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REMEDIATION STRATEGY LETTER WILLOW STREET, BURY

1. BACKGROUND

E3P has been instructed by PLP Construction Ltd (the Client) to develop a Remediation Strategy for the proposed scheme to construct a new apartment building on a parcel of land located to the west of Willow Street, Bury; herein referred to as the Site.

This document has been prepared to address Condition 5 & 6 with respect to approved planning application (Ref: 69602). This planning application relates to the erection of two apartment buildings; a plan of which is presented in Section 1.2 overleaf.

The development of the risk management strategy for the subject sites includes the following tasks:

-  Identification of the relevant pollutant linkages;
-  Review of site characteristics;
-  Development of remedial objectives;
-  Selection of appropriate remedial technology; and
-  Development of remedial strategy.

1.1. PREVIOUS WORKS

The following phases of Geoenvironmental investigations and assessments have previously been carried out at the site:

-  **E3P Ltd** – Phase II Geoenvironmental Site Investigation (Ref: 17-285-R1-2) dated January 2025.

To inform the assessment of the potential risk to contaminated land within the context of the proposed residential development and to inform the preparation of the remediation strategy, the pertinent points from the above Geo-environmental Investigation reports are summarised within Section 1.4 below.

For the avoidance of any doubt, the above reports should be read both as a precursor to and in conjunction with this document.



1.2. REDEVELOPMENT PLAN

E3P understands the client intend to redevelop the site with the construction of a low-rise residential development comprising two apartment blocks with associated gardens, estate roads and infrastructure.

A snapshot of the Proposed Development Scheme is indicated in Figure 1 below and Appendix I.

FIGURE 1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.3. SUMMARY OF PARTIES INVOLVED

Function/interest	Name of Party
Local Planning Authority	Bury Council
Developer	PLP Construction Ltd
Geoenvironmental Consultant	E3P
Main Contractor	Adapt Civils Ltd
Remediation/Enabling Works Contractor	Adapt Civils Ltd
Human Health Regulator	Bury Council
Controlled Waters and Waste Regulator	Environment Agency
Highways Adoption Authority	Bury Council



1.4. SITE SUMMARY

TABLE 1.1 SITE SUMMARY

Site Address	Land opposite 112 Willow St, Bury BL9 7QZ	
Occupancy/Use	The site is a rectangular shaped parcel of land located to the east of Bury town centre. The site is split into two distinct areas characterised by an elevation change of approx. 2 m and separated by a brick retaining wall. The north and west sector comprises an apartment block in the north with associated carparking and landscaping in the west. The south and east sector comprises a car park and disused commercial units/warehouses and storage sheds. The commercial unit has recently been demolished and the relict foundations removed.	
Environmental Setting	Drift Geology	Glacial Till – Cohesive.
	Bedrock Geology	Pennine Lower Coal Measures Formation - MUDSTONE, SILTSTONE AND SANDSTONE
	Hydrogeology	Glacial Till – Unproductive Strata Coal Measures – Secondary A Aquifer.
	Hydrology	No watercourses noted within 250 m of the site.
	Flood Risk	The site is within a Flood Zone 1 and is therefore not affected by flooding from rivers.
Site History	The site remained undeveloped until circa pre 1956 when commercial buildings were constructed. The building in the north of the site was redeveloped into residential flats between 2003 to 2005. The commercial buildings in the south of the site remain. Domestic garages were present in the centre of the site from circa 1985 to 2000.	
Landfill Sites	No landfill sites (current or historic) are located within 250m of the Site. However, the site appears to have artificially upfilled and levelled, with Made Ground recorded to depth of >1.80m bgl.	
Radon	Radon Class 3 - 3-5% of homes are estimated to be at or above the Action Level. Basic radon protection measures required.	
Ground Conditions	Topsoil: No suitable topsoil (for re-use) has been identified on-site. Made Ground: Made Ground deposits were encountered within all exploratory hole locations to depths of between 0.90 m and 4.00 m bgl. It should be noted that within WS103 where Made Ground was encountered to 4.00 m bgl, the recovery of material was poor, and this is therefore an estimated depth of Made Ground.	



	Made Ground deposits from ground level to 0.30 m bgl comprise tarmac underlain by MOT. Underlying the tarmac and MOT, Made Ground deposits are varied, comprising interbedded reworked clay, sand and gravel. Reworked clays were encountered within four exploratory locations (WS101, WS104, WS105 and WS106) and comprise grey and brown gravelly sandy clay. Gravel is fine to coarse angular to subrounded of mudstone, sandstone, ash, brick. With the exception of WS101, reworked clay deposits were encountered directly overlying natural strata. Granular Made Ground deposits were encountered within all exploratory locations apart from WS106. Granular Made Ground generally comprises brownish black and grey clayey very sandy gravel with localised areas comprising brown clayey gravelly fine to medium sand. Gravel is fine to coarse angular to subrounded of mudstone, brick, wood, concrete, ash, glass, slag and clinker. In WS105 granular Made Ground comprises and infilled natural sand underlain by a geotextile membrane, suggesting it is part of a cover system. <u>Drift Deposits:</u> Drift deposits were encountered within all exploratory locations to a maximum proven depth of 5.45 m bgl. The drift deposits comprise a generally firm low strength to stiff medium strength sandy gravelly CLAY with gravel of mudstone. Localised soft very low strength sandy CLAY was encountered within WS103 and WS104 at 4.00 m bgl. Localised very stiff very high strength sandy gravelly CLAY was encountered within WS106 at 3.00 m bgl. <u>Bedrock:</u> The solid bedrock geology was encountered within two exploratory locations (WS101 and WS105) with depth to rockhead varying between 2.70 and 4.50 m bgl. The solid geology comprises grey weathered MUDSTONE. <u>Groundwater:</u> Groundwater strikes were encountered as seepages within WS101 at 3.00m bgl. During post site investigation monitoring groundwater levels were observed between 0.57m (WS105) and 3.21m bgl (WS101) to date.
Human Health Risk Assessment <i>Non-Volatile PAHs and Heavy Metals</i>	Laboratory analysis identified the localised presence of elevated non-volatile PAHs, heavy metals and marginal exceedances of naphthalene and SVOCs within Made Ground deposits. These exceedances are associated within general Made Ground and are not attributed to a specific source. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH compounds can be mitigated through the installation of a suitable cover system in all landscaping and public open space to remove any potential for direct exposure to impacted soils. As such, it will be necessary to design and construct the proposed development in a manner that will ensure suitably validated cover systems to all areas soft landscaping and public open space. No asbestos was identified within samples tested in the laboratory to date. However, due to the age of the site, the presence within the wither Made Ground cannot be entirely discounted.



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Human Health Risk Assessment <i>Naphthalene</i>	With regards to the elevated naphthalene and SVOCs, these present a potential volatilisation to indoor air risk, albeit unlikely due to the very low concentrations and substructure design. When considering the chemical analysis data set as whole, 14 No. samples were tested for Naphthalene with a range of results between <0.10 and 3.7mg/kg, against a threshold of 2.3kg/mg. The sole exceedance in WS104 at 1.80m bgl, whilst marginal may pose a theoretical risk. The Naphthalene impact appears to be local, with a mean site concentration of 0.51mg/kg (significantly below the threshold). Furthermore, the proposed apartment structure benefits from a passively ventilated subfloor void, which will serve to limit any vapour ingress into the structures. In light of the above, E3P do not consider the apartments require a vapour membrane throughout and a CS2 protection membrane will be suitable to mitigate both ground gases and radon ingress.
Controlled Waters Risk Assessment	No elevated levels of contaminants in leachate or groundwater samples have been identified compared to the DWS values. One exceedance of zinc has been identified when compared to EWS values as there is no DWS value for zinc. The risk of this is negated, however, due to the lack of surface water receptor within influencing distance of the site. In the absence of any sources of mobile contaminants, no exceedances in GW when compared to DWS values and low sensitivity of the underlying receptor (Coal Measures), the site is considered to pose no unacceptable level of risk to controlled waters.
Ground Gas	Marginally elevated carbon dioxide concentrations were recorded on several occasions, however the flow rates were very low and the GSV rates indicate the site falls under CS1 and as such no specific ground gas protection measures are required. Basic radon protection measures are required. E3P understand the apartments will benefit from a subfloor void across the entire footprint (other than lift shaft) which will serve to passively ventilate the structure. However, as a precautionary measures and to mitigate potential radon ingress, CS2 ground gas protection measures will be installed in all areas other than the central lift pit. The lift pit will be installed with a vapour resistant membrane as a precautionary measure, being the only part of the substructure in direct contact with the underlying Made Ground soils.
Potable Water Supply	PE Barrier (Type A) Pipework is required.



2. SITE REMEDIATION AND ENABLING WORKS

2.1. SUMMARY OF REMEDIATION OPTIONS

It is considered that the following combination of remediation technologies provides the most sustainable, viable and economic solutions that will ultimately result in the successful remediation for the site(s):

- ✿ Installation of a suitable **cover system** in all proposed landscaping and public open space to remove any potential for direct exposure to impacted soils.
- ✿ Construction of **appropriate potable water supply** infrastructure using PE Barrier (Type A) Pipe.
- ✿ Installation of a **vapour membrane (to the lift pit)** and **CS2 ground gas protection measures** to the wider footprint (overlying the subfloor void space).

2.2. OVERVIEW OF WORK

Prior to the commencement of works on-site, the contractor must establish all necessary plant, equipment, and site welfare facilities as is necessary to complete the contract within the agreed timescales to the rationale as outlined in the following subsections.

For the avoidance of any doubt, the proposed operations as set out herein document the required performance objectives and validation sampling protocols; however, the specific methods of work deployed to ensure the remediation objectives are achieved in a compliant manner on-site will be the responsibility of the appointed contractor.

RE-1 – SITE CLEARANCE OPERATIONS

General site clearance and provision of welfare, offices and site security are to be determined as per the contract requirements.

The external areas of the site are largely capped by hardstanding with potential below-ground structures present beneath former structures. These features will require removal.

Vegetation material should be removed in a controlled manner with full compliance with any ecological mitigation measures that are required for the works. Any such measures are outside the scope of this report.

All vegetation should either be stockpiled at a pre-agreed location or alternatively removed from site in accordance with waste permitting regulations.

All root networks are to be removed from beneath the building footprint.



RE-2 – RETENTION OF IDENTIFIED NON-VOLATILE PAH & HEAVY METAL IMPACT

Elevated levels of non-volatile PAH and heavy metals have been identified at a number of locations within the Made Ground and it can be reasonably assumed further exceedances may be present within the wider Made Ground soils.

The identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion, soil ingestion and consumption of homegrown produce.

The elevated concentrations are associated with Made Ground deposits at depths of between 0.80m and 1.80m bgl.

These exceedances can be mitigated by the installation of a 300mm chemically suitable cover system within areas of soft landscaping or placement under hardstanding or the building footprint.

RE-3 – DELINEATION, EXCAVATION AND TREATMENT OF IDENTIFIED ASBESTOS IMPACT

No asbestos was recorded within the Made Ground at the site. However, the presence of asbestos within the subsurface cannot be entirely discounted.

The E3P Developed Conceptual Site Model demonstrates a suitable method for management of soils to negate any future risk.

The contractor must ensure that all personnel working on site are trained in the identification of ACM and the risks associated with impacted soils.

Where any visual evidence of ACM is identified, these materials should be carefully segregated and removed from the soil matrices (if/where possible).

Validation sampling of the processed Made Ground should be completed to demonstrate compliance with the developed conceptual site model.

This process should be completed under strict controls to be devised and employed by the nominated contractor to ensure no potential for fibre release into ambient air.

If necessary, reassurance air testing in accordance with the requirements of HSG248 should be completed during the operation to move the soils to demonstrate the deployment of the required control procedures and safe working methods.



RE-4 – EXCAVATION, BREAKING AND PROCESSING OF ALL ABOVE- AND BELOW-GROUND STRUCTURES

Obstructions, relict foundations, and infrastructure (apart from live services) are to be removed from the areas of proposed development, including where no foundations and infrastructure is proposed.

It will be the contractors responsibility to remove all obstructions from the sites.

Obstructions encountered within the near-surface soils will be chased to their full depth and removed; if not possible, the obstruction must be surveyed with the location communicated to E3P, the client and the developer.

Where natural soils are present at a relatively shallow depth, extreme care should be taken to ensure that the natural cohesive deposits remain undisturbed with a full reduced-level survey to be completed to map the depth of filled/processed material.

RE-5 – PREPARATION OF LANDSCAPED AREAS FOR COVER SYSTEM

As part of the land remediation works, landscaped areas will be prepared in a manner that will facilitate the placement of the clean cover system during the development phase of the works. The preparation of the areas requiring clean cover is critical in ensuring delivery of the site in a manner that will ensure no risk to the proposed end users.

Where Made Ground is deemed unsuitable for retention in a landscaped area, the area will be subject to a reduced-level dig to remove unsuitable material to a minimum depth of 300 mm below finished landscaped area level or verified natural stratum (whichever is the shallower).

Excavated soil will be stockpiled pending the results of the appropriate validation testing (to be completed in accordance with this specification) prior to reuse in an area of no sensitivity or, where necessary, this material will be removed from site in accordance with UK waste management legislation.

The placement of certified subsoil and topsoil will be completed as part of the developer works/build-phase mitigation plan. All landscaped areas where a cover system is required will be subject to independent validation.



RE-6 – PROVISION OF SUBSOIL

The natural drift deposits (predominantly cohesive soils) present underlying the site are considered chemically suitable for use as subsoils within the clean cover system, however these soils are at such a depth (typically >1.00m) that it would not likely be economically viable to recover for re-use.

Subsoil will therefore need to be imported and will require testing in line with the schedule present within Section 6.1 and Table 6.1.

The landscaped areas will require depth validation to satisfy the requirement of the Council of Mortgage Lenders (CML) in order to demonstrate that the appropriate thickness has been provided as a growing medium.

RE-7 – PROVISION OF TOPSOIL

No material that would be deemed suitable for use as topsoil is present, and as such, there will be a requirement to import suitable material for use within the proposed development.

Topsoil will require testing in line with the schedule present within Section 6.1 and Table 6.1.

The landscaped areas will require depth validation to satisfy the requirements of the CML in order to demonstrate that the appropriate thickness has been provided as a growing medium.

RE-8 – INDEPENDENT VALIDATION: WATCHING BRIEF

Given the site history and potential contamination sources identified within the ICSM, a degree of uncertainty remains with regard to the potential for as yet unidentified contamination impact within the near-surface soils and groundwater beneath the building footprint.

It will therefore be necessary that the on-site contractor notifies E3P if any previously unidentified contamination is encountered.



RE-9 – WASTE SOILS SURPLUS TO REQUIREMENTS

In the event that a surplus of excavation material is present on-site, this, in most cases, will be deemed to be a waste in accordance with the Waste Framework Directive (Article 3(1) Waste Framework Directive 2008/98/EE). The waste producer – but ultimately, the landowner – is responsible for the compliant disposal of such materials.

A formal waste classification assessment must be undertaken, irrespective of any future options or considerations for those materials that will be removed from site. Waste classification should only be made following the Environment Agency *Technical Guidance WM3 – Guidance on the Classification and Assessment of Waste*.

To remove the surplus material from site it will either need to be sent to a disposal site (landfill), to a permitted treatment facility or, dependent on the waste classification assessment, it may be suitable for use on a permitted land improvement or restoration operation.

Subject to suitability, these soils can be transferred to the receiving site, subject to an approved permit or materials management plan following guidance in the CL:AIRE *Definition of Waste: Code of Practice*.

RE-10 – REMEDIAL VERIFICATION REPORT

The collation of information relating to site clearance, chemical testing, remedial works, remedial verification, material movements and waste transfer documentation is required, where appropriate.

Complete remedial validation i.e. the retention and clean capping on PAH impacted materials is to be reported in line with regulatory guidance.

The report will be submitted to the Local Authority for approval following completion.

2.3. VALIDATION SAMPLING PROTOCOL

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be subject to movement under the protocols outlined within this remediation and enabling works strategy, or for materials to be imported onto site to facilitate the proposed residential development.

Soil samples destined for chemical analysis will be collected at regular intervals in appropriate sampling containers. All samples will subsequently be stored in cooled boxes prior to submission to a UKAS/MCERTS accredited laboratory.

All samples will be collected using appropriate personal protective equipment (PPE) and sampling equipment, which will be cleaned at each sampling location.

A detailed copy of E3P Ltd sampling methodology, QA procedures and laboratory chain of custody forms will be documented within the site records and presented with the final validation report for the site.



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Where material is found to contain concentrations of potential contaminants at levels in excess of the site-specific screening criteria (as detailed within the enclosed appendices), E3P will undertake further assessment and recommendations on the appropriate use for the material in question, which may involve the disposal of such materials off-site to a suitable waste management facility.

The sampling frequency for materials to be managed under the remediation strategy is presented within Table 2.1.

TABLE 2.1 SPECIFICATION OF CHEMICAL VALIDATION LABORATORY ANALYSIS

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Site-Generated		
Site-Generated 6F2	1 Sample per 1000 m ³	A/B/C/D
Site-Won Made Ground General Backfill	1 Sample per 250 m ³ where visual and/or olfactory impact is identified	G
Site-Won Made Ground General Backfill	1 Sample per 1000 m ³	A/B/C/D
Site-Won Made Ground General Backfill	1 Sample per 2000 m ³	I
Site-Won Natural Backfill	1 Sample per 2000 m ³	A/B/C/D
Site-Generated Subsoil	1 Sample per 250 m ³	A/B/C/D
Hotspot Validation Samples	1 Sample per 10 m of linear excavation to base and sidewall	E/G
Imported		
6F2	1 Sample per 1000 m ³	A/B/C/D
Subsoil Greenfield Source	1 Sample per 200 m ³	A/B/C/D
Subsoil Brownfield Source	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source	1 Sample per 50 m ³	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m ³	A/B/C/D

Notes

Suites of Analysis:

- A. Speciated PAH.
- B. Speciated TPH (C5-C35).
- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.
- E. Speciated PAH, Banded TPH and VOCs.
- F. SVOC/Speciated TPH.
- G. On-Site Screening for VOC Using Calibrated PID.
- H. Leachate 2:1 Speciated PAH and Banded TPH.
- I. Leachate Analysis of Inorganic Heavy Metals, TPH, Sulphate and PAH.

All analysis prescribed above to be completed by UKAS-accredited laboratory.



2.4. REMEDIATION CONTRACTORS SITE MANAGEMENT AND RESPONSIBILITY

The appointed remediation contractor will take full and overarching responsibility for all methods of work required to complete the site remediation and enabling operations to ensure the delivery of the site and the completion of the objectives in a safe, legislatively compliant manner that ensures no pollution to the subject site or the wider environs.

For individual remediation operations as set out within this performance specification, the contractor will provide site-specific methods of work for individual operations pertaining to the removal and treatment of contaminated liquids and soils. For each and every operation as set out herein, the contractor will provide a written methodology of works to be supplied to the supervising geo-environmental engineer prior to the instigation of operations on-site.

The site manager will be responsible for documentation of each day's activities with a full recorded schedule of works completed and corresponding site-specific method statements that have been utilised to ensure the completion of the task to the required standard.



3. ENVIRONMENTAL MONITORING AND VALIDATION

3.1. SITE MANAGEMENT

The tracking of materials will be based on the following hierarchy:

- ✿ The principal contractor will have the responsibility for setting out areas of the site on the basis of the contract specification.
- ✿ Operatives will have instructions only to excavate and to emplace materials in specified areas as assigned by the site manager/foreman.
- ✿ The site manager (employed by the principal contractor) will issue daily instructions to drivers regarding the placement of materials sourced from specific stockpiles or areas, ensuring that appropriate documentary evidence is collected that details which materials are going where and why.
- ✿ An E3P consultant, who will be in attendance as required, will:
 - Inspect the excavation areas and certify that the correct materials are being excavated;
 - Conduct spot checks on loaded vehicles to ensure compliance with this remediation strategy; and,
 - Ensure that any loads that fail visual, olfactory or spot checks either remain on the vehicle or, if unloaded, are excavated and set aside. This material will be treated according to the recommendations of the E3P site engineer.
- ✿ E3P will conduct an audit of waste consignment notes. All material imported and removed from site will have duty of care/consignment notes, copies of which will be retained on-site by the site manager.
- ✿ Materials directly reusable will be incorporated into the earthworks, subject to operational conditions and phasing of excavations, in which case they will be stockpiled prior to final placement.

3.2. COMPLETION

Following the completion of the remediation works, a report will be compiled by the nominated environmental consultant detailing all site enabling works undertaken, waste consignment notes, and all site investigations, laboratory test certificates and validation testing undertaken.

A certificate of completion of earthworks should be included within the report which should then be issued to the local authority for their approval.

E3P considers that with the adoption of the above best practices the site can be safely redeveloped. The site enabling works process and presence of any residual contamination (if this is the case) should be recorded for future reference by landowners/occupiers. Future development at the site where this may result in penetration of new areas of hardstanding should be subject to no-less-stringent measures with respect to assessment and, where appropriate, monitoring, than those set out herein.



3.3. MITIGATION OF RISK FROM SOILS WITH ASBESTOS FIBRES

No asbestos has been recorded within the chemical analysis completed to date, however the presence of asbestos within the Made Ground cannot be entirely discounted.

As such, the below measures are advised as a precautionary mitigation.

3.3.1. PRE-COMMENCEMENT WORKS

Prior to the commencement of works the following requirements must be satisfied:

- ☒ Induction of all people that will be involved with the proposed site works; and
- ☒ All methodologies must be agreed upon by all parties involved.

3.3.2. CONTROL, MONITORING AND REPORTING OF GENERAL AERIAL EMISSIONS FROM DUSTS AND PARTICULATES

DAMPING DOWN OF SOILS – MITIGATE PARTICULATE (DUST) EMISSION

During excavation, as outlined within the detailed working methodologies, soils will be regularly damped down using water to control the generation of dust (this may also comprise precipitation). The contractor will determine the best form of dust suppression to be used when a detailed programme has been issued.

If any previously unidentified asbestos-containing materials are identified, these should be dealt with in strict accordance with the *Control of Asbestos Regulations* (2012) and industry best practice as detailed in CIRIA 733.

GENERAL CONTROL OF DUST

The following control measures should be utilised to ensure that dust levels are kept to a minimum at all times:

- ☒ Where necessary, haul road, work areas and stockpiles will be damped down with water spray.
- ☒ The application of water to haul roads, work areas and stockpiles should be closely monitored by the resident engineer to ensure that soils are not saturated and, therefore, that the potential for water run-off is appropriately mitigated.
- ☒ Once completed, any stockpiles will be sealed by compacting at the surface.
- ☒ Vehicle speeds and movements on-site will be kept to a minimum (< 5 mph) during civil excavation works to reduce the potential to generate dust.



PERSONAL PROTECTIVE EQUIPMENT (PPE)

In accordance with the HSE *Guidance Note em6: Asbestos Essentials, Personal protective equipment (including RPE)*, E3P recommend that all site operatives present within the work area where potential asbestos-impacted soils are being excavated are supplied with the following personal protective equipment:

Overalls:

- ✿ Disposable overalls.
 - Type 5 (BS EN ISO 13982-1) are suitable.
 - Cotton overalls hold dust and need specialist laundering.
- ✿ Waterproof overalls for outdoor work.
- ✿ Use oversized overalls - this will help to prevent ripping at the seams.
- ✿ If the cuffs are loose, seal them with tape.
- ✿ Avoid wearing a long-sleeved shirt as these are difficult to cover properly.
- ✿ Wear the overall legs over footwear as tucking them in lets dust into footwear.
- ✿ Wear the hood over the RPE straps.

Failure to utilise and correctly employ PPE will result in immediate cessation of works. Works will not be permitted to recommence until the individual has undergone further training in the use of PPE or the individual is removed from the works area.

At this current time, with the levels of ACM identified within the soils, the above-listed PPE is not considered to be required for all site personnel during the entire management of these soils.

When handling asbestos-impacted soils during the enabling works, asbestos monitoring works should be conducted in accordance with, but not limited to, the following HSE legislation and guidance:

- ✿ *Health & Safety at Work Act 1974;*
- ✿ *The Control of Asbestos Regulations 2012;*
- ✿ CL:AIRE, 2016. *Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance;*
- ✿ *Approved Code of Practice L143 Work with materials containing asbestos;*
- ✿ *Management of Health and Safety at Work Regulations 1999;*
- ✿ *HSE Guidance Note HSG248 Asbestos, the analysts guide to sampling and analysis;*
- ✿ *HSE Guidance Note HSG247 Asbestos: The licensed contractors' guide;* and
- ✿ *CIRIA 733 Asbestos in soil and made ground: a guide to understanding and managing risks.*



If required, air monitoring in accordance with HSG248 will be undertaken intermittently throughout the duration of the works at a frequency to be determined by the contractor, entirely dependent on whether asbestos-impacted soils are being handled at any given time. In general terms, during any one monitoring period, ten standard monitoring pumps will be run throughout the day, for the appropriate time period to achieve the required limit of detection. These slides will be analysed immediately by the on-site UKAS-accredited laboratory.

Once any monitoring has been analysed by the on-site UKAS-accredited laboratory, the results will be delivered to the resident engineer who will then follow the correct site procedure. The results will then be included within the verification report.

4. RECORD-KEEPING AND VERIFICATION

4.1. RECORD-KEEPING

During the course of the remediation and site enabling works, the Site Manager and E3P consultant will undertake the following record-keeping protocols:

-  Detailed daily site diary including material movements;
-  Sampling register, testing results, photographs, details of locations of impacted soils (drawings), details of any hotspot removals, details of consignment notes of any impacted material that is required to be disposed of off-site; and
-  Detailed surveys (volumes).

Record-keeping on-site, in particular movements and analysis of specific material types, will be in the form of site diaries and a remediation excavation record.

This record will remain on-site and will be completed by the Site Manager (and E3P on-site engineer) during the course of the remediation and site enabling works.



4.2. VERIFICATION

The records listed above will then be compiled into a validation report produced by E3P on completion of the remediation and site enabling works, clearly referencing the origin of the materials used and testing carried out to confirm its suitability for use, where required.

The validation report may also include the following:

-  Remediation strategy (including copies of confirmation from regulatory authorities agreeing criteria);
-  Detailed surveys of all excavations and production of as-built drawings for the earthworks;
-  Copy of consignment notes relating to the movement of wastes to a licensed waste management facility;
-  Detailed drawings showing all sampling locations for both chemical and geotechnical testing;
-  Chemical test results (of in-situ soils or imported soils);
-  Geotechnical test results (if any required);
-  Details of qualified persons signed declaration; and
-  Monitoring results if undertaken (e.g., asbestos in air, gas water).

5. CONTINGENCY PLAN

5.1. PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Should significantly impacted material be encountered during the development, then it will be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

Once the laboratory analysis of the material is available, an assessment will be undertaken to determine whether it can be retained on-site as part of the material management plan or whether it should be disposed of off-site.

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.



6. SECOND PHASE MITIGATION AND MANAGEMENT – BUILD PHASE

This document details the construction works that are required to ensure full compliance with the remediation Strategy, Regulatory Authorities, Building Control & Warranty Providers;

The following should be implemented during the build phase of the development:

- ✚ Laboratory testing of the imported topsoil and subsoil;
- ✚ Placement and validation of imported subsoil and topsoil (clean material) in a 300 mm layer within any landscaping areas overlying a geotextile membrane;
- ✚ Installation of suitable vapour and ground gas protection measures; and
- ✚ Installation and validation of potable water supply infrastructure that will be compliant with United Kingdom Water Infrastructure Risk (UKWIR) assessment criteria

The validation protocols are presented within the E3P Remediation and Enabling Works Strategy and are presented below.

6.1. PLACEMENT OF COVER SYSTEM

The remedial requirements with respect to human health of the future site users includes the provision of a chemically suitable clean material to be installed in all landscaped areas; the construction of the clean cover / placement of clean material shall consist of:

- ✚ 150 mm subsoil;
- ✚ 150 mm topsoil (or 300mm topsoil if preferred); and
- ✚ Geotextile membrane (to prevent cross contamination).

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be imported to confirm the proposed development will pose no unacceptable risk to human health or the wider environ.

Subsoil and topsoil shall be free of any deleterious materials, such as buildings materials, timber, plastics etc and conform to the requirements of BS 3882:2007.

Testing requirements for topsoil and subsoil are presented in Table 6.1.



TABLE 6.1 SPECIFICATION FOR SOIL TESTING

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Subsoil Greenfield Source (150 mm Landscaping Cover)	1 Sample per 200 m ³	A/B/C/D
Subsoil Brownfield Source (150 mm Landscaping Cover)	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source (150 mm Landscaping Cover)	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source (150 mm Landscaping Cover)	1 Sample per 50 m ³	A/B/C/D

Notes

Suites of Analysis:

- A. Speciated PAH.
- B. Speciated TPH (C5-C35).
- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.

6.1.1. PROCEDURE FOR PLACEMENT OF CHEMICALLY SUITABLE COVER SYSTEM

Made Ground soils are to be stripped from beneath proposed areas of landscaping to a minimum of 300 mm bgl.

A geotextile membrane should form the base of the cover system installation, to prevent the mixing of Made Ground and placed cover system soils.

Landscaped areas need to be backfilled with 150 mm chemically validated subsoil, with 150 mm topsoil overlaying this. These soils are required to be confirmed as chemically suitable prior to placement.

There should be a minimum of three samples from any one source.

Details of the source of the topsoil and subsoil will be provided by the earthworks contractor appointed to install the cover system as part of the build phase.

The placement of 300mm of clean material will be undertaken during the build phase works of the project, following construction of the apartment building.

The placement of subsoil and topsoil and corresponding validation will be documented within the Landscaping Validation Letters (to be issued on completion of the contractor's works).

If natural drift deposits are encountered within the 300 mm strip, then excavations can cease here.

E3P will collect photographic evidence of the placement of 150 mm of certified topsoil and 150 mm of subsoil on completion of construction works. This element will also be checked by the Building Control Officer as part of the site completion prior to issuing of a CML certificate.

The landscaping validation procedure is detailed in Table 6.2 overleaf.



TABLE 6.2 LANDSCAPING VALIDATION PROCEDURE

PROCEDURE	METHOD
Chemical Validation	Imported topsoil (and subsoil) will need to be chemically analysed to confirm suitability for use with the proposed cover system prior to installation and completion of the landscaping systems. E3P will issue an email to the appropriate party with an assessment of the chemical suitability of the topsoil. If acceptable the materials can be installed to the required depth at which time the landscaping areas will be deemed complete following a validation procedure by a suitability qualified E3P engineer.
Trial Holes	Trial holes are deemed necessary for all landscaping areas given that the 300mm cover system will need to be placed on each landscaping area during the build phase.
Validation	Photographic evidence will be taken by E3P of the topsoil placement demonstrating the depth of topsoil and practical completion of works are required for each and every landscaping area.
Validation Certificate	E3P will issue a validation certificate (for each landscaped parcel) to demonstrate that the required topsoil has been placed in the required landscaped areas along with the chemical analysis.

Plate 1 provides an example of validation photographs that will be required for each area of landscaping.



PLATE 1 EXAMPLE COVER SYSTEM VALIDATION

Plot No: 4 (Car Park Landscaping)

Depth of Strata (m bgl)

0.00-0.30

Validated TOPSOIL

Depth of Cover System Materials

Depth of Cover System Materials



Depth of Cover System at Ground Level and in Relation to Unit / Structure



6.2. GROUND GAS & RADON PROTECTION MEASURES

Ground gas monitoring suggests that the site will fall into the bracket for Characteristic Situation 1 based on the recorded GSV values and limited flow rates, however marginal exceedances of 5% were recorded for carbon dioxide on several occasions.

Furthermore, the site is in an area where between 3% and 5% of homes are above the Radon Action Level, therefore basic radon protection measures will need to be incorporated into the apartments.

All sites registered from 1st December 2022 onwards will have been assessed against the updated radon maps by NHBC and will be required to have radon protection measures installed in accordance with the updated mapping.

Based on the 3% - 5% area observed, the site falls under a Radon Potential Class of 3 within the User Guide for the HPA-BGS Joint Radon Potential Dataset for Great Britain (Ref: IR/11/044, dated 2011). A Radon potential class of 3 indicates that basic Radon Measures are required.

Basic radon protection measures are required to be installed as Section 5.1 of BRE211_2015: Radon Guidance on protective measures for new buildings.

Section 5.1 of BRE211_2015 states:

"For basic protection measures, the damp-proof course (DPC) to a cavity wall should be in the form of a cavity tray to prevent radon from entering the building through the cavity. Sealing of joints in the barrier and sealing around service penetrations are also required. It is important that attention is paid to detailing and workmanship in jointing of the barrier.

If good standards of design and workmanship are applied to the provision of a 1200 gauge damp-proof barrier to the floor sealed to a DPC/cavity tray through the walls, adequate protection from radon will be provided along with the general function of excluding moisture."

For all new dwellings constructed after 1st September 2023, in line with changes to the British Board of Agrément (BBA) building standards, plots requiring basic radon measures will require a specialized Radon Membrane, with minimum thickness of 0.4mm thick (1600 gauge) suitably installed and validated.

However, as a precautionary measure the apartment will be installed with a CS2 ground gas protection measures. The Visqueen **Low Permeability Gas Membrane** (Technical Datasheet – Published July 2024) confirmed this product also mitigates against radon ingress.

To date no Foundation Detail Plan or sub-structure designs have been provided which includes the installation detail for the ground gas membrane and microscopic air vents.



6.3. INSTALLATION REQUIREMENTS – VALIDATION REQUIREMENTS

6.3.1. PERSONS RESPONSIBLE FOR VERIFICATION

CIRIA C735 (Section 3.2.2) states that the person validating the membrane must be independent of the installation contractor or material supplier.

It is recognised that under certain circumstances, others may assist the independent third-party verifier, but in such a case, their work must be subject to independent third-party audit.

6.3.2. VERIFICATION ACTIVITY PLAN

TABLE 6.3 LANDSCAPING VALIDATION PROCEDURE

VERIFICATION ACTIVITY	FREQUENCY
Inspection of the sub-floor void dimensions	Three locations across footprint for sub-floor void inspections.
Inspection of telescopic ventilation and air-brick system	
Inspection of membrane construction and installation.	Entire building footprint for ventilation and membrane.

6.3.3. VENTILATED SUB-FLOOR VOID

Photographic evidence will be collected to demonstrate that, as a minimum a 250mm clear void is present beneath the suspended floor slab with interconnecting ventilation to the periphery constructed in accordance with the structural engineers' design.

Inspection of sub-floor voids will be completed on an intermittent basis at three locations as and where possible to demonstrate a high degree of general compliance .

6.3.4. MEMBRANE STORAGE AND PREPARATION

The gas membrane should be stored horizontally, undercover in its original packaging.

The gas membrane is to 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.

When installing the membrane in demanding site conditions, use specialist measures to enhance construction and, specifically, the jointing of membranes.



6.3.5. INSTALLATION GENERAL PRINCIPLES

The approved installation contractor will provide all necessary information pertaining to the installation process, as detailed in the earlier sections of this verification strategy.

- ✿ The membrane will be loosely laid on the substrate with the correct side up to avoid direct sunlight.
- ✿ The membrane will be clean and dry at the time of joining.
- ✿ It should be overlapped by at least 150 mm, bonded with the appropriate jointing tape and sealed to the manufacturer's specification.
- ✿ Alternatively, lap joints can be heat welded to achieve an effective seal.
- ✿ The overlap in the barrier is typically 100 mm, and when hand welding, a 35 mm weld is normally achieved.
- ✿ When hand welding, a roller must be used.
- ✿ Airtight seals should be formed around all service entry points.
- ✿ Pre-formed 'Top Hat Units' are recommended for sealing service entry pipes.
- ✿ The base of the top hat and the upstand should be bonded using specialist jointing tape and sealed.
- ✿ Forming an effective barrier to radon gases may give rise to complex three-dimensional detailing where it is recommended that pre-formed units are used, e.g. corners. Alternatively, specialist detailing strips can be used to seal difficult junctions.
- ✿ If the barrier is punctured or perforated, a patch of the same material should be lapped at least 150 mm beyond the limits of the puncture and bonded jointing tape and sealed. Alternatively, a patch can be formed using a detailing strip and lapped at least 150 mm beyond the extent 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 50 mm 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 specialist guard protection, screed or other approved protection material before positioning the reinforcement.



6.3.6. SEALING OF SERVICE DUCTING – CONTRACTORS VERIFICATION RESPONSIBILITY

One of the most common preferential pathways for the migration of hazardous radon / ground gasses into a building is through service ducting that creates a conduit for exaggerated radon ingress.

The contractor and developer will be responsible for sealing all service ducts in their entirety with suitable impervious expanding foam to ensure there is no potential for gas migration.

The adequate sealing of service ducting can be checked at any point during construction. Therefore, there is no requirement for independent attendance by a specialist such as E3P to inspect this work.

It is the client's responsibility, working with their appointed contractors to ensure all service ducts are fully sealed prior to the completion of the development.

6.3.7. GAS / RADON MITIGATION MEASURES VALIDATION

The validation of gas mitigations should be completed in line with the items specified in **Error! Reference source not found..4**.

TABLE 6.4 GAS & RADON MITIGATION MEASURES VALIDATION ITEMS

INSPECTION	METHOD
Product Verification	Confirmation that suitable products have been procured for installation to consist of photographs of product types, labels on packaging and delivery tickets.
Passively Ventilated Sub-floor Cavity	A qualified engineer/consultant will be required to attend the site and validate the compliant construction of the sub-structure with a minimum 250 mm sub-floor void. Due to the nature of the construction process and construction using precast suspended segmental floors, it is considered appropriate to check and verify 30% of the structure constructed with the minimum 250 mm sub-floor void.
Wall Cavity Inspection	Confirmation that the gas membrane spans the external wall cavity above the periscopic vents.
General Condition	The membrane is to be inspected to ensure there are no tears, punctures or rips.
Structural reinforcement	Here, structural reinforcement is used over a membrane, which must either be supported by a physical barrier or inspected after placement over a membrane to ensure no damage.
Jointing	The engineer is to check the overlaps between membranes are correctly sealed with sufficient overlaps. The membrane is to be jointed and sealed in accordance with the pre-agreed CQA plan and design requirements.
Service Entry Points	Verification of the presence of pre-formed top hats sealed to the pipe and membrane as per the construction detail.
Remedial Action	Any damage or requirement for remedial action must be recorded and notified in writing. Once repaired, the verifier will undertake the necessary reinspection.
Passive Venting Systems	The engineer should verify the presence of vents at 2 m centres on at least three of the external walls.



CQA / Audit

The verifier must use an ISO approved system to ensure CQA. This will include electronic data capture with time and location stamps to ensure auditability if required.

Examples of gas membrane verification photographs are provided in Figure 2.

It should be noted that these are for illustrative purposes only, as each site will have a site-specific gas membrane specification.

FIGURE 2 EXAMPLE GAS MEMBRANE VERIFICATION



Remediation Strategy Letter

Willow Street, Bury

January 2025

Plot Inspection 3 - 100%		100%					
Plot Number		183					
Type of Development: Other add note		House					
			Condition of sub-grade and underside of gas membrane: Check that the subgrade 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.				
Photo 78			Pass				
Gas Characteristic Situation		CS2					
Foundation Type: Other add note		Suspended Floor					
Gas Membrane Type: Manufacturer, gauge, and colour.		Yellow visqueen brand not stated					
Gas Membrane Condition: Open puptures, tears, rips, stretching, Presence of debris, Repairs, Signs of weakness such as raised or sunken indentations, Protection plan in place to restrict access to lain gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED		Pass	   				
Photo 79			Passive Venting				
Photo 80			Sub-floor Void: Is a check possible on future plots (insert Plot number or NO in text box)				
Photo 81			No				
Photo 82			External Wall Air bricks: Numbers, size, positions as design drawing? (Minimum of 3 walls)				
		Pass	Pass				
Laps, welds, and joints seals: Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap insured? Sections taped twice? Are welds complete? Appropriate joining/double-sided tape used, Folds running in line with joints? (no joints cutting across folds)		Pass	   				
Service entries seals: Top hats seal arrangements fixed around service entries? Use of jubilee clips?		Yes					
     							
     							
 							
Photo 103							
Photo 104							
Type of joints/ Lapping		Taped					
Corners / Internal joints: Check all corners are correctly formed or contractor has used performed corners.		Pass					
     							
    							
Photo 111							
Photo 112							
Photo 113							
Photo 114							
Photo 115							
Extent of Coverage: Is the membrane covering the entire plot? Does membrane span over outside walls?		Yes					



Remediation Strategy Letter

Willow Street, Bury

January 2025

6.4. POTABLE WATER SUPPLY – CONTAMINANT ASSESSMENT CRITERIA

E3P has completed a UK Water Industry Research (UKWIR) Risk Assessment (dated January 2025), which confirmed the site is to be installed with PE Barrier (Type A) pipework for water supply infrastructure.

We trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of E3P Ltd

Alex Smith
Associate Director
(BSc Hons, MSc, FGS)

Enclosed

Appendix I Drawings

17-285-001	Site Location Plan
17-954-005	Exploratory Hole Location Plan
1118-JDA-ZZ-XX-DR-A-0100-P02	Proposed Development Plan
2527-SCE-XX-XX-DR-S-1003-P03	Apartment Block Foundation Details

Appendix II E3P Remediation / Validation Criteria



APPENDIX I

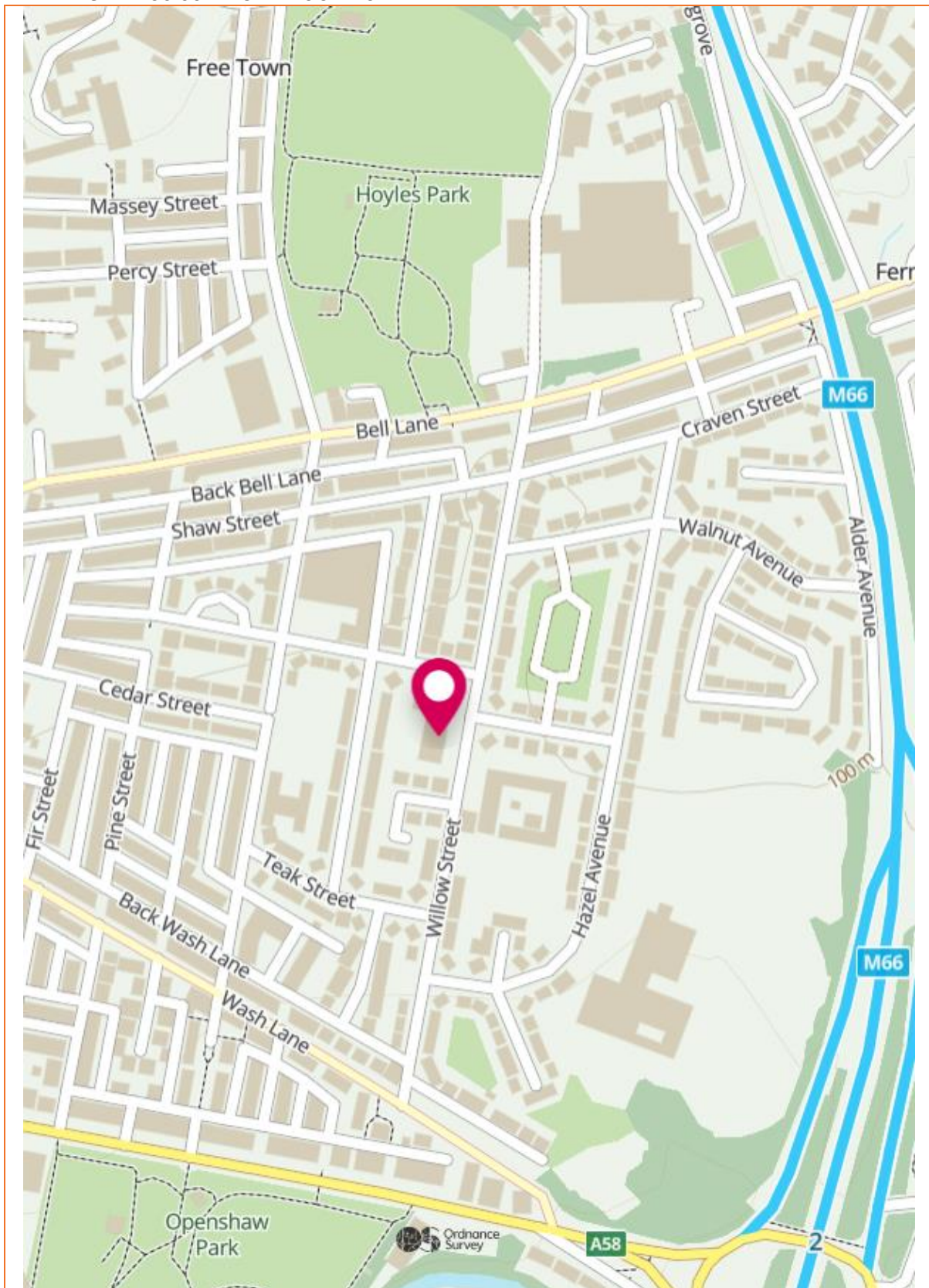
DRAWINGS

Remediation Strategy Letter

Willow Street, Bury

January 2025

DRAWING 17-285-001 – SITE LOCATION PLAN





Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Approximate Window Sample Probehole Location
- Hardstanding
- 6F2

Notes:

P1	REVC	09.01.2025	OW	BW	BW
P1	REVB	21.03.2024	OW	JB	AS
P1	REVA	31.01.2024	CB	AS	AS
Phase	Issue	Date	Drawn	Checked	PM

Client:

Shape Consulting Engineers

Job Title:

Willow Street, Bury

Job No:

17-285

Drawing No:

005

Date:

09.01.2025

Scale:

NTS @ A3

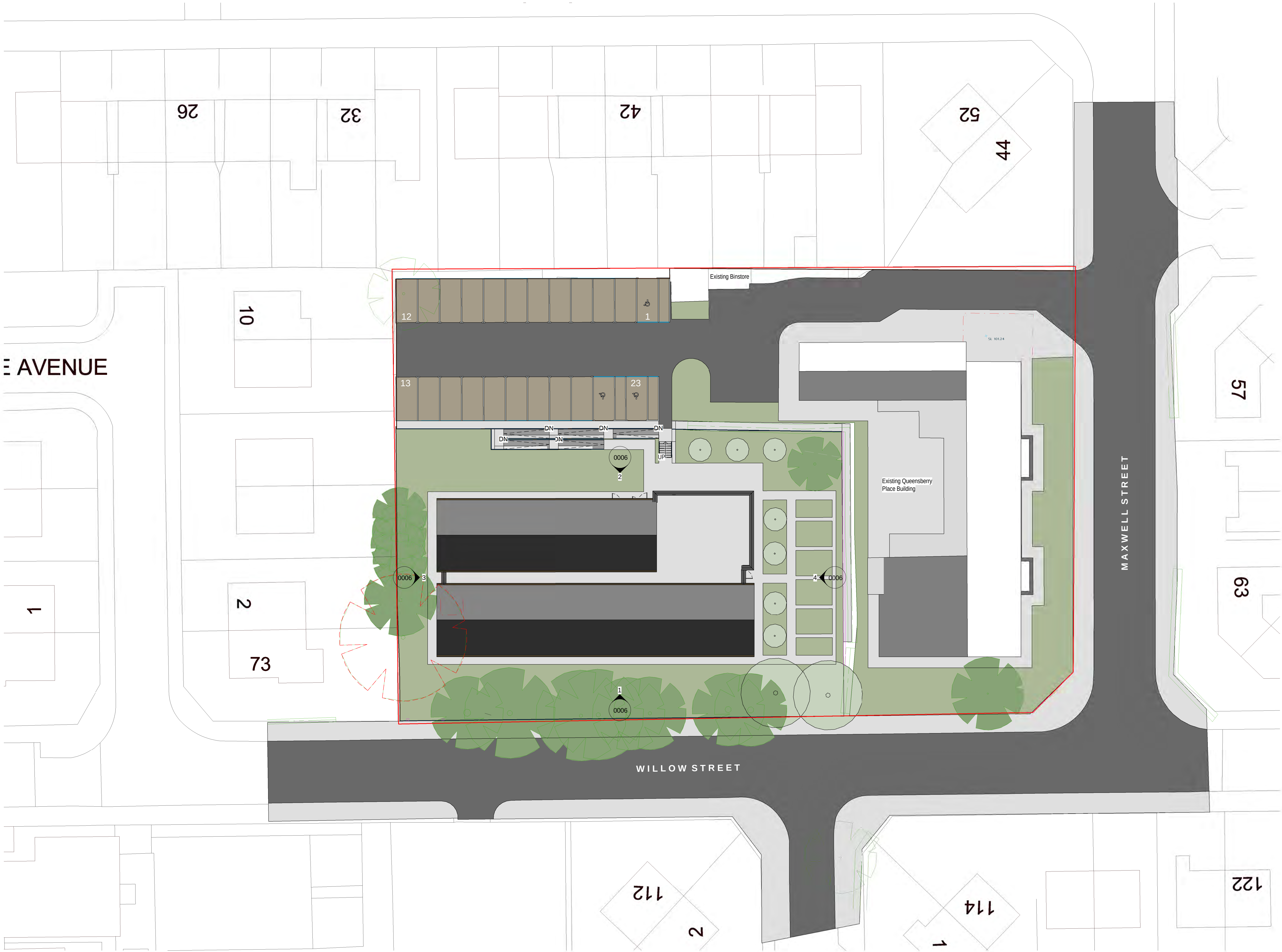
Drawing Title:

Exploratory Hole Location Plan



Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

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E AVENUE

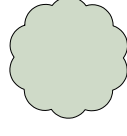
MAXWELL STREET

WILLOW STREET

Notes

Jennings Design Associates take no responsibility for any dimensions obtained by scaling from this drawing. If no dimension is shown the recipient must ascertain the dimension specifically from the Architect or by site measurement. Supplying this drawing in digital form is solely for convenience and no reliance may be placed on digital data. All data must be checked against hard copy. Dimensions must be checked on site. Any discrepancies must be reported to the Architect immediately. This drawing is copyright of Jennings Design Associates

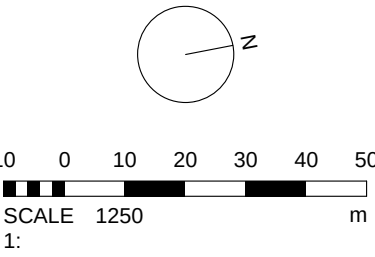
Proposed Tree Amendments

-  Tree to be retained
-  Tree planted as part of the proposal
-  Tree to be removed

Note: See landscaping proposal for full details

Proposed Boundary Treatment Details

-  1100mm Metal Railing
-  1800mm Timber Fence



Rev	Description	Date	By
Revision Schedule			



jda architects

info@jda-architects.com
www.jda-architects.com

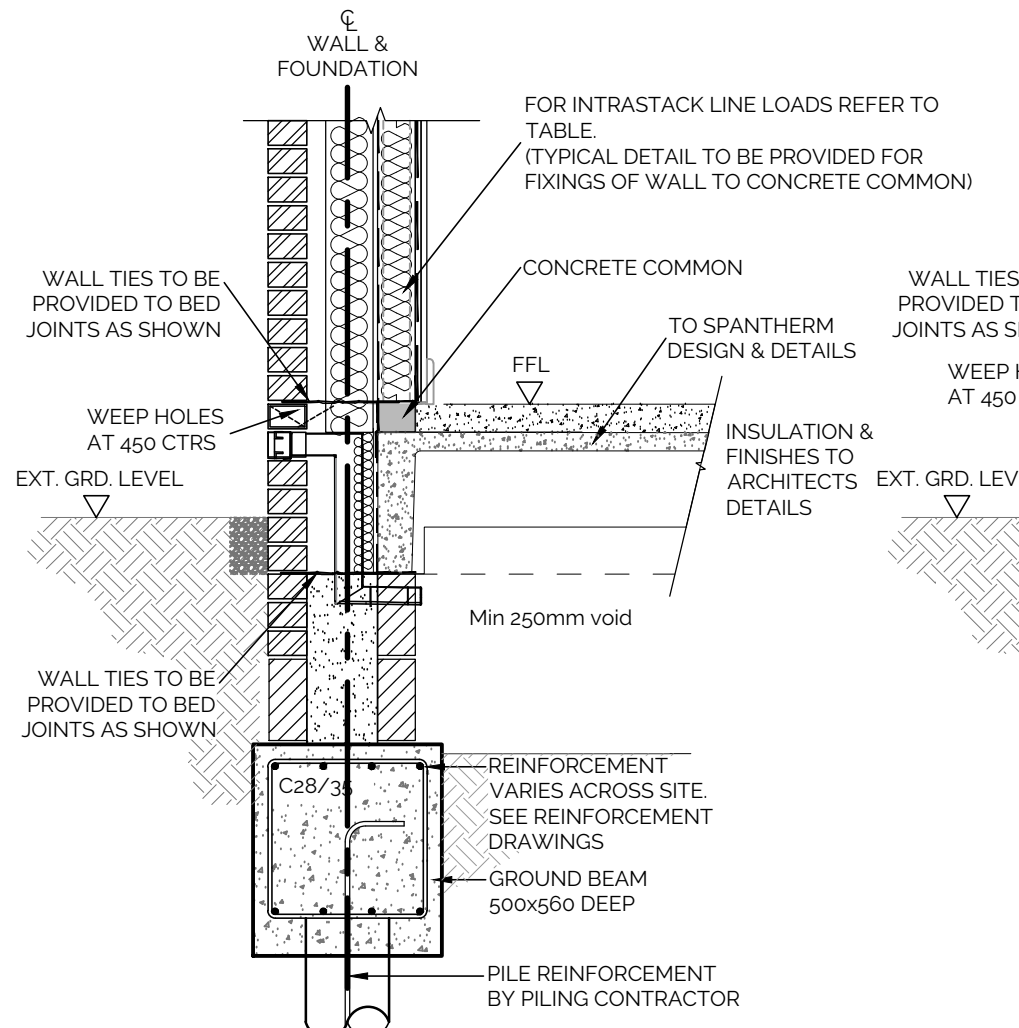
manchester: 0161 336 6011
liverpool: 0151 685 0112

Project Details:		1264 - Willow Street, Bury	
Client:		Irwell Valley	
RIBA Workstage:		Preliminary	
Scale:		1: 200	
@ Original size		@ A1	
Date:		14/09/22	
Drawn by:		SD	
Checked by:		KOR	
Project Code:		1264-JDA-Z1-00-DR-A-0004	
Description:		Proposed Site Plan	

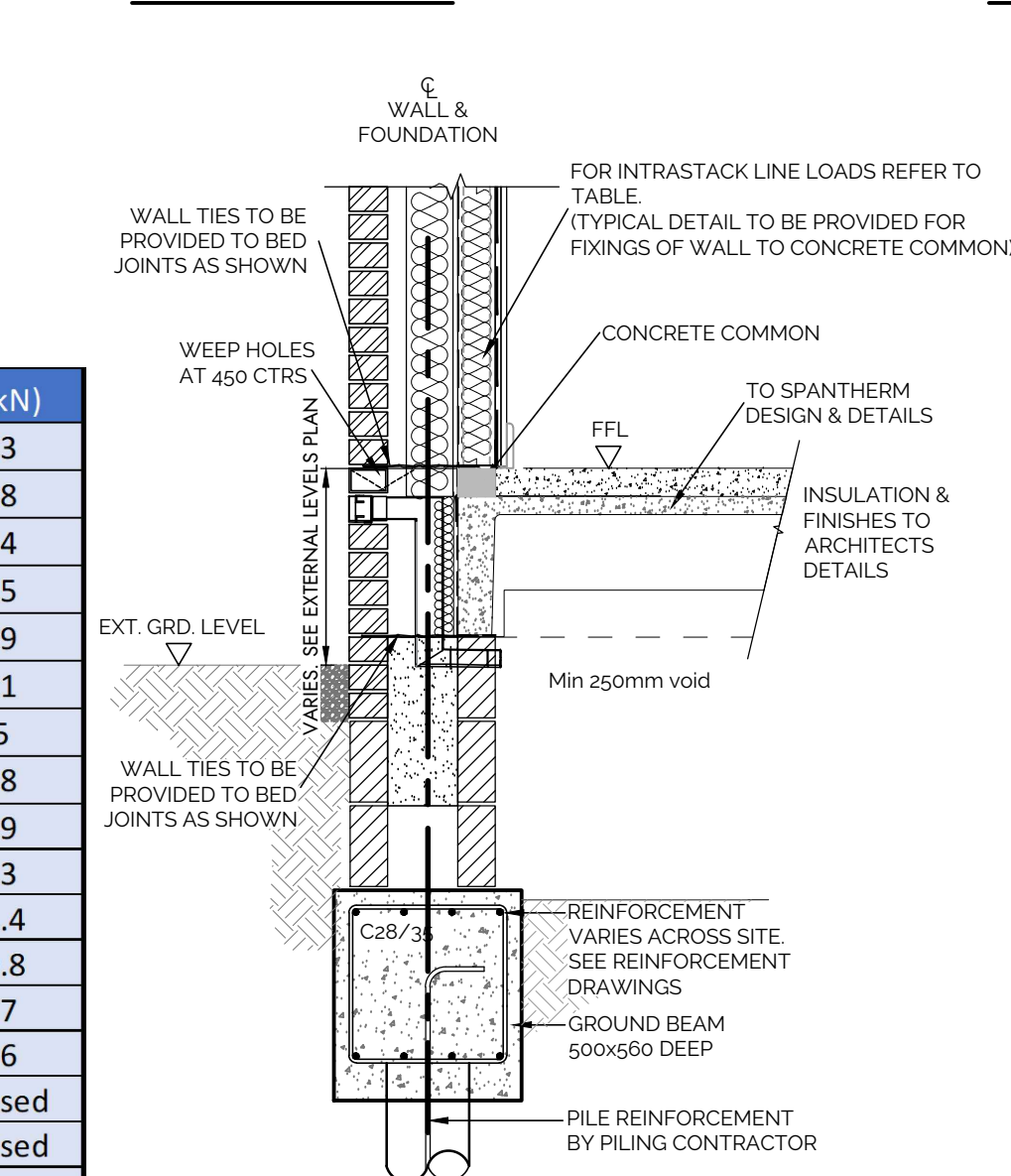
Z:\1264 - Willow Street, Bury\Working\Level\MSA\Site Plan V01 Positioning.dwg

Ref	PL (kN)	VL (kN)	Ult (kN)
C00-01	16.8	3.1	27.3
C00-02	13.9	4.7	25.8
C00-03	1.0	20.0	31.4
C00-04	7.5	3.6	15.5
C00-05	10.0	1.6	15.9
C00-06	14.0	2.1	22.1
C00-07	6.0	0.9	9.5
C00-08	48.3	12.4	83.8
C00-09	48.4	12.4	83.9
C00-10	13.5	1.4	20.3
C00-11	167.0	30.6	271.4
C00-12	123.5	15.4	189.8
C00-13	17.2	2.3	26.7
C00-14	33.2	5.2	52.6
C00-15	not used	not used	not used
C00-16	not used	not used	not used
C00-17	6.8	4.5	15.9
C00-18	27.9	7.1	48.3
C00-19	1.0	2.0	4.4
C00-20	51.0	10.7	84.9
C00-21	9.0	2.1	15.3
C00-22	44.5	12.6	79.0
C00-23	22.5	6.6	40.3
C00-24	51.5	5.4	77.6

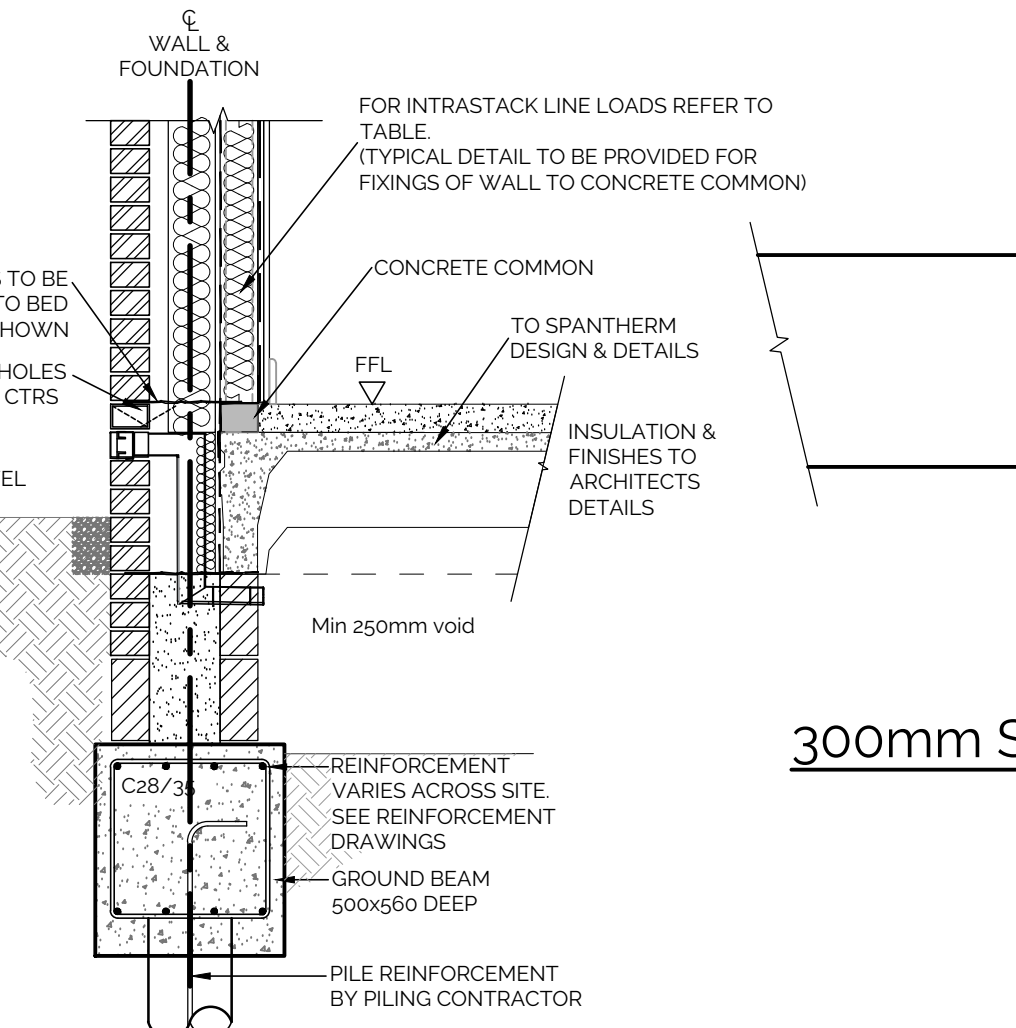
SECTION E-E (SCALE 1:20)
DETAIL TBC. SPANTHERM TO
CONFIRM



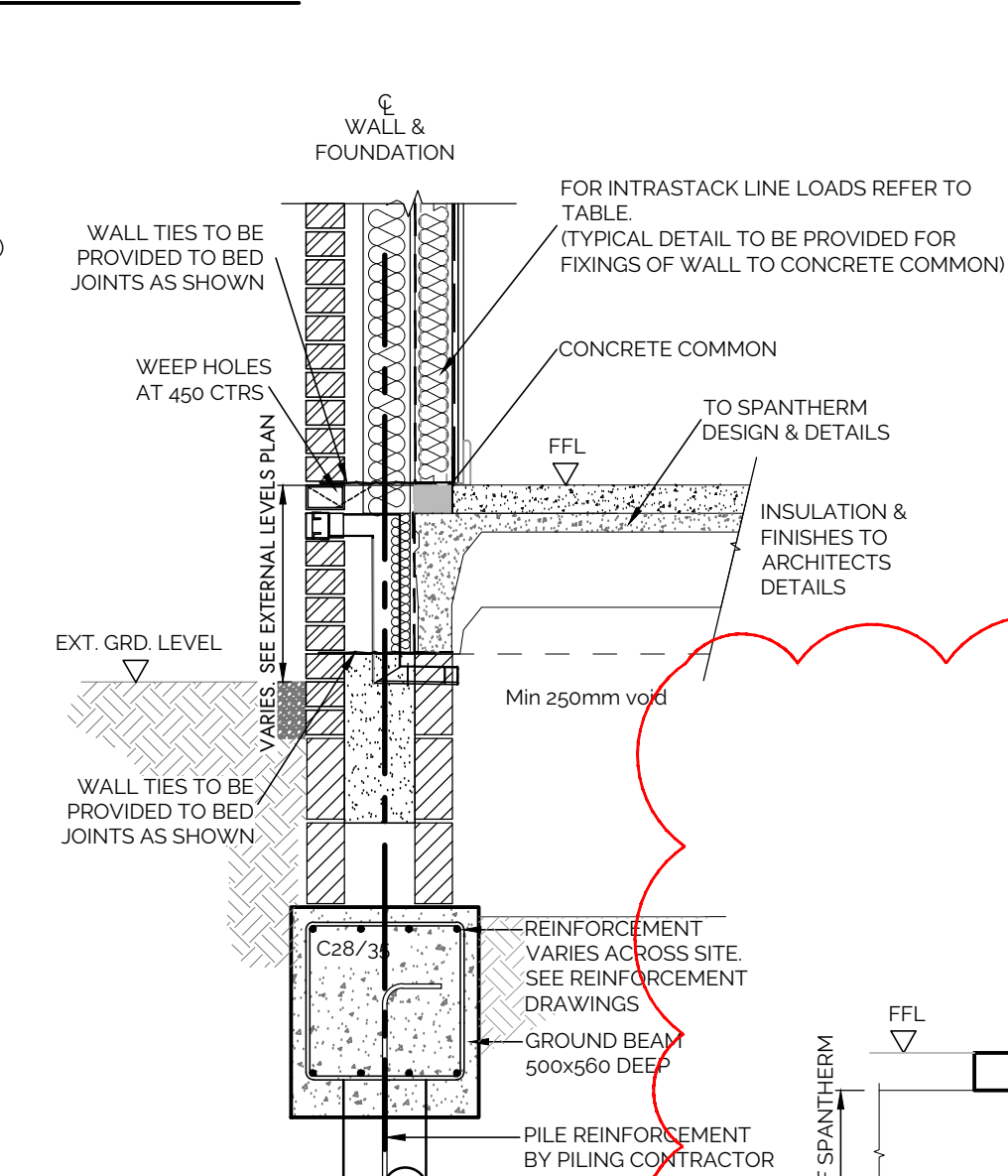
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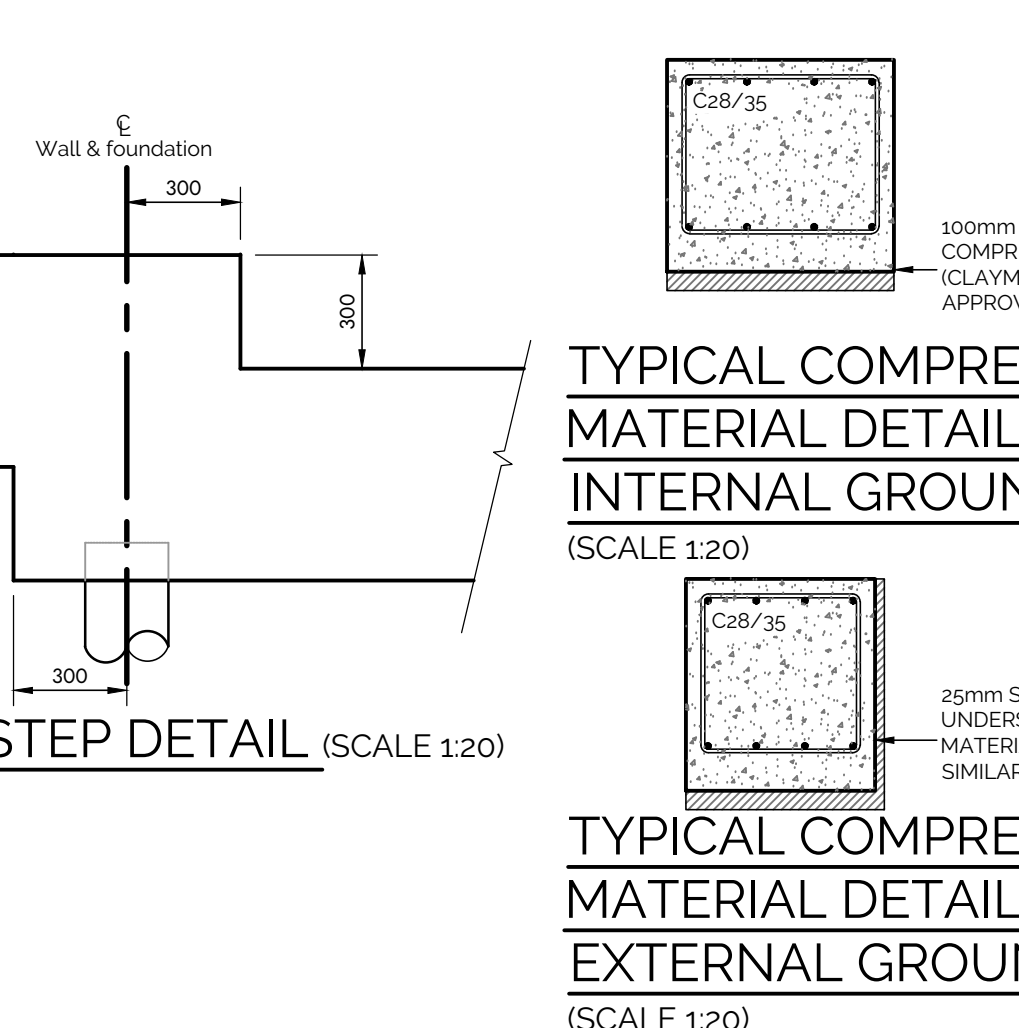
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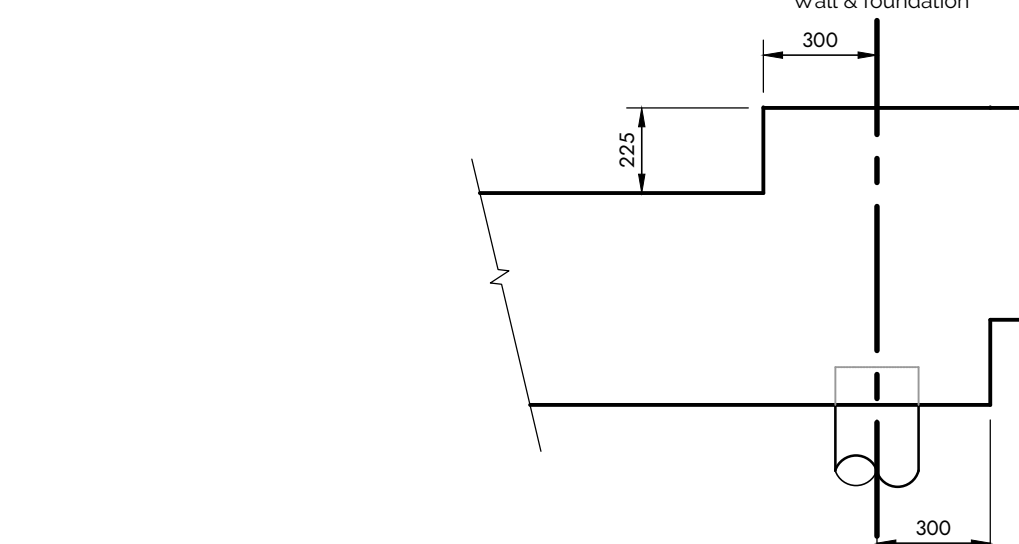
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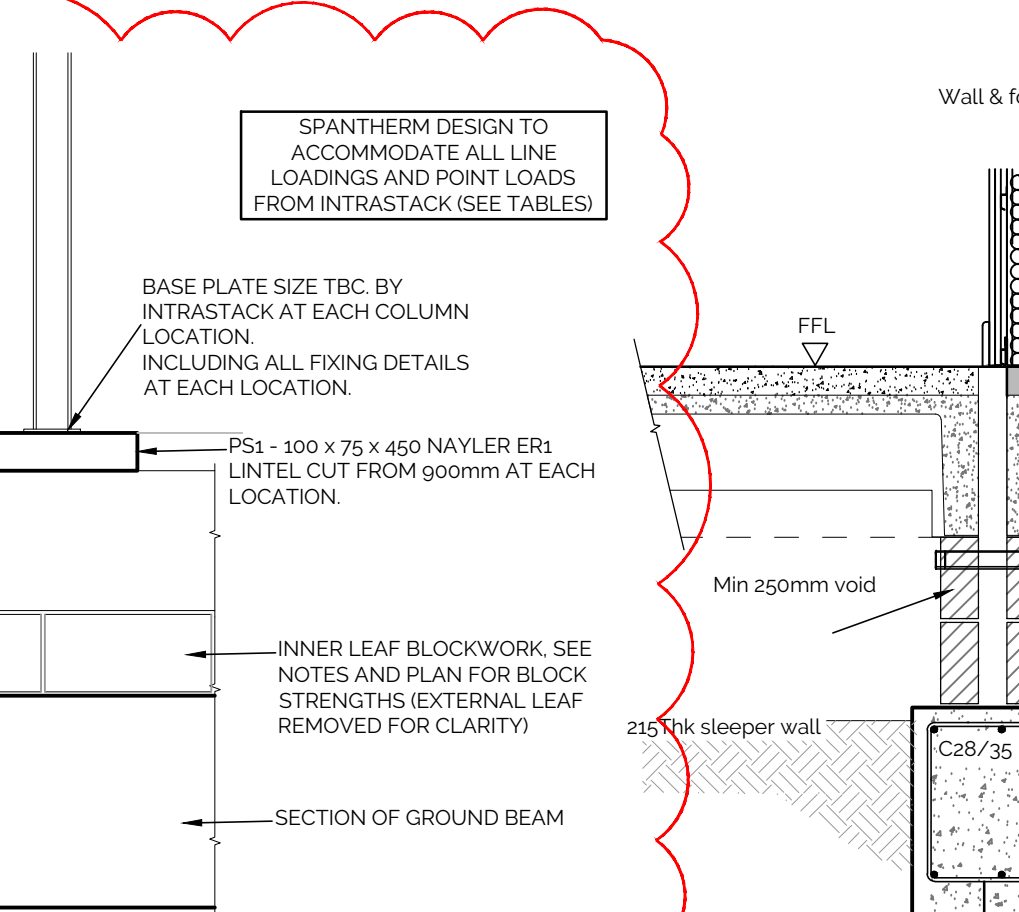
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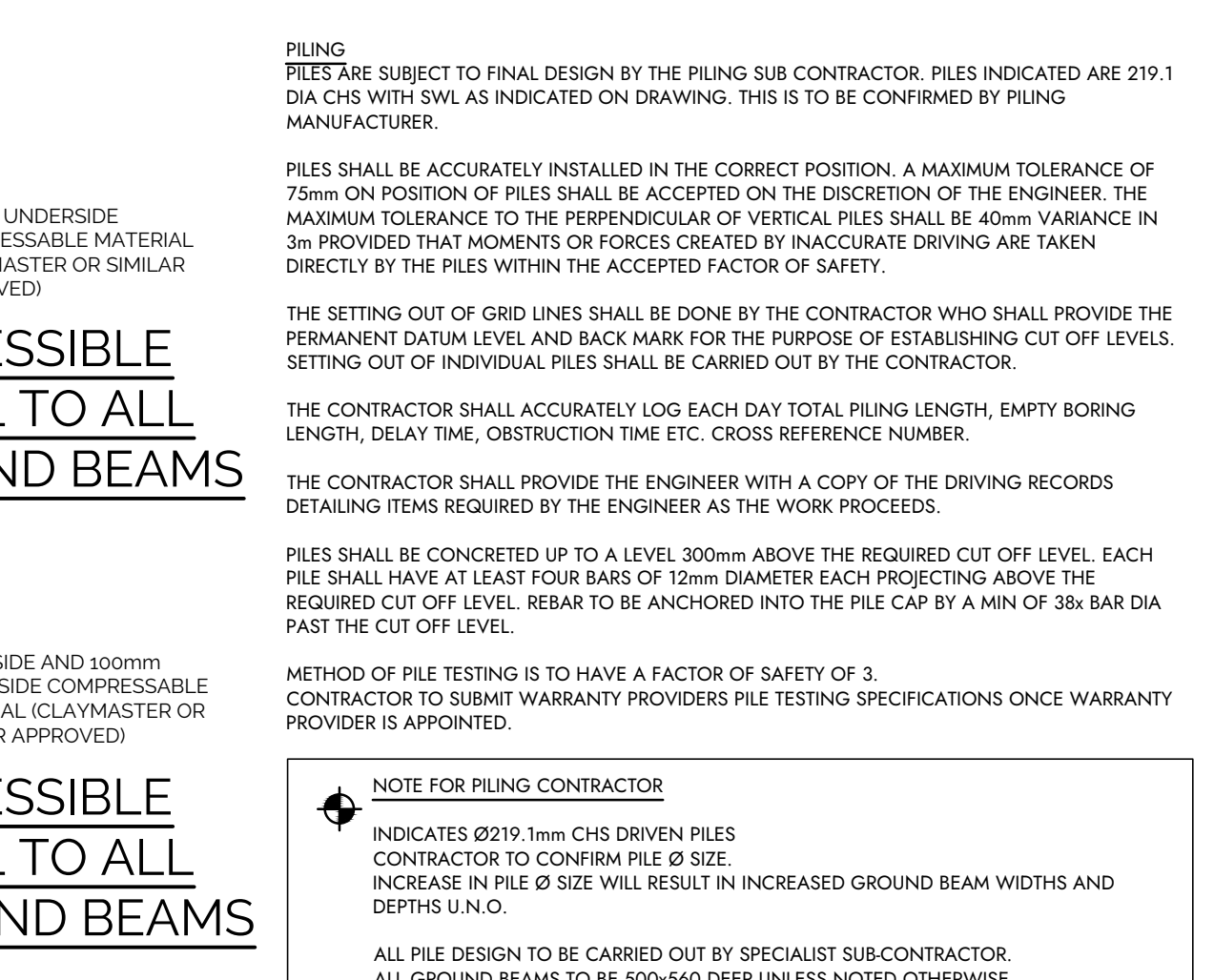
Wall & Foundation



225mm STEP DETAIL

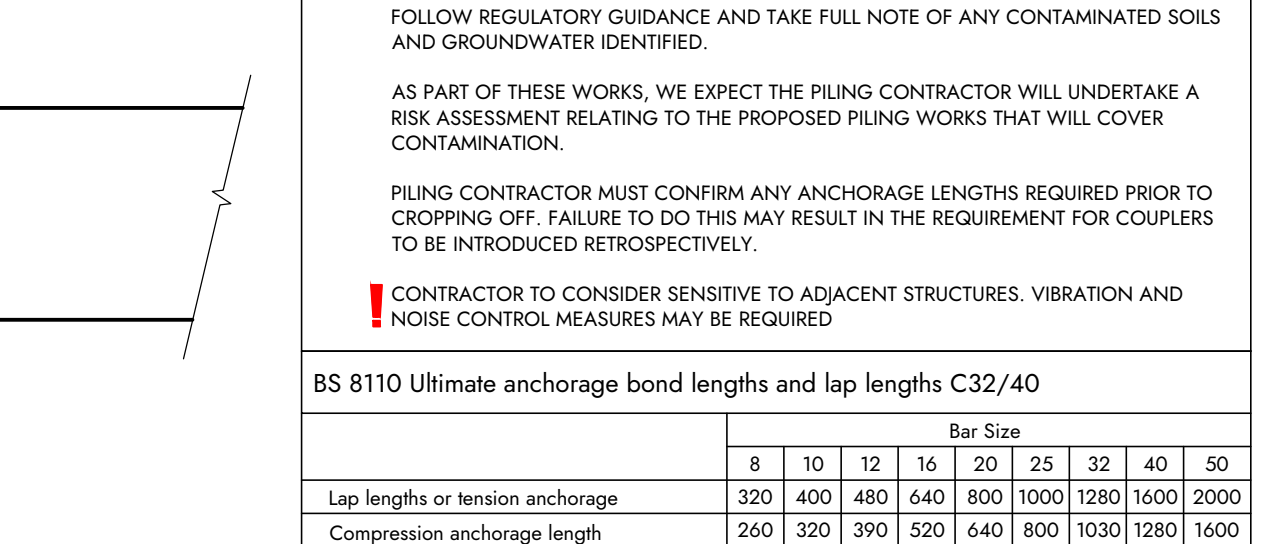


RASTACK COLUMN BASE
CONNECTION (TBC)
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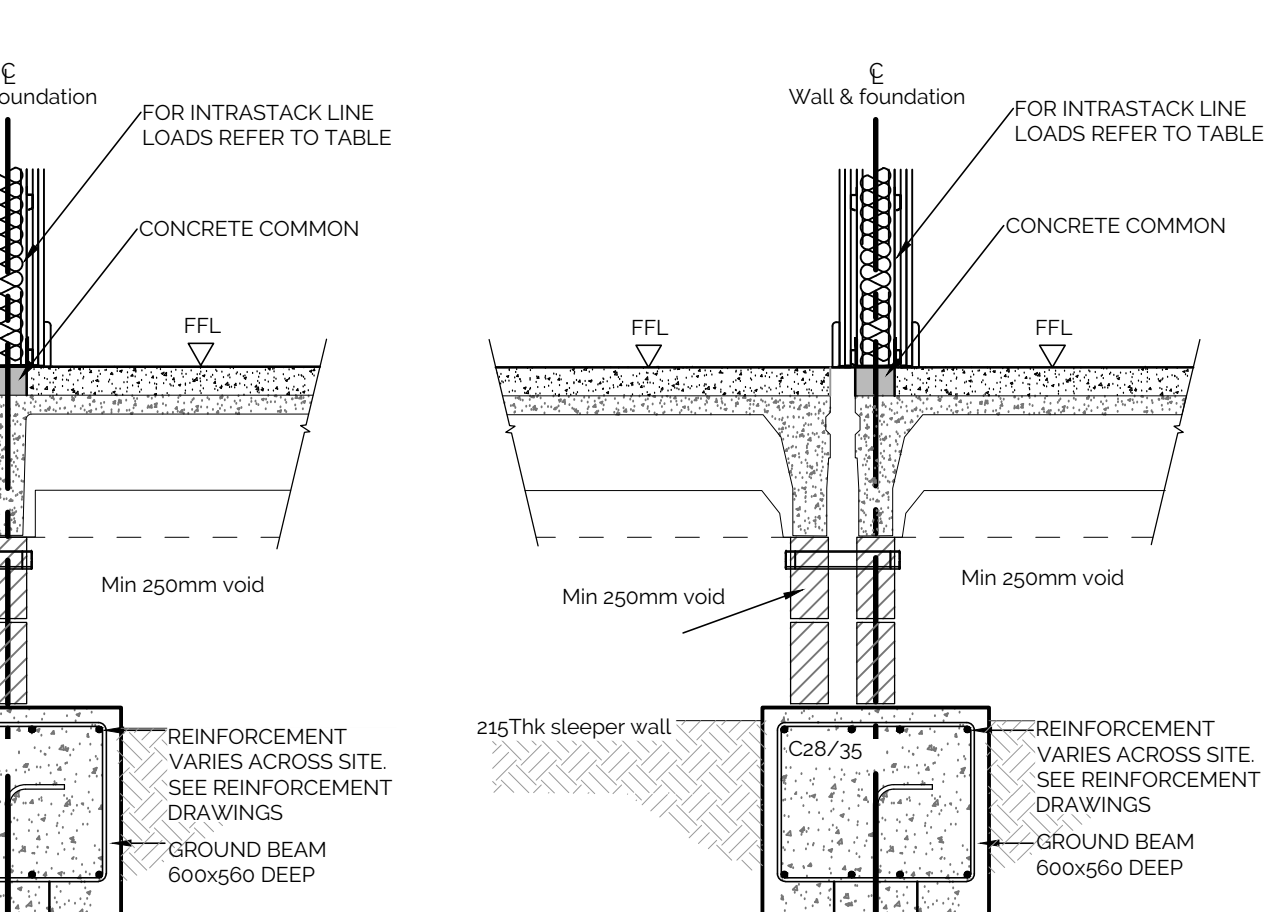


THE PILING CONTRACTOR IS TO ADVISE OF ANY ACCESS CONSTRAINT ISSUES RELATING TO THE CURRENT PILE LAYOUT.

THE SPECIFIC PILE DESIGN WILL BE THE RESPONSIBILITY OF THE SPECIALIST CONTRACTOR ASSIGNED TO UNDERTAKE THE WORKS. THEIR DETAILED PILING DESIGN WILL NEED TO



L (SCALE 1:20)



SECTION C-C (SCALE 1:20)

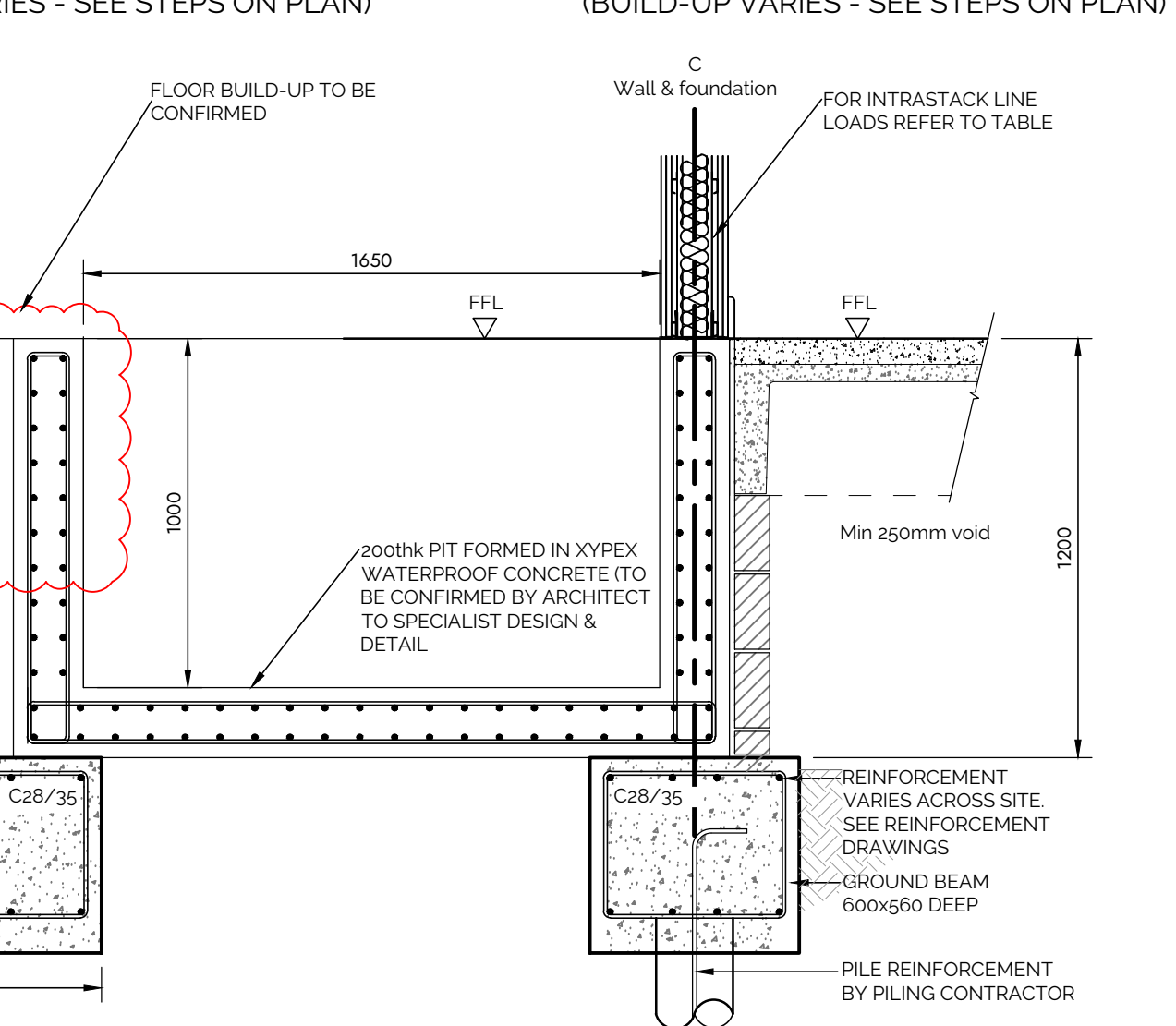
(BUILD UP VARIABLES - SEE STEPS ON PLAN)

PILE REINFORCEMENT BY PILING CONTRACTOR

SECTION D-D (SCALE 1:20)

(BUILD UP VARIABLES - SEE STEPS ON PLAN)

PILE REINFORCEMENT BY PILING CONTRACTOR



SECTION G-G (SCALE 1:20)

PILING
PILES ARE SUBJECT TO FINAL DESIGN BY THE PILING SUB CONTRACTOR. PILES INDICATED ARE 21" x 24" CHS WITH SWL AS INSTALLED ON DRAWING. THIS IS TO BE CONFIRMED BY PILING MANUFACTURER.

PILES SHALL BE ACCURATELY INSTALLED IN THE CORRECT POSITION, A MAXIMUM TOLERANCE OF 75mm ON POSITION OF PILES SHALL BE ACCEPTED ON THE DISCRETION OF THE ENGINEER. THE MAXIMUM TOLERANCE TO THE PERPENDICULAR OF VERTICAL PILES SHALL BE 40mm/VARIANCE IN POSITION. IF MOMENTS OR FORCES CREATED BY INACCURATE DRIVING ARE TAKEN DIRECTLY BY THE PILES WITHIN THE ACCEPTED FACTOR OF SAFETY.

THE SETTING OUT OF GRID LINES SHALL BE DONE BY THE CONTRACTOR WHO SHALL PROVIDE THE PERMANENT DATUM LEVEL AND BACK MARK FOR THE PURPOSE OF ESTABLISHING CUT OFF LEVELS. SETTING OUT OF INDIVIDUAL PILES SHALL BE CARRIED OUT BY THE CONTRACTOR.

THE CONTRACTOR SHALL ACCURATELY LOG EACH DAY TOTAL PILING LENGTH, EMPTY BORING LENGTH, DELAY TIME, OBSTRUCTION TIME ETC. CROSS REFERENCE NUMBER.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A COPY OF THE DRIVING RECORDS DETAILING ITEMS REQUIRED BY THE ENGINEER AS THE WORK PROCEEDS.

PILES SHALL BE CONCRETE UP TO A LEVEL 300mm ABOVE THE REQUIRED CUT OFF LEVEL. EACH PILE SHALL HAVE AT LEAST FOUR BARS of 12mm diameter EACH PROJECTING ABOVE THE REQUIRED CUT OFF LEVEL. REBAR TO BE ANCHORED INTO THE PILE CAP BY A MIN OF 38x BAR DIA past the CUT OFF LEVEL.

METHOD OF PILE TESTING IS TO HAVE A FACTOR OF SAFETY OF 3.

CONTRACTOR TO SUBMIT WARRANTY PROVIDERS PILE TESTING SPECIFICATIONS ONCE WARRANTY PROVIDER IS APPOINTED.

NOTE FOR PILING CONTRACTOR

INDICATES Ø219.1mm CHS DRIVEN PILES
CONTRACTOR TO CONFIRM PILE Ø SIZE.
INCREASE IN PILE Ø SIZE WILL RESULT IN INCREASED GROUND BEAM WIDTHS AND
DEPTHS U.N.O.

ALL PILE DESIGN TO BE CARRIED OUT BY SPECIALIST SUB-CONTRACTOR.
ALL GROUND BEAMS TO BE 500x500 DEEP UNLESS NOTED OTHERWISE.
THE PILING CONTRACTOR IS TO ADVISE OF ANY ACCESS CONSTRAINT ISSUES RELATING
TO THE CURRENT PILE LAYOUT.
THE SPECIFIC PILE DESIGN WILL BE THE RESPONSIBILITY OF THE SPECIALIST CONTRACTOR
ASSIGNED TO UNDERTAKE THE WORKS. THEIR DETAILED PILING DESIGN WILL NEED TO
OBTAIN REGULATORY GUIDANCE AND TAKE FULL NOTE OF ANY CONTAMINATED SOILS
AND GROUNDWATER IDENTIFIED.

AS PART OF THESE WORKS, WE EXPECT THE PILING CONTRACTOR WILL UNDERTAKE A
RISK ASSESSMENT RELATING TO THE PROPOSED PILING WORKS THAT WILL COVER
PILING CONTRACTOR.

PILING CONTRACTOR MUST CONFIRM ANY ANCHORAGE LENGTHS REQUIRED PRIOR TO
CROPPING OFF. FAILURE TO DO THIS MAY RESULT IN THE REQUIREMENT FOR COUPLERS
TO BE INTRODUCED RETROSPECTIVELY.

! CONTRACTOR TO CONSIDER SENSITIVE TO ADJACENT STRUCTURES, VIBRATION AND NOISE CONTROL MEASURES MAY BE REQUIRED										
BS 8110 Ultimate anchorage bond lengths and lap lengths C32/40										
	Bar Size									
	8	10	12	16	20	25	32	40	50	
Lap lengths or tension anchorage	320	400	480	640	800	1000	1280	1600	2000	
Compression anchorage length	260	320	390	520	640	800	1030	1280	1600	

GENERAL NOTES

DO NOT SCALE OFF THIS DRAWING

THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, STATUTORY HEALTH AND SAFETY/C.D. REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.

THE CONTRACTOR MUST OBTAIN INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.

ALL DIMENSIONS, LEVELS AND SETTING OUT TO BE CONFIRMED WITH THE ARCHITECT PRIOR TO CONSTRUCTION.

THE CONTRACTOR IS TO BE FULLY RESPONSIBLE FOR ALL TEMPORARY/PERMANENT PROPPING AND SHORING ON THE PROJECT. CONTRACTOR TO ENSURE THAT ALL PARTS OF THE STRUCTURE ARE ADEQUATELY PROPPED PRIOR TO ANY COMMENCEMENT OF WORKS. ADVICE MAY BE SOUGHT FROM A SPECIALIST OR FROM THE STRUCTURAL ENGINEER.

PLAIN CONCRETE

CT/120 PLAIN CONCRETE USED IN FOUNDATIONS TO HAVE:-

SINGLE SULTAPHE CLASS DS-1, ACEC CLASSIFICATION AC-1

MINIMUM CEMENT CONTENT OF 225kg/m³

WATER/CEMENT RATIO OF 0.7.

MAXIMUM SIZE OF AGGREGATE TO BE 20mm

GC TO ENSURE ALL GROUND EXCAVATIONS ARE STABLE AND SECURELY SHORED. ADVICE ON THIS MATTER MAY BE OBTAINED FROM THE STRUCTURAL ENGINEER.

PC FLOORS
FLOORING SPECIALIST TO SUBMIT DRAWINGS AND CALCULATIONS TO ENGINEER PRIOR TO MANUFACTURE

PC UNITS TO BE DESIGNED TO CARRY THE FOLLOWING LOADINGS (INC. OF S.W. UNITS).

DEAD LOADS	
WEIGHT	PROVIDED BY MANUFACTURER
SCREED	1.8kN/m ²
FINISHES	FROM ARCHITECTS DRAWINGS

IMPOSED LOADS:

RESIDENTIAL	1.5kN/m ²
ROOF	0.75kN/m ²
NON LOADBEARING STUD PARTITIONS =	1.5kN/m RUN / 1.0kN/m ² BLANKET UNO.
100 BLOCK WALL	5kN/m RUN

DIRECTION OF SPAN OF FLOOR INDICATED THIS ON PLAN- ➡

REINFORCED CONCRETE
REINFORCED CONCRETE TO BE GRADE RC32/40
ACEC CLASS AC-1, DESIGN SULPHATE CLASS DS-1
MINIMUM CEMENT CONTENT 300 kg/m³
WATER/CEMENT RATIO OF 0.55
MAXIMUM AGGREGATE SIZE 20mm.

MINIMUM CONCRETE COVER TO BE 40mm TOP, 40mm BTM AND SIDES UNLESS NOTED OTHERWISE:
REINFORCEMENT AS B58666 CUT AND BENT TO B58666 AND DENOTED:-
H HIGH YIELD PY500 N/mm²

REINFORCEMENT MINIMUM LAPS FOR C32/40

H8 : 320mm	H10 : 400mm
H12 : 480mm	H16 : 640mm
H20 : 800mm	H25 : 1000mm
H32 : 1280mm	H40 : 1600mm

ALL LAPS AND INTERSECTIONS OF BARS SHALL BE SECURELY CONNECTED WITH MALLEABLE IRON WIRE OF A SUITABLE SIZE OR OTHER APPROVED METHOD OF FIXING.

ALL REINFORCEMENT SHALL BE ACCURATELY PLACED, SECURED AND MAINTAINED IN POSITION. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY STOOLS, CHAIRS AND SPACERS REQUIRED TO SUPPORT AND RESTRAIN REINFORCEMENT.

MESH REINFORCEMENT TO HAVE A MINIMUM LAP OF 460mm UNLESS NOTED OTHERWISE.

ALL CONCRETE TO BE ADEQUATELY VIBRO COMPACTED (ON PLACING) TO ENSURE THAT ALL VOIDS ARE REMOVED.

ALL WORKS ARE TO CARRIED OUT IN ACCORDANCE WITH ALL THE RELEVANT BRITISH STANDARD CODES OF PRACTICE.

STRUCTURAL DESIGN
STRUCTURAL DESIGN AND LAYOUT MAY CHANGE DEPENDING ON CONFIRMATION OF ARCHITECTS DESIGN AND DETAILS

WALLS
BRICKWORK TO HAVE A WATER ABSORPTION BETWEEN 7% AND 12%
MINIMUM STRENGTH OF BLOCKWORK:-
WHERE SPECIFIED BELOW GROUND 10.4 N/mm²
ALL OTHER AREAS BELOW GROUND 7.3N/mm²

MORTAR ABOVE GRD TO BE 1:1:6 (iii) / M4
MORTAR BELOW GRD TO BE 1:0:3 (i) / M6

MOVEMENT JOINTS TO BE:-
CLAYBRICK - POSITIONED AT MAX. 12000mm CENTRES
BLOCKWORK - POSITIONED AT MAX. 6000mm CENTRES
ALL JOINT WIDTHS TO BE MIN. 16mm

ALL INTERNAL WALLS TO BE TOOTHED INTO EXTERNAL/PARTITION WALL OR BUILT INTO USING CANTILEV STRONGHOLD SYSTEM OR SIMILAR APPROVED

WALL TIES

INTERNAL CAVITY WALL TIES TO BE STAINLESS STEEL TYPE 2 [50 CAVITY AND 275mm LONG, UNLESS OTHERWISE PROVIDED] ANCON STRATFORD RT2 WALL TIES OR SIMILAR APPROVED MINIMUM EMBEDMENT DEPTH IN MORTAR TO BE 50mm. SPACING 900mm HORIZONTALLY AND 450mm VERTICALLY IE 5.0 TIES PER SQ. METRE OF WALL MINIMUM.

ADDITIONAL TIES ARE TO BE USED AT JAMBS OF OPENINGS SO AS TO PROVIDE A VERTICAL SPACING NOT GREATER THAN 225mm. WITHIN 150mm OF VERGES AND JAMBS A TIE IS REQUIRED AT LEAST EVERY 225mm VERTICALLY.

P03	19.12.24	JP	Lift Pit Details Amended
P02	05.12.24	JP	Details Included
P01	21.11.24	JP	Preliminary Issue
Rev	Date	By	Description



SHAPE

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Client

Irwell Valley Homes

PROJECT

Willow Street, Bury

TITLE

Apartment Block Foundation Details

Status	Suitability Description	Structural Stage	Date
S1	Information	Preliminary	Oct 24
Designed By	Drawn By	Scale @ A1	Project No.
PK	J/P	As Shown	2527

Sheet No.
2527-SCE-XX-XX-DR-S-1003

Revision
P03

APPENDIX II

E3P REMEDIATION/ VALIDATION CRITERIA

Remediation Strategy Letter

Willow Street, Bury

January 2025

HUMAN HEALTH REMEDIATION TARGETS –RESIDENTIAL END USE (APARTMENT)

DETERMINAND	UNITS	HARD STANDING BELOW	PUBLIC OPEN SPACE WITHIN 300 mm COVER	PUBLIC OPEN SPACE BELOW 300 mm COVER	PATHWAY
Arsenic	mg/kg	40 ⁽ⁱⁱ⁾	79 ⁽ⁱⁱⁱ⁾	170 ^(iv)	1
Cadmium	mg/kg	85 ⁽ⁱⁱ⁾	120 ⁽ⁱⁱⁱ⁾	532 ^(iv)	1
Chromium (Hexavalent)	mg/kg	6 ⁽ⁱⁱ⁾	7.7 ⁽ⁱⁱⁱ⁾	220 ^(iv)	1
Lead	mg/kg	310 ^(vii)	630 ^(viii)	1300 ^(viii)	1
Elemental Mercury	mg/kg	1.2 ⁽ⁱⁱ⁾	16 ⁽ⁱⁱⁱ⁾	30 ^(iv)	2
Nickel	mg/kg	180 ⁽ⁱⁱ⁾	230 ⁽ⁱⁱⁱ⁾	800 ^(iv)	1
Selenium	mg/kg	430 ⁽ⁱⁱ⁾	1100 ⁽ⁱⁱⁱ⁾	1800 ^(iv)	1
Copper	mg/kg	7100 ⁽ⁱⁱ⁾	12,000 ⁽ⁱⁱⁱ⁾	44,000 ^(iv)	1
Zinc	mg/kg	40,000 ⁽ⁱⁱⁱ⁾	81,000 ⁽ⁱⁱⁱ⁾	170,000 ^(iv)	1
Phenol	mg/kg	440 ^{(xiv)(xi)}	440 ^{(iii)(xi)}	440 ^{(iv)(xi)}	2
Naphthalene	mg/kg	2.3 ^{(xiv)(xi)}	1200 ^{(iv)(xi)}	1200 ^{(iv)(xi)}	2
Acenaphthylene	mg/kg	500 ^(v)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	3
Acenaphthene	mg/kg	500 ^(v)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	1
Fluorene	mg/kg	500 ^(v)	9900 ^{(iii)(xi)}	20,000 ^{(iv)(xi)}	1
Phenanthrene	mg/kg	500 ^(v)	3100 ^{(iii)(xi)}	6200 ^{(iv)(xi)}	3
Anthracene	mg/kg	500 ^(v)	74,000 ^{(iii)(xi)}	150,000 ^{(iv)(xi)}	3
Fluoranthene	mg/kg	500 ^(v)	3100 ^{(iii)(xi)}	6300 ^{(iv)(xi)}	3
Pyrene	mg/kg	500 ^(v)	7400 ^{(iii)(xi)}	15,000 ^{(iv)(xi)}	3
Benzo(a)Anthracene	mg/kg	11 ^{(ii)(xi)}	29 ^{(iii)(xi)}	49 ^{(iv)(xi)}	3
Chrysene	mg/kg	30 ^{(ii)(xi)}	57 ^{(iii)(xi)}	93 ^{(iv)(xi)}	3
Benzo(b)Fluoranthene	mg/kg	3.9 ^{(ii)(xi)}	7.1 ^{(iii)(xi)}	13 ^{(iv)(xi)}	3
Benzo(k)Fluoranthene	mg/kg	110 ^{(ii)(xi)}	190 ^{(iii)(xi)}	370 ^{(iv)(xi)}	3
Benzo(a)Pyrene	mg/kg	3.2 ^{(ii)(xi)}	5.7 ^{(iii)(xi)}	11 ^{(iv)(xi)}	3
Indeno(123-cd)Pyrene	mg/kg	45 ^{(ii)(xi)}	82 ^{(iii)(xi)}	150 ^{(iv)(xi)}	3
Dibenzo(a,h)Anthracene	mg/kg	0.31 ^{(ii)(xi)}	0.57 ^{(iii)(xi)}	1.1 ^{(iv)(xi)}	3
Benzo(ghi)Perylene	mg/kg	360 ^{(ii)(xi)}	640 ^{(iii)(xi)}	1400 ^{(iv)(xi)}	3
TPH C ₅ -C ₆ (aliphatic)	mg/kg	42 ^{(ii)(xi)}	42 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₆ -C ₈ (aliphatic)	mg/kg	100 ^{(ii)(xi)}	100 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	27 ^{(ii)(xi)}	27 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	130 ^{(ii)(xi)}	130 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₂ -C ₁₆ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₆ -C ₂₁ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aliphatic)	mg/kg				1
TPH C ₅ -C ₇ (aromatic)	mg/kg	370 ^{(ii)(xi)}	370 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₇ -C ₈ (aromatic)	mg/kg	860 ^{(ii)(xi)}	860 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aromatic)	mg/kg	47 ^{(ii)(xi)}	47 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aromatic)	mg/kg	250 ^{(ii)(xi)}	250 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₂ -C ₁₆ (aromatic)	mg/kg	1800 ^{(ii)(xi)}	1800 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1



Remediation Strategy Letter

Willow Street, Bury

January 2025

DETERMINAND	UNITS	HARD STANDING BELOW	PUBLIC OPEN SPACE WITHIN 300 mm COVER	PUBLIC OPEN SPACE BELOW 300 mm COVER	PATHWAY
TPH C ₁₆ -C ₂₁ (aromatic)	mg/kg	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aromatic)	mg/kg	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
Asbestos	Fibres Volume Weight (%)	0.001%	NFD	0.001	4

Notes 1

NFD = No Fibres Detected

Asbestos will be screened visually on-site by a qualified environmental consultant and where potential ACM is identified, representative samples will be subject to quantitative analysis of % volume by weight.

Should any ACM be identified within the soil matrices, further detailed % assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).

Notes 2

Excludes matrices where free product is observed.

No viable exposure pathway beneath hardstanding and cover system.

Notes 3

Main exposure pathways: 1 = soil ingestion, 2 = vapour inhalation (indoor), 3 = dermal contact and ingestion, 4 = dust inhalation.

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration, N/A = Not Applicable (no exceedance of assessment criteria), Loc of MC = location of exceedances.

- i. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use with plant uptake.
- ii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use without plant uptake – these levels used below 600 mm cover system within residential gardens as soils will be present within a residential setting yet soils will not be disturbed and garden plants will not reach these soils.
- iii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for public open space (POS) residential.
- iv. Value derived from LQM Sutable 4 Use Levels (S4ULs) for public open space (POS) park – these levels used below 300 mm POS cover system as soils will not be disturbed by any future site users and exposure to these soils will be similar to a park end use.
- v. Value derived from LQM Sutable 4 Use Levels (S4ULs) alongside assessment with WM3 to ensure that materials remaining on-site do not exceed the WM3 toxicity criteria for hazardous waste.
- vi. Value derived from Category 4 Screening Levels (C4SL) for residential land use with homegrown produce.
- vii. Value derived from Category 4 Screening Levels (C4SL) for residential land use without homegrown produce.
- viii. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) residential.
- ix. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) park.
- x. Mercury – based on elemental mercury.
- xi. PAH and TPH levels used are for 1% SOM.
- xii. Xylenes based on p-xylene (o-xylene 2600 mg/kg, m-xylene 3500 mg/kg) and is capped by its solubility.
- xiii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use with plant uptake due to the volatilisation risk.
- xiv. BTEX is not SOM-related due to inhalation pathway.

