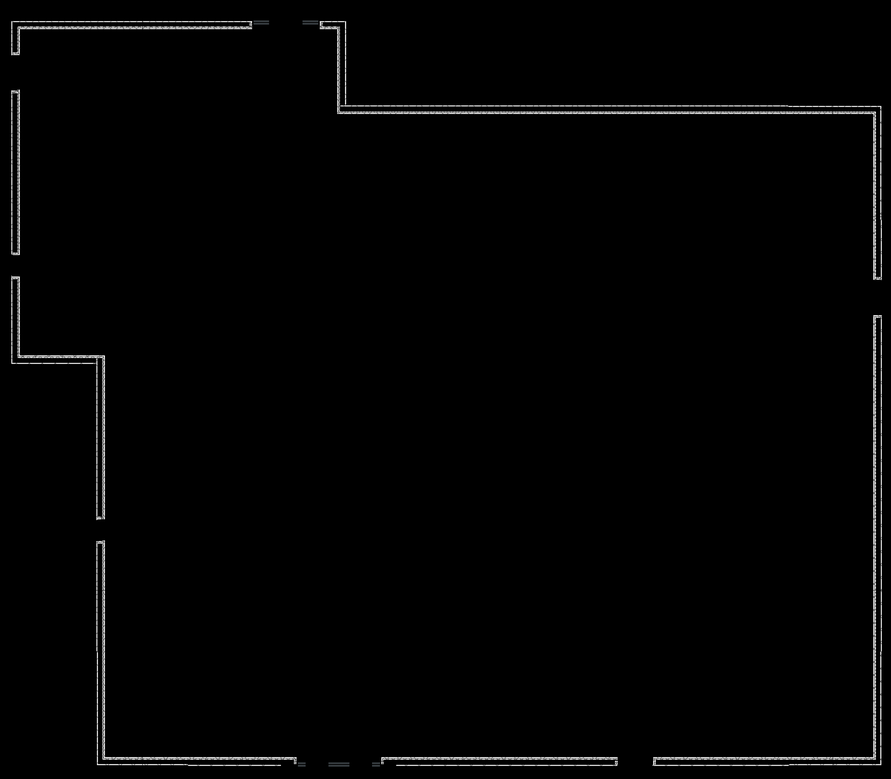
1 : 100

SECTION C-C





SECTION A-A



SMR
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The Exchange Station Parade Harrogate HG1 1TS
01423 707 757
admin@smrarchitects.co.uk

Protech GM Super

GAS PROTECTION

• HIGH RISK CHARACTERISTIC SITES •

REGULATIONS COMPATIBILITY TABLE

	CIRIA 665 CHARACTERISTIC SITUATION 2	CIRIA 665 CHARACTERISTIC SITUATION 3-6	BS8485 CHARACTERISTIC SITUATION 2	BS8485 CHARACTERISTIC SITUATION 3-6	BRE 211 RADON	NHBC AMBER 1	NHBC AMBER 2 & RED
METHANE	✓	✓	✓	✓	N/A	✓	✓
CARBON DIOXIDE	✓	✓	✓	✓	N/A	✓	✓
RADON	N/A	N/A	N/A	N/A	✓	N/A	N/A

DESCRIPTION

Protech GM Super is a proprietary reinforced gas barrier, that incorporates a 12 micron aluminium foil layer, for maximum protection against ground-borne gases. This specifically conforms with the latest guidance documents. The membrane also provides protection from damp when placed below the slab and, therefore, there is no need to install a separate DPM.

SPECIFICATION

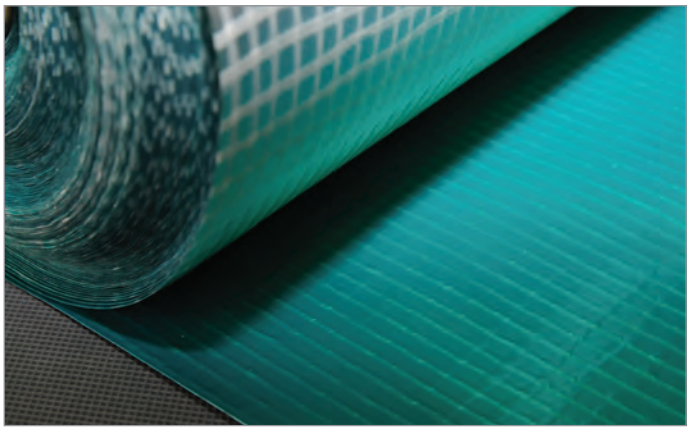
CIRIA C665, BS8485:2015 & Local Authority Ground Gas Handbook recommended that gas membranes are specified on the basis of the 'need to survive' construction, i.e. use one that is puncture and tear resistant.

Thickness should not be the main determinant of the suitability of a membrane for a particular site, although it can indirectly influence some key performance parameters.

In practise, because of the nature of construction sites, the survivability of membranes are equally important than purely permeability to gas.

Protech GM Super incorporates a reinforced grid to ensure that maximum protection is achieved when installed to manufacturers' instructions.

The need for high quality workmanship during installation should not be under-estimated. The health and safety of the occupants of the building is dependent on its satisfactory performance. If installed incorrectly or damaged during the construction process, the membrane is rendered ineffective and will fail to provide adequate protection against the ingress of ground gas or vapours.



TYPICAL PROPERTIES BS EN 13967:2012	
Roll Length	50m
Width	2m
Weight	370g/m^2
Thickness	0.4mm
Colour	Green / Silver
Methane Permeability (ISO 15105-1)	≤ 0.1 ml/day/m^2

REQUIRED ACCESSORIES

- Protech GM Super Starter Band (1m x 50m)
- Protech GM Tape
- Protech GM Tophats
- Protech SAGM (Self Adhesive Gas Membrane)
- Protech GM Flashing Strip
- Protech GM Super Corner Units
- Protech GM Primer
- Protech GM 3mm Protection Board
- Protech GM Protection Fleece
- Protech 125

VENTING

On sites where venting is required, our Provoid Venting System should be used. We can provide design advice for both passive and active venting systems to suit individual site requirements.

Protech SAGM

GAS PROTECTION

DESCRIPTION

Protech SAGM is a self adhesive gas and waterproofing membrane for use in detailing and vertical installation applications.



APPLICATIONS

Protech SAGM can be used on any site where Carbon Dioxide, Radon or Methane is present. Methane will occur on any construction, on any sites previously used for landfill. Such conditions can exist on household, commercial and industrial sites. Protech SAGM is optimal for detailing work around awkward penetrations and finishes. It is suitable for vertical, horizontal, stepped and cavity applications, however care should be taken when applying to porous materials that Protech GM Primer be used first.

USAGE

Protech SAGM should be installed in accordance with manufacturers instructions. Protech SAGM consists of an aluminium/polythene laminate coated on one surface, and a bitumen-polymer adhesive compound.

METHOD

Protech SAGM has a removal silicone coated paper on the lower side. Release liner should only be removed at the time of use. SAGM installation must not be carried out below 5°C and some warming with a hot air gun may be required between temperatures of 5 and 10°C to ensure a satisfactory seal. Ensure exact positioning prior to removal of the release film, as product will adhere instantly and any repositioning may compromise the adhesive properties.

STORAGE & HANDLING

The product should be stored out of direct sunlight, and should avoid strong acids, alkalis and oxidising agents.

BGA British Geomembrane Association

Protech SAGM

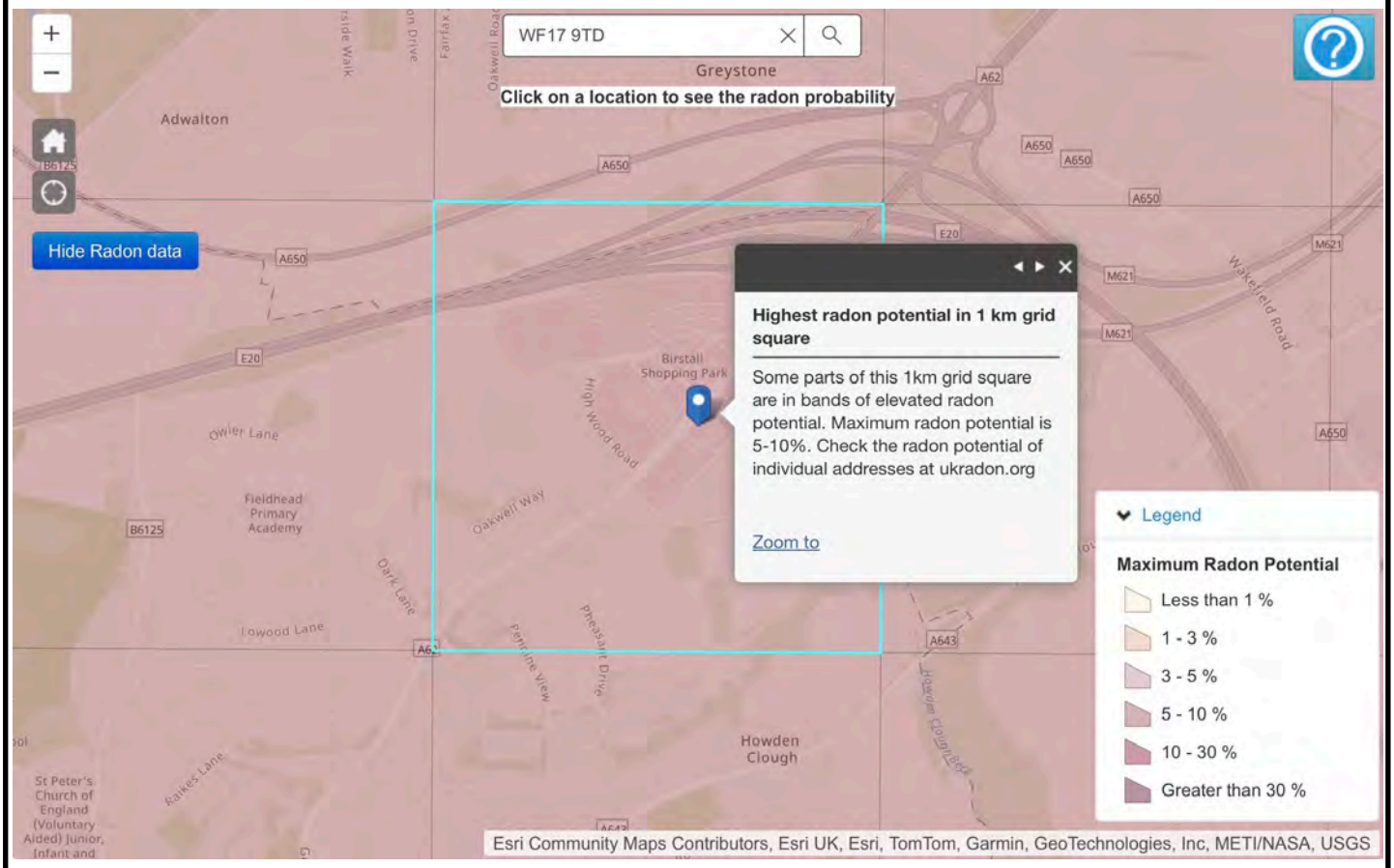
TYPICAL PROPERTIES		
Property	**Test Method**	**Result**
Roll Size	EN 1848-2	1.05m x 19.05m
Thickness	EN 1849-2	1.5mm
Weight	EN 1849-2	1700 g/m^2
Water tightness to liquid water	EN 1928	Pass
Resistance to Static Load	EN 12730	20kg Pass
Tensile Properties, Maximum Tensile Stress	EN 12311-2	CD ≥ 2N/mm^2 MD ≥ 2N/mm^2
Tensile Properties, Elongation at Break	EN 12311-2	CD ≥ 120% MD ≥ 120%
Durability of Watertightness against ageing	EN 1847 Method A 60 KPa	Pass
Durability of Watertightness against chemicals	EN 1847 Method A 60 KPa	Pass
Resistance to Impact	EN 12691	≥ 700mm
Resistance to tear (Nail Shank) CD/MD	EN 12310-1	CD ≥ 110N MD ≥ 110N
Reaction to Fire (Euro Class)	EN 13501	Class F
Joint Strength	EN 12317-2	≥ 45N
Water Vapour Transmission (Density Flow rate)	EN 1931	0.013 g/(day/m^2)
Water Vapour Transmission (Resistance factor, μ)	EN 1931	2380000 μ
Other Data		
Methane GTR	ISO 15105-1	< 10ml/m^2.day
Carbon dioxide GTR	ISO 15105-1	< 10ml/m^2.day
Radon Diffusion	-	5.0 x 10^{-14}
Roll Weight	-	33kg

Download a full Gas Protection brochure from our website...
www.proctorgroup.com

contact@proctorgroup.com | +44 (0) 1250 872261

GeoShield Verification Plan

RADON MAPS UK - (Map 1) Site Location



Maximum Radon Potential:	5-10%
Description:	Basic radon protection measures required.
Postcode:	WF17 9TD

GeoShield Verification Plan

CLIENT DETAILS

CLIENT CONTACT:	Jonathan Smith
CONTACTS ROLE:	
MOBILE PHONE:	07557 869 035
EMAIL ADDRESS:	Jonathan@pageo.co.uk

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

GeoShield Verification Plan

APPLICATOR'S DETAILS

APPLICATOR NAME: TBC

COMPANY: PAGeo Contracting Ltd

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME: TBC

COMPANY: PAGeo Contracting Ltd

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES: At least one member of each team group will have an NVQ Level 2

qualification in the gas membrane installation.

All installers are competent and skilled to complete gas membrane

installation.

GeoShield Verification Plan

APPLICATOR'S DETAILS

TRAINING LEVEL:

SPECIALIST CONTRACTOR:	YES	✔		NO			
NVQ LEVEL 2:	YES	✔		NO			
NVQ LEVEL 4:	YES			NO		✔	
COMPETENT APPLICATOR :	YES	✔		NO			

REASON FOR VISIT:

DURING INSTALLATION:	✔	UNDERSLAB VENTILATION	
PRE - POUR:		DPC MEMBRANE CONNECTION	
TESTING:	✔	OTHER (PLEASE SPECIFY):	

NOTES: See method statement for breakdown of site visits.

NOTES: Having worked with PAGeoContracting Ltd on numerous successful projects, these applicators will be deemed to be at an appropriate skill level for the job of installing the ground gas protection measures.

GeoShield Verification Plan

HEALTH AND SAFETY

INDUCTION:	YES		NO:	✔
INDUCTION TIME:				

CSCS CARD:	YES	✔	NO:	
CSCS CARD NUMBER:	5369294			

METHOD STATEMENT:	YES	✔	NO:	
RISK ASSESSMENT:	YES	✔	NO:	
COSHH:	YES	✔	NO:	

SITE SPECIFIC HAZARDS: Materials falling from height

Slips, trips and falls

Excavations

Confined spaces

Plant

GeoShield Verification Plan

In accordance with guidance from CIRIA C735 & CIRIA C748.

Radon gas protection measures specify to the guidance from the BR 211 document:

VOC/Hydrocarbons	☐
RADON BASIC	☑
RADON FULL	☐

Characteristic Specification (CS) Rating	CS2
Building Type:	TYPE C
Points Required Under BS 8485:2015+A1:2019	2.5 POINTS

POINTS GAINED FROM BS 8485:2015+A1:2019

Score for Structural Barrier:	0.5 POINTS
Grade 2 Basement:	N/A
Grade 3 Basement:	N/A
Score for Venting:	N/A
Car Park:	N/A
Score for Membrane:	2.0 POINTS
Points Achieved Under BS 8485:2015+A1:2019	2.5 POINTS

GeoShield Verification Plan

TESTING

VISUAL: PICK & PROBE/MECHANICAL POINT STRESS TEST:	✔
NON-DESTRUCTIVE COMPRESSED AIR LANCE TEST:	✔
NON-DESTRUCTIVE SMOKE TEST:	
DESTRUCTIVE JOINT TESTING:	
NON-DESTRUCTIVE TRACER GAS TESTING:	
DIELECTRIC POROSITY TEST:	
PUMP TEST FOR "Twinny" WELD	

NOTES: From the risk assessment, GeoShield will initially conduct a visual

NOTES: and pick and probe testing regime for this project.

NOTES: Air lance testing with be conducted to test the installed membrane in

NOTES: accordance with CIRIA C735.

NOTES:

NOTES: Only if the application falls below the accepted standard will other testing

NOTES: be used.

GeoShield Verification Plan

VERIFICATION REPORT

These items will be included in the report

NUMBER 1	GAS MEMBRANE SPECIFICATION
NUMBER 2	ELEMENTS OF THE GAS MEMBRANE
NUMBER 3	DATE, TIME and WEATHER CONDITIONS
NUMBER 4	PLANS and DETAILS ISSUED
NUMBER 5	INSTALLATION PHOTO'S RELATING TO GRID LINES
NUMBER 6	REPORTING DEFECTS AND LOGGING IN REMEDIATION LOG
NUMBER 7	AREAS OF LIMITATION (areas unable to inspect)
NUMBER 8	LOGGING AND REPORTING RESULTS OF TESTING

VERIFICATION REPORT ISSUE

HARD COPY:	YES	✔	NO		EMAIL:	YES	✔	NO	
DROP BOX LINK:	YES	✔	NO		FLASH DRIVE:	YES		NO	✔

GeoShield Verification Plan

GEOSHIELD COMPETENCE

>GeoShield was founded in 2015

>GeoShield solely verifies, they are fully independent of installers, manufacturers and geotechnical companies.

>GeoShield follow guidance in CIRIA C735 (sufficient experience, membership of relevant professional organisations) GeoShield are members of the BVC, BGA, ERA, The RADON Council, and UKRA

>Currently GeoShield hold the Chairmanship of the British Verification Council

>Two employees are NSAC Level 3 assessors for the NVQ 2 Gas Membrane install

>GeoShield were key in forming the NVQ 4 Verification qualification in which 2 Verification officers are undertaking this qualification

>GeoShield have the only qualified assessor for the NVQ 4 Verification qualification

>GeoShield Verification officers currently keep up to date CPD's

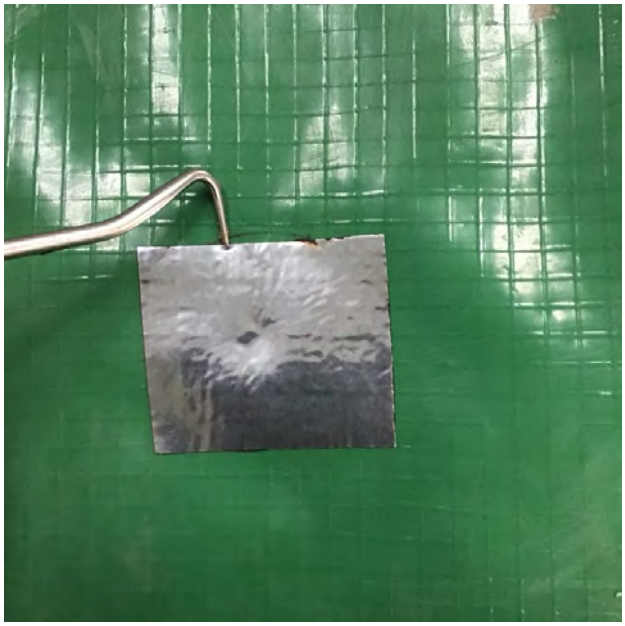
>All GeoShield Verification Officers have a full understanding of gas membrane install including 3 experienced (NVQ 2) installers in the GeoShield team

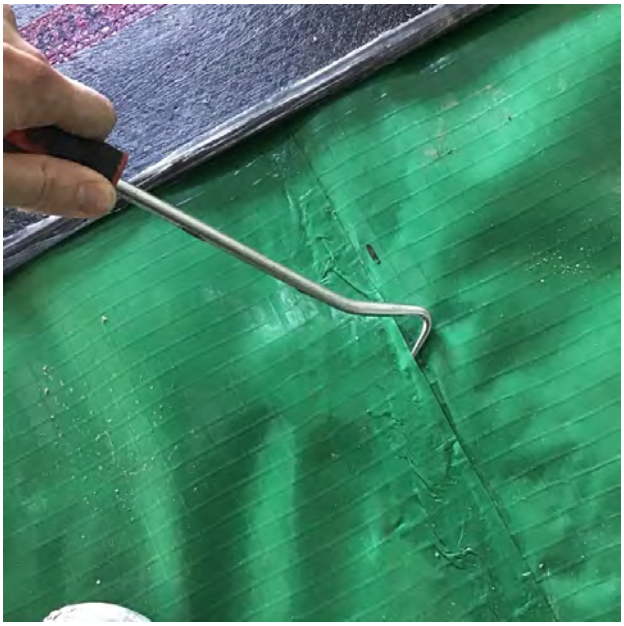
>GeoShield Verification Officers are all independent carrying there own air compressors. Other testing equipment GeoShield have access to are 2 x Buckley Dielectric Testing machines and also inert gas testing equipment

GeoShield Verification Plan

SPECIFICATION

Mechanical Point Stress/ ‘Pick and Probe’ Testing





CIRIA C735

4.3.2 - Mechanical point stress tests involve running a blunt instrument (e.g. a screwdriver) along the edge of a seam to identify any unbonded seams. This method is not as effective as air lancing but it can be especially useful in hard to reach areas where it is not possible to air lance.

The instrument used should not puncture the gas membrane. This method is less appropriate for materials that are easily punctured where an air lance test is more suitable (although if a gas membrane can be easily punctured its suitability as a membrane is open to question).

GeoShield Verification Plan

SPECIFICATION

Air Lance Testing





CIRIA C735

4.3.3 - Air lance testing identifies unbonded areas of seam by directing a high pressure jet of air at the seam. The air is at a minimum pressure of 345kPa via a 4.8mm nozzle and is located no more than 50mm from the seam being tested.

In order to achieve the requirements of ASTM D4437-08:2013 bespoke specialist equipment is required to maintain the required pressure.

GeoShield Verification Plan

RISK ASSESSMENT

SITE SPECIFIC CIRCUMSTANCES	1	2	3	4	5
Complexity of Design			✔		
Repetition of design		✔			
Experience of workforce		✔			
Gas regime			✔		
Project management experience			✔		
Installation conditions (exposed?)			✔		
Robust Project specific gas design		✔			

TYPE OF RISK	RANGE	RISK
High Risk	23 - 30	
Medium High Risk	19 - 22	
Medium Risk	15 - 18	18
Medium Low Risk	11 - 14	
Low Risk	0 - 10	

GeoShield have classed this project as a medium risk.

GeoShield will lay all perimeters down for standards at the pre-verification meeting to

assist both the installer and the main contractor.

GeoShield Verification Plan

TESTING PROCEDURE

Method Statement - Pipe Penetrations and Service Entries Notice Signs





GeoShield Notice Signs

During testing on site, notice signs will be tied to all service entries which will be sealed internally at a later date.

Verification to the internal sealing of ducts will be carried out at a later stage in the project and will be kept separate to initial certificates.

Main contractor to contact GeoShield on completion for inspection.

GeoShield Verification Plan

TESTING PROCEDURE

Method Statement - Membrane Sticker Notice Signs





GeoShield Notice Signs -

During testing on site, areas cannot be passed unless verification stickers have been applied, once remediations have been successfully carried out.

GeoShield Verification Plan

METHOD STATEMENT - Page 1

EXPECTED VISITS:-	1 site visit is expected in line with the proposed build programme, additional visits may be considered (if required) to achieve sign off.
TESTING:-	Mechanical Point Stress (Pick & Probe) testing on welded areas. Air lance testing with be carried out (as per CIRIA C735 Annex 1, Table A3). Only if the application falls below the accepted standard will other testing be used. This project will NOT achieve sign off for gas membrane installation unless independent verification is carried out.
PURPOSE:-	GeoShield are 3rd party gas membrane verifiers in accordance with CIRIA C735 and for this project to be compliant with BS8485, the gas system must meet certain criteria from the document to achieve mitigation of score for verification. The chosen membrane must be verified by GeoShield to ensure the materials have been installed in accordance with the manufacturer's specification.
REPORTING:-	Each site visit be accompanied with a written and electronic report. Any remediations either completed on the visit or outstanding will be recorded and logged, sign off will not be achieved for each section area until all remediations has been completed. This will be fully recorded at all times.

GeoShield Verification Plan

METHOD STATEMENT - Page 2

GROUND GAS RISK:-	From the Ground Gas Assessment,

this project has been classified as Type C building and a CS2

rating in accordance with BS 8485:2015+A1:2019, so this project will require a

minimum score of 2.5 points for mitigation with basic radon protection.

This will be achieved by 3rd party verification of the Gas protection membrane

Installation and reinforced concrete GB slab, where applicable to the site

specific design. A combination of which will achieve the necessary requirements.

GAS MEMBRANE PROTECTION:-	It is advised that the substrate should be prepared

by removal of loose stone and debris. Other forms of protection could be in the

form of either a protection board, geotextile fleece and insulation. In addition, labels

will be issued by GeoShield to restrict access to the installed area by follow on

trades and help raise awareness to encourage a better duty of care. This will help

to reduce the risk of potential damage caused to the gas membrane system.

FINAL:-	GeoShield will liaise with the projects site supervision and all relevant

parties prior to the installation start. This plan will be presented and reviewed, all

points made clear as previously stated. Any alterations will be listed at the end of

this plan as an all party agreed way forward.

GeoShield Verification Plan

SUBSTRATE METHOD STATEMENT

SUBSTRATE TYPE:

Block and Beam Construction	Yes		No	✔			
Minimum Preparation	Swept Clear	Yes		No	✔		
Minimum Preparation	Vacuuming	Yes		No	✔		
Minimum Preparation	Compressed air to remove	Yes		No	✔		
Minimum Preparation	Remove Mortar Droppings	Yes		No	✔		
Stone Substrate		Yes	✔	No			
Minimum Preparation	Minimum 25mm Sand Blinding	Yes		No	✔		
Minimum Preparation	Limestone Dust	Yes		No	✔		
Minimum Preparation	Compacted Substrate	Yes	✔	No			
Minimum Preparation	No large stones	Yes	✔	No			
Concrete Substrate		Yes		No	✔		
Minimum Preparation	No Hollows	Yes		No	✔		
Minimum Preparation	Troweled Surface	Yes		No	✔		
Remarks:							

GeoShield Verification Plan

PRE-CONTRACT MEETING

Items for discussion at the Pre-Contract meeting	
>Induction Procedure	
>Identification of installation team and point of contact	
>Identification of Project management team	
>Identification of Sub-Contractors associated with membrane installation	
>Validation of Membrane and design specification	
>Verification procedure	
>Notifications for Verification	
>Preparation of substrate	
>Program of works	
>Utility entry	
>Protection of Membrane	
>Remediation Procedure	
>Testing Procedures	
>Sign off Procedure	
>Installer PI	

All information is assumed correct at time of issue.

DATE:	

GeoShield Verification Plan

PRE-CONTRACT MEETING SUMMARY

A pro-forma quality assurance document will be discussed during the Pre-Verification

meeting and training undertaken with the management team for non verified areas.

The Pre-Verification meeting will be led by GeoShield and should include all relevant

parties who have an impact on the installation and future protection. GeoShield will

provide guidance and strategy for all parties.

The site specific checklist will be covered as well as the risk assessment.

This site has been classified as CS2 with basic radon protection.

Any design alterations will be discussed and included in a revised Pre-Verification Plan.

Any specification changes must also be included in a revised Pre-Verification Plan.

All items will be minuted by the GeoShield representative.

This Pre-Verification plan follows all current guidance and the aim is to make all parties

aware of the ramifications of poor installation and their responsibilities if they damage

the membrane.

GeoShield

BR211 Quality Management Rcord

Design		Allocate contractual responsibility	Accountable party
Radon search	Carry out a radon search via www.ukradon.org to establish what level of protection is required.	Client/ Designer	
Drawings	Establish the location of the Radon Barrier in conjunction with the building design (section 5). Ensure there is continuity of the barrier across the full footprint of the building. With full radon protection, identify the location of sumps and their exhaust outlets or underfloor vents (ensuring adequate numbers on at least two faces of the building to ensure a cross flow of air). Liaise with building control.	Designer	
Specification	Specify appropriate materials (section 6), check with manufacturers and suppliers that components, materials and sealants are compatible with each other and are suitable for use as a radon barrier. Consider using accredited installers particularly for more complex projects, determine the inspection regime and on-site quality management (section 7).	Designer	
Buildability	Consider buildability and the order of construction/inspection necessary to achieve a continuous barrier.	Construction/ Design Team	
	Construction		
Schedule of work and Pre-Inspection Planning	A risk-based approach is recommended, via Pre-Inspection Planning, which would consider various elements that could affect the installation and performance of the radon protection system including the complexity of the installation, the competency of the application team and influences of adjacent and follow-on trades.	Construction Design Team / Inspector	GeoShield
Procurement of materials and installers	Ensure that materials purchased match the requirements set in the project specification. Reduced specification is likely to result in reduced protection. Consider using accredited installers particularly for more complex projects.	Contractor/ Inspector	GeoShield
Weather conditions	Avoid installation of barriers in wet, windy or cold weather. Minimise the length of time that the barrier is exposed to the weather. It is easier to lay a barrier internally just before laying a protective layer such as a floor topping. Weather conditions to be recorded.	Contractor/ Inspector	
Barriers through walls	Ensure cavity trays are installed with an adequate step to prevent damp penetration, all joints in the tray and where it abuts the main floor barrier are, sealed, and, weepholes and cavities are clean. An installation inspection record is required.	Designer/ Inspector	
Barriers within floors	Check that the membrane is laid on a smooth level surface (typically blinding or insulation), all joints in the membrane and where it abuts barriers through walls are sealed, and all penetrations for services or structural members are fully sealed. An installation inspection record is required	Inspector	GeoShield
Sumps	Ensure that sumps are correctly located and assembled, that exhaust pipework is not damaged and exits the building away from doors, windows and vents, and is suitably labelled. An installation inspection record is required	Inspector	N/A Basic Measures
Underfloor ventilation	Check that sufficient underfloor vents have been installed as required, and that they are clear. An installation inspection record is required	Inspector	N/A Basic Measures
Prior to covering up	Protect the completed barrier and inspect for damage, repairing as necessary immediately prior to covering up with later construction. An installation inspection record is required.	Inspector	GeoShield

GeoShield

BR211 Quality Management Rcord

Completion	Allocate contractual responsibility	Allocate contractual responsibility	Accountable party
Prior to Handover	Check that the exhaust outlet from the sump is labelled and the outlet and/ or underfloor vents have not been covered up by landscaping works. An installation inspector record is required.	Installer / Inspector	
Handover to purchaser	Provide a report explaining the level of Radon protection provided, see 'information to be provided to the purchaser' section. This report should include a completed Radon Protective Measures Quality Management Record and documented evidence of the installation inspection	House Builder	
Radon Monitoring	It is recommended by the UK Health Security Agency (HSA) that any new building should be subject to an appropriate test during the first year of occupation. The proposed dates for radon testing to commence should be included in the handover document.	Occupier	

GeoShield are responsible for carrying out activities assigned to them as per the above document 'BR211 quality management record'. GeoShield do not take responsibility for elements of work outside of our scope or the full build process.

GeoShield Verification Report 01

PROJECT REFERENCE:	GEO106192
PROJECT ADDRESS:	Home Bargins Bankwood Way Batley Birstall WF17 9TD
SPECIFICATION:	Verified in accordance with CIRIA C735. Design in accordance with BS 8485:2015 +A1:2019 for Methane and Carbon Dioxide. Substrate prepared in accordance with manufacturer's instructions.
MATERIAL SPECIFICATION:	Protech GM Super Gas Barrier PAG SAGR

GeoShield Verification Report

NAME OF SURVEYOR:	Nigel White
VERIFICATION COMPANY:	GeoShield Limited
COMPANY ADDRESS:	Icon Business Centre
	4100 Park Approach, Thorpe Park
	Leeds
	LS15 8GB
CONTACT NUMBER:	07584 222519
EMAIL ADDRESS:	nwhite@geoshield.co.uk

GeoShield Verification Report

CLIENT DETAILS

CLIENT CONTACT:	Andrew Wright
CONTACTS ROLE:	
MOBILE PHONE:	07900 100709
EMAIL ADDRESS:	andrew@pageo.co.uk

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

GeoShield Verification Report

APPLICATOR'S DETAILS

APPLICATOR NAME:	Mike Farrel
COMPANY:	PAgeo Contracting Ltd
APPLICATOR TEL:	
APPLICATOR EMAIL:	

APPLICATOR NAME:	
COMPANY:	
APPLICATOR TEL:	
APPLICATOR EMAIL:	

NOTES:

At least one member of each team group will have an NVQ Level 2 qualification in gas membrane installation.

All installers are deemed competent and skilled to complete the installation of gas membranes.

GeoShield Verification Report

INSPECTION AREA(S)

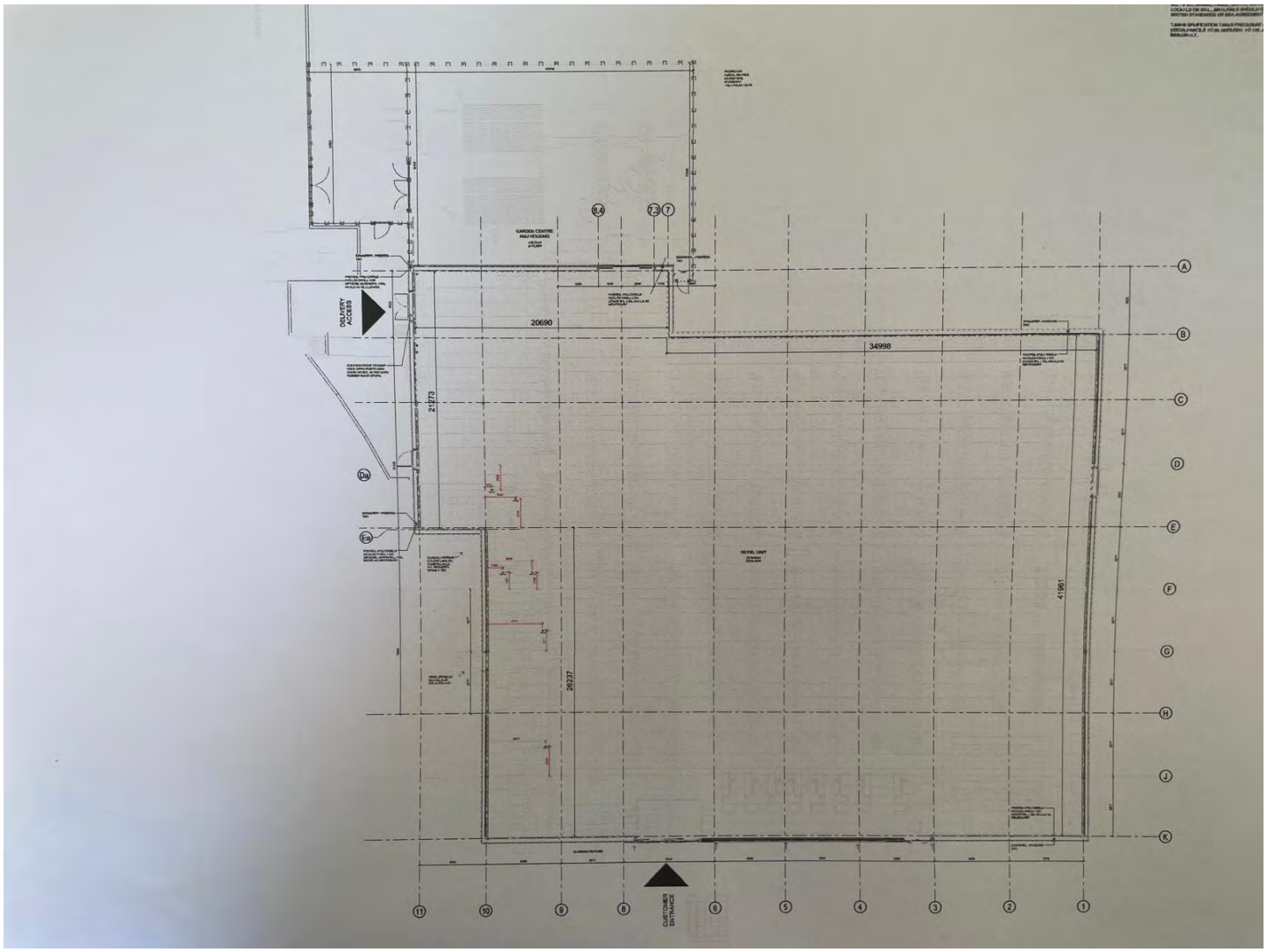
Perimeters (40%)

SITE CONDITIONS

WEATHER:	Dry
TEMPERATURE:	25ºC
TIME:	10.00 - 11.00
DATE:	19.06.2026
REPORT NUMBER:	001
ACCOMPANIED BY:	

GeoShield Verification Report

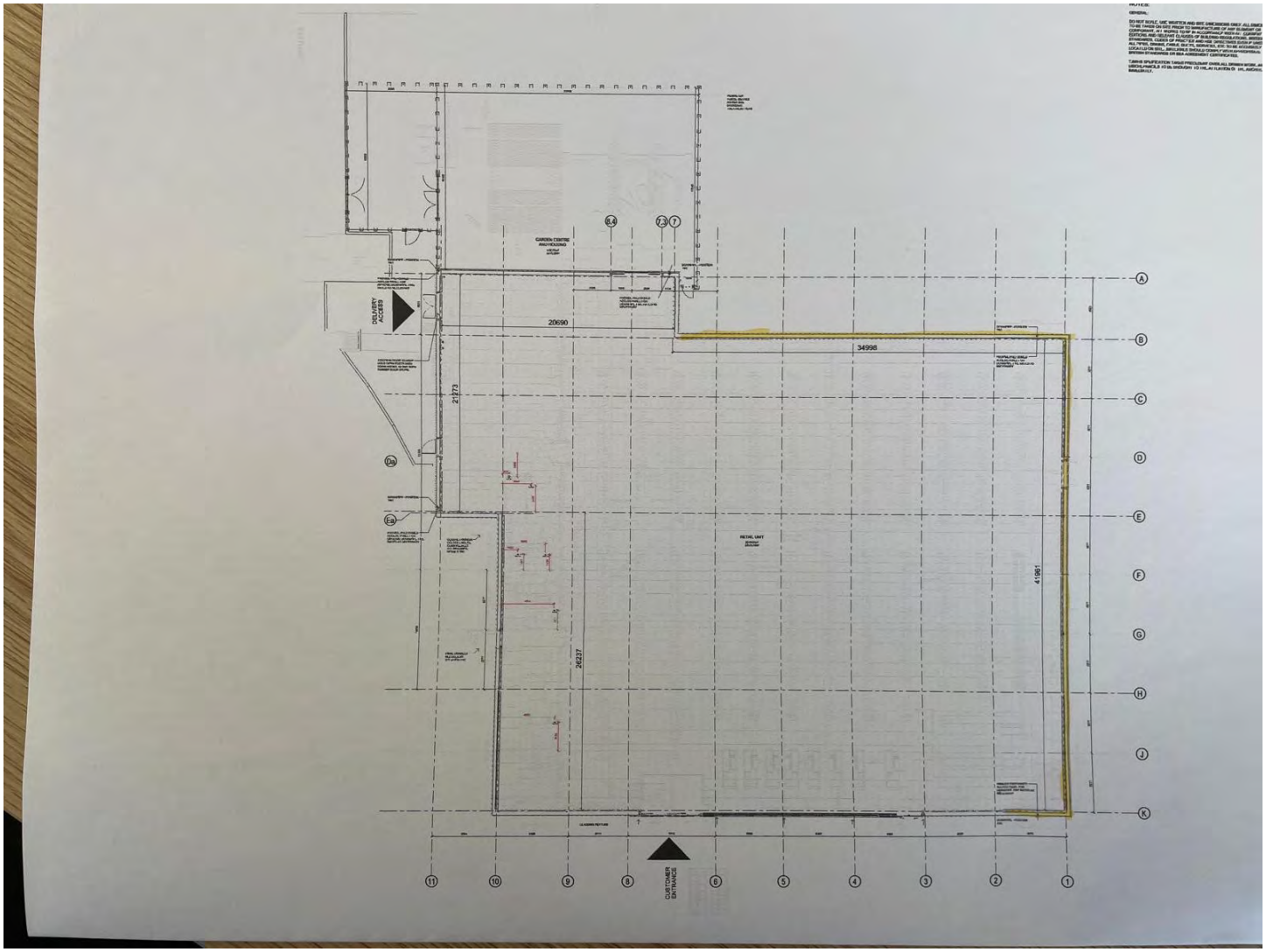
VERIFICATION LAYOUT



The photograph above shows a plan layout of the site for this project.

GeoShield Verification Report

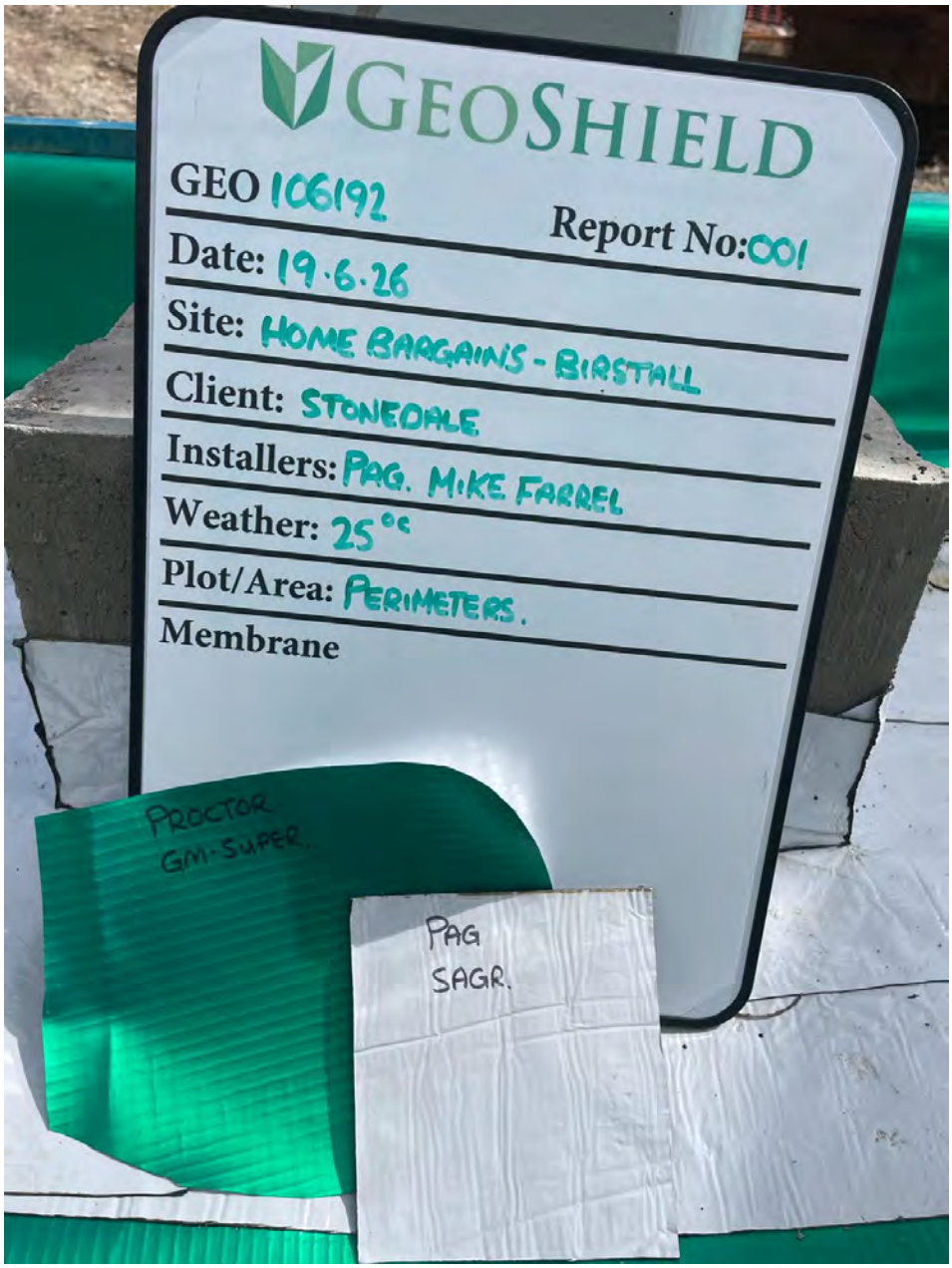
VERIFICATION LAYOUT



The photograph above shows a plan layout of the site. The area highlighted in yellow shows where the verification inspection took place on site today.

GeoShield Verification Report

Verification Inspection Information



The above photograph shows the details of the verification visit and the materials used.

GeoShield Verification Report

OVERVIEW



The photograph above displays an overview of a perimeter area where today's verification inspection took place on site.

GeoShield Verification Report

OVERVIEW



The photograph above displays an overview of a perimeter area where today's verification inspection took place on site.

GeoShield Verification Report

OVERVIEW



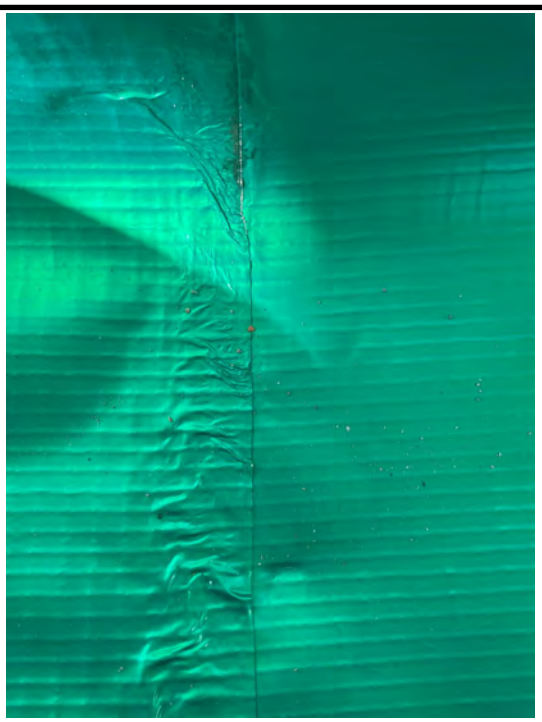
The photograph above displays an overview of a perimeter area where today's verification inspection took place on site.

GeoShield Verification Report

VERIFICATION ITEM ONE

AREA INSPECTED: Perimeters (40%)

INSPECTION DETAILS: Installation of Protech GM Super Gas Barrier



NOTES:

Protech GM Super Gas Barrier has been installed around 40% of the perimeters of the Home Bargins building. All adjacent sheets of Protech GM Super Gas Barrier have been overlapped a minimum of 100mm and heat welded using a hot air leister and silicone roller,

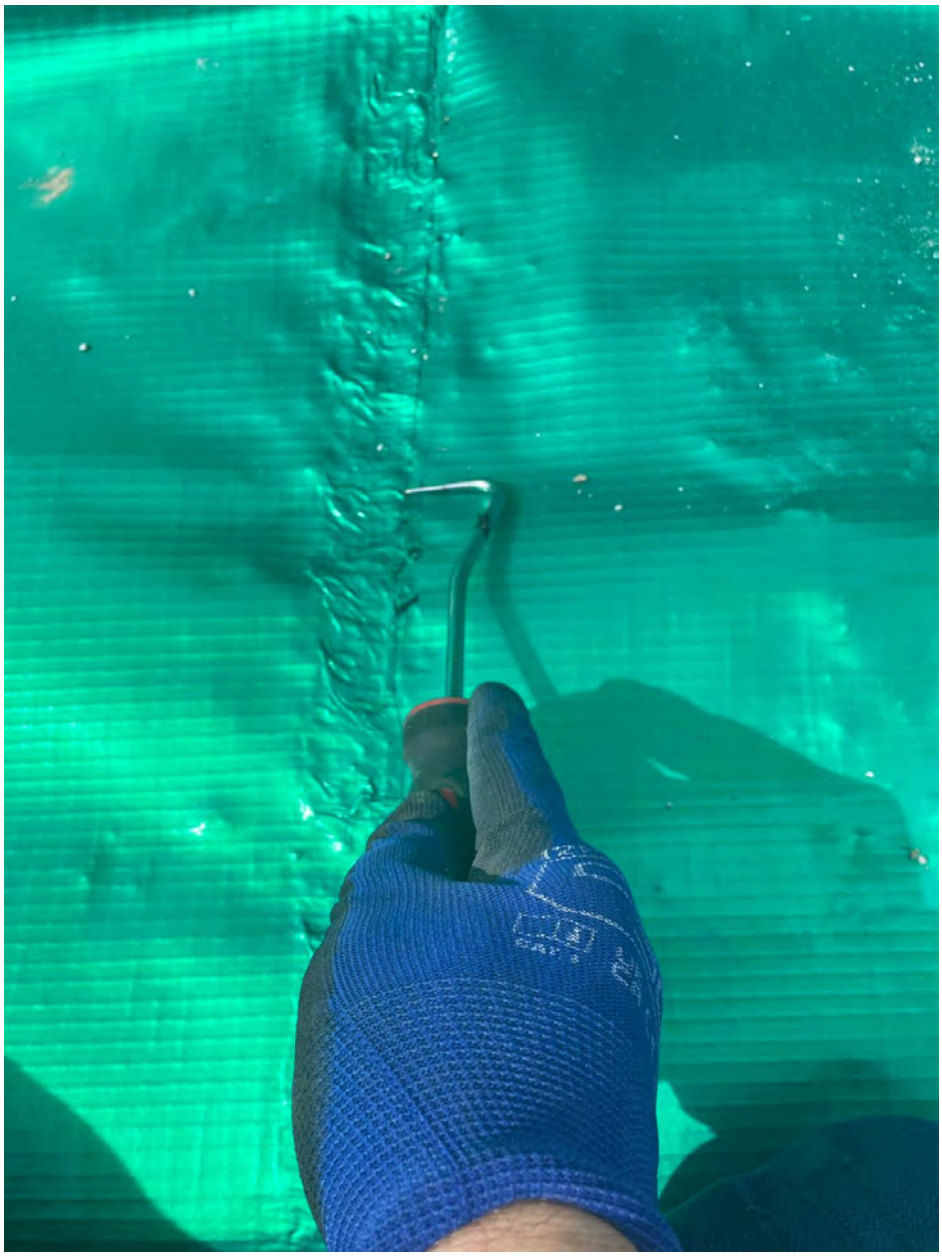


NOTES:

with firm rolled pressure applied to create a continuous seal throughout. Installed in accordance with manufacturer's specifications and design guidelines.

GeoShield Verification Report

VERIFICATION ITEM ONE



All lap joints were subjected to a thorough visual inspection, supported by a mechanical point stress test, also known as a pick and probe test which identified no faults or defects throughout the installation. Tested and verified in accordance with CIRIA C735.

GeoShield Verification Report

VERIFICATION ITEM TWO

AREA INSPECTED: Perimeters (40%)

INSPECTION DETAILS: Steel Stanchions



NOTES:

Throughout the installation of the Protech GM Super Gas Barrier to the perimeters, there were a number steel stanchions that have been sealed in accordance with manufacturer's specifications and design guidelines. This has been achieved using sheets of PAG SAGR.



NOTES:

The installers have first coated the concrete base of the steel stanchion with a primer, once this has thoroughly dried, the Protech GM Super Gas Barrier is cut tight around the base of each stanchion. Next, strips of PAG SAGR are placed around the steel stanchion and onto the Protech GM Super Gas Barrier.

GeoShield Verification Report

VERIFICATION ITEM TWO



Heat and rolled pressure is applied to activate the bitumen backing, creating a secure bond between the steel stanchion and the Protech GM Super Gas Barrier. A thorough visual inspection followed by pick and probe testing identified no faults or defects.

GeoShield Verification Report

VERIFICATION ITEM THREE



Two corners throughout the perimeters have been sealed using PAG SAGR. The membrane has been cut to minimise any voided areas and gaps across the footprint of the perimeters. Each corner junction has been reinforced by heating strips of PAG SAGR and placing them into position around each corner, onto the membrane. Firm rolled pressure is applied with a silicone roller to aid in the adhesion. A thorough visual inspection followed by pick and probe testing identified no faults.

GeoShield Verification Report

ADDITIONAL PHOTOGRAPHS



A pick and probe test being conducted on a sealed steel stanchion.



An overview of an area verified during today's visit.



A pick and probe test being conducted on a sealed steel stanchion.



A pick and probe test being conducted on a sealed steel stanchion.

GeoShield Verification Report

ADDITIONAL PHOTOGRAPHS



Sufficient overlap achieved.



An overview of an area verified during today's visit.



An overview of the Protech GM Super Gas Barrier used throughout the installation.



A pick and probe test being conducted on a welded lap joint.

GeoShield Verification Report

REMEDIATION LOG

Date	No.	Remediation Description	Y/N
19/06/2026	001	No faults or defects were identified during today’s visit.	✔

GeoShield Verification Report

GAS MEMBRANE TESTING

VISUAL /PICK & PROBE:	✔	DIELECTRIC:	
AIR LANCING:		OTHER (PLEASE SPECIFY):	
DESTRUCTIVE:			
INERT GAS TEST:			
SMOKE TEST:			

Report No.	AREA INSPECTED	Y/N
001	Perimeters (40%)	✔

GeoShield Verification Report

VERIFICATION SUMMARY

This was the first visit to the site where verification was required for the installation of the Protech GM Super Gas Barrier to 40% of the perimeters of the new Home Bargins.

All overlaps between the adjacent sheets of Protech GM Super Gas Barrier have been successfully welded using a hot air leister and silicone roller, creating continuous welded joints throughout.

All corners throughout the installation have been successfully sealed using PAG SAGR, heated down to aid in the adherence.

Thorough mechanical point stress testing, as well as visual inspections and were conducted throughout the visit today.

No faults or defects were identified.

The installation has been conducted to a good NVQ 2 standard and in accordance with manufacturer's specifications.

Is the project ready for handover?	No

This was passed and verified in accordance with CIRIA C735 and installed to BS 8485:2015+A1:2019.

GEOSHIELD SIGNATURE

N. White

DATE: 19-Jun-2026

APPENDIX I

EPG GROUND GAS RISK ASSESSMENT

part of STRI group

epg environmental protection group

Ground Gas Risk Assessment

Lidl, Birstall

Client: Lidl Great Britain Limited

000976
23 October 2026
Version 1

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The Environmental Protection Group Limited ("EPG") has prepared this report in accordance with the instructions of Lidl ("the Client") under the terms of its appointment for consulting engineering services by the Client. The document and its contents should not be used for any purpose other than that for which it was prepared and provided. Should the Client require to pass copies of the report to other parties for information, the whole of the report should be so copied, but no professional liability or warranty shall be extended to other parties by EPG in this connection without the explicit written agreement thereto by EPG.

REFERENCE:	000976	**VERSION:**	1	**ISSUE DATE:**	23 October 2026

Prepared by:



Steve Wilson, BEng MSc CEng CWEM MICE MCIWEM FGS ROGEP
Technical Director, EPG Ltd

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Associate, EPG Ltd

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Appendix A
Foundation drawings

Appendix B
EPG internal monitoring results

Appendix C
Gound gas DQRA model results

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Summary

This ground gas risk assessment has been completed by EPG post completion of the buildings and developments. It considers all of the previous site investigation and gas monitoring data holistically. It also considers the building floor construction and post remediation gas monitoring by Remada. It includes detail of post construction gas monitoring undertaken by EPG to confirm the results of the assessment. This risk assessment superseded all previous gas risk assessments and recommendations for the site.

Previous risk assessment by SIRIUS and Curtins did not consider the conceptual site model and the influence of monitoring well construction on the gas monitoring results. This resulted in the incorrect classification of the site as Characteristic Situation CS4.

There is no landfill waste or ungrouted unflooded mine workings below Home Bargains. Landfill is only present below Lidl.

Correct assessment of the data, considering the conceptual site model and the influence of monitoring well construction on flow rates shows that the site can be classified as CS1 for Home Bargains and CS2 for Lidl.

The raft foundation at Lidl provides and effective barrier to gas migration into the building on its own.

Both Home Bargains and Lidl have been provided with gas membranes.

This revised risk assessment has demonstrated that there is very low risk posed be the presence of the gas in the ground to the buildings.

EPG has undertaken internal gas monitoring and this has identified some minor gas ingress into both buildings but it is very localised and well below minimal risk levels.

The buildings are safe for occupation. There is no justification for requiring gas alarms inside the buildings.

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1 Introduction

1.1 Background

EPG has been appointed by LIDL to provide advice on the need for a landfill gas alarm system at the new LIDL store in Birstall. Lidl are close to completing the store which is located off Bankwood Way in Birstall, West Yorkshire. The development also includes a separate retail unit to be occupied by Home Bargains along with associated access roads, car parking and service areas for deliveries.

The site is located on a former landfill from the 1970s and 1980s with evidence of historical shallow coal mining features encountered below the site. The site has also been subjected to cut and fill as part of the site preparation works, exposing natural ground in the area of Home Bargains and raising ground levels in the area of Lidl.

The development has been constructed with gas protection based on Characteristic Situation 2 which comprises a gas membrane and the floor construction. The Lidl store has a raft foundation and Home Bargains has a ground bearing floor and pad footings. There is controlled modulus column ground improvement below both buildings.

The Remediation Strategy, including gas protection measures, has not been agreed by the Local Authority. The definitive Remediation Strategy is the Remada one, dated June 2026 This is the one that has been followed on site and the works verified by Remada.

Previous risk assessment by SIRIUS and Curtins did not consider the conceptual site model and the influence of monitoring well construction on the gas monitoring results. This resulted in the incorrect classification of the site as Characteristic Situation CS4.

This ground gas risk assessment has been completed post completion of the buildings and developments. It considers all of the previous site investigation and gas monitoring data holistically. It also considers the building floor construction and post remediation gas monitoring by Remada. It includes detail of post construction gas monitoring undertaken by EPG to confirm the results of the assessment.

1.2 Competence

This technical note has been prepared by Steve Wilson. Steve is a Chartered Engineer, Member of the Institution of Civil Engineers and Registered Ground Engineering Advisor with over 35 years' experience in geotechnical design and the investigation and assessment of ground gas (including mine gas, landfill gas, natural methane emissions and leaking natural gas wells). He is a SoBRA Accredited Risk Assessor (permanent gas and vapour intrusion). He has contributed to most of the recent guidance on ground gas risk and mitigation design, including various CIRIA and CL:AIRE Reports and BS8485. He is lead author of the CL:AIRE guidance on good practice in mine gas risk assessment.

1.3 Information

A summary of the previous site investigations and reports is provided below. The data and information in these reports has been relied upon for this risk assessment.

- Deltasimons, 24 July 2018, Geo-Environmental Assessment, Centre 27, Birstall
- Curtins, 16 October 2020, Bankwood Way, Birstall, Combined Phase 1 & Phase 2 Ground Investigation Report
- GB Card and Partners, 11 December 2020, Proposed Lidl Store, Bankwood Way, Birstall, West Yorkshire
- Curtins, 18 December 2020, Bankwood Way, Birstall, Combined Phase 1 & Phase 2 Ground Investigation Report
- Sirius, 28 October 2021, RE: Detailed Coal Mining Risk Assessment for Land at Centre 27, off Bankwood Way, Birstall, Batley (Planning Application Ref: 2021/62/92528/E)
- GB Card and Partners, 29 October 2021, Proposed development at Centre 27, off Bankwood Way, Birstall, Batley, Planning Application Ref: 2021/62/92528/E, Coal mining risk assessment
- Sirius, 28 March 2022, RE: Supplementary Coal Mining Investigation for Land at Centre 27, off Bankwood Way, Birstall, Batley (Planning Application Ref: 2021/62/92528/E)
- Sirius, 6 May 2022, Re: Hazardous Ground Gas Risk Assessment for Land at Centre 27, off Bankwood Way, Birstall, Batley (Planning Application Ref: 2021/62/92528/E)
- Sirius, May 2022, Strategy for remedial and preparatory works. (**NOTE** this was superseded by the Remada strategy).
- Remada, October 2022, Remediation Strategy, Client: Lidl Great Britain Ltd, Lidl Birstall (**Note** this was suoerseded by the June 2026 Remada strategy).
- Remada, October 2022, Drill & grout specification, Client: Lidl Great Britain Ltd, Lidl Birstall
- Remada, 24 February 2026, Post Remediation Ground Gas Assessment, Lidl Birstall, West Yorkshire
- Remada, February 2026, Verification Report, Client: Stonedale Construction Ltd, Lidl Birstall (Note this includes:
    - Soil Engineering, 19 November 2025, Report on consolidation of mine workings at new Lidl store, Birstall and
    - Menard, November 2025, Lidle Store, Birstall, Ground improvement by controlled modulus columns (CMC).
- Remada, June 2026, Combined Remediation Strategy ,Drilling & Grouting Plan, Client: Lidl Great Britain Ltd, Lidl Birstall
- Remada, 22 June 2026, Post Remediation Ground Gas Assessment, Lidl Birstall, West Yorkshire (Re-issue)

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2 Risk assessment

2.1 Risk assessment model

Ground gas risk assessment is based on the source - pathway - receptor (SPR) model. This is a framework used to analyse how environmental hazards move from their origin (source) through a medium (pathway) to affect people, ecosystems, or property (receptor)..

The following sections discuss each part of the SPR linkage for ground gas at this site.

2.2 Source of ground gas

There were two sources of ground gas below the site prior to redevelopment:

1. The former land fill that is on site; and
2. The former mine workings below the site.

There are also off-site landfills and filled ground, the closet of which is 53m to the east of the site. However, given the locations, age, topography and distance to this site, none of them are considered to be a potential source of gas at this site. They are not considered further.

VOCS and radon were not considered to be ground gas risk drivers at the site by previous consultants or the local authority and are not considered further.

2.2.1 Landfill

The desk study for the site has identified the following key points:

- British Geological Survey (BGS) maps show the site to be underlain by Made Ground. No superficial deposits are shown to be present on-site. The bedrock or solid geology comprises the Pennine Lower Coal Measures Formation.
- The earliest available (1850s) indicate the site as agricultural fields and woodland. Coal Authority Abandonment Plans indicate historical coal workings in the northeast of the site, extending offsite to the northeast until the 1911. Curtins refer to a '*highwall' is shown running north to south in the centre of the site on historical mapping dated [*1893-4*]*". This is incorrect. The feature shown indicates filling and not excavations. It is most likely placement of colliery spoil from the nearby Howden Clough Colliery.
- A historical landfill is indicated to have been present across the majority of the site and extending offsite to the southeast in 1970. Operations are considered to have continued until c.1986. The landfill was a land raise placed above the existing valley side slopes.
- In 1992, eight commercial office buildings are present across the site. These remained onsite until 2018 before being demolished. Because it suffered from settlement of the landfill material. This would have occurred as the results of self-weight compaction and also degradation of organic material in the waste.
- Offsite, extensive coal and mineral mining had occurred within close proximity to the site and within the surrounding area.
- The Envirocheck Repot included in the Curtons report indicates a historical landfill, namely Nab Lane Refuse Disposal Tip, extending across the southern, northeastern and eastern portions of the site. The landfill was authorised to accept inert, industrial, commercial and

household waste, and liquid sludge, with operations commencing in November 1970. The last input date is not indicated. A further entry pertaining to the site lists the site as a registered landfill which was operational from March 1982. It is not known when operations ceased but given the presence of buildings by the 1992 map it is likely to have been around 1990 at the latest. Thus the most recent landfill material is 36 years old and much of it will be between 36 and 56 years old.

The site investigations across the site have determined the following in relation to the landfill material:

- Prior to remediation and earthworks ground conditions generally comprised a sequence of:
    - **Outside the landfill area** - reworked natural cohesive clay overlying mudstone and siltstone with minor bands of sandstone of the Pennine Lower Coal Measures. Between 0.4m and 5.2m thick.
    - **Landfill area** – variable thickness of reworked natural clay or sandy gravel overlying decomposed waste materials.
- The landfill is in excess of 15.8m at its deepest point.
- The landfill depth shallows from east to west which reflects the previous valley slope. Therefore, the average thickness is much less than the maximum. The waste material is predominantly confined to the south west of the site.
- The landfill material has previously been capped with reworked natural clay which is of significant thickness in some areas. In the southern part of the site there was about 2m of sandy gravel over the landfill.
- Outside the footprint of the historic landfill, bedrock (including shallow coal) was generally encountered at shallow depth below a thin layer of Made Ground that comprises mainly reworked natural soils. The Curtins investigation found an average depth of 1.75mbgl.
- Perched water levels within the landfill waste materials were highly variable, with levels fluctuating rapidly over relatively short temporal scales. Perched water levels were generally greater than 3mbgl.
- The made Ground is a mix of greenish brown clay with rare timber fragments; dark blackish brown slightly sandy slightly gravelly organic CLAY. Gravel is of roots, branches, plant fibres and plastic bagging; and creamish brown to greyish brown slightly sandy clayey angular to subangular fine to coarse GRAVEL of sandstone, limestone and variably concrete.
- The Made Ground on the site has been recorded to typically contain organic matter concentrations of between 0.5% and 4.6%. Although one sample of cohesive made ground obtained from the eastern part of the site had a recorded organic matter content of 20%.
- The landfill material comprises a black clayey matrix with textiles, plastics, refuse plastic bagging, metal, brick, glass carpet, rubber, tyres, timber, wire, concrete and sandstone cobbles, fragments of bone.
- The landfill material recorded organic matter concentrations of between 4.4% and 9.9%. Typically organic wastes such as grass clippings and vegetables have between 50% and 60%

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total organic carbon and composted domestic waste is around 30%[1]. Thus the organic matter content of the waste at this site is representative of degraded waste that cannot generate large volumes of landfill gas.

- Strong putrid/organic odours associated with a black sludge matrix to the landfill waste materials were noted. Gas bubbling was noted within the perched waters during the drilling of one borehole and subsequent gas monitoring in the well. This is caused by gas trapped a thickness of reworked natural soil or below less permeable layers in the waste below groundwater. The drilling reduces the total pressure on the gas and allows it to escape. This only happens because the borehole is drilled and shows that gas migration to the surface is limited (if it was significant the gas would not become trapped). It is not an indication of current gas generation.
- There is no reference to fresh non degraded waste in the landfill material or the Made Ground. There are reference to putrid and organic odours.

2.2.2 Mine gas

The following is relevant to mine gas below the site:

- Bedrock of the Lower Pennine Coal Measures comprises predominantly comprised extremely weak to medium strong (becoming slightly stronger with depth) thinly laminated orangish brown mottled grey mudstone and siltstone, with minor/occasional bands of medium strong to strong grey fine-grained sandstone up to a depth of 30mbgl.
- The bedrock is completely weathered at the surface to a clay which will act as a barrier to mine gas migration upwards.
- The geological maps shows the Flockton Thin (or Black Bed Coal) is conjectured to outcrop within the site, trending approximately south to north from the southern corner of the site, before turning abruptly in an approximately easterly direction, crossing the site boundary in the area of the eastern corner. The thickness of the Flockton Thin coal seam is recorded to range between 0.3m and 0.8m.
- Coal attributed to the Flockton Thin coal seam was encountered in the site investigations between depths of 2.8mbgl and 8.4mbgl across the northeastern, northwestern and western areas of the site. No other coal seams were encountered within 30mbgl.
- The Flockton Thin is recorded to have been mined at a depth of 10m bgl, with an extraction thickness of 0.91m (last worked in 1877). Potential collapsed mine workings and voids have been encountered during the site investigation at shallow depths across the site. Voids and collapsed ground suggestive of bell pits was encountered in the western areas of the site.
- Sirius report refers to shallow coal Flockton Thin Coal Seam being removed by historic excavations but there is no evidence on maps of excavations. If coal was removed by open cast excavation it predates mapping and the fill would simply be overburden that was replaced, not landfill, or colliery spoil. The contours on the maps indicate that there has not

[1] Diacono M et al (2019). Recycling agricultural wastes and by products in organic farming: Biofertlizer production, yield performance and carbon footprint analysis. Sustainability July 2019.

been any prior excavation before the earliest maps and it is likely that any excavations would have been where the coal was very close to surface.

- The intrusive ground investigations suggest that the deeper coal seam anticipated below the site (Third Brown Metal) is intact and unworked beneath the Site and with a maximum proven thickness of 0.3 m.
- An adit was shown on records to be present at the eastern end of the site and heading off site to the north east (ie away from the proposed buildings). Sirius undertook a comprehensive investigation to find the adit. It was determined that it was not present. It does not therefore pose amine gas risk to the buildings.

2.2.3 Remediation works

The remediation works that have been completed have changed the conceptual model. The works (as described in the most recent and applicable remediation strategy and drilling and grouting plan by Remada, dated June 2026) comprised:

- Cut and fill earthworks operations with site levels raised in the east and cut in the west.
- Removal of about 1800m^3 of surplus Made Ground
- Controlled modulus columns and associated load transfer platform below buildings foot prints
- Grouting of shallow mine workings

The cut and fill works generally involved lowering ground levels (cut) in the western part of the site and raising ground levels (fill) in the eastern part of the site. The cut and fill is shown in Figure 1. Below the Home Bargains footprint, pre-construction ground levels (excluding stockpiles) were 150.5 +/- 0.5m mAOD and the store formation level is 150.7 mAOD. Below the Lidl store footprint, pre-construction ground levels (excluding stockpiles) increase from approximately 148.0 mAOD at the site boundary to 149.7 m AOD in the centre of the site. The store formation level is 150.18mAOD.

The cut and fill does not include the additional 6F2 capping and sub-base below the car parks and the load distribution mat below the buildings. This is 750mm in total below car parks (Figure 2), 650mm below Home Bargains (Figure 5) and a minimum of 500mm below Lidl.

No landfill waste was exposed, excavated or removed from site, thus its gas generation properties should not have been significantly altered by the works.

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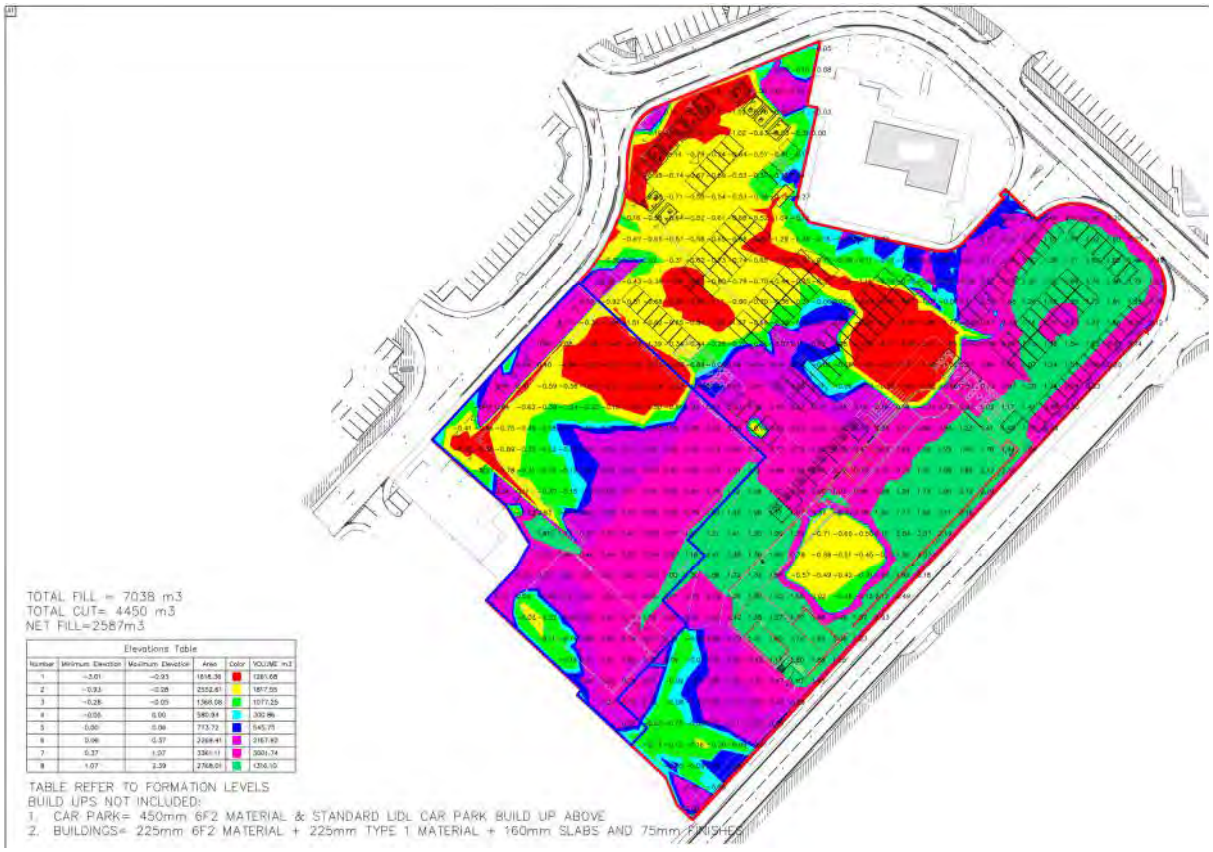


Figure 1 Earthworks cut and fill plan

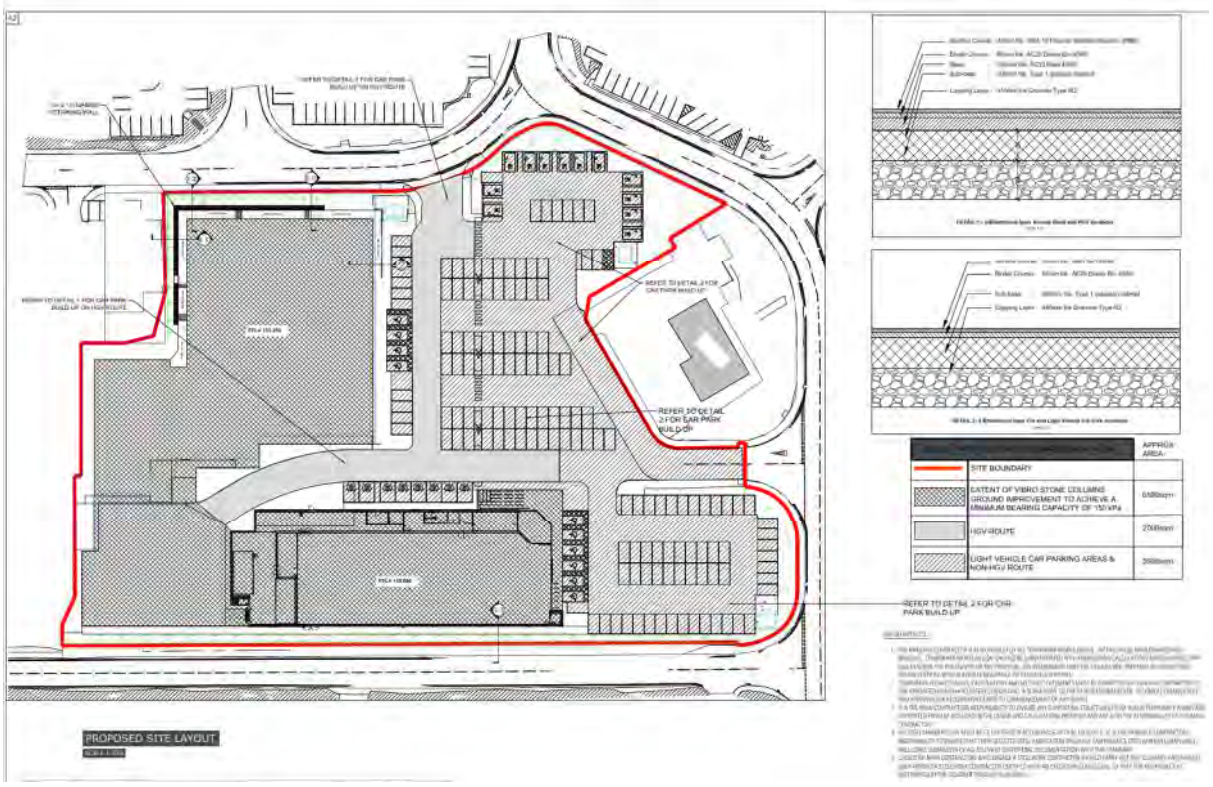


Figure 2 Capping and sub-base thickness below car parks (note reference to vibro stone columns is incorrect and these have been replaced with controlled modulus columns)

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The remediation strategy also proposed gas protection measures within the proposed buildings.

The Remada strategy indicates that the gas protection will comprise a passive sub floor ventilation layer comprising and expanded polystyrene (EPS) vent strips in a no fines gravel layer with ground level vent boxes. This has not been provided but in any even it would not have provided effective sub slab ventilation on this site. It would only have acted as a passive relief rather than a ventilation layer. A gas membrane was also to be provided below the floor slabs. The strategy also states that the local authority requires a gas alarm system but there is no justification or risk assessment that demonstrates this is necessary (which it is not).

The buildings are now completed with gas membranes installed and this risk assessment supersedes the requirements in the Remada strategy. The building gas protection comprises the floor slabs or raft foundation and the gas membranes.

The shallow mine workings were probed/grouted below building footprints which will minimises the risk of emissions because there are no voids in which gas can accumulate to hazardous volumes.

The grouting used a PFA: cement mix which is routinely used in this kind or work and it significantly reduces the volume of gas that can accumulate and removes connected open pathways for migration. There are two proposed building footprints within the overall site area as indicated on the attached

The Remada strategy required the shallow mine seams are to be probed/grouted to a depth of 30m bgl. The holes were to be on a grid as follows:

- Primary grouting of probeholes on a 6m x 6m grid to a depth of 30m bgl.
- Secondary grouting of probeholes where necessary to form a 3m x 3m grid.

The actual grouting that was completed is less than this. Only selected holes were drilled because as the works progressed it was shown that there is no shallow coal seam present below LIDL and no voids below Home Bargains (Figure 3). There was limited grout take in all holes indicating no voids (figure 4).

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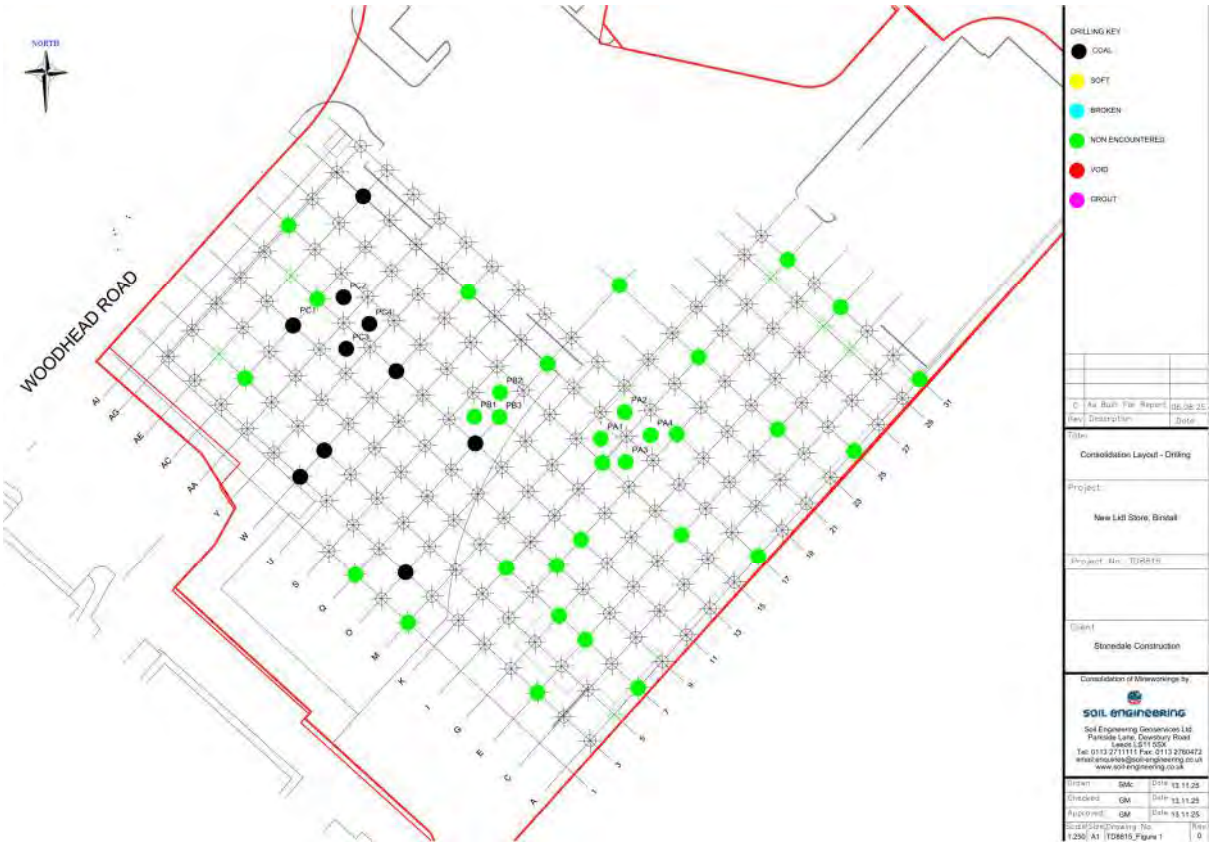


Figure 3 Mine consolidation works – completed holes



Figure 4 Mine consolidation works – grout takes in each hole

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On completion of remediation works Remada drilled 6 boreholes on the site. These boreholes confirmed that there is no landfill below Home Bargains and therefore landfill is no longer a source below that building. There is a thin layer of Made Ground that is predominantly slightly sandy slightly gravelly clay which does not contain any significant degradable organic carbon. This not a source of ground gas.

Mine workings have been grouted (the grouting works did not find any voids below either building and grout takes were minimal). Therefore, there are no voids where large volumes of gas could accumulate and not open pathway for migration. Thus, mine gas is no longer a source at the site.

In summary there is no longer any source of ground gas under the majority of the Home Bargains building. Landfill is still present below Lidl and a very small localised area at southern edge of Home Bargains. This is the only remaining source of gas at the site. The landfill material is predominantly non or slowly degradable material which is consistent with its age. Gas that has been recorded in monitoring wells is predominantly trapped gas from historic generation.

2.3 Pathways for and barriers to gas movement

The following pathways are relevant to this site:

- Vertically upwards from the landfill material to the underside of the Lidl raft foundation.

GB Card and Partners noted that the landfill waste was described as being within a clay matrix that would generally dominate the geotechnical engineering behaviour of the waste, though variation was predicted given the heterogeneity of the material. This is also relevant to gas migration and the clay will be of lower permeability and limit the rate of gas migration through the degraded waste.

Lateral gas migration of gas from the landfill though coal measures towards Home Bargains is not considered to be a credible pathway. This is for the following reasons:

The waste is sufficiently old that current generation rates are too low to support lateral gas migration. Lateral gas migration requires constant replenishment to support and maintain it which will not occur here.

The landfill sits over the old valley side and the Coal Measures will be weathered at previous ground surface over sides of valley which limits the potential for migration

The shallow angle of interface limits potential migration. The greatest risk of gas migration is where there are sub vertical quarry faces with a significant depth of waste in contact, which are not present here.

Pre remediation gas monitoring results show that gas is not present on the red migration line on the ternary plot discussed later in this report.

Horizontal migration of ground gas due to the presence of extensive hardstanding is also not a consideration and there is no risk of this occurring (it requires large scale gas generation, for example from a recent actively gassing landfill site).

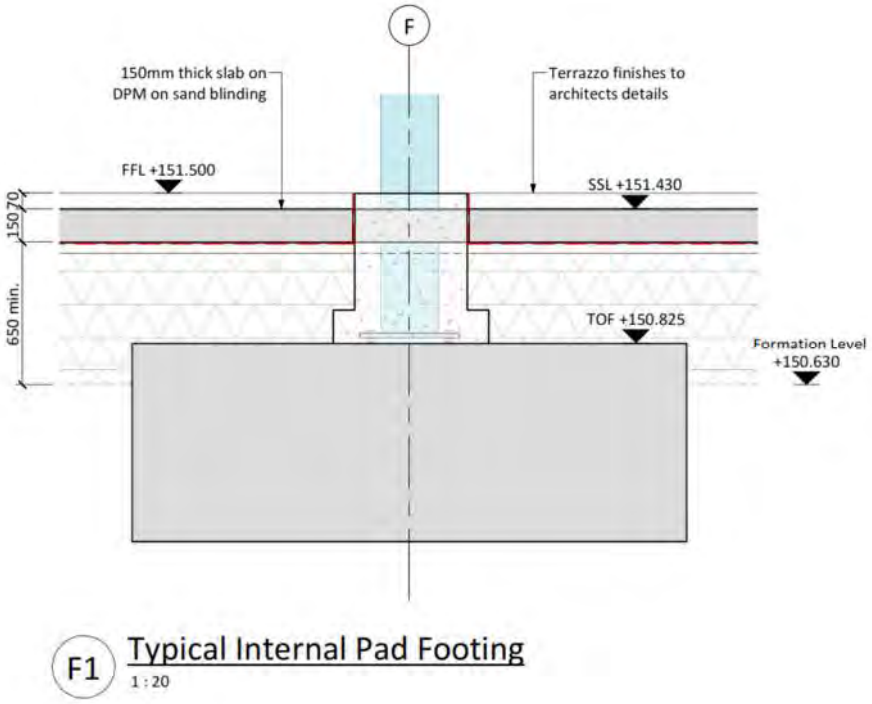
Controlled modulus columns are not a preferential pathway (note that previous remediation strategies refer to stone columns and bi modulus columns. The verification report is clear that controlled modulus columns have been installed. These are concrete inclusions in the ground that

do not create a preferential pathway for gas (CLAIRE, 2025, Piling and Penetrative Ground Improvement methods on land affected by contamination: guidance on pollution prevention).

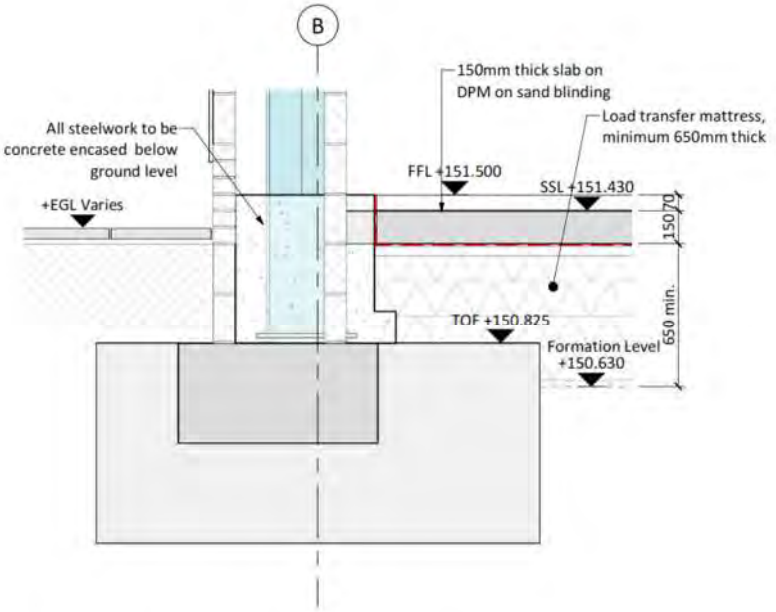
The floor construction of the buildings will provide a barrier to gas migration and is considered as part of the overall gas protection design. The Home Bargains floor slab is a 150mm thick reinforced concrete ground bearing slab on controlled modulus columns (Figure 5). The columns penetrate the slab and there will be isolation and movement joints as well as service ducts that penetrate it. These are the main gas migration pathways from the ground into the building. The main concrete area of the slab itself provides a good barrier to gas migration and will effectively prevent it. The gas membrane and sealing of the joints in the floor slab, combine with floor covering in the main store will also provide a further barrier to gas migration.

The building foundation drawings are provided in Appendix A.

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F1 Typical Internal Pad Footing
1 : 20



F2 Typical External Pad Footing
1 : 20

Figure 5 Floor slab details for Home Bargains

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Lidl is constructed with a raft foundation and the walls and columns are located over thickenings in the raft slab (Figure 6). They do not penetrate through the floor. There are limited construction joints and no open movement or isolation joints. Engineered raft foundations will provide an attenuation factor of at least 1000 for ground gas that is flowing from the ground under diffusive forces[2]. This means that even if 100% in the ground it would only reach 0.1% inside the building. The floor covering in the main store area will also provide an additional barrier to gas ingress.

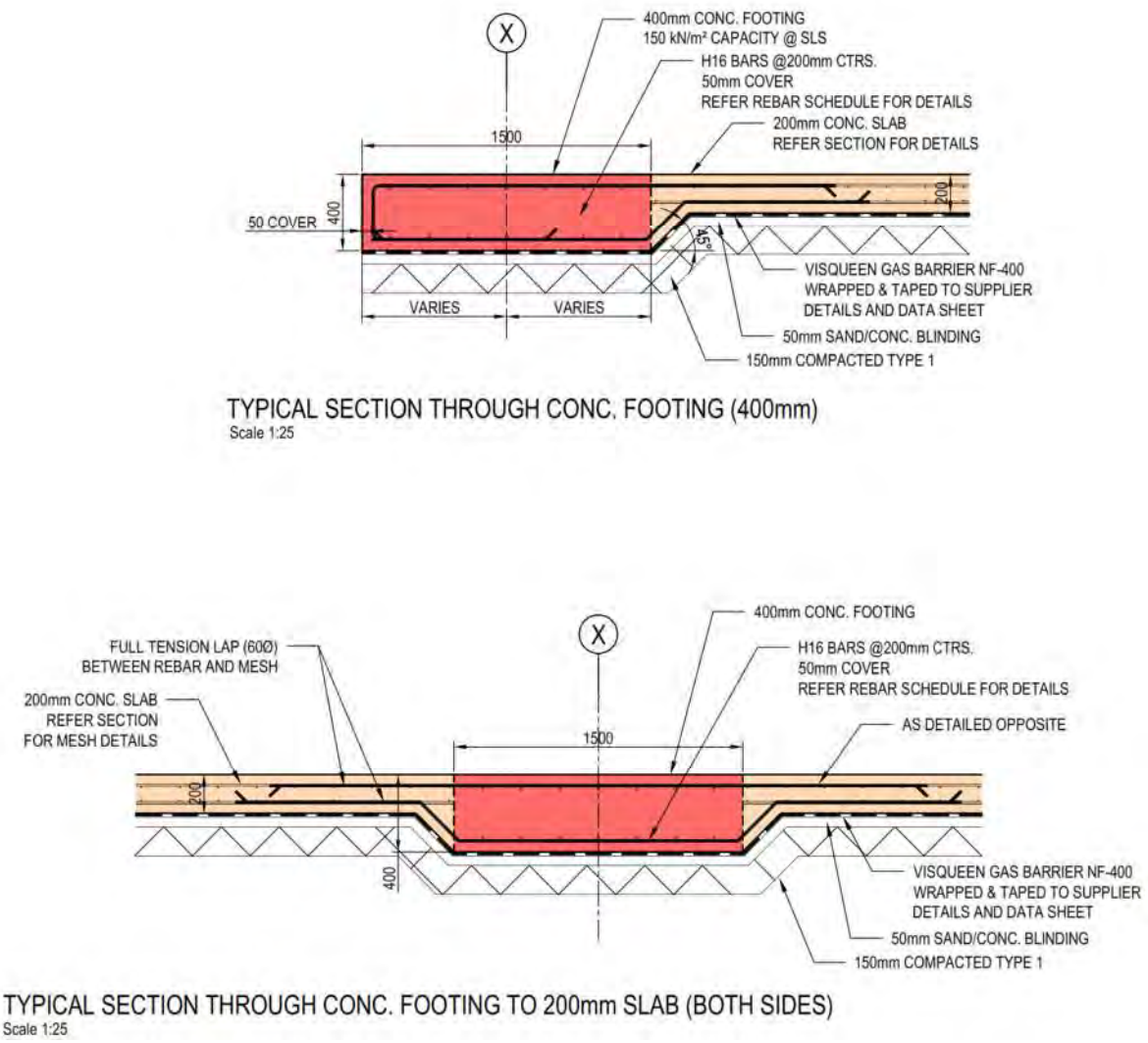


Figure 6 Raft foundation for Lidl

[2] Focused Remediation Seminar, Hydrogen generation from sub-base below residential houses – investigation and remediation, S Wilson, 2026

2.4 Receptor

The receptors in this case are the buildings, and occupiers/users.

2.5 Conceptual site model

The conceptual site model based on the above is provided in Figures 7 and 8.

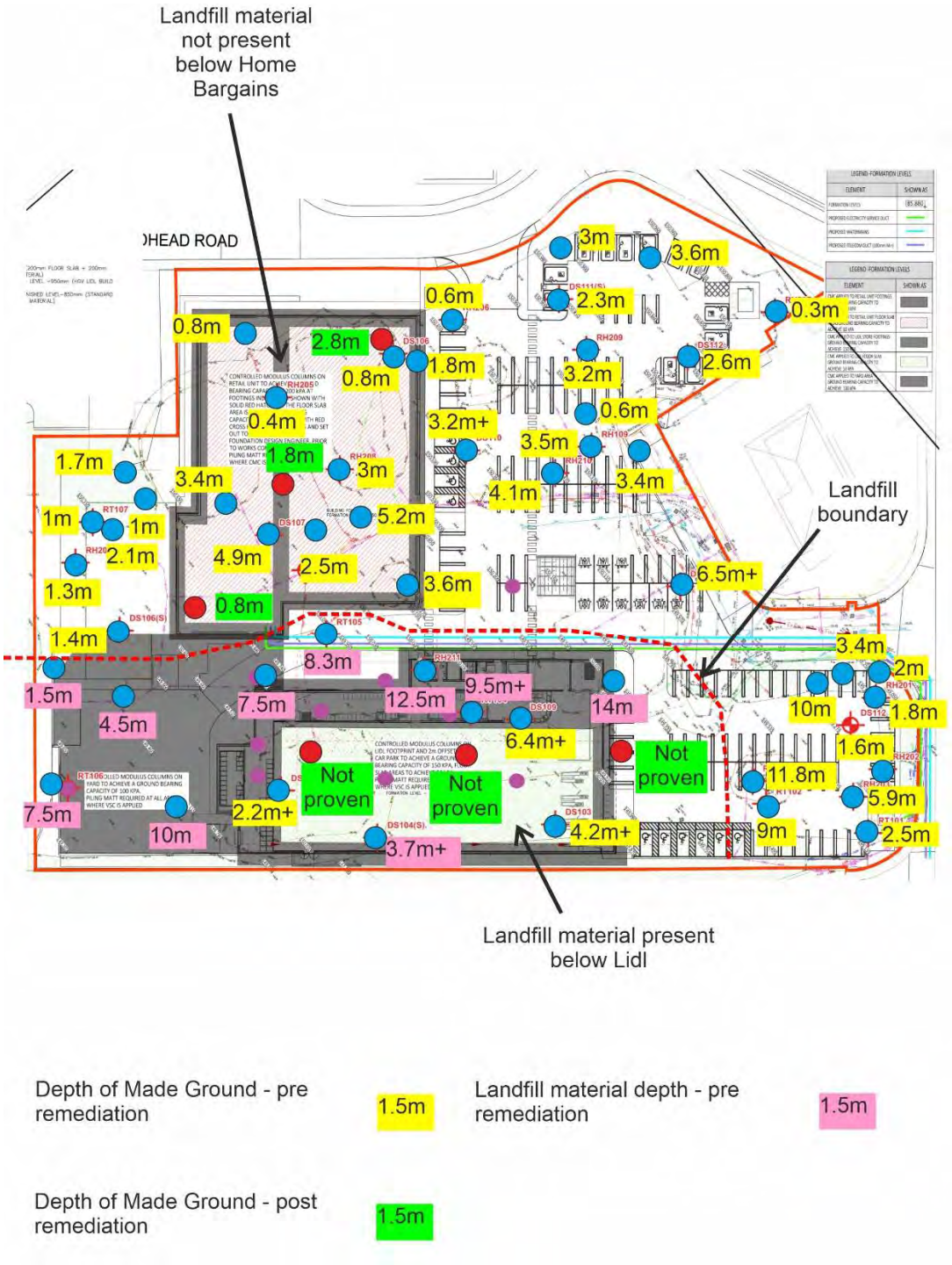


Figure 7 Conceptual model for ground gas - plan

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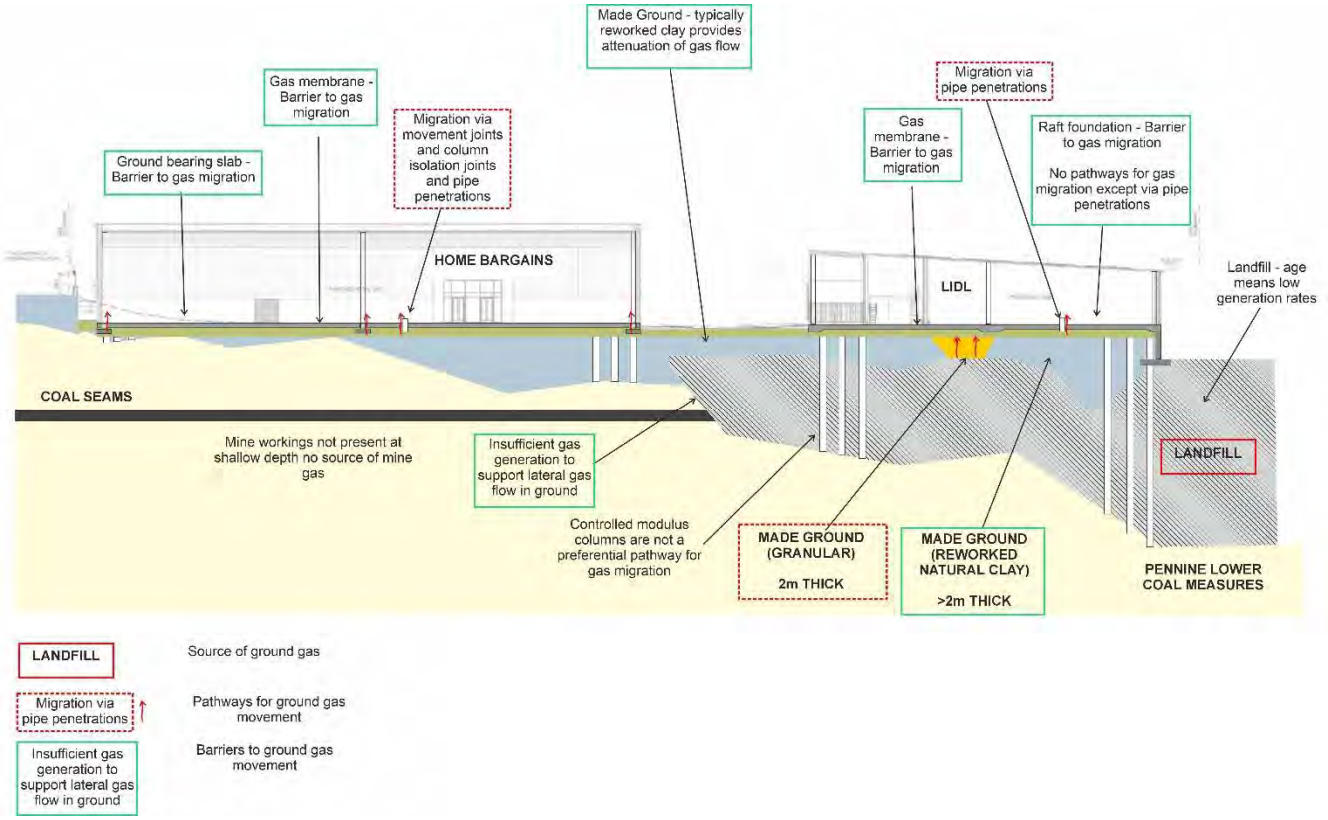


Figure 8 Conceptual model for ground gas - section

In summary the conceptual models shows:

- The only source of ground gas at the site is the landfill material which is mainly below Lidl
- There is no significant source of ground gas below Home Bargains
- The raft foundation to the Lidl provides a robust barrier to gas migration with the only minor pathways through it via pipe penetrations or similar
- The ground bearing slab to Home Bargains provides an effective barrier to widespread gas migration into Home Bargains. It will allow gas migration via pipe penetrations and movement or isolation joints.

2.6 Semi qualitative risk screening

2.6.1 Predevelopment gas monitoring

Several phases of gas monitoring were completed prior to development. The Made Ground and waste deposits are some 30 to 50 years old and as such the majority of degradable waste within these materials will have significantly reduced and hence also reduced the potential for any significant ground gas generation. It is therefore not a high risk site and is more reasonably defined as moderate generation in accordance with BS8576: 2013.

In total there was sufficient gas monitoring over the phases of investigation and monitoring to adequately and robustly characterise the site. This included periods of continuous gas monitoring.

Overall the gas monitoring meets the requirements of BS8576: 2013 which is the applicable standard and not CIRIA C665 which the local authority has referred to. BS8576 has guidance which supersedes the guidance in C665 on the required duration and frequency of gas monitoring and is less prescriptive.

Delta Simons completed continuous monitoring for a period of approximately two weeks in each of nine shallow monitoring wells installed into the Pennine Lower Coal Measures or the reworked natural clay Made Ground. The overall monitoring period spanned a total of six weeks.

Maximum methane concentration recorded was 2.02 % and carbon dioxide 6.3%. The maximum flow rate was 0.25l/h. There was no evidence of any significant landfill gas generation or mine gas emissions. All the hazardous gas flow rates (HGFR) were <0.07l/h (ie which is equivalent to Characteristic Situation CS1). With the other evidence (ie no evidence of fresh degradable waste and low methane concentrations less than 30% (as per ASTM E2993- 23[3]) it was not absolutely necessary to increase to CS2. It was increased on the basis of parts of the site are underlain by relatively recent landfill waste which has the potential to generate ground gas and is adjacent to a former landfill which is known to be generating ground gas Also limited ground gas monitoring was undertaken within the landfill waste.

The gas monitoring was appropriate for the Home Bargains building and given the absence of waste in that area and no evidence of significant migration it could have remained CS1. Increasing area of Lidl to CS2 was valid.

Curtins completed gas monitoring that targeted the landfill waste with monitoring wells. Bubbling of methane gas was noted within the perched waters during the drilling of one borehole RH 211. Bubbling/effervescing was further reported during the second round of gas monitoring in the same borehole. However this well penetrated a black clayey matrix (decomposed waste) below 7.2m of reworked natural clay. The response zone was sealed into this stratum. A flow rate of 4.5l/h was recorded. Whilst gas bubbling may appear alarming to the inexperienced it is only occurring because the overlying confining pressure has been removed by drilling the hole. It is not indicative of large scale gas migration or gas generation in the surrounding ground. The gas has been confined in the ground in the past which demonstrates the effective barrier to gas migration provided by the reworked natural clay Made Ground.

It is incorrect to use gas Screening Values (GSVs) for data from a well such as this which is acting as a chimney and is not representative of gas emissions in the surrounding ground. The closest shallow wells to RH211 (DS107 and DS109) at shallow depth of 5m in the clay above the waste show no gas being present so gas is not migrating vertically in large volumes.

The monitoring results from wells installed into landfill are shown on the ternary plot in Figure 9. This shows that there is no current large scale gas generation below the site. Flow rates were generally less than detection with a maximum of 0.5l/h apart from the single well discussed above and also in CP301 and CP302, both of which are deep (8.7m and 10.0m respectively).

[3] ASTM E2993-23, Standard Guide for Evaluating Potential Hazard in Buildings as a Result of Methane in the Vadose Zone. ASTM International

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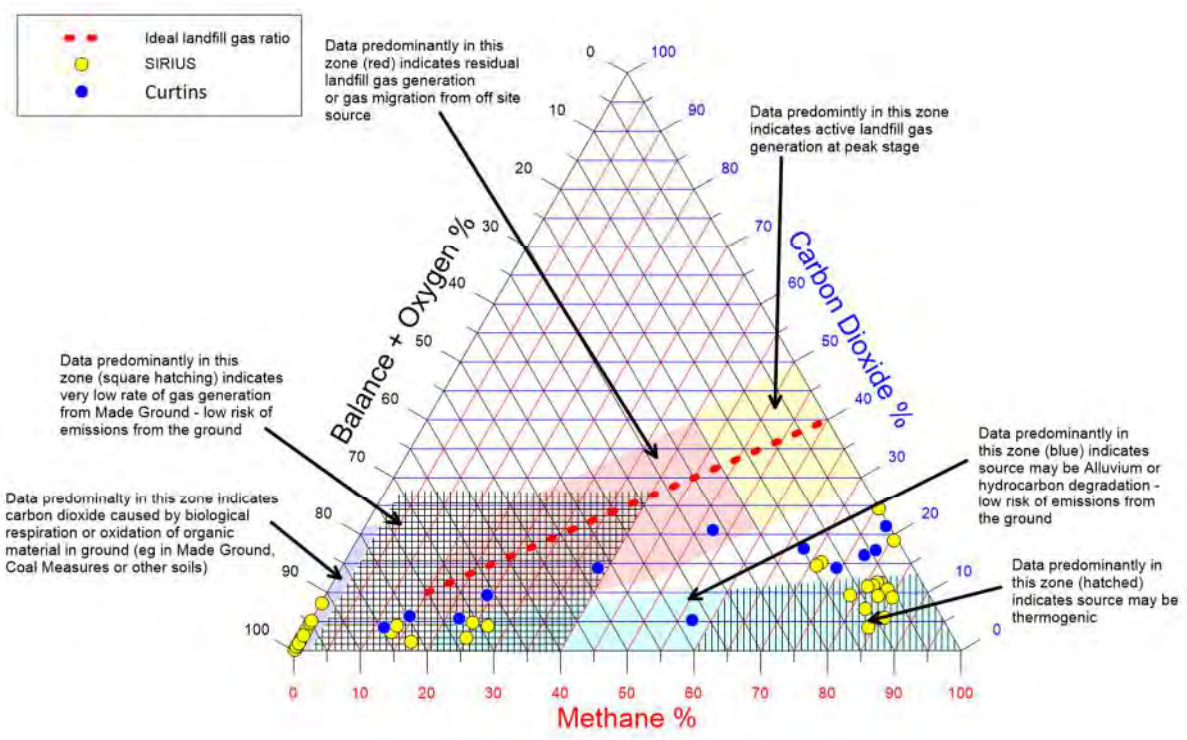


Figure 9 Ternary plot of monitoring data for wells installed in the landfill waste

The waste is below 2m of granular fill at these locations. The depth of the wells means that they are acting as chimneys giving artificial flow rates that are not representative of surface emissions at the ground surface. The chimney effect can be seen in the continuous monitoring data from SIRIUS (Figures 10 and 11) which shows that when barometric pressure rises there is oxygen ingress to the wells and methane and carbon dioxide reduce to very low levels as fresh air flows into the well. Negative flow rates occur at the same time. If there was any significant underlying pressure this would not occur. It was therefore inappropriate for Sirius to use GSVs to assess the data. The SIRIUS gas risk assessment only considered the results in the two deep wells and did not consider the conceptual model for the site when assessing the data. Therefore the CS4 classification was incorrect and should not have been applied to the site.

The landfill waste in these wells was described as 65% plastic, 20% decomposed material, 5% wood, 5% metal and 5% glass. There is no fresh degradable material and the decomposed waste does not produce large volumes of gas. The gas being detected is gas that was generated over the past 30 years since filling and is trapped in the ground. As gas is generated the source is used up. Gas generation cannot continue at hazardous rates indefinitely.

Sirius completed gas monitoring in wells with response zones in the Coal Measures or cohesive Made Ground. Methane concentrations were <1% and carbon dioxide was recorded at a maximum of 2.7%. Maximum flow rates was 0.09l/h. This indicates CS1 conditions where landfill is not present.

Concentrations up to 80% methane were recorded in wells installed into the landfill material.

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FIGURE 1 – TIME SERIES DECOMPOSITION – ATMOSPHERIC PRESSURE & METHANE CONCENTRATIONS

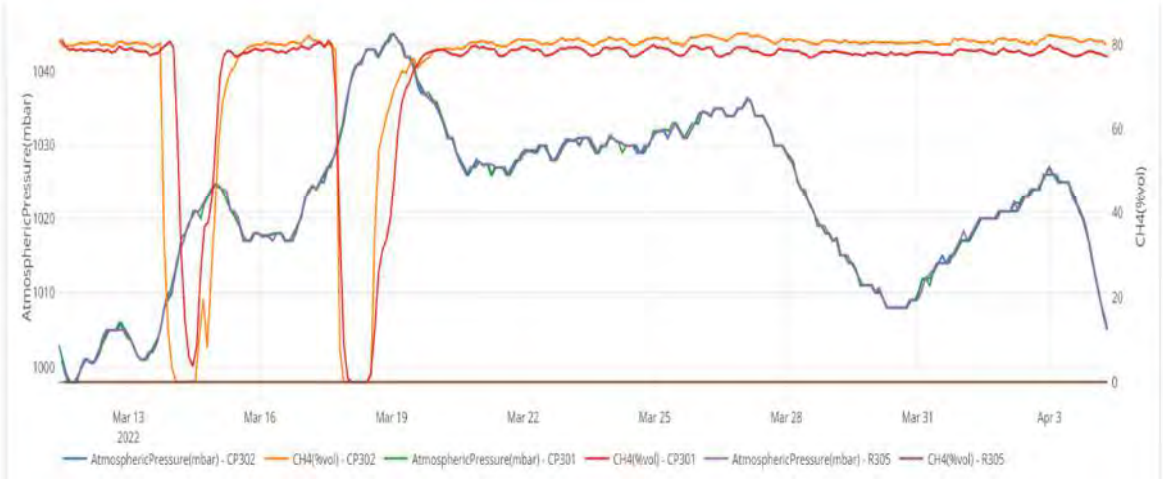


Figure 10 SIRIUS continuous monitoring data methane

FIGURE 4 – TIME SERIES DECOMPOSITION – ATMOSPHERIC PRESSURE & GAS FLOW RATES

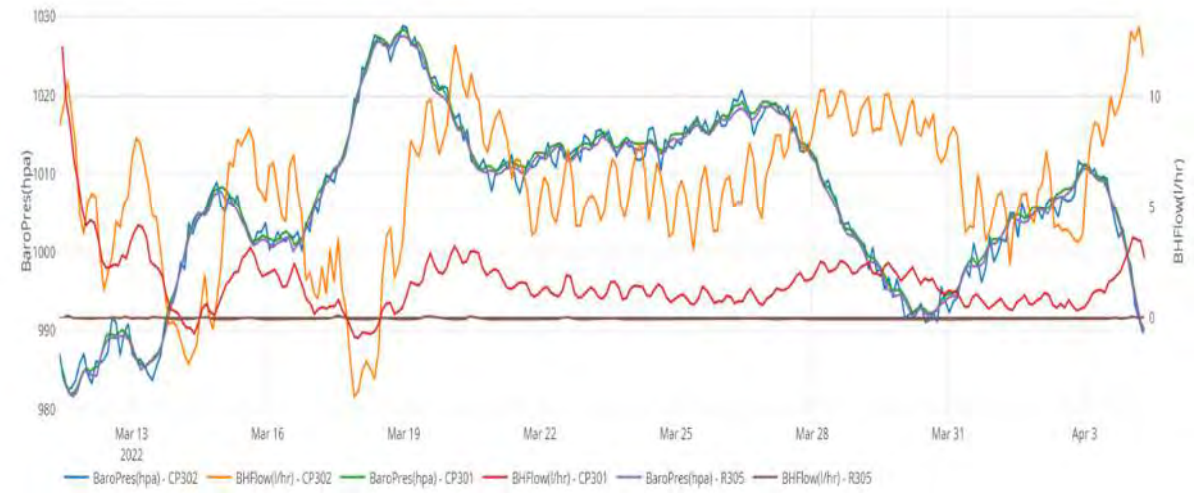


Figure 11 SIRIUS continuous monitoring data flow rate

2.6.2 Post remediation gas monitoring

The Remada remediation strategy indicated that a minimum of three ground gas monitoring wells would be installed within each proposed building footprint to a depth of 5m below the proposed formation level. The concentrations of methane, carbon dioxide, oxygen and the gas flow rate are to be measured at each well for a minimum of four monitoring events over a four week period during periods of low and high atmospheric pressure.

The location of the monitoring wells that have been installed are shown in Figure 12.

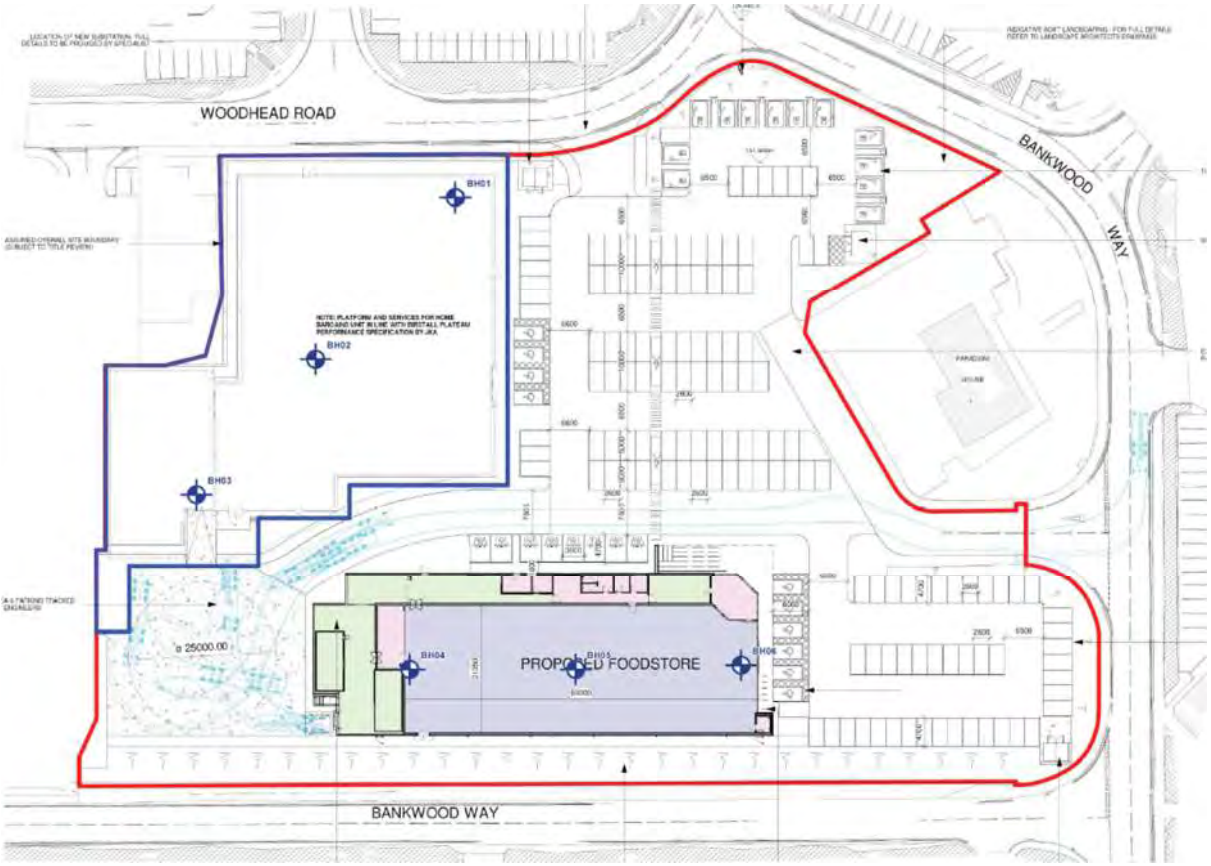


Figure 12 Post remediation monitoring wells

The wells were installed post grouting and post earthworks. The wells that have been installed are between 1.5m and 4m deep at Home bargains and 1m deep at Lidl. The wells at Lidl are shallow and not sufficient to fully characterise gas risk. However the data from them does provide one line of evidence on potential gas migration from depth to the shallow soils. This data gap has been addressed by the additional internal monitoring completed by EPG (see below).

Five gas monitoring visits were completed during January 2026 with atmospheric pressure below 1000mb. The results gave HGFRs for methane and carbon dioxide less than 0.07l/h.

There was slightly elevated methane in BH3 (3.8%, Home Bargains) and BH4 (27.4%, Lidl). BH3 was installed into Coal Measures and the methane is representative of natural concentrations that occur in this stratum. The low flow rates show that it is not mine gas related.

The result in BH4 shows there is some vertical migration from the deeper landfill materials but it is being attenuated.

The data has been plotted in a ternary plot in Figure 13. The ternary plot shows that the elevated methane is not in a high risk area indicative of active large scale gas generation. It is result of diffusive flow from depth. Carbon dioxide concentrations were all less than 5%. The implications of the post construction gas monitoring are as follows:

Home Bargains – There is no landfill below Home Bargains. No significant ground gas has been detected, remains at CS1.

Lidl – located over landfill but gas monitoring data shows low risk, remains at CS2.

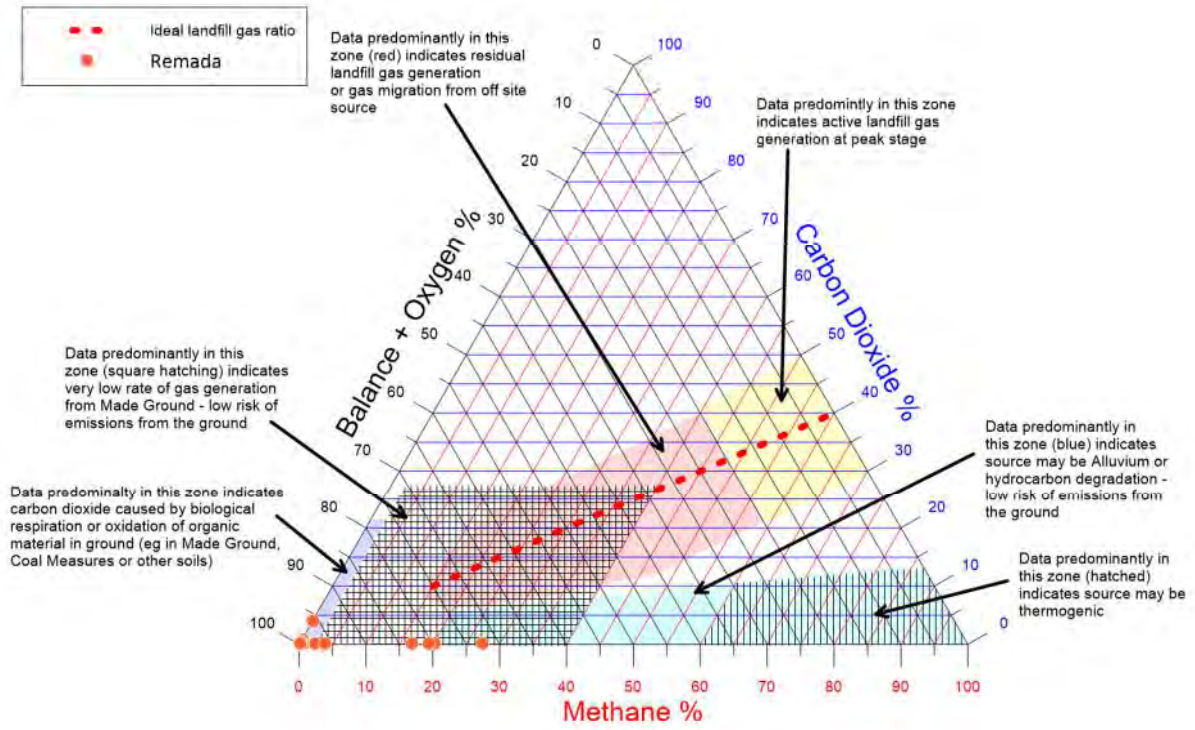


Figure 13 Post remediation gas monitoring by Remada

2.7 EPG Internal gas monitoring

EPG has completed internal gas monitoring using a tuneable laser diode instrument that can detect methane at 1ppm. The instrument is not affected by any cross interference. Monitoring also used a GFM 226 carbon dioxide meter that has a limit of detection of 1ppm carbon dioxide.

Monitoring was completed on four occasions, (23 September, 5 October, 23 October and 26 October 2026). The results are provided in Appendix B and summarised in Table 1.

Barometric pressure variations prior to monitoring are shown in Figure 14. All the monitoring events were during or slightly after falls in barometric pressure. The last two visits after significant falls can be considered worst case.

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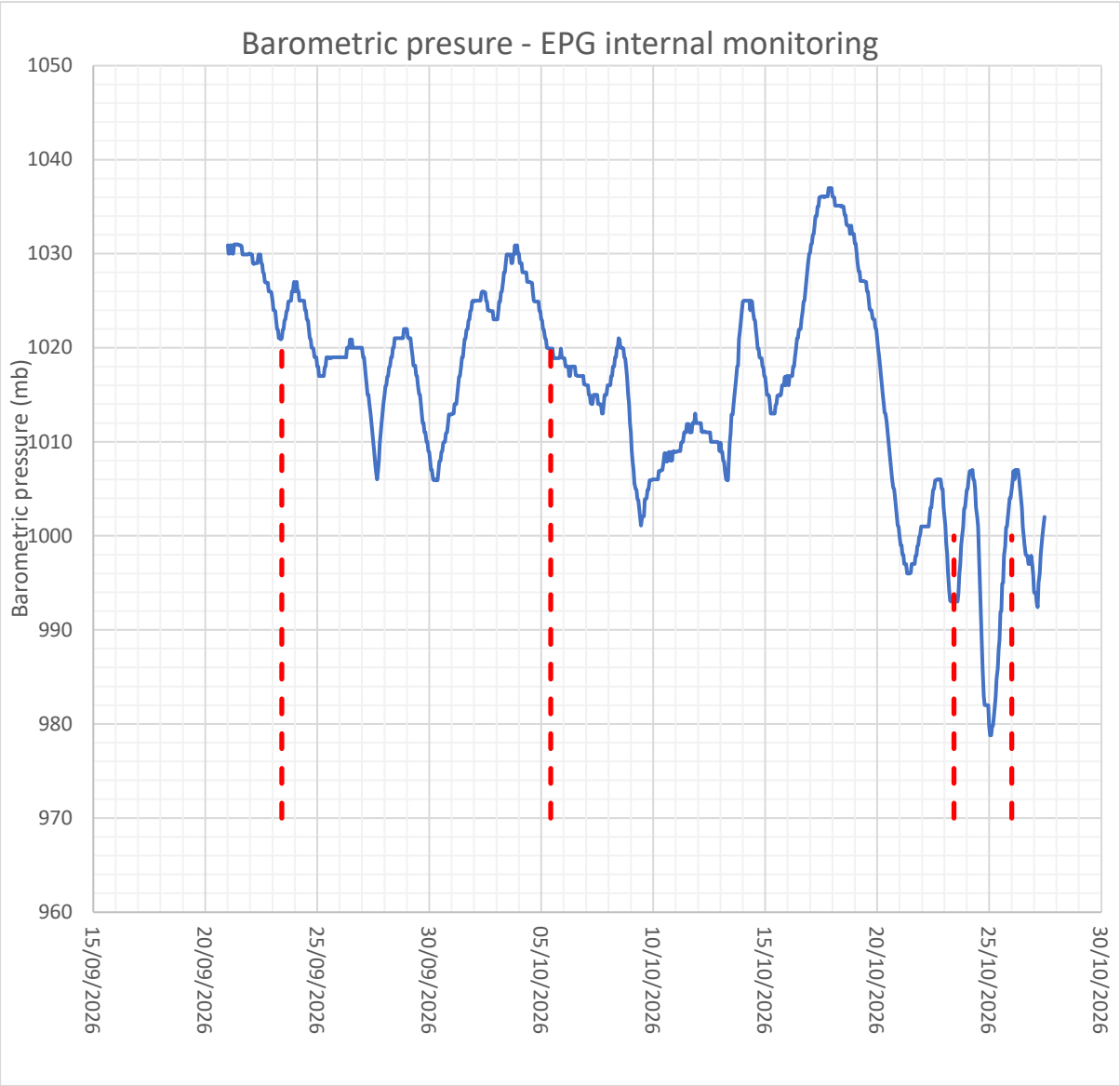


Figure 14 Barometric pressure – EPG internal monitoring

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Table 1 Summary of EPG internal monitoring

Date	Methane (ppm)		Carbon dioxide (ppm)		Comments
	Maximum ambient	Maximum at floor level	Maximum ambient	Maximum at floor level	
Lidl					
23 September 2026	6	General 7.7 Local 470	380	520	Local slightly elevated at pipe pop ups maximum of 30ppm at slab level. One isolated area at three points near fire exit on southern side – up to 470ppm reduced to 10ppm at 50mm above slab. No associated carbon dioxide so gas migration is via diffusion.
5 October 2026	12	General 22.1 Local 500	368	439 One room 600	Peak results quickly dissipated with height above slab.
23 October 2026	52.5	85	372	561 655 in two rooms	Toilet in use 719ppm
26 October 2026	35.5	62.3	358	422	Fire exit above cored holes 20.6ppm
Home Bargains					
23 September 2026	1.4	General 2.7 Local 24	350	360	Methane in one joint at 4.6ppm and one column at 24ppm quickly dropped at 10ppm at 50mm height
5 October 2026	2.9	Local 397	349	349	At floor level around isolated columns up to 250pm was recorded at one location. This immediately dropped to 20ppm in 30 seconds. At joints 397ppm was recorded in isolated locations but dissipated to 7ppm 100mm above the slab.
23 October 2026	3.9	47.7	335	344	Localised peaks reduced, 47.7ppm to 17.5ppm at 200mm above slab
26 October 2026	3.1	General 3.8 Local 30	327	350	Localised peaks reduce to 6.5ppm at 200mm above slab

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Lidl

In summary for the Lidl building there is no evidence of carbon dioxide ingress into the building. All results are below the CIRIA C795[4] minimal risk level of 1,000ppm.

On 5 October 2026 methane was detected at four locations at floor level. At the edge of building there were concentrations up to 143ppm by a fire escape on the southern side of building which reduced to 20ppm at 150mm above slab level. Minor ingress to west of this was recorded at 33ppm at ground level.

On the northern western corner peaks occurred at two points of 500ppm and 437ppm. The 500ppm reduced immediately to 89ppm in less than 10 seconds which indicates the volume of gas is minimal. At 50mm above ground level the concentration reduced to 13ppm.

The 437ppm result averaged at 370ppm and at 50mm above ground level was 40ppm. The spot was monitored again in the afternoon and the methane was present at 12ppm peak and steady at 8.9ppm. There was no elevated carbon dioxide at these points. This demonstrates that migration into the building is via diffusion (if pressure driven flow was occurring it would suck a volume of gas from the ground containing methane and carbon dioxide, not just the methane on its own).

Ambient methane concentrations have remained below the CIRIA C795 minimal risk concentration of 100ppm. Therefore, the minor gas ingress is well below acceptable levels and does not pose a risk to the building or occupants.

The internal monitoring at the Lidl Building has found minor gas ingress through the gas membrane and floor slab at one location at the edge of the building where the retaining wall is present. Any ground gas at this location is migrating upwards and getting trapped in the corner formed by the retaining wall and the raft foundation. It cannot move out sideways to vent to the air and there is clearly a preferential route into the building at this point. The gas ingress is minor and does not pose any significant risk to the building where ambient concentrations are well below minimal risk levels.

However, to reduce that risk further and try and minimise the ingress or prevent it, holes three 75mm diameter holes have been cored through the retaining wall to act as a relief pathway and dissipate any gas already present. Gas will always take the easiest route and the core holes provide that. The holes also allow diffusion of fresh air into the fill behind the wall which will dilute gas. This has been completed on other sites to reduce gas ingress from below raft foundations.

The gas membrane on the back of the retaining wall should have been self adhesive and therefore there the core hole should not have any impact on its performance. If it has been installed correctly there should not be a pathway for gas to track up the wall between membrane and concrete. The easiest route is out of the core holes.

Three 75mm core holes have be drilled through the retaining wall as shown in Figure 14.

[4] CIRIA C795, Retrofitting hazardous ground gas protection measures in existing or refurbished buildings.

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This is summarised on the diagram attached.

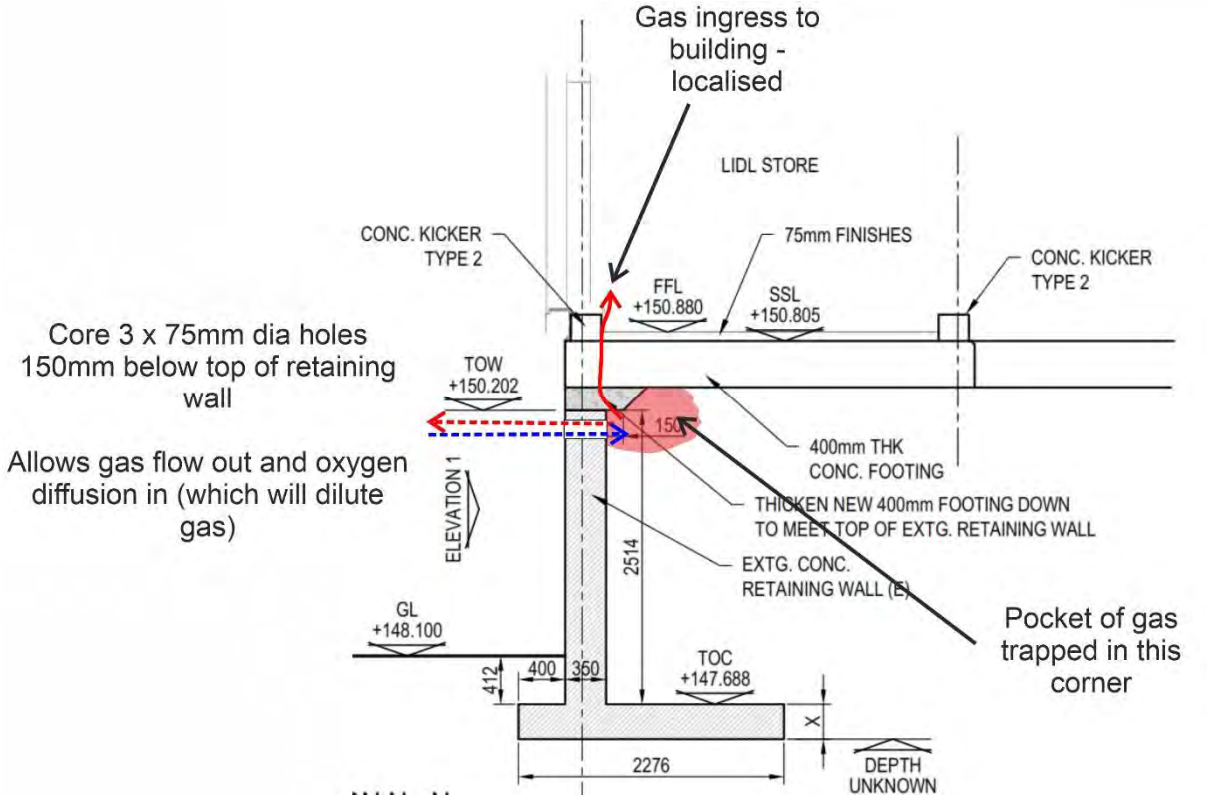


Figure 15 Remedial coring in the retaining wall

The monitoring visit on 26 October did not detect any methane ingress at the fire escape after the holes had been cored.

Home Bargains

In summary there is no evidence of significant gas migration from the ground into building all results in ambient air are below CIRIA C795 minimal risk levels. Carbon dioxide is not elevated where methane detected so methane ingress is via diffusion.

The results all indicate very small volumes of methane and this may well be being generated within the joints themselves, as a result of gas generation from debris that has entered or from degradation of concrete curing compounds that have over sprayed during construction. There is no evidence of large scale methane ingress from the ground and ambient concentrations are at background minimal risk concentrations.

Summary

In both buildings gas ambient gas concentrations have remained below minimal risk levels on four different monitoring events during worst case falls in barometric pressure. There is some minor ingress which results in slightly elevated concentrations at floor slab level. These do not pose a risk of hazardous conditions. For hazardous conditions to exist in the concentration in the ambient air must exceed 50,000ppm methane. This is shown in Figure 16 where the small bubble of gas is

compared to the large cloud of gas required for hazardous conditions. This can only occur where there are large open pathways through the ground and slab and pressure driven from the ground. Those are not present at this site.

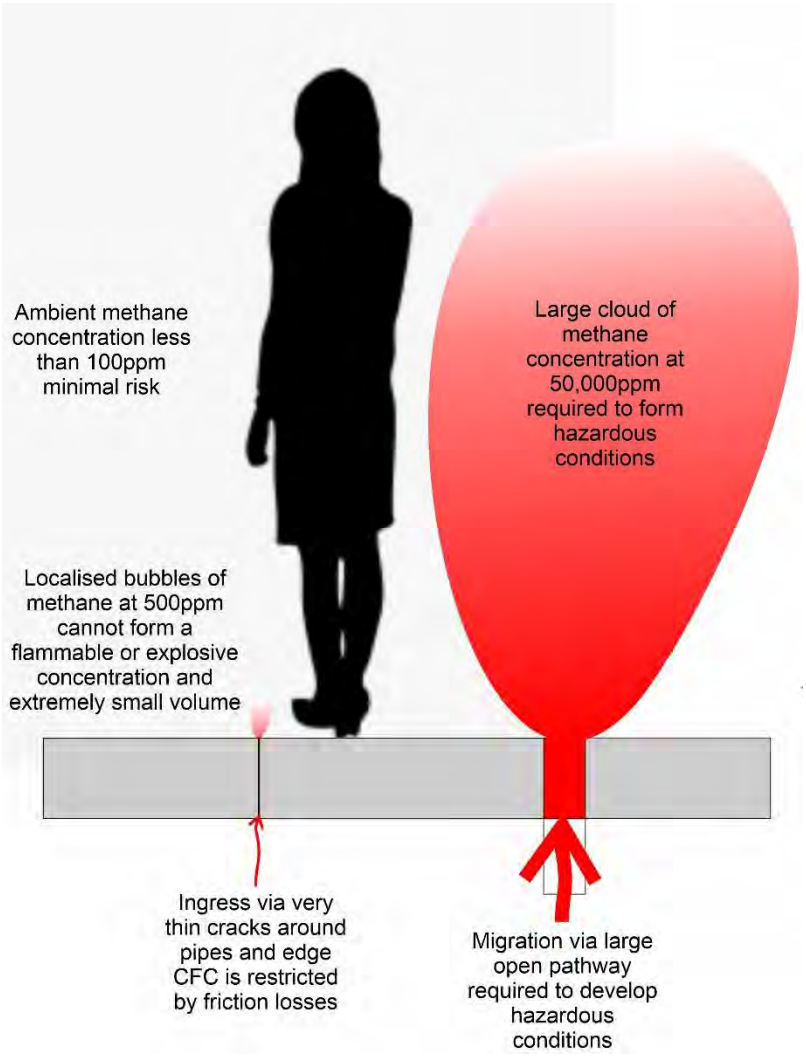


Figure 16 Methane bubble and hazardous gas cloud

Detection and alarm systems use sensors that can only detect down to 0.1% flammable gas (ie 1,000ppm methane). They are normally specified to alarm at 0.5% flammable gas (5,000ppm). None of the recorded gas concentrations in the buildings are anywhere near that level.

2.8 Quantitative modelling of ground gas migration

Modelling of gas emissions into the building from the sub-slab has been completed. This assumes advective flow from the underside of the slab into the building (even though all the preceding information indicates that flow is caused by diffusion). It is therefore very conservative

The model is an adaptation of the commonly applied Johnson and Ettinger model used for vapor intrusion assessment (e.g. in CLEA) as described by Wilson, 2008[5]. The results and input parameters are provided in Appendix C.

The results show that predicted methane and carbon dioxide concentrations are 3.6ppm and 0.8ppm respectively. This is around two orders of magnitude below the minimal risk values of 100ppm and 1,000ppm respectively.

Barometric pressure changes will not be a key driver for gas ingress to this site. This is shown in Figure 17.

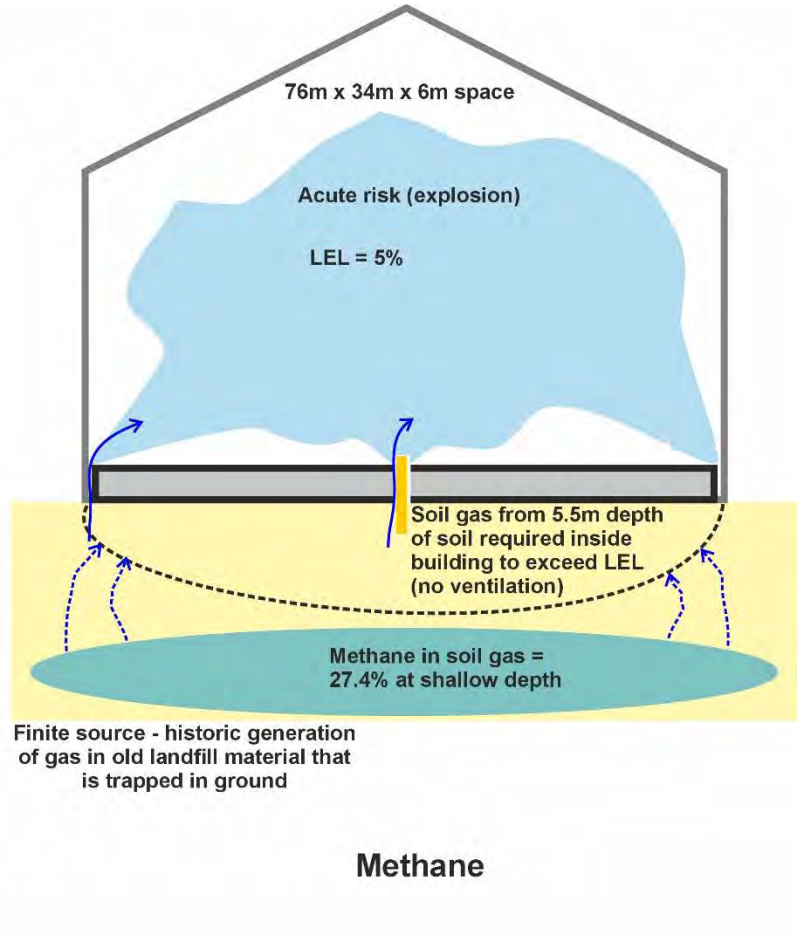


Figure 17 Extent of baromteric pressure intrusion into ground below a slab

Research by EPG has shown that there is significant friction to air flow in sub-base materials and soils. This results in head losses and means that the pressure front below cracks in the slab due to barometric pressure drops cannot extend more than 0.5m into the ground.

If the maximum methane concentration below the slab is assumed to be present in a 500mm layer below the whole building (3.8% below Home Bargains) over an area of approximately 44m by 52m),

[5] Wilson S (2008) Modular approach to analysing vapour migration into buildings in the UK. July 2008 Land Contamination & Reclamation 16(3):223-236

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and all that methane entered the building instantly it would not be sufficient to cause an explosive atmosphere (even without any ventilation). This very conservative assessment is demonstrated in the box below. The same also applies to Lidl.

Home Bargains

Area of building = 44m by 52m (site specific, measured)

Depth of pressure influence = 0.5m (distance of pressure response)

Porosity of sub-base/ground = 20% (conservative value assumed)

Methane concentration below slab = 3.8% (conservative, maximum value measured)

Therefore, volume of methane in soil pores = 44 x 52 x 0.5 x 0.2 x 0.038 = **8.7m³**

Assume whole building has a ceiling height of 8m

Volume of air space in building = 44 x 52 x 8 = **18304m³**

Concentration of methane = 8.7/18304 = 0.0005 or **0.05%**. Assumes no ventilation to dilute the gas.

Lidl

Area of building = 76m by 34m (site specific, measured)

Depth of pressure influence = 0.5m (distance of pressure response)

Porosity of sub-base/ground = 20% (conservative value assumed)

Methane concentration below slab = 27.4% (conservative, maximum value measured)

Therefore, volume of methane in soil pores = 76 x 34 x 0.5 x 0.2 x 0.274 = **70.8m³**

Assume whole building has a ceiling height of 6m

Volume of air space in building = 76 x 34 x 6 = **15504m³**

Concentration of methane = 70.8/15504 = 0.0045 or **0.45%**. Assumes no ventilation to dilute the gas.

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3 Conclusions

Prior to remediation there were two sources of ground gas below the site:

1. Landfill
2. Former coal workings.

Remediation works have resulted in the following sources remaining:

- Home Bargains – Limited localised sources of gas because coal workings are grouted (no voids present)and there is only very localised landfill present below 2m or more of overlying soils.
- Lidl – Landfill below the building. There is no mine gas source because workings are grouted.

The preconstruction site investigations and gas monitoring provided sufficient data to adequately characterise the site with respect to ground gas risk. The data meets the requirements in BS8756: 2013.

Prior to remediation risk assessments incorrectly concluded that the site was Characteristic Situaion CS4. This risk assessment has assessed the data following BS8485 and importantly has considered the conceptual site model and influence of monitoring wells on gas data. This risk assessment (which supersedes all others) shows that the Home Bargains site was reasonably classified as CS1 and Lidl CS2 prior to construction.

Post construction gas monitoring in monitoring wells and internal space surveys by EPG have been completed. This again meets the requirements of BS8576: 2013.

The post construction borehole gas monitoring shows that the Home Bargains is CS1 and the Lidl CS2. This fits with the conceptual model where there is only a very limited low to moderate generation source of ground gas below a small part of the Home Bargains.

Both buildings have gas membranes installed below the floor slabs. In addition, the Lidl has a raft foundation in which columns do not penetrate the concrete construction and all pipes, etc are cast into the concrete. The floor coverings in the store area also provide additional gas resistance (actually more gas resistant and durable than the underlying gas membrane).

Post construction internal monitoring has not detected any significant gas ingress into Home Bargains. There was generally no gas ingress to Lidl apart from localised minor points. The most consistent was by a fire escape on the southern side adjacent to the retaining wall. The gas was present within the floor construction itself and at 100mm or so above the slab it had reduced to background concentrations. This is minimal risk with respect to ground gas. Remedial works comprising coring holes in the retaining wall below the point of ingress to allow gas a route to air have been completed. This has resulted in the gas ingress at that point stopping.

There is no requirement for gas alarms. Provision of gas alarms is unreasonable and is not supported by the evidence for the site, nor any guidance document. Alarms should never have been a consideration for this site.

The design of the gas protection is in accordance with the BS8485: 2015 +A1: 2109 which is the document that should be followed for new buildings.

4 Recommendations

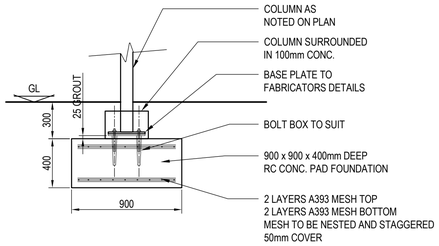
All service ducts in both buildings should be sealed internally with JUTA Ductseal.
On completion of duct sealing both buildings at the site are safe for occupation.
No further works are necessary to mitigate ground gas risk and internal gas alarms are not required (and there is no justification for requiring them).

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Appendix A

Foundation drawings



SECTION THROUGH PAD FOUNDATION
Scale 1:25

0m 0.5m 1m 1.5m 2m 3m 4m 5m

SCALE 1:50 - ENSURE PDF'S ARE PRINTED AT 1:1

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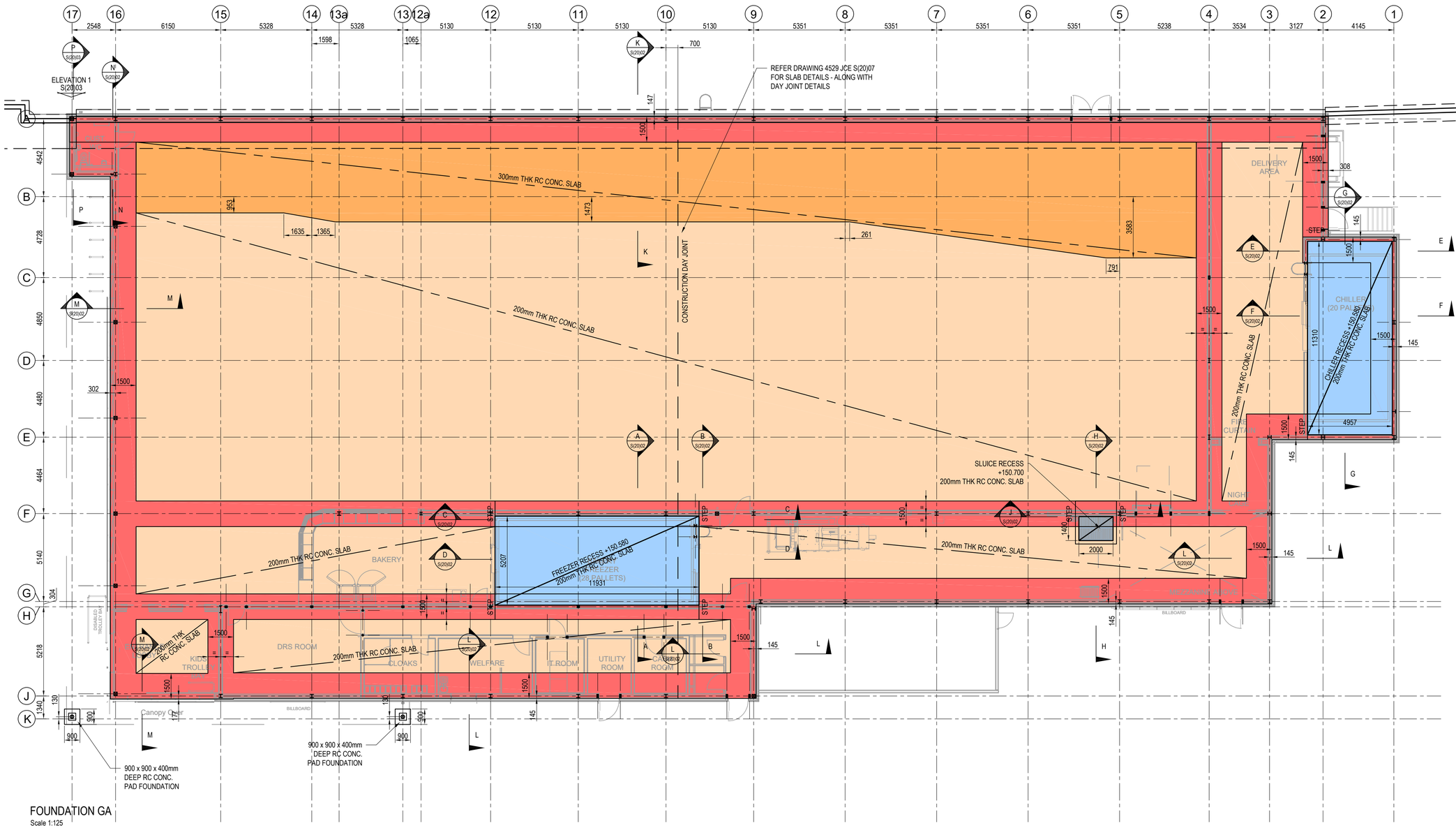
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RETAINING WALLS	DC-1	130 O
FOUNDATIONS	DC-1	130 C

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	TOP	BOTTOM	SIDE	END
SLAB	FLOATED	---	SHUTTER	SHUTTER

4. ALL SERVICE ACCESSES TO BE RAISED TO NEW LEVEL.
5. ALL SURFACE MOUNTED KIT TO BE REMOVED, STORED AND REFITTED.
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DRAWING KEY - PRINT IN COLOUR
- 400mm THK CONC. FOOTING
- 300mm THK CONC. SLAB
- 200mm THK CONC. SLAB
- RECESSED 200mm THK CONC. SLAB



FOUNDATION GA
Scale 1:125

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B	SLAB CONSTRUCTION DAY JOINT SHOWN	RL	CM	CM	12.03.26
A	MINOR CHANGES	RL	CM	CM	02.03.26

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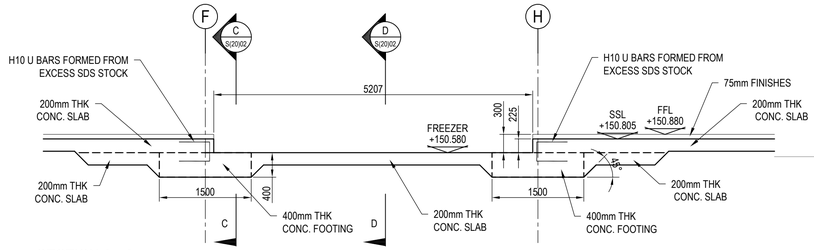
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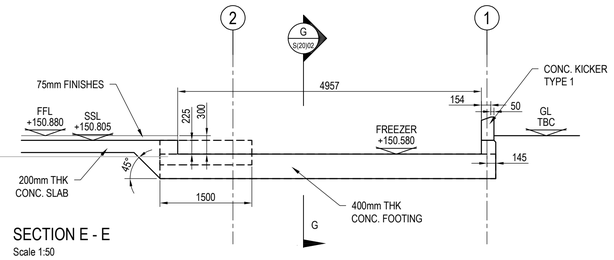
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Revision
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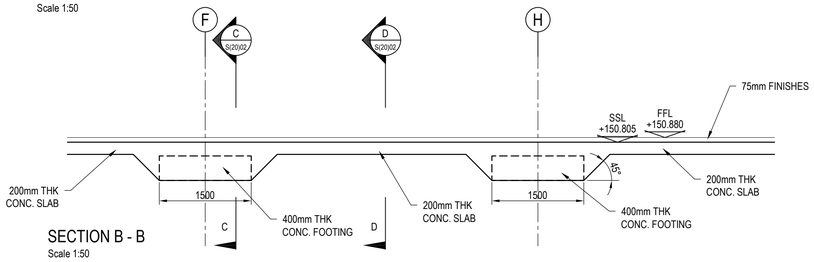
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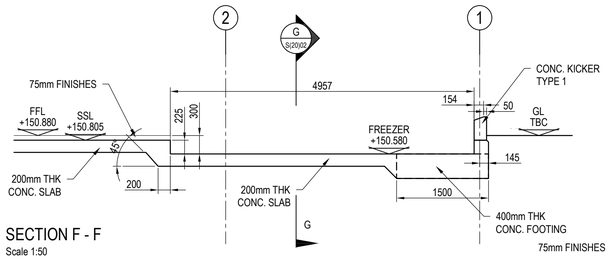
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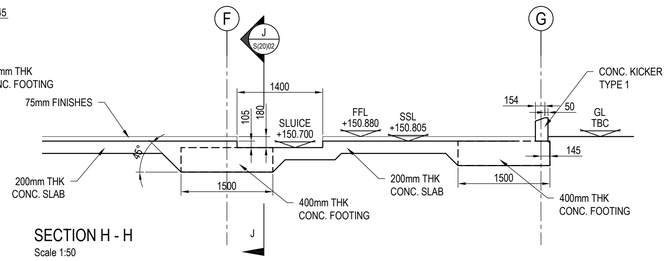
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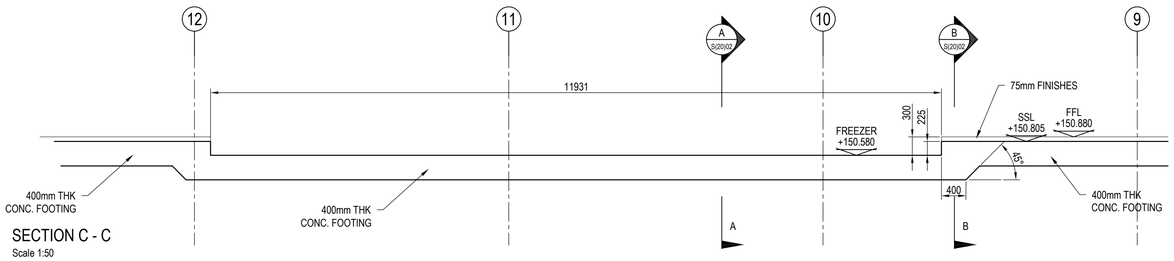
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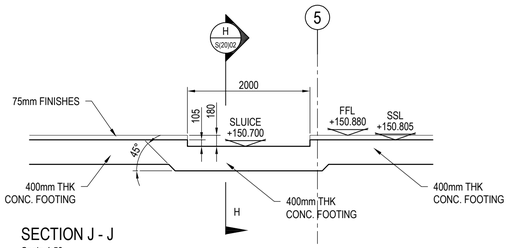
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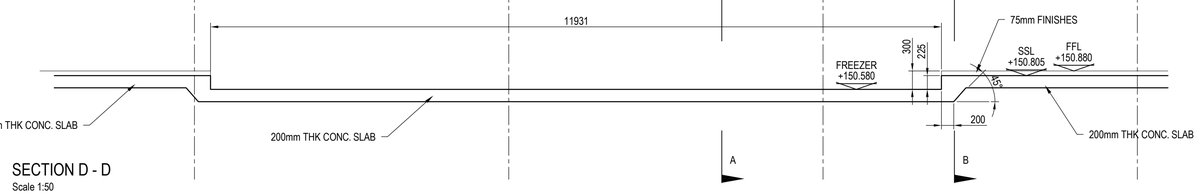
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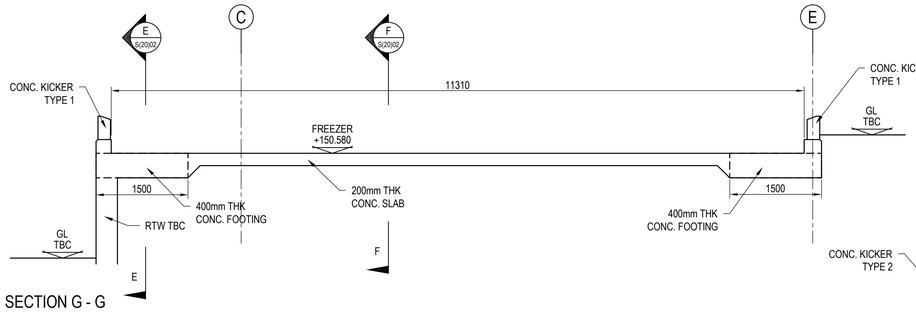
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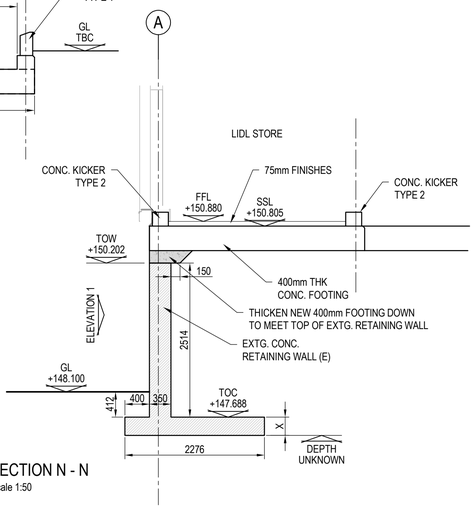
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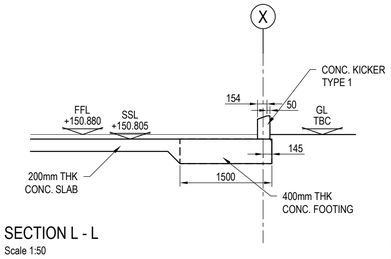
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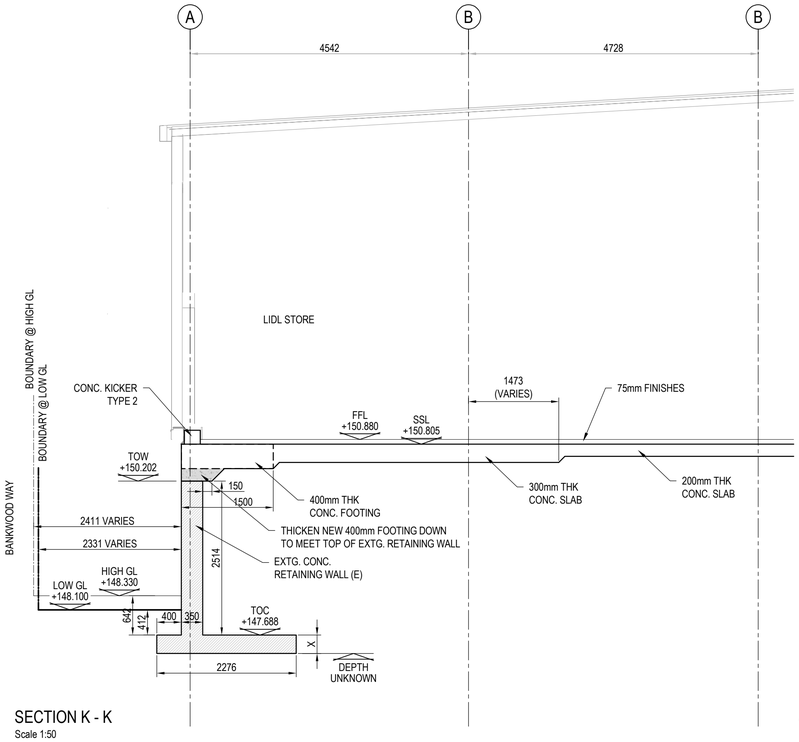


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SECTION M - M
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SECTION L - L
Scale 1:50



SECTION K - K
Scale 1:50

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FOUNDATIONS	DC-1	130 C

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SLAB	FLOATED	---	SHUTTER	SHUTTER

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A	MINOR CHANGES	RL	CM	CM	02.03.26

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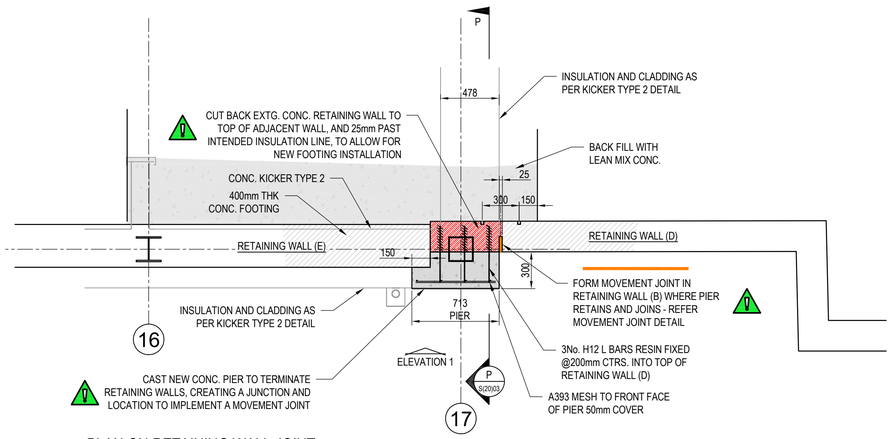
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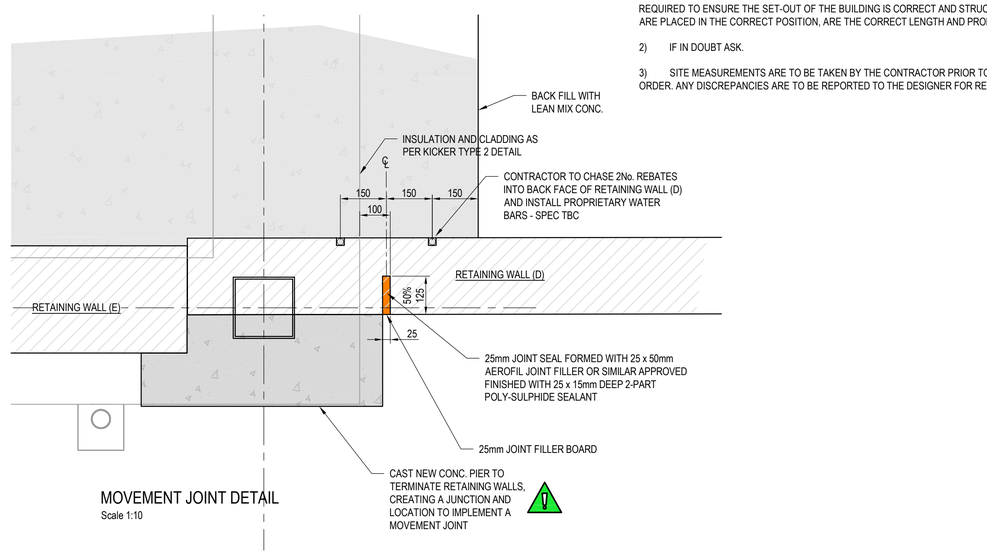
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E:\JME CJAMESON\JCE\DRAWINGS\NEW\PROJECTS\BIRSTALL\DRAWINGS\BIRSTALL 4529 JCE S(20) 02 SECTIONS.DWG | PLOTTED BY: RICHARD.WATSON | PLOTTED DATE: 25/March/2026 09:53:33



PLAN ON RETAINING WALL JOINT

Scale 1:25



MOVEMENT JOINT DETAIL

Scale 1:10

0m 0.5m 1m 1.5m 2m 3m 4m 5m

SCALE 1:50 - ENSURE PDF'S ARE PRINTED AT 1:1

CDM 2015 RISK NOTES

THE PROJECT HAS BEEN ASSESSED FOR SPECIFIC CONSTRUCTION RISK. THOSE RISKS THAT A COMPETENT CONTRACTOR SHOULD BE AWARE OF ARE NOT LISTED HERE. RISKS THAT ARE INHERENT IN THE DESIGN DECISIONS TAKEN THAT A CONTRACTOR NEEDS TO BE AWARE OF ARE HIGHLIGHTED BELOW AND REFERENCED IN LOCATION ON THE DRAWING PLANS BY THE NOTED SYMBOL.

① NO SPECIFIC ISSUES TO HIGHLIGHT. CONTRACTOR TO REVIEW SEQUENCE OF WORKS AND DISCUSS WITH THE ENGINEER.

SITE & DRAWN MEASUREMENTS

1) DRAWN DIMENSIONS ARE BASED ON ARCHITECTS DRAWINGS OR INTERPOLATED FROM ELECTRONIC FILES. THE CONTRACTOR SHOULD TAKE SITE MEASUREMENTS AS REQUIRED TO ENSURE THE SET-OUT OF THE BUILDING IS CORRECT AND STRUCTURAL ITEMS ARE PLACED IN THE CORRECT POSITION, ARE THE CORRECT LENGTH AND PROPORTIONS.

2) IF IN DOUBT ASK.

3) SITE MEASUREMENTS ARE TO BE TAKEN BY THE CONTRACTOR PRIOR TO MATERIAL ORDER. ANY DISCREPANCIES ARE TO BE REPORTED TO THE DESIGNER FOR REVIEW.

NOTES:
DO NOT SCALE FROM THIS DRAWING, UTILISE ONLY NUMBERED DIMENSIONS.
THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS, NOTIFY JAMESON CONSULTING LTD, IMMEDIATELY OF ANY DISCREPANCIES. UNLESS NOTED OTHERWISE.
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DRAWING STATUS

AS BUILT STATUS

GENERAL NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE SHOWN FOR DESIGN AND TENDER PURPOSES ONLY. ACTUAL SURVEY OR ARCHITECTS DIMENSIONS SHOULD BE USED IN ALL CASES. BUILDER/CONTRACTOR TO SATISFY THEMSELVES THAT DIMENSIONS ARE CORRECT PRIOR TO MATERIAL ORDER.
3. REFER ARCHITECTS DRAWINGS FOR CONSTRUCTION AND FINISH REQUIREMENTS.
4. NOTIFY JAMESON CE LTD IMMEDIATELY IF ANY DISCREPANCY ARISES.

CONCRETE NOTES

1. ALL CONCRETE WORK IS TO BE IN ACCORDANCE WITH JCE-LTD NBS-SECTION E

2. RELEVANT CONCRETE MIX DESIGN :-

CONCRETE ELEMENT	DESIGN CHEMICAL CLASS	SPEC. CLAUSE No.
SLAB	DC-1	130 D
RETAINING WALLS	DC-1	130 O
FOUNDATIONS	DC-1	130 C

3. SURFACE FINISH TO CONCRETE TO BE IN ACCORDANCE WITH SECTION 600. ALL FACES TO BE "AS CAST" UNLESS SPECIFIED BELOW :-

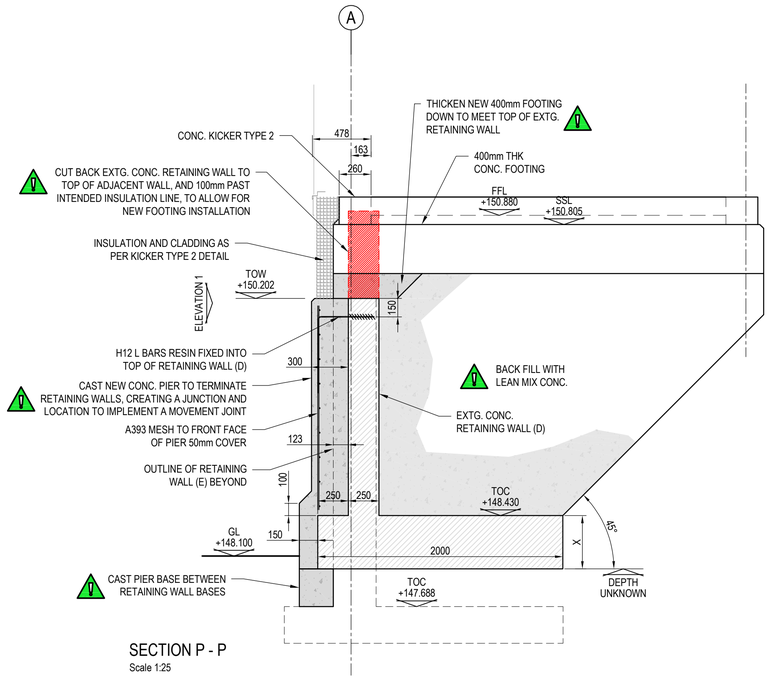
CONCRETE ELEMENT	SURFACE FINISH			
	TOP	BOTTOM	SIDE	END
-	-	-	-	-

4. ALL SERVICE ACCESSES TO BE RAISED TO NEW LEVEL.

5. ALL SURFACE MOUNTED KIT TO BE REMOVED, STORED AND REFITTED.

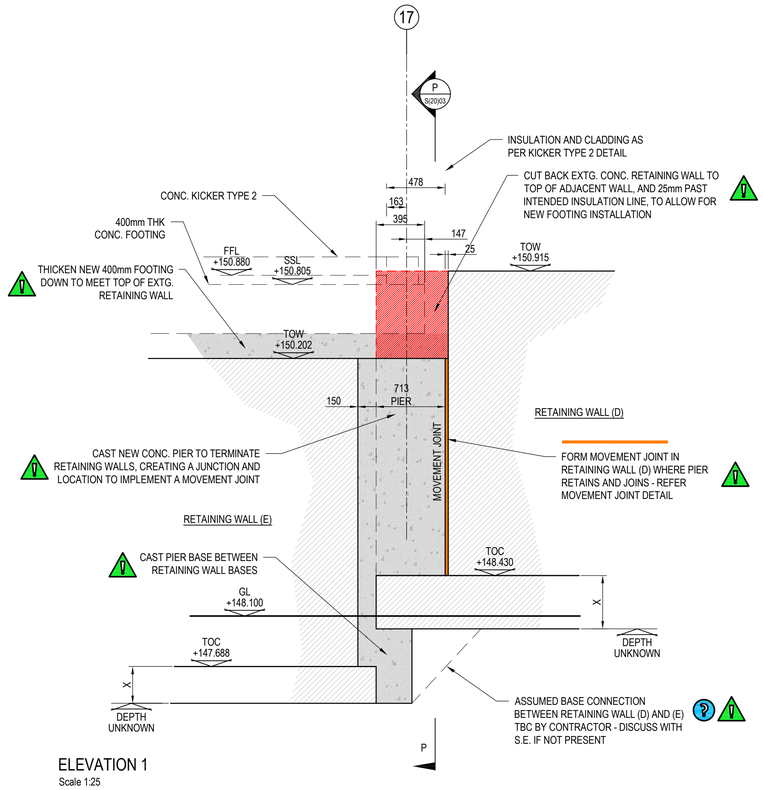
6. REFER JCE SPECIFICATION FOR CONCRETE CURING PROVISION. CARE TO BE TAKEN TO CURE TOPPING TO PREVENT EARLY SHRINKAGE CRACKS.

7. FORMED JOINTS AS PROPOSED ON PLAN TO BE FOLLOWED UNLESS PRIOR AGREEMENT SOUGHT FROM JCE LTD.



SECTION P - P

Scale 1:25



ELEVATION 1

Scale 1:25

REV	DESCRIPTION	BY	CHK	APP	DATE
B	DRAWING STATUS REVISED TO AS BUILT	RL	CM	CM	02.09.26
A	PIER WIDTH REDUCED. DRAWING STATUS REVISED.	RL	CM	CM	04.03.26

JAMESON CONSULTING

Pure Offices, 4100 Park Approach, Thorpe Park, Leeds LS15 8GB
0113 8231 915 info@jamesonconsulting.co.uk

Client:

LIDL

Project:

LIDL BIRSTALL
LEEDS

Drawing Title:

PROPOSED NEW STORE
FOUNDATION SECTIONS 02

Scale	Drawn	Date	Checked	Date	Approved	Date
A1 1:50 & 25	RL	FEB 26	EJ	FEB 26	CM	FEB 26

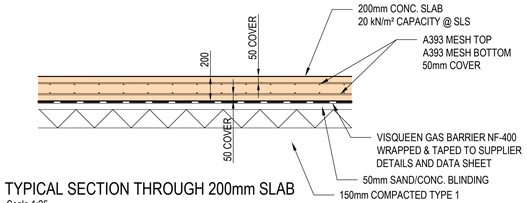
Drawing No. 4529 JCE S (20) 03

Revision B

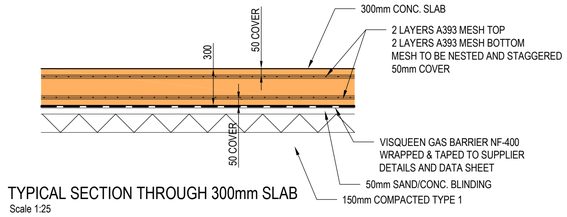
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SHEET SIZE : A1 LANDSCAPE

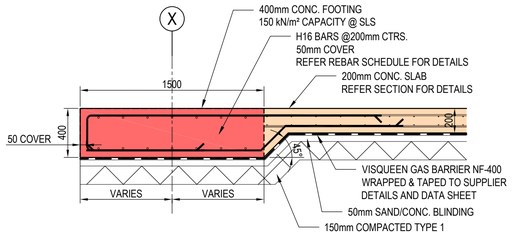
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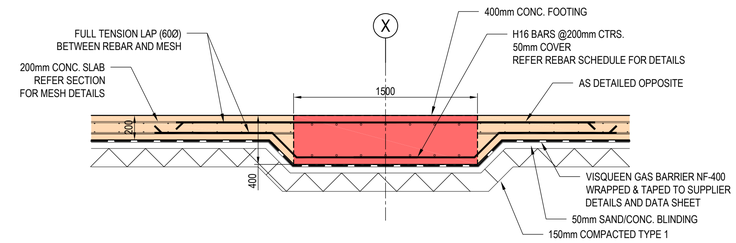
TYPICAL SECTION THROUGH 200mm SLAB
Scale 1:25



TYPICAL SECTION THROUGH 300mm SLAB
Scale 1:25

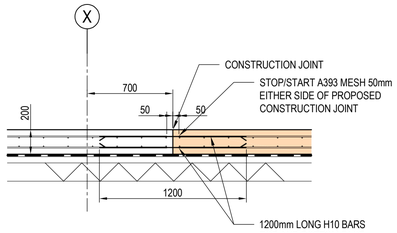


TYPICAL SECTION THROUGH CONC. FOOTING (400mm)
Scale 1:25

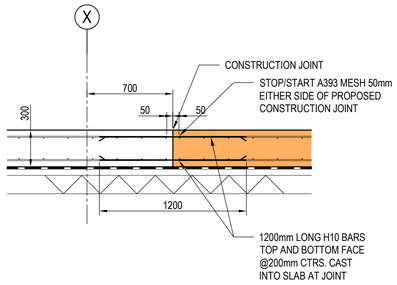


TYPICAL SECTION THROUGH CONC. FOOTING TO 200mm SLAB (BOTH SIDES)
Scale 1:25

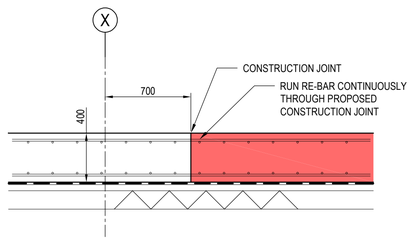
CONSTRUCTION JOINT DETAILS



CONSTRUCTION JOINT THROUGH 200mm SLAB
Scale 1:25



CONSTRUCTION JOINT THROUGH 300mm SLAB
Scale 1:25



CONSTRUCTION JOINT THROUGH CONC. FOOTING (400mm)
Scale 1:25



SCALE 1:50 - ENSURE PDF'S ARE PRINTED AT 1:1

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AS BUILT STATUS

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RETAINING WALLS	DC-1	130 O
FOUNDATIONS	DC-1	130 C

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CONCRETE ELEMENT	SURFACE FINISH			
	TOP	BOTTOM	SIDE	END
SLAB	FLOATED	---	SHUTTER	SHUTTER

4. ALL SERVICE ACCESSES TO BE RAISED TO NEW LEVEL.
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7. FORMED JOINTS AS PROPOSED ON PLAN TO BE FOLLOWED UNLESS PRIOR AGREEMENT SOUGHT FROM JCE LTD.

DRAWING KEY - PRINT IN COLOUR
- 400mm THK CONC. FOOTING
- 300mm THK CONC. SLAB
- 200mm THK CONC. SLAB
- RECESSED 200mm THK CONC. SLAB

REV	DESCRIPTION	BY	CHK	APP	DATE
A	DRAWING STATUS REVISED TO AS BUILT	RL	CM	CM	02.09.26

JAMESON CONSULTING
Pure Offices, 4100 Park Approach, Thorpe Park, Leeds LS15 8GB
0113 8231 915 info@jamesonconsulting.co.uk

Client:

Project:
LIDL BIRSTALL
LEEDS

Drawing Title:
PROPOSED NEW STORE
FOUNDATION SECTIONS 03

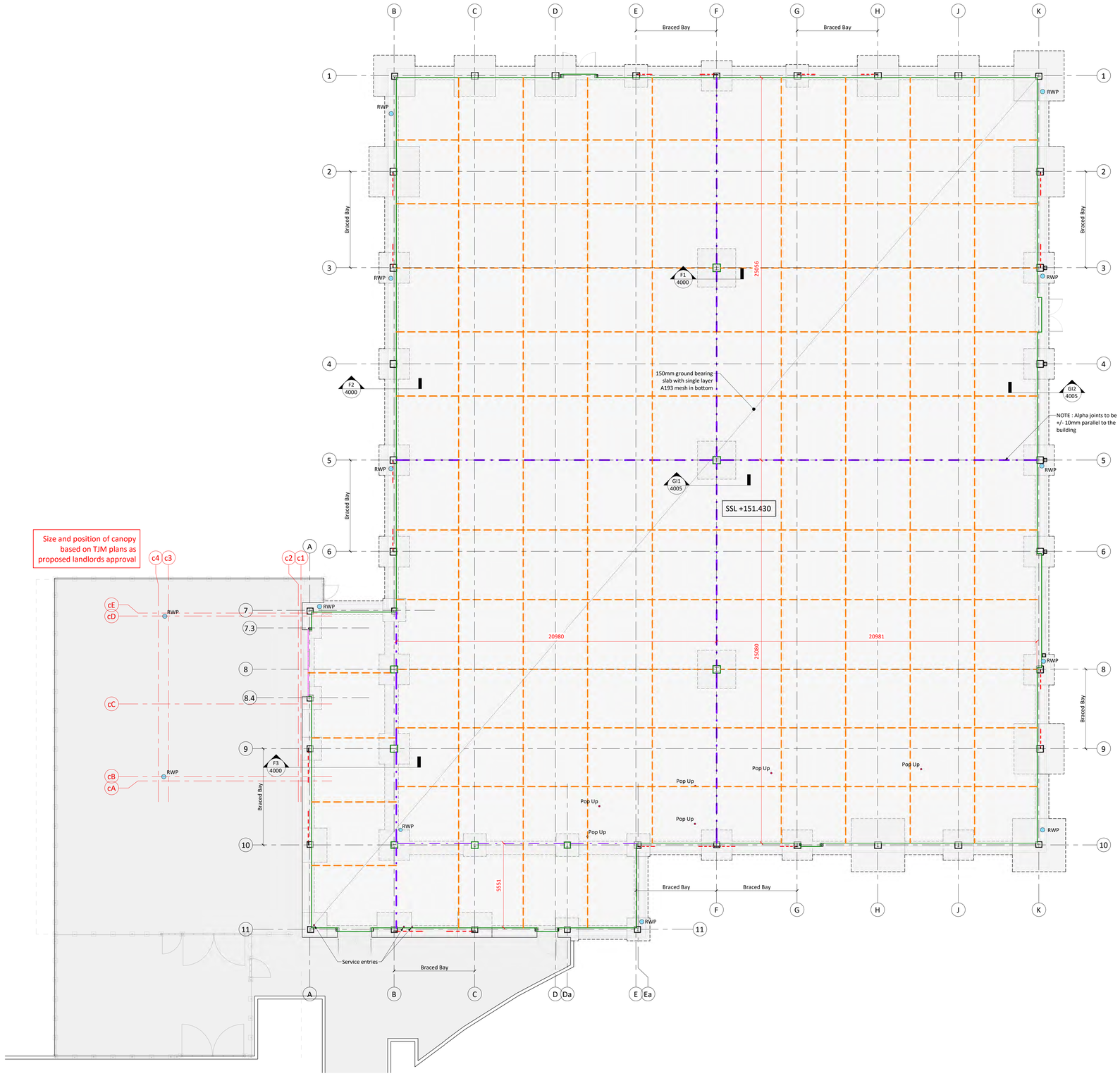
Scale	Drawn	Date	Checked	Date	Approved	Date
A1 1:25	RL	MAR 26	CM	MAR 26	CM	MAR 26

Drawing No.
4529 JCE S (20) 07

Revision
A

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SHEET SIZE : A1 LANDSCAPE

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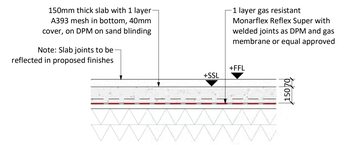


Size and position of canopy based on TJM plans as proposed landlords approval

GF Ground Floor Slab Plan
1 : 100

Slab Joint Key:

- Armoured Alpha Joint (AJ)
- Isolation Joint (IJ)
- Cut Joint (CJ)
- Armoured Edge Joint (AEJ)



S1 Section Through Slab
1 : 20

Do Not Scale

Drawing Notes

1. For general notes refer to Adept drawings 0151 & 0152.
2. This drawing is to be read in conjunction with all Architect's drawings from which all setting out details, dimensions, levels & waterproofing should be confirmed.
3. The Contractor is to check all drawings and report any discrepancies immediately.
4. All work is to be carried out in accordance with current edition of The Building Regulations and to the satisfaction of the Local Authority Building Inspector.
5. The symbols represented on Adept drawings should be read in conjunction with BS8541-2.
6. DPM and insulation to architects details.
7. All levels are in metres to ordnance datum.
8. Ground gas protection measures in accordance with BS8485:2019 to the below CS2 ground protection scores.
   - 150mm Slab, Type D = 1.5 pts
   - 150mm Slab, Type C = 2.5 pts
9. All gas protection details indicative and to be designed by a specialist.

FINAL CONSTRUCTION ISSUE

This final construction drawing is based on information supplied to Adept by the Principal Contractor which amends the construction issue and may incorporate instructions and other design information supplied to the Principal Contractor by others. Where future works to elements on this drawing are required it is recommended that adequate investigatory work is carried out to determine the accuracy of the information contained in this drawing. Adept cannot accept any liability for the accuracy of the information as this drawing includes data provided by others.

Date	Description	By	Chk	Rev
27.08.26	Final Construction Issue	GJH	VM	C3
24.07.26	RWP locations updated, slab bay sizes added	GJH	VM	C2
14.05.26	Construction Issue	JW	VM	C1
24.03.26	Pad footings added for canopy, layout updated to suit reduced gas protection requirements	GJH	VM	P7
06.02.26	Floor slab joints added	GJH	VM	P6
03.02.26	RWPs added and slab level updated to suit revised finishes	GJH	VM	P5
15.01.26	Slab thickened between grids 9-11, gas venting system added	GJH	VM	P4
12.12.25	Pop up locations added	GJH	VM	P3
08.12.25	Grid 10-11 floor area extended, gable columns added, steelwork and grids updated to suit	GJH	VM	P2
14.11.25	Initial issue	GJH	VM	P1

ADEPT
CIVIL AND STRUCTURAL CONSULTING ENGINEERS
Web www.adeptcsce.com
Email inbox@adeptcsce.com
Tel 0113 239 4518
Office 1912 Mill, Sunny Bank Mills, Farsley, Leeds LS28 5UJ

Project
Proposed Retail Unit
Birstall, Bankwood Way

Title
Ground Floor Slab Layout

Client
Cookridge Estates

Scale @ A0	Initial author	Initial checker	Approver	Initial Date
As indicated	JW	VM	GS	Nov. '25

Status	Purpose	Adept Project Number
A	Final Construction	00.20321

Project-Originator-Functional Breakdown-Spatial Breakdown-Form-Discipline-Number: 00.20321-ACE-ZZ-00-D-S-4010 Rev. C3