



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

LIDL GB LTD

Lowry House, Chorlton

Remedial Strategy

LC/C5061/13280 Rev A

January 2025

EXECUTIVE SUMMARY OF REMEDIAL PROPOSALS

Remedial Requirements	Verification Requirements
Removal of all hardstanding, floor slabs basement structures, relic foundations etc across the site alongside removal of existing drainage runs.	Crush materials destined for re-use to meet chemical criteria as per Appendix A.
It is recommended within the UXO report that there should be an Unexploded Ordnance (UXO) briefings prior to works taking place.	Confirmation that no UXO encountered during construction works, or if encountered measures taken to mitigate risk.
Excavation, screening and engineering / re-use of soils to an appropriate specification.	Materials destined for re-use to meet chemical criteria as per Appendix B.
Installation of clean cover system in soft landscaping areas by the turning circle which should comprise (top down): • Minimum 100mm “clean” validated topsoil; over • 350mm “clean” validated subsoil. Elsewhere hardstanding will break the pathway to site end users/ human health. For areas of proposed trees, a tree pit will need to be excavated and additional subsoil provided above the hard dig layer / membrane. Installation of ground gas protection measures (to CS2). The above is subject to agreement with the local authority, and requirements should be confirmed at the earliest opportunity.	Imported topsoil and subsoil, and any materials re-used requiring chemical testing as per Appendix A. Thickness of clean cover system requires validation. Verification of the installation of ground gas protection measures.
On completion of the above follow final verification reporting requirements.	Final verification and reporting to include (but not limited to): • All the material imported to the site (including volume, source and chemical composition). • All the material exported from the site (including volume, destination and chemical composition). • Clean cover thickness validation records. • Gas protection measures verification records.

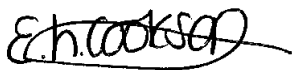
This executive summary should be read in conjunction with the full report, reference LC/C5061/13280 Rev A, and not as a standalone document. Document Version 2.3.

PROJECT QUALITY CONTROL DATA SHEET

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DRAWINGS		
Drawing Number	Rev	Title
XX-XX-DR-A-91002	-	Proposed Site Plan – Option 2
C5061/01	-	Site Location Plan
C5061/02	-	Exploratory Hole Location Plan
24245-DR-S-0221	P1	Substructural Details

APPENDICIES	
Appendix	Title
Appendix A	Chemical Specification for Soils
Appendix B	BSL Guidance -Re-use of Waste and Disposal
Appendix C	Ground Gas Protection System Typical Details and Data Sheets

1.0 INTRODUCTION

1.1 Context

This Remedial Strategy has been produced by Brownfield Solutions Limited (BSL) for Lidl GB Ltd on a site at Lowry House, Chorlton and has been completed in general accordance with the following guidance:

-
- Environment Agency guidance - Land Contamination: Risk Management (LCRM).
 - BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.
-

1.2 Background and Scope

This Remedial Strategy is to set out how the remediation of the site will be undertaken and how the works will be validated. The document explains how the works will be permitted under current regulatory regimes and has been produced to address conditions 11a and 11b of Manchester City Council Planning Permissions reference 135647/FO/2022.

The scope of work for this document comprises a summary of the ground model, summaries of the of risk assessments carried out, a remedial options appraisal (LCRM Stage 2), Remedial Strategy (LCRM stage 3) implementation details and any validation requirements.

Note that geotechnical aspects are not specifically addressed within this document as it seeks to meet the requirements set out within LCRM. Geotechnical aspects should be considered within a Geotechnical Design Report in accordance with Eurocode 7 or a suitable site specific Earthworks Strategy.

1.3 Proposed Development

The proposed development is for commercial end use comprising the demolition of the existing structure on site and the construction of a steel framed Lidl retail building with associated car park and soft landscaping areas as shown on drawing No. XX-XX-DR-A-91002 Proposed Site Plan -Option 2 provided by the client.

1.4 Available Information

The following reports have been produced for the site and should be read in conjunction with this assessment (in date order):

-
- BSL Desk Study Assessment Report, reference JEM/C5061/11005, dated April 2022.
 - BSL Phase II Geo-Environmental Assessment Report, reference MS/C5061/11249 Rev A, dated September 2022.
-

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

1.5 Limitations

This report has been prepared for the sole use and reliance of the Client, Lidl GB Ltd. This report shall not be relied upon or transferred to any other parties without the express written authorisation of BSL. If an unauthorised third party comes into possession of this report they rely on it at their risk and the authors owe them no duty of care or skill.

Current UK guidance and legislation has been used in the environmental assessment of the site, BSL is not liable for any subsequent changes in the guidance and legislation.

BSL have used reasonable skill, care and diligence in the production of this report. The findings and opinions conveyed via this report are based on information obtained from a number of sources as detailed within this report, BSL have assumed this information is correct and reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon. This report may not be relied upon by the client or submitted to a third party for their reliance for the purposes of valuation, mortgage, insurance and regulatory approval, until all invoices have been settled in full.

The recommendations within this report are based upon the proposed site end use provided to BSL at the time of writing. If the end use or development layout changes from the proposal, then the recommendations may change or become invalid.

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

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

2.0 GROUND MODEL SUMMARY

2.1 Description of Site

The site is located at Lowry House, Chorlton, M21 7AA. It is situated approximately 5.25 Km south of Manchester City Centre, centred on National Grid Reference 382509, 393220 as shown on the Site Location Plan, Drawing No. C5061/01.

The main site features and potential issues identified during the time of the intrusive investigation are detailed below:

Feature	Description
Site Area	Approximately 0.7 hectares.
Site Access	Access to the site is gained off Nell Lane to the southwest.
Current Land Use and Site Features	The site comprised an existing four storey office building of brick masonry/concrete frame construction with associated hardstanding car park and soft landscaping areas. As of 2023, this is understood to have been demolished. A large sewer is known to traverse through the site. Additional underground services appear to be present associated with the office building including lighting and drainage for the car park, with several manhole covers noted. A potential borehole standpipe cover was also noted at one location, potentially suggestive that a third party may have carried out intrusive ground investigations at the site at some point in the recent past.
Potential Sources of Gross Contamination	There were no apparent potential sources of gross contamination. However, given the apparent age of the building, it may have contained ACMs – these should have been removed prior to demolition.
Vegetation	There was an area of soft landscaping of grass with occasional hedges and semi/mature trees along the north-eastern, eastern and southern site boundary. An area of grass was present on the western boundary.
Topography	The site is generally flat. However, the car parking area to the south is raised above street level to maintain the level across the site.
Site Boundaries	The site was bound to the north, east, south and west by panel form wire mesh security fencing. The only exceptions to this are on the eastern boundary to Mauldeth Road West where there is a masonry wall with a gate topped with panel form wire mesh security fencing and additional semi/mature trees to the northeast, and at the north of the western boundary where the wall of the onsite office building makes up the boundary.
Surrounding Area	The site is set within a predominantly residential area, bordered by Chorlton High School to the north, residential properties to the east, south and northwest. Chorlton park is present to the southwest of the site.

2.2 Environmental Setting

Site History

The site has had previous development since 1849. Buildings associated with Houghend Hall were present in the south of the site. An infilled pond was also noted in the southeast of the site. By 1974 an office block was erected in the northeast half of the site; this is understood to have been demolished during 2023.

Published Geology

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

- Made Ground; over

- Glaciofluvial Deposits; over
- Wilmslow Sandstone Formation.

Hydrogeology

Based on the inferred geology, a summary of the Environment Agency aquifer designations is presented in the table below:

Stratum	Coverage	Aquifer Designation
Glaciofluvial Sheet deposits	Full Site	Secondary (A) Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Wilmslow Sandstone Formation	Full Site	Principal Aquifer. This is Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

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

There are no active groundwater abstractions within 1000m of the site and no abstractions for potable water supply within 2000m of the site.

Hydrology

The nearest named watercourse and surface water features is Chorlton Brook located 99m north of the site.

Potential Environmental Constraints

There is one recorded historic landfill within 500m, it is located 181m SE at Nell Lane accepting Environmental Permitting Regulations Waste. No further information is supplied. It is considered that this is related to the refuse destructor identified on historical mapping; it does not appear to be a feature that has been infilled.

Radon

Information from the environmental database report indicates the property is in an area where <1% of properties are above the Action Level for radon, and therefore radon protective measures are not required in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2023 Edition.

UXO Risk

In accordance with CIRIA Report C681, BSL have reviewed non-specialist UXO data for the site using the online Zetica Bomb Risk Mapping data. The map indicates the site to be in an area where the bomb risk is moderate.

A Detailed UXO Risk Assessment Report was procured from Brimstone Site Investigation, reference DRA-22-1423-BROW69R-Lowry House, Chorlton, dated August 2022. The report assesses a low to moderate risk from UXO and recommended UXO safety awareness briefings during intrusive works.

2.3 Ground Conditions

Observed Geology and Groundwater

From the investigations carried out, the ground conditions can be summarised as below (top down):

- Made ground generally comprising sands and gravels / sandy gravelly clay from ground level to between 0.60m and 2.60m bgl. Generally, less than 1.00m thick. Deeper deposits were encountered outside the proposed footprint (WS02 & WS03).

-
- Natural superficial deposits comprising sand / clay proven to depths between 5.45m and 10.65m bgl.
 - Groundwater levels ranging between 2.70m and 3.10m bgl during site works.
 - Post site works monitoring levels ranging between 2.07m and 3.59m bgl.
-

Observations

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

No evidence of contamination was observed at the site.

3.0 SUMMARY OF RISK ASSESSMENTS

3.1 General

The previous site investigation has confirmed the following:

- Localised PAH contamination within the made ground in the north corner of the site.
- The ground gas risk assessment indicates that the site should be categorised as CS2 and ground gas protection measures are required.
- Moderate to Low risk of UXO.

3.2 Human Health Risks

Made ground underlies the whole site. Testing of the made ground at the site did not reveal any exceedances of heavy metals, petroleum hydrocarbons, BTEX or MTBE compounds. No asbestos was identified in any of the six samples tested.

An exceedance in PAHs has been identified in one sample of made ground (WS08 at 03.0m to 0.60m bgl), with PAH contamination (Benzo(a)pyrene).

Whilst HWOL analysis found that the soil sample from WS02 at 0.50-0.70m depth was hazardous from a waste disposal perspective, it was not found to pose a significant risk to human health bar a small exceedance of Dibenzo(a,h)anthracene. Whilst this hole is over an area of soft landscaping this material will not leave site and therefore would not technically count as hazardous and in any case the small PAH risk will be addressed by the proposed remedial options.

3.3 Permanent Ground Gases and Vapours

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

- BSL conducted 4 monitoring visits over 2 months, in line with CIRIA C665 guidance.
- The highest carbon dioxide concentrations were recorded within WS07 (9.0% v/v) on the third monitoring visit.
- Methane was not recorded above the limit of detection (0.1% v/v) in any of the boreholes.
- The maximum steady state gas flow rate was 0.1 l/hr.

The main sources of ground gas identified were on site made ground and infilled ponds.

On the basis of the above and the assessment carried out, the site is classified to fall within Characteristic Situation 2 in accordance with CIRIA 665. Ground gas protection measures are therefore required within new buildings at the site.

3.4 Risk to Controlled Waters

The site is not considered to pose a significant risk to controlled water for the following reasons:

- No significant contamination has been identified on site in soils based on the results obtained as a potential indicator of groundwater contamination.
- The nearest watercourse is 99m away, which provides considerable distance for attenuation and contaminant degradation.
- The site is underlain by low permeability clays at depth which will inhibit lateral and vertical contaminant migration.

- The site does not lie within 500m of an SPZ.
- There are no groundwater abstractions within 1000m.
- There are no potable (sensitive) water abstractions within 2000m.

3.5 Summary

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

Source	Receptor
<- Poses an unacceptable risk to ->	
Elevated concentrations of PAH present within the made ground	Human health / construction workers (Commercial screening criteria adopted)
Ground gas (carbon dioxide)	Human Health and Property
UXO	Human Health and Property

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

4.0 REMEDIAL OPTIONS APPRAISAL

4.1 Remediation Options

This section has been produced in general accordance with the requirements of LCRM: Stage 2 Options Appraisal.

The Investigations and risk assessment have concluded that the site will require remediation is the action required to prevent, minimise, remedy or mitigate the effects of the identified unacceptable risks listed in the section above.

The remediation of the site will need to ensure that upon completion of the development, the ground conditions at the site can be shown to be appropriate for the intended use and that they will not pose unacceptable contamination risks to the identified receptors.

For the options appraisal, there are 3 steps to follow:

- 1) Identify feasible remediation options.
- 2) Do a detailed evaluation of options.
- 3) Select the final remediation option.

The objectives of the remediation will be to sever one or more of the linkages within the source-pathway-receptor (S-P-R) model. There are three broad approaches which can be adopted:

- Remove or treat the source of pollutants.
- Remove or modify the migration pathway.
- Remove or modify the behaviour of the receptor.

The options appraisal process considers the available remedial techniques to achieve the above based on following key criteria:

- Effectiveness.
- Practicality.
- Durability.
- Relative Cost.
- Relative Operational Time (in terms of installation or the activity).
- Sustainability.

The feasibility of each of the listed remedial option is assessed in terms of effectiveness at treating the contamination, which is broken down into; effective (Yes), partially effective (Partially) or not effective (No).

The listed techniques are also assessed in terms of relative cost ranging from negligible cost (£) through moderately expensive (££) to prohibitively expensive (£££).

Timescales over which the remediation technique is operational has been relatively assessed as weeks, months, years and decades. If a given technique is only effective over a period in the order of years to decades then its overall feasibility is diminished.

A sustainable approach can help to ensure that the benefit of doing the remediation is greater than its impact.

The table below summarises the possible remedial options and assesses each against the six key criteria listed above:

Remedial Activity	Effective	Relative Cost	Operational Time	Comments (Practicality / Sustainability / Durability)	Feasible
Civil Engineering Methods					
Cover System	Yes	£	Weeks	Will prevent contact between site end users and shallow contaminated soils, breaking the S-P-R linkage.	Yes - considered a suitable remediation option to mitigate the risk to human health.
Excavation and Disposal (may also require pre-treatment by screening & sorting).	Yes	£££	Weeks	This will effectively remove the source of the contamination, but is much less sustainable compared to other feasible options (excessive cost, take up of landfill space, transport issues, need to replace with clean material)	Yes – would be possible in conjunction with other options, however could be costly.
Materials Management (Excavation and Re-Use of Suitable Materials)	Yes	££	Weeks	Excavation and re-use of any suitable materials and potential re-use of treated materials at a suitable depth. Would need to be undertaken in association with a Materials Management Plan (MMP) prepared in accordance with the CLAIRE Definition of Waste Code of Practice and signed off by a Qualified Person.	Yes – in conjunction with other options if there is a requirement for re-use of materials.
Stabilisation and Solidification	No	££	Weeks to months	Mixing of cement/lime into soils to effectively bind contamination to minimise migration from soil to vapour and dissolved phases and reduce the mobility of contaminants in soils. Bench trials would be required to determine the most suitable binder formulation and to prove that solidification/stabilisation will be effective in reducing leachate concentrations. Option would still require a cover system to mitigate human health risks.	Yes, but discounted as it is considered there is no need for such an aggressive remediation technique.
New water supply pipelines	Yes	£	Weeks	A pipeline risk assessment will be required to determine the most suitable pipe materials for potable water supply.	Yes – in conjunction with other options.
Ground Gas Protection Measures	Yes	£	Weeks	Installation of proprietary gas protection measures to prevent ingress of ground gases / hydrocarbon vapours. Readily available and practical to install. Suitable for the lifetime of the development, relatively sustainable.	Yes – in conjunction with other options.
Biological Methods					
Not considered to be relevant to the subject site.					
Chemical Methods					

Remedial Activity	Effective	Relative Cost	Operational Time	Comments (Practicality / Sustainability / Durability)	Feasible
Not considered to be relevant to the subject site.					
Physical Methods					
Not considered to be relevant to the subject site.					

4.2 Selected Remedial Options

Based on the above remedial options appraisal, the most appropriate approaches to the residual risks are listed below:

- Utilise ground gas protection measures in proposed store, comprising a gas resistant membrane beneath the concrete slab.
- Undertake a water supplier pipeline Risk Assessment/Utilise barrier pipe for water feed.
- Utilise a clean cover system in areas of soft landscaping.

The options selected have been chosen because they are considered to be effective, can be carried out practically within the available time periods and are commercially viable.

4.3 Site Remediation Requirements

The key requirements are summarised in the table below:

Source	Contaminants of Concern	Remediation Method	Further Details / Remedial Requirements
1 – Made Ground	Ground Gas (CO ₂)	CS2 Gas Protection Measures	Based on the risk assessments undertaken, gas protection measures should be implemented based on the requirements of 'Characteristic Situation 2 (CS2)' in accordance with BS8485.
2 – Made Ground in WS08 and WS02	PAHs	Installation of Clean Cover System	In the area of the proposed HGV turning circle in the north corner of the site, as shown on the 'Proposed Site Plan – Option 2' (XX-XX-DR-A-91002), the risk will be mitigated by concrete hardstanding; any areas of soft landscaping should have a cover system comprising "clean" validated topsoil/subsoil installed.

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

Detailed requirements are discussed in section 5.0 below. Note where the word "clean" is used from here on, the definition of this shall mean chemically suitable for the intended use.

5.0 DETAILED REMEDIAL REQUIREMENTS AND OTHER CONSTRAINTS

5.1 General

This section is intended to fulfil the requirements of LCRM Stage 3: Remediation and Verification.

All remedial works are to be overseen by suitably experienced and qualified site staff and a site watching brief will be in place alongside regular visits by a suitably qualified person to undertake the necessary verification works described.

The table below provides a summary of requirements in terms of the approximate order of works. It should be noted that the precise sequencing has not yet been confirmed by an appointed Contractor. This Remedial Strategy may also be subject to revision, dependant on the requirements of the regulators.

Task	Description
1.	Pre-Commencement - Approval of this Remedial Strategy with the Local Authority, Warranty Provider (e.g. NHBC) and Environment Agency (EA) prior to site works commencing. - Appointment of contractor for the works, who is to obtain appropriate permits, licences and approvals. Other appointments as per CDM requirements. - Production and declaration of a Materials Management Plan (MMP) under the DoWCoP prior to any works commencing or confirmation of waste exceptions (U1) to be in place (if required).
2.	Site Clearance and Demolition Works Subject to all necessary ecological and arboricultural surveys being undertaken and appropriate mitigation measures in place, the site should be cleared and any vegetation below areas of proposed development should be stripped in accordance with Series 200 of the Specification for Highway Works. Demolition of buildings, removal of hardstanding, floor slabs, drainage runs etc. A watching brief should be maintained during demolition and clearance/soils strip for any previously unidentified contamination.
3.	Installation of a Ground Gas Protection Measures Installation of ground gas protection measures to comply with CS2. Protection measures to be designed in accordance with BS8385:2015+A1:2019.
4.	Installation of a Clean Cover System / Placement of Soft Landscaping Area Soils Installation of “clean” validated cover system in soft landscaping areas in the area of the proposed HGV turning circle in the north corner of the site, as shown on the ‘Proposed Site Plan – Option 2’ (XX-XX-DR-A-91002) to provide growing medium. Imported soils to be used as part of the cover layer should meet the chemical criteria outlined in Appendix A.
5.	Verification and Reporting of Remedial Work The landscaped areas in the area of the proposed turning circle will require depth validation. The ground gas protection measures will require verification in accordance with CIRIA C735. Collation of information relating to site clearance, chemical testing, any remedial works, remedial verification, material movements and waste transfer documentation where appropriate. A closure Verification Report will be required to close out the declared Materials Management Plan and submitted to CL:AIRE (if an MMP is utilised). Complete remedial validation report(s) in line with regulatory guidance and warranty provider requirements. The report(s) should be submitted to the Local Authority and warranty provider for approval following completion.

5.2 Demolition Works

Issues surrounding demolition of above ground buildings is outside the scope of this report, it is assumed that all existing above ground buildings and structures will be removed to ground level prior to remedial works commencing, following completion of any enabling works such as asbestos removal where present.

The excavation of all hardstanding areas, slabs, basement structures, relict foundations and similar below ground obstructions, will be undertaken with materials stockpiled and tested to determine their fate (on-site re-use or off-site disposal) in accordance with a Materials Tracking System.

All excavations should be suitably benched or otherwise supported for the duration of the works in accordance with relevant industry guidance.

Redundant drainage associated with the previous development will require chasing out. Existing connections to be located and capped to prevent contaminated groundwater entering the off-site drainage. The contractor should locate and record connection points and maintain off site connection pipework to allow for future connection if required.

It should be noted that an existing sewer crosses the site in the east centrally.

5.3 Earthworks

General Considerations

Work procedures should be designed to minimise the risk of dust becoming airborne by suitable means, such as keeping the exposed soils damp or covered at all times. It is important that the control measures in place are sufficiently robust to prevent release of contaminated dust into the surrounding environment.

Geotechnical Considerations

Whilst geotechnical aspects are not specifically considered within this Remedial Strategy, all earthworks should be undertaken in accordance with an appropriate Earthworks' Specification.

Final site levels have not been provided and therefore the extent of any cut/fill earthworks requirements are unknown. Materials classification for earthworks has not been undertaken.

If present, unsuitable materials (e.g. timber, metals and plastics) removed during screening should be segregated and stored in a suitable location prior to off-site disposal to a suitable licence facility. Where practicable materials should be re-used or recycled.

The contractor should be responsible for controlling groundwater entry into excavations.

Materials Management

Any works involving the movement of soils within the site boundary shall be done in accordance with a Materials Management Plan (MMP) under the CL:AIRE Definition of Waste Code of Practice (CoP). Further guidance is presented in Appendix B.

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

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

-
- The aims and objectives of the project meet the requirements of the Waste Framework Directive.
-

-
- The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
 - There is certainty of use (i.e. materials tacking which should be in place as part of good site practice in any case).
 - Quantity (the quantity of materials used should be known).
-

Information on existing site levels, proposed levels, volumes generated (e.g. foundation / drainage excavation arisings) would need to be known in order to complete the MMP.

If the DoWCoP is the chosen route, it is an absolute that the MMP should be in place and declared by a Qualified Persons (QP) before works commence, otherwise excavated soils could constitute an illegal deposit of waste and enforcement action could be taken by the EA and HMRC.

In regard to “clean” naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion. So long as the project can prove the four criteria (listed above) then permits or the DoWCoP are not required. However, many projects still use the DoWCoP to ensure compliance.

Re-use of soils containing asbestos should comply with the CL:AIRE publication ‘Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials’ (CAR-SOILTM) and CAR 2012.

In terms of the re-use of brick/concrete crush materials, the DoWCoP does cover aggregates, but only on the site of origin and the EA WRAP aggregate Quality Protocol might best apply to ensure quality standards.

Imported Materials and Materials for Re-use

Any soils or materials imported or to be re-used as part of the works should be tested for chemical compliance and suitability in line with the guidance stipulated in Appendix A and the proposed end use.

Any imported material should be approved by BSL and the Local Authority prior to being imported onto site.

Where feasible, imported topsoil should conform to the requirements of BS 3882:2015 (Specification for Topsoil and requirements for use), or as agreed with the client. Imported subsoil should also conform to the requirements of BS 38601:2013 (Specification for subsoil and requirements for use), or as agreed with the client.

In addition, all materials must be free from aggressive / invasive weeds (such as Japanese Knotweed and Giant Hogweed) and bulk vegetative growth.

Hydrocarbon and VOC Impacted Soils

A watching brief should be in place during works to observe for potential contamination.

Should significant contamination be encountered, it is wholly possible that by virtue of excavation and sorting, the VOCs within soils will volatilise. However, an allowance should be made for volumes of soil that may not be readily treatable (e.g. grossly impacted soils) and may require off-site disposal to a suitably licensed waste facility. Further guidance is presented in Appendix B for off site disposal of soils.

Asbestos Impacted Soils

Whilst asbestos was not identified during the intrusive investigation works, if encountered any easily identifiable asbestos containing material (e.g. asbestos cement sheeting tile etc) shall be removed by hand

picking and disposed off-site to a suitably licensed waste facility by a suitably qualified and licensed contractor.

The reuse of excavated soils contaminated by asbestos should also be carried out in accordance with “Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition materials: Industry Guidance (shortened name CAR-SOILS™)” with work requirements assessed by a competent person in line with the Joint Industry Working Group (JIWG) Decision Support Tool for CAR 2012 Work Categories (i.e. are the works notifiable or not and are they non-licensed or licensed).

The presence of asbestos within the ground will require a safe system of work to be set up on site to deal with the asbestos risk from the made ground. This may include, but be not limited to:

- Personal working in the vicinity of the ACM should be suitably trained and competent in line with CAR 2012.
- Careful segregation of stockpiles on site.
- Defining transport routes.
- Cleaning down of machinery in designated areas.
- Suitable PPE, RPE and decontamination unit for ground workers.
- Damping down of soils to prevent dust migration.
- Air quality reassurance monitoring (before/during/after works).

Note that a reduction in control methods is possible if natural factors are present (e.g. wet ground or raining).

UXO

The UXO desk study indicates the site is Low to Medium Risk.

It is recommended that a site-specific plan for the management of UXO risk is written for this site. This plan should be kept on site and be referred to in the event that a suspect item of UXO is encountered at any stage of the project. It should detail the steps to be taken in the event of such a discovery, considering elements such as communication, raising the alarm, nominated responsible persons etc.

As a minimum precaution, all personnel working on the site should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.

5.4 Ground Gas

Based on the ground gas risk assessment and options appraisal, CS2 protection measures are required.

In accordance with BS8485:2015 for a C building placed within CS2, a minimum of 2.5 points is required. The gas protection system should consist of at least 2 separate elements including a structural barrier, ventilation systems and/or a gas resistant membrane.

For a Type C building falling within CS2 the following gas protection systems are proposed in line with BS 8485:2015:

- A cast in-situ monolithic reinforced ground bearing slab with minimal penetrations (assumed 1.0 score).
- A gas resistant membrane which is suitably impervious to carbon dioxide and methane and verified in accordance with CIRIA C735 - 2.0 score.

Gas Resistant Membrane

The gas membrane recommended for use in construction is the Visqueen Gas Barrier (or same specification from alternative manufacturer) with associated products. The product data sheets, indicative installation details and manufacturer methods of installation are presented in Appendix A.

The membrane will be installed as per the architects drawings and manufacturer instructions. The membrane requires a 150mm lap at all joints and seams, sealed either by welding techniques (heat gun and roller or automatic welder) or use of VisqueenPro Double Sided Jointing Tape (50mm). Introduction of low heat and use of a hard plastic/wooden roller aids formation of a good seal between the membranes and the tape, especially during colder weather.

Service entries should be sealed with Visqueen Top Hat units with double sided tape and jubilee clips, or constructed utilising Visqueen Pro Detail Strip.

Corners and major stress points should ideally be reinforced and detailed with self adhesive VisqueenPro Detailing Strip (300mm strips).

Once the primary seals have been verified, Visqueen Gas Resistant Foil Lap Tape can then be applied over seams; note this is not required where laps/seams have been welded.

Where products used on site are identified to differ from the above or not meet expectations, then the verifier classify this as a non-conformance, or if it is deemed that the non-conforming product is of a suitable specification to the original specified product, a variation of the specification will be required from the designer. This may also need to be agreed with the Local Authority and / or warranty provider.

Standard details are presented in Appendix A, which should be taken into consideration during detail design by the architect/structural engineer.

This provides a 2.0 point score when suitably verified in accordance with CIRICA C735.

Suitability of Proposed System

The above proposed system totals 2.5 points, which meets minimum requirements. BSL therefore confirm the proposed protection system meets requirements.

Whilst there is no specific pressure relief pathway, the presence of a number of service trenches beneath the store, which will be filled with same size gravel, will in effect actually provide an inherent pressure relief pathway (adding an additional 0.5 score).

Protection of Installed Membrane

BSL strongly recommend that once the membrane has been installed and verified, either protective insulation or Visqueen TreadGUARD fleece matting is placed over the membrane to protect this from follow on trade damage especially prior to concrete pours.

Verification

Installed ground gas protection measures will require verification in line with CIRIA C735.

In order to address the methods of installation and set out requirements for verification, a Ground Gas Protection Systems Verification Plan is also included in Section 7.0

5.5 Cover Layer

A cover system comprising “clean” validated topsoil/subsoil should be placed in proposed soft landscaped areas in the northeast of the site where the turning circle is located.

Imported soils to be used as part of the cover layer should meet the chemical criteria outlined in Appendix A.

It should be noted that the screening criteria and scenarios adopted within Appendix A are conservative, thus an exceedance of a contaminant will not necessarily deem the material to be unsuitable. Any exceedances detected and overall material suitability will be assessed on a case by case basis, with the results included and discussed in the Validation Report.

The installation of a clean cover system will break the pathway to human health from the PAH contamination and act as a growing medium.

The cover layer in public open space (POS) soft landscaping areas identified should comprise (top down):

-
- Min 100mm “clean” validated topsoil; over
 - 350mm “clean” validated subsoil.
-

For areas of proposed trees, a tree pit will need to be excavated and additional subsoil provided above the hard dig layer / membrane, further guidance over suitable thickness’ should be obtained from a landscape architect.

Site drainage should be taken into consideration with the implementation of the clean cover layer. It is also essential to provide a structured, uncompacted and well-aerated soil profile for the successful establishment and subsequent growth of plants and grass. However, where heavy machinery and large volumes of soil are excavated and stored, soil structure can easily be destroyed by over-compaction, leading to poor drainage and failed garden planting. This can often be mitigated by careful site planning or rotavating the soils as required.

The above is subject to agreement with the Local Authority and requirements should be confirmed at the earliest opportunity.

5.6 Records

Accurate records and as-built drawings will need to be kept, updated and provided for all aspects of the remedial works as they progress.

The construction works should be devised in a way to allow the maximum re-use of site won materials adhering to current waste regulations. To allow this and demonstrate compliance with Waste Management Licensing Regulations the Contractor should maintain an accurate Materials Management Plan (MMP). These shall show the source, description, classification and placement location of all fill used on the site. The plans shall be revised regularly with archive versions maintained for future reporting purposes. The MMP should show the extent of any excavations undertaken on site.

5.7 Stockpile Management

Segregation of materials and stockpiles should be maintained, and accurate records kept to avoid the potential for cross contamination. Good site practice for stockpile management includes, but is not limited to:

- Damping down of the site surface, excavations and stockpiles to prevent the generation of dust (wind blown asbestos fibres can contaminate “clean” topsoil stockpiles potentially resulting in expensive disposal costs).
- Stockpiles sizes should be kept to a minimum to reduce ‘wind whip’ causing potentially hazardous material to be blown from the pile.
- Once at the intended size, stockpiles should be “sealed” to ensure no excess materials are placed and mixed into the stockpiled to prevent cross contamination.
- Clean, validated material proposed for re-use as part of the cover system should ideally be placed on a suitable polythene membrane or clean concrete hardstanding to prevent any cross contamination.
- Appropriate loading of plant to prevent spillages.
- Appropriate signage should be displayed so that site workers/visitors are aware of the intended use and are alerted to the potential hazards associated with the material to be stored on site.

Examples of good site practice for stockpile management are presented below:



5.8 Testing

Prior to commencing any works the Contractor will submit to the Clients Representative (Suitably qualified Geo-environmental Engineers) details for the testing laboratories to be used together with their UKAS and MCERTS accreditations (as appropriate). The Clients Representative will approve the laboratories subject to them holding the relevant certifications. Alternatively, providing the Client’s Representative is a suitably qualified Engineer, then they may attend site to obtain samples for appropriate testing.

Tests carried out by a laboratory without the approval of the Client’s Representative will be rejected.

All samples will be taken in accordance with relevant guidance (e.g. BS 10175:2011+A2:2017).

The contractor is responsible for the testing of the physical properties of any imported or processed material to be used in the engineering works. This applies to both site won and any imported materials.

Site won material shall be tested to confirm its chemical suitability. Contaminated material for disposal should be tested to define the most economical disposal route. In addition, any material to be imported to the site shall be tested and its suitability demonstrated prior to it being brought to the site.

The geotechnical suitability of site-won materials will be confirmed before reuse, by appropriate earthworks testing, in accordance with an Earthworks Specification (preparation of which is outside the scope of this remedial strategy).

5.9 Permits

The appointed contractor will need to hold or obtain relevant waste permits or exemptions (where applicable) in accordance with the Environmental Permitting Regulations 2016 to carry out waste recovery, treatment and re-use activities on site. Alternatively, waste recovery and re-use operations shall be in accordance with the CL:AIRE Definition of Waste Code of Practice (DoWCoP), 2011 and an approved Materials Management Plan (MMP) declared under the DoWCoP by a Qualified Person (QP).

A crusher/screener will also require a waste permit or exemption. Aggregates should be processed in accordance with relevant WRAP Quality Protocol to produce a non-waste product.

It is the contractor's duty of care to ensure that any waste to be treated or disposed off-site is transported by a licenced waste carrier and that the waste facility is licenced, permitted or holds an appropriate exemption.

Evidence of the above should be maintained and provided on request along with any waste transfer or consignment notes for materials removed off-site.

5.10 Unexpected Contamination

If any unexpected contaminated materials are encountered by the contractor, then works should cease in that area and the contractor should consult BSL for advice prior to any irrevocable action at the site.

6.0 STAKEHOLDERS AND RESPONSIBILITIES

6.1 Key Stakeholders

A summary of the key project stakeholders is presented below (not exhaustive):

Client / Developer	Consultant / Engineer	Contractor	CDM Stakeholders	Regulators
Lidl GB Ltd	Brownfield Solutions Ltd (BSL)	Demolition and Groundworks Contractors (TBC)	Principal Contractor (TBC) Principal Designer (TBC) Health and Safety Executive (HSE)	Manchester City Council (regulator - Human Health risk and planning consent) Environment Agency (EA) (regulator - controlled waters and waste)

6.2 Client

The remediation works will come under the umbrella of CDM 2015 Regulations. The Client is responsible for formally appointing a Principal Designer and Principal Contractor, otherwise the Client assumes the role of Principal Designer. All pre-construction information will need to be made available to the appointed duty holders and sufficient time and resources allowed.

6.3 Consultant/Engineer (Client's Representative)

A suitably qualified Geo-Environmental Engineer/consultant should be appointed as the client's representative to oversee the works, who will have a visiting role throughout and provide advice when required.

They should be responsible for:

- Providing appropriate supervision of the remedial works (either part time or full time).
- Monitoring the works to ensure compliance with this strategy and specification.
- Audit testing of materials. (However, it is the responsibility of the contractors to demonstrate the suitability/acceptability and the compliance of the material with the specification).
- Approval of test results.
- Validation of the works.

They will maintain records of the works to include the following:

- Record sheets to include a summary of the activities.
- Aspects relating to Environmental Control or non-compliance with this strategy.
- Test Results.

Liaison will be carried out with relevant regulators prior to commencing on site. The design of the Remedial Strategy can be adapted to avoid unnecessary delays at a later date.

Validation information will be supplied to the Local Authority for approval in a Verification Report. The report will include relevant site records and stand as certification that the remedial works have been carried out in accordance with this strategy.

6.4 Contractor

The contractor appointed to oversee the development construction works should comply with the following regulations, guidance and legislation relating to the works:

-
- Environmental Protection Act 1990.
 - Health and Safety Executive “Protection of Workers and the General Public during the Redevelopment of Contaminated Land”, HS(G)66, HMSO 1991.
 - Duty of Care Regulations 1991.
 - Water Resources Act 1991.
 - Water Industry Act 1991.
 - Environment Act 1995.
 - The Control of Substances Hazardous to Health Regulations 2002.
 - Hazardous Waste Regulations.
 - Control of Asbestos Regulations (CAR) 2012.
 - Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition materials: Industry Guidance (shortened name CAR-SOIL™).
 - The Construction, Design and Management Regulations 2015.
-

The contractor should provide adequate supervision for all the site works. This shall include a suitably experienced Remediation Engineer or Site Manager who will validate the work and maintain records allowing preparation of a validation report for the works.

The appointed contractors will be responsible for maintaining all records in connection with the works.

Records shall include details of:

-
- All the material imported to the site (including volume, source and chemical composition).
 - All the material exported from the site (including volume, destination and chemical composition).
 - The size and extent of the remedial excavations (lateral extent and depth plotted on suitable plans).
 - Any treatment undertaken.
 - Details of the contractor’s waste exemptions, if applicable.
 - Discharge of any groundwater.
-

6.5 CDM Stakeholders - Health & Safety

The appointed Principal Contractor (PC) will need to produce a Construction Phase Plan for the work, prepare risk assessments and method statements. The PC will be responsible for the coordination of welfare and H&S matters on-site including sub-contractors.

The Principal Designer/Client will review the Construction Phase Plan and notify the local office of the Health and Safety Executive (HSE) of the works prior to commencing (via form F10). Unless otherwise agreed with the client, the table below provides a broad outline of the overall project team.

All works should be carried out in a manner that will safeguard all site employees. This should include but not be limited to; site induction for all staff and visitors, training/safety awareness training, issue of Personal Protective Equipment (PPE) and the provision of suitable welfare facilities. Further advice is

provided within HSE publication 'HSG 66 Protection of Workers and the General Public during Redevelopment of Contaminated Land'.

The works should be carried out in a manner to protect against damage to property or nuisance to property or persons on the site or within its immediate vicinity. Noise and dust issues should be considered. Members of the public should be excluded from the works areas and the contractor should maintain suitable security to ensure unauthorised persons cannot access the works.

Appropriate temporary protection and warning signs should be erected to warn of hazards that may result as a consequence of the works.

6.6 Regulators

Implement the regulations and environmental standards set by government. The contents of this report will need to be agreed in advance of works with the regulators.

7.0 VERIFICATION PLAN

7.1 Clean Cover System

Soils used within the top 450mm in soft landscaping will comply with the chemical specification and testing frequencies provided within Appendix A.

Prior to importing any soils, test results for the proposed import will be provided to the clients representative, alongside the confirmation of the source (greenfield/brownfield/recycled etc).

Once installed by the groundworks contractor, there is a requirement to provide evidence of the chemical suitability and depths of the clean cover system, with inspections to be carried out by a suitably qualified Geo-environmental Engineer in a randomly selected area of the plot. Confirmatory photographs will be taken for inclusion in the validation report. An example of good practice for depth validation is provided below:



In areas of soft landscaping/public open space (POS), validation pits should be excavated at a frequency of circa one pit per 25m x 25m area of POS.

Minor variances in the thickness of individual soils layers cover may be tolerated during validation, provided the overall clean cover system is a minimum depth of 450mm to minimise soils mixing. If the thickness is varied, the topsoil layer should be a minimum thickness of 100mm in accordance with warranty provider standards.

Where made ground has been completely removed, the cover system as such is not required, however a “clean” topsoil/subsoil layer comprising a minimum of 150mm “clean” topsoil is still required to act as a growing medium. Evidence of the removal of made ground soils down to natural strata will be required in such areas (visual inspection by an engineer with photos taken or survey data provided with photos from the contractor).

If the cover system is deemed to be insufficient, the groundworks contractor will be informed and advised on how much more material is needed for the cover system to be meet requirements, with additional verification pits re-excavated after rectification to confirm that a sufficient thickness of soil is present.

7.2 Contingency Planning

Should significantly contaminated material be encountered during the development (e.g. gross hydrocarbon impaction) then a suitably qualified geo-environmental engineer should be consulted for advice. Measures may include the excavation of the material which should stockpiled on 2000-gauge polythene sheeting, sampled and tested for an appropriate range of contaminants.

Once the laboratory analysis of the material is available, an assessment will be undertaken to determine whether it will need to be disposed off-site to a suitable facility or if the materials could be retained on site re-used with or without some form of treatment within regulatory requirements.

Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

Should gross asbestos contamination be identified, then all works should cease until an Asbestos Management Plan is put into place (if not done so already) and remedial requirements are confirmed by a suitably qualified geo-environmental engineer. Note remedial works under such instances may be classified as either licenced or non-licenced and may be notifiable to the Health and Safety Executive (HSE). Works would need to comply with CAR 2012 and CARSOILS™.

7.3 Ground Gas Protection Systems

The selected design of ground gas protection systems should be confirmed with the Local Authority prior to implementation.

Stakeholders

The key project stakeholders in respect to ground gas are listed below:

Designer(s)	Installer	Verifier	Regulators
Architect Structural Engineer Brownfield Solutions Ltd (BSL)	TBC	Brownfield Solutions Ltd (BSL)	- Manchester City Council (regulator - Human Health risk and planning consent) - Building control.

Pre-Start Meeting and Requirements

Prior to installation, a pre-starting meeting should be held to discuss requirements between the installer, the verifier and site managers. This should help mitigate delays during the verification process.

The installer will be checked by the verifier (BSL) as to why they are considered appropriate to undertake the role, prior to construction. To aid this, the installer should provide their RAMS to BSL for records. Evidence of any qualifications and past experience will be required to be provided to BSL prior to installation and should be checked on site.

Attendance for verification is required prior to the placement of any construction over the installed membrane (e.g. before laying insulation or a concrete pour).

Due to the nature of the proposed commercial development, the installed protection systems will be verified in sections as they become available, closely liaising with the site manager in regard to progress.

Records of installation shall be maintained by the verifier and installer and once all proposed installations are complete, a copy of the records will be issued within a separate Verification Report.

The Installer

The ground gas protection system will be installed as per the manufacturers recommendations, however at this time the design drawings and the installers method statement are TBC.

Prior to the installation of protection system, all on site personnel should be made aware of the presence of the installed membrane and should be informed that damage needs to be prevented. Adequate protection of the gas membrane (appropriate to the build sequences of follow-on trades and the robustness of the gas membrane used) will always be required to ensure that installed gas membranes have retained their integrity.

It is essential that an appropriately experienced and qualified workforce is employed on site to install ground gas protection systems.

The site is assessed intermediate risk CS2 (without venting systems to be installed), therefore a general builder/groundworker with relevant experience, but no relevant formal qualification in gas membrane installation could be employed. However, the verifier (consultant or qualified and experienced installer) will be required to conduct a thorough verification (visual) inspection prior to all concrete pours. In addition, all joints, pipe penetrations etc should be independently air lanced to ASTM D4437. Integrity testing should initially be carried out on say 25 to 50 percent of pours then falling to 10 to percent if acceptable results obtained and no concerns raised by visual inspections.

The installer will also be required to maintain their own records of installation, which will include sign off sheets detailing areas and dates of installation alongside photos of before, during and after installation. This information is required by BSL to be included in our Verification report.

The installer shall notify the independent verifier of progress so that they can visit site and conduct verification in accordance with above scope.

The Independent Verifier

The installation of the ground gas protection systems shall be visually inspected and verified by an independent and suitably competent ground engineering professional or third party independent qualified and experienced installer. The competence of BSL verifiers is presented in Appendix C.

It will be necessary for the verifier to attend site prior to the installation of the membrane in order to discuss requirements and view the floor slab construction/ventilation systems. Note that prior to attending site, the verifier will require each area ready for inspection to be free of overlap/lapping tape on all seams where applicable during the visit.

When installed, the verifier will check the membrane used meets the requirements set out within this Verification Plan.

Edges, walls, pillars, service entries etc. will be checked that they have enough overlap in accordance with the manufacture's specification. The inspection should cover floor areas, paying attention to walls and any other locations where venting systems might be positioned. Areas where the membrane may be bridging across unsupported will be checked. Any discrepancies with the design drawings should be highlighted.

BSL reserves the right to increase levels of inspection should the quality of installation of the membrane deteriorate significantly over any phase of the construction works.

During the inspections, photographs will be taken as evidence and a pro forma check sheet will be used to record the assessment of the installation of the required ground gas precautions. A plan detailing which areas of the structure have been installed/verified shall also be maintained.

Repairs should be instructed and observed on the same day as the site visit or re-inspected later.

Systems taken to minimise any damage to membranes whilst working (e.g. placement of insulation) will also be recorded and reported.

Integrity Testing

Integrity testing is not a substitute for well designed and installed gas protection systems. When used, integrity testing should always be combined with visual inspection.

Given the likely construction of the store, air lance testing of 25% of total the seams in line with ASTM standard D4437 will be carried out, with all areas receiving an Integrity Testing Certificate.

Non-Conformances

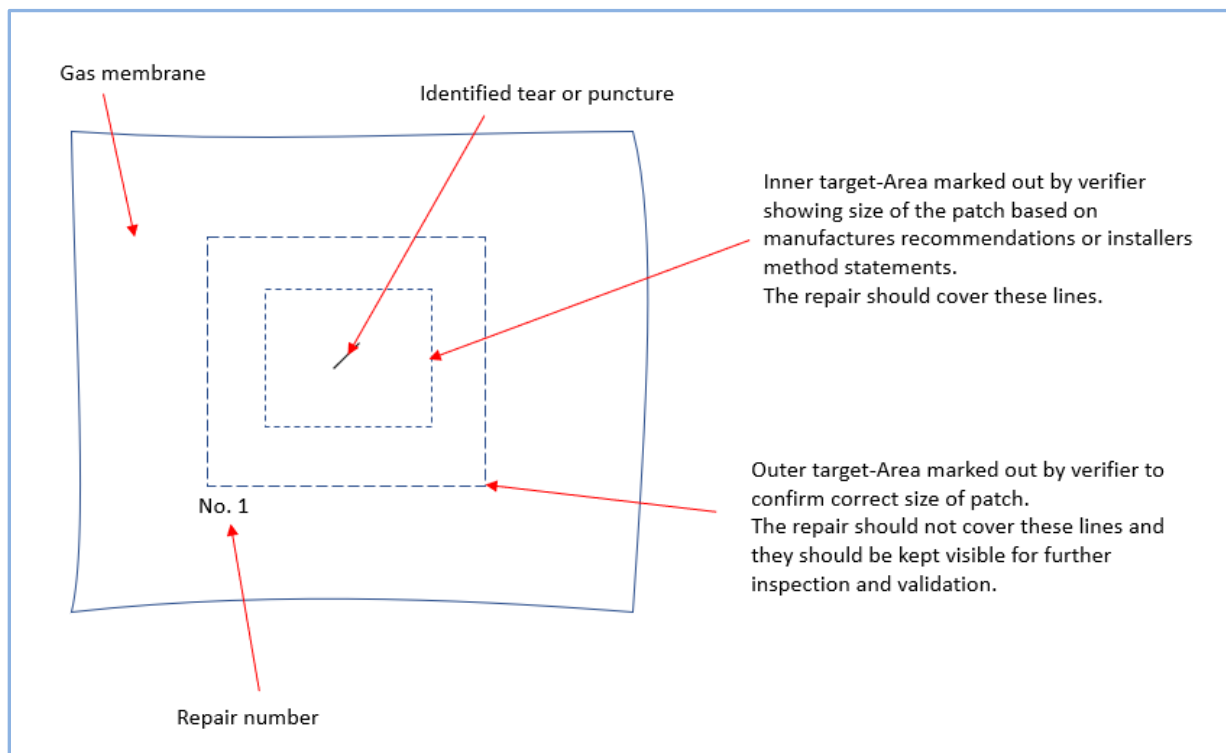
If installed incorrectly or damaged during the construction process, the membrane is rendered ineffective and will fail to provide adequate protection against the ingress of ground gas or vapours.

All damaged areas should be repaired in accordance with the manufacturer's instructions/installers method statements, ensuring a minimum lap is maintained and the repair subsequently verified. No bridging of unsupported membrane is permitted.

The following procedure will apply for any identified non-conformances:

-
- Damaged areas will be marked on site using a permanent marker (e.g. BSL, date, initials) and photographed to be included in the final verification report.
 - The mark will highlight the area to be patched or repaired, maintaining a suitable lap.
 - Verbally inform the installers on site of the repair(s) for them to address.
 - When repaired, the area(s) will then be inspected again (re-verified).
 - Once repaired to a satisfactory standard, a second mark will then be placed outside of the highlighted area to indicate the location of the repair (e.g. BSL, date, initials, repaired and a tick mark) with photographic evidence of the repair taken to be included in the final verification report.
 - If there are a very high number of non-conformances and installation is generally very poor, do not attempt to identify all non-conformances; stop works and discuss the issues with the installer and the site manager. Indicate that the installation is not to a satisfactory standard and that further training should be provided prior to continuing installation, with re-verification once addressed.
 - Where repairs can be reasonably achieved during the allotted time available for the inspection visit, then re-verification be conducted. Where this cannot be achieved; additional visits will be required.
-

The below diagram provides a sketch of typical repair requirements:



Following each inspection visit, the verifier will provide a verbal summary of their findings to the site manager and/or client.

It should be noted that on rare occasions, the BSL engineer carrying out the verification works may accidentally cause damage to the membrane during the verification visit by walking over the membrane. This typically occurs when the underside of the membrane has not been suitably cleared of debris prior to laying. Should this occur then a non-conformance will be recorded, and a repair will be required. BSL and the engineer in attendance shall not be held accountable for such damage unless it is proven to have been deliberate.

A time allowance should be made during the construction phase to address non-conformance highlighted during inspection. Incorrect installation may have an impact on timescales for concrete pours and subsequent follow on works, therefore good workmanship is essential to save on time and potential additional costs/delays.

If changes to the development design or installers method statement take place during construction, then these changes must be communicated to the verifier to ensure requirements continue to be met.

Gross non-conformance (e.g. inaccurate records or no records of installation whatsoever) may result in not achieving regulatory sign off, which may have significant financial implications.

Note that any form of abusive or threatening behaviour, deception, bribery or other corruptive activity towards BSL and its staff before, during or after verification activities will potentially result in our services being suspended with immediate effect and withdrawn where such activity has been shown to have occurred.

Post Verification

Once the installed membrane has been verified and all non-conformances addressed, it will be considered acceptable. Once acceptable the membrane should be protected from follow on trades as best as possible

(e.g. placement of insulation over the membrane to avoid damage). Any damage to the membrane after this will render the gas protection systems unsuitable and BSL should be advised immediately. Repair works and re-verification may be required in that instance.

It is not the Verifier or the Installers responsibility to ensure that all follow-on works are aware of the risk to damage to the gas protection systems present at the site.

The importance of the membrane will need to be communicated to all site personnel during the site induction. It is recommended that the Warning Notice provided in Appendix C is displayed in a number of clear locations to indicate the presence of the membrane and to avoid damage to this element.

We also strongly recommend that any follow-on trades responsible for preparing sub-base surfaces for gas protection systems are made aware of finishing requirements. Damage to the installed membrane can be minimised by providing toolbox talks given to follow on trades and by the use of sacrificial protection layers applied where traffic across the exposed membrane is necessary.

Note that if damage is caused to a gas protection system by follow on trades post verification and BSL observe this, then BSL reserves the right to retract any Verification Report until suitable repairs are completed and revalidated.

7.4 Reporting

On receipt of all information, the appointed Geo-Environmental Engineer will compile a Verification Report(s). The report will be a concise document that provides records and collected evidence of the remediation carried out at the site. The final report should contain:

- Introduction, including description of the project and background to the works.
- Summary references to site investigation data, risk assessments and the Remedial Strategy.
- A description of the works undertaken and any treatment records.
- Details of chemical validation testing.
- Reference to the MMP (if utilised), records of where material was moved from/imported from/to and final destinations, including volumes, suitable for use criteria, QP declaration references etc.
- Details of how any out of specification materials were dealt with and final destination, including waste transfer notes.
- Appropriate site plans and photographic record.
- Conclusions, detailing any additional works that may be required.
- Details of any long term monitoring requirements, if any.

For Ground Gas Protection Systems the report shall also include:

- A description of the inspection regime.
- A description of the elements of the ground gas protection system.
- A presentation of the material specifications etc.
- Dates of inspection, inspection staff present, weather conditions and the surrounding trades activity.
- Specifics relating to the level of training, competency and accuracy of the installation team.
- Installation photos.
- Recognised defects and repairs.
- Areas inspected along sectors and grid lines if appropriate.
- Areas of limitation: areas unable to be inspected, identified and noted.
- Records of CPD and any certifications that the verifier holds (staff competency).

This should then be submitted to the regulators and warranty providers for approval, which should close out the requirements of this Remedial Strategy.

8.0 REFERENCES

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- CL:AIRE RB17 'A Pragmatic Approach to Ground Gas Risk Assessment'. 2012.

CL:AIRE SP1010 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'. Rev 2 2014.

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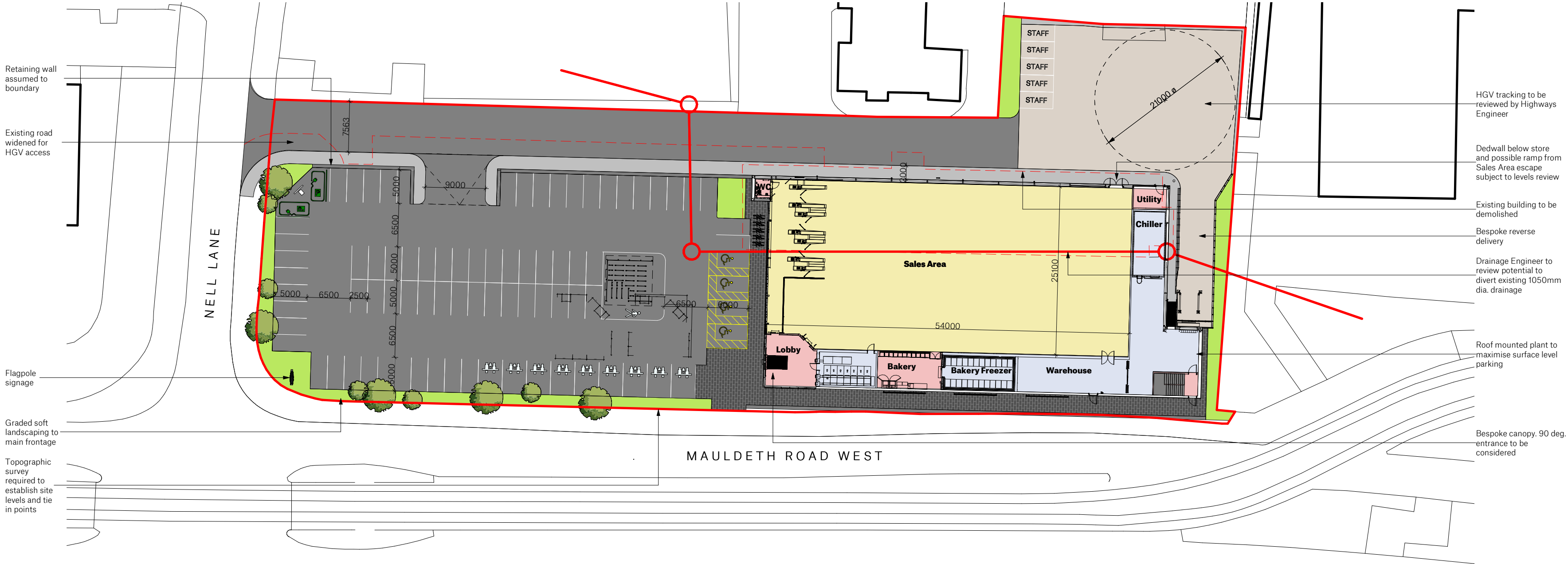
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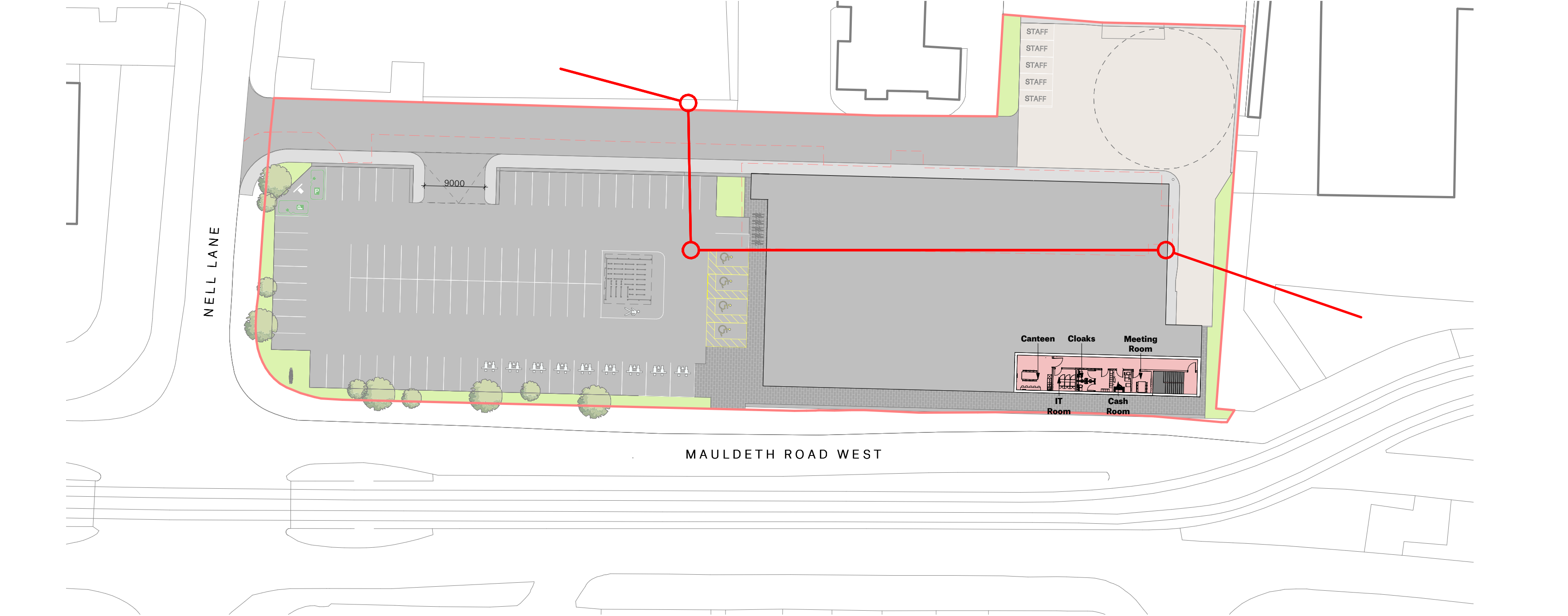
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DRAWINGS



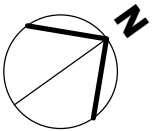
Proposed Ground Floor Site Plan
1:500



Proposed First Floor Plan
1:500

OVERALL	
SITE AREA (Approx.):	6893 m ²
BUILDING AREAS - LIDL	
Ancillary Area	154 m ²
Sales Area	1343 m ²
Warehouse Area	379 m ²
GROSS INTERNAL AREA (TOTAL)	1876 m ²
FIRST FLOOR	
Ancillary	140m ²
PARKING - LIDL	
Disabled	4
Electric Vehicle Charging	2
Parent & Child	9
Staff	5
Standard	68
TOTAL	88
Short Stay Bicycles	10

Tarmac (Vehicles)	Tarmac (Pedestrians)
Block paving, stretcher bond	Concrete cast in-situ
Soft landscaping	Tactile paving



Store Specification
Bespoke BBS 2021 Store

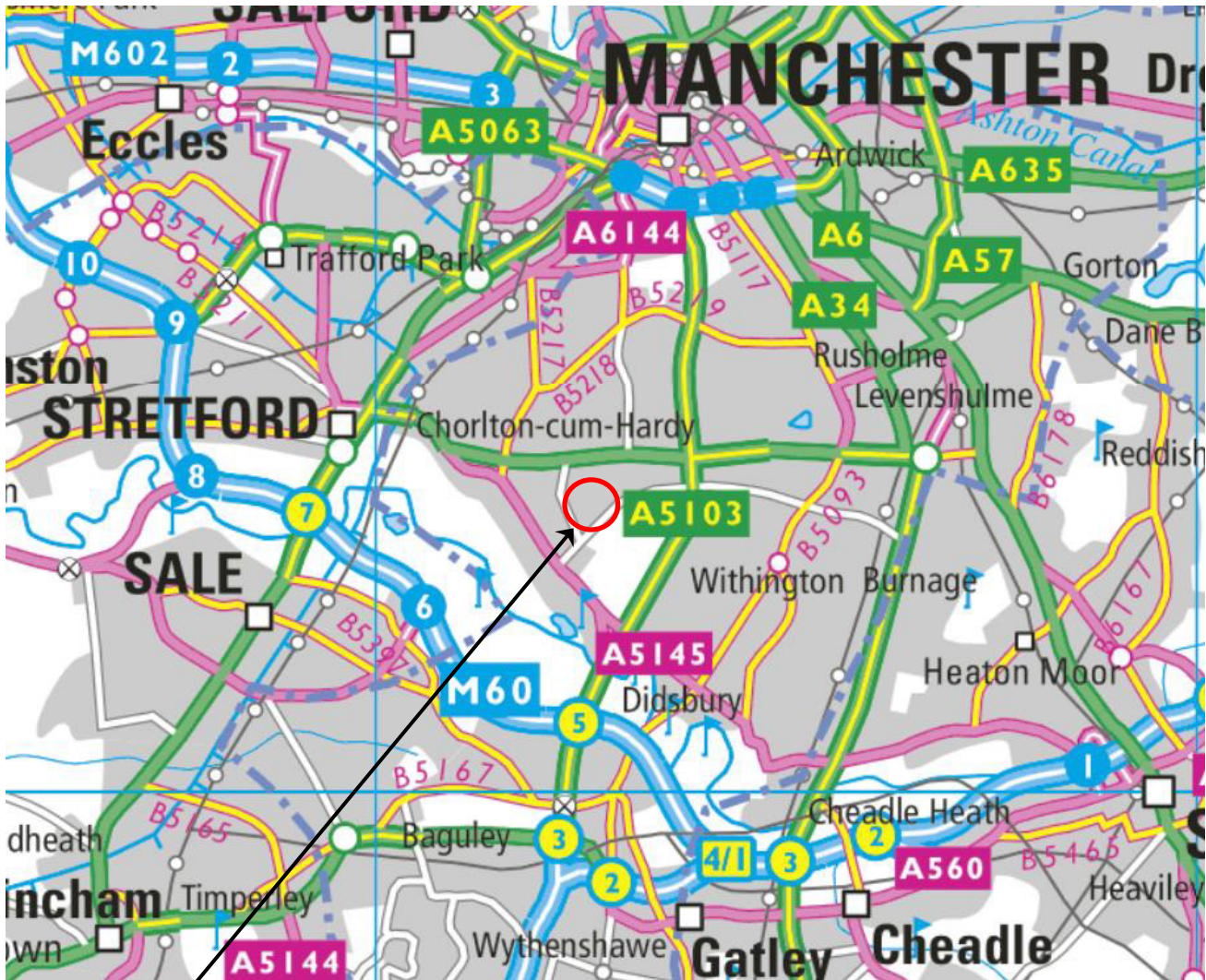
Drawing Purpose
FEASIBILITY

This drawing has been prepared for the sole purpose of forming part of a feasibility study, and should not be used for any other purpose.

SPACE

Spaceworks, Benton Park Road, Newcastle upon Tyne, NE7 7LX
T: +44 (0)844 800 6660
www.spacearchitects.co.uk

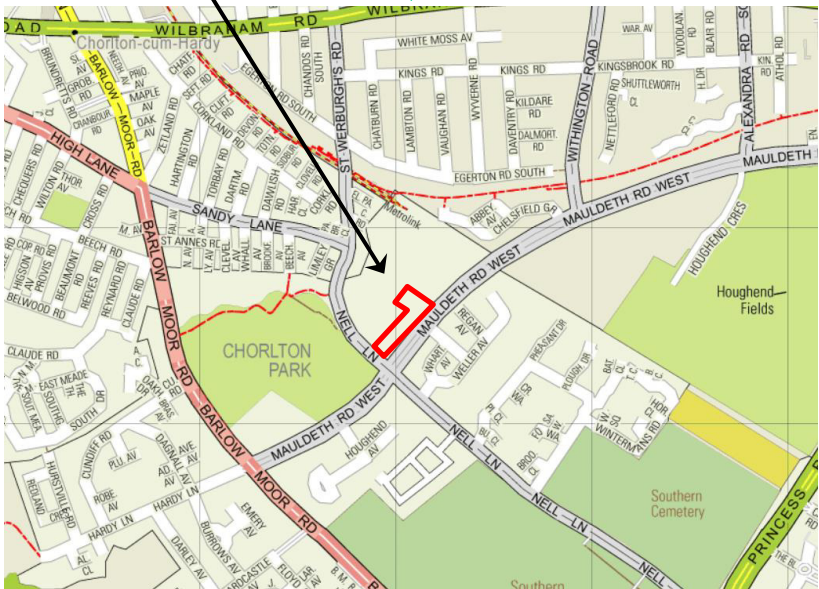
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Drawing Title Proposed Site Plan - Option 2				
Project No. 08474	Drawing No. XX-XX-DR-A-91002	Status S3	Rev. P04	Scale at A2 1:500
File Reference: 08474-SPACE-XX-XX-DR-A-91002-S3-P04				



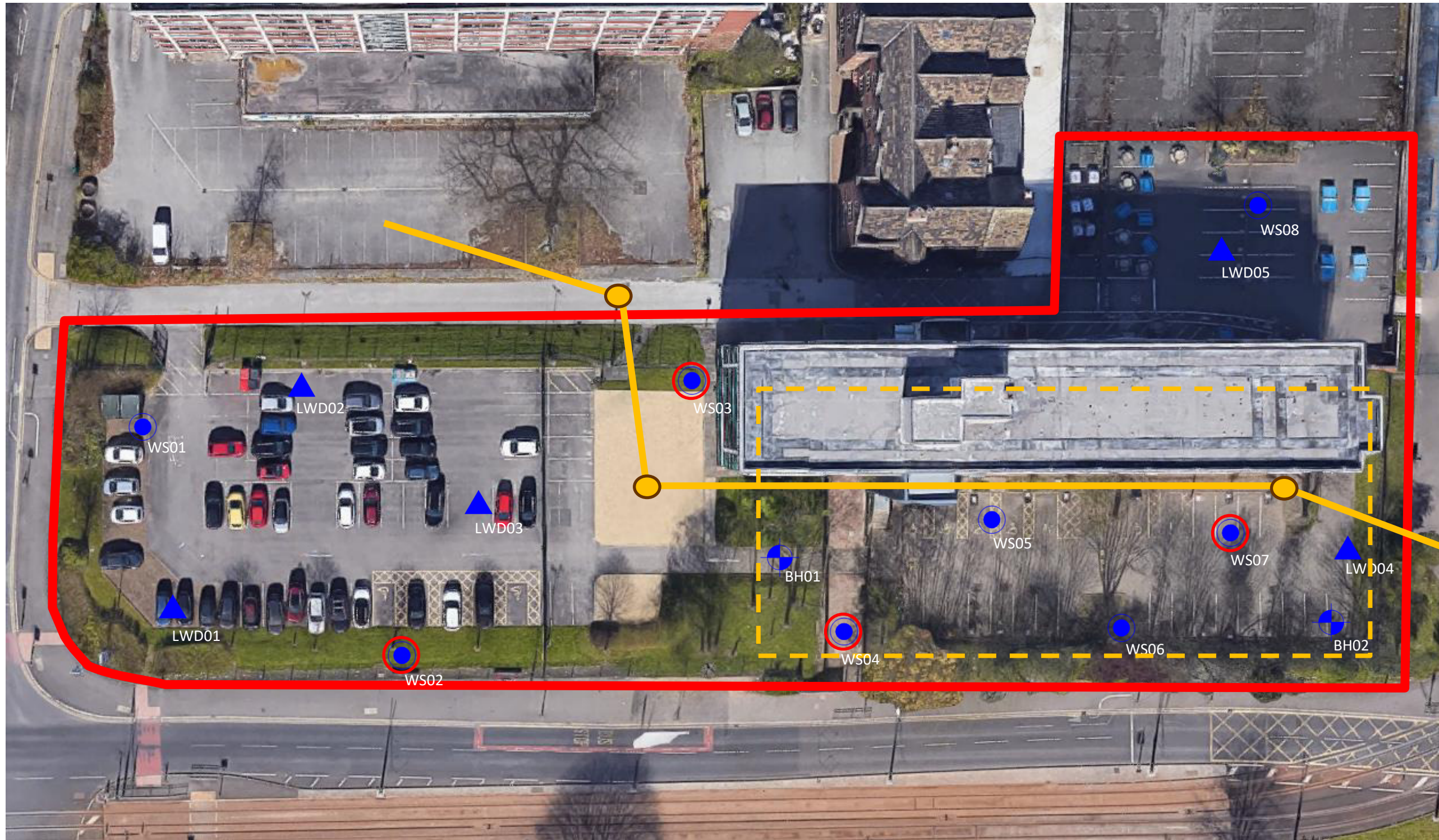
SITE LOCATION

NEAREST POSTCODE: M21 7AA

SITE ENTRANCE WHAT3WORDS:
///REAR.LEGEND.ROPE5



REV	DATE	DESCRIPTION	BY	CKD
 BROWNFIELD SOLUTIONS LTD GEO ENVIRONMENTAL ENGINEERING EXCELLENCE				
CLIENT				
LIDL GB LTD				
PROJECT TITLE				
LOWRY HOUSE, CHORLTON				
DRAWING TITLE				
SITE LOCATION PLAN				
DRAWING No.	REVISION	SCALE	DATE	
C5061/01	-	NTS	04/04/22	
DRAWN BY		CHECKED BY		
SD		JEM		



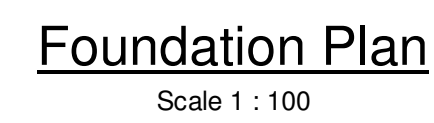
KEY

- APPROXIMATE SITE BOUNDARY
- WINDOW SAMPLE BOREHOLE
BHXX
- CABLE PERCUSSIVE BOREHOLE
WSXX
- BOREHOLE INSTALLATION
- LIGHTWEIGHT DEFLECTOMETER TEST
LWDXX
- APPROXIMATE SEWER LOCATION
- APPROXIMATE MANHOLE LOCATION
- APPROXIMATE PROPOSED STORE FOOTPRINT

REV	DATE	DESCRIPTION	BY	CKD



CLIENT			
LIDL GB LTD			
PROJECT TITLE			
LOWRY HOUSE, CHORLTON			
DRAWING TITLE			
PROPOSED EXPLORATORY HOLEPLAN			
DRAWING No.	REVISION	SCALE	DATE
C5061/02	-	NTS	16/06/22
DRAWN BY		CHECKED BY	
MS		AJS	



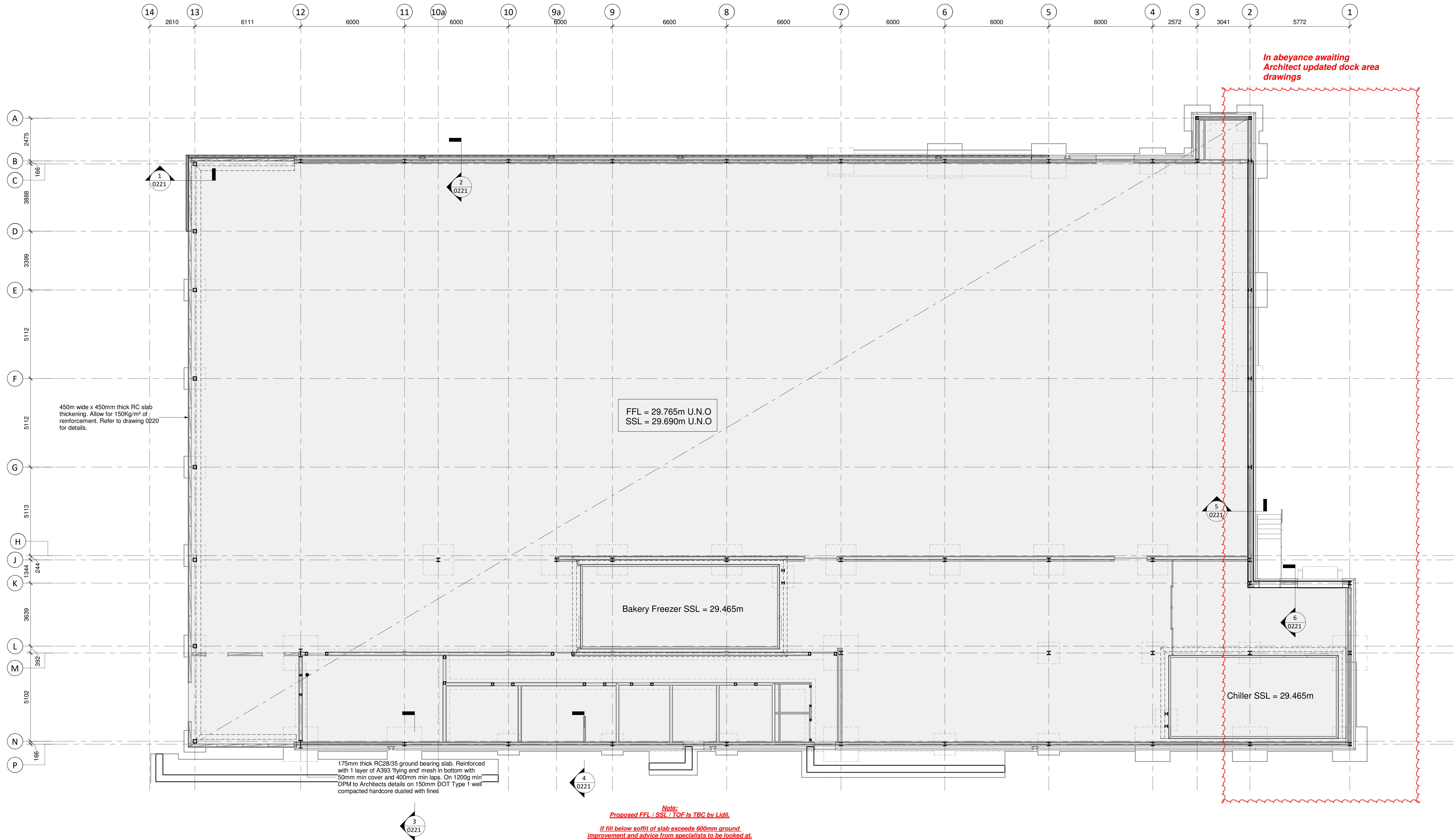
CDM HAZARDS		
It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.		
In addition to the Hazards/Risks normally associated with the types of work detailed on this drawing, note the following:		
Ref:	Activity	Hazard
1	Excavations	Stability of Excavations
2	Existing Services	Contact with existing services
3	Demolition works	Danger of uncontrolled collapse. Experienced personal only working to approved RAMS

Note:
THE EMPLOYER GIVES NO WARRANTY IN
RELATION TO THE ACCURACY OR
COMPLETENESS OF ANY DOCUMENTS OR
REPORTS INCLUDED WITH THE TENDER
PACK. THE CONTRACTOR IS LIABLE FOR
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No.	Preliminary Issue	25.09.2024	Mk3	AltR
No.	Revision	Date	Dwn	Chk
 TOPPING ENGINEERS STRUCTURAL ENGINEERS Aine House, 12 Victoria Avenue Marganaghy, Co. Wick t: 01423 322 295 e: info@topping-engineers.com				
Client LIDL GB Ltd  Project Chorlton Drawing title Foundation General Arrangement				
Sheet Size	Drawing No.	Revision		
A0	24246-DR-S-0200		P1	

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings.
2. It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.
3. Refer to drawing 0002 for General Notes



Ground Floor Slab Plan
Scale 1 : 100

Note:
Slab joint setting out and configuration to be agreed with Architects to suit tile layout

Note:
Upstand locations and details as per LiDL Spec. Refer to Architects drawings

Note:
Location of sluice TBC by Architects. Allow for recess in slab as per LiDL Spec

Note:
Setting out of slab edge to Architects details

CDM HAZARDS

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.

In addition to the Hazards/Risks normally associated with the types of work detailed on this drawing, note the following:

Ref.	Activity	Hazard
1	Excavations	Stability of Excavations
2	Existing Services	Contact with existing services
3	Demolition works	Danger of uncontrolled collapse. Experienced personal only working to approved RAMS

Note:
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Note:
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TENDER ONLY

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No.	Revision	Date	Drawn	Chk
P1	Preliminary issue	25.09.2024	MG	AB

Status: **Preliminary**



Client: **LiDL GB Ltd**

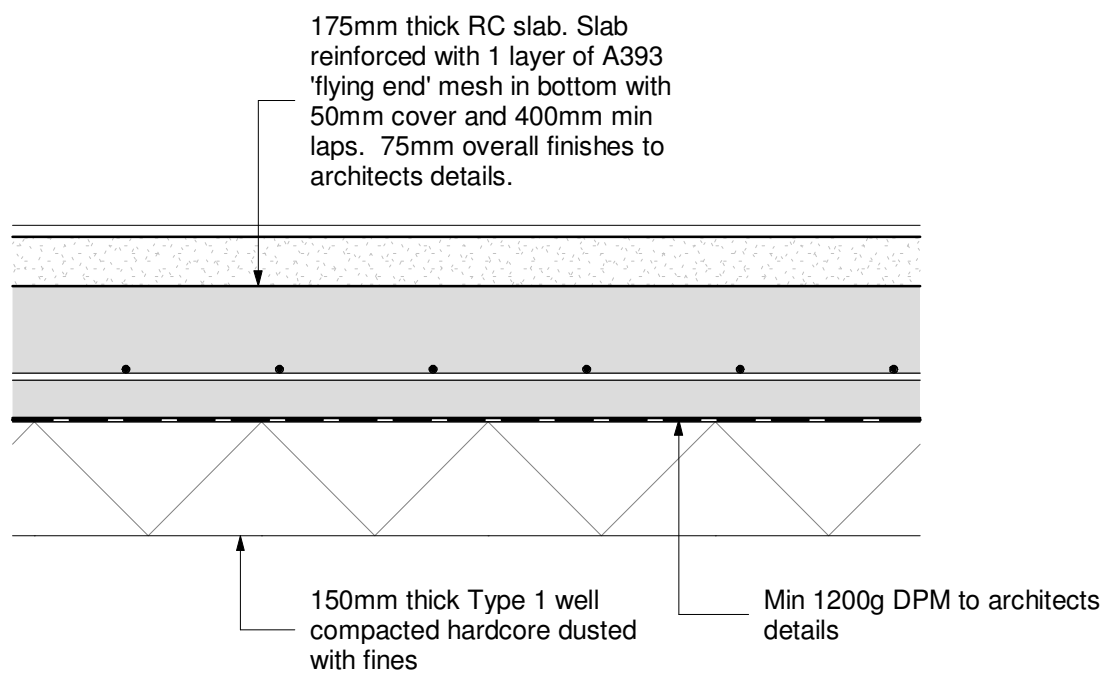
Project: **Chorlton**

Drawing title: **Ground Slab General Arrangement**

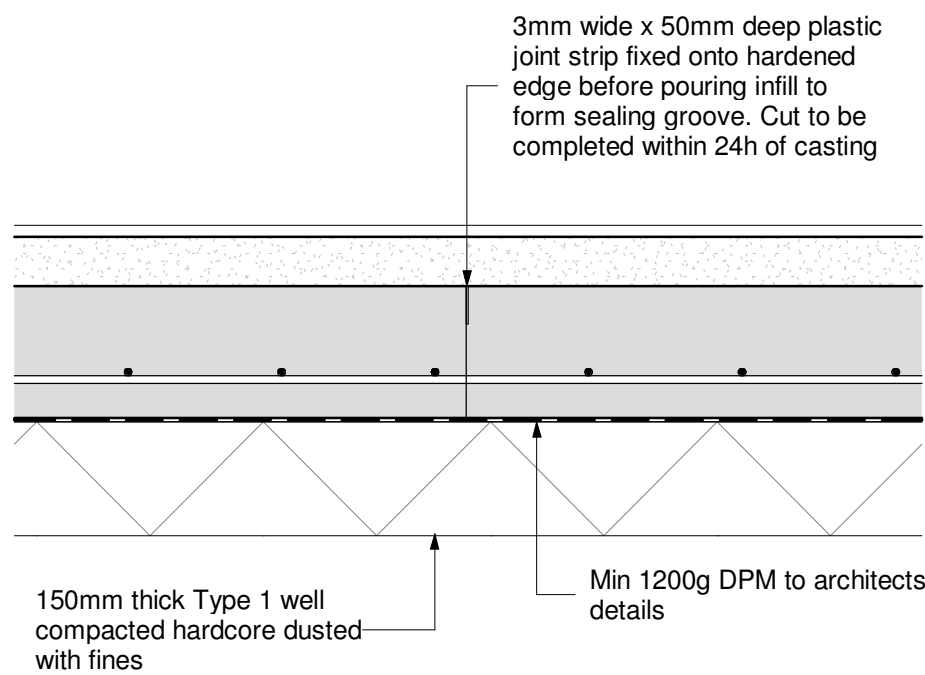
Sheet Size	Drawing No.	Revision
A0	24246-DR-S-0210	P1

Notes:

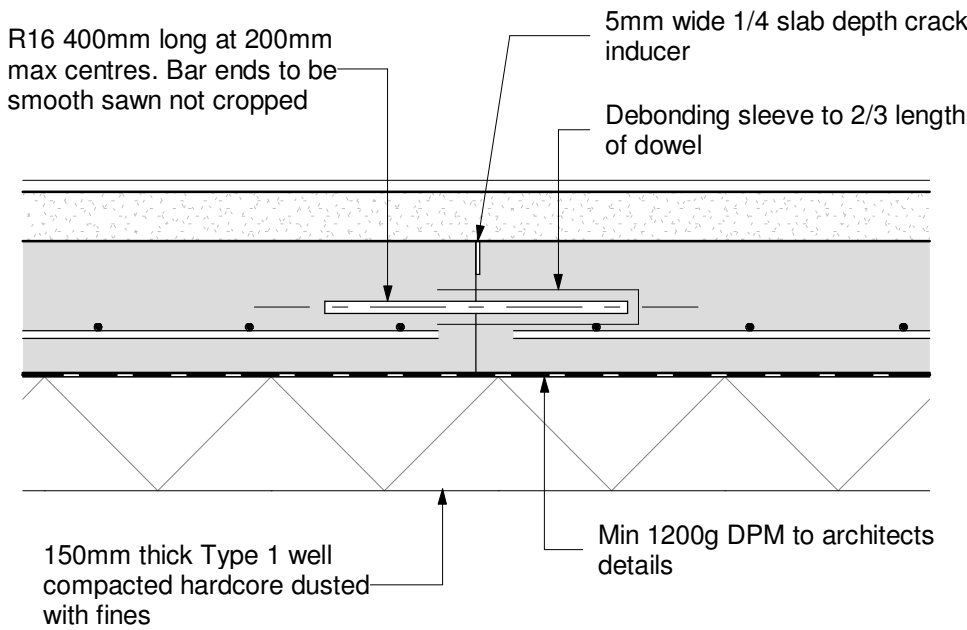
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3. Refer to drawing 0002 for General Notes



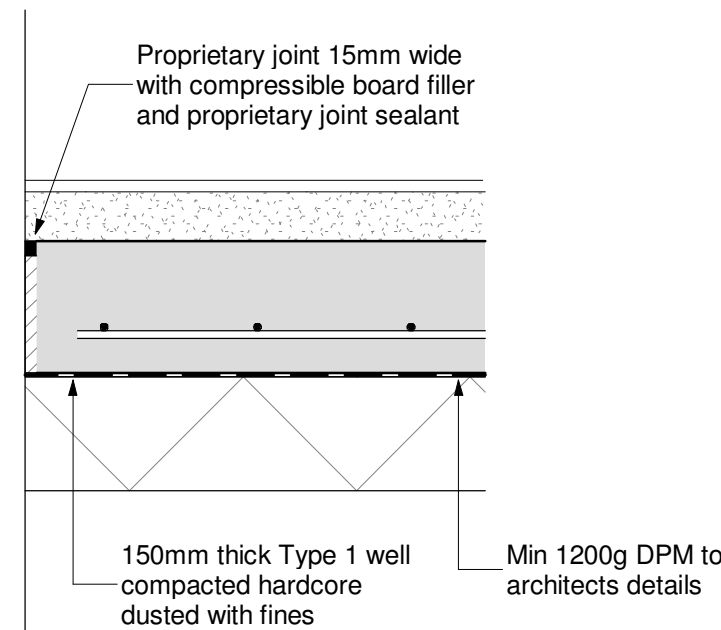
Typical Slab Construction



Typical Saw Cut Joint (SCJ)



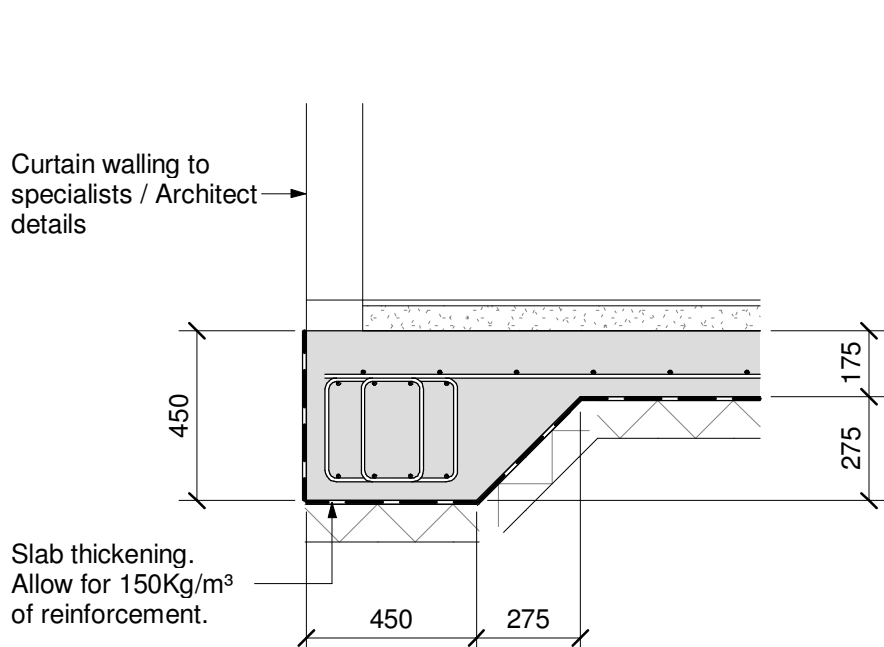
Typical Dowelled Contraction Joint (DCJ)



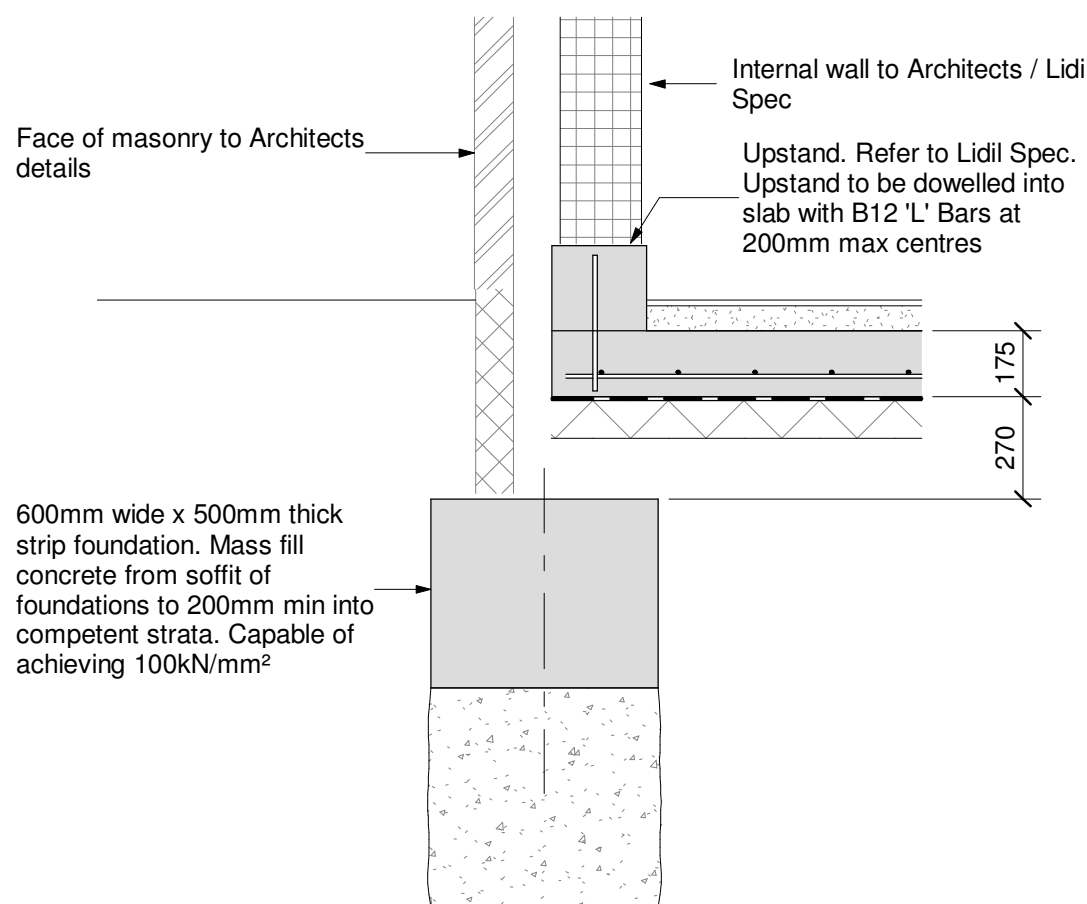
Typical Isolation Joint (IJ)

Typical Slab Details

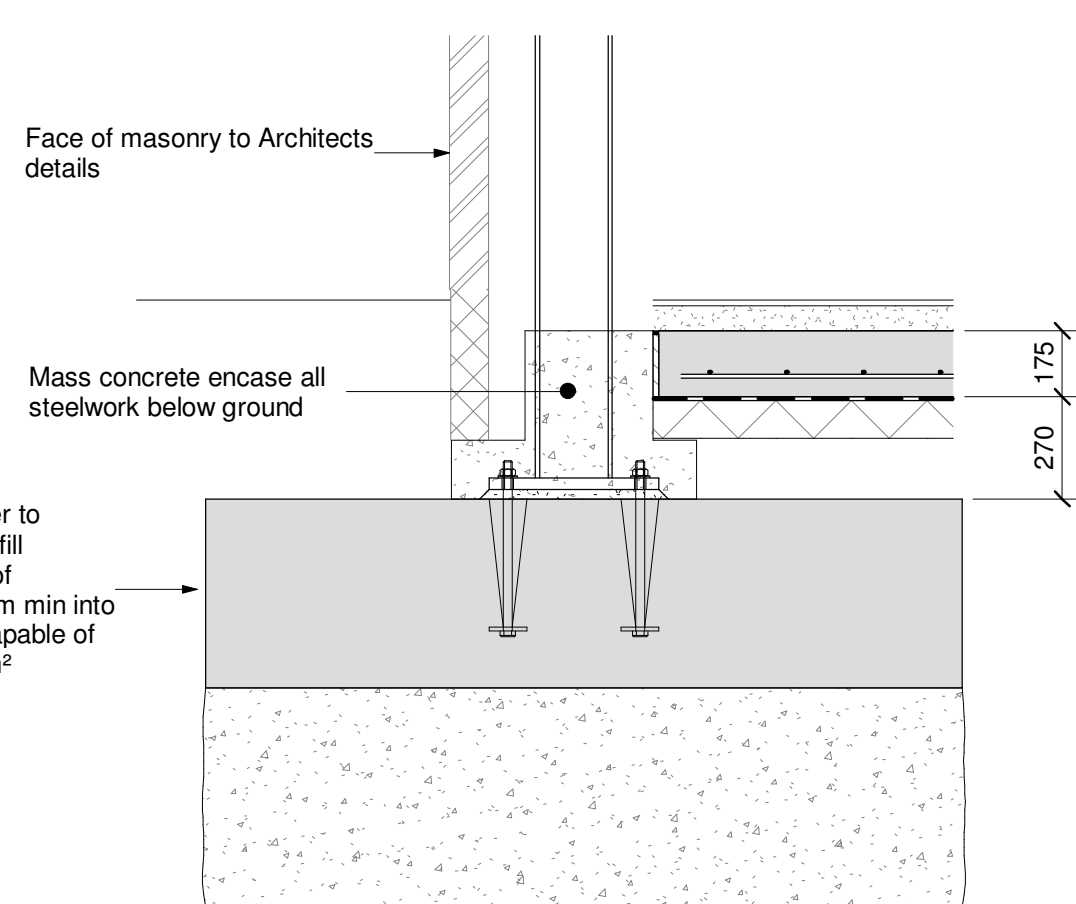
Scale 1 : 10



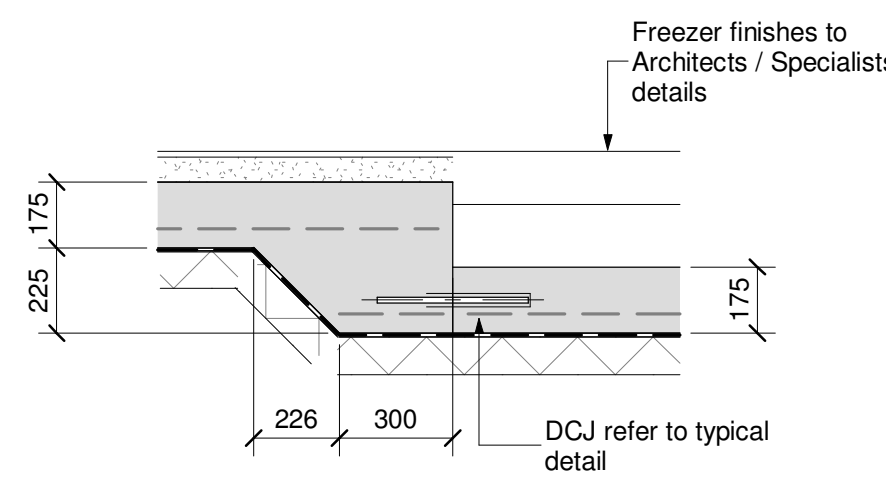
Slab edge Type 1



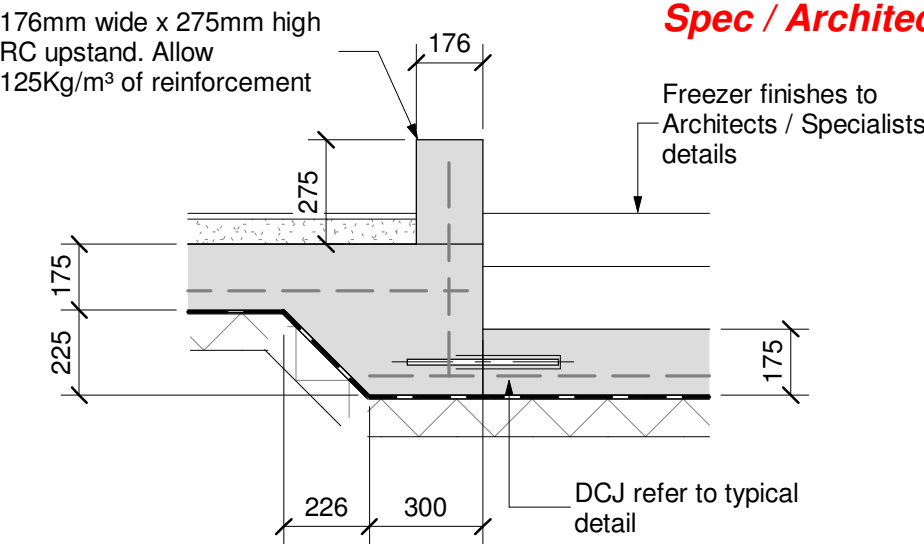
Slab edge Type 2



Slab edge Type 3



Chiller / Freezer Recess Section 1

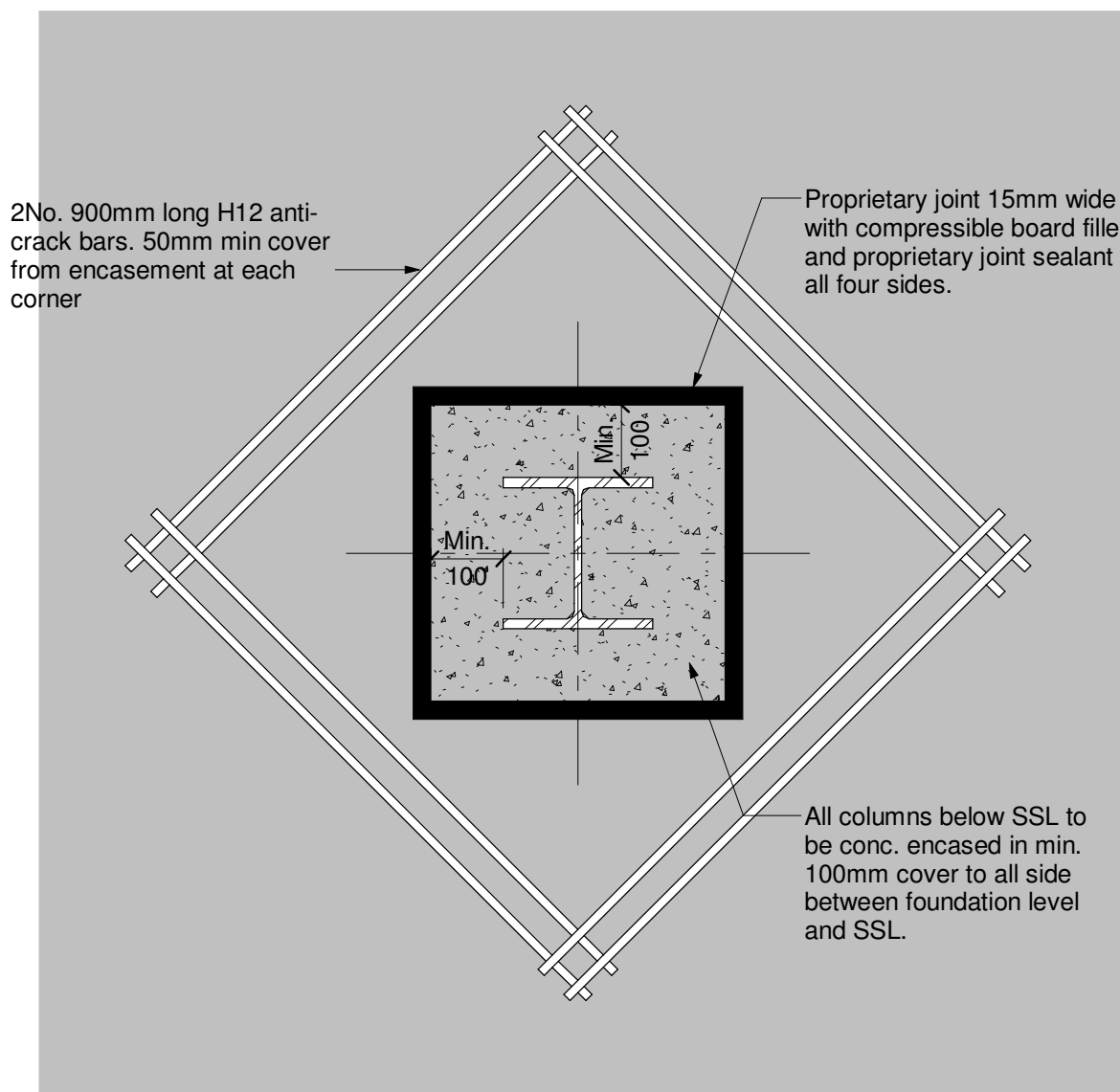


Chiller / Freezer Recess Section 2

For locations of upstands refer to Lidil Spec / Architect details

Typical Freezer / Chiller Slab Detail

Scale 1 : 20



Typical plan on column encasement

Scale 1 : 10

Note:
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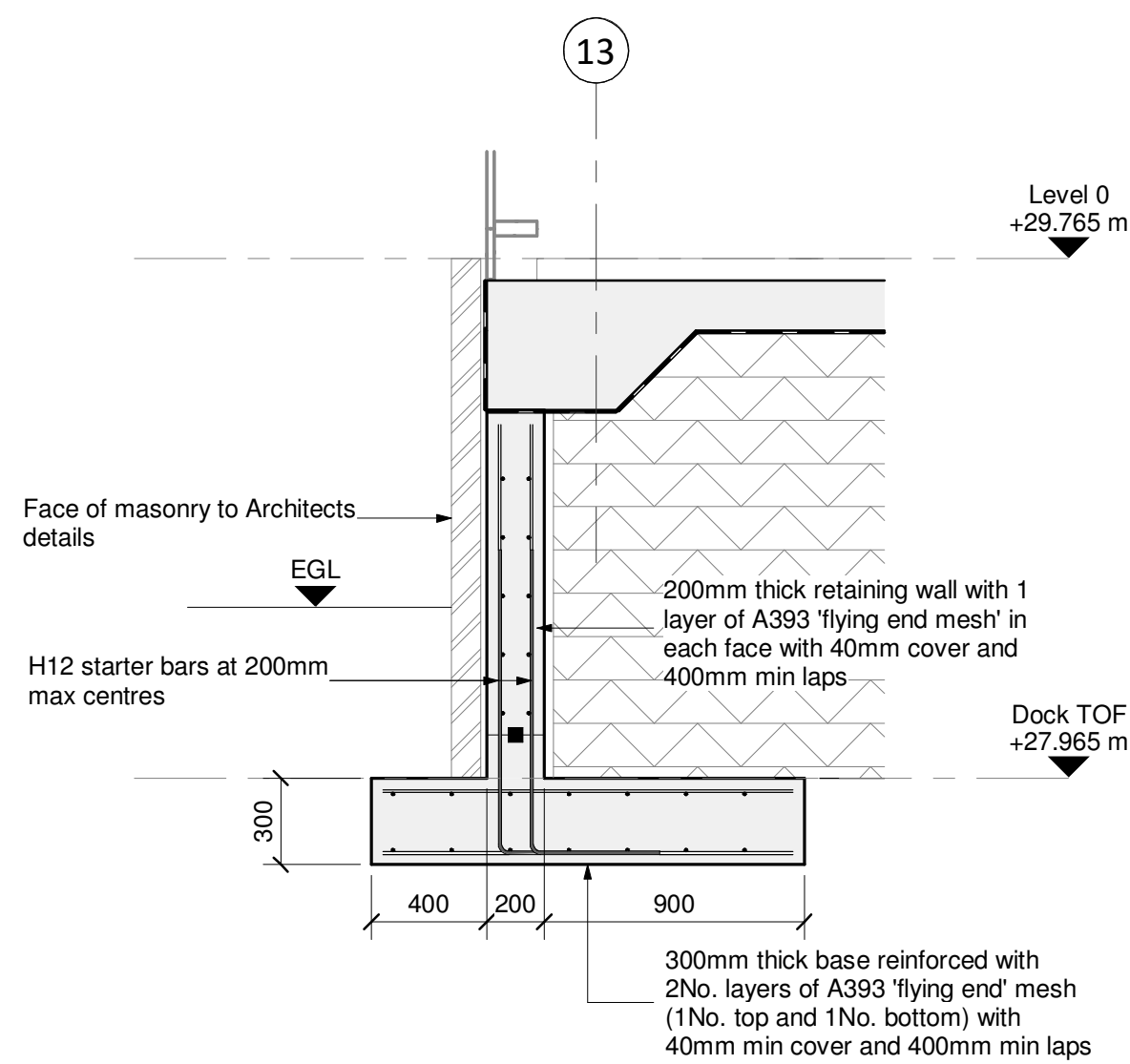
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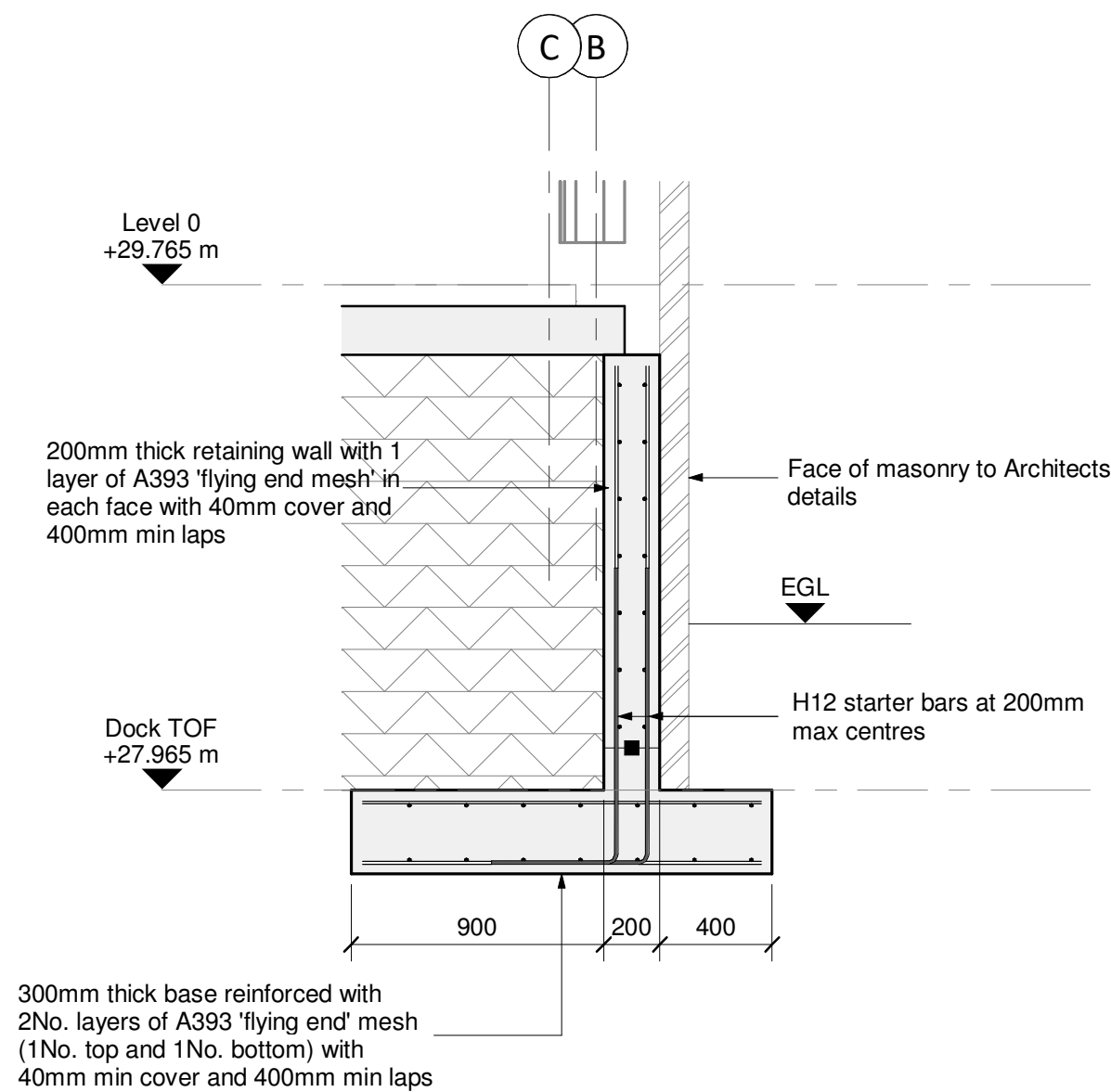
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No.	Revision	Date	Drwn	Chk
Status Preliminary				
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Client LiDL GB Ltd 				
Project Chorlton				
Drawing title Substructure Details - Sheet 1				
Sheet Size A0	Drawing No. 24246-DR-S-0220	Revision	P1	

Notes:

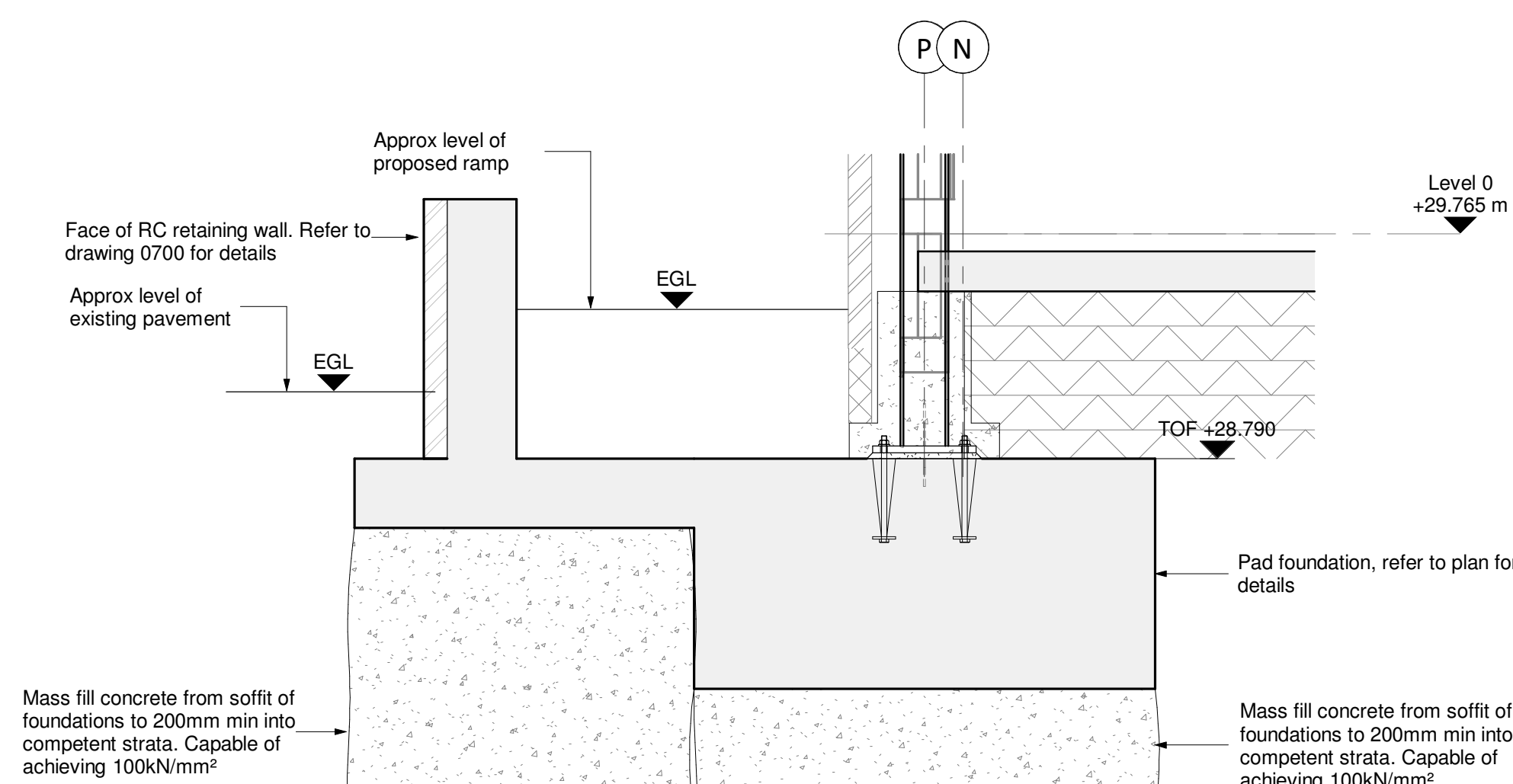
1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings.
2. It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.
3. Refer to drawing 0002 for General Notes



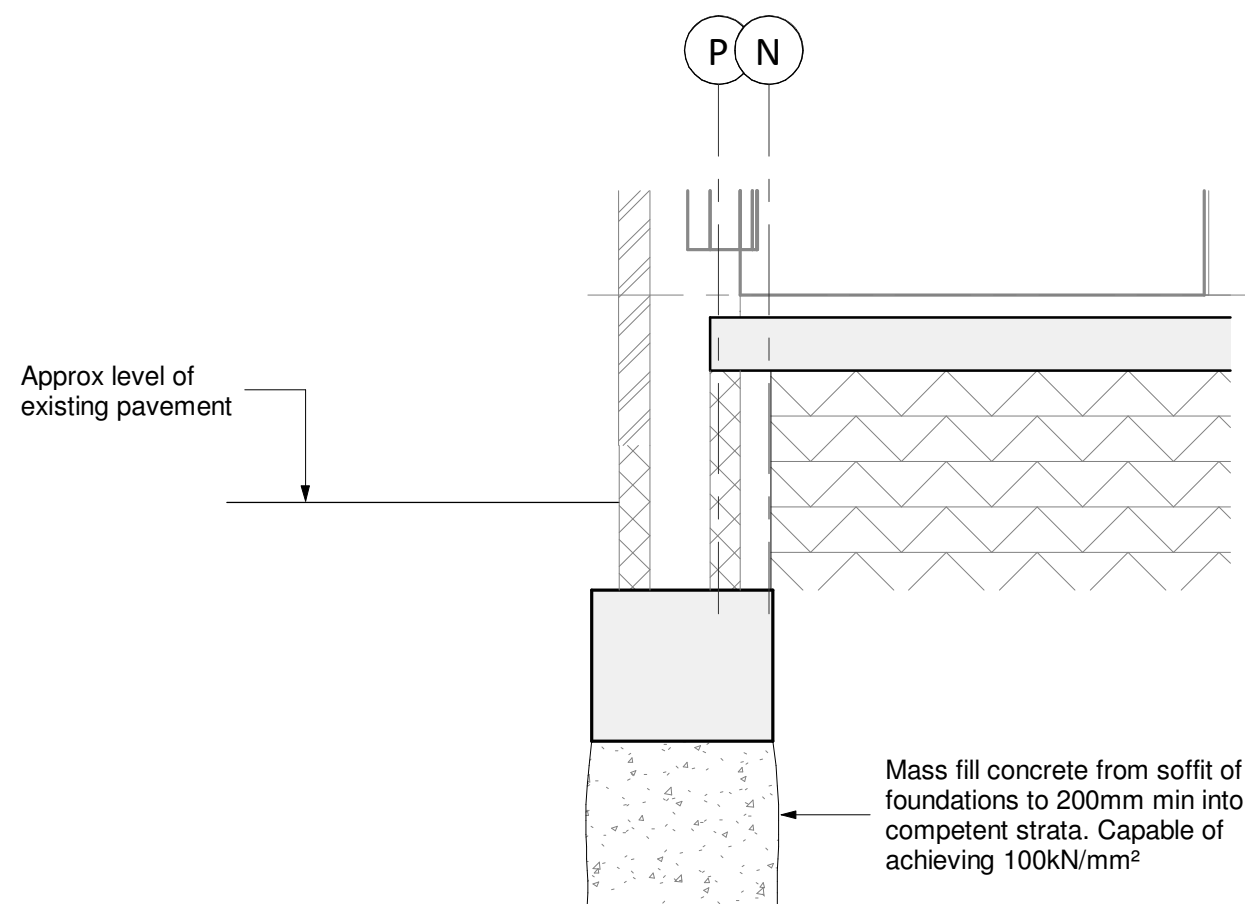
1 Section GL13/C
1 : 25



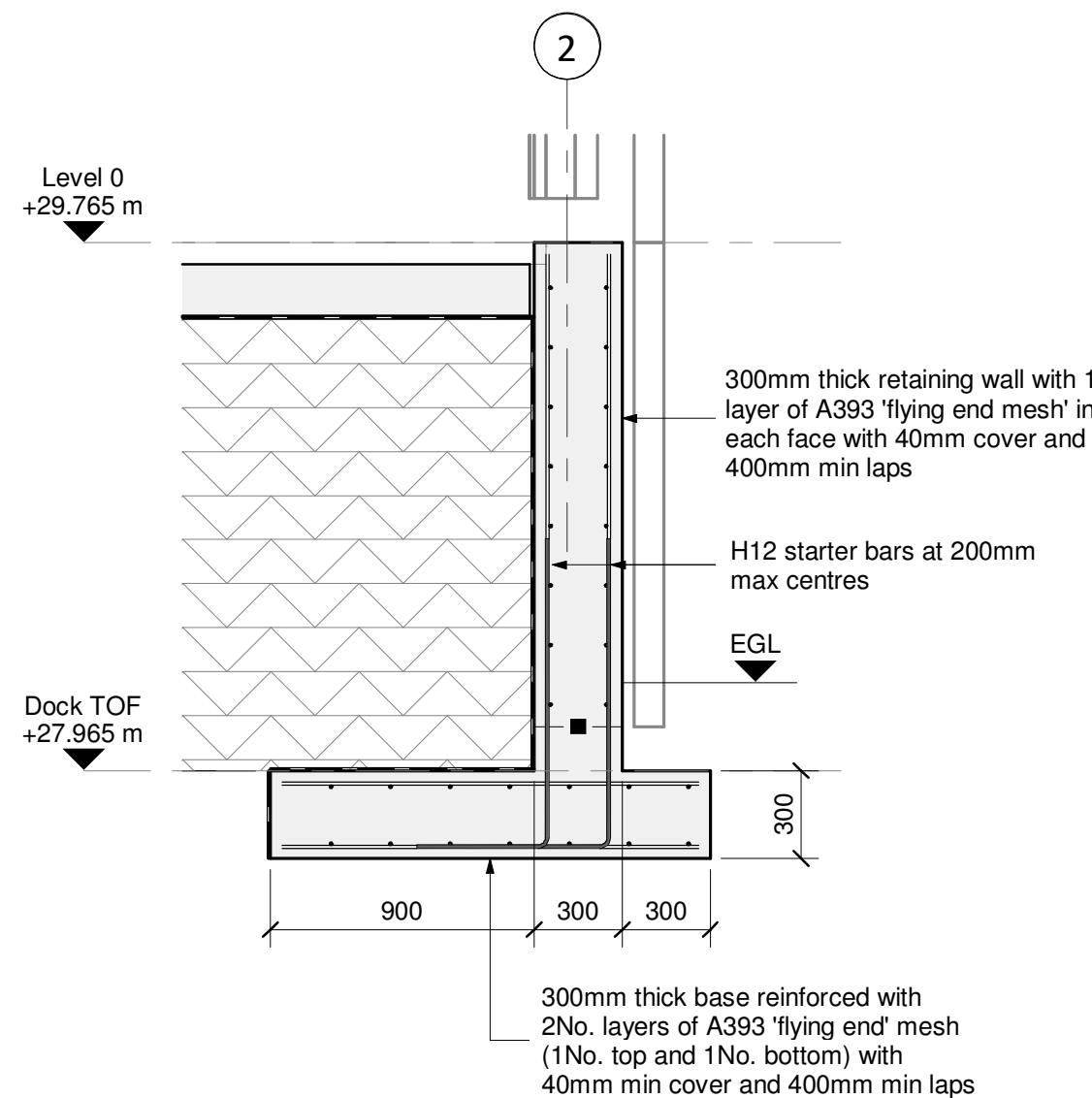
2 Section GLB/10
1 : 25



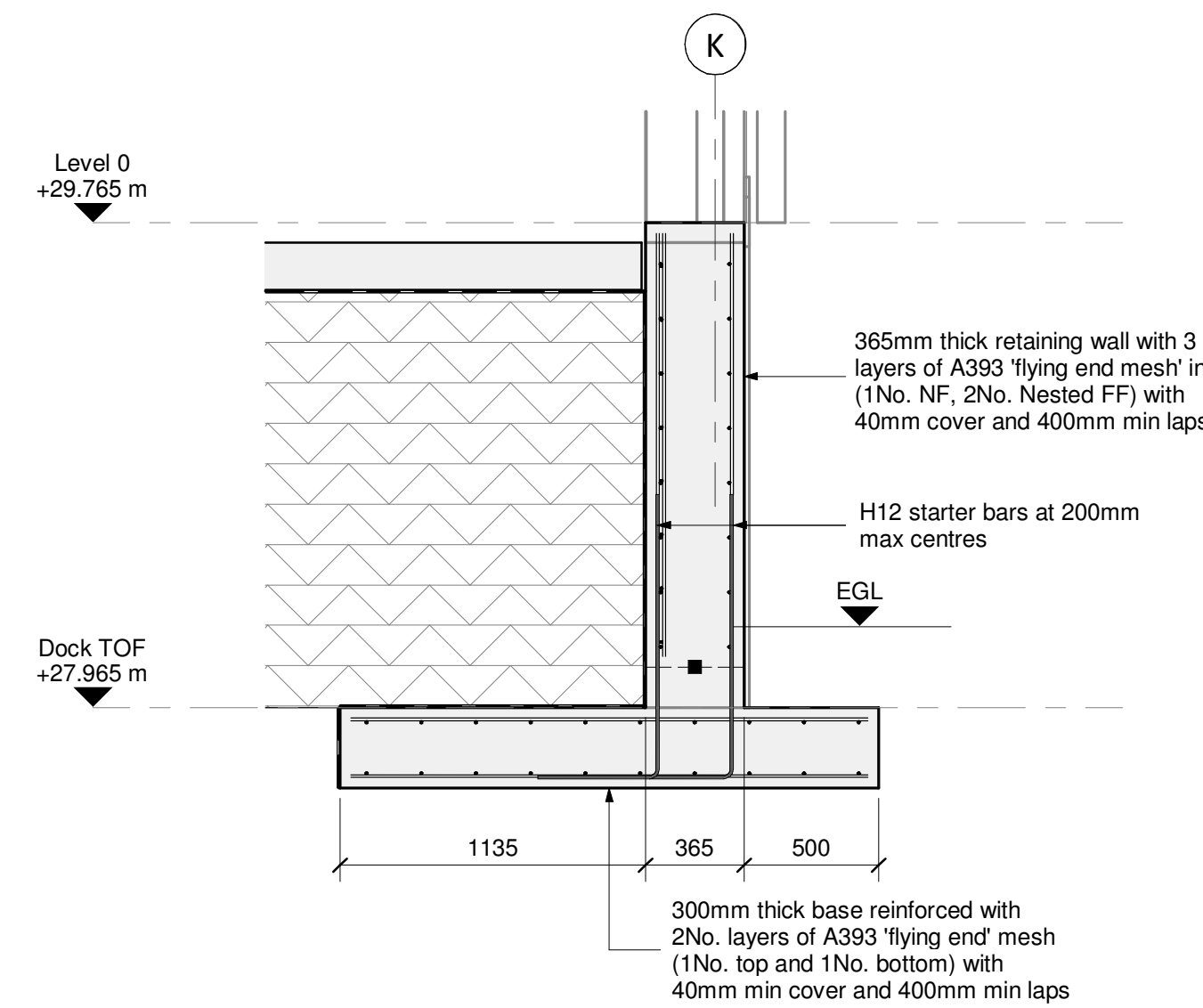
3 Section GLN/11
1 : 25



4 Section GLN/9a
1 : 25



5 Dock Retaining Wall GL 2
1 : 25



6 Dock Retaining Wall GL K
1 : 25

Note:
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P1	Preliminary Issue	25.09.2024	MG	ABr
No.	Revision	Date	Drwn	Chk
Status Preliminary				
TOPPING ENGINEERS CONSULTING CIVIL & STRUCTURAL ENGINEERS Aire House, 12 Victoria Avenue Harrogate, HG1 1ED t: 01423 522 293 w: www.topping-engineers.com e: info@topping-engineers.com				
Client LiDL GB Ltd				
Project Chorlton				
Drawing title Substructure Details - Sheet 2				
Sheet Size A0	Drawing No. 24246-DR-S-0221	Revision	P1	

APPENDIX A

Chemical Specification for Soils

Quality Control Methodology for Imported and Re-used Soils

Prior to Importation and Re-use

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

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

Material Use	Testing Frequency*	Suite of Analysis					
		1	2	3	4	5	6
Topsoil							
Greenfield Source (Top 600mm)	1 per 200m³						
Brownfield/Recycled Source including Site Won (Top 600mm)	1 per 150m³						
Subsoil							
Greenfield Source (Top 600mm)	1 per 200m³						
Brownfield/Recycled Source (Top 600mm)	1 per 150m³						
Site Won (Top 600mm)	1 per 150m³						
First Generation (i.e. quarried sand)	No testing required. Certificate of material provenance is required.						
General Fill **							
Site Generated / Imported 6F2	1 per 1000m³						
Site Won Made Ground	1 per 250m³						
	1 per 1000m³						
Site Won Natural Arisings on Brownfield Site	1 per 1500m³						
Site Win Natural Arisings on Greenfield Site	1 per 2000m³						

Notes

1 – BSL Default Suite - *arsenic, cadmium, chromium (total and hex), copper, nickel, mercury, lead, zinc, selenium, speciated polycyclic hydrocarbons (PAH 16), water soluble sulphate (2:1 Extract), soil organic matter, and pH.*

2 – Asbestos ID (and Quantification if detected).

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

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

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

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

* - Minimum of 3 samples per source.

** To be used at depths >600mm bgl or below building/hardstanding.

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

Topsoil/Subsoil

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

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

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

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

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

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

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

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

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

Post Importation

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

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

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

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

Validation and Verification Report

Site

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

Cover Layer

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

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

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

Human Health Remediation Targets			Re-use Criteria based on Human health -Commercial (1%SOM)
Source	Contaminant	Unit	
LQM S4UL	Arsenic	mg/kg	640
LQM S4UL	Cadmium	mg/kg	190
LQM S4UL	Chromium (III)	mg/kg	8600
LQM S4UL	Chromium (VI)	mg/kg	33
LQM S4UL	Copper	mg/kg	68000
C4SL	Lead	mg/kg	2300
LQM S4UL	Mercury, Elemental	mg/kg	58
LQM S4UL	Nickel	mg/kg	980
LQM S4UL	Selenium	mg/kg	12000
LQM S4UL	Zinc	mg/kg	730000
LQM S4UL	Phenol (total)	mg/kg	760
LQM S4UL	Acenaphthene	mg/kg	84000
LQM S4UL	Acenaphthylene	mg/kg	83000
LQM S4UL	Anthracene	mg/kg	520000
LQM S4UL	Benz(a)anthracene	mg/kg	170
LQM S4UL / DEFRA C4SL	Benzo(a)pyrene	mg/kg	35
LQM S4UL	Benzo(b)fluoranthene	mg/kg	44
LQM S4UL	Benzo(ghi)perylene	mg/kg	3900
LQM S4UL	Benzo(k)fluoranthene	mg/kg	1200
LQM S4UL	Chrysene	mg/kg	350
LQM S4UL	Dibenz(a,h)anthracene	mg/kg	3.5
LQM S4UL	Fluoranthene	mg/kg	23000
LQM S4UL	Fluorene	mg/kg	63000
LQM S4UL	Indeno(1,2,3,cd)pyrene	mg/kg	500
LQM S4UL	Naphthalene	mg/kg	190
LQM S4UL	Phenanthrene	mg/kg	22000
LQM S4UL	Pyrene	mg/kg	54000
LQM S4UL	TPH Aliphatic EC 5 - 6*	mg/kg	3200
LQM S4UL	TPH Aliphatic EC 6 - 8*	mg/kg	7800
LQM S4UL	TPH Aliphatic EC 8 - 10*	mg/kg	2000
LQM S4UL	TPH Aliphatic EC 10 - 12*	mg/kg	9700
LQM S4UL	TPH Aliphatic EC 12 - 16*	mg/kg	59000
LQM S4UL	TPH Aliphatic EC 16 - 35*	mg/kg	1600000
LQM S4UL	TPH Aliphatic EC 35 - 44*	mg/kg	1600000
LQM S4UL	TPH Aromatic EC 5 - 7*	mg/kg	26000
LQM S4UL	TPH Aromatic EC 7 - 8*	mg/kg	56000
LQM S4UL	TPH Aromatic EC 8 - 10*	mg/kg	3500
LQM S4UL	TPH Aromatic EC 10 - 12*	mg/kg	16000
LQM S4UL	TPH Aromatic EC 12 -16*	mg/kg	36000
LQM S4UL	TPH Aromatic EC 16 - 21*	mg/kg	28000
LQM S4UL	TPH Aromatic EC 21 - 35*	mg/kg	28000



LQM S4UL		mg/kg	28200
LQM S4UL	Benzene	mg/kg	27
LQM S4UL	Toluene	mg/kg	56000
LQM S4UL	Ethyl Benzene	mg/kg	5700
LQM S4UL	Xylene - o	mg/kg	6600
LQM S4UL	Xylene - m	mg/kg	6200
LQM S4UL	Xylene - p	mg/kg	5900
CL:AIRE 2010	MTBE (methyl tert-butyl ether)	mg/kg	7900
NA	Asbestos (No visual ACM)	% w/w	None Detected
pH	BS3882	pH Units	5 - 8.2

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

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

*Soil matrix should contain no free product.

which is a range.

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

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

APPENDIX B

BSL Guidance – Re-use and Disposal of Waste

Re-Use Of Waste - Guidance Note

Definition of Waste

The Environment Agency considers waste to be “...any material that is discarded, or intended to be discarded...” This includes any soil from trenches, footing, site strip etc. It is no longer required in its original location, therefore it is considered to be waste.

CL:AIRE: Code of Practice

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

The developer/contractor is advised to complete all works under the DoWCoP.

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

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

The Code of Practice requires 4 No. Factors to be addressed:

1. Protection of human health and protection of the environment.
2. Suitability of use, without further treatment.
3. Certainty of use.
4. Quantity of material.

In order to satisfy these requirements the following are required:

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

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

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

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

Alternatives include the EA U1 exemption (soils and stones <1000 tonnes and aggregates <5000 tonnes) and the Waste Framework Directive, which applies to naturally occurring soils used on site of origin only. Aggregates can also fall under the EA WRAP Quality Protocols.

Waste Classification For Soils

Introduction

Waste producers have a duty of care to classify the waste they are producing:

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

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

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

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

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

Background for Landfill Disposal

In July 2005 the United Kingdom implemented the European Directive 1999/31/EC (The Landfill Directive), this introduced the current regime for waste and waste disposal to landfill. The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

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

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

Key Points

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

Classification

Wastes are listed in the European Waste Catalogue (EWC 2002) and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

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

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

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

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations**.

Waste Definitions

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

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

WAC Testing

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

Classification based on Total Concentrations ¹	Non-Hazardous Waste		Hazardous Waste	
	Below inert WAC limit values:	Above inert WAC limit values:	Below hazardous WAC limit values	Above hazardous WAC limit values
WAC testing				
Landfill requirements	INERT landfill	NON-HAZARDOUS landfill ²	HAZARDOUS landfill	PRE-TREATMENT ³

1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).

2 Individual sites may have certain limit values pre-determined in their licence.

3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.

Hydrocarbons in Soils

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

Known Oils

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

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

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

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

Unknown Oils

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

WM3 states that:

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

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

The use of **marker compounds** is optional; however it is recommended that where possible the marker compounds should be used.

WM3 states:

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

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

For example:

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

References

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

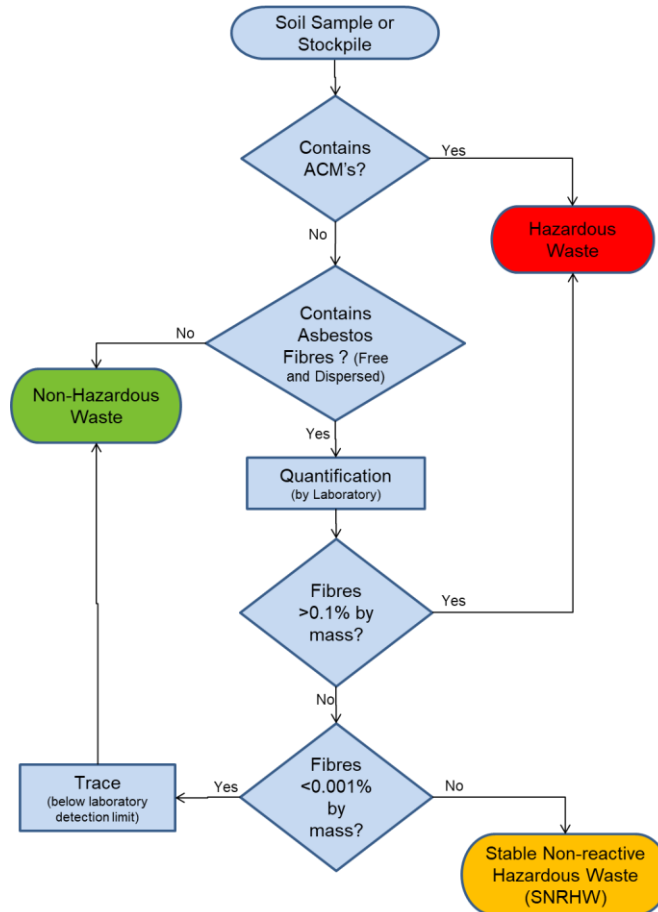
Additional Asbestos Guidance Notes

Disposal

The 1st Edition of WM3 “Guidance on the classification and assessment of waste”, details the way in which Asbestos is assessed within soils.

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

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



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

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

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

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

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

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

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

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

Construction

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

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

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

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

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

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

End Use

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation. There is currently a Joint Industry Working Group (JIWG) tasked with producing a Code of Practice for Asbestos in Soil, Made Ground and Construction & Demolition Material that will clarify in due course the position of the various government agencies.

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

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

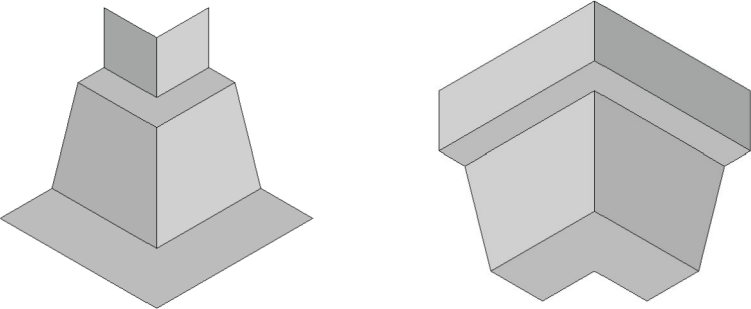
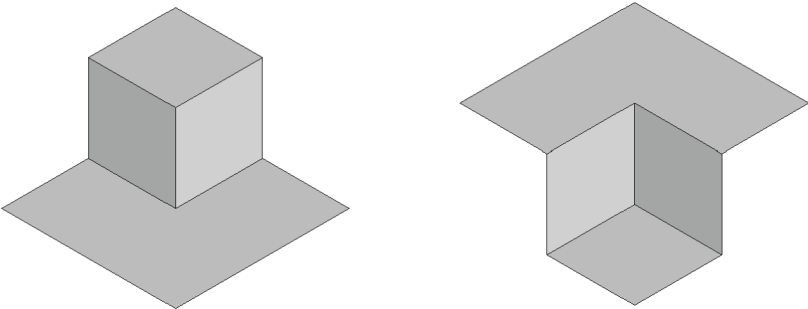
Preliminary publications from JIWG (April 2015) provide guides for decision making in relation to construction. These are at a “Beta” test stage and further publications will be provided in due course.

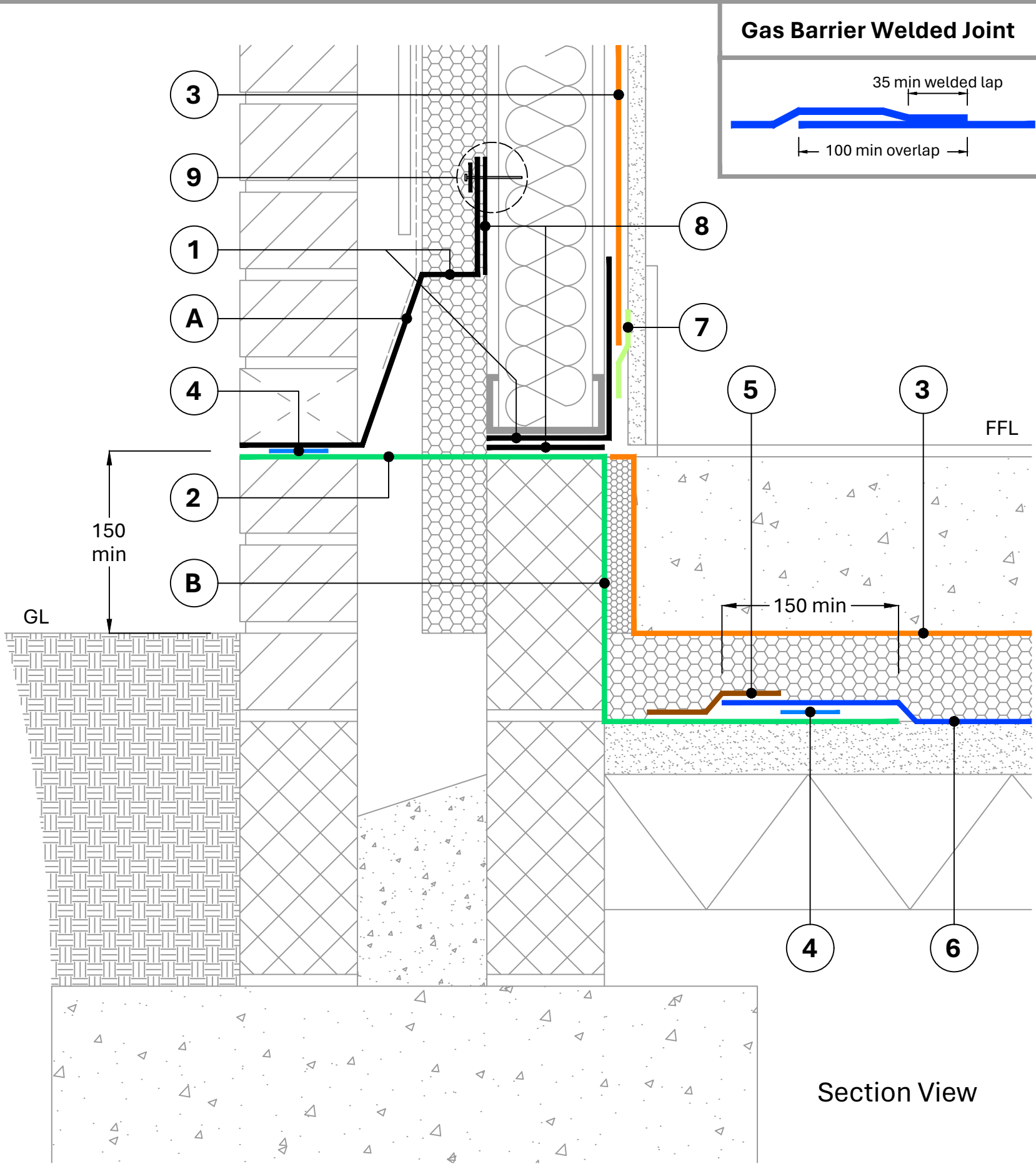
The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk. There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required. The re-use of soils containing asbestos at concentrations above hazardous waste levels is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

APPENDIX C

Ground Gas Protection System Typical Details and Data Sheets

Key to materials:

1	Visqueen Zedex CPT High Performance Damp Proof Course
2	Visqueen Ultimate Gas Damp Proof Course
3	Visqueen Vapour Check or Visqueen Vapour Barrier
4	VisqueenPro Double Sided Jointing Tape
5	Visqueen Gas Resistant Foil Lap Tape
6	Visqueen Gas Barrier
7	Visqueen FR Single Sided Vapour Tape
8	Visqueen 100mm Double Sided Butyl Tape
9	Visqueen Zedex DPC Surface Fixing System
A	PFU-503 Preformed Units at corners
	
B	PFU-553 Preformed Units at corners
	



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Protection such as pressure relief or ventilation measures (not shown) may be necessary to meet the requirements of British Standards and industry guidance.

Some Visqueen membranes can be installed with welded lap joints.

Visqueen Preformed Units are available to assist complex detailing, such as internal and external corners.

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Guidance Detail

Drawing No: GB-25

Drawn by: JR

Approved: SD

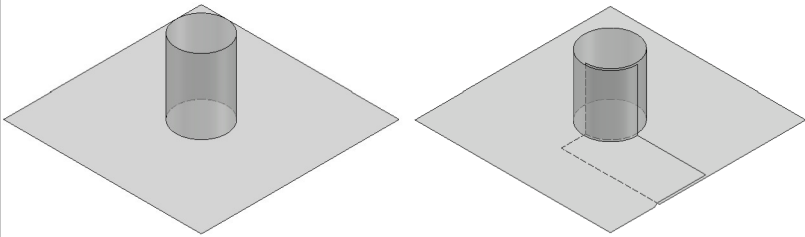
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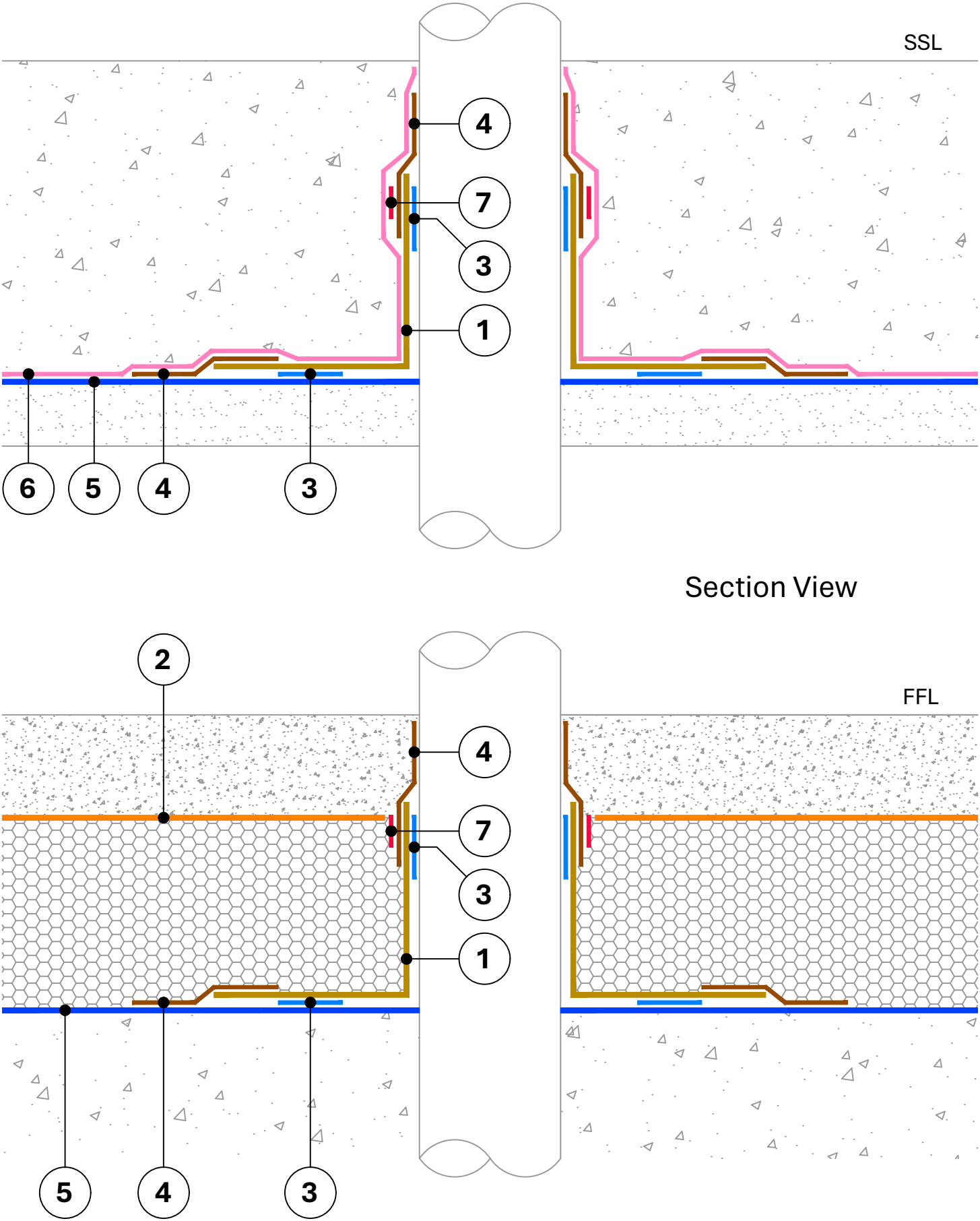
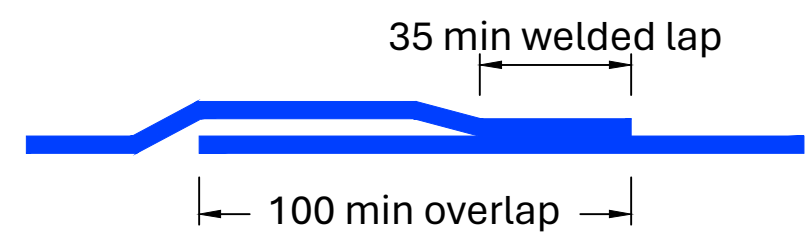


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enquiries@visqueen.com
www.visqueen.com

Key to materials:

1	Visqueen Ultimate Preformed Pipe Sleeve (Top Hat)  PFU-203PFU-205
2	Visqueen Vapour Check or Visqueen Vapour Barrier
3	VisqueenPro Double Sided Jointing Tape
4	Visqueen Gas Resistant Foil Lap Tape
5	Visqueen Gas Barrier
6	Visqueen TreadGUARD
7	Jubilee clip

Gas Barrier Welded Joint



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Guidance Detail

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BARRIER BELOW & ABOVE SLAB
PIPE SLEEVE DETAILS

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Key to materials:

- 1

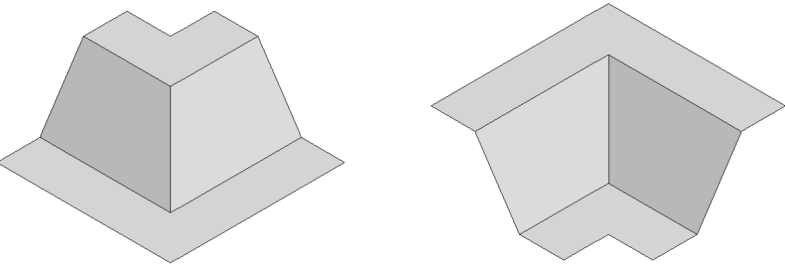
Visqueen Zedex CPT High Performance Damp Proof Course
- 2

Visqueen Vapour Check or Visqueen Vapour Barrier
- 3

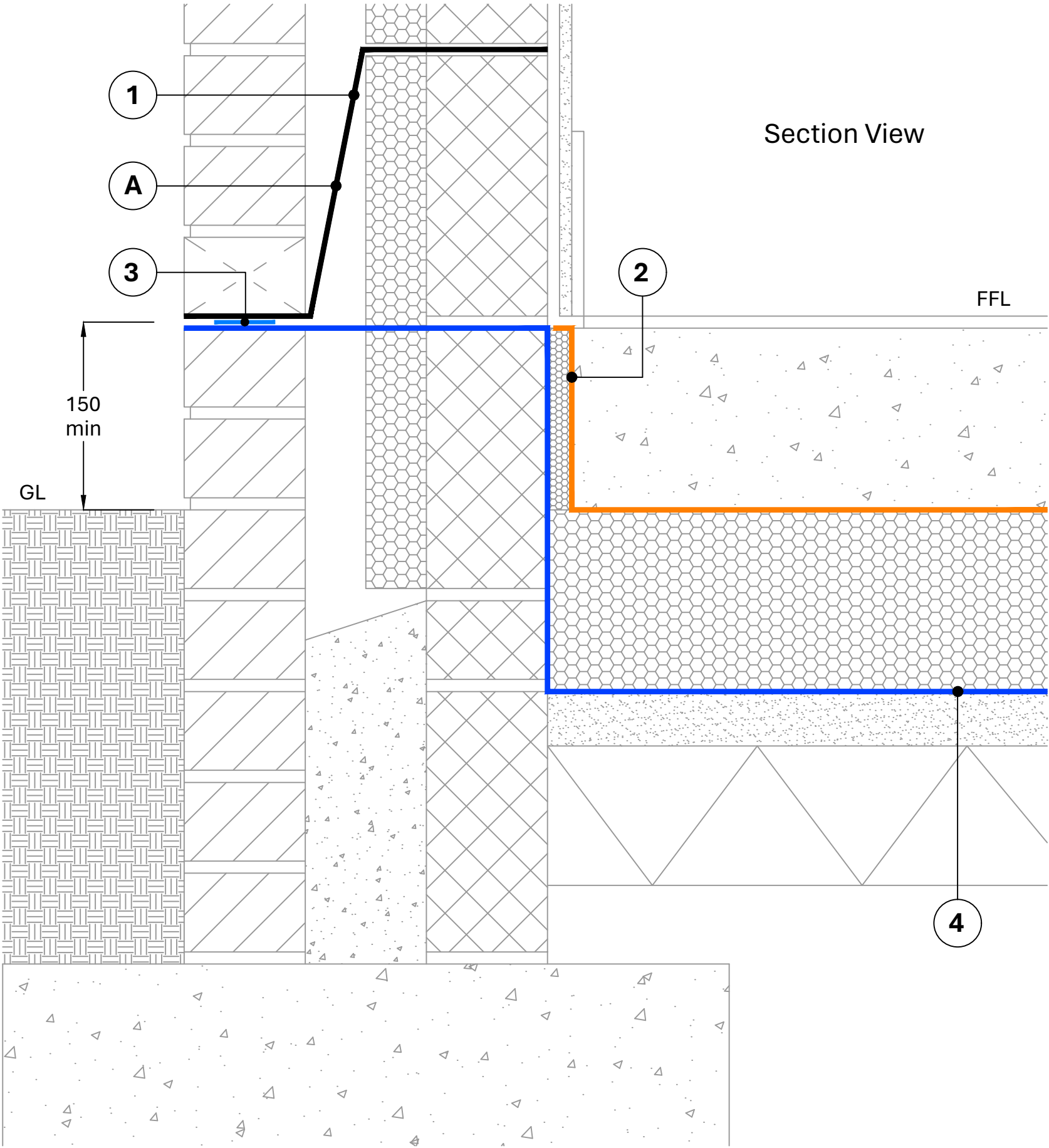
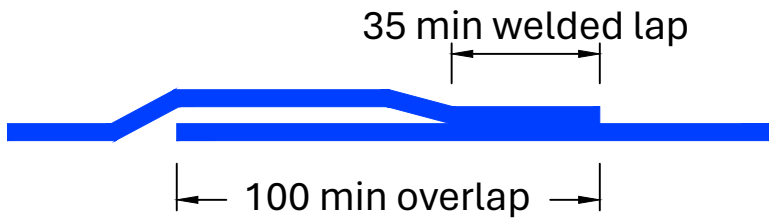
VisqueenPro Double Sided Jointing Tape
- 4

Visqueen Gas Barrier
- A

PFU-501 Preformed Units at corners



Gas Barrier Welded Joint



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Visqueen Preformed Units are available to assist complex detailing, such as internal and external corners.

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Guidance Detail

Drawing No: GB-62

Drawn by: JR

Approved: SD

Date drawn: September 2024

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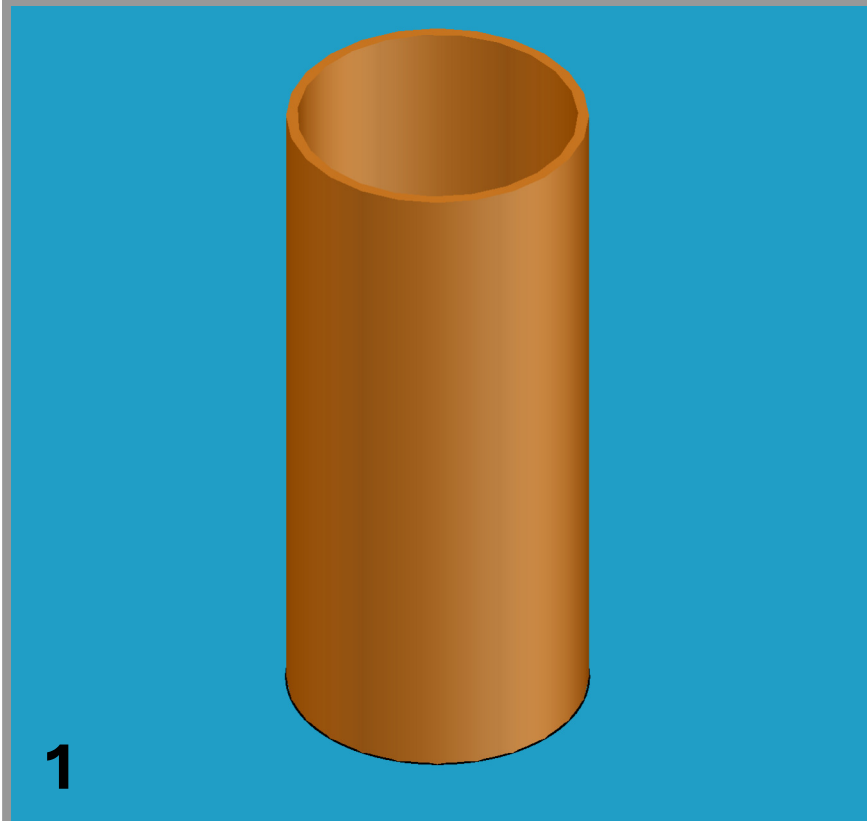
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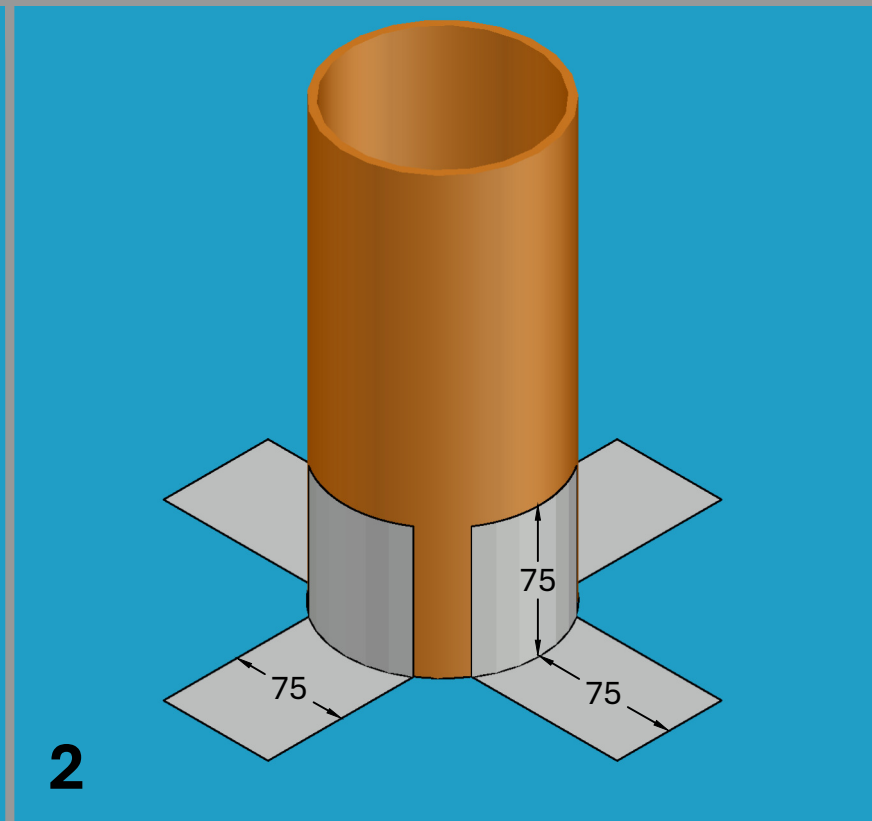


**BARRIER BELOW SLAB & INSULATION
CAST IN SITU RC GROUND BEARING SLAB AT
EXTERNAL MASONRY CAVITY WALL**



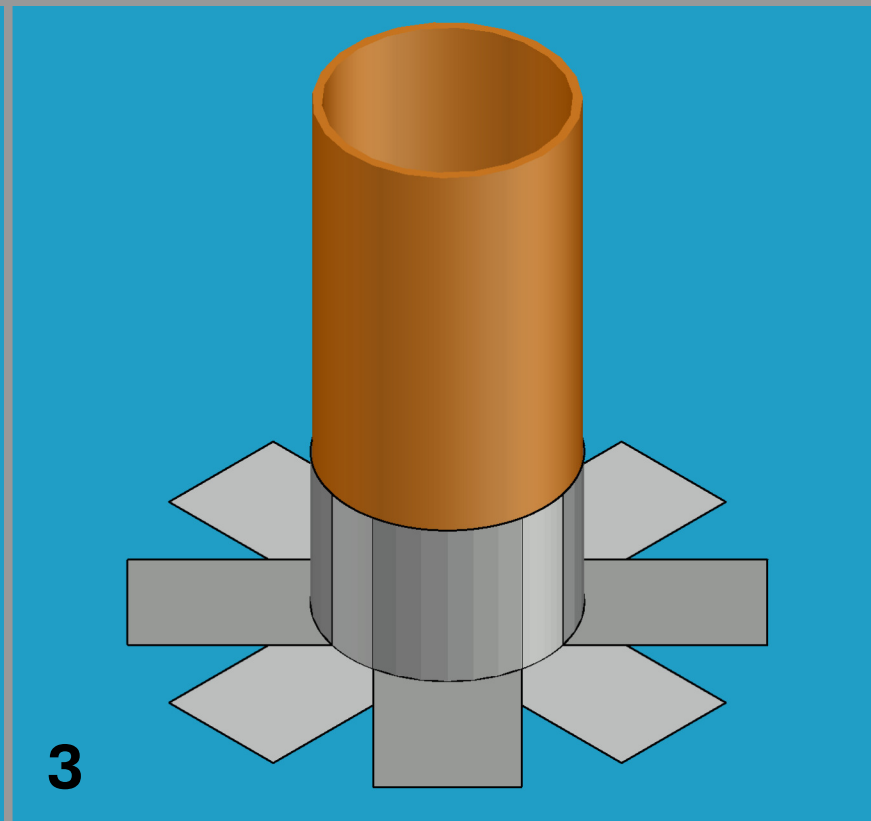
1

Ensure surface of pipe is clean and free from any contamination. Cut Visqueen Gas Barrier to fit tight around base of pipe.



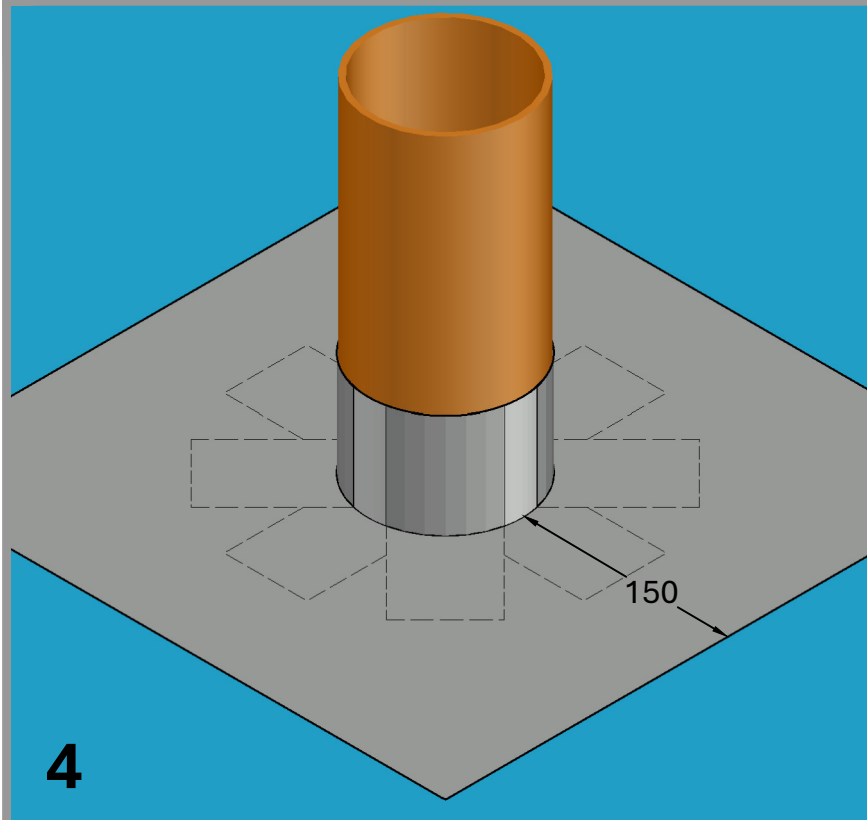
2

Bond 150mm x 75mm strips of VisqueenPro Detailing Strip as shown. Strips to be bonded 75mm onto pipe and 75mm onto barrier.



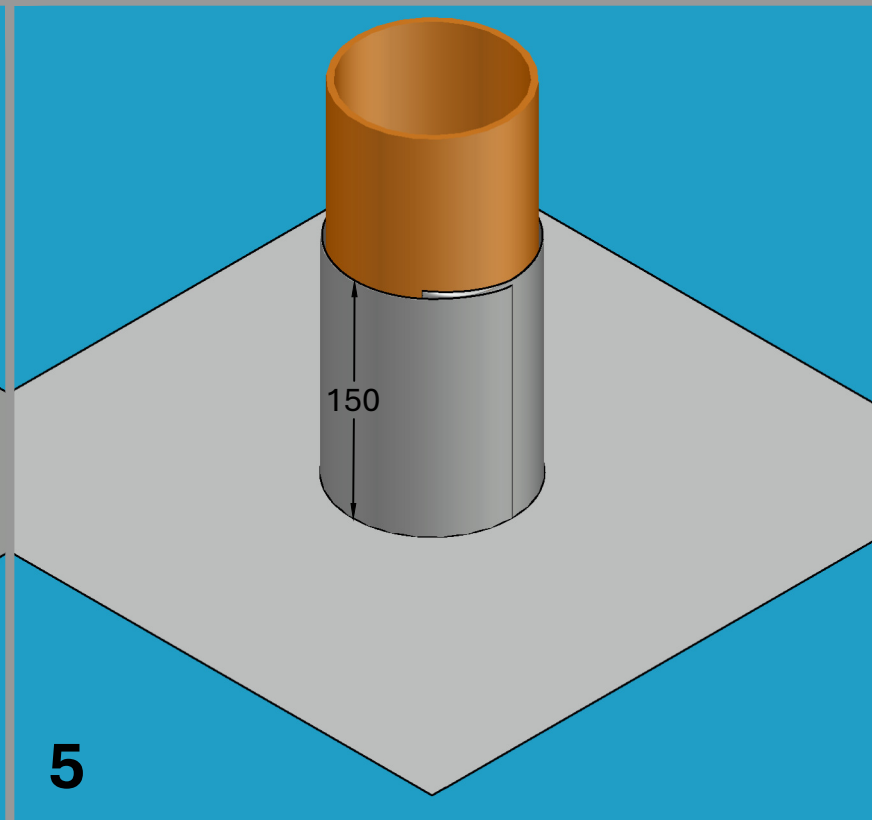
3

Bond additional strips overlapping previous strips by minimum 25mm.



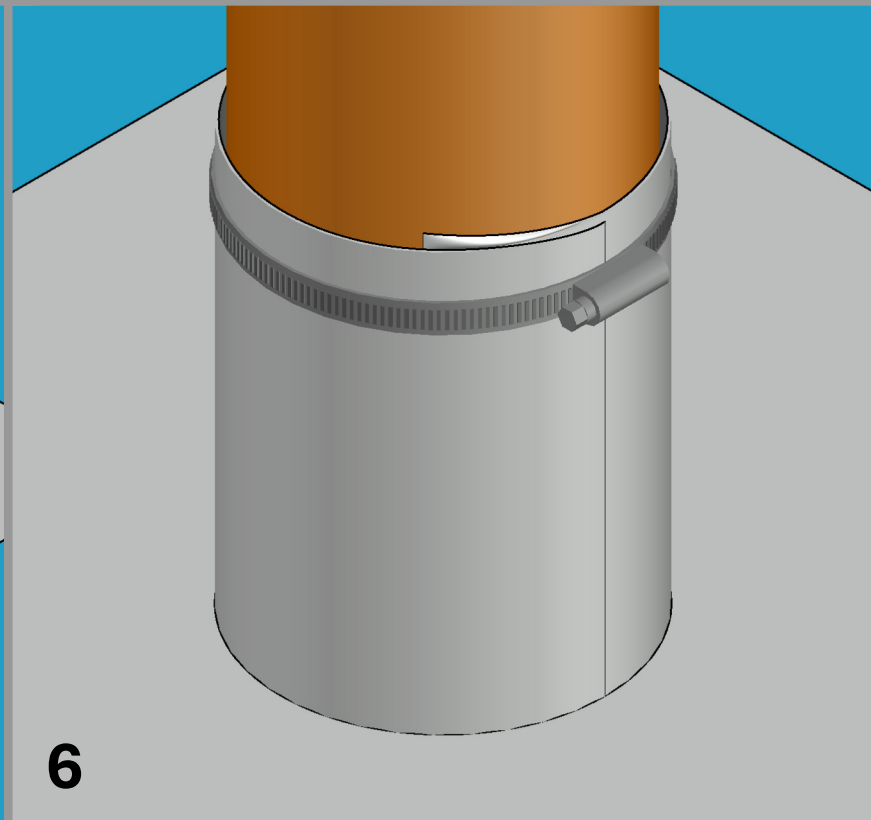
4

Cut central hole in a square of detailing strip. Square to extend minimum 150mm beyond base of pipe. Bond over horizontal strips and barrier.



5

Bond minimum 150mm detailing strip upstand collar around vertical strips and pipe.



6

Secure upstand collar with a mechanical fastening.

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Protection such as pressure relief or ventilation measures (not shown) may be necessary to meet the requirements of British Standards and industry guidance.

Each stage of the VisqueenPro Detailing Strip installation to be rolled to ensure a full bond is achieved.

Visqueen TreadGUARD protection layer above barrier required as per specification.

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Guidance Detail

Drawing No: GB-81

Drawn by: JR

Approved: SD

Date drawn: September 2024

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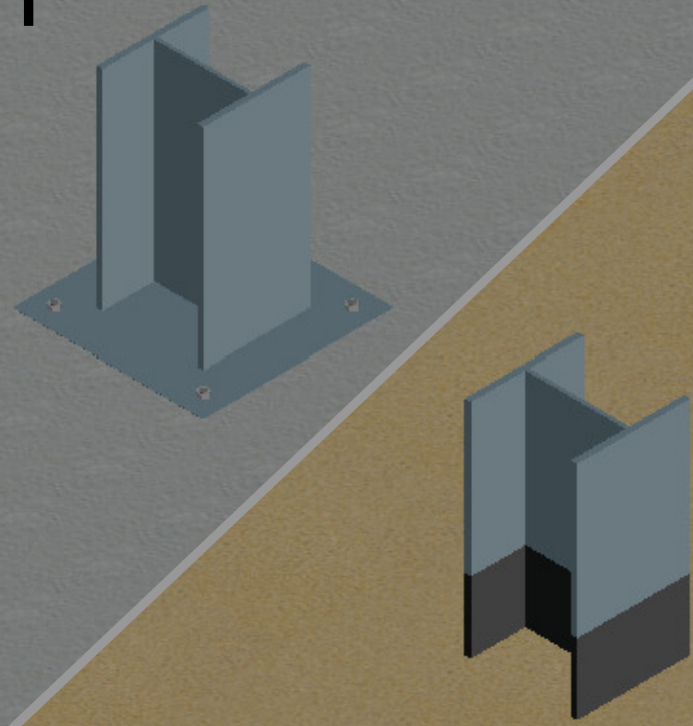
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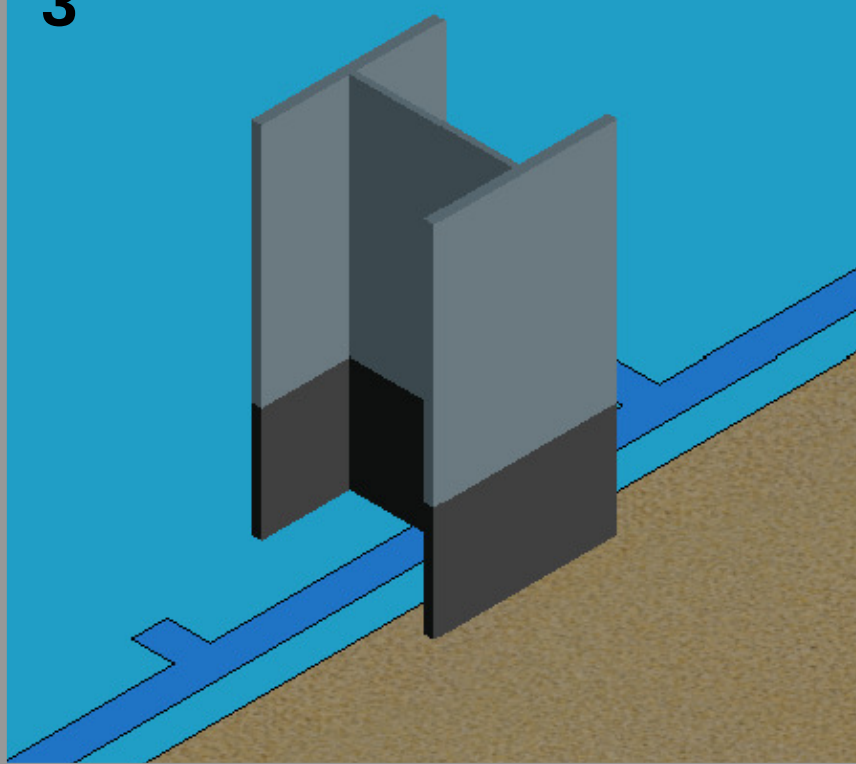
SERVICE PIPE DETAILING USING VISQUEENPRODETAILING STRIP STEP BY STEP

1



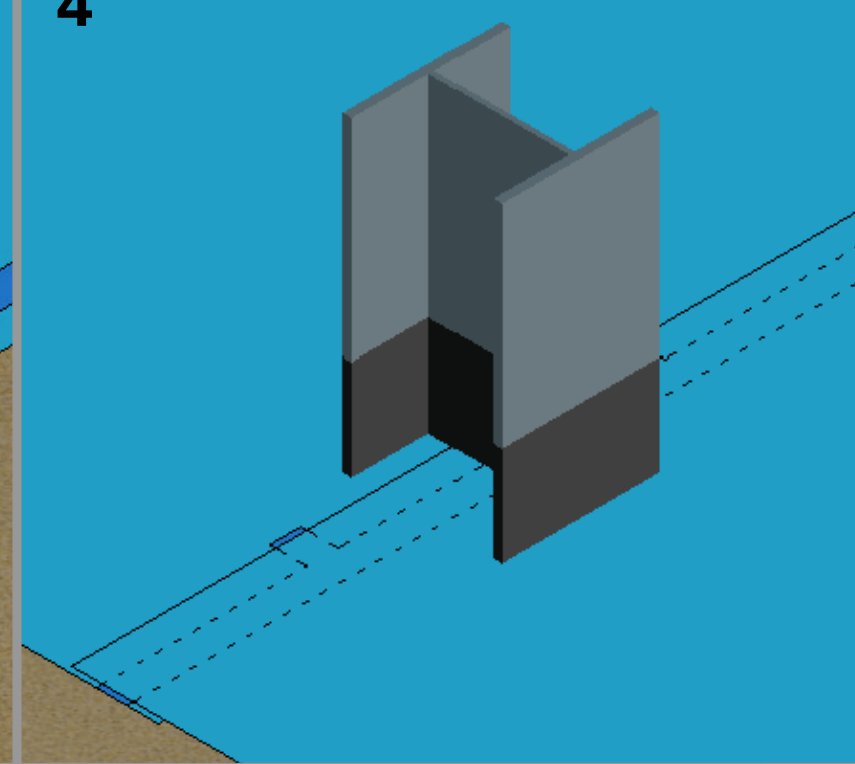
Install blinding layer. Prime steel column with Visqueen HP Tanking Primer min 150mm vertically.

3



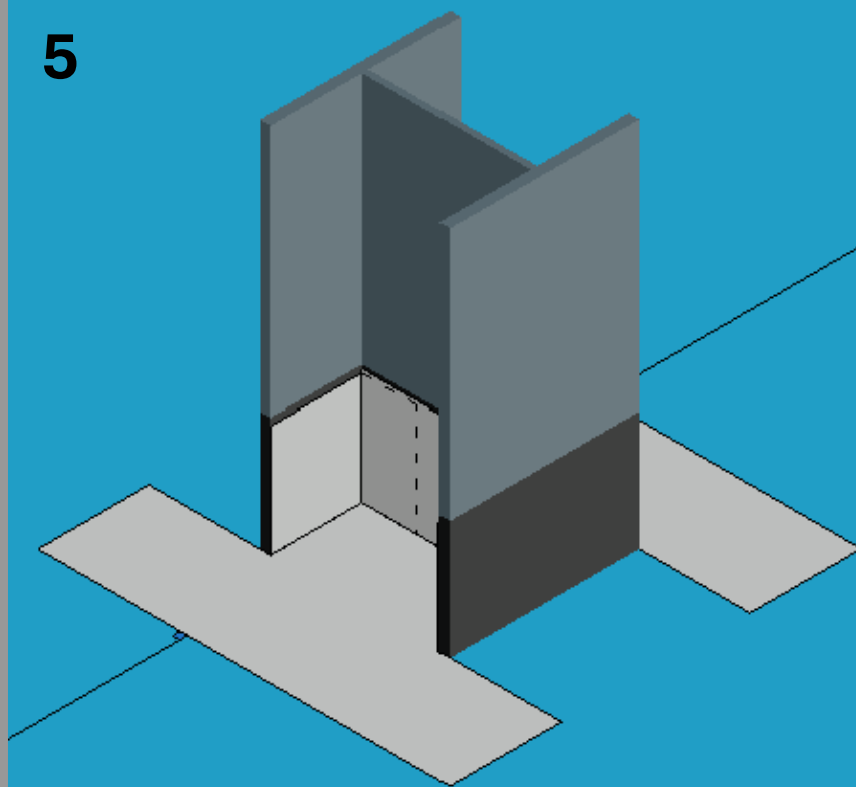
Cut and install Visqueen Gas Barrier around column. Apply VisqueenPro Double Sided Jointing Tape.

4



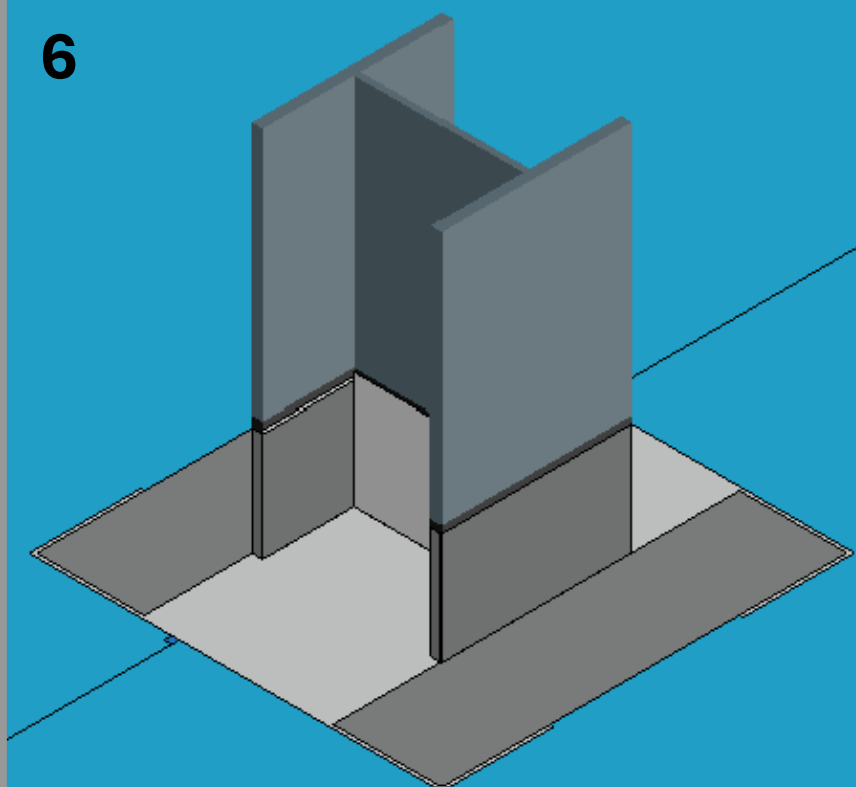
Cut and install adjacent barrier around column, bonding to double sided tape.

5



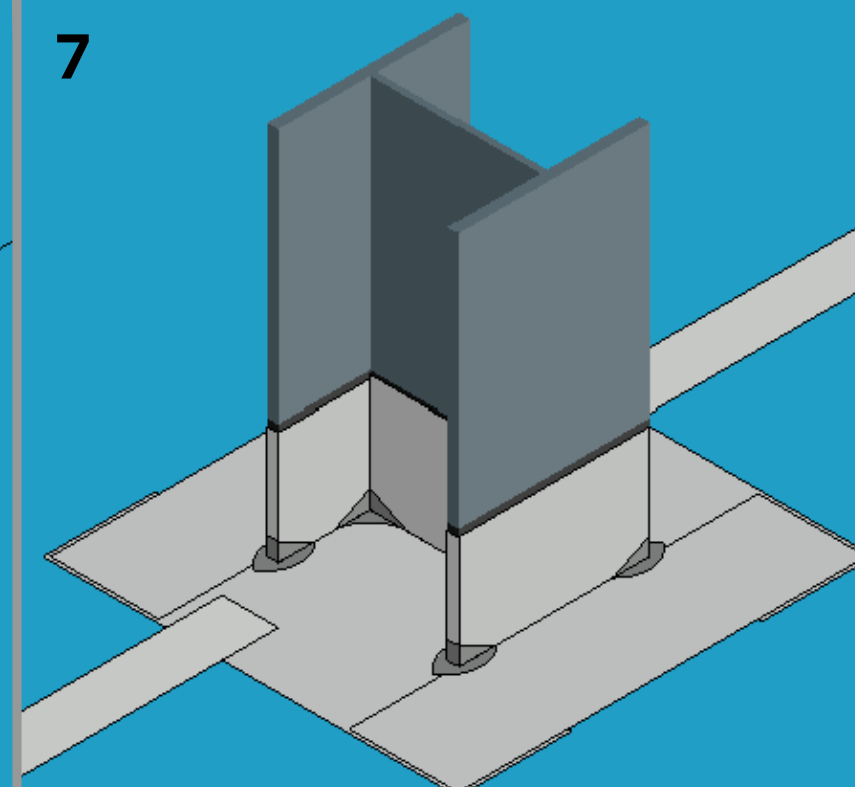
Bond VisqueenPro Detailing Strip to column web and barrier, extending min 150mm up column and onto barrier.

6



Bond additional detailing strip to column flange and barrier, extending min 150mm up column, onto barrier and detailing strip from previous step.

7



Cut detailing strip into triangular pieces and bond to corners. Bond Visqueen Gas Resistant Foil Lap Tape over barrier lap and min 75mm onto detailing strip.

CRITICAL GUIDANCE NOTES

Visqueen Guidance Details are for illustration purposes only. It is the lead designer's responsibility to ensure Guidance Details are incorporated correctly into construction drawings.

Visqueen take no project design liability, or responsibility for the use of Guidance Details.

Drawing not to scale, use figured dimensions only. All figured dimensions are in millimetres.

British Standards are regularly updated. Visqueens' Guidance Details meet recommendations in place on date drawn.

Protection such as pressure relief or ventilation measures (not shown) may be necessary to meet the requirements of British Standards and industry guidance.

Each stage of the VisqueenPro Detailing Strip installation to be rolled to ensure a full bond is achieved.

Visqueen TreadGUARD protection layer above barrier required as per specification.

Contact Visqueen Technical Services for further information.

Guidance Detail

Drawing No: GB-82

Drawn by: JR

Approved: SD

Date drawn: September 2024

Visqueen provide a Contract Design Service where project specific drawings can be produced. Contact Visqueen Technical Services for further information.



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VISQUEEN

GAS BARRIER

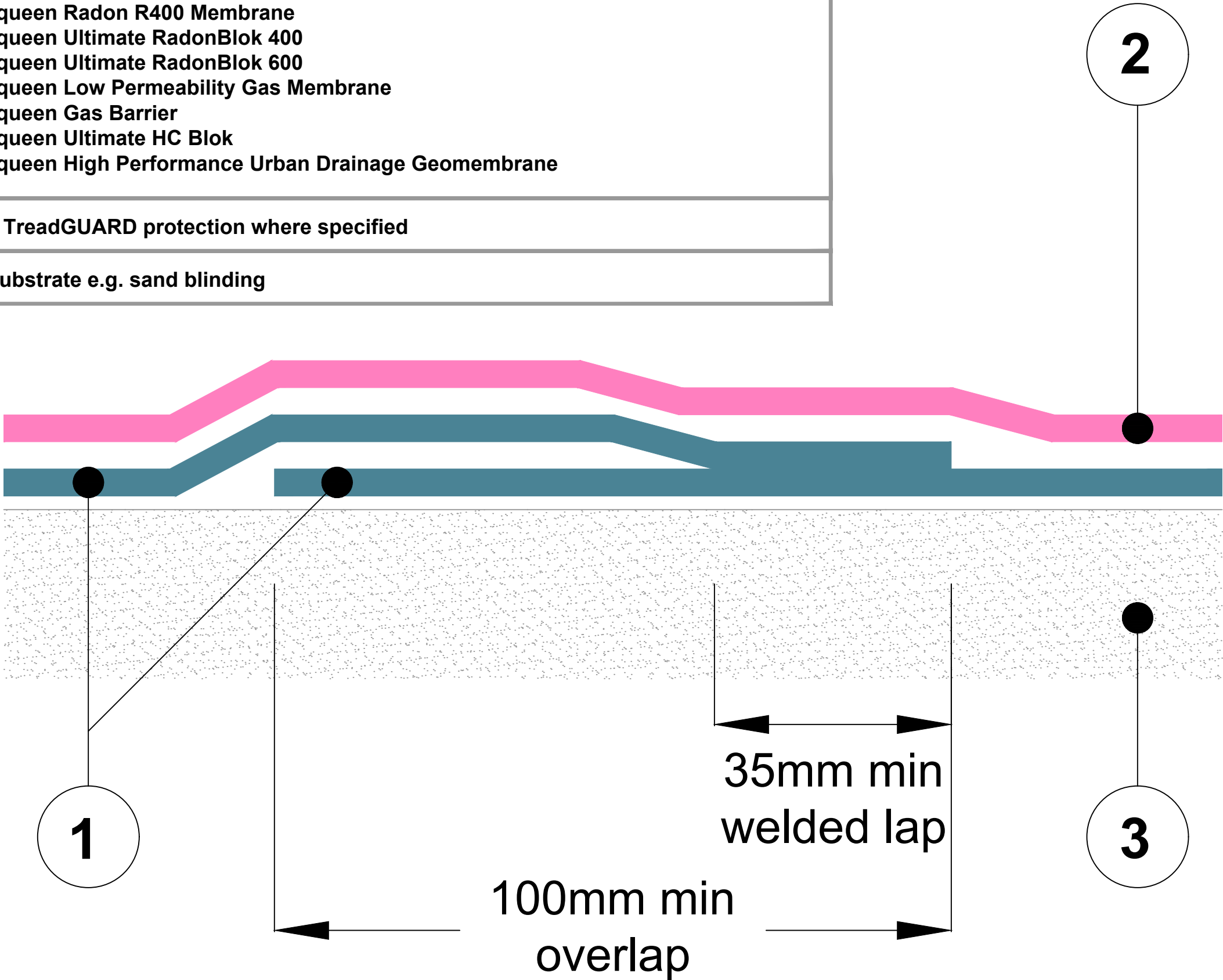
STEEL COLUMN DETAILING USING VISQUEENPRO DETAILING STRIP STEP BY STEP

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VISQUEEN

A Berry Global Brand

1	Visqueen membrane as specified. On-site heat weldable membranes include the following: - Visqueen High Performance Damp Proof Membrane - Visqueen Radon R400 Membrane - Visqueen Ultimate RadonBlok 400 - Visqueen Ultimate RadonBlok 600 - Visqueen Low Permeability Gas Membrane - Visqueen Gas Barrier - Visqueen Ultimate HC Blok - Visqueen High Performance Urban Drainage Geomembrane
2	Visqueen TreadGUARD protection where specified
3	Smooth substrate e.g. sand blinding



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Site construction sequencing should be assessed before the appropriate Guidance Detail is selected and approved by the lead designer.

All Visqueen materials must be installed in strict accordance with the Visqueen Product Datasheets and applicable third party certificates.

This detail relates to the formation of a sealed lap joint using a hot air hand welder and roller. Other lap joint heat welding techniques are suitable including wedge welding.

Drawing not to scale, use figured dimensions only. All figured dimensions are in millimetres.

Guidance Detail

Date: September 2023

Drawing No: JD-08

Revision: A Drawn by: JR

Approved by: SD

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HAND WELDED LAP JOINT DETAIL

Visqueen Gas Barrier

Features & benefits

- BBA certified - third party accreditation
- Complies with NHBC Foundation's NF94 guidance for use in Type A membrane locations
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Also provides radon and damp proof membrane protection
- Dual jointing methods - lap joints can be taped or heat welded

Product description

Visqueen Gas Barrier is a multi-layer reinforced polyethylene gas barrier with a 20 micron aluminium foil. The barrier is coloured blue on the upper surface and silver on the reverse. The product is supplied in single wound rolls (not folded), 2m x 50m.

Approvals and standards

- Third party accreditation (BBA 13/5069)
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Complies with NHBC Foundation's NF94 guidance for use in Type A membrane locations
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- UKCA UKNI CE to EN 13967:2017
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Barrier is suitable for use in all types of buildings to prevent the ingress of harmful levels of ground gases e.g. methane, carbon dioxide and radon.

The barrier can be positioned above or below reinforced cast in situ concrete floor slabs or above precast suspended segmental subfloors, e.g. beam and block floor.

The barrier can also be used as a high performance radon membrane and/or damp proof membrane.

Radon, carbon dioxide, and methane protection - NHBC NF94 guidance:
Visqueen Gas Barrier when installed with either taped or welded joints complies with NHBC Foundation's NF94 publication, Hazardous ground gas - an essential guide for housebuilders, in Type A membrane locations in precast suspended segmental subfloors and reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft). For site or zone characteristic gas situations of CS4 and above, contact Visqueen Technical Services.

The product is not intended for use where there is a risk of hydrostatic pressure.

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- Visqueen Gas Resistant Foil Lap Tape, 75mm x 50m
- VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m
- Visqueen TreadGUARD 1500, 1m x 2m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen Ultimate Top Hat Units
- Visqueen GR Lap Tape, 150mm x 10m

Storage and handling

Visqueen Gas Barrier should be stored horizontally, under cover in its original packaging.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Visqueen Gas Barrier should be installed on a smooth continuous surface e.g. grouted beam and block floor, a compacted blinding layer e.g. 50mm thick sand blinding, or smooth concrete blinding. The substrate should be free from irregularities such as voids or protrusions.

The barrier can be cut with a sharp retractable safety knife or robust scissors.

When installing the membrane in demanding site conditions, use Visqueen GR Lap Tape in place of Visqueen Gas Resistant Foil Lap Tape.

Visqueen Gas Barrier

Installation

Visqueen Gas Barrier should be loose laid on the substrate with the blue side up so as to avoid sunlight glare.

The barrier should be clean and dry at the time of jointing. It should be overlapped by at least 150mm, bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. Alternatively lap joints can be heat welded to achieve an effective seal. The overlap in the barrier is typically 100mm and when hand welding, a 35mm weld is normally achieved. When hand welding, a roller must be used.

Airtight seals should be formed around all service entry points. Visqueen Preformed Top Hat Units are recommended for sealing service entry pipes. The base of the top hat and the upstand should be bonded using VisqueenPro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. The upstand should be secured with the supplied jubilee clip. Alternatively VisqueenPro Detailing Strip can be used to seal service entry points. The upstand should be secured with a jubilee clip.

Forming an effective barrier to gases may give rise to complex three-dimensional detailing where, it is recommended Visqueen Preformed Units are used e.g. corners. Alternatively VisqueenPro Detailing Strip can be used to seal awkward junctions.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. Alternatively a patch can be formed using VisqueenPro Detailing Strip and lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane. The membrane should be covered by a protective layer immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended. When reinforced concrete is to be laid over the barrier the wire reinforcements and spacers must be prevented from puncturing the barrier. Where there is a high risk of potential damage, the barrier should be covered with Visqueen TreadGuard protection, screed or other approved protection material before positioning the reinforcement.

Usable temperature range

It is recommended that Visqueen Gas Barrier and all associated system components should not be installed below 5°C.

Additional information

When used in accordance BS8485:2015 + A1:2019 a subfloor ventilation system or pressure relief maybe required Where hydrocarbon or VOC contamination is present use Visqueen Ultimate HC Blok or Ultimate GeoSeal gas protection systems

To assist build sequencing, Visqueen Ultimate Gas DPC is available for gas protection through the wall constructions

For additional detailing information, contact Visqueen Technical Services +44 (0) 333 202 6800

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Property	Test method	Units	Compliance criteria	Result
Dimensions	BS EN 1848-2	m		2 x 50
Overall thickness including scrim mesh	BS EN 1849-2	mm	+/-10%	0.52
Mass	BS EN 1849-2	g/m ²	-0%/+5%	400
Tensile strength - MD	BS EN 12311	N/50mm	MLV	350
Tensile strength - CD	BS EN 12311	N/50mm	MLV	350
Tensile elongation - MD	BS EN 12311	%	MLV	20
Tensile elongation - CD	BS EN 12311	%	MLV	21
Joint strength	BS EN 12317-2	N	MLV	332
Watertightness at 2kPa for 24 hours	BS EN 1928	-	Pass/Fail	Pass
Resistance to impact	BS EN 12691	mm	MDV	150
Dart impact	BS EN 2782	g	MDV	731
Low temperature flexibility	BS EN 495-5	°C	MDV	-40

Visqueen Gas Barrier

Durability against ageing	BS EN 1296 and BS EN 1928	-	Pass/Fail	Pass
Durability chemical resistance	BS EN 1847	-	Pass/Fail	Pass
Resistance to tearing (nail shank) CD	BS EN 12310-1	N	MDV	358
Resistance to tearing (nail shank) MD	BS EN 12310-1	N	MDV	368
Resistance to static loading	BS EN 12730	kg	MLV	20
Water vapour resistance	BS EN 1931	MNs/g	MDV	240,000
Water vapour permeability	BS EN 1931	g/m ² /d	MDV	0.0008658
Water vapour resistance factor	BS EN 1931	μ	MDV	120,000,000
Equivalent air layer thickness	BS EN 1931	SD in m	MDV	47,700
BS 8485:2015 + A1:2019 testing requirements				
Mass	BS EN 1849-2	g/m ²	Average >370	400
Methane gas transmission rate	BS ISO 15105-1	ml/m ² /day/atm	MDV	<0.15
Puncture CBR	BS EN 12236	N	MDV	1114
Tensiles yield strength MD	ASTM D4885-01	kN/m	MDV	12.5
Tensiles yield strength CD	ASTM D4885-02	kN/m	MDV	7.3
Resistance to static loading	BS EN 12730	kg	>MLV	20
Yield elongation CD	ASTM D4885-04	%	MDV	19
Tear resistance - trouser method A - MD	BS ISO 34-1	kN/m	MDV	48.2
Tear resistance - trouser method A - CD	BS ISO 34-1	kN/m	MDV	44.8
Tear resistance - angle method B - MD	BS ISO 34-1	N	MDV	53.5
Tear resistance - angle method B - CD	BS ISO 34-1	N	MDV	60.6

Health and safety information

Refer to the Visqueen Gas Barrier safety datasheet (SDS).

About Visqueen

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We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

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Complete Range, Complete Solution



Passive Fire Protection



Gas Protection



Damp Proof Membrane



Air and Vapor Control



Stormwater



Damp Proof Course



Temporary Protection

Visqueen Technical Support



Visqueen Gas Barrier

Visqueen offer a comprehensive full nationwide technical support. Our team of CSSW qualified technical support managers provide on site design-based solutions for specifiers, contractors and builders merchants, and will ensure that from design stage to installation the project is fully risk assessed and the specification is approved by all stakeholders.

Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

Competency & Design

Visqueen promotes competency in building design by ensuring that its technical team possesses the necessary skills, knowledge, experience, and ethical practices. The company adopts the "golden thread of information," ensuring all project data is digitally secure and accessible throughout a building's lifecycle. This approach aligns with the Building Safety Act and aims to foster accountability and compliance with evolving regulations, providing clients with confidence in the safety and reliability of their projects.

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to damp proofing, hazardous ground gas protection, and structural waterproofing. These one-hour seminars are tailored for construction design professionals and delivered by our Technical Support Managers. Visit our website to book a free CPD.

Visqueen Contract Design Services

Visqueen Contract Design Services offers a bespoke design service led by our team of Certified Surveyors in Structural Waterproofing (CSSW), providing experienced and specialised waterproofing design expertise for complex projects. We provide comprehensive support throughout the entire project, ensuring that all work meets the requirements of warranty providers and adheres to the highest standards of quality, reliability and current legislation.

Visqueen Training Academy

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Visqueen Gas Resistant Foil Lap Tape, 75mm x 50m

Features & benefits

- BBA certified jointing system - third party accreditation
- Provides an overlap seal to Visqueen gas protection membranes
- Joint integrity - reduces the risk of poured concrete entering the lap joint

Product description

Visqueen Gas Resistant (GR) Foil Lap Tape is a single sided overlap tape which has a solvent acrylic adhesive with a composite aluminium/PET carrier therefore it is resistant to alkaline which is present in cement and concrete. The tape also has a release film.

The product is supplied in roll format 75mm x 50m.

To be used in conjunction with VisqueenPro Double Sided Jointing Tape, 50mm x 10m.

Approvals and standards

- Third party accreditation (BBA 13/5069)
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Resistant Foil Lap Tape is used to seal lap joints on gas protection membranes. It can be used internally and externally and is suitable in compressed load applications.

Storage and handling

Store in warm, dry and clean environment in its current packaging. The tape should not be exposed to long periods of ultraviolet light. In very cold weather, prior to use ensure that the material is stored in warm conditions above 5°C.

Preparation

Ensure all surfaces are clean and dry. The membrane joint surfaces should be dry and free from contamination such as dust or sand. Ensure the surface and working area is not water logged. Avoid areas of unsupported jointing.

Installation

The membrane should be overlapped by at least 150mm, bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape.

When using Visqueen Gas Resistant Foil Lap Tape, apply the tape equidistant over the lap area of the laid sheet and the overlap adjoining membrane. Apply pressure to the jointed area to ensure adhesion. Once the tape is applied, the completed lap should be well rolled with firm pressure to ensure a complete seal joint has occurred, and continuity with the adjacent sheet has been achieved.

Usable temperature range

It is recommended that Visqueen Gas Resistant Foil Lap Tape should not be installed below 5°C.

Additional information

In demanding site conditions seal lap joints with Visqueen GR Lap Tape.

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Property	Result
Dimensions	75mm x 50m
Peel adhesion	750N/m
Adhesive type	Solvent acrylic

Please refer to Visqueen Gas Resistant Foil Lap Tape safety datasheet (SDS).

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

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For more information, visit visqueen.com or contact our sales office at [+44 \(0\) 333 202 6800](tel:+442023332026800) or enquiries@visqueen.com

Passive Fire Protection



Gas Protection



Damp Proof
Membrane



Air and Vapor Control



Stormwater



Damp Proof
Course



Temporary Protection

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Visqueen Gas Resistant Foil Lap Tape, 75mm x 50m

Visqueen Training Academy

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Visqueen GR Lap Tape, 150mm x 10m

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Visqueen NF-Detailing Strip, 300mm x 10, 500mm x 10m

Features & benefits

- BDA Agreement Certified detailing material - third party accreditation
- Flexible - can be cut and shaped to various applications
- Multi-use - suitable for complex junctions, stanchions, patchwork and terminations
- Gas resistant non foil carrier membrane

Product description

Visqueen NF-Detailing Strip is a composite of white non foil polymer film and a cold weather butyl compound protected by a release film. It is available in roll format, 300mm and 500mm x 10m.

Approvals and standards

- BDA Agreement Certified detailing material - third party accreditation
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 -
- industry standard for methane and carbon dioxide protection
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen NF-Detailing Strip is used for sealing junctions and complicated detailing in Visqueen gas protection systems, waterproofing systems, and damp proofing systems. It can be used on concrete, blockwork, brickwork, particle boards, steel work, steel stanchions and wooden substrates for both vertical and horizontal application.

Storage and handling

Store in dry and clean environment in its current packaging. The product should not be exposed to long periods of ultraviolet light.

Care should be taken when handling the product in line with current manual handling regulations.

For ease of installation, during hot weather conditions (>25°C), it is recommended to store the product in a cool location prior to use.

Preparation

Surfaces must be smooth and free from sharp protrusions, ensure the surface and working area is not water logged and is frost free. When applying to blockwork or brickwork the joints must be flush pointed. Prior to bonding, substrates such as masonry, concrete and steel should be primed using Visqueen HP Tanking Primer and allowed to dry thoroughly. Visqueen HP Tanking Primer must not be used on Insulation or ICF systems.

Visqueen NF-Detailing Strip can be cut with a sharp retractable safety knife.

Hand rollers are required during application. Typical hand rollers include 40mm silicone pressure roller and 6mm brass penny pressure roller.

Installation

Position and peel back the Visqueen NF-Detailing Strip release film and apply the pressure sensitive, self adhesive face to the prepared substrate. Apply pressure by rolling to ensure a full bond is achieved. All lap joints should be a minimum of 150mm and must be pressed and rolled to ensure damp, gas or waterproofing continuity.

When used for sealing membranes punctures, Visqueen NF-Detailing Strip should be lapped at least 150mm beyond the extents of the puncture.

Usable temperature range

It is recommended that Visqueen NF-Detailing Strip should be installed above -5°C. Prior to installation, ensure that frost or ice is not present on the substrate.

For ease of installation, during hot weather conditions (>25°C), it is recommended to store the product in a cool location prior to use.

Additional information

Visqueen NF-Detailing Strip, 300mm x 10, 500mm x 10m

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Property	Value
Widths	300mm and 500mm
Length	10m
Application temperature range	-5°C to 40°C

Health and safety information

Refer to the Visqueen-NF Detailing Strip safety datasheet (SDS)

About Visqueen

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

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Gas Protection



Damp Proof Membrane



Air and Vapor Control



Stormwater



Damp Proof Course



Temporary Protection

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Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

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Visqueen Contract Design Services

Visqueen NF-Detailing Strip, 300mm x 10, 500mm x 10m

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VisqueenPro Double Sided Jointing Tape, 50mm x 10m

Features & benefits

- Part of a Visqueen's DPM and gas protection BBA approved jointing system
- Provides resistance to harmful bulk gases ingress and moisture ingress

Product description

VisqueenPro Double Sided Jointing Tape is a blue, double sided butyl based self adhesive lap bonding tape with an oversize quick release film. It is available in roll format 50mm x 10m.

Approvals and standards

- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

VisqueenPro Double Sided Jointing Tape is used to bond membranes (gas or damp) together along the lap joints.

To complete the joint, seal with the appropriate Visqueen single sided tape.

System components

- Visqueen Top Hat Units

Storage and handling

Store in a dry and clean environment in its current packaging. The tape should not be exposed to long periods of ultraviolet light. Prior to use, ensure that the tape is stored at temperatures above 5°C.

The tape can be cut with a sharp retractable safety knife.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Ensure all lap joint surfaces are clean, dry and free from contamination such as dust or sand. Ensure the surface and working area is not water logged. Avoid areas of unsupported jointing.

Installation

Apply VisqueenPro Double Sided Jointing Tape to the lap area of the laid sheet starting approximately 50mm from the membrane edge. Apply pressure to the tape to ensure the tape has adhered to the membrane. Remove release paper from the tape and overlap the adjoining membrane by minimum 150mm. For Visqueen damp proof membranes and gas protection membranes lap joints should then be sealed using the appropriate Visqueen lap tape. Once the tape is applied, the completed lap should be well rolled with firm pressure to ensure a completely sealed joint has occurred, and continuity with the adjacent sheet has been achieved.

Usable temperature range

It is recommended that VisqueenPro Double Sided Jointing Tape should be installed above 5°C.

Additional information

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Property	Result
Width	50mm
Length	10m
Colour	Blue
Adhesive type	Butyl
Dynamic Shear Adhesion	14 N/cm ²

VisqueenPro Double Sided Jointing Tape, 50mm x 10m

Dynamic Tensile Adhesion	18 N/cm ²
180° Peel Adhesion	11 N/cm ²
Moisture Vapour Transmission Rate	0.24 g/m ² /d
Service Temperature Range	-40 to 90°C
Application temperature	>5°C

Health and safety information

Refer to VisqueenPro Double Sided Jointing Tape safety datasheet (SDS).

About Visqueen

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

Visqueen is at the forefront of advanced membrane technology and innovation in the construction industry, earning the trust and loyalty of specifiers throughout the UK and Europe.

For more information, visit [visqueen.com](https://www.visqueen.com) or contact our sales office at [+44 \(0\) 333 202 6800](tel:+442023332026800) or enquiries@visqueen.com

Complete Range, Complete Solution



Passive Fire Protection



Gas Protection



Damp Proof Membrane



Air and Vapor Control



Stormwater



Damp Proof Course



Temporary Protection

Visqueen Technical Support

Visqueen offer a comprehensive full nationwide technical support. Our team of CSSW qualified technical support managers provide on site design-based solutions for specifiers, contractors and builders merchants, and will ensure that from design stage to installation the project is fully risk assessed and the specification is approved by all stakeholders.

Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

Competency & Design

Visqueen promotes competency in building design by ensuring that its technical team possesses the necessary skills, knowledge, experience, and ethical practices. The company adopts the "golden thread of information," ensuring all project data is digitally secure and accessible throughout a building's lifecycle. This approach aligns with the Building Safety Act and aims to foster accountability and compliance with evolving regulations, providing clients with confidence in the safety and reliability of their projects.

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to damp proofing, hazardous ground gas protection, and structural waterproofing. These one-hour seminars are tailored for construction design professionals and delivered by our Technical Support Managers. Visit our website to book a free CPD.

Visqueen Contract Design Services

Visqueen Contract Design Services offers a bespoke design service led by our team of Certified Surveyors in Structural Waterproofing (CSSW), providing experienced and specialised waterproofing design expertise for complex projects. We provide comprehensive support throughout the entire project, ensuring that all work meets the requirements of warranty providers and adheres to the highest standards of quality, reliability and current

VisqueenPro Double Sided Jointing Tape, 50mm x 10m

legislation.

Visqueen Training Academy

Based at our Derbyshire facility, the Visqueen Training Academy offers a variety of training programs across the UK. These include one-day product awareness sessions for distributors and builders' merchants, and intensive two-day courses for hands-on product installation training. Contact us for more information.

Visqueen Top Hat Units

Features & benefits

- Provides an airtight and damp proof seal around service pipe penetrations

Product description

Visqueen Top Hat Units are made from rigid black polyethylene. and are supplied with a metal jubilee clip.

The units are available in the following standard sizes: 110mm, 135mm and 160mm. These sizes relate to the external diameter of the pipe.

Non standard sizes produced from flexible material are available on request.

Approvals and standards

- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Top Hat Units are used in conjunction with Visqueen damp proof membrane and Visqueen radon membranes to provide continuity of protection at service pipe penetrations.

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- VisqueenPro Single Sided Tape, 75mm x 25m

Storage and handling

Visqueen Top Hats should be stored under cover in their original packaging.

To aid installation, store in warm conditions (above 5°C) prior to use.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Ensure all surfaces are clean, dry and free from contamination such as dust or sand. Avoid areas of unsupported jointing.

Installation

Cut a circular hole in the Visqueen membrane as close as possible to the pipe. Bond the Visqueen Top Hat Unit to both the pipe and the membrane with VisqueenPro Double Sided Jointing Tape. Seal the top hat laps to the pipe and membrane with VisqueenPro Single Sided Tape. N.B. An alternative taping system may be specified.

Complete the installation by fixing the supplied jubilee clip around the top hat upstand.

Usable temperature range

it is recommended that Visqueen Top Hat Units and associated system components should not be installed below 5°C.

Additional information

Where protection to BS8485:2015 + A1:2019 or VOCs are required, use Visqueen Ultimate Top Hat Units.

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Health and safety information

Refer to Visqueen Top Hat Units safety datasheet (SDS).

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Gas Protection Measures Inspection Checklist

Sub-floor void	Is a check possible? Void former? Gravel (type/specification)? Height of void space? Is it clear?
External wall airbricks	Numbers, size, positions as design drawing?
Internal sleeper walls	Ventilation holes (honeycomb brickwork/pipe crossings?) – size, spacing, location in accordance with design?
External vent trenches/ducts	Usually an alternative to periscopic vents where the void former is either single size stone layer or vent mat. Or there may be a separate duct for radon if there is a sump. Located and constructed in accordance with design drawings? If open-topped gravel – gravel type/presence of fines? If pipe or other vent, check position and construction for functionality and absence of blockages. Ability of void former to withstand bearing of the structure?
Underside of gas membrane	Check that the sub grade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.
Gas membrane type	Manufacturer and product specification, gauge, colour, brand/name, material batch/roll numbers, storage arrangements (protected from dirt/damage?)
Gas membrane condition	Open punctures, tears, rips, stretching? Excessive footprints/evidence of traffic? Presence of debris? Repairs? Signs of weakness such as raised or sunken indentations? Protection plan in place to restrict access to gas membrane?
Joining tape product	Product type, brand, thickness, material, width, colour? Use of double sided tape?
Lapping design	Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap? Sections taped twice?
Laps and joints sealed	Welds complete? Appropriate joining/double sided tape used?
Service entries sealed	Top hats seal arrangements fixed around service entries? Use of Jubilee clips?
Cavity Inspection	Confirm that the cavity is not blocked with debris, check that there are no rips in the membrane across the cavity and the jointing detail (if present) is fully sealed.

Verification of Ground Gas Protection Systems



Job No:

Client:

Site Name:

Plot/Area Number (s):

Weather:

Verifier/Inspector (s):

Drawing Refs:

Structure Type:

Floor Slab Type:

Gas protection Type:

Installer and competency (e.g. NVQ)

Passive Venting Measures	✓/✖	Inspection Date (s)	Photos:	
Void Former				
Void Height				
Gravel Type				
External Wall Air Bricks				
Internal Sleeper Wall Vents				
External Vent Trench/Duct				

Gas Barrier/Membrane	✓/✖	Inspection Date (s)	Photo	
Underside of membrane				
Membrane Type				
Extent of Coverage				
Slab/membrane condition				
Jointing tape product				
Laps, joints, welds and seals				
Damp-proof course				
Service entries and seals				
Cavity inspection				

This plot/area

REQUIRES FURTHER INSPECTION

Where the above inspection indicates a Pass, construction worksn for that plot/area may proceed, subject to suitable protection measures of the membrane being applied in accordance with the manufacturer’s recommendations.

Compiled by:

Insert Signature here

Print Name (overwrite here)

Checked By:

Insert Signature here

Print Name (overwrite here)

CAUTION

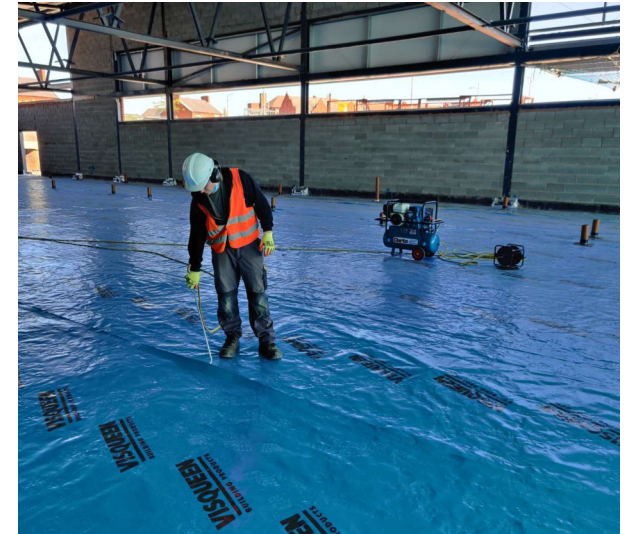
THE MEMBRANE YOU WILL ENCOUNTER ACROSS THIS SITE IS NOT JUST A DPM. THIS MEMBRANE IS A **GAS BARRIER!!**

IT HAS BEEN PURPOSEFULLY SELECTED TO PROTECT THE FUTURE OCCUPANTS OF THIS BUILDING.

PLEASE BE CAREFUL NOT TO **DAMAGE**.

ALTHOUGH IT CAN BE REPAIRED AND PATCHED, UNREPORTED DAMAGE AND CUTS CAN RENDER THE MEMBRANE **USELESS**.

THE GROUND CONDITIONS BENEATH YOUR FEET ON THIS SITE HAVE THE POTENTIAL TO PRODUCE ASPHYXIAN OR EXPLOSIVE GASES. THESE PRESENT NO RISK IN YOUR DAILY TASKS BUT CAN ACCUMULATE IN A CLOSED BUILDING OVER TIME. THE GAS BARRIER IS VITAL FOR THE HEALTH AND WELLBEING OF THOSE WHO OCCUPY THIS BUILDING.



Experience and Qualifications of Verifiers of Ground Gas Protection Systems

Brownfield Solutions Ltd hold ISO9001 and 14001 accreditations for our IMS. We are registered members of the CHAS Health and Safety accreditation scheme, members of the Association of Geotechnical and Geo-Environmental Specialists (AGS) and Gold Constructionline Members.

Where verifiers are required to hold either NVQ L4 or SGPV status and no BSL staff member who holds these qualifications/certifications is available, then works will either be subcontracted to a suitably competent specialist: <https://claire.co.uk/projects-and-initiatives/sgpv-register>

Aaron Stokoe

Qualifications:

BSc (Hons) (Geology) CSci MEnvSc FGS
Chartered Scientist (2018)

Professional Bodies:

Member of the Institute of Environmental Science (IES)
Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)
GGs Two Day A-Z of Ground Gas Protection June 2016
CL:AIRE Webinar “An Introduction to the Verification of Ground Gas Protection Measures”
Visqueen CPD Seminar 1: Gas Protection - Protecting against gas on contaminated land 28 March 2019
LQM Technical Briefing Webinar (Ground Gases) “Correct Application of BS8485 to Characterise Gas Risk” 3 May 2019
Proctor Group Webinar “Protection of Buildings on Brownfield Sites” 18 February 2020
Environmental Analyst Webinar “Mine Gas Risk Assessment: Best Practice” 2 April 2020
Property Care Association (PCA) Webinar “Verification of Ground Gas Protection Systems” 23 July 2020.
Property Care Association (PCA) Webinar “Controlling Ground Gases & Water – How to get Synergy” watched 12 January 2021
SoBRA – Ground Gas September 2021
SoBRA – Vapour Risk October 2021
Atlas Copco Compressors “Introduction to Compressed Air” 8 January 2021 (compressor for air lance)
British Compressed Air Society “Working Safely with Compressed Air” January 2021 (compressor for air lance)
GGs Webinar Verification of ground gas protection – How to do it well May 2023.
CL:AIRE Good Practice for Risk Assessment for Coal Mine Gas Emissions Training May 2024.

Chartered Scientist with circa 15 years’ experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Dan Gates

Qualifications:

MGeoscience (Geology) FGS

Professional Bodies:

Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)
GGs Two Day A-Z of Ground Gas Protection 18 October 2017
Visqueen CPD Seminar 1: Gas Protection - Protecting against gas on contaminated land 28 March 2019
Atlas Copco Compressors "Introduction to Compressed Air" 8 January 2021 (compressor for air lance)
British Compressed Air Society "Working Safely with Compressed Air" January 2021 (compressor for air lance).

Senior project engineer with over 12 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Jack Mather

Qualifications:

BSc (Hons) FGS (Geology)

Professional Bodies:

Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)
Visqueen CPD Seminar 1: Gas Protection - Protecting against gas on contaminated land 28 March 2019
Neil Salvidge TD&A Ltd "Ground Gas Protection installation covering basic membrane installation methods of heat fusing, detailing, and implementation of Verification in accordance with CIRIA C735" 29 January 2020 (Full day Course)
Proctor Group CPD Webinar: Ground Gas Protection 16 October 2020
CL:AIRE CPD Webinar: Verification of Gas Protection Systems 16 October 2020
Property Care Association CPD Webinar: Verification of Ground Gas Protection Systems 16 October 2020

Senior project engineer with over 7 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Tim Mayall

Qualifications:

MGeol (Hons) (Geology) FGS

Professional Bodies:

Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

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Atlas Copco Compressors "Introduction to Compressed Air" 8 January 2021 (compressor for air lance)
British Compressed Air Society "Working Safely with Compressed Air" January 2021 (compressor for air lance)

Senior project engineer with circa 7 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Nicola Swallow

Qualifications:

BSc (Hons) (Environmental Science) MSc MEnvSc

Professional Bodies:

Member of the Institute of Environmental Science (IES)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Visqueen CPD Seminar 1: Gas Protection - Protecting against gas on contaminated land 28 March 2019.

Senior Project engineer with over 12 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Tim Wilson

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Ground Gas Protection installation covering basic membrane installation methods of heat fusing, detailing, and implementation of Verification in accordance with CIRIA C735" 25 January 2022 (Full day Course)

Senior Geo-Environmental Technician with over 20 years' experience in the construction industry trade.

Jake Wheaton

Qualifications:

BSc (Hons) FGS (Geology)

Professional Bodies:

Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Ground Gas Protection installation covering basic membrane installation methods of heat fusing, detailing, and implementation of Verification in accordance with CIRIA C735" 22 June 2022 (Half day Course)

Senior project engineer with circa 8 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Amy Thornes

Qualifications:

BSc (Hons)(Geology) MSc (Geotechnical Engineering) FGS

Professional Bodies:

Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Ground Gas Protection installation covering basic membrane installation methods of heat fusing, detailing, and implementation of Verification in accordance with CIRIA C735" 22 June 2022 (Full day Course)

Project engineer with circa 5 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed systems.

Megan Buckley

Qualifications:

BSc (Hons) AMIEnvSc

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" April 2024 2023 (Full day Course).

Project engineer with circa 3 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed system under supervision of senior staff.

Kyle Bolderson

Qualifications:

BSc (Hons) MSc FGS

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" April 2024 (Full day Course).

Graduate project engineer with circa 2 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed system under supervision of senior staff.

Amber Hunt

Qualifications:

BSc (Hons) FGS

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" April 2024 (Full day Course).

Graduate project engineer with a years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed system under supervision of senior staff.

Oliver Scott

Qualifications:

BSc (Hons) MSc

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" April 2024 (Full day Course).

Graduate project engineer with a years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed system under supervision of senior staff.

Sam Jennings

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" 10 May 2023 (Full day Course).

Technician with circa 2 years' experience in verification works, ground works and ground gas monitoring.

George Kerr

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" 10 May 2023 (Full day Course).

Technician with a years' experience in verification works, ground works and ground gas monitoring. Studying part time for bachelor's degree in Environmental Science.

Chigozie Orafu

Qualifications:

BSc (Hons) MSc FGS

Professional Bodies:

Fellow of the Geological Society (FGS)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request)

Neil Salvidge TD&A Ltd "Verification of Ground gas protection systems in accordance with C735 and NOS VR764" 10 May 2023 (Full day Course).

Peter Holland

Qualifications:

BSc (Hons) (Geology)

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request).

Neil Salvidge TD&A Ltd "Ground Gas Protection installation covering basic membrane installation methods of heat fusing, detailing, and implementation of Verification in accordance with CIRIA C735" 29 January 2020 (Full day).

Project engineer with circa 3 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed system.

Joel Massey

Qualifications:

BSc (Hons) (Geography) AMIEnvSc

Relevant CPD Training and Experience Summary:

Valid and in date CSCS Card held (scan available on request).

Neil Salvidge TD&A Ltd "Ground Gas Protection installation covering basic membrane installation methods of heat fusing, detailing, and implementation of Verification in accordance with CIRIA C735" 29 January 2020 (Full day).

Project engineer with circa 3 years' experience in ground investigation, characterisation of ground gas regimes, recommendations for ground gas protection systems and verification of installed system.

North West

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