

Remediation Strategy and Verification Plan

2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH

The Trustees of the Alitex DBSSAS

Report Reference: GWPR6838/RS&VP/June 2026		Status: FINAL
Issue	Prepared By	Checked and Verified By
v.1.3		
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1. INTRODUCTION

1.1. Aims of the Investigation

This Remediation Strategy and Verification Plan was undertaken to advise the client of the next steps on site with regards to remediation to allow for discharge of Condition 3 and what information is required for the verification report required to discharge Condition 11 of planning application ref: APP/22/00155.

The site has undergone various phases of investigation; reference should be made to the following documentation:

- The Phase 1 Desk Study, produced by Ground and Water Limited (reference: GWPR5385/DS/June 2023);
- The Phase 2 Site Investigation Report, produced by Ground and Water Limited (reference: GWPR5385/SIR/June 2023);
- The Phase 2 Site Investigation Report, produced by Ground and Water Limited (reference: GWPR5475/SIR/November 2023);
- The Remediation Method Statement and Ground-Gas Design Report, produced by Ground and Water Limited (reference: GWPR6668/RMS&GGDR/August 2025);
- The Contamination Assessment and Groundwater Detailed Quantitative Risk Assessment Report, produced by Ground and Water Limited (reference: GWPR6838/CAR&GDQRA/January 2026 V1.2);
- Cover Letter, produced by Ground and Water Limited (reference: GWPR6838/CL/January 2026).

This Risk Assessment must be read in conjunction with the previous reports detailed above.

1.2. Conditions and Limitations

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

This version of the report includes minor amendments and supersedes the previous.

1.3. Technical Glossary

Generic technical terms and their description can be viewed within the glossary provided within Appendix B.

2. SITE SETTING

2.1. Site Location

The site comprised a ~2,800m² roughly rectangular shaped plot of land, orientated in a west to east direction, along the southern side of Seagull Lane. The site was located in the northern portion of the town of Emsworth in the county of Hampshire. The national grid reference for the centre of the site was approximately SU 74955 06184. A site location plan has been provided within Figure 1, with a plan of the site development area provided within Figure 2.

2.2. Site Description

At the time of the most recent site visit (December 2025), all structures on-site had been demolished.

2.3. Proposed Development

The proposed development was understood to comprise the demolition of the majority of the existing buildings on-site and the construction of eight new commercial units varying in size from 100 – 120m² with new access roads onto the site as well as new car parking spaces. A bin store was noted on the northern portion of the site near the proposed site entranceway. The existing office building located on the centre of the site is to remain.

Due to the on-site ground conditions that were found during the previous site investigation, traditional strip and pad foundations are required to all units, including those on the southern site boundary. Suspended reinforced slabs are proposed and will not be ground-bearing.

Information on the proposed development can be viewed within Appendix C.

2.4. Proposed Drainage Strategy

The strategy for the site, considered in terms of the NPPG, is summarised in the table below:

	SuDS Hierarchy	Used	Comment
1	Into the ground (infiltration)	X	High water table, contamination risks
2	To a surface water body;	X	River Ems 48m away; outfall would require crossing 3 rd party land and additional consents to achieve
3	To a surface water sewer, highway drain or another drainage system	✓	Existing public surface water sewer runs parallel to the site in Seagull Lane.
4	To a combined sewer	N/A	N/A

With infiltration excluded, all subsequent options require attenuation of the surface water run-off, to ensure rate and volume control are achieved to the receiving network.

To attenuate the run-off from roof and road surfaces, a series of shallow crates have been placed under the parking spaces and flow control chambers used to throttle the flows. The parking spaces are constructed with a permeable surface that will drain directly into the crates below; adjacent impermeable surfaces such as the concrete access road are laid to fall onto the permeable zones. The permeable zones are bundled by the concrete foundations under standard precast concrete kerbs, with a 1mm thick impermeable geomembrane liner in these areas retaining the water. The liner is

designed to prevent infiltration and will therefore stop run-off from entering the existing strata and increasing onward transmission of any existing contaminants. The liner will also work in reverse, preventing migration of existing contaminants into the attenuation matrix, so no new pathway to the River Ems will be formed. The design takes account of climate change, with critical storage volumes generated from storms in the 1:100yr event (1% AEP) including a 45% increase for climate change.

The drainage system also comprises standard polypropylene and PVCu elements such as inspection chambers and pipes, and these, like any drainage network, are intended to be watertight. The majority of the pipes are outside or underneath the lined areas, so preventing leaks to and from the pipes is just as important. This is achieved by ensuring seals and joints are correctly installed and sufficient cover/protection to the pipes is provided. As standard we would expect the contractor to carry out the necessary watertight tests in accordance with the requirements of BS EN 1610 prior to backfilling, to prove the system is leak free. The linear membrane will be welded rather than taped for the joints.

Information on the proposed drainage strategy can be viewed within Appendix D.

3. SUMMARY OF REQUIRED REMEDIATION

3.1. Soils

3.1.1. During Construction

The contamination testing results recorded no exceedances with respect of the commercial end use within the soils from a human health perspective; however, groundworkers during the construction stage will require full PPE and will need to maintain good personal hygiene, e.g. regular hand washing. If any gross contamination is encountered during the construction phase, works should stop and a competent and qualified person (Ground and Water Limited) should be contacted. The discovery strategy should be followed as outlined in Section 4.1. The works occurring within the south (closest to the gas holder and lower level anticipated to be the most likely area for gross contamination to be discovered) will be supervised by a Ground and Water Limited Engineer to support the contractor with dealing with any gross contamination (if encountered). The Local Authority will be informed if any gross contamination is encountered and how it is to be dealt with as outlined in Section 4.1.

3.1.2. Post Construction

It is understood that for the deeper digs (Foundations) it is anticipated circa 900 Tonnes of soils will be removed, anything from 800mm – 1400mm depending on the natural strata levels found across the site. There will also be circa 650 Tonnes for the reduction in levels across the remainder of the site. This comprises 200mm – 400mm below the old concrete slab, to accommodate the new construction material, service trenches and drainage scheme. The change in levels can be seen on the drawings provided in Appendix E, and the changes are being adjusted in the low-level areas, to produce a natural fall towards Seagull Lane (and the new drains) across the whole site. Levels are primarily being raised in the south-east corner, most of the site naturally falls in the correct direction, just improved with the final top finish. These soils will be appropriately disposed of at a landfill, none of the material is intended for re-use at the site. Any areas that will be backfilled will be filled with construction aggregates.

In areas of proposed soft landscaping, levels will be lowered to at least 150mm and backfilled with 150mm of certified clean and suitable for use for use Topsoil as a growing medium, due to zinc concentrations above the phytotoxicity threshold within the soils. There will be 10m³ of Topsoil utilised to make up the 150mm capping required within the raised planters.

All materials should be removed and stockpiled on an impermeable liner with raised edges and covered at all times. Stockpiles destined for removal from site should be stored away from imported soils. Should grossly contaminated soils be encountered (i.e. black staining and/or fuel odour), these soils should be segregated on another separate impermeable liner as well.

Materials to be removed off-site must be classified by carrying out Waste Acceptance Criteria (WAC) testing. A representative WAC can be extrapolated to all material of broadly similar description and conceptually applied to volumes indicated in available waste transfer notes, which can in turn be roughly compared to anticipated volumes/tonnage. A registered contractor must undertake the removal of waste. Consignment notes for the removal of waste must be obtained and kept for inclusion within the final validation Report.

3.1.3. Remediation Strategy Relating to Asbestos

An Asbestos Management Strategy should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination. An Asbestos Management Plan is a crucial document designed to register and detail how asbestos will be managed in a property and what activities will be engaged to ensure people remain safe from asbestos exposure. An asbestos management strategy has been provided within Appendix F.

3.2. Water Supply Pipes

3.2.1. Remediation

The Water Supply pipe risk assessment indicated that the use of PE pipes is inappropriate at the site due to the concentrations of TPH within the soils. It is therefore required that the use of Metal or Barrier pipes are implemented as part of the design in order to prevent an unacceptable risk to future receptors.

3.3. Remediation Strategy Relating to Groundwater

The Level 2 (Groundwater) Risk Assessment has been undertaken and found typical gas works related contamination within the shallow aquifer. These are likely to have a detrimental effect on the underlying aquifer and potentially impacting the nearby River Ems.

It is considered that the contamination is gas works sourced due to the following evidence:

- It is noted that the groundwater flow direction is to the south-east, with a gasworks noted immediately to the south and west of the site. With the contaminants also being typical of gasworks, it is likely that the contamination is sourced off-site from the gasworks, rather than on-site sources.
- The on-site sources are considered to be minimal in respect to the amount of contamination identified. Whereas the gas works and identified holder is considered a significant source of contamination adjacent to the subject site.
- Hydrocarbon odours and black oily contamination were noted within WS1 and WS5 of the 1st Phase Boreholes, as well as within WS1, WS3 and WS4 of the 2nd Phase Boreholes. These were mainly localised within the centre and south-east of the site, bordering the gasworks.
- During the third phase of investigation, a significant hydrocarbon odour and black staining was noted within TP5, TP6 and TP7. A site visit to the neighbouring gas works site during excavation of the historic holder also indicted that the material identified on-site was identical in appearance and smell to that seen within the holder.
- Cyanide was not found within the on-site soil samples; however, it is found within the groundwater during both phases of analysis, which may have been contaminated off-site. Cyanide is a typical gas works contaminant.

The neighbouring gas works is undergoing remediation including removal of the contents of the holder adjacent to the west of the site. The contents were found to comprise black tar like material and black stained clay with a significant hydrocarbon odour.

Conceptually the site is located within a historically industrial area and the development is also industrial, with the proposed drainage strategy not utilising soakaways. The site is bordered by

significant off-site contamination sources in the form of a gas works.

The extent of construction excavations provides a substantial opportunity for observation, documentation, and site betterment. Details of the information required to be recorded will be outlined in the verification Section 4.2.

It is anticipated circa 1500 Tonnes of soils will be removed from the site as part of foundation excavations and reduction in levels across the site. These soils will be appropriately disposed of at a landfill, none of the material is intended for re-use at the site.

The intent being for documentation & site betterment to be routine at the site, and the discovery strategy to be reserved for something that is unexpected e.g. a buried tank, or a significant reservoir of gasworks related material (e.g. in a poorly functioning soakaway or natural sump – i.e. which might involve works beyond the scope of those required by the construction schedule to access/remove the reservoir).

Throughout the construction process Ground and Water Limited will be in contact with the Principal Contractor to ensure that anything that is identified is dealt with appropriately and the Local Authority notified where relevant. If at any stage gross contamination is identified (e.g. free product), the discovery strategy should be adopted to address any contamination as detailed in section 4.1.

3.4. Remediation Strategy Relating to Ground-Gas, Vapours and Radon

Based on risk assessment undertaken, the site warrants classification as **Characteristic Situation CS2**, where precautions to prevent the ingress of ground-gas are necessary. Type C buildings on CS2 classified sites require **2.5 points** worth of protection, in accordance with BS8485:2015+A1:2019. Points must be made up through a structural barrier and a membrane, where at least two methods are incorporated. Basic radon protection measures are also required and it should be checked that any membrane installed will protect against both ground-gases and radon.

The type of remedial measures that can be applied are influenced by the foundation design of the properties. A cross section of the slab design within Units 1 – 8 has been provided within Appendix C. The cross section shows that a concrete slab is to be constructed onto rigid insulation before compacted Made Ground. Whilst not documented on the cross section, there are also to be minimal service entries through the slab, with some noted to be within pits and some not. The slab was also to be reinforced and a minimum thickness of 200mm. A multi-purpose ground-gas, radon and waterproofing protection membrane was to be installed below the RC slab.

Based on the above, the following remedial measures are required to ensure suitable ground-gas protection in alignment with CS2 conditions. It should be noted that BS8485 should not be used as a points system.

Required Gas Protection Measures				
Block	Required Points	Foundation Design	Further Remedial Measures	Total Score
Units 1 – 8 (Type C)	2.5 (CS2)	Reinforced concrete slab cast directly onto insulation and hardcore. Floor slab a	A multi-purpose membrane protecting	3.5

Required Gas Protection Measures				
Block	Required Points	Foundation Design	Further Remedial Measures	Total Score
Building)	classification)	minimum thickness of 200mm, with reinforcement. (1.5 points) Minimal service entries through the slab with some noted in pits	against ground-gas, water ingress, vapours and radon below the slab (2 points)	

3.4.1. Cast In-Situ Reinforced Concrete Slab

In accordance with BS8485: Any floor slab would need to ensure it is suitably reinforced to minimise potential cracking and must have limited penetrations caused by services. This reinforcement should be in accordance with Annex A, Section 2.2.2.

3.4.2. Multi-Purpose Membrane

The multi-purpose membrane, protecting against ground-gas, water ingress, vapours and radon, should meet the following criteria outlined within Table 7 of BS 8485:2015+A1:2019, repeated below. Where an alternative product is used, it must be demonstrated by laboratory testing that the alternative product achieves or exceeds the performance characteristics of the product originally agreed. The installation can utilise taped joints (a metallic core vapour-resistant barrier product is not required) and to be installed by a competent contractor and verified by a suitably trained independent party, generally following C735 guidance.

- Sufficiently impervious to the gases (methane and carbon dioxide);
- Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
- 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);
- Capable, after installation, of providing a complete barrier to the entry of the relevant gas;
- Verified by a suitably trained independent engineer in accordance with CIRIA C735. It is understood the Client is in conversations with Geoshield for this.

At the time of reporting the contractor to undertake the works is to be confirmed. This confirmation will be provided to the regulatory body prior to undertaking the commencement of construction works. No installation can take place until this an Installation Plan is agreed with the regulatory authority.

Prior to installation and prior to construction starting, a method statement for membrane installation (Installation Plan) and verification (Verification Plan) should be issued to the local authority for comment.

The Installation Plan is to be prepared by the installation contractor and should outline the method

statement for the installation of the ground gas protection system.

The Verification Plan should outline the required evidence for verification, the roles and responsibilities of all parties involved and the scope for the inspection and testing regime to verify the appropriate installation. Details of the inspection regime should include: the contractor responsible for carrying out inspections (including competence/ verification), the period and frequency over which inspections will take place, what elements will be inspected and how inspections will be recorded and reported; details of the integrity testing programme should include: what testing methods are considered appropriate (with full justification), who will carry out the integrity testing; the period and frequency over which testing will take place, the elements of the system to be tested; performance requirements of the testing and how the results will be recorded and reported.

3.4.3. Prior to Construction

Prior to construction of the buildings, the following should be undertaken:

- Suitable design of ground gas protection measures with Installation and Verification Plan agreed with council.
- The appointed verification contractor will need to be able to demonstrate: they are suitably trained by submitting a statement detailing their qualifications (NVQ Level 4 Verification of Ground Gas Protection Systems, CLA:IRE accredited Specialist in Gas Protection Verification (SGPV)), independence and relevant experience and a verification method statement (design specification conformance, inspection/ testing validation regime (including integrity testing where necessary), non-conformance resolution etc) in a Verification Plan.
- No installation can take place until an Installation/Verification Plan is agreed with the regulatory authority.
- The decommissioning of all boreholes beneath the footprint of the building, in line with this report and EA guidance.

3.4.3.1. Well Decommissioning

Improperly abandoned wells, boreholes and standpipes can provide preferential pathways for groundwater or contaminant movement. This may result in the contamination of groundwater, the mixing of groundwaters of variable quality from different aquifers or contribute to the loss of aquifer yield and water pressure (referred to as the potentiometric or piezometric head) as groundwater flows out of the system. This can threaten the availability and quality of groundwater resources for other users and potentially have an impact on wetlands. Abandoned wells can also present a physical hazard to people and property; therefore, site owners need to ensure that redundant wells, boreholes and standpipes are made both safe and structurally stable and also backfilled or sealed to prevent groundwater pollution and flow of water between different aquifer units. This is particularly important where other potable groundwater supplies are at risk.

In order to safely and sufficiently decommission the well, any pathway between sources and receptors at the surface, to sources and receptors within the groundwater, should be severed.

Decommissioning should address the following:

- Remove the hazard of an open hole (safety issues).

- Prevent the wells, boreholes and standpipes acting as a conduit for contamination of groundwater.
- Prevent the mixing of contaminated and uncontaminated groundwater from different aquifers.
- Prevent the flow of groundwater from one geological horizon to another.
- Prevent the wastage of groundwater from the overflow of artesian wells, boreholes and standpipes.

To decommission any boreholes and wells, internal pipework should be removed, if possible, and the void remaining backfilled with bentonite pellets. Should it not be possible to remove the well, then the well void should be backfilled with bentonite pellets, with the top 1m of the well screen cut off or unscrewed and a 1m bentonite pellet capping installed at surface. This will create a sufficient impermeable layer to prevent the wells being a preferential pathway for contaminants.

3.4.4. During Construction

During construction of the structure, the following should be undertaken within each plot:

- A gas resistant membrane (Visqueen Gas barrier or similar) should be installed by a suitably competent groundworker prior to pouring of the floor slab.
- The gas resistant membrane must be visually verified in accordance with CIRIA C735, by a suitably trained independent engineer in accordance with CIRIA C735. It is understood the Client is in conversations with Geoshield for this. Photographs must be obtained of all components (overlaps, service entries, corners, repairs). This is required prior to pouring of the floor slab.
- The floor slab should be poured to prevent any damage or loss of integrity to the installed ground gas precautions.

3.5. Proposed Drainage Strategy Residual Risk Assessment

The strategy for the site, considered in terms of the NPPG, is summarised in the table below:

	SuDS Hierarchy	Used	Comment
1	Into the ground (infiltration)	X	High water table, contamination risks
2	To a surface water body;	X	River Ems 48m away; outfall would require crossing 3 rd party land and additional consents to achieve
3	To a surface water sewer, highway drain or another drainage system	✓	Existing public surface water sewer runs parallel to the site in Seagull Lane.
4	To a combined sewer	N/A	N/A

With infiltration excluded, all subsequent options require attenuation of the surface water run-off, to ensure rate and volume control are achieved to the receiving network.

To attenuate the run-off from roof and road surfaces, a series of shallow crates have been placed under the parking spaces and flow control chambers used to throttle the flows. The parking spaces are constructed with a permeable surface that will drain directly into the crates below; adjacent impermeable surfaces such as the concrete access road are laid to fall onto the permeable zones. The

permeable zones are banded by the concrete foundations under standard precast concrete kerbs, with a 1mm thick impermeable geomembrane liner in these areas retaining the water. The liner is designed to prevent infiltration and will therefore stop run-off from entering the existing strata and increasing onward transmission of any existing contaminants. The liner will also work in reverse, preventing migration of existing contaminants into the attenuation matrix, so no new pathway to the River Ems will be formed. The design takes account of climate change, with critical storage volumes generated from storms in the 1:100yr event (1% AEP) including a 45% increase for climate change.

The drainage system also comprises standard polypropylene and PVCu elements such as inspection chambers and pipes, and these, like any drainage network, are intended to be watertight. The majority of the pipes are outside or underneath the lined areas, so preventing leaks to and from the pipes is just as important. This is achieved by ensuring seals and joints are correctly installed and sufficient cover/protection to the pipes is provided. As standard we would expect the contractor to carry out the necessary watertight tests in accordance with the requirements of BS EN 1610 prior to backfilling, to prove the system is leak free. The linear membrane will be welded rather than taped for the joints.

Information on the proposed drainage strategy can be viewed within Appendix D.

3.6. Dewatering

The new surface water drainage system will not be in place during the major (deeper) foundation construction phase and therefore reducing the risk of migration of any potential pollutants during dewatering.

Throughout the complete construction phase, the existing foul setup is to be utilised through existing permissions via filter bags for any dewatering requirements. The aim is for construction to be undertaken during the driest months to minimise the amount of dewatering required.

The filter bags will capture any suspended solids which may contain bonded hydrocarbons. If any product is encountered in the water consideration can be given to placing absorbent pillows, pads, or booms inside sumps and tanks to soak up any free oil.

3.7. Validation Strategy

Any remedial works undertaken on the site will need to be inspected and independently validated by a Ground and Water Limited Engineer. All remedial excavations will need to be inspected, documented and photographed.

Following completion of all the remediation and validation works outlined above, a report should be submitted to the local authority for approval to satisfy Condition 11.

Full liaison must be made with the statutory authority, prior to the implementation of this method statement and/or the removal of any material from site. All works must be undertaken to meet their full approval.

A detailed Verification Plan is provided in Section 4.

3.8. Health, Safety and Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls,

boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust would be generated as a result of construction activities.

The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess.

4. VERIFICATION PLAN

4.1. Discovery Strategy

There may be areas of contamination that have not been identified during the course of the intrusive investigation (e.g. underground storage tanks). Such occurrences may be discovered during the construction phases for the redevelopment of the site. The appointed Main Contractor will be the Principal Contractor for this development and will be responsible for the discovery strategy being followed.

Groundworkers should be instructed to report to the Site Manager any evidence for such contamination; this may comprise visual indicators, such as fibrous materials within the soil, discolouration, or odours and emission. Upon discovery advice must be taken from a suitably qualified person and then the Local Authority will need to be informed.

A broad discovery strategy written for this site to be followed by The Principal Contractor is provided in Appendix G. The following main points should be focused on:

- An Asbestos Management Strategy should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination. A copy of the asbestos management strategy can be viewed in Appendix F.
In the event of positive detections, Construction Workers will need to ensure the Construction Method Statements restrict dust production via damping down activities during dry weather and include appropriate use of PPE, depending on risk assessment. Boundary monitoring and dust suppression may be required dependent on risk assessment.
- Groundworkers should be informed through toolbox talks of the potential signs of contamination that may be encountered at the site. **For this site, the most likely signs will be black staining of the soils, fuel odours and an oily sheen to any groundwater encountered.** Other signs of contamination may be well-being (e.g. reports of light-headedness, dizziness and blacking out). Should any of these be encountered by the groundworkers, they must be reported to the site manager immediately. It is the site manager's responsibility to seek advice from a suitably qualified person (Ground and Water Limited) before proceeding, such that appropriate remedial measures and health and safety protection may be applied if required. Should the suitably qualified person determine that unexpected contamination has been identified (e.g. free product), this will be communicated with the Local Authority and the next steps agreed in writing before proceeding. Should the contamination encountered be consistent with what has already been identified, recommendations for removal of the contaminated soils, separation on to an impermeable liner and subsequent testing to determine the appropriate landfill destination will be undertaken. A letter to confirm the discovery strategy has been adopted and maintained and no contamination identified (if relevant) should be provided by the contractor and included within the verification report.
- It is recommended that prior to construction activities, a Ground and Water Limited Engineer gives a toolbox talk to outline the above and provide an opportunity for confirmation of procedures and any other questions the site workers may have to ensure they are confident in the steps that need to be taken.
- Following the completion of the works, the contractor must pass all information with respect to the discovery strategy to the Client and Ground and Water Limited for inclusion within the verification report. A summary statement written by an experienced individual who has been on-site during the works saying that no contamination was found must also be included within the verification report, should this be the case.

4.2. Soils and Groundwater

The appointed Main Contractor will be the Principal Contractor for this development and will be responsible for the contents of this report being followed. The Project Co-ordinator (Client Rep) will be Nick Bashford from Nyetimber Management Ltd, who will liaise between the site team and Ground and Water Limited.

The appointed Principal Contractor will need to ensure the following is undertaken:

- An Asbestos Management Strategy is implemented, detailed in Appendix F. In the event of positive detections, Construction Workers will need to ensure the Construction Method Statements restrict dust production via damping down activities during dry weather and include appropriate use of PPE, depending on risk assessment. Boundary monitoring and dust suppression may be required dependent on risk assessment.
- Based on the findings of the survey it may be necessary that toolbox talks are given to all site workers highlighting any areas of identified asbestos and areas to avoid working.
- Construction Workers will need to be provided with adequate PPE and maintain good hygiene during all works.
- The discovery strategy should also be adopted to address any unexpected gross contamination identified as detailed in section 4.1. Throughout the construction process Ground and Water Limited will be in contact with the Principal Contractor to ensure that anything that is identified is dealt with appropriately and the Local Authority notified where relevant. A letter to confirm the discovery strategy has been adopted and maintained and any measures taken should gross contamination be identified will be provided by the contractor and included within the verification report.
- Active observation and documentation, especially by photographic evidence, should be undertaken throughout the construction process with a particular focus during deep excavations (>1m bgl), especially in the south/south-east of the site where gas works contaminants are likely to be present.
 - Most likely observational signs will be black staining of the soils, fuel odours and an oily sheen to any groundwater encountered.
- Photos should be taken throughout the construction process to catalogue the changes in levels, stockpiled materials (with clear segregation shown of imported clean material, soils to be removed and gross contaminated soils to be removed).
- Materials to be removed off-site must be classified by carrying out Waste Acceptance Criteria (WAC) testing and these test(s) will need to be supplied. A representative WAC can be extrapolated to all material of broadly similar description and conceptually applied to volumes indicated in available waste transfer notes, which can in turn be roughly compared to anticipated volumes/tonnage.
- Waste transfer notes will need to be provided for any materials to be removed and must be counter-signed by the receiving party.
- It is understood with respect of imported materials, 10m³ will be utilised to form the soft landscaped areas and the remainder will comprise construction aggregates. Imported soils and materials must be fit for purpose. Therefore, the following will be required to verify the Topsoil material only:
 - If the Topsoil purchased complies with BS3882 soils where representative characterisation samples are available from the supplier (e.g. sample taken within 4 weeks of supply date). Then no testing of the imported soils is required.
 - If sufficient testing is not provided by the Topsoil supplier then it is recommended that 1No. BS3882 test and 1No. test for the following determinands is undertaken:
 - Semi-metals and heavy metals incl. Arsenic, Cadmium, Chromium (incl.

- Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc;
- Polycyclic Aromatic Hydrocarbons (PAHs) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene;
 - Fuel Oils – Speciated TPH including full aliphatic/aromatic split;
 - BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs);
 - Asbestos screen.
 - The compounds that are to be tested for are those given in the Generic Assessment Criteria, which can be viewed in Appendix H of this report. Further details are provided separately in Section 4.5.

4.2.1. Water Supply Pipes

The Water Supply pipe risk assessment indicated that the use of PE pipes is inappropriate at the site due to the concentrations of TPH within the soils. It is therefore required that the use of Metal or Barrier pipes are implemented as part of the design in order to prevent an unacceptable risk to future receptors.

Details will be supplied in the verification report of the following:

- A plan showing the location of the water supply pipes and where it enters the property;
- Details of the type of water supply pipe and sealing used for the service entry; and
- Signoff from the statutory undertaker.

4.3. Drainage Strategy

The proposed drainage strategy involves the altering of the existing site levels to promote surface water runoff northwards where it will discharge into a surface water sewer at Seagull Lane. Permeable paving is proposed across the site, enabling capture at/near source, with treatment and attenuation. A permafilter geotextile is also proposed, aiming to break down hydrocarbons by aerobic means. Everything will be welded rather than taped. It is recommended that a suitably qualified and experienced engineer verifies that the drainage strategy is implemented as outlined in the document in Appendix D. This should involve site visit(s) to confirm the correct materials and method is adopted with photos to document the process.

4.4. Ground Gas, Radon and Vapours

Pre-Construction:

An independent third party verifier must be appointed to verify the gas protection system and be suitably qualified for the task. At this stage it is understood conversations are being held with Geoshield and the client for this purpose. Geoshield verifiers are NVQ 4, SGPV/TGPV NVQ 2 and CSSW qualified, therefore would be an appropriate choice.

The independent verifier within a verification plan and subsequent verification report will need to:

- Confirm details of the installers their relevant NVQ2 training, they should also provide toolbox talks if required.

- Details of the materials to be used should also be provided to confirm the membrane etc. is designed for the task. It is also recommended that given the contamination identified welding rather than taping of joints is undertaken.
- For the verification itself, they should conduct a visual and pick and probe testing regime on the installed membrane. Air lance testing can be undertaken to test the installed membrane in accordance with CIRIA 735 as well. They will lay all parameters down for standards at a pre-verification meeting to assist both the installer and the main contractor.
- The verification report will provide photographs and details of any remedial measures undertaken to make the measure fit for purpose. E.g. mending any holes.
- No installation can take place until this Installation/Verification Plan is agreed with the regulatory authority.

4.4.1. Well Decommissioning

In order to safely and sufficiently decommission the well, any pathway between sources and receptors at the surface, to sources and receptors within the groundwater, should be severed.

Decommissioning should address the following:

- Remove the hazard of an open hole (safety issues).
- Prevent the wells, boreholes and standpipes acting as a conduit for contamination of groundwater.
- Prevent the mixing of contaminated and uncontaminated groundwater from different aquifers.
- Prevent the flow of groundwater from one geological horizon to another.
- Prevent the wastage of groundwater from the overflow of artesian wells, boreholes and standpipes.

To decommission any boreholes and wells, internal pipework should be removed, if possible, and the void remaining backfilled with bentonite pellets. Should it not be possible to remove the well, then the well void should be backfilled with bentonite pellets, with the top 1m of the well screen cut off or unscrewed and a 1m bentonite pellet capping installed at surface. This will create a sufficient impermeable layer to prevent the wells being a preferential pathway for contaminants.

Photos of this process and a method statement for how the boreholes have been decommissioned will need to be provided within the verification report.

4.5. Imported Material

Any soil which is to be imported onto the site must undergo chemical analysis to prove that it is suitable for the purpose for which it is intended. Imported soils as part of the soft landscaping remediation works must be sourced from a clean donor site so that minimal testing will be sufficient to characterise it (sites polluted by industrial uses are often variable in their concentrations of pollutants and so much larger testing densities are needed). The Topsoil supplier should provide evidence that the soils are absent of propagules of Japanese knotweed.

It is understood with respect of imported materials, 10m³ will be utilised to form the soft landscaped areas and the remainder will comprise construction aggregates. Imported soils and materials must be fit for purpose. Therefore, the following will be required to verify the Topsoil material only:

If the Topsoil purchased complies with BS3882 soils where representative characterisation samples are available from the supplier (e.g. sample taken within 4 weeks of supply date). Then no testing of the imported soils is required.

If sufficient testing is not provided by the Topsoil supplier then it is recommended that 1No. BS3882 test and 1No. test for the following determinands is undertaken:

- Semi-metals and heavy metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc;
- Polycyclic Aromatic Hydrocarbons (PAHs) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene;
- Fuel Oils – Speciated TPH including full aliphatic/aromatic split;
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs);
- Asbestos screen.

The compounds that are to be tested for are those given in the Generic Assessment Criteria, which can be viewed in Appendix H of this report. In the case of phytotoxins such as Cu and Zn, BS3882 should be followed. Any measurable level of asbestos within the imported Topsoil/Subsoil will not be acceptable.

The laboratory assigned the testing should be UKAS accredited and the actual analyses method should be an MCERTS one (if a MCERTS method exists); to retain this accreditation the data should be supplied as received from the laboratory with the cover sheets confirming whether there are any deviations.

Photographic evidence should be included within the validation report which shows the depth of imported soil placed in any soft landscaped areas.

4.5.1. Disposal of Unsuitable Imported Materials

Should exceedances of guidance values be noted within placed or stockpiled soils, then further risk assessment should be undertaken to determine the risk posed to end users.

Should the identification of exceedances/risks arise, the councils Environmental Health should be consulted and a methodology developed before any risk assessment is undertaken.

Should risk be highlighted, then the material will be deemed unsuitable for use and should be removed from the site, before being replaced with more suitable materials. It would be necessary to keep consignment notes for materials transported away from the site, to ensure that the material has been disposed of appropriately, in accordance with the waste guidance given in Section 4.6.

4.6. Waste Disposal

The excavation of foundations and other soils is likely to produce waste which will require classification and then recycling or removal from site.

Under the Landfill (England and Wales) Regulations 2002 (as amended), prior to disposal, all waste must be classified as either: Inert; Non-hazardous; or Hazardous.

The Environment Agency's Hazardous Waste Technical Guidance (WM3) document outlines the methodology for classifying wastes. Once classified the waste can be removed to the appropriately licensed facilities, with some waste requiring pre-treatments prior to disposal.

Following the investigation, 5No. samples of the Made Ground were submitted to the analytical laboratory to undergo a suite of testing for contamination testing, as discussed in the previous sections. Sampling depths were chosen to reflect the receptor of concern, human health, and typically comprised a surface or near surface sample and periodically to 1.00m bgl. Any horizon where olfactory or visual evidence of contamination was present was also sampled.

Based on a risk phase analysis of the chemical laboratory test results, in accordance with EC Hazardous Waste Directive and undertaken by Ground and Water Limited, all soil samples of Made Ground encountered on-site were NON-HAZARDOUS.

Soils containing asbestos are considered HAZARDOUS if the level of asbestos in the Made Ground is above the threshold of 0.1% or visual fragments can be observed. As quantification of the asbestos in the sample recovered from BH101/0.50-1.00m bgl was <0.001% (less than 0.1%) the Made Ground with asbestos detected in was NON-HAZARDOUS with respect to waste classification.

It is important to note that whilst we consider our in-house assessment tool to be an accurate interpretation of the requirements of WM3, therefore producing an initial classification in accordance with the guidance, this method classifies soils as either non-hazardous or hazardous and landfill operators have their own assessment tools and can often come to different conclusions. As a result, some landfill operators could refuse to take apparently suitable waste. The receiving landfill should review the results of this assessment and the chemical laboratory results to determine their own classification.

In addition to the samples described above, 1No. sample of the Made Ground were scheduled to undergo Waste Acceptance Criteria (WAC) testing with single batch leachate from samples with a range of depths. The results indicate that WS1/0.20m were classified as non-inert as a result of high concentrations of Total Organic Carbon (TOC), Mineral Oil and Antimony.

Hazardous waste may require pre-treatment prior to removal. The site may need to be registered as a Hazardous waste producer should such waste be removed from the site.

As part of the verification report the following needs to be provided:

- Calculations to indicate the volume of material removed in comparison to that imported/relocated.
- Waste transfer notes will need to be provided for any materials to be removed and must be counter-signed by the receiving party.
- Details of licence/permit information for the waste carrier and waste sites used.
- Photos should be taken throughout the construction process to catalogue the changes in levels, stockpiled materials (with clear segregation shown of imported clean material, soils to be removed and gross contaminated soils to be removed).

- Should any further asbestos be encountered above the threshold of 0.1% or visual fragments are observed, these will need to be removed as hazardous waste. If they are visible fragments/ACMs removed from the building (should any be identified in the asbestos survey and determined they need to be removed), these will also need to be removed as hazardous waste.
- Materials to be removed off-site must be classified by carrying out Waste Acceptance Criteria (WAC) testing and these test(s) will need to be supplied. A representative WAC can be extrapolated to all material of broadly similar description and conceptually applied to volumes indicated in available waste transfer notes, which can in turn be roughly compared to anticipated volumes/tonnage.

4.7. Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

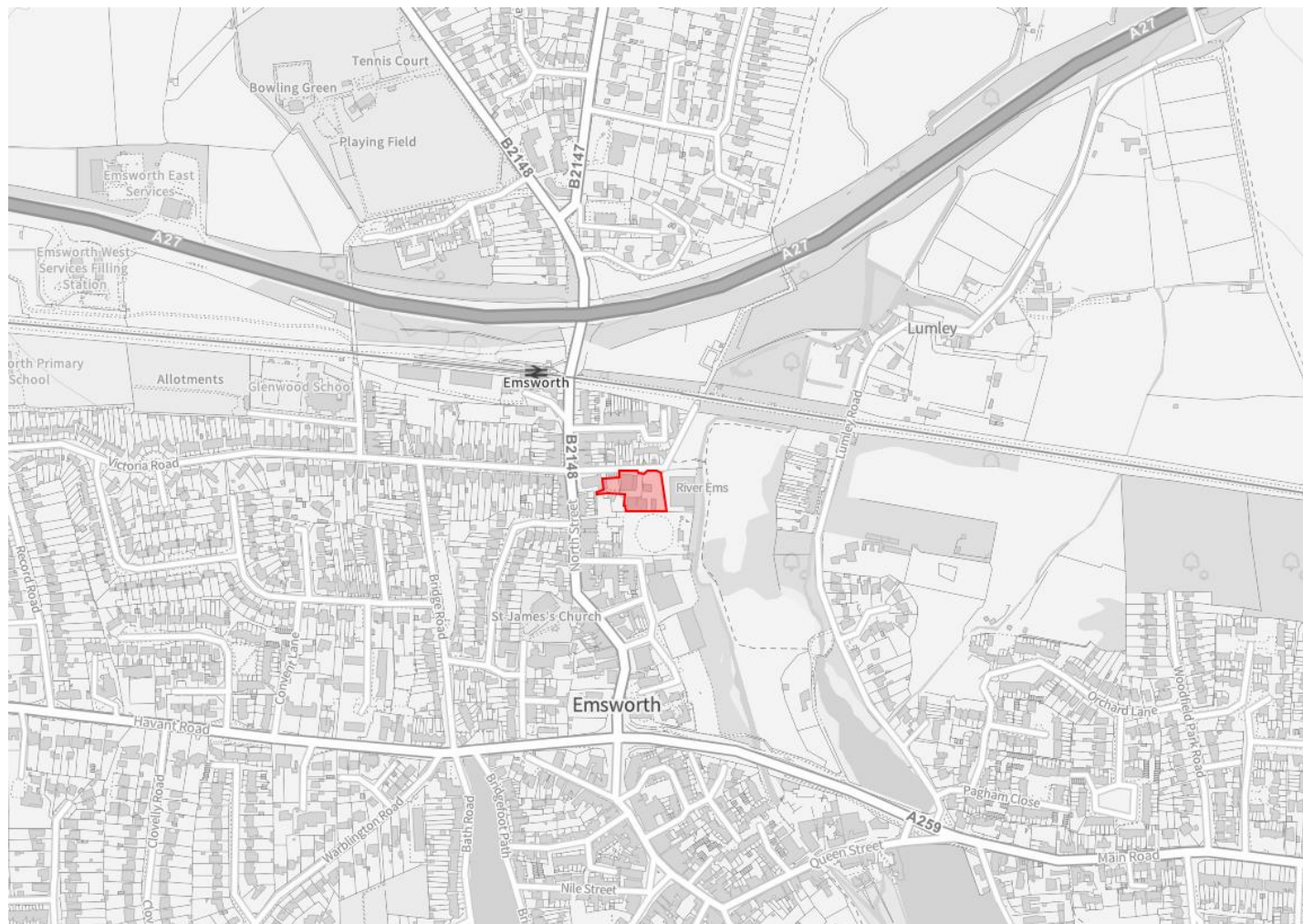
To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust would be generated as a result of construction activities.

The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

FIGURES




Site Location



2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH

The Trustees of the Alitex DBSSAS

April 2026

Figure 1 – Site Location Plan

GWPR6838





◇ Site Boundary

2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH

The Trustees of the Alitex DBSSAS

April 2026

Figure 2 – Site Development Area

GWPR6838





NTS

2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH

The Trustees of the Alitex DBSSAS

April 2026

Figure 3 – Aerial Photograph

GWPR6838





*** = well installation**

1st Phase:

⊕ Windowless
Sampler Boreholes
(June 2023 SI)

2nd Phase:

⊕ Windowless
Sampler Boreholes (Feb
2025)

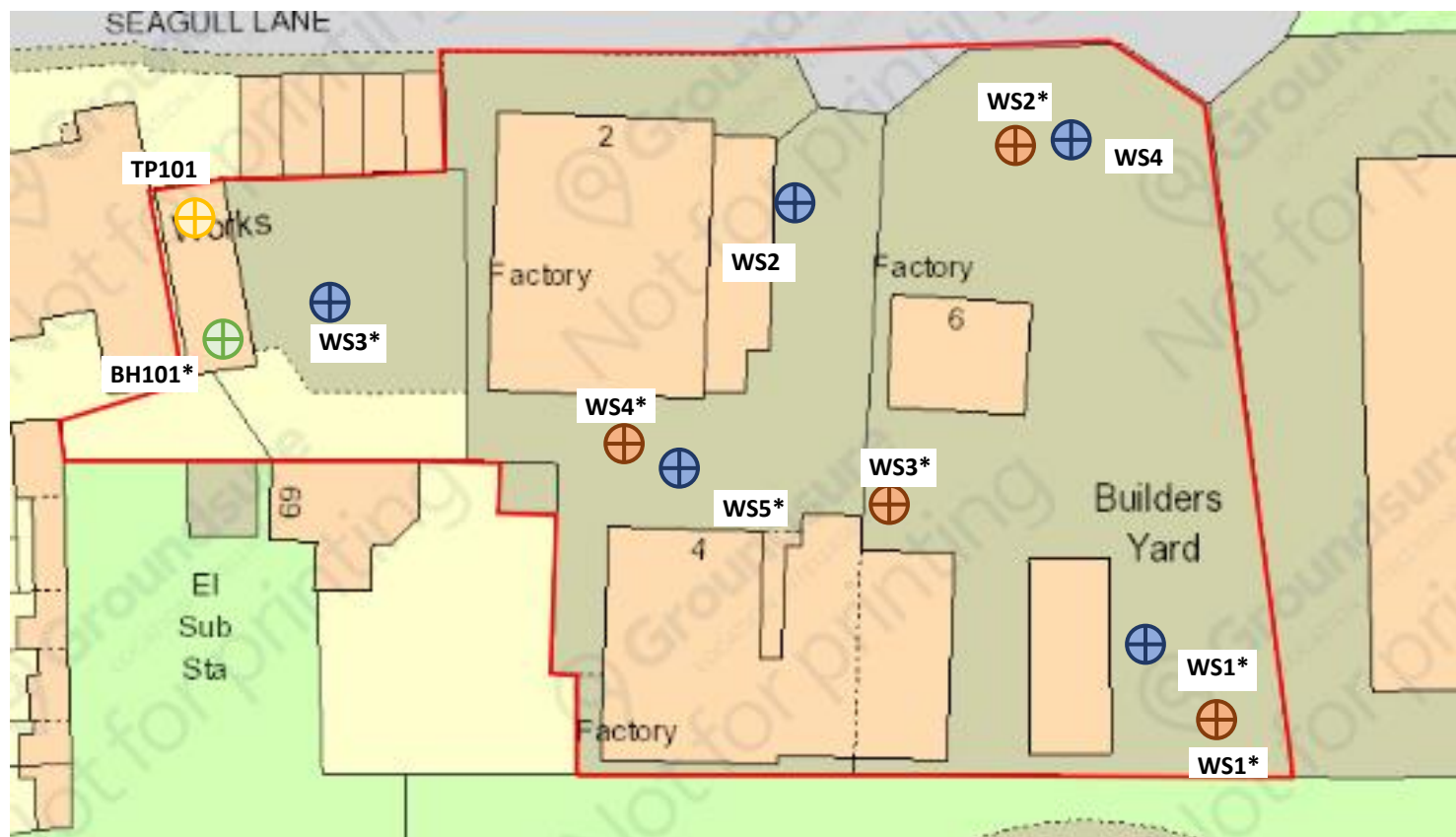
4th Phase:

⊕ Cut Down Cable
Percussion Borehole
with install (Nov 2025)

⊕ Hand dug trial pit
(Nov 2025)

**The blue well
installation locations
were destroyed/lost
during the demolition
process on-site.**

NTS



2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH

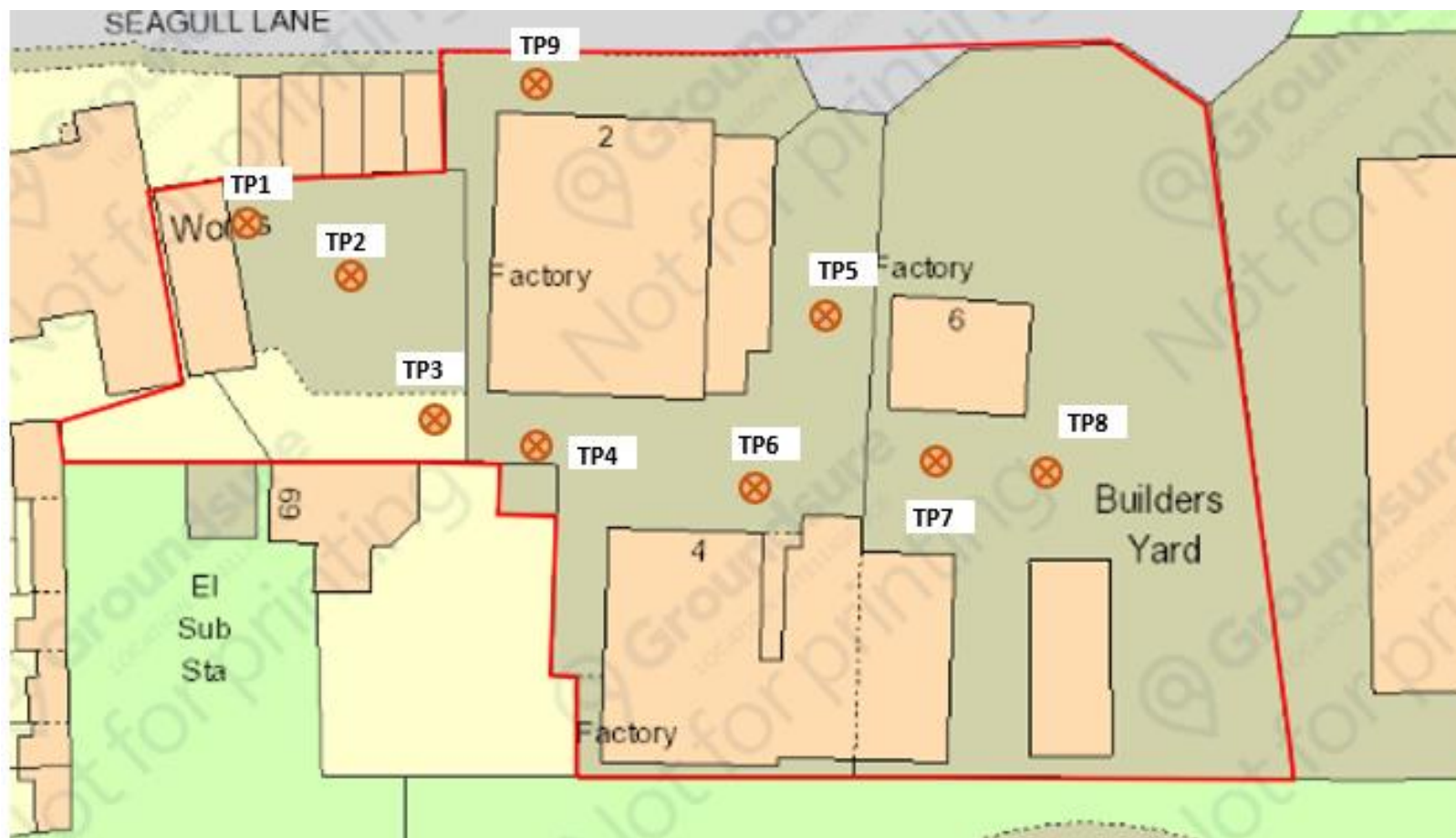
The Trustees of the Alitex DBSSAS

April 2026

Figure 4 – Trial Hole Location Plan (Boreholes)

GWPR6838





3rd Phase:

 Machine
Excavated Trial
Pits (July 2025)

NTS

2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH

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April 2026

Figure 5 – Trial Hole Location Plan (Trial Pits)

GWPR6838



APPENDIX A: Conditions and Limitations

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The report has been prepared on the basis of information, data and materials which were available at the time of writing. Accordingly, any conclusions, opinions or judgements made in the report should not be regarded as definitive or relied upon to the exclusion of other information, opinions and judgements.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Any decisions made by you, or by any organisation, agency or person who has read, received or been provided with information contained in the report ("you" or "the Recipient") are decisions of the Recipient and we will not make, or be deemed to make, any decisions on behalf of any Recipient. We will not be liable for the consequences of any such decisions.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Any Recipient must take into account any other factors apart from the Report of which they and their experts and advisers are or should be aware. The information, data, conclusions, opinions and judgements set out in the report may relate to certain contexts and may not be suitable in other contexts. It is your responsibility to ensure that you do not use the information we provide in the wrong context.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground

conditions have been sampled or monitored in recorded locations and tests for some of the more common chemicals generally expected. Other concentrations of types of chemicals may exist.

The conclusions and recommendations relate to 2 - 6 Seagull Lane, Emsworth, Hampshire PO10 7QH.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sampler borehole implies the specific technique used to produce a trial hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets, remain with Ground and Water Limited. Licence is for the sole use of the client and may not be assigned, transferred or given to a third party.

Only our client may rely on this report and should this report or any information contained in it be provided to any third party we accept no responsibility to the third party for the contents of this report save to the extent expressly outlined by us in writing in a reliance letter addressed from us to the third party.

Recipients are not permitted to publish this report outside of their organisation without our express written consent.

APPENDIX B:

Technical Glossary

TECHNICAL GLOSSARY

The list of possible definitions within the report may be seen below. Please note that some definitions may not be relevant to this report.

HYDROGEOLOGY:

A **Principal Aquifer** is a layer of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary (A) Aquifers consist of deposits with permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

Secondary (B) Aquifers consist of deposits with predominantly lower permeability layers with may stoke and yield limited amounts of groundwater due to localised features such as fissures, think permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary Aquifers (Undifferentiated) are assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both a minor aquifer and non-aquifer in different locations due to the variable characteristics of the rock type.

Unproductive Strata are rock layers with low permeability that have negligible significance for water supply or river base flow. These were formerly classified as non-aquifers.

FLOOD ZONES:

Environment Agency Flood Zone 2, defined as; land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

Environment Agency Flood Zone 3 shows the extent of a river flood with a 1 in 100 (1%0 or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

Environment Agency Flood Zone 3 area that benefits from flood defences, defined as; land and property in this flood zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

GROUNDWATER SOURCE PROTECTION ZONES (SPZS):

Inner Zone (SPZ1): This zone is 50 day travel time of pollutant to source with a 50 metres default minimum radius.

Outer Zone (SPZ2): This zone is 400 day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken.

Total Catchment (SPZ3): This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

Zone of Special Interest (SPZ4): This zone is where local conditions require additional protection.

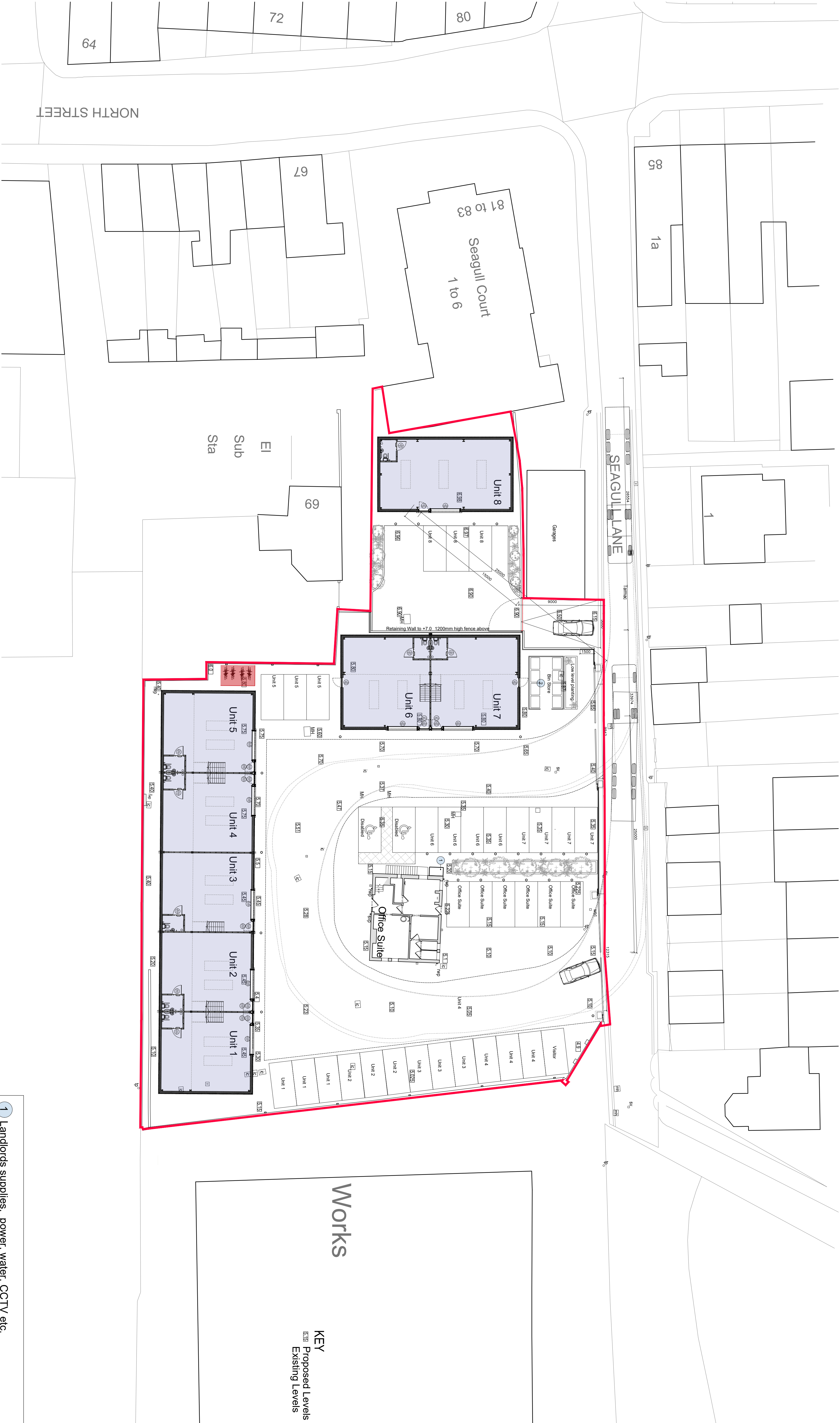
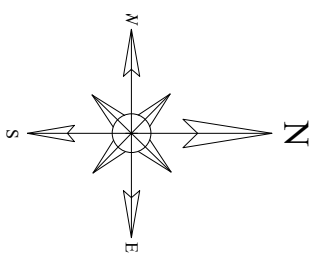
IN-SITU STRENGTH GEOTECHNICAL TESTING:

Windowless Sample and/or Cable Percussion and/or Rotary Boreholes provide samples of the ground for assessment but they do not give any engineering data. The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The test uses a thick-walled sample tube, with an outside diameter of 50mm and an inside diameter of 35mm, and a length of around 650mm. This is driven into the ground at the bottom of a borehole by blows from a slide hammer with a weight of 63.5kg falling through a distance of 760mm. The sample tube is driven 150mm into the ground and then the number of blows needed for the tube to penetrate each 75mm up to a depth of 450mm is recorded. The sum of the number of blows is termed the "standard penetration resistance" or the "N-value".

Dynamic Probing involves the driving of a metal cone into the ground via a series of steel rods. These rods are driven from the surface by a hammer system that lifts and drops a 63.5kg (SHDP) hammer onto the top of the rods through a set height, thus ensuring a consistent energy input. The number of hammer blows that are required to drive the cone down by each 100mm increment are recorded. These blow counts then provide a comparative assessment from which correlations have been published, based on dynamic energy, which permits engineering parameters to be generated. (The Dynamic Probe 'Super Heavy' (SHDP) Tests were conducted in accordance with BS 1377; 1990; Part 9, Clause 3.2).

APPENDIX C:

Proposed Development



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notes:

revisions:

A | 10.02.2022 | PT | Issued for Planning
B | 09.08.2022 | PT | Unit 8 parking amended
C | 30.01.2025 | PT | Updated for building control

revisions:

1 Landlords supplies, power, water, CCTV etc.

2 Central shared bin collection point - 6 no. Euro Bin - 3 general waste
3 recycling

Trustees of The Alltlex DBSSASS

Seagull Lane

Emsworth, Hampshire, PO10 7QH

drawing information

title : Proposed Site Plan

status :
date :
scale :
drawn :
checked :

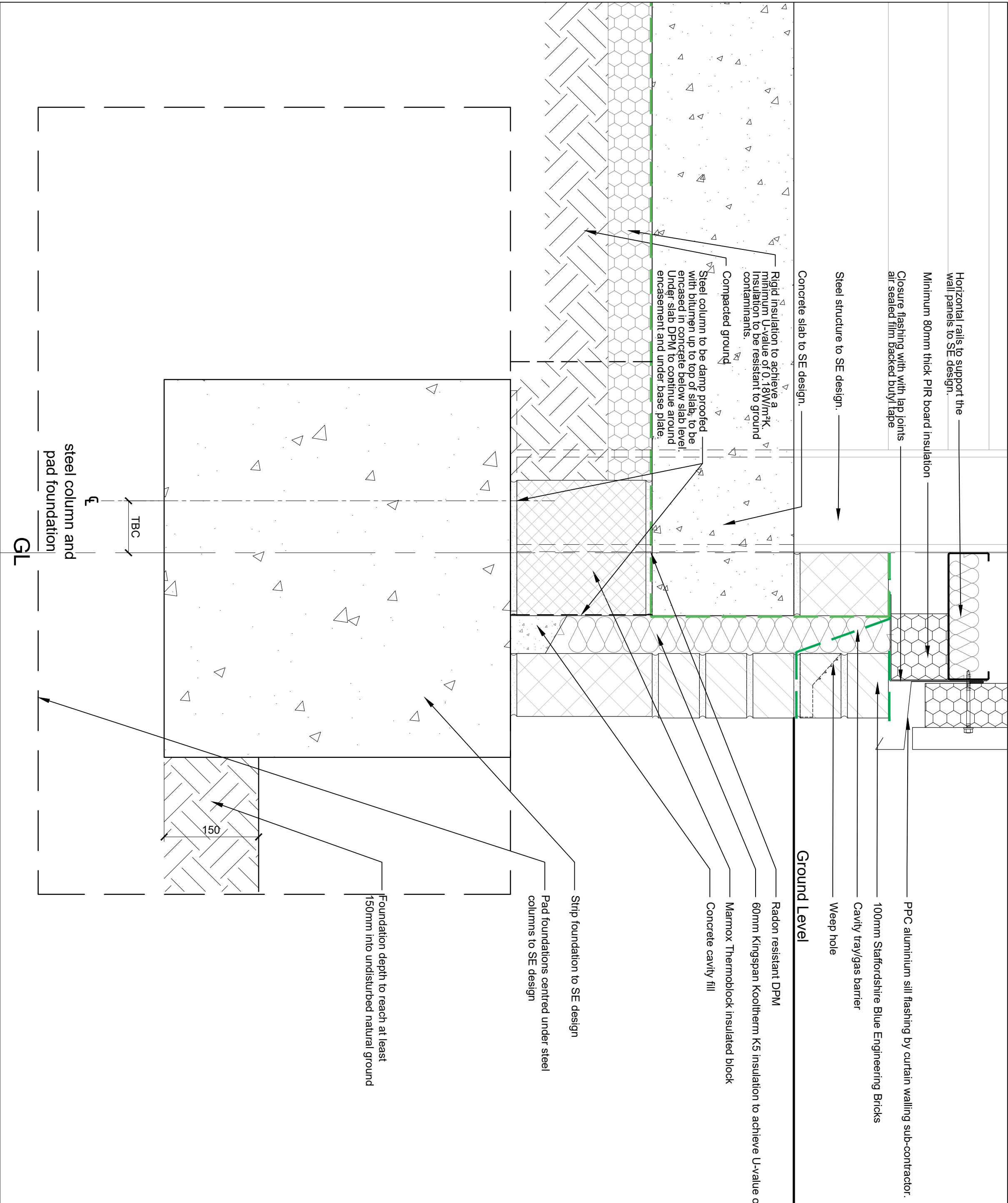
Information
November 21
1:200 @ A1
PT
Job: 5807
dwg: 1010
rev: C



PWP Architects Ltd 6 South Street, Havant, Hampshire PO9 1BZ
t: 02392 462404 f: 02392 481152
e: design@pwp-architects.com
w: www.pwp-architects.com

100mm @A1 50mm @A3

NOTE: The contractor is responsible for checking all site dimensions and levels. These should be checked prior to the ordering of any components and before the commencement of the works. All discrepancies should be brought to the attention of the Contract Administrator.



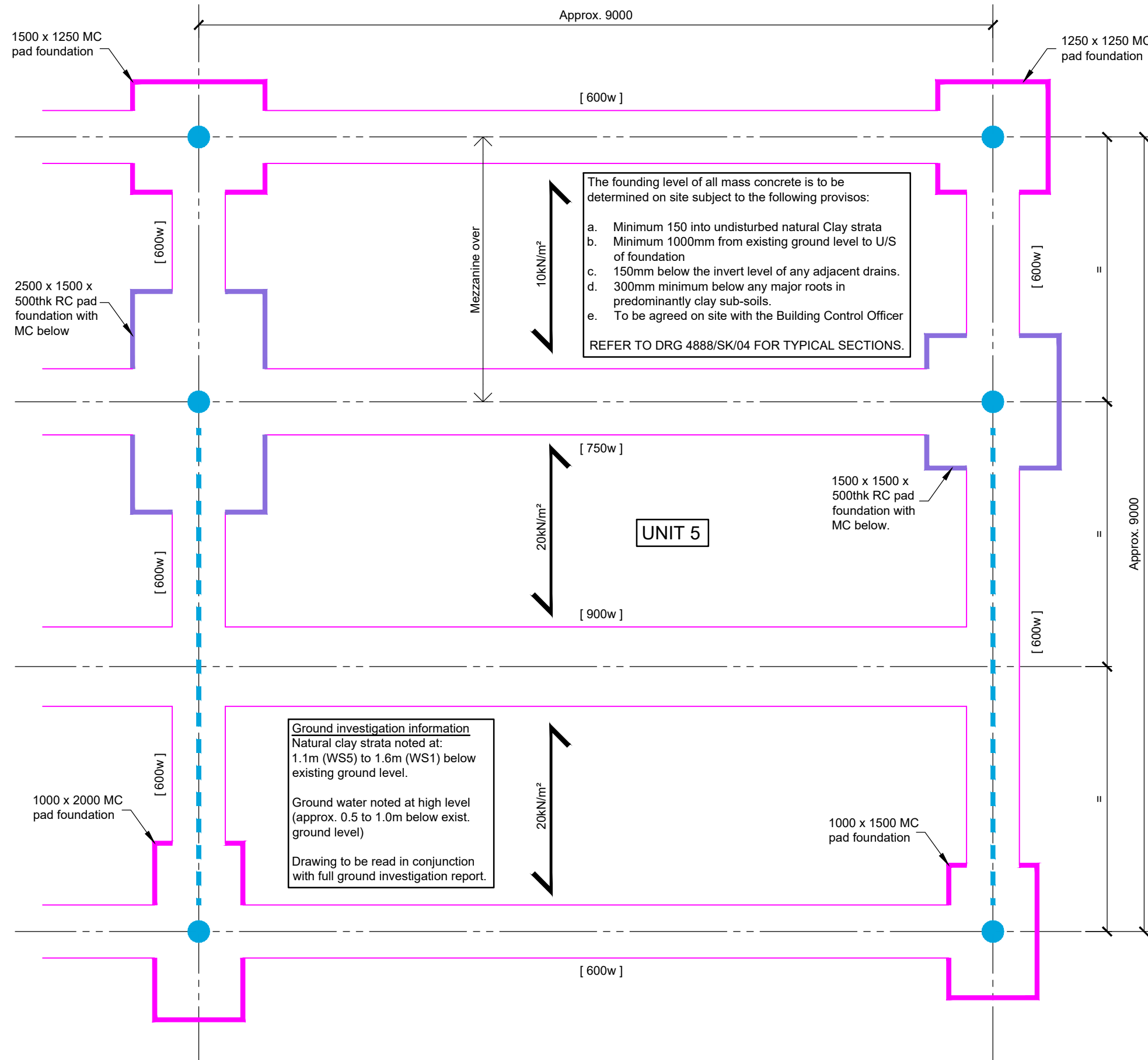
1. Standard plinth detail Units 1-8.

notes: revisions: A | 14.01.2025 | AG | Detail 1 amended to SE slab edge detail.

revisions:

100mm @A1 / 50mm @A3

NOTE: The contractor is responsible for checking all site dimensions and levels. These should be checked prior to the ordering of any components and before the commencement of the works. All discrepancies should be brought to the attention of the Contract Administrator.



KEY

- [600w] Indicates mass concrete (MC) trench foundations, widths noted thus [600w]. Foundations to be taken min. 150mm into undisturbed natural Clay strata (approx. 1.1 - 1.6m below existing ground level)
- Indicates mass concrete (MC) pad foundations centred under columns. Thickness noted on plan is minimum for pad size, increased to suit minimum 150 into undisturbed natural clay strata (as above).
- Indicates reinforced concrete (RC) pad foundations centred under columns. R.C. installed on min. 50mm mass concrete, increased to suit minimum 150 into undisturbed natural clay strata (as above).
- 20kN/m² Indicates span of minimum 225thk reinforced concrete (RC) slab, spanning between foundations. Designed to cater for imposed loading noted on span marks.
- Indicates assumed column position, to be confirmed by superstructure design Engineer.
- Indicates assumed bracing position, to be confirmed by superstructure design Engineer.

PRELIMINARY ISSUE

P2	01.11.23	Issued for information only	JM
P1	29.09.23	Issued for information only	JM
MK	DATE	REVISION	BY

JOB TITLE		
2-6 Seagull Lane Emsworth, PO10 7QH		
CLIENT		
M&M Hall Family Pension Trust		
SCALE	1:50	DRG. SIZE A3
DATE	Sept 23	ENG / TECH RC / JM
CHECKED		

DRAWING TITLE		
Unit 5 Scheme foundation layout		

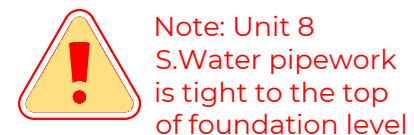
STRUCTURAL AND CIVIL CONSULTING ENGINEERS		
Forder House, High Street, Buriton, Petersfield, Hampshire GU31 5RX		
Telephone: 01730 266944 www.andrewsnewby.co.uk		
ANDREWS NEWBY PARTNERSHIP		

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DRAWING No.	4888 / SK / 01	REVISION	P2
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APPENDIX D:

Drainage Strategy



Note: Unit 8
S.Water pipework
is tight to the top
of foundation level

FOUL RUN						
Node	Cover Level	Invert Level	Backdrop	Depth (m)	Type	Cover Class
F1	6.970	6.449		0.521	300Ø poly	A15
F2	6.950	6.106		0.844	450Ø poly	A15
F3	6.850	4.845	5.899	2.005	1050Ø conc	C250
F4	5.750	4.667		1.083	450Ø poly	B125
F5	5.750	4.632		1.118	450Ø poly	B125
F6	5.150	4.300		0.850	Existing	D400
F7	5.070	4.050		1.020	Existing	C250
F8	5.300	4.560		0.740	450Ø poly	A15
F9	5.150	4.309		0.841	450Ø poly	A15
F10	5.750	5.245		0.505	450Ø poly	
F11	5.200	4.700		0.500	Gully	

All foul pipes to be 100 dia. laid 1 : 40 unless noted otherwise.
All cover levels are approximate. Cover classes to be in accordance with BS EN 124.
Cover types assumed; Recessed in paved landscape, solid in soft, solid in gravel drives
(all subject to final design by landscape architect)
Poly = Polypropylene manhole Conc = Precast concrete box/ring as appropriate

Form new saddle connection to
existing DN225 pipe to facilitate new
connection - requires S106
application with Southern Water
CL: 5.960 IL: 4.95 (approx. tbc on site)

DN150 vitrified clay pipe connecting
to 225 pipe using Fernco or equal
WRC approved saddle

Total Site 2724.7m²

PV5 - Shallow sub-base replacement
crates (permavoid) 300mm deep as
attenuation for run-off from Units 1-3,
Unit 6, bays and adjacent
concrete roadway (760m² area) giving
20.91m³ storage.
Base Level: 4.70
Top of crate: 5.00

S13 ControFlow Commercial (FC1) with
internal overflow weir and mesh guard,
discharge unit with orifice plate to
throttle outlet to 1.55l/s
CL 5.15 IL 4.565
Ex public sewer DN225 at 1.95

S14 ControFlow Commercial (FC1) with
internal overflow weir and mesh guard,
discharge unit with orifice plate to
throttle outlet to 1.55l/s
CL 5.100 IL 4.500

PV6 - shallow sub-base replacement
crates (permavoid) 300mm deep
linked to PV5 giving 25.6m³ storage.
Base Level: 4.565

S5 - 450 IC
CL: 6.150 IL: 5.150
S4
0.9m precast concrete
backdrop manhole
CL 6.90
BD 6.00
IL 5.300

Permavoid diffuser unit
with accessible sump
IL 6.39

S1 - ST300
CL 6.97
IL 6.43
Out 6.415

PV1 - Shallow sub-base
replacement crates (Permavoid) 150mm
deep as storage for roof
run-off from Unit 8
(57m² area) giving 4.9m³
storage under block
paving
Base Level: 6.390
Top crate: 6.540
Contractor to locally lower
top of foundation to allow
drainage pipes to pass over

Rwp with bottle gully to
give rodding access to
head of run IL: 6.66

PV2 - Shallow sub-base
replacement crates
(Permavoid) 150mm
deep as storage for roof
run-off from Unit 8
(57m² area) giving 4.9m³
storage under block
paving
Base Level: 6.390

F1 - 300IC
CL 6.97
IL 6.449
S2 - ST300
CL 6.97
IL 6.43
Out 6.415
Permavoid diffuser unit
with accessible sump
IL 6.39

Existing foul
drainage to be
grubbed out
F2 - 450IC
CL 6.95
IL 6.106

F3 - 1.05m precast
concrete backdrop
manhole
CL 6.85
BD 5.900
IL 4.845

Permavoid diffuser unit as
outlet
PV4 - Shallow sub-base
replacement crates
(permavoid) 300mm deep as
attenuation for roof run-off
from Unit 4&5 (171m² area)
giving 9.28m³ storage.
Base Level: 5.05

S7 - ControFlow Universal
(FC2) flow control chamber
with internal overflow weir
and mesh guard, with 32mm
orifice plate to throttle outlet
to 1.2l/s - CL 5.71 IL 5.175

Permavoid diffuser unit with
accessible sump IL 5.20

Rwp with bottle gully to
give rodding access to
head of run (open grate)
IL: 5.25

UNITS 1-5 - Foul drainage to be hung
above ground along external face of
building, with connections and rodding
points as detailed by M&E designer

ACO + sump

Permaceptor
filter and
treatment
unit

Sub
station

Permaceptor unit with
150 x 150 top access plate
IL 4.90

S10 - ST300
CL: 5.37
IL: 4.925
Out: 4.90

Contractor to locally lower
top of foundation to allow
drainage pipes to pass over

F10 - 450IC
CL 5.75
IL 5.240

Existing foul
drainage grubbed
out

F4 - 450IC
CL 5.75
IL 4.667

F5 - 450IC
CL 5.75
IL 4.635

S11 - ST300 CL: 5.75
IL: 5.20 Out: 5.175
Pipe Y'd into outlet
pipe from S7

S9 - SB500
CL 5.32
IL 4.732
Out 4.712

S8 - 450IC
CL 5.45
IL 4.785

Permavoid diffuser
unit with accessible
sump IL 4.70

ACO + sump

ACO out:
4.860

Bin slab: F11
trapped floor
gully IL 4.70

Existing foul pipes
and manholes
grubbed out

Permaceptor with
150 x 150 top access
plate IL: 4.80

ACO + sump

ACO

ACO

DRAINAGE LEGEND

- New foul water
- New storm water
- Existing foul
- Existing storm
- Drainage removed
- soil vent pipe
- flow control - ControFlow Universal
- flow control - ControFlow Commercial
- silt trap
- yard gully in pedestrian areas
- overflow gully
- channel drainage with flat grating
- channel drainage with brickslot grating
- downpipe with direct connection
- downpipe with gully
- Existing levels (topographical survey)
- Proposed finished ground levels
- Permeable paving - storage in sub-base
- Overland flow path

DRAINAGE STRATEGY STATEMENT

EXISTING SITE
The site currently comprises a series of light industrial buildings and concrete hard standings. The topography shows a fall from West to East, from a high point of 7.02 AOD and falling to a low spot of 4.45 in the South-East corner. A less prominent fall exists from North to South.

Due to the topography of the site, none of the run-off generated on site discharges to the existing surface water sewer in Seagull Lane, with all flows passing into the existing below ground drainage before conveyance to the foul sewer to the East of the site. The existing connection is considered a combined sewer, although Southern Water do not recognise it as such.

Intrusive Geotechnical investigation was carried out by Messrs Ground & Water Ltd, which identified a water table within 1.10m of ground level.

PROPOSED SURFACE WATER
Due to the high water table the use of infiltration techniques has been ruled out.

An attenuated discharge was sought, utilising the existing combined connection, but was rejected by the undertaker. It is therefore necessary to alter the existing site levels to reverse the fall to the North and allow a connection to the surface water sewer in Seagull Lane, which is very shallow.

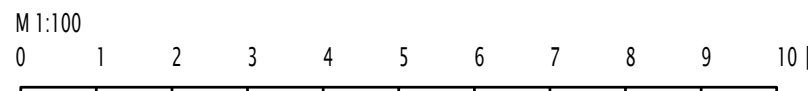
To account for the shallow discharge point, the strategy leverages permeable paving as a means of draining the hard standings and generally offering capture at or near source, with treatment and attenuation to the run-off.

Overland flows follow the existing West-to-East fall, with exceedance events directed away from the Units and onto parking spaces.

FOUL DRAINAGE
The existing foul drainage will be removed and re-laid to suit the revised building layouts, utilising the existing connection to the foul sewer to the East. The usage and foul load will not change from the existing situation, the number of units and users staying the same.

DRAWING TO BE READ IN
CONJUNCTION WITH EXTERNAL WORKS
DRAWINGS 13505-103 & 104

NOTE: DRAWING TO BE VIEWED/PRINTED
IN COLOUR



C1	16/6/25	CONSTRUCTION ISSUE	C1B	CB
P3	6/11/24	PV7 resized	C1B	CB
P2	4/11/24	Issued for Approval	C1B	CB
P1	15/5/24	First Issue	C1B	CB

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ARCHITECT pwp architects

CLIENT Alitex DBSSASS

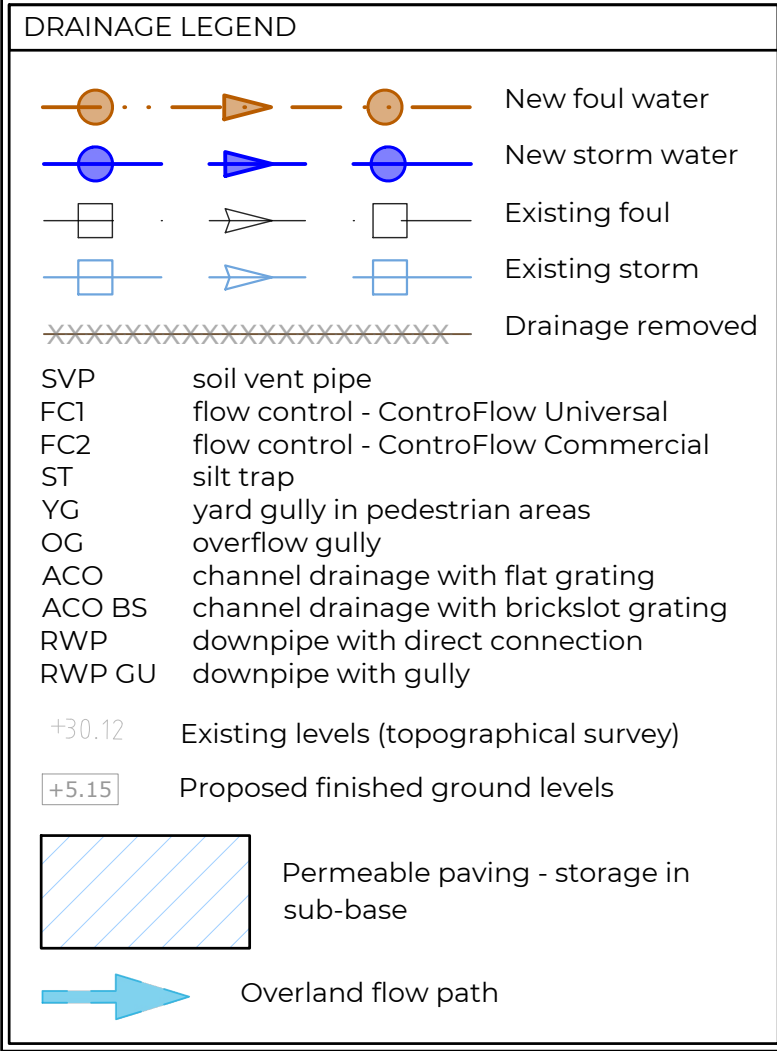
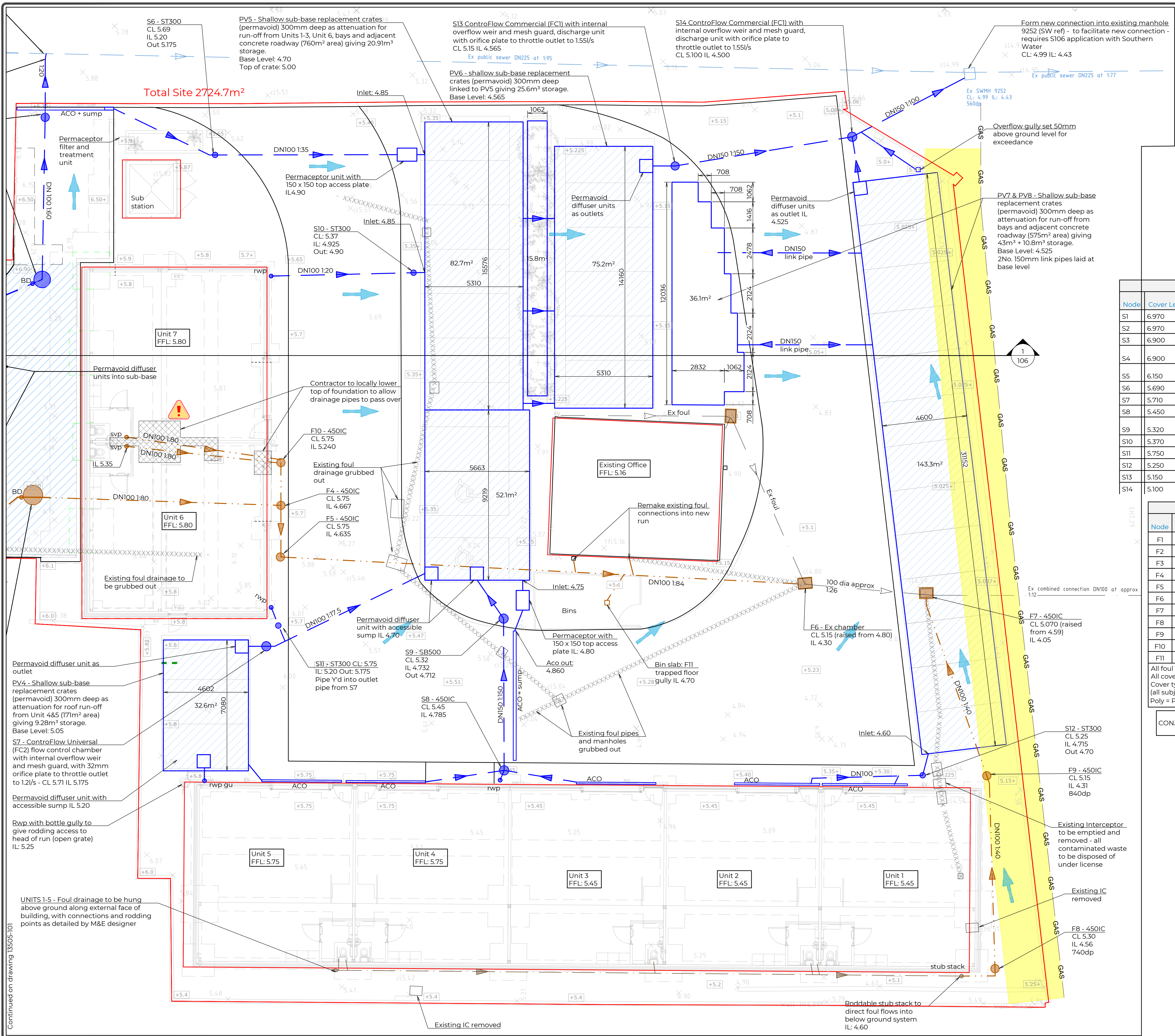
JOB TITLE 6 SEAGULL LANE, EMSWORTH

DWG TITLE LOCAL DRAINAGE PLAN 1 of 2

STATUS CONSTRUCTION

DWG NO 13505-101 **REV** C1

SCALE 1:100 @ A1 uno **DATE** AUG 2024 **DRAWN BY** C1B **CHECKED BY** CB



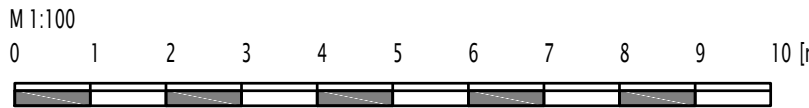
STORM WATER RUN								
Node	Cover Level	Invert Level	Backdrop	Depth (m)	Sump (m)	Type	Cover size	Cover Class
S1	6.970	6.430		0.880	0.340	300Ø poly	300Ø	A15
S2	6.970	6.430		0.880	0.340	300Ø poly	300Ø	A15
S3	6.900	6.100		1.100	0.300	450Ø poly	300Ø	A15
S4	6.900	5.300	6.000	1.600		900Ø conc	600 x 600	C250
S5	6.150	5.150		1.000		450Ø poly	450 x 450	C250
S6	5.690	5.200		0.830	0.340	300Ø poly	300Ø	B125
S7	5.710	5.175		0.835	0.300	300Ø poly	300Ø	A15
S8	5.450	4.785		0.665		300Ø poly	300Ø	A15
S9	5.320	4.732		1.038	0.450	450Ø poly	450 x 450	C250
S10	5.370	4.925		0.745	0.300	300Ø poly	300Ø	B125
S11	5.750	5.200		0.850	0.300	300Ø poly	300Ø	B125
S12	5.250	4.715		0.835	0.300	300Ø poly	300Ø	B125
S13	5.150	4.565		0.885	0.300	450Ø poly	450Ø	B125
S14	5.100	4.500		0.900	0.300	450Ø poly	450Ø	B125

FOUL RUN							
Node	Cover Level	Invert Level	Backdrop	Depth (m)	Type	Cover size	Cover Class
F1	6.970	6.449		0.521	300Ø poly	600 x 600	A15
F2	6.950	6.106		0.844	450Ø poly	450Ø	A15
F3	6.850	4.845	5.899	2.005	1050Ø conc	700 x 600	C250
F4	5.750	4.667		1.083	450Ø poly	450 x 450	B125
F5	5.750	4.632		1.118	450Ø poly	450 x 450	B125
F6	5.150	4.300		0.850	Existing	700 x 600	D400
F7	5.070	4.050		1.020	Existing	700 x 600	C250
F8	5.300	4.560		0.740	450Ø poly	450Ø	A15
F9	5.150	4.309		0.841	450Ø poly	450Ø	A15
F10	5.750	5.245		0.505	450Ø poly		
F11	5.200	4.700		0.500	Gully		

All foul pipes to be 100 dia, laid 1:40 unless noted otherwise.
All cover levels are approximate. Cover classes to be in accordance with BS EN 124.
Cover types assumed: Recessed in paved landscape, solid in soft, solid in gravel drives
(all subject to final design by landscape architect)
Poly = Polypropylene manhole. Conc = Precast concrete box/ring as appropriate

DRAWING TO BE READ IN CONJUNCTION WITH EXTERNAL WORKS DRAWINGS 13505-103 & 104

NOTE: DRAWING TO BE VIEWED/PRINTED IN COLOUR



REV	DATE	DESCRIPTION	REV BY	CHK BY
C1	16/6/25	CONSTRUCTION ISSUE		
P3	6/11/24	PV7 resized		
P2	4/11/24	Issued for Approval		
P1	15/5/24	First Issue		

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awawa Consulting Engineers
STRUCTURAL - CIVIL - PLUMBING
Barnes, Weybridge - Dorset, Dorset

ARCHITECT: pwp architects
CLIENT: Alitex DBSSASS

JOB TITLE: 6 SEAGULL LANE, EMSWORTH

DWG TITLE: LOCAL DRAINAGE PLAN 2 of 2

STATUS: CONSTRUCTION

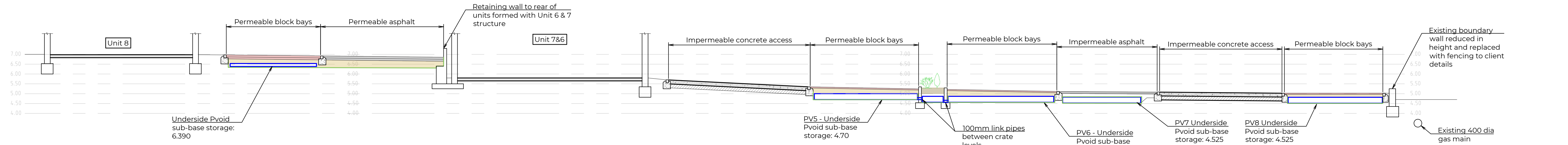
DWG NO: 13505-102

SCALE: 1:100 @ A1 uno

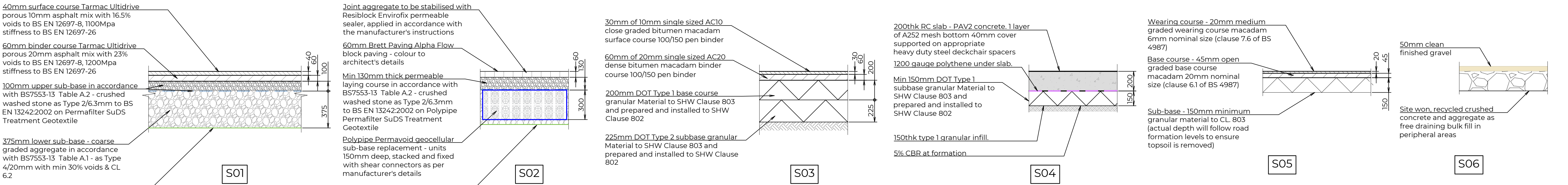
DATE: AUG 2024

DRAWN BY: CJB

CHECKED BY: CB



SITE LONG SECTION 1-1
1:100



PERMEABLE ASPHALT (UNIT 8 CAR PARK)
- ATTENUATION
1:20

ALPHA BLOCK PERMEABLE PAVING
PARKING BAYS ON SUB-BASE CRATES
1:20

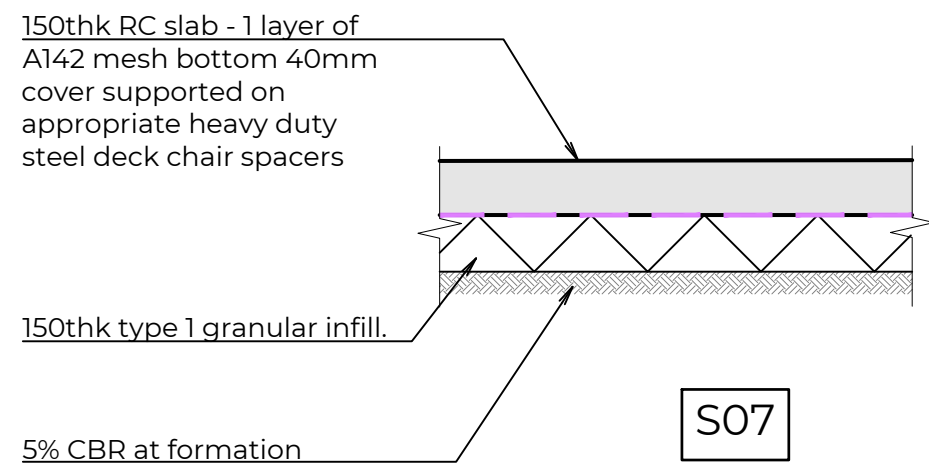
IMPERMEABLE ASPHALT CAR PARK AISLES
1:20

REINFORCED CONCRETE SLAB -
ACCESS WAY
1:20

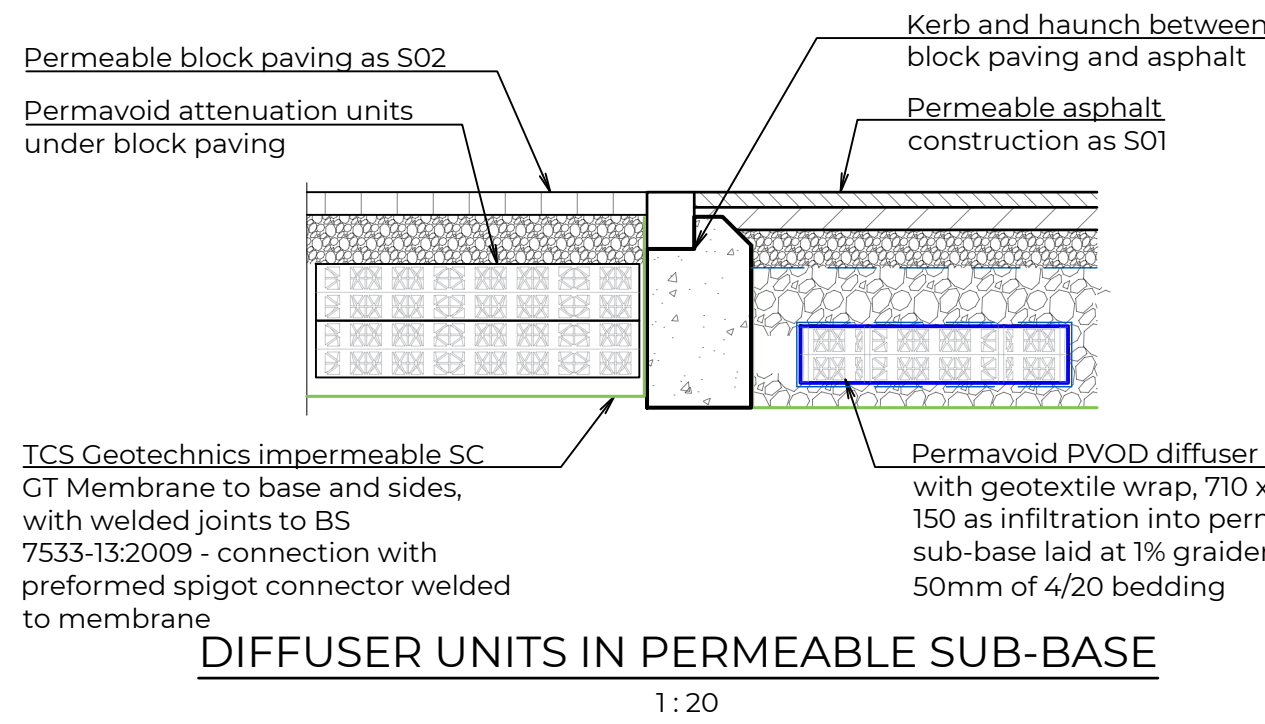
ASPHALT FOOTPATHS
1:20

GRAVEL FILL TO REAR OF UNITS
1:20

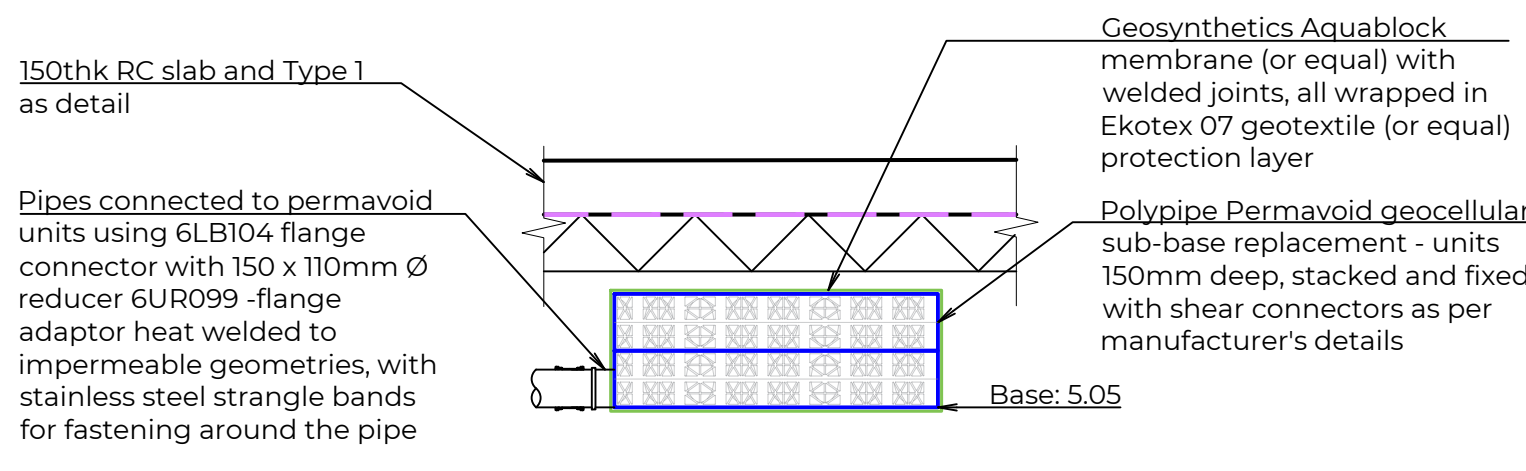
PAVING MAKE UPS ARE BASED ON A SUB-GRADE CBR OF 5%



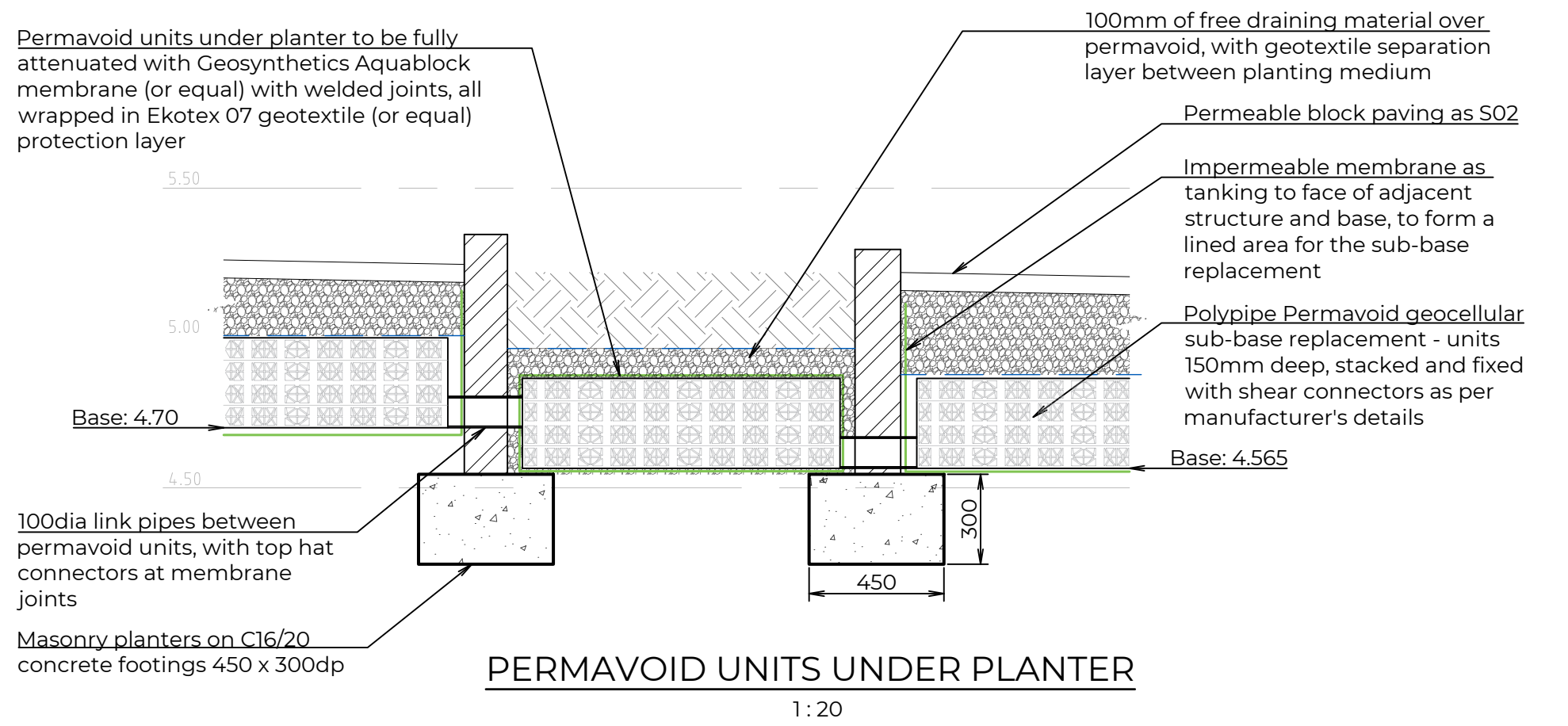
BIN SLAB SECTION
1:20



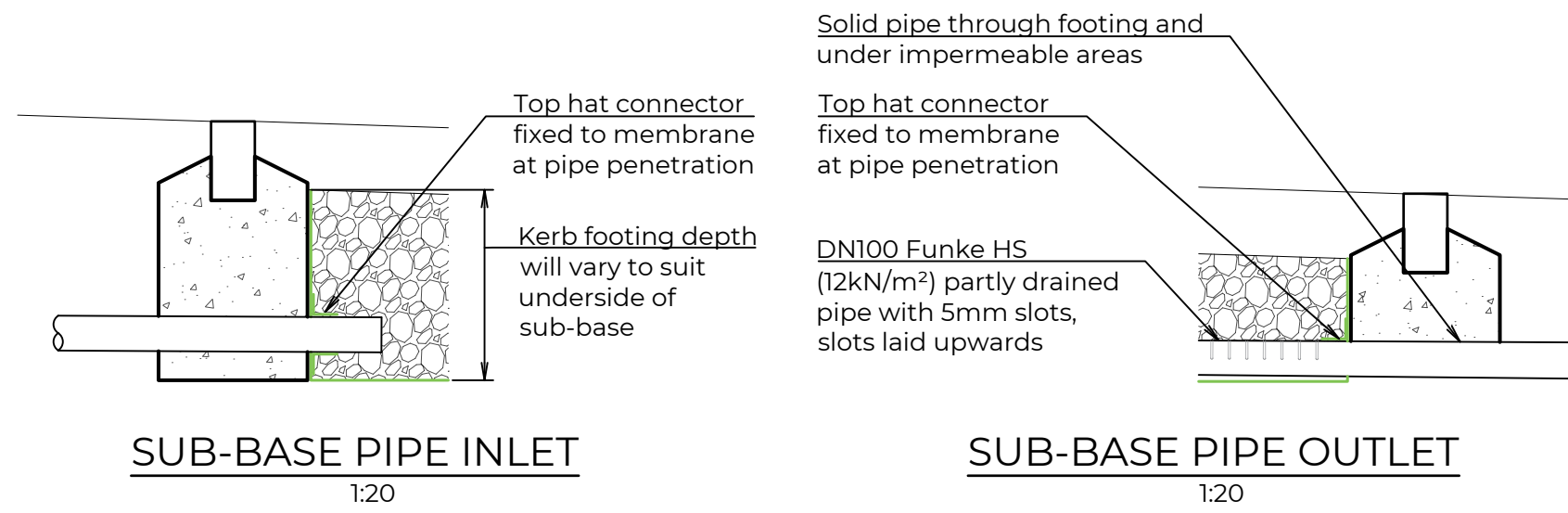
DIFFUSER UNITS IN PERMEABLE SUB-BASE
1:20



PERMAVOID UNITS UNDER BIN SLAB
1:20



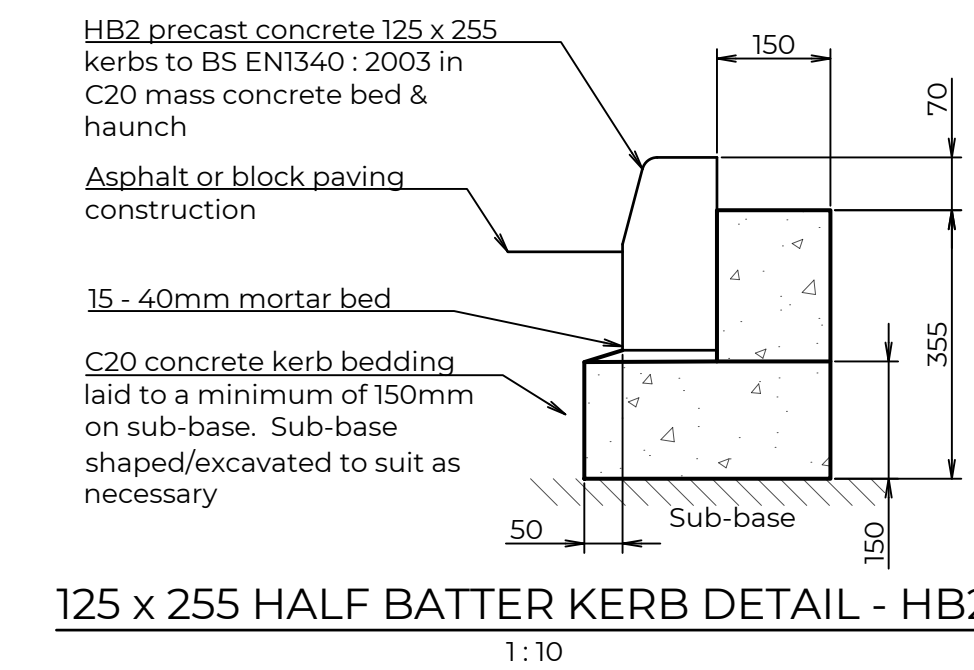
PERMAVOID UNITS UNDER PLANTER
1:20



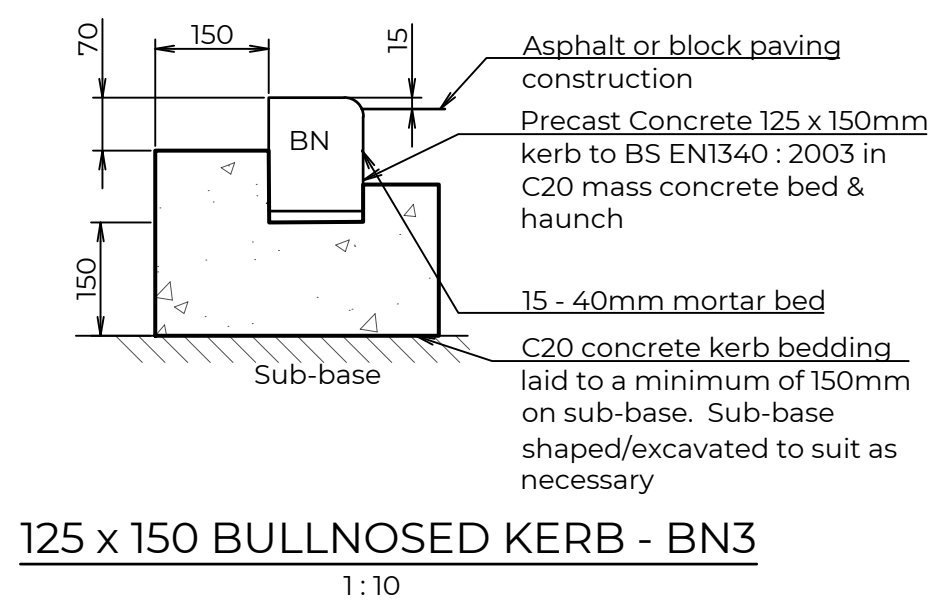
SUB-BASE PIPE INLET
1:20

SUB-BASE PIPE OUTLET
1:20

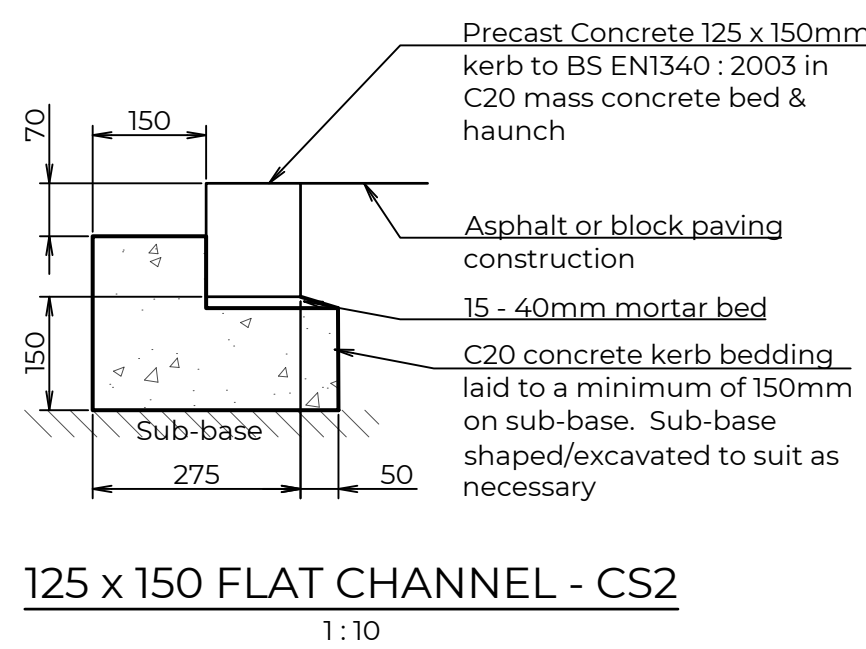
PEDESTRIAN KNEE RAIL FENCE
1:20



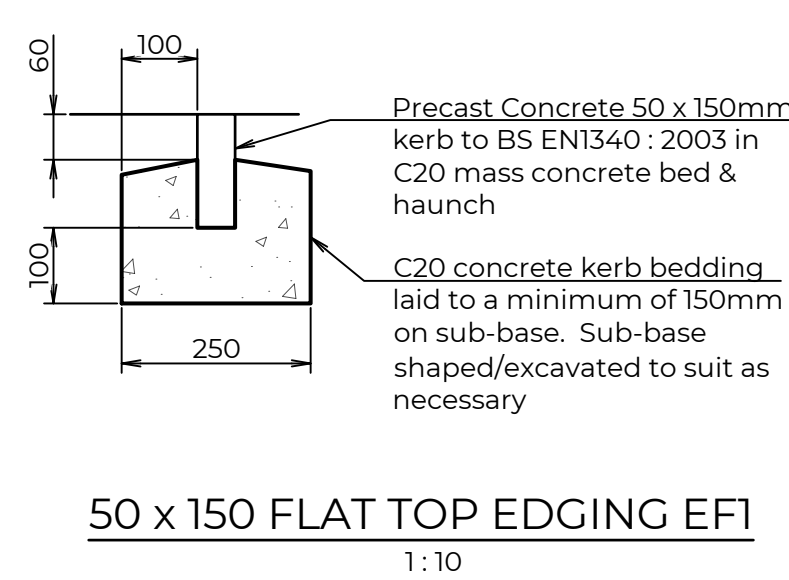
125 x 255 HALF BATTER KERB DETAIL - HB2
1:10



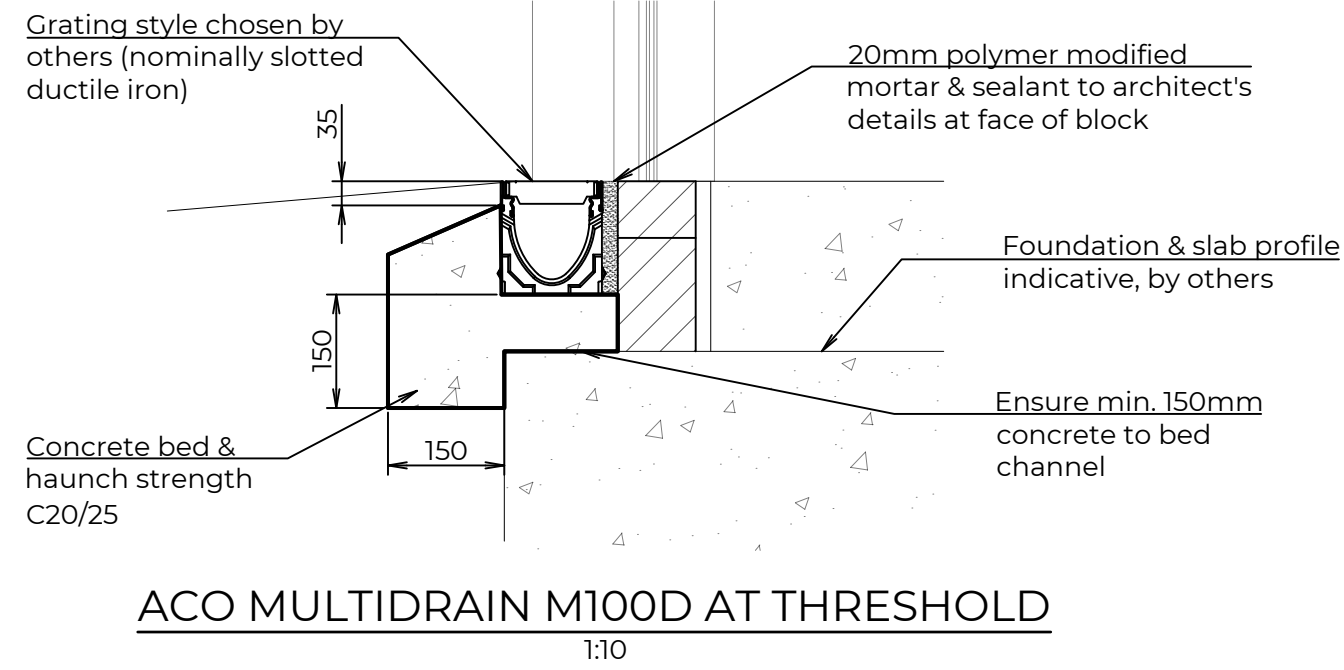
125 x 150 BULLNOSED KERB - BN3
1:10



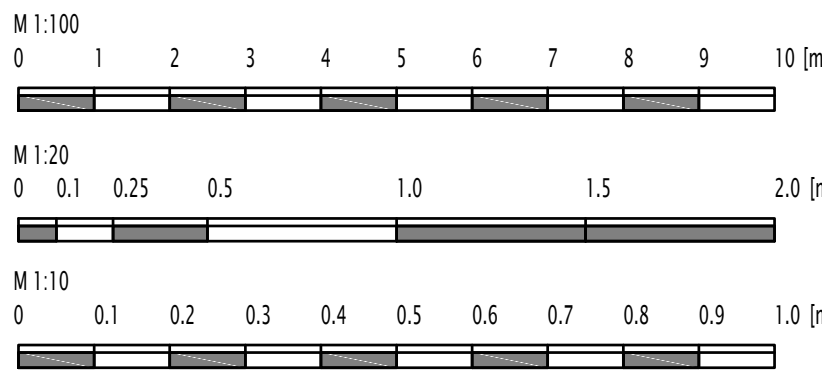
125 x 150 FLAT CHANNEL - CS2
1:10



50 x 150 FLAT TOP EDGING EF1
1:10



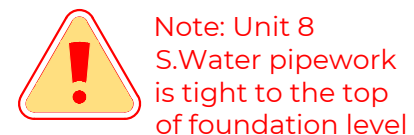
ACO MULTIDRAIN M100D AT THRESHOLD
1:10



C1	21/4/26	Linear membrane changed to welded joints	CJB	CB
C1	16/6/25	CONSTRUCTION ISSUE	CJB	CB
P1	4/1/24	Issued for Approval	CJB	CB
REV	DATE	REV/ISSUES	REV BY	CHK BY
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a company of				
 AWA ANDREW WARING ASSOCIATES		 Consulting Engineers STRUCTURAL - CIVIL - MARINE Barnes, Hounslow - Dids, Twickenham	 07794 524447	
			 mail@awaringengineers.com	
			 www.awaringengineers.com	
ARCHITECT			pwp architects	
CLIENT			Alitex DBSSASS	
JOB TITLE			6 SEAGULL LANE, EMSWORTH	
DWG TITLE				
SECTIONS AND BUILD UPS				
STATUS				
CONSTRUCTION				
DWG NO			REV	
13505-106			C2	
SCALE	DATE	DRAWN BY	CHECKED BY	
As shown @ A1 un	AUG 2024	CJB	CB	

APPENDIX E:

Topographic Drawings



Note: Unit 8
S.Water pipework
is tight to the top
of foundation level

FOUL RUN						
Node	Cover Level	Invert Level	Backdrop	Depth (m)	Type	Cover Class
F1	6.970	6.449		0.521	300Ø poly	A15
F2	6.950	6.106		0.844	450Ø poly	A15
F3	6.850	4.845	5.899	2.005	1050Ø conc	C250
F4	5.750	4.667		1.083	450Ø poly	B125
F5	5.750	4.632		1.118	450Ø poly	B125
F6	5.150	4.300		0.850	Existing	D400
F7	5.070	4.050		1.020	Existing	C250
F8	5.300	4.560		0.740	450Ø poly	A15
F9	5.150	4.309		0.841	450Ø poly	A15
F10	5.750	5.245		0.505	450Ø poly	
F11	5.200	4.700		0.500	Gully	

All foul pipes to be 100 dia. laid 1 : 40 unless noted otherwise.
All cover levels are approximate. Cover classes to be in accordance with BS EN 124.
Cover types assumed; Recessed in paved landscape, solid in soft, solid in gravel drives
(all subject to final design by landscape architect)
Poly = Polypropylene manhole Conc = Precast concrete box/ring as appropriate

Form new saddle connection to
existing DN225 pipe to facilitate new
connection - requires S106
application with Southern Water
CL: 5.960 IL: 4.95 (approx. tbc on site)

DN150 vitrified clay pipe connecting
to 225 pipe using Fernco or equal
WRC approved saddle

Total Site 2724.7m²

PV5 - Shallow sub-base replacement
crates (permavoid) 300mm deep as
attenuation for run-off from Units 1-3,
Unit 6, bays and adjacent
concrete roadway (760m² area) giving
20.91m³ storage.
Base Level: 4.70
Top of crate: 5.00

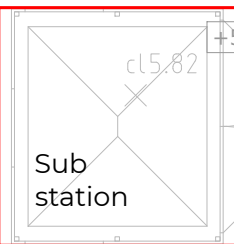
S13 ControFlow Commercial (FC1) with
internal overflow weir and mesh guard,
discharge unit with orifice plate to
throttle outlet to 1.55l/s
CL 5.15 IL 4.565
Ex public sewer DN225 at 1.95

S14 ControFlow Commercial (FC1) with
internal overflow weir and mesh guard,
discharge unit with orifice plate to
throttle outlet to 1.55l/s
CL 5.100 IL 4.500

PV6 - shallow sub-base replacement
crates (permavoid) 300mm deep
linked to PV5 giving 25.6m³ storage.
Base Level: 4.565

S5 - 450 IC
CL: 6.150 IL: 5.150
S4
0.9m precast concrete
backdrop manhole
CL 6.90
BD 6.00
IL 5.300

Permaceptor
filter and
treatment
unit



S1 - ST300
CL 6.97
IL 6.43
Out 6.415

Permavoid diffuser unit
with accessible sump
IL 6.39

PV1 - Shallow sub-base
replacement crates (Permavoid) 150mm
deep as storage for roof
run-off from Unit 8
(57m² area) giving 4.9m³
storage under block
paving
Base Level: 6.390
Top crate: 6.540

Contractor to locally lower
top of foundation to allow
drainage pipes to pass over

Rwp with bottle gully to
give rodding access to
head of run IL: 6.66

PV2 - Shallow sub-base
replacement crates
(Permavoid) 150mm
deep as storage for roof
run-off from Unit 8
(57m² area) giving 4.9m³
storage under block
paving
Base Level: 6.390

Permavoid diffuser unit
with accessible sump
IL 6.39

Existing foul
drainage to be
grubbed out
F2 - 450IC
CL 6.95
IL 6.106

F3 - 1.05m precast
concrete backdrop
manhole
CL 6.85
BD 5.900
IL 4.845

Permavoid diffuser unit as
outlet
PV4 - Shallow sub-base
replacement crates
(permavoid) 300mm deep as
attenuation for roof run-off
from Unit 4&5 (171m² area)
giving 9.28m³ storage.
Base Level: 5.05

S7 - ControFlow Universal
(FC2) flow control chamber
with internal overflow weir
and mesh guard, with 32mm
orifice plate to throttle outlet
to 1.2l/s - CL 5.71 IL 5.175

Permavoid diffuser unit with
accessible sump IL 5.20

Rwp with bottle gully to
give rodding access to
head of run (open grate)
IL: 5.25

UNITS 1-5 - Foul drainage to be hung
above ground along external face of
building, with connections and rodding
points as detailed by M&E designer

Contractor to locally lower
top of foundation to allow
drainage pipes to pass over

F10 - 450IC
CL 5.75
IL 5.240

Existing foul
drainage grubbed
out

F4 - 450IC
CL 5.75
IL 4.667

F5 - 450IC
CL 5.75
IL 4.635

Existing foul
drainage to be
grubbed out

Permavoid diffuser
unit with accessible
sump IL 4.70

S11 - ST300 CL: 5.75
IL: 5.20 Out: 5.175
Pipe Y'd into outlet
pipe from S7

S9 - SB500
CL 5.32
IL 4.732
Out 4.712

S8 - 450IC
CL 5.45
IL 4.785

ACO + sump

ACO out:
4.860

Bin slab: F11
trapped floor
gully IL 4.70

Existing foul pipes
and manholes
grubbed out

ACO

ACO

ACO

ACO

ACO

ACO

ACO

ACO

ACO

DRAINAGE LEGEND

- New foul water
- New storm water
- Existing foul
- Existing storm
- Drainage removed
- SVP soil vent pipe
- FC1 flow control - ControFlow Universal
- FC2 flow control - ControFlow Commercial
- ST silt trap
- YG yard gully in pedestrian areas
- OG overflow gully
- ACO channel drainage with flat grating
- ACO BS channel drainage with brickslot grating
- RWP downpipe with direct connection
- RWP GU downpipe with gully
- Existing levels (topographical survey)
- Proposed finished ground levels
- Permeable paving - storage in sub-base
- Overland flow path

DRAINAGE STRATEGY STATEMENT

EXISTING SITE
The site currently comprises a series of light industrial buildings and concrete hard standings. The topography shows a fall from West to East, from a high point of 7.02 AOD and falling to a low spot of 4.45 in the South-East corner. A less prominent fall exists from North to South.

Due to the topography of the site, none of the run-off generated on site discharges to the existing surface water sewer in Seagull Lane, with all flows passing into the existing below ground drainage before conveyance to the foul sewer to the East of the site. The existing connection is considered a combined sewer, although Southern Water do not recognise it as such.

Intrusive Geotechnical investigation was carried out by Messrs Ground & Water Ltd, which identified a water table within 1.10m of ground level.

PROPOSED SURFACE WATER
Due to the high water table the use of infiltration techniques has been ruled out.

An attenuated discharge was sought, utilising the existing combined connection, but was rejected by the undertaker. It is therefore necessary to alter the existing site levels to reverse the fall to the North and allow a connection to the surface water sewer in Seagull Lane, which is very shallow.

To account for the shallow discharge point, the strategy leverages permeable paving as a means of draining the hard standings and generally offering capture at or near source, with treatment and attenuation to the run-off.

Overland flows follow the existing West-to-East fall, with exceedance events directed away from the Units and onto parking spaces.

FOUL DRAINAGE
The existing foul drainage will be removed and re-laid to suit the revised building layouts, utilising the existing connection to the foul sewer to the East. The usage and foul load will not change from the existing situation, the number of units and users staying the same.

DRAWING TO BE READ IN
CONJUNCTION WITH EXTERNAL WORKS
DRAWINGS 13505-103 & 104

NOTE: DRAWING TO BE VIEWED/PRINTED
IN COLOUR



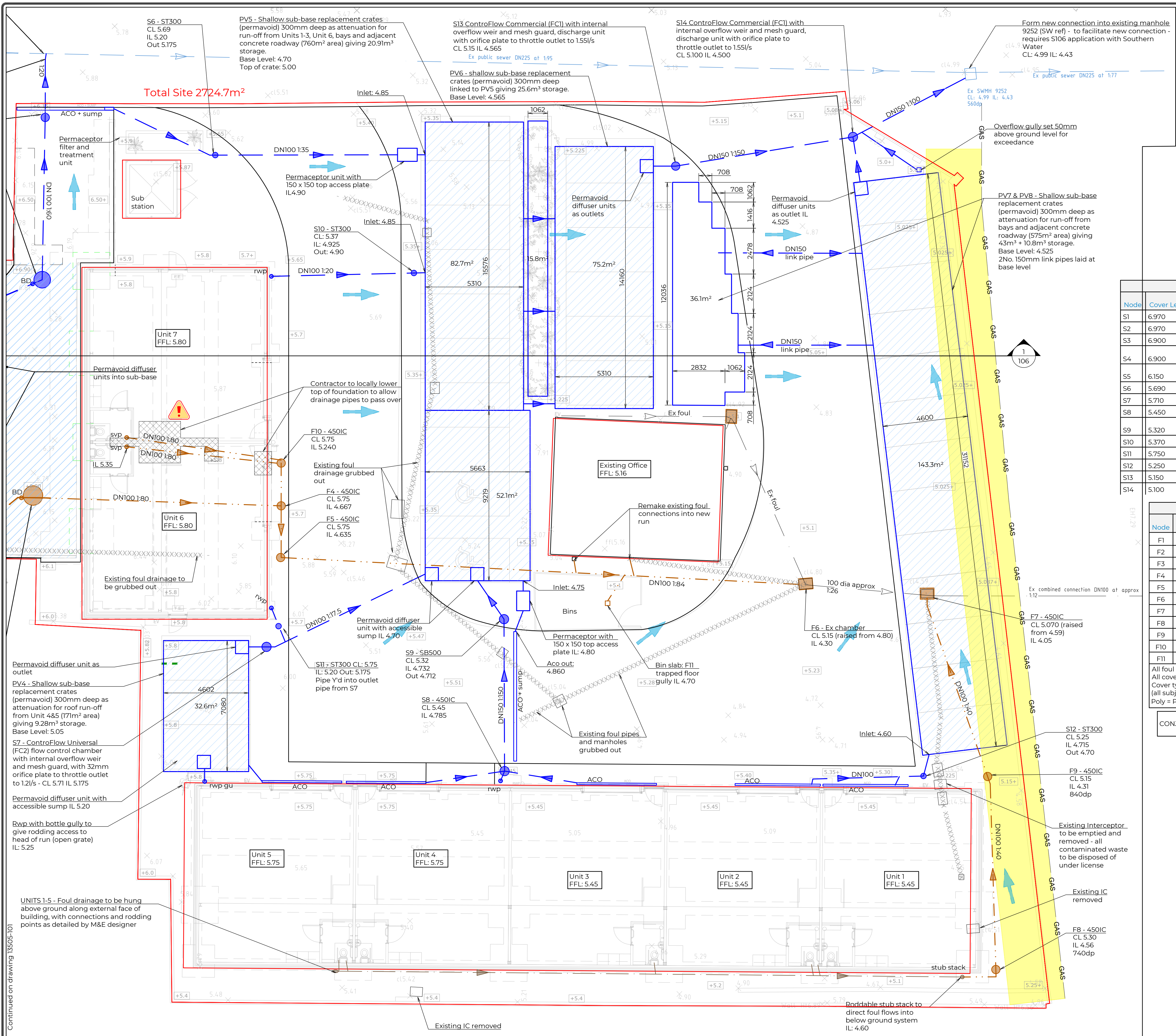
C1	16/6/25	CONSTRUCTION ISSUE	C1B	CB
P3	6/11/24	PV7 resized	C1B	CB
P2	4/11/24	Issued for Approval	C1B	CB
P1	15/5/24	First Issue	C1B	CB

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ARCHITECT	pwp architects
CLIENT	Alitex DBSSASS
JOB TITLE	6 SEAGULL LANE, EMSWORTH
DWG TITLE	LOCAL DRAINAGE PLAN 1 of 2
STATUS	CONSTRUCTION
DWG NO	13505-101
SCALE	1:100 @ A1 uno
DATE	AUG 2024
DRAWN BY	C1B
CHECKED BY	CB



DRAINAGE LEGEND

- New foul water
- New storm water
- Existing foul
- Existing storm
- Drainage removed
- SVP: soil vent pipe
- FC1: flow control - ControFlow Universal
- FC2: flow control - ControFlow Commercial
- ST: silt trap
- YG: yard gully in pedestrian areas
- OG: overflow gully
- ACO: channel drainage with flat grating
- ACO BS: channel drainage with brickslot grating
- RWP: downpipe with direct connection
- GU: downpipe with gully
- Existing levels (topographical survey)
- Proposed finished ground levels
- Permeable paving - storage in sub-base
- Overland flow path

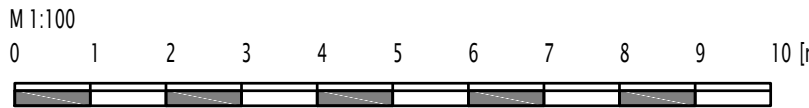
STORM WATER RUN								
Node	Cover Level	Invert Level	Backdrop	Depth (m)	Sump (m)	Type	Cover size	Cover Class
S1	6.970	6.430		0.880	0.340	300Ø poly	300Ø	A15
S2	6.970	6.430		0.880	0.340	300Ø poly	300Ø	A15
S3	6.900	6.100		1.100	0.300	450Ø poly	300Ø	A15
S4	6.900	5.300	6.000	1.600		900Ø conc	600 x 600	C250
S5	6.150	5.150		1.000		450Ø poly	450 x 450	C250
S6	5.690	5.200		0.830	0.340	300Ø poly	300Ø	B125
S7	5.710	5.175		0.835	0.300	300Ø poly	300Ø	A15
S8	5.450	4.785		0.665		300Ø poly	300Ø	A15
S9	5.320	4.732		1.038	0.450	450Ø poly	450 x 450	C250
S10	5.370	4.925		0.745	0.300	300Ø poly	300Ø	B125
S11	5.750	5.200		0.850	0.300	300Ø poly	300Ø	B125
S12	5.250	4.715		0.835	0.300	300Ø poly	300Ø	B125
S13	5.150	4.565		0.885	0.300	450Ø poly	450Ø	B125
S14	5.100	4.500		0.900	0.300	450Ø poly	450Ø	B125

FOUL RUN							
Node	Cover Level	Invert Level	Backdrop	Depth (m)	Type	Cover size	Cover Class
F1	6.970	6.449		0.521	300Ø poly	600 x 600	A15
F2	6.950	6.106		0.844	450Ø poly	450Ø	A15
F3	6.850	4.845	5.899	2.005	1050Ø conc	700 x 600	C250
F4	5.750	4.667		1.083	450Ø poly	450 x 450	B125
F5	5.750	4.632		1.118	450Ø poly	450 x 450	B125
F6	5.150	4.300		0.850	Existing	700 x 600	D400
F7	5.070	4.050		1.020	Existing	700 x 600	C250
F8	5.300	4.560		0.740	450Ø poly	450Ø	A15
F9	5.150	4.309		0.841	450Ø poly	450Ø	A15
F10	5.750	5.245		0.505	450Ø poly		
F11	5.200	4.700		0.500	Gully		

All foul pipes to be 100 dia, laid 1:40 unless noted otherwise.
All cover levels are approximate. Cover classes to be in accordance with BS EN 124.
Cover types assumed: Recessed in paved landscape, solid in soft, solid in gravel drives
(all subject to final design by landscape architect)
Poly = Polypropylene manhole. Conc = Precast concrete box/ring as appropriate

DRAWING TO BE READ IN CONJUNCTION WITH EXTERNAL WORKS DRAWINGS 13505-103 & 104

NOTE: DRAWING TO BE VIEWED/PRINTED IN COLOUR



REV	DATE	DESCRIPTION	REV BY	CHK BY
C1	16/6/25	CONSTRUCTION ISSUE		
P3	6/11/24	PV7 resized		
P2	4/11/24	Issued for Approval		
P1	15/5/24	First Issue		

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ARCHITECT: pwp architects
CLIENT: Alitex DBSSASS
JOB TITLE: 6 SEAGULL LANE, EMSWORTH
DRAWN TITLE: LOCAL DRAINAGE PLAN 2 of 2
STATUS: CONSTRUCTION
DRAW NO: 13505-102
SCALE: 1:100 @ A1 uno
DATE: AUG 2024
DRAWN BY: CJB
CHECKED BY: CB

APPENDIX F:

Asbestos

Management

Strategy

Asbestos Management Strategy

1. Management Plan

The measures outlined in the following sections are designed to ensure that potential contamination does not endanger groundworkers or end-users of the proposed development and those end-users do not come into contact with potentially contaminated materials.

- Further to this asbestos management strategy, on-site induction/toolbox talks should be given to all site workers. These toolbox talks should highlight the site-specific asbestos risks and what procedures should be undertaken to minimise the risk of exposure to workers (e.g. damping down and appropriate PPE use when excavating/disturbing any soils where residual asbestos is present). Any personnel on-site should be made aware of this Asbestos Management Strategy as part of the toolbox talks.
- The site manager and any Ground and Water Limited Engineers/Technicians should have asbestos awareness qualifications.
- Asbestos containing soils must not be reused on-site. Therefore, any soils of the Made Ground containing asbestos that is excavated must be removed to a suitably licensed facility.
- All groundworks where there is excavation/disturbance of the asbestos contaminated Made Ground on-site should be undertaken with sufficient damping down to minimize the production of dust/airborne asbestos fibres. Damping down should be undertaken using a water tanker/bowser/other suitable water supply which can cover the area of excavation/disturbance with a fine spray of water.
- There may be areas of contamination/buried asbestos containing materials (ACMs) that have not been identified during the intrusive investigation. Such occurrences may be discovered during the construction phases for the redevelopment of the site. Groundworkers should be instructed to report to the Site Manager if they encounter any evidence for such contamination.

Should evidence of potential ACM's or fibres be identified during the works then the following procedures should be adopted:

- Upon discovery of suspected ACMs, groundworks within the vicinity should be halted and Ground and Water Limited should be informed such that appropriate remedial measures and health and safety protection may be applied.
- It is considered likely that any further asbestos remediation required on-site will be Non-licensed Non-notifiable Asbestos Activity. Ground and Water Limited Engineers are all non-licensed operatives. However, should pipe lagging or loose fill installation/fibrous materials be encountered, HSE will need to be notified and remediation will need to be undertaken by an appropriately licensed asbestos removal contractor.
- Should a new source of contamination be suspected or identified then the Local Authority will need to be informed.
- It is recommended that in the event of contamination being identified, remedial works are supervised by a Ground and Water Limited Engineer. This will allow for supervision and segregation of the waste produced whilst remedial works are ongoing. This may reduce overall disposal costs.
- Stockpiled materials, destined for removal from site, must be placed on an impermeable liner with raised edge and must be covered at all times.
- Stockpiles will need to be named/assigned to differentiate and their location and size marked.
- It is recommended a separate skip be brought to site that is designated as the asbestos skip for all contaminated PPE and samples to be disposed in.

Given the nature of the works these works are likely to be classified as a Non-licensed Non-notifiable Asbestos Activity. Ground and Water Limited Engineers are all non-licensed operatives.

2. General/Site Safety

General PPE required during the works will be:

- Safety glasses;
- Gloves;
- Hard Hat, safety boots and hi-vis jackets;

Should potential ACMs be encountered then the following PPE would also be required until such point as it can be proven that the asbestos has been successfully remediated:

- Face-Fitted PP3 Particulate Masks;
- 2x 16 – 18L Knapsack Sprayers to minimise dust production during sampling.
- Tyvex suits (Type 6 Minimum) and Shoe covers.

Mobile telephones will be held by designated personnel and these would be used to contact the emergency services in the event of an emergency. Wearing shorts is not allowed.

Should further remediation be necessary, supervision of the work area will be undertaken by a Ground and Water Limited Engineer during works. We have assumed that the Main Contractor will cordon off the working area associated with the remediation.

We have assumed that a suitable water supply will be present on-site to enable damping down of soils and excavations.

All site operatives/personnel will need to comply with site regulations.

3. Sampling

Fragments of suspected cement bound asbestos identified during the works will be double bagged in accordance with the Non-licensed training undertaken. Cement bound debris will be placed within the red plastic bags first and sealed with a swan-neck and zip tie. The red bag will then be placed within an additional white bag with swan neck and zip tie closure.

The double bags will then be placed within the asbestos skips present on-site.

4. Decontamination

At the end of the day, and any subsequent days work, all PPE, including masks, suits and shoe covers, will be double bagged in line with the requirements of the bound asbestos materials and disposed of in the same way.

5. Dust and Vapours

All groundworks where there is excavation/disturbance of the Made Ground on-site should be undertaken with sufficient damping down to minimize the production of dust/airborne asbestos fibres, this includes damping down of material in buckets and tyres during vehicle movement.

Damping down should be undertaken using a water tanker/bowser/other suitable water supply which can cover the area of excavation/disturbance with a fine spray of water.

APPENDIX G:

Discovery Strategy

Discovery Strategy

There may be areas of contamination that have not been identified during the course of the intrusive investigation (e.g. underground storage tanks). Such occurrences may be discovered during the construction phases for the redevelopment of the site. The Principal Contractor for this development will be responsible for the discovery strategy being followed.

Groundworkers should be instructed to report to the Site Manager any evidence for such contamination; as part of any site induction a toolbox talk on the potential signs of contamination that may be encountered at the site should be undertaken. A signed record of anyone that has received the toolbox talk should be kept and provided at the end of construction along with a signed letter from the Principal Contractor confirming whether any contamination was encountered.

The toolbox talk must cover the following:

Visual indicators:

- Fibrous materials within the soil,
- Discolouration of soil (photos can be provided for what has already been seen on site).

Olfactory indicators:

The nature of any odour must be communicated:

- The strength of the odour should be categorised by:
 - Weak (just detectable at source);
 - Distinct (detectable immediately adjacent to source);
 - Strong (detectable up to 20m from source, bearable at source); or
 - Very strong (detectable >20m from source, pungent at source).
- The following odour types should be used:
 - Hydrogen Sulfide (H₂S) (rotten egg);
 - Mercaptan (Rotten cabbage);
 - Naphthalene (mothballs);
 - Solvent (acetone – nail varnish);
 - Chlorinated solvent ('Tippex');
 - Acetic (vinegar);
 - Fuel (petrol, diesel, paraffin);
 - Mineral oil (engine oil, lubricating oil);
 - Creosote / coal tar;
 - Putrid (decaying waste).

Well-being indicators:

- Light-headedness,
- Dizziness,
- Blacking out.

Should any of these be encountered by the groundworkers, they must be reported to the site manager immediately. It is the site manager's responsibility to seek advice from a suitably qualified person before proceeding, such that appropriate remedial measures and health and safety protection may be applied.

It is a requirement that any suspected contamination is reported to the Local Authority as soon as practically possible and no further development (unless otherwise agreed in writing by the Council) shall be carried out until a report indicating the nature of the contamination and how it is to be dealt with is submitted to, and agreed in writing by, the Council.

Following the completion of the works, the site manager must pass all information with respect to the discovery strategy to the Principal Contractor and Ground and Water Limited for inclusion within the verification report. A summary statement written by an experienced individual who has been on-site during the works saying that no contamination was found must also be included within the verification report, should this be the case.

APPENDIX H:

Soil

Assessment

Criteria

Ground and Water Limited

Soil Guideline Values and Generic Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'. At preliminary risk assessment stage, risks are evaluated qualitatively. As the site investigation progresses to a generic or detailed quantitative risk assessment, data is collected and assessment criteria are utilised to evaluate whether the contaminants represent an unacceptable risk to the identified receptors.

1. Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:

- 1) EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
- 2) EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
- 3) EA CLEA Bulletin (2009).
- 4) CLEA software version 1.07 (2015)
- 5) Toxicological reports and SGV technical notes.

The CLEA guidance and tools:

- Do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures;
- Do not cover risks to the environment, such as groundwater, ecosystems or buildings;
- Do not provide a definitive test for telling when human health risks are significant; and
- Are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

1.1. Land-use Scenarios

The CLEA model uses a range of standard land-use scenarios to develop conceptual exposure models outlined in the following sections.

1.1.1. Residential (with home grown produce) (RwHP)

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil and indoor dust ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
- Building type is a two-storey small-terraced house.

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur. (Residential without homegrown produce (RwoHP)).

1.1.2. Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
- There is no building.

1.1.3. Commercial/Industrial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

- Critical receptor is a working female adult (aged 16 to 65 years old).
- Exposure duration is a working lifetime of 49 years.
- Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
- Building type is a three-storey office (pre 1970).

2. LQM/CIEH Suitable 4 Use Levels (S4UL)

For derivation of these S4UL reference must be made to:

Nathanial, P., McCaffrey, C., Gillet, A., Ogden, R., Nathanial, J., *The LQM/CIEH S4UL's for Human Health Risk Assessment*. Land Quality Press. 2015

2.1. S4UL Background

The Land Quality Management/Chartered Institute of Environmental Health (LQM/CIEH) S4UL for a given land use is the concentration of the contaminant in soil at which the predicted daily exposure,

as calculated by the CLEA software, equals the Health Criteria Value. The S4ULs have been derived for substances based on various generic land use and soil organic matter contents.

The final output for each contaminant represents a synthesis of new toxicological (and fate and transport) reviews published since the preparation of the 2nd edition LQM/CIEH GAC's (Nathanial et al., 2009).

In the derivation of LQM/CIEH S4UL's the principles of 'minimal' or 'tolerable' risk enshrined in SR2, which has not been withdrawn, has been maintained.

2.2. S4UL Land-use

S4UL's have been derived for the basic CLEA land-uses, as described in section 1.2, and for two new land uses:

- Public Open Spaces near Residential Housing (POSresi).
- Public Park (POSpark).

2.2.1. Public Open Spaces near Residential Housing (POSresi)

Includes the predominantly grassed areas adjacent to high density housing, the central green area on many 1930's – 1970's housing estates, and smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soils with planting. It is assumed that the close proximity to the place of residence will allow tracking back of soil to occur.

2.2.2. Public Park (POSpark)

An area of open space, usually owned and maintained by the local authority, provided for recreational uses including family visits and picnics, children's play area, informal sporting activities (not a dedicated sports pitch), and dog walking. It is assumed that tracking back of soils into places of residence will be negligible.

The following LQM/CIEH S4ULs (Copyright Land Quality Management Limited) have been reproduced with permission, to the publication number S4UL3072.

3. Category 4 Screening Levels (C4SLs)

In the case of Lead, no SGV or GAC has been published to date. This is likely to be due to the toxicity review that is currently being undertaken by the Environment Agency. In the absence of updated toxicity information the SGV derived using CLEA 1.07 methodology and related toxicity will be used.

The overall objective of the C4SLs research project was to assist the provision of technical guidance in support of Defra's revised Statutory Guidance (SG) for Part 2A of the Environmental Protection Act 1990 (Part 2A) (Defra, 2012a). Specifically, the project aimed to deliver:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised SG presented a new four category

system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high. More specific guidance on what type of land should be considered as Category 4 (Human Health) is provided in Paragraphs 4.21 and 4.22 of the revised SG, as follows:

“4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.

(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

4.22 The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4: Human Health if following a detailed quantitative risk assessment it is satisfied that the level of risk posed is sufficiently low.”

The C4SLs are intended as “relevant technical tools” (in relation to Paragraph 4.21(c)) to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

“The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land.”

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

“SGVs are guidelines on the level of long-term human exposure to individual chemicals in soil that, unless stated otherwise, are tolerable or pose a minimal risk to human health.”

The implication of Paragraph 47(h) of the IA is that minimal risk is well within Category 4 and that the C4SLs should describe a higher level of risk which, whilst not minimal, can still be considered low enough to allow a judgement to be made that land containing substances at, or below, the C4SLs would typically fall within Category 4. This reflects Paragraph 4.20 of the revised SG, which states:

“4.20 The local authority should not assume that land poses a significant possibility of significant harm if it considers that there is no risk or that the level of risk posed is low. For the purposes of this Guidance, such land is referred to as a “Category 4: Human Health” case. The authority may decide that the land is a Category 4: Human Health case as soon as it considers it has evidence to this effect, and this may happen at any stage during risk assessment including the early stages.”

C4SLs, therefore, should not be viewed as “SPOSH levels” and they should not be used as a legal trigger for the determination of land under Part 2A.

The generic screening values referred to before usually take the form of risk-based Soil Guideline Values (SGVs) or other Generic Assessment Criteria (GACs) that are most typically derived using the Environment Agency’s Contaminated Land Exposure Assessment (CLEA) model, as described in the Environment Agency’s SR2, SR3 and SR7 reports (EA, 2009b & c; EA, 2008). It is anticipated that C4SLs will be used in a similar manner; as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the SGVs.

The suggested approach to the development of C4SLs consists of the retention and use of the CLEA framework, modified according to considerations of the underlying science within the context of Defra’s policy objectives relating to the revised SG. Within this context, it is suggested that the development of C4SLs may be achieved in one of three ways, namely:

- By modifying the toxicological parameters used within CLEA (while maintaining current exposure parameters);
- By modifying the exposure parameters embedded within CLEA (while maintaining current toxicological “minimal risk” interpretations); and
- By modifying both toxicological and exposure parameters.

There is also a suggested check on “other considerations” (e.g., background levels, epidemiological data, sources of uncertainty) within the approach, applicable to all three options.

It is suggested that a new term is defined for the toxicological guidance values associated with the derivation of C4SLs – a Low Level of Toxicological Concern (LLTC). A LLTC should represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as SPOSH.

4. CL:AIRE Generic Assessment Criteria (GAC)

For derivation of the CL:AIRE Generic Assessment Criteria (GAC) reference should be made to the following report:

CL:AIRE, *The Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in the Real Environment*. 2009.

Within this report, Contaminated Land: Applications in Real Environments (CL:AIRE) provided Generic Assessment Criteria (GAC) in accordance with the CLEA software and the principles outlined previously for a further 35 contaminants sometimes encountered on land affected by contamination.

5. SoBRA Acute GAC

The Society of Brownfield Risk Assessment (SoBRA) identified that most human health risk assessments focus on the chronic risks arising from long-term exposure to specific substances. As chronic risks often occur at lower doses than acute risks, they are often the key drivers, however, in some instances the acute dose may also be an important consideration within risk assessments.

The methodology for deriving the acute GAC were related to two distinct receptor groups:

- Members of the public, where the 'critical' receptor for this group will typically be a female child, which is consistent with CLEA residential and Public Open Space/allotments land-uses;
- Workers involved with excavations. The critical receptor for this group is assumed to be a female working adult, without the use of PPE.

The acute GACs relate to short term exposure of high concentrations of a substance that lead to acute effects. They are not considered to be average exposures across a specific / defined area. As a result, the GACs should be normally be compared with the maximum likely concentration that the individual may be exposed to, and not the average concentration within a specific area.

The SoBRA acute GAC will primarily be used for contaminants that do not currently have any GAC, most notably Cyanide.

6. Detailed Quantitative Risk Assessments (DQRA)

Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a DQRA may be undertaken to develop site specific values for relevant soil contaminants.

- | |
|---|
| <ul style="list-style-type: none">▪ Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.▪ Developing more accurate parameters using site data. |
|---|

7. Phytotoxicity

CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

- BS3882:2015 – *Specification for Topsoil*

The trigger values are relevant only to those contaminants, where present in excess, have the potential to inhibit plant growth, or kill plants (Cu, Ni and Zn). The criteria have been based on a wide range of planting that are common within a multi-purpose topsoil.

8. Statistical Tests

DEFRA R&D Publication CLR 7 (DOE 1994) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95th percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

CL:AIRE published guidance in 2020, *Guidance in comparing soil contamination data with a critical concentration*, superseding the CL:AIRE/CIEH 2008 report of the same name. The guidance provides ways to assist land contamination stakeholders to apply statistical methods to their data to enable decisions under the legislative framework; either planning system or Part 2A of the Environmental Protection Act 1990.

The use of the statistical tests should only be applied if the following statements are valid for the datasets:

- Averaging areas, as well as the smallest area of concern have been identified on the basis of the CSM, including the desk study and/or the site walkover;
- The sample locations were chosen using a simple random, stratified random or stratified systematic (square, herringbone or triangular grid) sampling pattern, rather than being targeted to locations suspected of being contaminated;
- The sample locations are relatively evenly spread across the area and are not clustered, to avoid giving undue weight to some parts of the site over others in the calculated statistics;
- The analyses do not suggest a hotspot or outlier of contamination that should be treated as a separate zone. This has been established by a histogram and/or a names statistical test;
- The sample locations are all taken from one population (i.e. the same material);
- Where an averaging zone encompasses several averaging areas, analyses do not show a spatial trend or other spatial pattern across that zone; and
- The number of samples has been shown to be sufficient for a statistical analysis.

Any included statistical spreadsheet is based on an in-house method of statistical analysis, in line with those outlined within the CL:AIRE guidance (2020).

Treatment of Hot-Spots

- A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.
- Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.

9. Ground and Water Limited Soil Assessment Criteria

The Soil Assessment Criteria used in the preparation of the Generic Quantitative Risk Assessment are tabulated in the following pages, where the source of each has been outlined in the previous sections.

9.1. Inorganics

SoBRA – Acute Generic Assessment Criteria						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Cyanide	24	24	24	1400	24	24

9.2. Metals

C4SL Low Level of Toxicological Concern						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Lead	< 200	< 310	< 80	< 2300	< 630	< 1300

LQM/CIEH Suitable 4 Use Levels – Metals and Semi-metals						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Arsenic	37	40	43	640	79	170
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11000	45	240000	21000	46000
Cadmium	11	85	1.9	190	120	532
Chromium (III)	910	910	18000	8600	1500	33000
Chromium (VI)	6	6	1.8	33	7.7	220
Copper	2400	7100	520	68000	12000	44000
Elemental Mercury	1.2	1.2	21	58	16	30
Inorganic Mercury	40	56	19	1100	120	240
Methylmercury	11	15	6	320	40	68
Nickel	130	180	53	980	230	800
Selenium	250	430	88	12000	1100	1800
Vanadium	410	1200	91	9000	2000	5000
Zinc	3700	40000	620	730000	81000	170000

Phytotoxicity (Harmful to Plants) Threshold Trigger Values			
Determinand	Soil pH < 6.0 (mg/kg)	Soil pH 6.0 – 7.0 (mg/kg)	Soil pH > 7.0 (mg/kg)
Copper	100	135	200
Nickel	60	75	110
Zinc	200	200	300
Notes: BS3882:2015 – <i>Specification for Topsoil</i> . Based on a wide range of common plants that will be exposed to multi-purpose topsoil. Toxicity of contaminant may also be impacted by pH of soils. Site observation of plant vitality may give additional guidance.			

CL:AIRE Soil Generic Assessment Criteria				
Determinand	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Antimony	ND	550	ND	7500
Barium	ND	1300	ND	22000
Molybdenum	ND	670	ND	17000
ND – Not derived				

9.3. Total Petroleum Hydrocarbons (TPHs)

9.3.1. BTEX Compounds

LQM/CIEH Suitable 4 Use Levels – BTEX Compounds							
Determinand	Soil Organic Matter	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Benzene	1.0% SOM	0.087	0.38	0.017	27	72	90
	2.5% SOM	0.170	0.70	0.034	47	72	100
	6.0% SOM	0.370	1.40	0.075	90	73	110
Toluene	1.0% SOM	130	880	22	56000	56000	87000
	2.5% SOM	290	1900	51	110000	56000	95000
	6.0% SOM	660	3900	120	180000	56000	100000
Ethylbenzene	1.0% SOM	47	83	16	5700	24000	17000
	2.5% SOM	110	190	39	13000	24000	22000
	6.0% SOM	260	440	91	27000	25000	27000
o-Xylene	1.0% SOM	60	88	28	6600	41000	17000
	2.5% SOM	140	210	67	15000	42000	24000
	6.0% SOM	330	480	160	33000	43000	33000
m-Xylene	1.0% SOM	59	82	31	6200	41000	17000
	2.5% SOM	140	190	74	14000	42000	24000
	6.0% SOM	320	450	170	31000	43000	33000
p-Xylene	1.0% SOM	56	79	29	5900	41000	17000
	2.5% SOM	130	180	69	14000	42000	23000
	6.0% SOM	310	430	160	30000	43000	31000

SOM = Soil Organic Matter Content (%)

9.3.2. Total Petroleum Hydrocarbons – Aliphatic

LQM/CIEH Suitable 4 Use Levels For TPH							
Aliphatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-6	1.0% SOM	42	42	730	3,200 (304) sol	570,000 (304) sol	95,000 (304) sol
	2.5% SOM	78	78	1,700	5,900 (558) sol	590,000	130,000 (558) sol
	6.0% SOM	160	160	3,900	12,000 (1150) sol	600,000 (1150) sol	180,000 (1150) sol
EC >6-8	1.0% SOM	100	100	2,300	7,800 (144) sol	600,000	150,000 (144) sol
	2.5% SOM	230	230	5,600	17,000 (322) sol	610,000	220,000 (322) sol
	6.0% SOM	530	530	13,000	40,000 (736) sol	620,000	320,000 (736) sol
EC >8-10	1.0% SOM	27	27	320	2,000 (78) sol	13,000	14,000 (78) sol
	2.5% SOM	65	65	770	4,800 (118) vap	13,000	18,000 (118) vap
	6.0% SOM	150	150	1,700	11,000 (451) vap	13,000	21,000 (451) vap
EC >10-12	1.0% SOM	130 (48) vap	130 (48) vap	2,200	9,700 (48) sol	13,000	21,000 (48) sol
	2.5% SOM	330 (118) vap	330 (118) vap	4,400	23,000 (118) vap	13,000	23,000 (118) vap
	6.0% SOM	760 (283) vap	760 (283) vap	7,300	47,000 (283) vap	13,000	24,000 (283) vap
EC >12-16	1.0% SOM	1,100 (24) sol	1,100 (24) sol	11,000	59,000 (24) sol	13,000	25,000 (24) sol
	2.5% SOM	2,400 (59) sol	2,400 (59) sol	13,000	82,000 (59) sol	13,000	25,000 (59) sol
	6.0% SOM	4,300 (142) sol	4,400 (142) sol	13,000	90,000 (142) sol	13,000	26,000 (142) sol
EC >16-35	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000
EC >35-44	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000

SOM = Soil Organic Matter Content (%)

vap – GAC presented exceeds the vapour saturation limit, which is presented in brackets.

sol – GAC presented exceeds the soil saturation limit, which is presented in brackets.

9.3.3. Total Petroleum Hydrocarbons – Aromatic

LQM/CIEH Suitable 4 Use Levels For TPH							
Aromatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-7 (Benzene)	1.0% SOM	70	370	13	26,000 (1220) ^{sol}	56,000	76,000 (1220) ^{sol}
	2.5% SOM	140	690	27	46,000 (2260) ^{sol}	56,000	84,000 (2260) ^{sol}
	6.0% SOM	300	1,400	57	86,000 (4710) ^{sol}	56,000	92,000 (4710) ^{sol}
EC >7-8 (Toluene)	1.0% SOM	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{sol}
	2.5% SOM	290	1,800	51	110,000 (1920) ^{sol}	56,000	95,000 (1920) ^{sol}
	6.0% SOM	660	3,900	120	180,000 (4360) ^{vap}	56,000	100,000 (4360) ^{vap}
EC >8-10	1.0% SOM	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}
	2.5% SOM	83	110	21	8,100 (1500) ^{vap}	5,000	8,500 (1500) ^{vap}
	6.0% SOM	190	270	51	17,000 (3850) ^{vap}	5,000	9,300 (3580) ^{vap}
EC >10-12	1.0% SOM	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}
	2.5% SOM	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (889) ^{sol}
	6.0% SOM	380	1,200	74	34,000 (2150) ^{sol}	5,000	10,000
EC >12-16	1.0% SOM	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000
	2.5% SOM	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000
	6.0% SOM	660	2,500	130	38,000	5,000	10,000
EC >16-21	1.0% SOM	260	1,900	46	28,000	3,800	7,600
	2.5% SOM	540	1,900	110	28,000	3,800	7,700
	6.0% SOM	930	1,900	260	28,000	3,800	7,800
EC >21-35	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >35-44	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >44-70	1.0% SOM	1,600	1,900	1,200	28,000	3,800	7,800
	2.5% SOM	1,800	1,900	2,100	28,000	3,800	7,800
	6.0% SOM	1,900	1,900	3,000	28,000	3,800	7,900
SOM = Soil Organic Matter Content (%)							
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

9.4. Polycyclic Aromatic Hydrocarbons (PAHs)

LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAHs)							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Acenaphthene	1.0% SOM	210	3,000 (57.0) ^{sol}	34	84,000(57.0) ^{sol}	15,000	29,000
	2.5% SOM	510	4,700(141) ^{sol}	85	97,000(141) ^{sol}	15,000	30,000
	6.0% SOM	1100	6,000(336) ^{sol}	200	100,000	15,000	30,000
Acenaphthylene	1.0% SOM	170	2,900(86.1) ^{sol}	28	83,000(86.1) ^{sol}	15,000	29,000
	2.5% SOM	420	4,600(212) ^{sol}	69	97,000(212) ^{sol}	15,000	30,000
	6.0% SOM	920	6,000(506) ^{sol}	160	100,000	15,000	30,000
Anthracene	1.0% SOM	2,400	31,000(1.17) ^{vap}	380	520,000	74,000	150,000
	2.5% SOM	5,400	35,000	950	540,000	74,000	150,000
	6.0% SOM	11,000	37,000	2,200	540,000	74,000	150,000
Benzo(a)anthracene	1.0% SOM	7.20	11	2.90	170	29	49
	2.5% SOM	11	14	6.50	170	29	56
	6.0% SOM	13	15	13	180	29	62
Benzo(a)pyrene	1.0% SOM	2.20	3.20	0.97	35	5.70	11
	2.5% SOM	2.70	3.20	2.00	35	5.70	12
	6.0% SOM	3.00	3.20	3.50	36	5.70	13
Benzo(b)flouranthene	1.0% SOM	2.60	3.90	0.99	44	7.10	13
	2.5% SOM	3.30	4.00	2.10	44	7.20	15
	6.0% SOM	3.70	4.00	3.90	45	7.20	16
Benzo(ghi)perylene	1.0% SOM	320	360	290	3,900	640	1,400
	2.5% SOM	340	360	470	4,000	640	1,500
	6.0% SOM	350	360	640	4,000	640	1,600
Benzo(k)flouranthene	1.0% SOM	77	110	37	1,200	190	370
	2.5% SOM	93	110	75	1,200	190	410
	6.0% SOM	100	110	130	1,200	190	440
Chrysene	1.0% SOM	15	30	4.10	350	57	93
	2.5% SOM	22	31	9.40	350	57	110
	6.0% SOM	27	32	19	350	57	120
Dibenzo(ah)anthracene	1.0% SOM	0.24	0.31	0.14	3.50	0.57	1.10
	2.5% SOM	0.28	0.32	0.27	3.50	0.57	1.30
	6.0% SOM	0.30	0.32	0.43	3.60	0.58	1.40
Flouranthene	1.0% SOM	280	1,500	52	23,000	3,100	6,300
	2.5% SOM	560	1,600	130	23,000	3,100	6,300
	6.0% SOM	890	1,600	290	23,000	3,100	6,300
Flourene	1.0% SOM	170	2,800 (30.9) ^{sol}	27	63,000(30.9) ^{sol}	9,900	20,000
	2.5% SOM	400	3,800(76.5) ^{sol}	67	68,000	9,900	20,000
	6.0% SOM	860	4,500(183) ^{sol}	160	71,000	9,900	20,000
Indeno(123-cd)pyrene	1.0% SOM	27	45	9.50	500	82	150
	2.5% SOM	36	46	21	510	82	170
	6.0% SOM	41	46	39	510	82	180
Napthalene	1.0% SOM	15	36	65	1,600	11,000	800
	2.5% SOM	36	36	130	3,700	15,000	1,200
	6.0% SOM	85	85	200	8,400	17,000	1,900
Phenanthrene	1.0% SOM	95	1,300(183) ^{sol}	15	22,000	3,100	6,200
	2.5% SOM	220	1,500	38	22,000	3,100	6,200
	6.0% SOM	440	1,500	90	23,000	3,100	6,300
Pyrene	1.0% SOM	620	3,700	110	54,000	7,400	15,000
	2.5% SOM	1200	3,800	270	54,000	7,400	15,000
	6.0% SOM	2000	3,800	620	54,000	7,400	15,000
Coal Tar (Benzo(a)pyrene used as marker compound)	1.0% SOM	0.79	1.2	0.32	15	2.20	4.40
	2.5% SOM	0.98	1.2	0.67	15	2.20	4.70
	6.0% SOM	1.10	1.2	1.20	15	2.20	4.80
SOM = Soil Organic Matter Content (%)							
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

9.5. Volatile and Semi-volatile Organic Compounds

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
<i>Chloroalkanes & alkenes</i>							
1,2 Dichloroethane	1.0% SOM	0.0071	0.0092	0.0046	0.67	29	21
	2.5% SOM	0.011	0.013	0.0083	0.97	29	24
	6.0% SOM	0.019	0.023	0.016	1.70	29	28
1,1,2,2 Tetrachloroethane	1.0% SOM	1.60	3.90	0.41	270	1,400	1,800
	2.5% SOM	3.40	8.00	0.89	550	1,400	2,100
	6.0% SOM	7.50	17	2.00	1,100	1,400	2,300
1,1,1,2 Tetrachloroethane	1.0% SOM	1.20	1.50	0.79	110	1,400	1,500
	2.5% SOM	2.80	3.50	1.90	250	1,400	1,800
	6.0% SOM	6.40	8.20	4.40	560	1,400	2,100
Tetrachloroethene	1.0% SOM	0.18	0.18	0.65	19	1,400	810 ^{sol} (424)
	2.5% SOM	0.39	0.40	1.50	42	1,400	1,100 ^{sol} (951)
	6.0% SOM	0.90	0.92	3.60	95	1,400	1,500
1,1,1 Trichloroethane	1.0% SOM	8.80	9.00	48	660	140,000	57,000 ^{vap} (1425)
	2.5% SOM	18	18	110	1,300	140,000	76,000 ^{vap} (2915)
	6.0% SOM	39	40	240	3,000	140,000	100,000 ^{vap} (6392)
Tetrachloromethene	1.0% SOM	0.026	0.026	0.45	2.90	890	190
	2.5% SOM	0.056	0.056	1.00	6.30	920	270
	6.0% SOM	0.130	0.130	2.40	14	950	400
Trichloroethene	1.0% SOM	0.016	0.017	0.041	1.20	120	70
	2.5% SOM	0.034	0.036	0.091	2.60	120	91
	6.0% SOM	0.075	0.080	0.210	5.70	120	120
Trichloromethane	1.0% SOM	0.91	1.20	0.42	99	2,500	2,600
	2.5% SOM	1.70	2.10	0.83	170	2,500	2,800
	6.0% SOM	3.40	4.20	1.70	350	2,500	3,100
Vinyl Chloride	1.0% SOM	0.00064	0.00077	0.00055	0.059	3.50	4.80
	2.5% SOM	0.00087	0.00100	0.00100	0.077	3.50	5.00
	6.0% SOM	0.00014	0.00150	0.00180	0.120	3.50	5.40
<i>Explosives</i>							
2,4,6 Trinitrotoluene	1.0% SOM	1.60	65	0.24	1,000	130	260
	2.5% SOM	3.70	66	0.58	1,000	130	270
	6.0% SOM	8.10	66	1.40	1,000	130	270
RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)	1.0% SOM	120	13,000	17	210,000	26,000	49,000(18.7) ^{sol}
	2.5% SOM	250	13,000	38	210,000	26,000	51,000
	6.0% SOM	540	13,000	85	210,000	27,000	53,000
HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)	1.0% SOM	5.70	67,00	0.86	110,000	13,000	23,000(0.35) ^{vap}
	2.5% SOM	13	67,00	1.90	110,000	13,000	23,000(0.39) ^{vap}
	6.0% SOM	26	67,00	3.90	110,000	13,000	24,000(0.48) ^{vap}
Atrazine	1.0% SOM	3.30	610	0.50	9,300	1,200	2,300
	2.5% SOM	7.60	620	1.20	9,400	1,200	2,400
	6.0% SOM	17.40	620	2.70	9,400	1,200	2,400

^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Pesticides							
Aldrin	1.0% SOM	5.70	7.30	3.20	170	18	30
	2.5% SOM	6.60	7.40	6.10	170	18	31
	6.0% SOM	7.10	7.50	9.60	170	18	31
Dieldrin	1.0% SOM	0.97	7.00	0.17	170	18	30
	2.5% SOM	2.00	7.30	0.41	170	18	30
	6.0% SOM	3.50	7.40	0.96	170	18	31
Dichlorvos	1.0% SOM	0.032	6.40	0.0049	140	16	26
	2.5% SOM	0.066	6.50	0.0100	140	16	26
	6.0% SOM	0.140	6.60	0.0220	140	16	27
Alpha - Endosulfan	1.0% SOM	7.40	160(0.003) ^{vap}	1.20	5,600(0.003) ^{vap}	1,200	2,400
	2.5% SOM	18	280(0.007) ^{vap}	2.90	7,400(0.007) ^{vap}	1,200	2,400
	6.0% SOM	41	410(0.016) ^{vap}	6.80	8,400(0.016) ^{vap}	1,200	2,400
Beta - Endosulfan	1.0% SOM	7.00	190(0.00007) ^{vap}	1.10	6,300(0.00007) ^{vap}	1,200	2,400
	2.5% SOM	17	320(0.0002) ^{vap}	2.70	7,800(0.0002) ^{vap}	1,200	2,400
	6.0% SOM	39	440(0.0004) ^{vap}	6.40	8700	1,200	2,500
Alpha - Hexachlorocyclohexanes	1.0% SOM	0.23	6.90	0.035	170	24	47
	2.5% SOM	0.55	9.20	0.087	180	24	48
	6.0% SOM	1.20	11	0.210	180	24	48
Beta - Hexachlorocyclohexanes	1.0% SOM	0.085	3.70	0.013	65	8.10	15
	2.5% SOM	0.200	3.80	0.032	65	8.10	15
	6.0% SOM	0.460	3.80	0.077	65	8.10	16
Gamma - Hexachlorocyclohexanes	1.0% SOM	0.06	2.90	0.0092	67	8.2	14
	2.5% SOM	0.14	3.30	0.0230	69	8.2	15
	6.0% SOM	0.33	3.50	0.0540	70	8.2	15
Chlorobenzenes							
Chlorobenzene	1.0% SOM	0.46	0.46	5.90	56	11,000	1,300(675) ^{sol}
	2.5% SOM	1.00	1.00	14	130	13,000	2,000(1520) ^{sol}
	6.0% SOM	2.40	2.40	32	290	14,000	2,900
1,2-Dichlorobenzene	1.0% SOM	23	24	94	2,000 (571) ^{sol}	90,000	24,000(571) ^{sol}
	2.5% SOM	55	57	230	4,800 (1370) ^{sol}	95,000	36,000(1370) ^{sol}
	6.0% SOM	130	130	540	11,000 (3240) ^{sol}	98,000	51,000(3240) ^{sol}
1,3-Dichlorobenzene	1.0% SOM	0.40	0.44	0.25	30	300	390
	2.5% SOM	1.00	1.10	0.60	73	300	440
	6.0% SOM	2.30	2.50	1.50	170	300	470
1,4-Dichlorobenzene	1.0% SOM	61	61	15	4,400 (224) ^{vap}	17,000 ^g	36,000 (224) ^{vap}
	2.5% SOM	150	150	37	10,000 (540) ^{vap}	17,000 ^g	36,000 (540) ^{vap}
	6.0% SOM	350	350	88 ^g	25,000 (1280) ^{vap}	17,000 ^g	36,000 (1280) ^{vap}
1,2,3,-Trichlorobenzene	1.0% SOM	1.50	1.50	4.70	102	1,800	770(134) ^{vap}
	2.5% SOM	3.60	3.70	12	250	1,800	1,100(330) ^{vap}
	6.0% SOM	8.60	8.80	28	590	1,800	1,600(789) ^{vap}
1,2,4,-Trichlorobenzene	1.0% SOM	2.60	2.60	55	220	15,000	1,700(318) ^{vap}
	2.5% SOM	6.40	6.40	140	530	17,000	2,600(786) ^{vap}
	6.0% SOM	15	15	320	1,300	19,000	4,000(1880) ^{vap}
1,3,5,-Trichlorobenzene	1.0% SOM	0.33	0.33	4.70	23	1,700	380(36.7) ^{vap}
	2.5% SOM	0.81	0.81	12	55	1,700	590(90.8) ^{vap}
	6.0% SOM	1.90	1.90	140	130	1,800	860(217) ^{vap}
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets. ^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Chlorobenzenes (cont.)							
1,2,3,4,- Tetrachlorobenzene	1.0% SOM	15	24	4.40	1,700(122) ^{vap}	830	1,500(122) ^{vap}
	2.5% SOM	36	56	11	3,080(304) ^{vap}	830	1,600
	6.0% SOM	78	120	26	4,400(728) ^{vap}	830	1,600
1,2,3,5,- Tetrachlorobenzene	1.0% SOM	0.66	0.75	0.38	49(39.4) ^{vap}	78	110(39) ^{vap}
	2.5% SOM	1.60	1.90	0.90	120(98.1) ^{vap}	79	120
	6.0% SOM	3.70	4.30	2.20	240(235) ^{vap}	79	130
1,2,4, 5,- Tetrachlorobenzene	1.0% SOM	0.33	0.73	0.06	42(19.7) ^{sol}	13	25
	2.5% SOM	0.77	1.70	0.16	72(49.1) ^{sol}	13	26
	6.0% SOM	1.60	3.50	0.37	96	13	26
Pentachlorobenzene	1.0% SOM	5.80	19	1.20	640(43.0) ^{sol}	100	190
	2.5% SOM	12	30	3.10	770(107) ^{sol}	100	190
	6.0% SOM	22	38	7.00	830	100	190
Hexachlorobenzene	1.0% SOM	1.80(0.20) ^{vap}	4.10 (0.20) ^{vap}	0.47	110(0.20) ^{vap}	16	30
	2.5% SOM	3.30(0.50) ^{vap}	5.70 (0.50) ^{vap}	1.10	120	16	30
	6.0% SOM	4.90	6.70 (1.2) ^{vap}	2.50	120	16	30
Phenols & Chlorophenols							
BTEX	1.0% SOM	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)
	2.5% SOM	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir} (11,000)	1,500 ^{dir} (9,700)
	6.0% SOM	1100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)
	6.0% SOM	1100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)
Chlorophenols (4 Congeners)	1.0% SOM	0.87	94	0.13	3,500	620	1,100
	2.5% SOM	2.00	150	0.30	4,000	620	1,100
	6.0% SOM	4.50	210	0.70	4,300	620	1,100
Pentachlorophenols	1.0% SOM	0.22	27(16.4) ^{vap}	0.03	400	60	110
	2.5% SOM	0.52	29	0.08	400	60	120
	6.0% SOM	1.20	31	0.19	400	60	120
Others							
Carbon Disulphide	1.0% SOM	0.14	0.14	4.80	11	11,000	1,300
	2.5% SOM	0.29	0.29	10	22	11,000	1,900
	6.0% SOM	0.62	0.62	23	47	12,000	2,700
Hexachloro-1,3- Butadiene	1.0% SOM	0.29	0.32	0.25	31	25	48
	2.5% SOM	0.70	0.78	0.61	68	25	50
	6.0% SOM	1.60	1.80	1.40	120	25	51
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds					
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
1,1,2 Trichloroethane	1.0% SOM	0.60	0.88	0.28	94
	2.5% SOM	1.20	1.8	0.61	190
	6.0% SOM	2.70	3.9	1.40	400
1,1-Dichloroethane	1.0% SOM	2.40	2.50	9.20	280
	2.5% SOM	3.90	4.10	17	450
	6.0% SOM	7.40	7.70	35	850
1,1-Dichloroethene	1.0% SOM	0.23	0.23	2.80	26
	2.5% SOM	0.40	0.41	5.60	46
	6.0% SOM	0.82	0.82	12	92
1,2,4-Trimethylbenzene	1.0% SOM	0.35	0.41	0.38	42
	2.5% SOM	0.85	0.99	0.93	99
	6.0% SOM	2.00	2.30	2.20	220
1,2-Dichloropropane	1.0% SOM	0.024	0.024	0.62	3.3
	2.5% SOM	0.042	0.042	1.20	5.9
	6.0% SOM	0.084	0.085	2.60	12
2,4-Dimethylphenol	1.0% SOM	19	210	3.10	16000*
	2.5% SOM	43	410	7.20	24000*
	6.0% SOM	97	730	17	30000*
2,4-Dinitrotoluene	1.0% SOM	1.50	170*	0.22	3700*
	2.5% SOM	3.20	170	0.49	3700*
	6.0% SOM	7.20	170	1.10	3800*
2,6-Dinitrotoluene	1.0% SOM	0.78	78	0.12	1900*
	2.5% SOM	1.70	84	0.27	1900*
	6.0% SOM	3.90	87	0.61	1900*
2-Chloronaphthalene	1.0% SOM	3.70	3.80	40	390*
	2.5% SOM	9.20	9.30	98	960*
	6.0% SOM	22	22	230	2200*
Biphenyl	1.0% SOM	66*	220*	14	18000*
	2.5% SOM	160	500*	35	33000*
	6.0% SOM	360	980*	83	48000*
Bis (2-ethylhexyl) phthalate	1.0% SOM	280*	2700*	47*	85000*
	2.5% SOM	610*	2800*	120*	86000*
	6.0% SOM	1100*	2800*	280*	86000*
Bromobenzene	1.0% SOM	0.87	0.91	3.2	97
	2.5% SOM	2.0	2.1	7.6	220
	6.0% SOM	4.7	4.9	18	520
Bromodichloromethane	1.0% SOM	0.016	0.019	0.016	2.1
	2.5% SOM	0.030	0.034	0.032	3.7
	6.0% SOM	0.061	0.070	0.068	7.6
Bromoform	1.0% SOM	2.8	5.2	0.95	760
	2.5% SOM	5.9	11	2.1	1500
	6.0% SOM	13	23	4.6	3100
Butyl benzyl phthalate	1.0% SOM	1400*	42000*	220*	940000*
	2.5% SOM	3300*	44000*	550*	940000*
	6.0% SOM	7200*	44000*	1300*	950000*

*soil concentration above saturation limit

VOC and SVOC table continued from previous page

CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds					
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Chloroethane	1.0% SOM	8.3	8.4	110	960
	2.5% SOM	11	11	200	1300
	6.0% SOM	18	18	380	2100
Chloromethane	1.0% SOM	0.0083	0.0085	0.066	1.0
	2.5% SOM	0.0098	0.0099	0.13	1.2
	6.0% SOM	0.013	0.013	0.23	1.6
<i>Cis</i> 1,2 Dichloroethene	1.0% SOM	0.11	0.12	0.26	14
	2.5% SOM	0.19	0.20	0.50	24
	6.0% SOM	0.37	0.39	1.0	47
Dichloromethane	1.0% SOM	0.58	2.10	0.10	270
	2.5% SOM	0.98	2.80	0.19	360
	6.0% SOM	1.70	4.50	0.34	560
Diethyl Phthalate	1.0% SOM	120*	1800*	19*	150000*
	2.5% SOM	260*	3500*	41*	220000*
	6.0% SOM	570*	6300*	94*	290000*
Di- <i>n</i> -butyl phthalate	1.0% SOM	13*	450*	2.00	15000*
	2.5% SOM	31*	450*	5.00	15000*
	6.0% SOM	67*	450*	12	15000*
Di- <i>n</i> -octyl phthalate	1.0% SOM	2300*	3400*	940*	89000*
	2.5% SOM	2800*	3400*	2100*	89000*
	6.0% SOM	3100*	3400*	3900*	89000*
Hexachloroethane	1.0% SOM	0.20	0.22	0.27	22*
	2.5% SOM	0.48	0.54	0.67	53*
	6.0% SOM	1.10	1.30	1.60	120*
Isopropylbenzene	1.0% SOM	11	12	32	1400*
	2.5% SOM	27	28	79	3300*
	6.0% SOM	64	67	190	7700*
Methyl <i>tert</i> -butyl ether (MTBE)	1.0% SOM	49	73	23	7900
	2.5% SOM	84	120	44	13000
	6.0% SOM	160	220	90	24000
Propylbenzene	1.0% SOM	34	40	34	4100*
	2.5% SOM	82	97	83	9700*
	6.0% SOM	190	230	200	21000*
Styrene	1.0% SOM	8.10	35	1.60	3300*
	2.5% SOM	19	78	3.70	6500*
	6.0% SOM	43	170	8.70	11000*
Total Cresols (2-, 3-, and 4-methylphenol)	1.0% SOM	80	3700	12	160000
	2.5% SOM	180	5400	27	180000*
	6.0% SOM	400	6900	63	180000*
<i>Trans</i> 1,2 Dichloroethene	1.0% SOM	0.19	0.19	0.93	22
	2.5% SOM	0.34	0.35	1.90	40
	6.0% SOM	0.70	0.71	0.24	81
Tributyl tin oxide	1.0% SOM	0.25	1.40	0.042	130*
	2.5% SOM	0.59	3.10	0.100	180*
	6.0% SOM	1.30	5.70	0.240	200*

*soil concentration above saturation limit

C4SL Low Level of Toxicological Concern							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
1,2-Dichloroethane (Ethylene Dichloride)	1.0% SOM	0.11	0.16	0.054	12	300	300
	2.5% SOM	0.18	0.24	0.10	17	310	330
	6.0% SOM	0.31	0.41	0.19	29	310	380
Cis-1,2-Dichloroethene	1.0% SOM	0.46	0.50	0.89	38	3,800	2,000
	2.5% SOM	0.78	0.84	1.7	64	3,800	2,400
	6.0% SOM	1.5	1.6	3.6	120	3,900	3,100
Tetrachloroethene (PCE)	1.0% SOM	0.31	0.32	2	24	3,200	1,400
	2.5% SOM	0.70	0.71	4.8	55	3,300	1,900
	6.0% SOM	1.60	1.60	11	130	3,400	2,500
Trans-1,2-Dichloroethene	1.0% SOM	0.90	0.93	3.70	69	13,000	5,600
	2.5% SOM	1.60	1.70	7.50	120	13,000	7,000
	6.0% SOM	3.30	3.40	16	260	13,000	9,100
Trichloroethene (TCE)	1.0% SOM	0.0093	0.0097	0.032	0.73	76	41
	2.5% SOM	0.020	0.020	0.072	1.5	78	54
	6.0% SOM	0.043	0.045	0.16	3.4	79	69
Vinyl Chloride (Chloroethene)	1.0% SOM	0.0064	0.015	0.0017	1.1	7.8	18
	2.5% SOM	0.010	0.019	0.0031	1.4	7.8	19
	6.0% SOM	0.017	0.029	0.0058	2.2	7.8	19

9.6. Per- and Polyfluoroalkyl Substances (PFAS)

Interim C4SLs for PFOA, PFNA, PFHxS and PFOS						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
PFOA	0.076	0.041	0.0014	0.60	0.079	0.17
PFOS	0.013	0.041	0.0027	0.60	0.079	0.17
PFHxS	0.0081	0.041	0.0015	0.60	0.079	0.17
PFNA	0.0073	0.041	0.0013	0.60	0.079	0.17

9.7. Asbestos

No asbestos or asbestos containing materials (ACM's) are considered acceptable on-site from a human health perspective. Therefore the GAC for asbestos & ACM's within any imported material should be none detected (ND).