Remediation Strategy

Client: Lidl Great Britain Ltd

Briton Ferry Road, Neath

Report No: 769.09.02

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REMADA GEO CONSULTANTS

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Issue No	Date	Prepared By	Technical Review	Authorised
01	08.04.2025	P Dickinson		
02	19.09.2025	P Dickinson		

1. INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd ('the Client') to prepare a Remediation Strategy for a proposed Lidl retail store at Castle Retail Park, Briton Ferry Road, Neath SA11 1AS. This report was prepared with regards to Neath Port Talbot County Borough Council's planning application ref: P2024/0249.

This Remediation Strategy has been prepared to address the condition relating to land quality (Condition 7) and to present suitable mitigative measures were required.

1.1 Proposed Development

Lidl proposes to develop a new retail store with 130 customer parking spaces on the site of Castle Retail Park, which currently comprises an existing Lidl store, gym and Poundstretcher store. The new store will be located within the southern and south-western areas of the site, with a delivery bay located adjacent to the site's western boundary. The remainder of the site will comprise associated car parking and soft landscaping. The proposed development layout is shown in **Figure 1.**

1.2 Objectives

The objectives of this assessment are as follows:

- Summarise historic investigation reporting and recent ground investigation work.
- Define the works require to remediate the site to a suitable condition for a commercial/retail development; and,
- Detail the method of work to be adopted for the remediation of the site.

1.3 Scope of Work

The scope and layout of this document have been designed in mind of the Environment Agency's Land Contamination Risk Management guidance for land contamination reports.

The scope was also designed in line with the Welsh Land Contamination Working Group's Development of Land Affected by Contamination: A Guide for Developers version 4: September 2023. This guidance represents the culmination of a co-operative effort involving the Welsh Local Government Association (WLGA) and Natural Resources Wales (NRW). For the purpose of this report, any references to the Environment Agency (EA) should be seen as interchangeable with NRW.

The scope of the work comprised:

- An assessment of previous site investigation work on-site;
- A review of regulatory correspondence pertaining to the proposed development;
- An update of earlier Conceptual Site Model;
- Defining the extent of contamination requiring remediation;
- An appraisal of the appropriate remediation technology;
- Detailing the scope of environmental and geotechnical remediation works to be implemented; and

- Defining verification and reporting requirements.

1.4 Summary of Previous Investigations

The following reports have previously been prepared for the site by Remada:

- Phase 1 Site Investigation & Preliminary Risk Assessment. Remada Ltd report ref: 769.10.01, issued in September 2025.
- Coal Mining Risk Assessment, Remada Ltd report ref: 769.01.03, issued in September 2025.
- Phase 2 Ground Investigation, Remada Ltd Report 769.02.03 issued in September 2025.
- Supplementary Intrusive Investigation, Remada Ltd Report 769.05.02 issued in September 2025.
- Floor Slab Ferro Scan & Cores. Remada Ltd letter ref: 769.08.02 issued in April 2025.

1.5 Limitations

The comments given in this report and the opinions expressed are based on the information reviewed and observations during site work. However, there may be conditions pertaining to the site that have not been disclosed by this assessment and therefore could not be taken into account.

2. BACKGROUND

2.1 Phase 1 Desk Study (Remada, 2025)

The Executive Summary and Conceptual Site Model presented within Remada's Phase 1 Desk Study are reproduced below. Remada's report included a review of Opus Ltd's Geo-Environmental Investigation Report from 2016, which in turn presented a review of an earlier report by Earth Science Partnership (2002).:

Site Setting

The study site occupies an irregular (but very broadly triangular) plot to the west of A474 Briton Ferry Road. The site comprises three distinct areas, with a Lidl store present in the south-western area, a separate retail building previously occupied by 'Vitality Health & Fitness' and 'Poundstretcher' in the north-western area, and associated car parking occupying the eastern half of the site. Access to the study site is from School Road on the eastern boundary.

Site History

The earliest available mapping of 1878 and 1881 indicates it to be predominantly occupied by marshland. A railway line associated with the adjacent (off-site) Melin Crythan Works encroaches into the northern margins of the site in an arc. A 'Japan Works' encroaches into the south-western boundary of the site, extending off-site towards the south-west and expanding to occupy the southern half of the site by 1889. The Cryddan Brook bisects the central area of the site and would continue to do so until 1995, when it is no longer shown. By 1919 the railway sidings have expanded into the central area of the site, with rationalisation of these occurring by 1952. Buildings associated with the Melin Crythan Works / Tin Plate Works were constructed in the eastern area of the site in 1882, with the works complex being redeveloped between 1952 and 1958 when a new elongated building was constructed in the north-eastern margins of the site.

Between 1980 and 1987, the majority of the buildings in the southern area of the site are no longer shown, with only a north-west to south-east orientated elongate building still present parallel to Cryddan Brook and still labelled as 'Melyn Works'. A 'tank' of unspecified contents is indicated to be present encroaching into the eastern boundary of the site. By 1989, the majority of the buildings have been removed from the entire site, with only one small rectangular structure remaining adjacent to the eastern boundary. The area to the north of Cryddan Brook was labelled as a Coal Yard. The existing Lidl store building appears to have been constructed between 1993 and 1995, with its associated car park occupying the southern and eastern areas of the site. The Electricity Sub-Station adjacent to the eastern corner first appears in 1995, whilst the two now-defunct retail units in the north-western quadrant appear between the mapping of 1999 and Opus' investigation on-site in 2016.

Geology / Hydrogeology

Published geological maps record that the site is underlain by undivided deposits of Landscaped Ground and superficial Tidal Flat Deposits; the latter being designated as Secondary A and Secondary Undifferentiated Aquifers. The bedrock directly underlying the site is formed of the Hughes Member, for which the parent unit is the Pennant Sandstone Formation and designated as a Secondary A Aquifer.

Information obtained during Opus' intrusive investigation in the northern area of the site in 2016 recorded granular Made Ground to a maximum depth of 4.7m bgl, underlain by very soft grey CLAY. Historic BGS trial pit records in the eastern and north-eastern area of the site dating from 1994 recorded Made Ground to a maximum depth of 2.0m bgl, underlain by very clayey fine SAND to the base of a pit at 3.0m bgl.

Mining

The site is located within an area which 'might be' affected by coal mining activity and is located within

a Mining Remediation Authority designated Coal Mining Reporting Area, although it is not located within a Development High Risk Area. Consequently, it is recommended that Remada's previous Coal Mining Risk Assessment is updated the reflect the findings of this Phase 1 report.

Unexploded Ordnance (UXO) Risk

There is no indication of former military use from the desk study. Furthermore, the freely available Zetica UXO risk mapping indicates the site to be located within an area where the bomb risk is 'Low' due to WWII bombardment. This is defined by Zetica as an area having an indicated bombing density of 15 bombs per 1000 acres or less.

Radon

The site is located in both an Intermediate Probability Radon Area (3 to 5% of homes are estimated to be at or above the Action Level) and a Higher Probability Radon Area (10 to 30% of homes are estimated to be at or above the Action Level). Consequently, full radon protection measures are necessary in the proposed new development.

Recommendations

Environmental

The desk study has identified a number of on-site and off-site potential sources of contamination that would require further investigation. The following is recommended:

- *Investigation of the lateral and vertical extent of made ground/fill beneath the proposed store footprint.*
- *Collection of soil and groundwater samples from the areas identified above for contaminants of concern; and*
- *Ground gas monitoring.*

In accordance with CIRIA C665 the monitoring period should comprise not less than four visits for a proposed commercial development and should cover the "worst case" scenario which would occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall and frost.

Geotechnical

It is recommended that a ground investigation is undertaken to enable preliminary foundation design.

2.2 Coal Mining Risk Assessment (Remada, 2025)

The pertinent findings of Remada's Coal Mining Risk Assessment (report Ref: 769.01.03, issued in September 2025) are reproduced below:

Published Geology

Published geological maps record that the site is underlain by undivided deposits of Landscaped Ground and superficial Tidal Flat Deposits; the latter being designated as Secondary A and Secondary Undifferentiated Aquifers. The bedrock directly underlying the site is formed of the Hughes Member, for which the parent unit is the Pennant Sandstone Formation and designated as a Secondary A Aquifer.

The BGS indicates that the Hughes Member bedrock comprises predominantly sandstone beneath the southern half of the site, and mudstone, siltstone and sandstone beneath the northern half. The BGS mapping indicates that the Westernmoor coal seam bisects the central area of the site, orientated north-west to south-east. The site is located less than 500m south-east from the North-East to South-West trending 'Neath Disturbance'.

The Generalised Vertical Section (GVS) on the BGS Map Sheet 247 records the following succession of coal seams within the 265m thick Hughes Member within the area (i.e. east of the Neath Disturbance) as: Graigola, Coal, Westernmoor, Mountain Coal, Garlant and Wenallt Rider. Vertical separation between the Westernmoor and Mountain Coal is approximately 80m and the general strike and dip direction is between 12° to 15° to the north north-east.

Consultants Mining Report

The site is located within an area which 'may be affected by coal mining activity'. The Coal Authority Consultants Mining Report for the site states that 'no past mining recorded' on-site and the risk from probable unrecorded shallow mining as 'none'.

An adit is recorded approximately 75m to the south-east of the study site, adjacent to Walters Road (grid ref: 274725, 196378). The Mining Remediation Authority's interactive mapping records this adit as bearing 143 degrees, which is away from the study site.

Recommendations

The assessment has not identified a potential for the site to be impacted by either shallow worked seams or shafts and no further investigation or action is recommended.

2.3 Phase 2 Ground investigation Report (Remada, 2025)

2.3.1 Scope of Works & Ground Conditions

The investigation comprised three (3 No.) cable tool boreholes and three (3 No.) trial pits to expose existing foundations. The investigation was undertaken on the 23rd and 24th July 2020.

Two of the hand dug trial pits HDTP2 and HDTP3 exposed a spread footing bearing on made ground at a depth 0.75m bgl and with an estimated approximate width of 1.5m. HDTP1 exposed concrete that extended beyond the maximum excavation depth of 1.3m but stepped out only 0.1m indicative of a pile cap.

Made Ground comprised asphalt surfacing to a depth of 0.1m overlying sub-base to 0.4m in turn overlying a medium dense gravelly ashy fine to medium sand, gravel is wood, brick, coal and fragments of concrete. Superficial deposits were observed as soft to firm sandy or silty clay at a depth of between 2.6 and 3.0m.

Beneath the made ground soft to firm, occasionally sandy, silty clay was encountered to depths of between 3.45 and 5.0m bgl. In borehole BH1-B a slight organic odour was noted. The clay has been interpreted as Tidal Flat Deposits, as indicated to be present on the BGS map.

Beneath the Tidal Flat Deposits dense becoming very dense slightly sandy predominantly angular to subangular fine to coarse gravel comprising mudstone and shale. While the gravel was predominantly angular to subangular, the gravel was also noted to be rounded within BH1-B. There are two potential interpretations for this material: Glaciofluvial Deposits, or weathered bedrock. Given that the materials encountered comprised predominantly angular or subangular mudstone and shale it is considered that this material is more likely to represent a zone of weathered bedrock.

2.3.2 Groundwater Analyses

Water samples were recovered from Remada's BH1-B and BH2 and Opus's WS4 on 21st March 2022. Dedicated bailers were used for each monitoring well to prevent cross-contamination.

The average concentration of Dissolved Organic Carbon (DOC) and pH were 75 ug/l and 7.7 respectively. Detectable concentrations of metals were identified in all three samples, although the concentrations of beryllium, cadmium, mercury, lead and Chromium (III and VI) were recorded below the laboratory method detection limit (MDL).

The concentrations of Total Petroleum Hydrocarbon (TPH) were recorded below the MDL in all three samples analysed.

The concentrations of Polyaromatic Hydrocarbons (PAH-16) were recorded below the MDL in all three samples analysed.

2.3.3 Human Health Assessment

The results of soil chemical analysis were compared to Human Health Generic Assessment Criteria for commercial land use. None of the analytes tested were detected at concentrations that exceeded the human health GAC protective of on-site workers.

2.3.4 Water Resources Assessment

The site is not indicated to be within a Groundwater Source Protection Zone. The superficial Tidal Flat Deposits underlying the site are designated as Secondary Undifferentiated Aquifers, where it is not possible to designate it as 'A' or 'B'. The Hughes Member bedrock underlaying the site is designated as a Secondary 'A' Aquifer.

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range that would be expected for 'typical' made ground. Detectable concentrations of TPH and PAHs were encountered in some samples. However, the contaminants identified are of low solubility and mobility and as such are unlikely to present a risk to groundwater beneath the site.

The groundwater was encountered at depths of between 1.66m and 3.6m bgl within Remada's standpipes in the southern area of the site during the 2020 monitoring programme. During Opus' investigation in the northern area of the site in December 2015, groundwater was encountered in their borehole WS3 at a depth of 1.9m bgl. Standing groundwater levels recorded in the monitoring wells in WS3 and WS4A in December 2015 were 2.52m and 2.0m bgl respectively.

Post-development, the site will continue to be predominantly covered by a retail building and areas of hardstanding. Consequently, the risk of leaching of contaminants as a result of infiltration of groundwater is limited. Therefore, the risk to controlled waters from contaminants within the made ground at the site is considered to be low and does not warrant further consideration at this stage.

2.3.5 Geotechnical Assessment

The Coal Mining Risk Assessment, Remada 769.01.03 did not identify a potential for unrecorded shallow worked sems to be present beneath the site. All three cable tool boreholes proved the full depth of made ground and encountered a soft to firm CLAY to a maximum depth of 5.5m in BH2. The results of undrained shear strength tests on U100 samples produced Cu values of 17 to 34kPa for the CLAY. All three boreholes refused in a gravel/shale of mudstone at between 4.5 and 6m bgl. Groundwater monitoring has recorded that all wells were dry.

In order to prevent differential settlement between the existing store and proposed extension all foundations should bear on the same strata. The made ground and underlying soft to firm slightly organic clay would produce unacceptable amounts of total and differentials settlement and

consequently piled foundations are required.

Either ground improvement in the form of vibro concrete columns or piled foundations are considered necessary to transfer foundation loads to a suitable bearing layer. Concrete columns would require a depth in the order of 6m and advice should be sought from a specialist ground improvement contractor. Driven piles are unlikely to be acceptable due to vibration of the existing store and therefore either bored or CFA piles should be considered, however it may not be possible to socket CFA piles into the bedrock. Bored piles would require casing through made ground and alluvium and be socketed into the competent bearing strata in order to transfer loads. Rapid excavation of the pile sockets in weak rock is recommended to minimise the potential for deterioration in the walls which could result in the swelling of the mudstone. After formation, the pile should be concreted immediately, preferably on the same day.

Floor slabs should be suspended and bearing on the piled foundations.

A Design Sulphate Class DS-2 is considered appropriate for buried concrete and an ACEC Class of AC-1s is considered appropriate for the location.

2.3.6 Ground Gas

The results of four rounds of gas monitoring visits placed the site into Characteristic Situation 2 and therefore ground gas protection measures will be required within the proposed buildings.

The site is located in both an Intermediate Probability Radon Area (3 to 5% of homes are estimated to be at or above the Action Level) and a Higher Probability Radon Area (10 to 30% of homes are estimated to be at or above the Action Level). Consequently, full radon protection measures are necessary in the proposed new development.

(*) NOTE: At the time of the investigation, the existing store was to be extended.

2.4 Supplementary Intrusive Investigation (Remada, 2022)

The pertinent findings of Remada's Supplementary Intrusive Investigation report are reproduced below:

Intrusive Investigation

A supplementary intrusive investigation was designed and implemented by Remada Ltd, in order to increase coverage within the proposed building footprint and to further investigate the risk to controlled waters in response to Natural Resources Wales letter reference CAS-181089-F7D7. Three window sample boreholes (WS201 – WS203) were advanced to a target depth of 6.0m bgl within the Lidl store area on 24th August 2022. Access was not possible into the existing Poundstretcher (northern) area on the day of the intrusive investigation.

The findings of the supplementary investigation generally confirmed the findings of Remada's previous intrusive investigation in 2020, with a variable thickness of made ground being encountered overlying superficial Tidal Flat Deposits (a Secondary (Undifferentiated) Aquifer). SPT N-values >50 were recorded at depths of between 4.0m and 6.0m bgl, interpreted as being the top of the Hughes Member bedrock (a Secondary A Aquifer).

Human Health Assessment

The results of soil chemical analysis were compared to Human Health Generic Assessment Criteria for commercial land use. None of the analytes tested were detected at concentrations that exceeded the human health GAC protective of on-site workers.

Water Resources Assessment

The concentrations of contaminants with groundwater and surface water sampled from have been compared with the Water Framework Directive Regulations 2015 Schedule 3 General Quality of Groundwater as an applicable Environmental Quality Standards (EQS) for Secondary Aquifers. The AA-EQS level has been adopted.

Elevated concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene were detected in exceedance of the respective EQS within all three groundwater samples analyses. The concentrations of fluoranthene recorded in WS201 and WS203 were recorded in exceedance of the EQS, whilst an exceedance for dissolved mercury was detected in WS202. Benzene has been used as a proxy for the comparison of solubility of Total Petroleum Hydrocarbons (TPH).

Within the surface water samples, the downstream sample recorded an elevated concentration of benzo(g,h,i)perylene, although this 0.01 µg/l value was also at the laboratory's limit of detection.

Cryddan Brook flows from east to west proximal to the northern boundary of the site, and whilst the invert level is unknown, it is located circa 2.0m below the adjacent roadway (i.e. approx. 5.5m AOD). The standing water levels recorded with three monitoring wells during Remada's supplementary investigation ranged between 5.48m AOD (WS202) and 4.10m AOD (WS203). Consequently, this indicates that the groundwater level underlying the site is on par with the brook's level and that a potential pathway exists between the two.

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range that would be expected for 'typical' made ground i.e, soil contaminants are not greater than respective GAC. Detectable concentrations of TPH and PAHs were encountered in some samples. However, the contaminants identified are of low solubility and mobility and as such are unlikely to present a risk to groundwater beneath the site.

The results of the groundwater chemical analysis have identified detectable concentrations of some dissolved metals, TPH and PAHs within the three most recent samples (from WS201 – WS203). Localised exceedances of the respective EQS for fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene and dissolved mercury were recorded in exceedance of the respective EQS.

The results of the surface water chemical analysis upstream and downstream have also identified detectable concentrations of dissolved metals, TPH and PAH. However, no concentrations were identified above the MDL (the benzo(ghi)perylene concentration in the downstream sample being detected at the MDL).

Post-development, the site will continue to be predominantly covered by a retail building and areas of hardstanding. Consequently, the risk of leaching of contaminants as a result of infiltration of groundwater is limited. Therefore, the risk to controlled waters from contaminants within the made ground at the site is considered to be low and does not warrant further consideration at this stage.

Waste Classification

In general, the results of the chemical analyses indicate that the material would be classified as non-hazardous waste. While Waste Acceptance Criteria (WAC) analysis has not been undertaken, three of the four samples selected for analysis exceeded this TOC limit for disposal in an inert

landfill. Therefore, it is considered that the waste should be classified as non-hazardous. WAC testing is not required for disposal of non-hazardous waste to landfill.

Geotechnical Assessment

Remada's previous intrusive investigation in 2020 concluded that all foundations should bear on the same strata, in order to prevent differential settlement. Either ground improvement in the form of vibro concrete columns or piled foundations are considered necessary to transfer foundation loads to a suitable bearing layer. Floor slabs should be suspended and bearing on the piled foundations.

The window sampling undertaken by Remada in 2022 has identified similar ground conditions of made ground and organic superficial deposits, with suspected bedrock encountered between 4.0m and 6.0m bgl. Consequently, the supplementary intrusive investigation supports the foundation recommendations provided within Remada's previous report (ref: 769.02.02 dated March 2022).

The results of the BRE SD1 testing from 2020 and 2022 have been combined, in order to provide a more accurate review of the concrete classification requirements for the site. In accordance with BRE SD1 for buried concrete in a brownfield site with static groundwater, characteristic values for water soluble sulphate and pH have been taken as 440mg/l and 7.3 respectively, whilst the mean of the highest two calculated Total Potential Sulphate (3x Total Sulphur) is 1.92%.

Therefore, a Design Sulphate Class DS-4 is considered appropriate for buried concrete and an ACEC Class of AC-3s is considered appropriate for the location. This is an increase from DS-2 and AC-1s previously reported by Remada and is due to the elevated Total Potential Sulphate concentrations identified within the underlying soils. Further soil sampling and BRE SD1 analysis may be able to reduce this classification.

2.5.1 Floor Slab Ferro Scan & Cores (Remada, 2025)

The pertinent findings of Remada's letter report are reproduced below:

Lidl

Core Nos 1 & 2 were taken from the existing Lidl floor slab. The concrete slab has a thickness of approxiamtely 240mm overlain with a 60mm of screed and tile flooring. Two layers of rebar were present within the cores from the concrete floor slab with a diameter of approximately 20mm (lower layer).

Scan images GPR3012 to GPR 3022 revealed that the rebar is present throughout the floor slab with a greater spacing on the lower layer. The rebar also appears to be denser in specific locations which may be indicative of pile caps.

Gym

Cores Nos 3 & 4 were taken from the existing Gym floor slab. The concrete slab has a thickness of approxiamtely 170mm overlain with 20mm of flooring. Two layers of rebar were present within the cores from concrete floor slab with a diameter of approximately 8 to 10mm.

Scan images GPR3024 to GPR 3022 revealed that one layer of rebar is present throughout the floor slab.

2.2 Pre-Remediation Conceptual Site Model

The Conceptual Site Model presented in the Phase 2 report and subsequent Supplementary Intrusive Investigation report has been updated to form the Pre-Remediation Conceptual Model tabulated below in **Table 1**.

Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation
On-site Sources • Marshland • Japan Works • Melin Crythan Works / Tinplate Works / Melyn Works (Sheet & Tinplate) • Railway lines and sidings • Unspecified tank. • Coal Yard • Infilled / culverted Cryddan Brook • Lidl store, former retail units and associated car park. • Electricity Sub-station ***Off-site Sources*** • Residential properties • Tramway • Smithy • Coal Yard • Various Works • Railway line & sidinga • Fuel Filling Station	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH, VOCs and SVOCs.	Disturbance due to construction plant causing direct contact, dusts, vapours. Direct Contact with occupants of the proposed development Inhalation of fibres / vapours / gases by occupants of proposed development Permeation of water supply pipework Leachate	Occupants of the development / building fabric Adjacent residents during construction Secondary (A) & (Undifferentiated) Aquifers	• Direct Soil Ingestion	• No	N/A	N/A	N/A	N/A
				• Indoor Dust ingestion	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to cover retail site minimising direct contact.	Negligible
				• Skin Contact with Soils	• Yes	Low	As above	Negligible	Low
				• Skin Contact with Dust	• Yes	Low	As above	Negligible	Low
				• Inhalation of Outdoor Dust	• Yes	Low	As above	Negligible	Low
				• Ingestion of home grown produce	• No	Commercial development devoid of gardens	None	N/A	None
				• Inhalation of Outdoor Vapours	• Yes	Low	As above	Negligible	Low
				• Inhalation of Indoor Vapours	• Yes	Low	As above	Negligible	Low
				• Inhalation of ground gas	• Yes	CS2	Moderate risk	Gas protection measures	Low
				• Inhalation of radon gas	• No	Intermediate & Higher Probability Areas	Moderate risk	Full radon protection measures in new buildings	Low
				• Ingestion via permeated water supply pipework	• Yes	C12-C16 and C16-C44 < threshold for PE pipework.	Low	As per UKWIR	Low
				• Direct contact with Secondary (A & Undifferentiated) Aquifers in Superficial Deposits	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to prevent precipitation infiltration and leaching.	Negligible
				• In-direct contact with Secondary (A) Aquifer in bedrock	• Yes	As above	Low	As above	Negligible

Table 1: Pre-Remediation Conceptual Model

Direct contact with subsurface soil and/or groundwater during redevelopment works are not assessed as part of the CSM. It is considered that risks to workers will be managed as part of any the redevelopment works at the site through the application of health and safety procedures, where required.

3. REMEDIATION OPTIONS & OBJECTIVES

3.1 Sampling Strategy & Methodology

An appraisal of remediation options has not been considered on a site-wide basis because construction of the proposed store building necessitates the removal of specific features or obstructions associated with the existing relic foundations.

3.2 Objectives

3.2.1 Environmental Remediation Objectives

The principal environmental remediation objectives are to:

- Identify, manage and assess unforeseen contamination;
- Protection of Cryddan Brook
- Construct hard – cover surfacing beneath car park and external to store footprint;
- Provide clean cover of fill to the proposed landscaped areas; and
- Install basic ground gas protection measures.

3.2.2 Geotechnical Remediation Objectives

The principal geotechnical remediation objectives are to:

- Remove existing hardstand in the area of the proposed store footprint;
- Remove existing relic foundations beneath proposed store footprint in their entirety;
- Remove existing relic foundations beneath proposed car park;
- Excavate, screen and replace existing made ground material as engineered fill across the site below proposed hardstanding and car park / access road areas; and
- Crush, screen and emplace existing demolition rubble for re-use as engineered fill.

4. GENERAL NOTES FOR GUIDANCE

4.1 Reuse of Excavated Soils

4.1.1 Achieving Non-Waste Status

While clean uncontaminated natural soils can be reused directly on the site of origin, where soils have the potential to be contaminated it is necessary to prove that the materials are not considered a waste on completion of the works. Excavated soils can be reused at the site of origin or another site as long as the following four factors can be demonstrated (via appropriate permitting etc.):

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

It is important that materials that moved around the site or imported onto site are not classified as a waste (as defined by Waste Framework Directive) on completion of the works. There are several different waste regulatory options available, the suitability of which is dependent upon the complexity of the site and the quantity/composition of the material to be reused. These include:

- Quality Protocols – Allows for inert aggregate waste to be recovered and used subject to meeting set conditions.
- Waste Exemption – suitable for small volumes of non-hazardous waste;
- Standard Rules Environmental Permit – Suitable for non-hazardous waste with limits on the quantity. Can take several months to obtain from the Environment Agency;
- Bespoke Environmental Permit – Suitable for greater volumes of waste and includes hazardous waste. Can take several months to obtain from the Environment Agency;
- Application in accordance with CL:AIRE guidance 'Definition of Waste: Development Industry Code of Practice' (DoWCoP).

The following sections describe the procedures to be undertaken and testing requirements to ensure that materials reused at the site are suitable for use and on completion of the scheme are not classified as a waste.

4.1.2 Quality Protocols

Quality Protocols for converting waste into non-waste products in England have been jointly developed by the Environment Agency and the Waste and Resources Action Programme (WRAP). The main aim is to determine when specified wastes can be considered to have been fully recovered and no longer waste for the purposes of the WFD. Protocols are available for the following products, amongst others:

- Aggregates from inert waste; and
- Quality compost from source-segregated biodegradable waste.

Any recycled aggregate or manufactured topsoil should be produced in accordance with the Quality Protocols and evidence will be required to demonstrate that this is the case.

4.2 Waste Exemptions

The two waste exemptions most applicable to land remediation activities are:

- U1: use of waste in construction
- T5: screening and blending waste

The purpose of the waste exemptions is to allow the use of suitable wastes for small scale construction instead of using virgin raw materials. There are very strict limits placed on the quantities and types of waste that can be reused. With respect to soil and stones it is possible to use up to 1,000 tonnes (approximately 500m^3) with a U1 exemption. The soil and stones must be either inert or non-hazardous (no hazardous waste) and can either be directly reused or from a permitted remediation process.

4.3 Standard Rules and Bespoke Environmental Permits

Standard Rules Environmental Permits are available for a number of relatively low risk activities. A Standard Rules SR2008No27 – permits mobile plant for the treatment of soils and contaminated

material, substances or products. The operator is permitted to use the techniques listed below:

- Air sparging
- Bioremediation – in-situ and ex-situ (windrows, biopiles, in-vessel bioreactors)
- Biosparging
- Bioventing
- Chemical Treatment (including oxidation, dehalogenation)
- Ex-situ treatment of pumped groundwater (chemical treatment, biological treatment, air stripping, filtration, carbon adsorption)
- Soil Vapour Extraction (including dual phase SVE)
- Soil Flushing (including steam injection)
- Soil Washing Solidification Stabilisation
- Thermal treatment (including thermal desorption and steam injection), and
- Treatment plant for blending, mixing, bulking, sorting and segregating, screening, shredding, particle size reduction and / or particle separation in order to facilitate remedial action

There are application, transfer, surrender and subsistence fees associated with each of the standard rule permits payable to the EA. There are also restrictions placed on the operations that fall within the standard rule permits. For example, with respect to the use of waste in construction the waste must be either inert or non-hazardous (no hazardous waste). The activities must not be carried out within 500 metres of a European Site, Ramsar site or a Site of Special Scientific Interest (SSSI). The activities shall also not be within:

- Groundwater Source Protection Zones 1 or 2;

- 50 metres of any spring or well, or of any borehole not used to supply water for domestic or food production purposes; and
- 250 metres of any borehole used to supply water for domestic or food production.

It is therefore feasible that reuse of excavated materials could be undertaken under a standard rules permit. However, a potentially easier route is to carry out the work following the Definition of Waste: Development Industry Code of Practice.

4.4 EA Regulatory Position Statement (RPS)215

In summary, a RPS applies to time limited small scale:

- remediation of soil and groundwater for pollution incidents or historic land contamination, and/or
- site-specific remediation trials to find out if a technique will be effective.

The EA's local Groundwater and Contaminated Land Team must be notified at least five working days prior to commencement with:

- contact details and the competent person (Remada has Competent Person)
- site address, grid reference and a site plan that shows the site boundary and physical extent of the remediation or trial
- details of why remediation or trials are required
- details if it is soil or groundwater you are treating or a combination of the two
- The established technique or techniques being used, and
- The expected duration of the activity and when it will star.

The activity must be completed as soon as possible and within six months of notification to the EA.

The Operator must not:

- treat more than 1,000 cubic metres of soil and or groundwater in total
- re-deposit treated soils
- discharge the treated groundwater back to the ground, groundwater or surface water
- import or treat imported waste
- store waste for more than 12 months.

The Operator must keep records of:

- method statement detailing
  - how treated waste will be temporarily stored and used
  - processes to be used
  - a risk assessment (EA form MPP2)
  - calculation of volumes for in-situ groundwater treatment
  - mitigation measures for emissions, noise and vibration, and
  - a contingency plan
- volumes treated
- verification of remedial objectives

- any pollution incidents and how these were dealt with
- any unexpected contamination
- any correspondence with the Environment Agency.

The Operator can:

- register a suitable waste exemption
- apply for a permit
- use the CL:AIRE Definition of waste: code of practice.

The Environment Agency intends to review RPS215 by 31 October 2027.

4.5 Definition of Waste: Development Industry Code of Practice (DoWCoP)

The Environment Agency (EA) has worked with industry through CL:AIRE to prepare the DoWCoP. The purpose of the DoWCoP is to allow industry to regulate itself with respect to determining whether excavated materials have achieved non-waste status. The EA states that 'When a signed Declaration is sent to us (the EA) by a Qualified Person showing that excavated materials are to be dealt with as set out in the DoWCoP (including preparation of a verification report), we (the EA) will take the view that the materials on the site where they are to be used will not be waste.'

If materials are dealt within in accordance with the DoWCoP then the materials are unlikely to be waste. This is either due to the fact that the materials were never discarded in the first place or because they have been submitted to a recovery operation and have been completely recovered so that they have ceased to be waste.

In order to demonstrate that the four factors have been fulfilled will require preparation of various reports including:

- Site investigation report (Site Condition Report).
- Quantitative Risk Assessment (QRA);
- Remediation Strategy or Design Statement;
- Materials Management Plan (MMP); and
- Verification report (on completion of the works).

In addition to the risk assessment and remediation strategy, a materials management plan (MMP) will be required detailing where soils will be moved to and how they will be tracked. Approvals may need to be sought from the Local Authority and the Environment Agency (groundwater team) with respect to the remediation strategy. In addition, the Environment Agency (waste team) need to acknowledge that they have no objections to the use of the DoWCoP for the scheme. Planning permission is normally required.

The Materials Management and accompanying documentation will have to be reviewed by a Qualified Person prior to submitting a formal declaration to the Environment Agency (waste team), via CL:AIRE (the scheme administrators). On completion of the work a verification report will need to be completed. If a verification report is not prepared there is the potential that the materials reused will be viewed as a waste.

5. REMEDIATION OUTLINE METHOD STATEMENT

5.1 General

A summary of remediation activities with cognisance to the proposed site layout is shown in **Figure 1**.

5.1.1 Public Access

No public access is required to or through the site. However, the site requires full perimeter security fencing to be maintained throughout the remediation works to prevent public access.

5.1.2 Materials Management Plan (MMP)

A Materials Management Plan (MMP) should be prepared and declared as necessary to enable the re-use of existing Made Ground and demolition materials.

5.1.3 Utilities

Statutory service bodies should be consulted at an early stage with respect to the ground conditions within which the developer will install buried services in order to enable them to assess at an early stage any potential abnormal costs. It is possible that special water supply protective measures will be necessary but this should be confirmed with United Utilities at the earliest opportunity. Further advice is contained in UKWIR Report 10/WM/03/21 – 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites'.

5.1.4 Removal of Relict Floor Slabs

All brick and concrete rubble, ground floor concrete slabs and building foundations are to be excavated and crushed to produce 6F2 material to be used to achieve formation levels or stockpiled for later use in construction by Lidl.

5.1.5 Groundwater in Excavations

Any perched or shallow groundwater water that may collect in excavations is to be pumped out and either disposed of at a suitably permitted facility, or treated on-site and discharged to the public sewer system under licence / consent from the owner / operator of the public sewer system.

5.1.6 Drainage

All abandoned drainage runs encountered on-site during development works including those below the proposed footprint of the new store must be chased out, excavated and removed from site. Water and sludges are to be pumped from the drainage system where necessary and disposed at a suitably licensed facility. United Utilities and / or the appropriate utility owner should be consulted with regards to any modifications to existing site drainage.

5.1.7 Ground Obstructions

Further advice should also be sought if ground obstructions such as foundations, further basements etc associated with the former buildings and other structures on-site are encountered during the preparatory works; such obstructions might necessitate revised foundation design. Any grubbed-out ground obstructions will need to be replaced with suitably compacted fill material such as 6F2 to an engineered specification.

5.1.8 Stockpile Management

It should be ensured that the groundworker understands the need for good materials management. Most notably the importance of not mixing different materials within a given stockpile; i.e. there should be separate marked stockpiles of: Topsoil; made ground; demolition crush, excess clean, natural soil arisings; general construction waste etc.

5.2 Protection of Cryddan Brook

Potential rainwater run-off from the site is to be prevented from flowing into Cryddan Brook. Surface water drains that discharge to the brook should be temporarily stopped up during the construction works. It may be necessary to construct a temporary sump to contain surface water run-off and either for disposal of the water or discharge directly from site in accordance with a permit.

5.3 Foundation Details

Foundation design details are not known at the time of writing however it is antipcated that a form of ground improvement or piled foundations will be specified.

5.4 Landscape Cover Thickness

Unless specified elsewhere the minimum thickness of topsoil shall not be less than 150mm and the minimum thickness of subsoil not less than 150mm to provide a minimum overall thickness of 300mm over existing natural soils.

5.5 Soil Acceptance Criteria

5.5.1 General Fill Geotechnical Requirements

Site won soils shall conform to either Class 1, Class 2 or Class 3 fill as appropriate and be placed and compacted in layers in accordance with the Specification for Highway Works 600 series. No general fill should be placed beneath structures. The designer will provide further details on which materials are deemed to be geotechnically suitable for reuse and testing requirements to demonstrate compliance.

5.5.2 Engineered Fill Geotechnical Requirements

Any on-site produced 6F2 material will be used as a engineered fill beneath proposed buildings and structures. The designer will provide further details on testing requirements to demonstrate compliance. However, as a minimum this will include the following:

- Particle size distribution testing.
- Plate bearing tests.

5.5.3 Reuse of Soil

The upper limits for general and engineering fill material being produced from the site shall not exceed the LQM/CIEH S4ULs for Commercial Land Use presented in **Table 2** below.

5.5.4 Re-use of Landscape Soils

The upper limits for landscape soils being produced from the site shall not exceed the LQM/CIEH S4ULs for Commercial Land Use presented in **Table 2** below. Topsoil shall comply with the requirements of BS3882.

5.6 Post Remediation Constraints

5.6.1 Ground Gas Protection System

In accordance with BS 8485:2015+A1:2019 for a Type 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 measures and/or a gas resistant membrane.

For this proposed retail store design, the following gas protection measures are required:

- Cast in-situ ground-bearing floor slab (with only nominal mesh reinforcement. **Score 0.5**.
- Gas resistent membrane (**Score 2.0**) meeting all of the following criteria:
    - Sufficiently impervious, both in the sheet material and in the sealing of sheets and sealing around sheet penetrations, to prevent any significant passage of methane and/or carbon dioxide through the membrane.
    - Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions.
    - Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools etc); and to withstand in-service stresses (e.g. settlement if placed below a floor slab.
    - Capable after installation, of providing a complete barrier to the entry of the relevant gas; and
    - Verified in accordance with CIRIA C735.

An example of a suitable membrane is presented at **Appendix A**.

Foundation design details are not known at the time of writing but an example of gas protection measures from another Lidl site is presented at **Appendix C**.

5.6.2 Radon Protection

The site is located in both an Intermediate Probability Radon Area (3 to 5% of homes are estimated to be at or above the Action Level) and a Higher Probability Radon Area (10 to 30% of homes are estimated to be at or above the Action Level). Consequently, full radon protection measures are necessary in the proposed new development.

5.6.3 Membrane Installation

the membrane should be installed by installation technicians qualified to NVQ Level 2, and verified in accordance with CIRIA C735 Good Practice on the Testing & Verification of Protection Systems for Buildings / Against Hazardous Ground Gases (2014) which sets out current industry good practice. The membrane should be installed in accordance with the manufacturer's instructions and as per the Engineer's detail and construction drawings:

- Capable after installation, of providing a complete barrier to the entry of the relevant gas; and
- Gas Barrier to be installed in accordance with the manufacturer's instructions and Engineer's drawings,

- Underlying damp membrane or formation to be free of detritus prior to laying the gas barrier
- Barrier sheets to overlap by not less than the width of the joint tape.
- Double sided joint tape to be used.
- All tears and punctures to be repaired using double sided joint tape and off-cut membrane.
- All service entries to be sealed as 'top-hat' details to prevent gas ingress.
- Membrane installation to be inspected by a Verification Consultant following placement of rebar to ensure that may punctures have been repaired.
- Concrete to be placed as soon as possible after inspection.

CLEA Category	Commercial			
Contaminant	mg/kg 1% SOM	mg/kg 2.5% SOM	mg/kg 6% SOM	Reference
Asbestos	<0.0001%*	<0.0001%*	<0.0001%*	JIWG CAR 2012
Antimony	7500	7500	7500	EIC/AGS/CL:AIRE
Arsenic	640	640	640	LQM/CIEH S4UL
Barium	22000	22000	22000	EIC/AGS/CL:AIRE
Beryllium	12	12	12	LQM/CIEH S4UL
Boron	240000	240000	240000	LQM/CIEH S4UL
Cadmium	190	190	190	LQM/CIEH S4UL
Chromium III	8600	8600	8600	LQM/CIEH S4UL
Chromium VI	33	33	33	LQM/CIEH S4UL
Copper	68000	68000	68000	LQM/CIEH S4UL
Mercury (Elemental	58^{vap} (25.8)	58^{vap} (25.8)	58^{vap} (25.8)	LQM/CIEH S4UL
Mercury (Inorganic	1100	1100	1100	LQM/CIEH S4UL
Mercury (Methyl Hg)	320	320	320	LQM/CIEH S4UL
Molybdenum	18000	18000	18000	EIC/AGS/CL:AIRE
Nickel	980	980	980	LQM/CIEH S4UL
Lead	NC	NC	2300	DEFRA C4SL
Selenium	12000	12000	12000	LQM/CIEH S4UL
Vanadium	9000	9000	9000	LQM/CIEH S4UL
Zinc	730000	730000	730000	LQM/CIEH S4UL
BTEX				
Benzene	27	47	90	LQM/CIEH S4UL
Toluene	56000^{vap} (869)	110000^{vap} (1920)	180000^{vap} (4360)	LQM/CIEH S4UL
Ethylbenzene	5700^{vap} (518)	13000^{vap} (1220)	27000^{vap} (2840)	LQM/CIEH S4UL
O-Xylene	6600^{vap} (478)	15000^{vap} (1120)	33000^{vap} (2620)	LQM/CIEH S4UL
M-Xylene	6200^{vap} (825)	14000^{vap} (1470)	31000^{vap} (3460)	LQM/CIEH S4UL
P-Xylene	5900^{vap} (576)	14000^{vap} (1350)	30000^{vap} (3170)	LQM/CIEH S4UL
TPH Aliphatics				
>EC5-EC6	3200^{sol} (304)	5900^{sol} (558)	12000^{sol} (1150)	LQM/CIEH S4UL
>EC6-EC8	7800^{sol} (144)	17000^{sol} (322)	40000^{sol} (738)	LQM/CIEH S4UL
>EC8-EC10	2000^{sol} (78)	4800^{vap} (190)	11000^{vap} (451)	LQM/CIEH S4UL
>EC10-EC12	9700^{sol} (48)	23000^{vap} (118)	47000^{vap} (283)	LQM/CIEH S4UL
>EC12-EC16	59000^{sol} (24)	82000^{sol} (59)	90000^{sol} (142)	LQM/CIEH S4UL
>EC16-EC35	1600000	1700000	1800000	LQM/CIEH S4UL
>EC35-EC44	1600000	1700000	1800000	LQM/CIEH S4UL
>EC44-EC70 (ali+aro)	28000	28000	28000	LQM/CIEH S4UL
TPH Aromatics				
>EC5-EC7 (Benzene)	26000^{sol} (1220)	46000^{sol} (2260)	86000^{sol} (4710)	LQM/CIEH S4UL
>EC7-EC8 (Toluene)	56000^{vap} (869)	110000^{vap} (1920)	180000^{vap} (4360)	LQM/CIEH S4UL
>EC8-EC10	3500^{vap} (813)	8100^{vap} (1500)	17000^{vap} (3580)	LQM/CIEH S4UL
>EC10-EC12	15000^{sol} (364)	28000^{sol} (899)	34000^{sol} (2150)	LQM/CIEH S4UL
>EC12-EC16	38000^{sol} (169)	37000	38000	LQM/CIEH S4UL
>EC16-EC21	28000	28000	28000	LQM/CIEH S4UL
>EC21-EC35	28000	28000	28000	LQM/CIEH S4UL
>EC35-EC44	28000	28000	28000	LQM/CIEH S4UL
>EC44-EC70 (ali+aro)	28000	28000	28000	LQM/CIEH S4UL
PAH				LQM/CIEH S4UL
Naphthalene	190^{sol} (78.4)	460^{sol} (183)	1100^{sol} (432)	LQM/CIEH S4UL
Acenaphthylene	83000^{sol} (86.1)	97000^{sol} (212)	100000	LQM/CIEH S4UL
Acenaphthene	84000^{sol} (57)	97000^{sol} (141)	100000	LQM/CIEH S4UL
Fluorene	63000^{sol} (30.9)	68000	71000	LQM/CIEH S4UL
Phenanthrene	22000	22000	23000	LQM/CIEH S4UL
Anthracene	520000	540000	540000	LQM/CIEH S4UL
Fluoranthene	23000	23000	23000	LQM/CIEH S4UL
Pyrene	54000	54000	54000	LQM/CIEH S4UL
Benzo(a)anthracene	170	170	180	LQM/CIEH S4UL
Chrysene	350	350	350	LQM/CIEH S4UL
Benzo(b)fluoranthene	44	45	45	LQM/CIEH S4UL
Benzo(k)fluoranthene	1200	1200	1200	LQM/CIEH S4UL
Benzo(a)pyrene(1)	35	35	35	LQM/CIEH S4UL
Indeno(1,2,3-	500	510	510	LQM/CIEH S4UL
Dibenzo(a,h)anthrace	3.5	3.6	3.6	LQM/CIEH S4UL
Benzo(g,h,i)perylene	3900	4000	4000	LQM/CIEH S4UL
Coal Tar(1)	15	15	15	LQM/CIEH S4UL
Chloroalkanes &				LQM/CIEH S4UL
1,2-Dichloroethane	0.67	0.97	1.7	LQM/CIEH S4UL
1,1,1-Trichloroethane	660	1300	3000	LQM/CIEH S4UL
1,1,2,2-	270	550	1100	LQM/CIEH S4UL
1,1,1,2-	110	250	560	LQM/CIEH S4UL
Tetrachloroethene	19	42	95	LQM/CIEH S4UL
Tetrachloromethane	2.9	6.3	14	LQM/CIEH S4UL
Trichloroethene (TCE)	1.2	2.6	5.7	LQM/CIEH S4UL
Trichloromethane	99	170	350	LQM/CIEH S4UL
Chloroethene (Vinyl	0.059	0.077	0.12	LQM/CIEH S4UL
Explosives				LQM/CIEH S4UL
2,4,6-Trinitrotoluene	1000	1000	1000	LQM/CIEH S4UL
RDX	210000	210000	210000	LQM/CIEH S4UL
HMX	110000	110000	110000	LQM/CIEH S4UL
Pesticides				LQM/CIEH S4UL
Aldrin	170	170	170	LQM/CIEH S4UL
Dieldrin	170	170	170	LQM/CIEH S4UL
Atrazine	9300	9400	9400	LQM/CIEH S4UL
Dichlorvos	140	140	140	LQM/CIEH S4UL
alpha-Endosulfan	5600^{dir} (0.003)	7400^{dir} (0.007)	8400^{dir} (0.016)	LQM/CIEH S4UL
beta-Endosulfan	6300^{dir} (0.00007)	7800^{dir} (0.0002)	8700	LQM/CIEH S4UL
alpha-	170	180	180	LQM/CIEH S4UL
beta-	65	65	65	LQM/CIEH S4UL
gamma-	67	69	70	LQM/CIEH S4UL
Chlorobenzenes				LQM/CIEH S4UL
Chlorobenzene	56	130	290	LQM/CIEH S4UL
1,2-Dichlorobenzene	2000^{sol} (571)	4800^{sol} (1370)	11000^{sol} (3240)	LQM/CIEH S4UL
1,3-Dichlorobenzene	30	73	170	LQM/CIEH S4UL
1,4-Dichlorobenzene	4400^{dir} (224)	10000^{dir} (540)	25000^{dir} (1280)	LQM/CIEH S4UL
1,2,3-	102	250	590	LQM/CIEH S4UL
1,2,4-	220	530	1300	LQM/CIEH S4UL
1,2,5-	23	55	130	LQM/CIEH S4UL
1,2,3,4-	1700^{dir} (122)	3080^{dir} (304)	4400^{dir} (728)	LQM/CIEH S4UL
1,2,3,5-	49^{dir} (39.4)	120^{dir} (98.1)	240^{dir} (235)	LQM/CIEH S4UL
1,2,4,5-	42^{dir} (19.7)	72^{dir} (49.1)	98	LQM/CIEH S4UL
Pentachlorobenzene	640^{dir} (43.0)	770^{dir} (107)	830	LQM/CIEH S4UL
Hexachlorobenzene	110^{dir} (0.20)	120	120	LQM/CIEH S4UL
Phenols &				LQM/CIEH S4UL
Phenols	440^{dir} 26000)	690^{dir} (30000)	1300^{dir} (34000)	LQM/CIEH S4UL
Chlorophenols	3800	4000	4300	LQM/CIEH S4UL
Pentachlorophenol	400	400	400	LQM/CIEH S4UL
Other				LQM/CIEH S4UL
Carbon Disulphide	11	22	47	LQM/CIEH S4UL
Hexachlorobutadiene	31	66	120	LQM/CIEH S4UL
dieldrin	7900	13000	24000	EIC/AGS/CL:AIRE

NC: No published criteria
vap: Screening criteria presented exceed the vapour saturation limit, which is presented in brackets.
sol: Screening criteria presented exceed the solubility saturation limit, which is presented in brackets.
dir: Screening criteria based on threshold protective of direct skin contact (guideline in brackets based on health effects following long term exposure provided for illustration only).
(1): For assessment based on the use of the surrogate marker approach the GAC for Coal Tar must be used instead of benzo(a)pyrene.
* Asbestos trace level

Updated with LQM/CIEH errata/erratum to March 2016.

Table 2: Imported Fill Acceptance Criteria

6 MONITORING & VERIFICATION PLAN

6.1 Main Remediation Works - General

A photographic record of all excavations and backfill operations will be maintained and compiled within a Verification Report. A photographic will be prepared by the Main Contractor for use by Remada in preparation of the Verification Report.

6.2 Engineered Ground & Imported Fill

Any engineered ground and imported fill will require testing to confirm it been correctly placed and suitably compacted in accordance with the Engineer's Specification. General and structural fill materials shall be tested at rate of 1 /500m³ but not less than one sample per source and not less than three samples in total. Records are to be provided to Remada for compilation in the Verification Report.

Engineered fill placed beneath the proposed store car park should be inspected to ensure that it is of the correct layer and total thickness and has been correctly placed and suitably compacted. CBR or Plate load tests will be necessary on the compacted fill immediately after placement and this should be directed / supervised by a geotechnical engineer.

Imported fill material and site-won material shall not contain concentrations of contaminants greater than the suitability for reuse criteria detailed in **Table 2.** Provided that it is placed at depths greater than 600mm or below buildings / hardstanding, these materials should be tested at a rate of one per 1000m³ with a minimum of four tests on any individual source material and at an ongoing frequency to ensure the assessment of representative contaminant concentrations.

Records are to be provided to Remada for compilation in the Verification Report.

6.3 Soft Landscaping Areas & Cover System

Topsoil imported for landscape shall not contain concentration of contaminants greater than **Table 2.** The thickness of topsoil and subsoil in the landscape area should be checked ensure that the minimum required thickness has been achieved. The following sampling frequency for assessing site-won and imported soils located within soft landscaping / areas is required:

- For material from a greenfield source, testing should be undertaken at a rate of one sample per 250m³, with a minimum of four tests on any individual source material and at an ongoing frequency to ensure the assessment of representative contaminant concentrations.
- For material from a brownfield, recycled or unverified source, testing should be undertaken at a rate of one sample per 100m³, with a minimum of four tests on any individual source material and at an ongoing frequency to ensure the assessment of representative contaminant concentrations.

Records are to be provided to Remada for compilation in the Verification Report.

6.4 Engineered Capping Material

Site won and imported engineering capping material (6F2/6F5 etc) shall not contain concentration of contaminants greater than **Table 2** shall be tested at rate of one per 1000m³. Records are to be provided to Remada for compilation in the Verification Report.

6.5 Sampling & Analysis

All verification sampling will be conducted by suitably qualified and experienced geoenvironmental engineer. Samples are to be tested at a UKAS and MCERTS accredited laboratory.

6.6 Unforeseen Contamination

In the event that unforeseen contamination is encountered during the works, samples of the suspected soil or groundwater contamination shall be taken and submitted for laboratory analysis. The results will be assessed by Remada.

6.7 Waste Disposal Records

Any contaminated materials (including unforeseen contaminated soils) requiring removal from the site must be recorded and copies of Consignment notes or Duty of Care transfer notes must be retained by the Main Contractor for incorporation in the Verification Report.

6.8 Ground Gas & Membrane

Installation of any gas resistant membrane shall be inspected and verified by a geo-environmental engineer or suitably qualified verifier prior to placing of the screed. Ground gas protection measures are required to meet the requirements of CS2.

The installer is required to provide Remada with CQA records for the gas resistant membranes installed on-site.

Installation of any gas resistant membrane shall be inspected and verified by a geo-environmental engineer or suitably qualified verifier on at least three (3 No.) occasions prior to the concrete pour commencing.

During these three visits (minimum), all seams and non-seam areas of the available gas membrane will be inspected/tested by the verifier for identification of defects, protruding and penetrating objects, lack of subgrade support, overheating, holes, blisters, undispersed raw materials, scratches and gouges, and any sign of contamination by foreign matter.

The verification consultant will ensure that the following is undertaken:

- Record the product details
- Record the membrane batch number (if available).
- Record details of the double sided joint tape.
- Inspect that all laps and joints are sealed;
- Inspect that all service entries have been lapped to surround as a 'top hat' detail.
- Inspect the membrane for punctures and check that repairs have been carried out using double sided joint tape and off-cut membrane.
- Take photos of the membrane prior to installation of the screed.
- Complete an inspection record as per the example at **Appendix B**.

Photographic records and technical details relating to the chosen protection measures must be taken and retained. Examples of suitable membranes are presented at **Appendix B** and verification requirements are set out below.

6.9 Final Verification Report

On completion of the works a Verification Report will be compiled by Remada and submitted to the local authority to demonstrate that the remediation criteria have been met and to discharge relevant planning conditions. The report will as a minimum include the following:

- Description of the works that have taken place.
- Present photographic records of the work undertaken.
- Provide material tracking forms.
- Provide results of laboratory analysis undertaken during earthworks.
- Geotechnical test results.
- Provide records of off-site disposal of soil and groundwater.
- Document variations due to unforeseen contamination; and
- Provide details and results of laboratory analysis for imported materials

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STUDY LIMITATIONS

IMPORTANT. This section should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report.

1. This report has been prepared by Remada, Ltd with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with (the 'Client'). Remada does not accept responsibility for any matters outside the agreed scope.

2. This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing.

3. Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. Remada is unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have published, more stringent objectives. Further work may be required by these parties.

4. All work carried out in preparing this report has used, and is based on, Remada' professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice pending changes in legislation, of which Remada is aware, have been considered. Following delivery of the report Remada has no obligation to advise the Client or any other party of such changes or their repercussions.

5. This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.

6. Whilst this report and the opinions made are to the best of Remada' belief, Remada cannot guarantee the accuracy or completeness of any information provided by third parties.

7. This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have received

8. This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of changes in the condition of the site since the time of the investigation.

9. The content of this report represents the professional opinion of experienced environmental consultants. Remada does not provide specialist legal or other professional advice. The advice of other professionals may be required.

10. Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the site have not been investigated.

11. If below ground intrusive investigations have been conducted as part of the scope, service tracing for safe location of exploratory holes has been carried out. The location of underground services shown on any drawing in this report has been determined by visual observations and electromagnetic techniques. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on site.

12. Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issues.

13. Unless otherwise stated, samples from the site (soil, groundwater, building fabric or other samples) have NOT been analysed or assessed for waste classification purposes.

FIGURES

Notes

Proposed site layout plan reproduced from client-supplied HTC Architects's Proposed Lidl Site Plan, drawing ref: 2782-P4403-Rev H dated October 2024.

The proposed site layout plan is indicative only and subject to change following publication of Remada's Phase 1 report.

Revision	Approved	Date

Project Title	Scale	Drawn	Size
Briton Ferry Road, Neath	as shown	PD	A4
Drawing Title	**Date**	**Job No.**	**Figure No.**
Proposed Site Layout Plan	18.09.25	769.10	03
Client			
Lidl Great Britain Ltd			

REMADA GEO CONSULTANTS

Legend

- Cable Percussive Borehole Location
- Hand Excavated Inspection Pit
- Window sample Borehole
- Groundwater samples March 2022
- Opus window sample holes 2016
- River water sample
- C01 Concrete Core
- FS01 Ferro-Scan

Notes

Issue	Approved	Date
-	PD	08.04.2025

Project Title
Briton Ferry Road, Neath

Drawing Title
Exploratory Hole Location Plan

Client
Lidl Great Britain Ltd

Scale	Drawn	Size
as shown	PD	A4
Date	Job No.	Figure No.
08.04.25	769.05	02

Drawing Reference
769.09-Fig2

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General Requirements

01. Soft strip.

02. Demolish existing Lidl, Gym and Poundstretcher' buildings including removal of existing surfacing.

03. Break floor slabs and relic foundations to formation level.

04. Turnover made ground to remove obstructions to construction. Remada to be consulted regarding chemical analysis at this stage.

05. Chase out redundant services

06. Crush site-won concrete for reuse

07. Regrade site and compact made ground / 6F2 in accordance with engineer's specification.

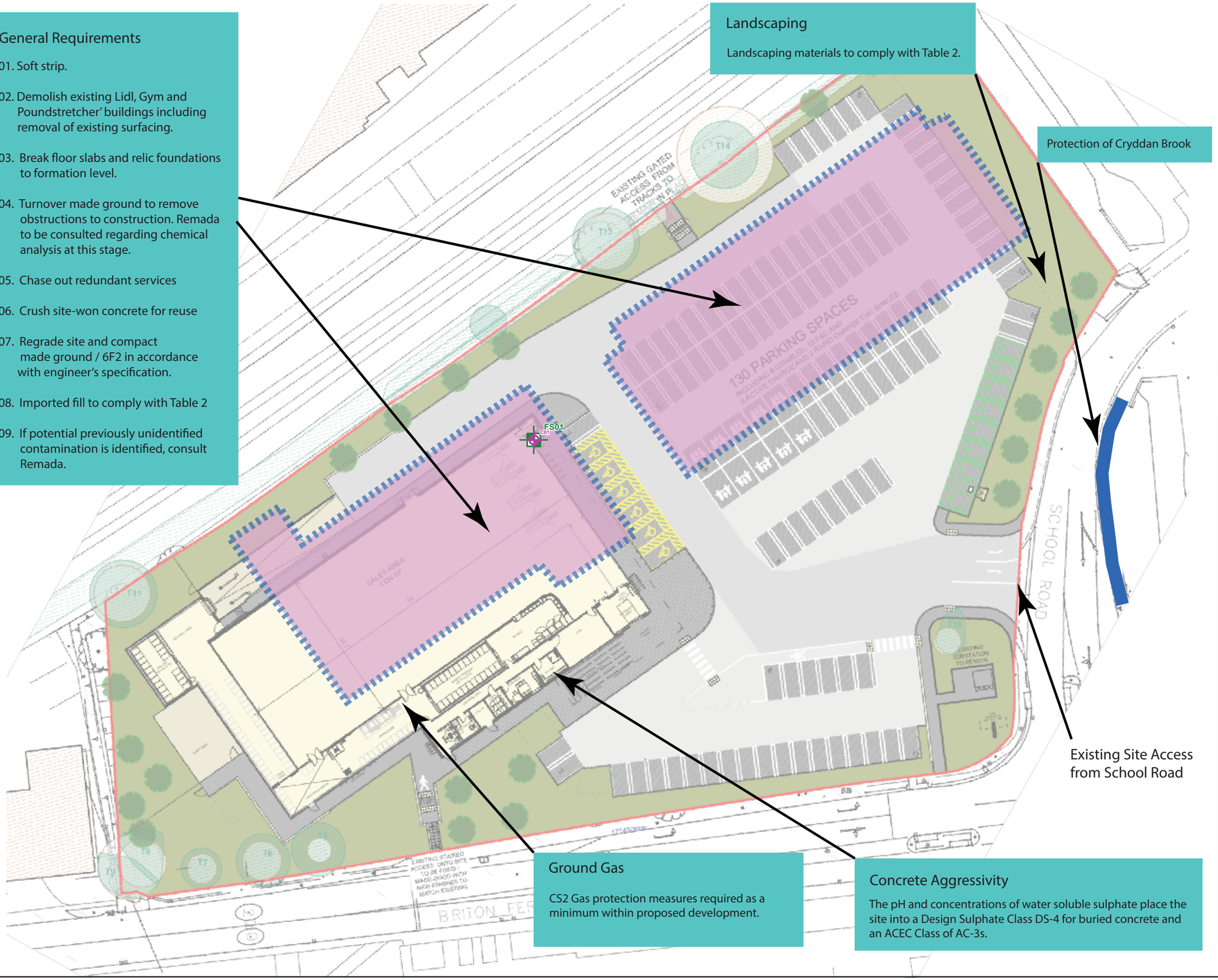
08. Imported fill to comply with Table 2

09. If potential previously unidentified contamination is identified, consult Remada.

Landscaping

Landscaping materials to comply with Table 2.

Protection of Cryddan Brook



Existing Site Access from School Road

Ground Gas

CS2 Gas protection measures required as a minimum within proposed development.

Concrete Aggressivity

The pH and concentrations of water soluble sulphate place the site into a Design Sulphate Class DS-4 for buried concrete and an ACEC Class of AC-3s.

Legend

Notes

Proposed site layout plan reproduced from client-supplied HTC Architects's Proposed Lidl Site Plan, drawing ref: 2782-P4403-Rev H dated October 2024.

Issue	Approved	Date
-	PD	08.04.2025

Project Title

Briton Ferry Road, Neath

Drawing Title

Remediation Activities

Client

Lidl Great Britain Ltd

Scale	Drawn	Size
as shown	PD	A4
Date	Job No.	Figure No.
08.04.25	769.09	03

Drawing Reference

769.09-Fig3

REMADA GEO CONSULTANTS

APPENDIX A
Gas Membrane Inspection Record

	CIRIA 735 Visual Inspection of Gas Protection Measures	REMADA GEO CONSULTANTS	Sheet 1 of 1

Site Name:		Gas Characteristic Situation (CS)	
Remada Job No:		Type of Development & Building / Block Checked:	
Dates:		Building Description:	
Inspection By:		Gas Protection Type:	

No.	Item	Comments
1 Gas Membrane		
1.1	Condition of subgrade and underside of gas membrane	
1.2	Gas membrane type	
1.3	Gas membrane condition	
1.4	Joint tape product	
1.5	Lapping design	
1.6	Laps, welds and joints seals	
1.7	Service entries seals	
2 Passive Venting		
2.1	Sub-floor void	
2.2	External wall airbricks	
2.3	Internal sleeper wall	
2.4	External vent trenches / duct	
3 Active Venting		
3.1	System details	

No	Photograph	Description
1		
2		
3		
4		
5		
6		

The gas protection measures inspected	a. Acceptable and comply with the specification b. Are acceptable but attention is drawn to issues related to item Nos 1 - 6 (after completion of repairs) c. Are not acceptable due to the issues related to item(s) No.

Checked by:		Signature:		Date:	

APPENDIX B
Alderprufe GRA Product Sheet

ALDERPRUFE GRA

Alderprufe GRA Gas Barrier is a multilayer, low-density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil (BBA 16/5368) for use above or below a concrete ground floors that are not subject to hydrostatic pressure, to protect buildings against gas penetration from the ground.

General Description

Alderprufe GRA is a proprietary gas barrier that is compliant with **BS8485:2015, Ciria 665** and is suitable for **Amber 1 & 2** applications. It provides an effective barrier to methane, carbon dioxide, radon, and hydrocarbon vapours; as **Ciria C748** notes, aluminium simply does not allow any permeation of almost any common organic pollutant.
It can be installed above or below a slab, above or below insulation or beneath a screed.
The methods of jointing provide an effective barrier to the passage of gases, hydrocarbon vapours, liquid water and water vapour from the ground.

Alderprufe GRA is suitable for use in accordance with the relevant clauses of CP102:1973 Code of Practice for protection of buildings against water from the ground (as amended), in concrete floors not subject to a hydrostatic pressure, and will meet Requirement of Building Regulations Approved Document C (England and Wales), in that sheet thickness is at least 1000 gauge.

Alderprufe GRA has a high resistance to puncture. On smooth or blinded surfaces it will not be damaged by normal on-site foot traffic but care should be taken to avoid damage during installation, particularly when handling building materials and equipment over the surface and when placing concrete or screed since it can be punctured by sharp objects.
Alderprufe GRA may be installed under all conditions normal to the construction of ground floor slabs.

The membranes remain flexible and do not soften at the extreme temperatures likely to occur in practice. When used in accordance with the manufacturer's instructions there will be no adverse effect on the membranes from underfloor heating under normal conditions of use, **Alderprufe GRA** will provide an effective barrier to the transmission of gases, liquid water and water vapour for the life of the concrete slab in which it is installed.

ALDERPRUFE GRA GAS BARRIER

Characteristic	Test Method	Unit	Alderprufe GRA
Physical Properties			
Thickness	EN 1849-2	mm	0.60
Width	EN 1849-2	m	2
Length	EN 1849-2	m	50 / 25
Weight	EN 1849-2	g/m2	350
Gas Permeability			
Methane	EN ISO 15105 - 1	ml/m2/day/atm	0.09
Carbon Dioxide	EN ISO 15105 - 1	ml/m2/day/atm	0.09
Radon	K124/02/95	m2/s	8.00
Water Vapour Transmission	EN 1931	g/m2/day	0.10
Complies with: BS8485:2015, CIRIA C664, CIRIA C748, NHBC (Green Amber 1, Amber 2, Red),			

Installation

Unless the base is smooth, a surface blinding of soft sand or **Geotex 300PP** protection should be used to avoid puncturing the membrane during installation or when the concrete or screed is being placed.

Before jointing, sheets must be clean and free from dirt and grease. Adjacent sheets should be overlapped by at least 100mm wide and bonded with 100mm wide double-sided **Gastite Tape**.

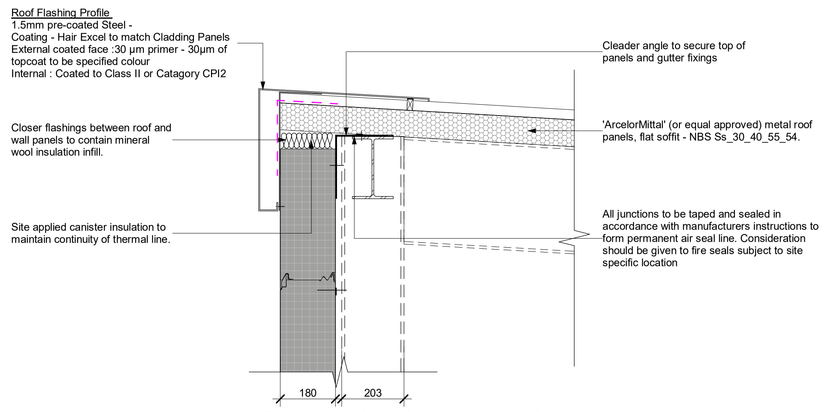
Perforation or puncture of the sheets should be patched with sheets of identical thickness lapped at least 150mm beyond the limit of the puncture and sealed with 100mm wide **Gastite Tape**.
Continuity with DPC: **Alderprufe GRA** membrane must be continuous with damp-proof course in the surrounding walls; lapped and bonded to **Aldercourse GRA** gas dpc for continuation through load-bearing walls. Where necessary **Alderprufe MR50** should be used as a vertical course to link the two (refer to typical details and separate data sheets.)

Placing Concrete or Screed: **Alderprufe GRA** must be covered by a screed or other protective layer as soon as possible after installation. Care should be taken to ensure that the membrane is not stretched or displaced when placing the concrete or screed.
Best practice is to use pre-formed collars and cloaks at penetrations to the gas barrier, for example at columns, pipes or piles.
If gas ventilation is needed, refer to **Aldervent Gas Ventilation** brochure.

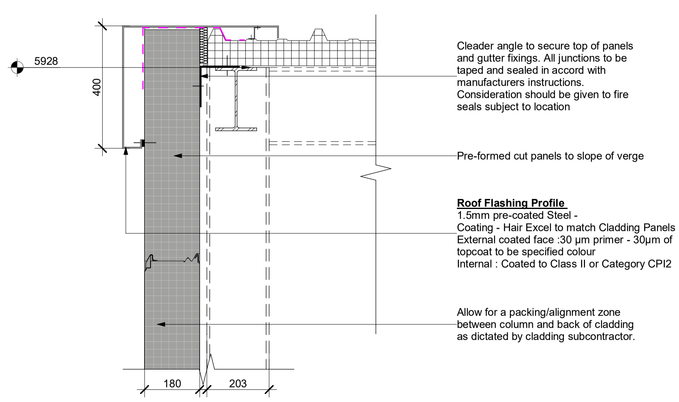
Use with: *Aldercourse GRA gas dpc * Gastite Tape * Preformed pipe collars, column cloaks, pile collars * Geotex 300PP or Backerboard HD protection * Membrane Holdfast * Alderprufe MR50*

APPENDIX C
Example Ground Gas Membrane Detail

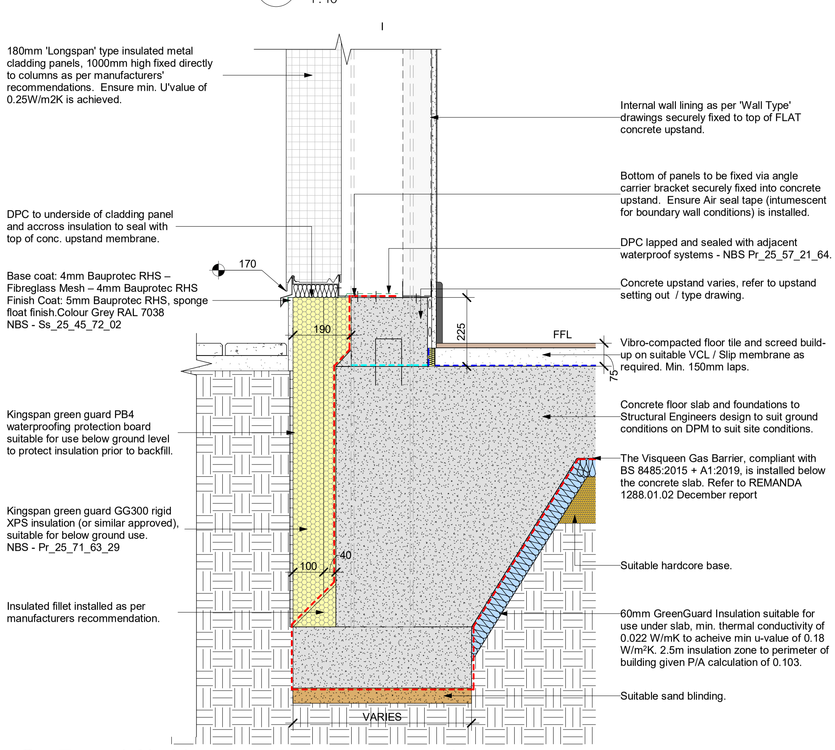
Architectural drawings show design intent in accordance with the Lidl International Specification. These drawings and specification are for guidance only and must be developed by the site-specific project/design team, with the Principal Designer (Building Regulations) appointed by the Principal Contractor, to ensure the completed solution achieves compliance with all relevant statutory authorities, BS / EN Standards, etc for that specific project. All products and design data must be fully assessed for suitability and compliance on a site specific basis. All deviations from the design intent should be approved by Lidl.



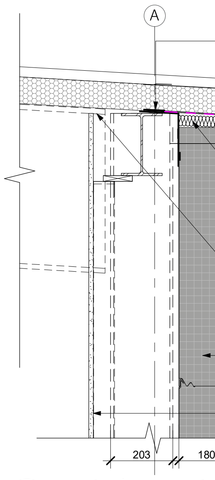
5 Typical High Verge Detail
1 : 10



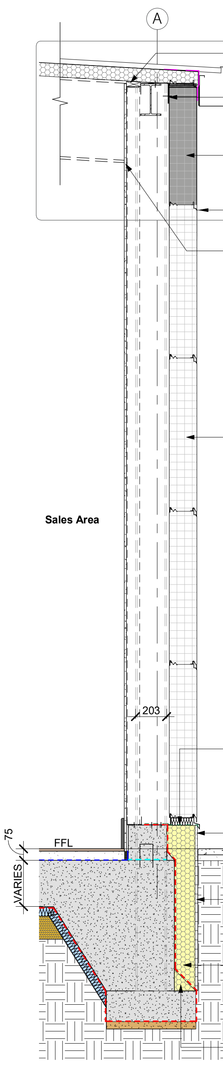
6 Typical Sloping Verge Detail
1 : 10



2 Typical Cladding Base Detail with Internal Lining
1 : 10



4 Typical Eaves De
1 : 10



3 Section Detail
1 : 20