



**WESTONS FARM, DORKING ROAD,
WARNHAM, RH12 3QQ
REMEDiation METHOD STATEMENT
WESTONS FARM TRUST
16TH JANUARY 2026
LS9080**

Site:	WESTONS FARM, DORKING ROAD, WARNHAM, RH12 3QQ	
Title:	REMEDIATION METHOD STATEMENT	
Project:	REDEVELOPMENT INCLUDING CONVERSION OF BUILDINGS TO RESIDENTIAL UNITS WITH GARDENS	
Client:	WESTONS FARM TRUST	
Date:	16 TH JANUARY 2026	
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1.0 INTRODUCTION

1.1 General

Land Science was instructed to undertake a Remediation Method Statement in relation to the proposed redevelopment at Westons Farm, Dorking Road, Warnham, RH12 3QQ. The location is shown on Figure 1, which is centred at grid reference TQ 16524 33757.

1.2 Client

The Client for this appointment was Westons Fram Trust, supported by Batcheller Monkhouse. This report may only be used by this named client and their project team for the purposes set out and subject to the report conditions. It was assumed that the Client already owned the property, and that this investigation was not a pre-purchase appraisal.

1.3 Area Under Investigation

The area under investigation comprised 12no. former agricultural buildings (including two metal silos) which was part of a former pig farming business, with an area of approximately 0.855 hectares. The layout is indicated on Figure 2.

1.4 Proposed Development

The proposed redevelopment was understood to comprise the conversion of units 1, 3, 5 and 7 into five residential dwellings (including both single- and two-storey dwellings) with associated car parking spaces, soft-landscaping and private gardens. The proposed development was covered under planning application number DC/24/1819. Figure 3 illustrates the layout of the proposed redevelopment. The findings of this report may not be valid if the proposed development is altered.

1.5 Previous Investigations

The following previous investigations relevant to the site were made available:

- Preliminary Investigation Report, Soils Ltd, ref. 22047/PIR Rev1.0, dated August 2025
- Phase II Contamination Assessment, Land Science, ref. LS8779, dated December 2025

This Remediation Method Statement report was carried out in accordance with the recommendations provided in the previous report and all reports must be read in conjunction with each other.

1.6 Scope of Work

Land Science were instructed to carry out a Remediation Method Statement Report, in relation to removing/reducing any potential risks to any sensitive receptors.

It is understood that this report will be used to inform planning conditions with regards to managing contaminated land risks as part of the development.

1.7 Standards

Where practicable, the investigation was undertaken in accordance with the following primary standards and guidance:

- Land Contamination Risk Management (LCRM) Environment Agency June 2025.
- BS10175:2011+A2:2017, Investigation of Potentially Contaminated Sites.
- National Planning Policy Framework, December 2024.
- Building Regulations Approved Document C: Site preparation and resistance to contaminants and moisture, HM Government, September 2013.
- NHBC Standards Chapter 4.1: Land Quality - Managing Ground Conditions, 2024.

Other technical sources have been cited in respect of specific aspects of the investigation, as referenced throughout the text.

2.0 SUMMARY OF PREVIOUS LAND SCIENCE REPORTS (LS8779)

This summary is a brief precis of the main findings and conclusions of the previous Phase II Geo-Environmental Assessment. For detailed information, the reader is referred to the main report.

The area under investigation comprised 12no. former agricultural buildings (including two metal silos) which was part of a former pig farming business. The proposed redevelopment was understood to comprise the conversion of units 1, 3, 5 and 7 into five residential dwellings (including both single- and two-storey dwellings) with associated car parking spaces, soft-landscaping and private gardens. The intrusive investigation included 12no. hand pits to a maximum of 1.20mbgl.

Strata	Base Depth range (m)	Summary
Hardstanding	0.10-0.17	Concrete (HP02, 03, 04 and 06)
Topsoil	0.15	Dark brown gravelly sandy Silt with flint, brick and 1no. glass fragment (only HP01)
Made Ground	0.30-0.60	Orange/red-brown to dark brown locally light yellow-grey to orange (locally gravelly) sandy silty Clay / silty/sandy Gravel / silty gravelly Sand with flint, brick, concrete, ballast, clinker and rock fragments and rare cobbles (all except HP10)
Reworked Fill	0.60-0.70	Off-white/grey silty Gravel of chalk; or brown and off-white gravelly sandy Silt/Clay with chalk, siltstone, rare brick and 1no wooden fragment (only HP09 and 10)
Weald Clay Formation	0.70-1.20+	Light yellow-grey locally red-brown gravelly sandy silty Clay to sandy Clay with phosphatic nodules, rare siltstone/mudstone fragments and pockets of sand and local black specks and organic material.

Groundwater was not encountered during excavation of any of the investigative positions within a depth of 1.20mbgl.

Buried structural concrete may be designed to DS-1 and AC-1 in accordance with BS8500. Water supply pipe work will require protection from aggressive soil contaminants.

No issues with respect to ground gases have been identified.

No Radon Protection Measures (RPM) are required for new dwellings and extensions at this location.

Soil testing has identified elevated levels of lead, beryllium and PAHs. Requirements for remediation have been identified in Section 11 (of the previous report).

Chemical results on most soils corresponded to Non-hazardous waste classification, however the Reworked Fill corresponded to Stable non-reactive hazardous waste. Natural soils are anticipated to generally be Inert waste with further testing.

A Remediation Method Statement should be prepared. This report should be submitted to relevant authorities etc. in good time for consideration and approval.

3.0 REMEDIATION OBJECTIVES AND OPTIONS

3.1 Objectives

The distribution, nature, and concentrations of contaminants of concern are a critical consideration for the selection of the correct remedial technology for the attainment of the remediation objectives.

The prevalence of some recalcitrant contaminants may make a specific technology expensive or unviable in terms of treatability and/or cost. The selection of the right remedial technology is further complicated by other considerations such as the geological and hydrogeological setting, extent of previous investigation/remediation works, the time available for implementation and treatment, site access and restrictions posed by ongoing development, and cost.

The primary objective of the remediation activities will be for the safe redevelopment of the site that is suitable for the proposed end-use. Considering the previous sections, the following remedial options available to manage unacceptable risks will either:

- Manage (remove, destroy, modify or immobilise) the source;
- Interrupt the pathway; or
- Modify the receptor or the behaviour of the receptor.

The preferred options will be designed to manage the source of contamination or interrupt the pathway.

Source management may involve the removal, destruction, or transformation of the source. Pathway interruption may involve either the blocking of the pathway or the destruction or removal of contaminants moving along a pathway.

This can be achieved either via the permanent reduction of contaminant concentrations to acceptable limits; source removal; pathway interruption.

3.2 Remediation Options Appraisal and Constraints

Potential Remediation Options	Comments
Soil washing	Can be carried out on site but not always effective, sustainable method, high upfront cost, can be complex requiring specialised equipment/expertise. It has the potential for secondary environmental impacts – leaching of contaminants into groundwater or surface water.
Bioremediation / phytoremediation (using plants to stabilise, degrade, extract pollutants)	Sustainable but remediation can be complex due to some metal's persistence and strong absorption characteristics, often ineffective for lead, time-consuming but can be used as part of broader remediation strategy.
Thermal	Can be less expensive but not as effective as other methods, efficient, time-consuming, potential for contaminating treated soils if not carried out correctly.
Excavation and infilling	Excavating contaminated soil and transporting to landfill, with levels raised with clean materials – effective, costly, disruptive to site but permanent solution.
Capping	Covering the contaminated soil – placing a barrier over the contaminated soil (clean soil or hardstanding), less invasive, reduces metal exposure by blocking pathway to receptor.

There are limited constraints at the site; proposed site levels could be raised / lowered slightly if needed. The site requires the most practical regarding cost and time.

In summary, the preferred remediation option for this site would be to excavate and replace with a capping layer.

4.0 IMPLEMENTATION PLAN

The previous phase II report (LS8779) undertaken by Land Science identified some risks to receptors at the site and the following remedial measures were recommended: -

- Excavating and disposing of contaminated soils and replacement with a capping system.
- Removal of Made Ground / Reworked Fill to a depth of 600mm below finish levels from proposed soft standing areas (or to natural ground if proven at a shallower depth).
- Reinstating with 'clean' imported topsoil/subsoil:
 - Soft standing areas – 300mm* topsoil and 300mm subsoil (*maximum 300mm topsoil to prevent anaerobic conditions at depth)
- Hi-Vis geotextile membrane[†] that prevents capillary action to be installed at 0.60m below finish levels where natural ground is not proven during the reduced dig.
- Provision of upgraded or protected water supply pipework to a specification agreed with the local utility.
- Provision of an upgraded DPM with vapour protection within the proposed dwellings.
- Waste Disposal considerations.
- A Discovery Strategy should also be followed during the development.

[†]It should be noted that an impermeable membrane may lead to water logging of the subsoil / topsoil.

The following strategy has been prepared in order to render the site safe for residential occupation.

4.1 End Users

4.1.1 Landscaped Areas

Made Ground/Reworked Fill (referred to as Made Ground in the following paragraphs) was encountered within the proposed soft standing areas and was considered unsuitable for soft landscaping purposes. The previous Phase II report recommended the removal of Made Ground in proposed soft standing areas and replacement with chemically compliant material.

The Made Ground should be removed to a required depth of 600mm below finished levels (or to natural ground if proven at a shallower depth). The levels should then be raised by 'clean' imported subsoil and topsoil. The depth of topsoil should comply with any building control requirements, and the remainder of the levels comprising subsoil.

A visual/olfactory inspection of the reduced dig should be undertaken prior to the laying of any topsoil/subsoil by a suitably qualified environmental consultant. Where excavations encounter natural soils within 600mm the soils should be inspected and sampled as part of remedial inspections to confirm if the material can be left in place.

However, Made Ground is expected to remain present below 600mm in local areas as it was recorded at 0.70mbgl at HP09. Therefore, where Made Ground is still present below a depth of 600mm from the proposed final levels a geotextile membrane, which prevents upward capillary action (e.g. Terram Hi-Vis) should be placed between the Made Ground and imported soils. The data sheet for the Terram Hi-Vis Geotextile is contained within Appendix B. Where any tree pits are included in the landscaping design and taken down to a depth of 1m then the geotextile should be installed along the sides against any Made Ground below a depth of 0.60m (600mm) and at the base if Made Ground is still present at this depth.

The removal of Made Ground and the provision of chemically suitable fill material should be monitored and validated by a suitably qualified environmental consultant. The monitoring will include detailed site inspection sheets (confirming details of inspected reduced dig areas, visual/olfactory inspection of imported materials prior to placement, depths of any imported soils verified by measuring staff, samples taken and where any further work is required etc.). As part of the verification process photographs will be taken and included with the inspection sheets in the final Remediation Verification Report.

4.1.2 Imported Materials

Material used to replace the removed soils must be suitable for the proposed end use and chemical testing is recommended to confirm that they do not contain elevated concentrations of potential contaminants of concern that could pose a risk to end users (e.g. asbestos). Unless otherwise agreed by the Contaminated Land Officer at the Local Authority once the materials have been imported to site and placed in-situ samples of the imported topsoil / subsoil should be taken (by a qualified environmental consultant) and scheduled for the chemical tests listed below. Testing should meet the screening criteria appended to this document and must be 'clean' and 'suitable for use' with no visual evidence of contamination (sharps or visual signs of pollution).

The soil testing requirements for any imported backfill materials should be as follows: -

Soil Type	Chemical Testing	Required Testing Frequency (for each material and source)
Imported Topsoil	pH, Soil Organic Matter, Heavy Metals, PAH, BTEX, Asbestos Screen + BS3882:2015 physical testing for topsoil.	On site: 1no. sample per 50m ³ for each material and source. Where >10m ³ a minimum of 3no. samples.
Subsoil	pH, Soil Organic Matter, Heavy Metals, PAH, Asbestos Screen + BS8601:2013 for subsoil.	

In addition, the laboratory test results for material imported to soft landscaping areas should also meet the criteria in the following table with respect to potential phytotoxic risk to plant growth.

Element	Phytotoxicity Value (mg/kg)			Arable (grassland)
	pH <6.0	pH 6.0-7.0	pH >7.0	pH >5.2
Zinc	200	200	300	300 (300)
Copper	100	135	200	200 (330)
Nickel	60	757	110	110 (180)
Cadmium	50*			3.0 (3.0)
Arsenic	1,000*			50 (50)

The soil testing requirements for backfill material is a minimum of three soil tests per source and once placed *in-situ* verification testing to confirm depth of fill meets the specified fill depths and chemical suitability at a rate of approximately one sample per 50sq.m.

If the verification tests fail the screening criteria (provided in Appendix A), then the material is deemed not acceptable and should be removed from site. Details of any failures of the laboratory

testing suites should be included within the Verification Report along with details of any failures of thicknesses. Waste transfer tickets should be provided to confirm that the unsuitable material has been removed from site. Remedial actions should be detailed in the Verification Report on how the failures can be rectified.

Records of the volume of imported materials will be kept (transfer notes/ purchase records) and a summary table (with volumes, dates removed and waste classification) will be included within the Verification Report. It is recommended that topsoil / subsoil is imported from a reputable supplier and that certification should be supplied from the source of the material. These certificates must not be older than six months old, have a declaration of compliance and should be scheduled for the chemical tests previously detailed. The summary will also have a calculation to show the volume of material removed from the landscaped areas corresponds to the same volume of imported subsoil/ topsoil this is to confirm that enough 'clean' imported material has been brought onto the site to infill any excavations and that site won materials have not been re-used.

The reduced levels should be suitably prepared prior to the laying of any Hi-Vis geotextile and imported subsoil / topsoil. If the ground has been compacted during the groundworks (e.g. movement of site traffic) then to aid drainage and to prevent any undue flooding / waterlogging which can lead to raised anaerobic conditions the ground should be rotavated / broken up with the use of a specialised ripper tool or deep soil rotovator. Any sharps should be removed to prevent puncturing the Hi-Vis geotextile.

Topsoil should be at least 150mm but should not exceed a depth of 300mm as this would also lead to creation of anaerobic soil conditions leading to poor vegetation growth.

It is recommended that a Soil Management Plan be followed once any imported subsoil or topsoil are brought on to the site or existing site won topsoil has been stripped and stockpiled on site for later use. The plan should include details on handling soils during differing climatic conditions and the correct procedures for stockpiling.

Photographs will be taken and included with the inspection sheets in the Remediation Verification Report. Photographs should have a clearly visible measuring tape / staff to confirm thickness of imported materials, and should also include a photo board to confirm sample location, date etc.

If proposed soft landscaped areas are to be surfaced with artificial grass or similar products, it is recommended that the clean cover depth for an associated vegetation finish should be matched.

4.2 Potable Water Supplies

Buried plastics used for potable water supplies should be upgraded to resist chemical contamination. Barrier pipework will be acceptable (e.g. Protecta-Line – see Appendix C for details). No pipework should be laid where there is evidence of hydrocarbons.

Confirmation should be sought from the utility supply company as to the suitability of potable water supply pipes prior to install.

New service utility trenches should be backfilled with chemically inert material for example naturally sourced sand or pea shingle or material that has been chemically tested and meets the chemical validation specification in Appendix A.

4.3 Volatile Vapour Protection

The phase II report recommended that any damp proof membrane is upgraded to a fully resistant organic vapour membrane as various semi-volatile compounds were detected above their detection limit. The installation of the membrane should follow the following steps.

Vapour Membrane

- The gas membrane (VOC resistant) should be specified in accordance with BS8458:2015.
- The membrane should come with key performance mechanical property test data that complies with Table 6.1 of CIRIA C748 Guidance on the use of plastic membranes as VOC vapour barriers. The supplier should be able to demonstrate that the properties of the chosen membrane by providing the laboratory test data for independent verification.
- The membrane should come with demonstrable and verifiable low vapour permeation against naphthalene (as a minimum). The test data should be in accordance with CIRIA C748. The membrane supplier should be able to demonstrate the low vapour permeation of the chosen membrane by providing the laboratory test data for independent verification.
- The minimum recommended membrane thickness is 0.5mm.
- The membrane should be robust enough to withstand the installation and following construction process, including following trades. Therefore, the minimum recommended puncture resistance is 2.0kN, or alternatively appropriate protection should be used above and below the membrane.
- If installed beneath a ground slab (i.e unsupported), the membrane should be strong enough to withstand in-service stresses, including settlement (if anticipated).
- If installed beneath a ground slab, the membrane should be protected on top and bottom with a geo-fabric (or other appropriate protection) immediately following a satisfactory inspection and testing regime. Architects insulation may be laid over the membrane as an alternative to using a protective geo-fabric.
- If installed above a solid slab, protection should be installed at least on top of the membrane.
- The membrane should be sealed across wall cavities.
- The membrane should be compatible with foundations and structures i.e. suitable detail is required with respect to joining complexity.
- The membrane should be sealed to all services and any penetrations through it.

Whilst the membrane may be installed by a non-specialist, the work should be carried out to a high professional standard and inspected by the environmental consultant as part of the remediation validation, in accordance with BRE414 and CIRIA C735.

A formal design should be undertaken by a designer (architect, supplier or gas installation contractor) as part of the Construction Phase Plan.

4.4 New Buried Concrete

All sub surface concrete should be designed and specified in accordance with BS8500-1:2015+A1:2016. The results of the sulphate and pH analyses fell into Class DS-1 and an ACEC class AC-1 is appropriate.

4.5 Adjacent Land Users

The site has not been identified as a risk of ongoing pollution to neighbouring land. However, measures should always be taken to prevent and control any dust, run-off and mud etc. generated during groundworks, as part of good site management.

The provision of clean cover and new hardstandings will form a capping, which will block/ reduce and minimise the generation of dust in the long-term.

4.6 Waste Management

4.6.1 Stockpiles

Material excavated from the ground (e.g. site strip and service trenches) producing stockpiles should be on impermeable ground, over a geotextile membrane and managed suitably to minimise dust generation i.e. dust suppression and suitable covers. Stockpiles must be bunded to prevent the possibility of contaminated surface water run-off impacting surrounding land.

Stockpiles of 'waste arising' for off-site disposal and stockpiles of imported 'clean' material for use as anti-dig / clean capping need to be clearly marked and appropriately segregated to avoid the potential for cross contamination.

Stockpiles should be regularly surveyed and records maintained to be included in the verification report.

The Contractor undertaking the remediation works is responsible for compliance with waste management legislation where issues relating to waste arise as a result of the works. As a minimum, the following is required:

- Management of material that arises during the works and is classified as waste.
- Waste streams are appropriately classified prior to off-site disposal.
- Audit process for the selection of waste management contractors to include the collection and assessment of licences, permits and registrations.

4.6.2 Soil Disposal

The contractor should allow for a suitable regime of testing soil arisings to ensure they are being disposed of to the appropriate facility with the appropriate level of duty of care.

The results of the soil analysis have been classified as follows:

Soil	Step 1: Hazardous Waste	Step 2: Waste Acceptance	Asbestos etc.	Waste Designation
Topsoil – HP01 0.10m	Non-hazardous	WAC not carried out	None	Non-hazardous waste*
Made Ground - HP02 0.40m	Non-hazardous	WAC carried out confirming waste to be accepted as non-		Non-hazardous waste

Soil	Step 1: Hazardous Waste	Step 2: Waste Acceptance	Asbestos etc.	Waste Designation
		hazardous, due to mercury and antimony exceeding the inert waste threshold		
Made Ground – HP03 0.50m HP04 0.30m HP05 0.10m HP06 0.20m HP09 0.10m HP12 0.10m	Non-hazardous	WAC not carried out		Non-hazardous waste*
Reworked Fill – HP10 0.30m	Hazardous – due to exceedances in zinc and TPH	WAC carried out confirming waste to be accepted as Stable non-reactive hazardous waste due to cadmium exceeding the inert waste threshold		Stable non-reactive hazardous waste
Weald Clay – HP11 0.50m	Non-hazardous	WAC not carried out		Non-hazardous waste*

Whilst the samples marked * were classified as non-hazardous, WAC testing was not carried out and therefore the materials could not be sub-classified as Inert. It was anticipated that the underlying natural soils would meet the inert waste criteria.

Liaison with the proposed receiving facility is recommended to be undertaken at an early stage in the scheme to confirm the requirements.

Soils may potentially be handled as Non-Waste and re-used on other sites in accordance with various protocols such as those published by the EA or CL:AIRE. Typical requirements include:

- That the re-use of material will not endanger human health, cause nuisance, or harm the wider environment (controlled waters, ecosystems, etc).
- That there is a clear environmental benefit from the activity, and that the waste is being used as a substitute for non-waste material.
- The materials are suitable for use without further treatment.
- The holder is certain that the materials will be used in a safe manner.
- Only the necessary quantities of materials are being used.
- A Waste Recovery Plan (EA) or Materials Management Plan [MMP] (CL:AIRE) are produced and followed, and audited in a Verification Plan.

It may also be possible to treat materials under an environmental permit, standard rules permit, or U1 exemption, subject to strict limits.

The soil testing undertaken in the phase II report indicated that there were significant risks to end users due to elevated metals and PAH, so Made Ground soils are unlikely to be re-used on site.

Records of the removal and disposal of soils must be kept and included within the final Verification Report. The records should include details of volumes, waste codes, facility that the material is sent to and dates etc.

4.7 Discovery Strategy

During groundworks, a watching brief is required by a competent environmental consultant, site-based engineer or site manager. Should visual signs or olfactory signs of unexpected contamination be identified then the following is required:

- Stop works in the location of identified gross contamination.
- Inform the Site Manager and Environmental Consultant.
- Environmental Consultant to inform Local Planning Authority Contaminated Land Team, with no further works undertaken in the area until any new recommendations have been agreed.
- Excavate the impacted area until impacted material is visually removed.
- The excavated material can be temporarily stockpiled on site, for pre-treatment and waste classification, prior to being disposed of offsite at a suitably licensed facility in accordance with the above (as detailed in the Phase II report).

Unexpected contamination may include:

- Visible fragments of asbestos board/ tile or fibre (lagging);
- Soil headspace readings >100 ppm (using photo-ionisation detector [PID]);
- Significant discolouration of the soil;
- Visible hydrocarbon seeps; and, strong hydrocarbon odour in the hand.

5.0 SITE CONTROLS

5.1 General Controls

Site works should be undertaken in accordance with the CDM:2015 Regulations and guidelines prepared by the Health and Safety Executive [HSE, 1991 Protection of Works and the General Public during the Development of Contaminated Land and Guidance Note HS(G)66, Health and Safety Executive, HMSO, 1991].

Detailed control measures with respect to contaminated land will be required during works on the site, to include (but not limited to):

- Monitoring of actual changes to ensure mitigation of potential adverse effects;
- Education of workers to risks associated with contamination (site inductions and appropriate toolbox talks);
- Posting of appropriate warning signs;
- Provision of suitable welfare facilities; and
- Provision of suitable PPE (and RPE if required).

5.2 Odours, Noise and Vibration

Care will need to be taken during activities to minimise the impact of any odours, dusts, noise and vibration on the surrounding buildings and receptors. In all instances, best practicable means (BPM) should be employed to control noise and vibration. BPM should also be employed to control dust emissions, such as (but not limited to) damping down dusty operations throughout the earthworks.

6.0 VERIFICATION REPORT REQUIREMENTS

There is a requirement that the remediation of the site is verified and documented in line with Environment Agency document: verification of remediation of land contamination report (SC030114/R1).

The Contractor will hold as a minimum:

- Records of all excavations including:
 - Records of earthwork excavations including as constructed, photographic record of each excavation, quantities of materials and records of progress.
 - Inspection records to include accurate ordnance survey depths and final extents.
 - Plans of the site showing where remediation has been undertaken including estimated area of each discrete soft landscaping area.
 - Records of any alterations to proposed changes to the landscaping scheme.
- Records of laboratory analytical and *in-situ* field test results, including:
 - Laboratory test certificate for any verification test of imported material (granular infill for remediation excavations, subsoil and topsoil).
 - Particulars of remediation monitoring on site inspection sheets (date / location / personnel), each area of soft landscaping will be inspected to confirm depth and make up of 'clean' cover;
 - Calibration data for any field measurement equipment used during the remediation supervision in accordance with manufacturers guidance;
 - Confirmation of depths and volumes of each backfill layer; subsoil and topsoil layers; and,
 - Chain of custody forms.
- Confirmation records that the Contractors Construction Method Statement has been followed with specific reference to dust control during the development.
- Following completion of the various development phases (groundworks, landscaping etc.) a signed confirmation that the Discovery Strategy has been followed (including if no unexpected contamination was encountered) from the appointed site contractor or client will be required and copies included within the Remediation Verification Report.
- Records of material movement, including:
 - Records of the volume of each type of material excavated and imported to each remedial excavation / soft landscaping area will also be estimated and included in the Remediation Verification Report. There should be a calculation for soft landscaped areas to confirm the volume of material removed is the same as volume of imported soils.
 - Records of any alterations to proposed changes to volumes of materials removed and imported.
 - Waste transfer notes for any material disposed of as waste.
- Waste classification and management documentation, including:
 - Details of all parties involved in the works.
 - Records of approval and method statements.
 - Records of discussions with regulatory authorities and written approval for actions.
 - Records of license applications (including mobile treatment license or declaration under the Definition of Waste Industry Code of Practice); and,
 - Records demonstrating environmental monitoring.

All relevant information as detailed in the above shall be collected during the remediation works and an independent verification report compiled on completion. The verification report shall take account of the recommendations in Land Contamination Risk Management (LCRM) Environment Agency 2025 and comprise as a minimum:

- Photographs of the excavations showing the required depths.
- Site plan showing the areas that have been remediated.
- Waste transfer notes for all excavated soils removed from the site (including a copy of the waste carrier's licence).
- Details of the waste disposal facility (including a copy of the environmental permit).
- Supplier certificate and associated laboratory analysis results for the imported material.
- Laboratory analysis results for the independent verification testing completed by the environmental consultant/engineer.

It should be noted that consideration has not been given to the protection of groundworkers, during the construction phase of this project, as that is outside the scope of this report. Adequate protection measures should be provided within a Construction Method Statement, completed by the Principal Contractor (CDM regulations 2015) for the project.

REFERENCES

A number of technical references have been referred to in the preparation of this document, including:

- Smith, I. (2014) Smith's Elements of Soil Mechanics. Chichester. Wiley Blackwell. 9th edition.
- BRE Design Guide 365. Soakaway design ("DG365").
- Radon: Guidance on protective measures for new buildings, BRE Report BR 211, 2023 6th edition.
- The Environment Agency's approach to groundwater protection. February 2018 Version 1.2.
- Water UK and the Home Builders Federation; Contaminated Land Assessment Guidance, dated January 2014.
- Concrete – Complementary British Standard to BS EN 206 - Method of specifying and guidance for the specifier BS 8500-1:2023 - TC, dated November 2023.
- Revised EU Waste Framework Directive 2008 2008/98/EC [transposed into English law under The Waste (England and Wales) Regulations 2011].
- European Community (EC) Directive 1999/31/EC [transposed into English law under the Landfill (England and Wales) Regulations 2002].
- Defining Waste Recovery - Permanent Deposit of Waste on Land, EPR13 v1.0, EA 2010.
- The definition of waste: Development Industry Code of Practice, v2, CL:AIRE 2011.
- Guidance on the classification and assessment of waste Technical Guidance WM3 ("WM3") EA publication (1st edition v1.2GB) dated 2021.

REPORT CONDITIONS

The Client

This report may also be used only by the client named in section 1 and their appointed project team for the purpose of design, obtaining planning, building regulations approval, and in connection with finance. This report must not be used by any other persons or for other purposes without express written agreement of Land Science.

General

Land Science takes all reasonable professional care in preparation of this report, using current standards and industry practice. However, the evaluation of ground conditions depends on an interpretation and extrapolation of the conditions revealed by a limited data set. The level of risk is related to the extent of investigation and no site is ever free of risk. The client should understand their risks and liabilities. We accept no liability whatsoever in respect of:

- The scope, extent or design of an investigation.
- Any conditions not directly revealed by the investigation.
- Published standards or methodologies used or adopted in this report.
- The opinion of any other party including any regulator, authority or stakeholder.
- Any dispute, claim or consequential loss arising from any findings of this report.
- Third party information and data.

This report relates solely to ground-related matters as set out in the objectives and makes no representation on other matters such as ecology, arboriculture, invasive plant species, the condition of buildings and structures, hazardous building materials such as insulation or asbestos, the locations of boundaries, unexploded ordnance, and or planning constraints etc. Further reports should be commissioned in this respect as appropriate.

Regulators and Approvals

This (and any other) report should be submitted to relevant authorities for their own assessments and to provide their approval or comments accordingly. This should be in good time before commencing on site in case additional work is to be carried out.

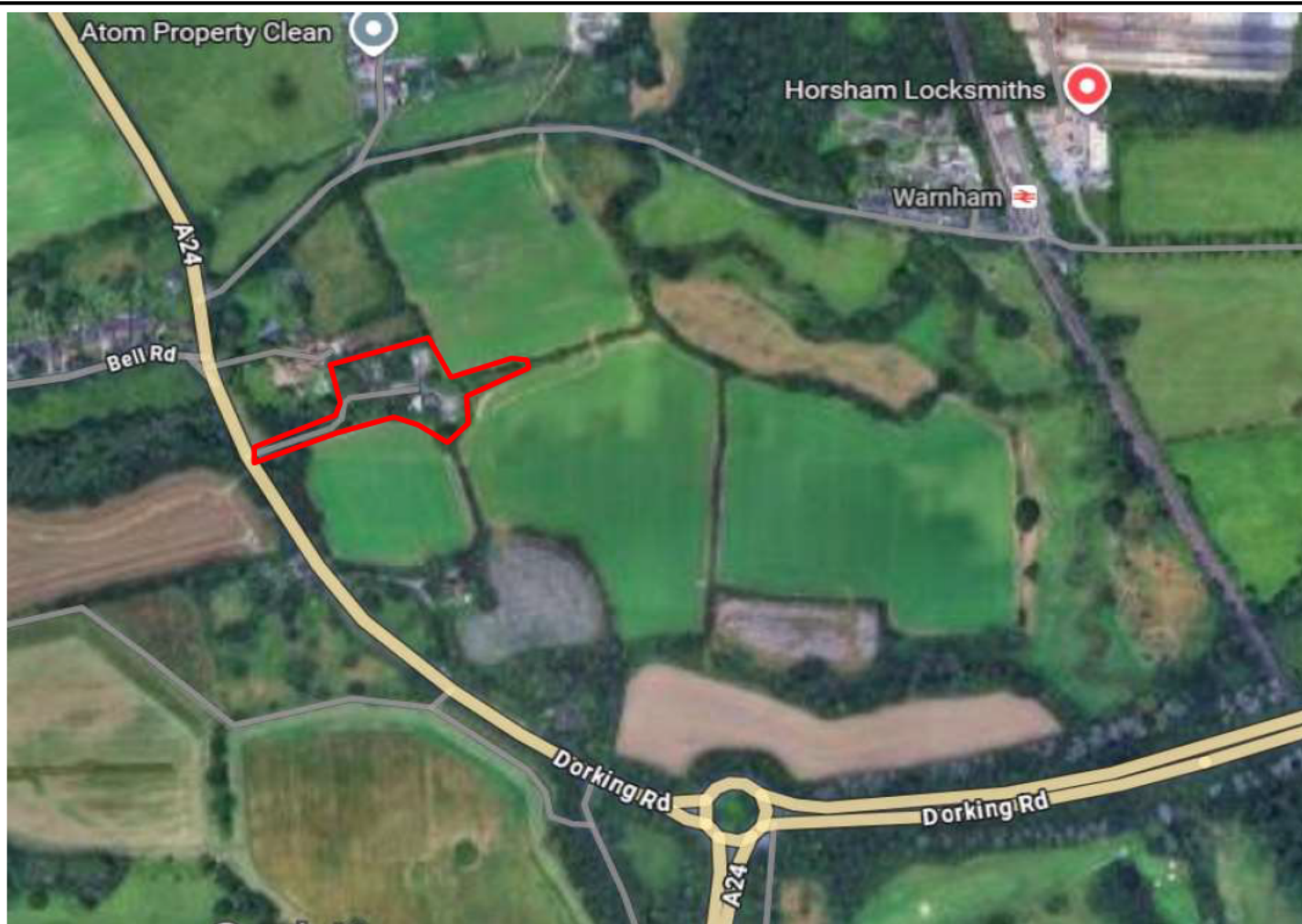
Standards, technical guidance and regulatory positions change over time and which may therefore affect the findings and recommendations made in this report; this should be verified by the client prior to any critical project milestones. Where this information is used in design, the designer should verify that the information is appropriate and has been used correctly.

Variations with Time

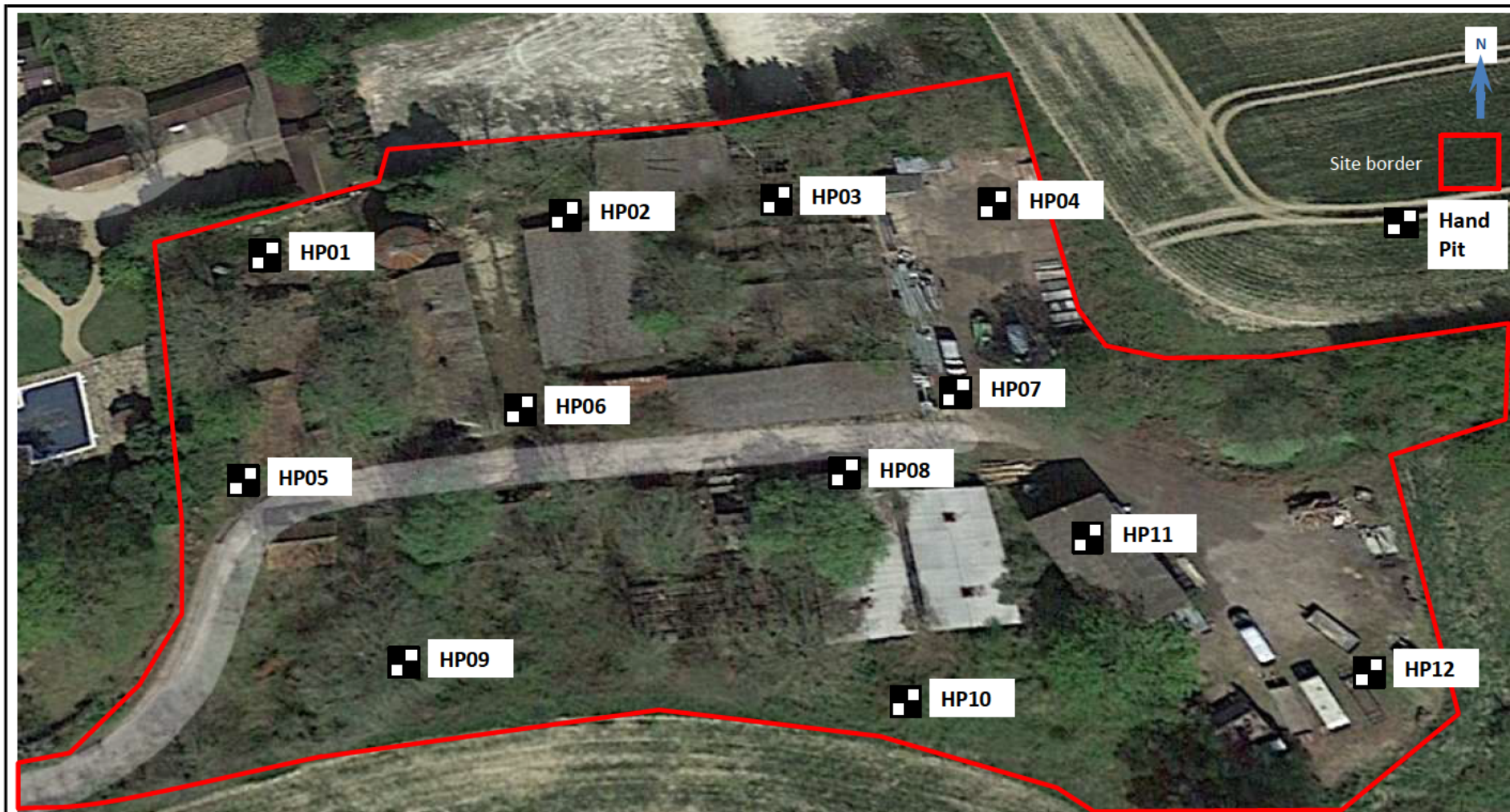
The report relates to conditions revealed at the time of the investigation and any monitoring visits. Some parameters may vary over time or seasonally; groundwater levels, ground gas compositions, or concentrations of contaminants are particularly variable in this respect. Further monitoring or verification should be considered as appropriate.

GLOSSARY OF TERMS

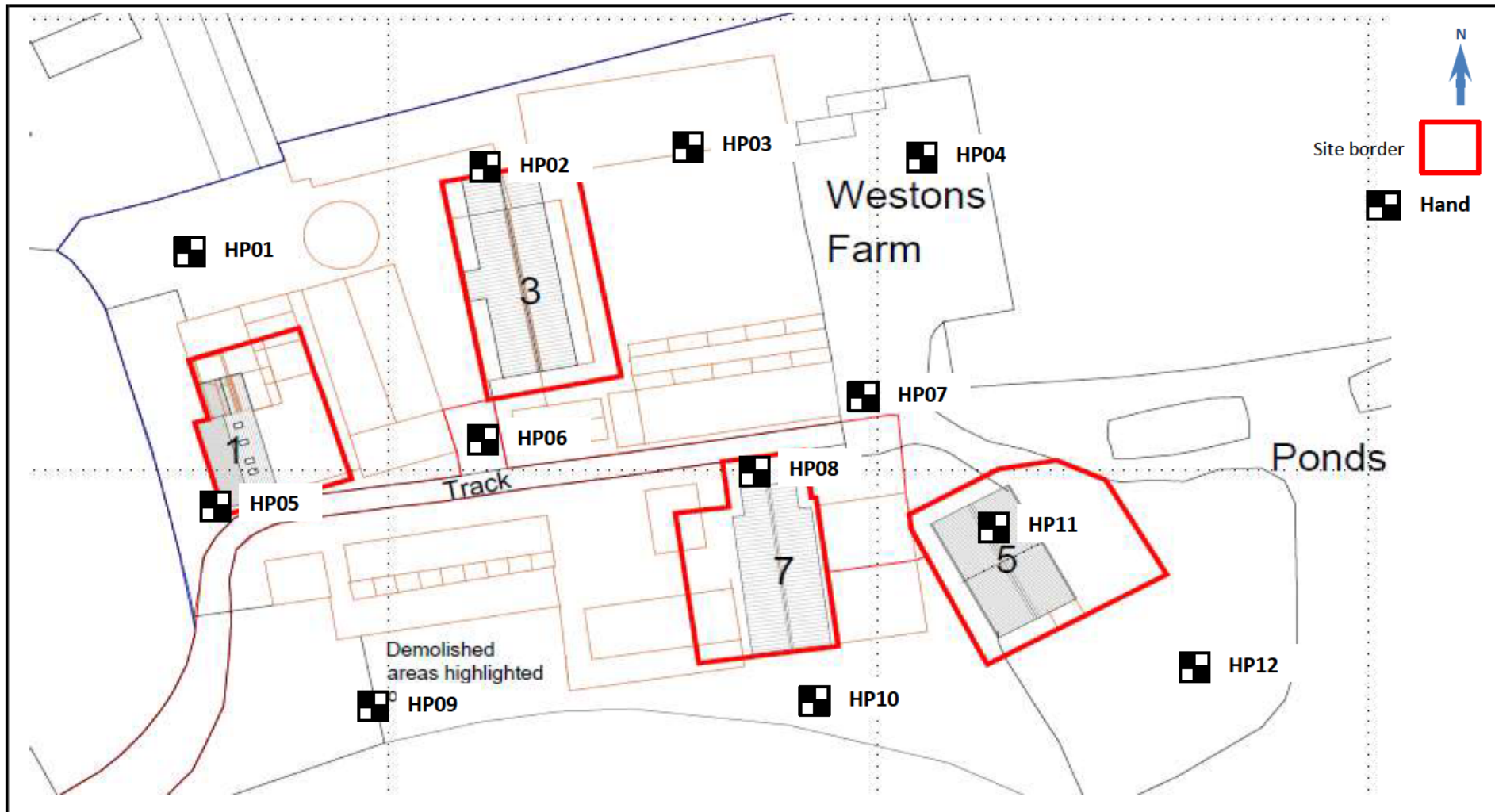
ACM	Asbestos Containing Material
BGS	British Geological Survey
BRE	Building Research Establishment
BS	British Standard
C4SL	Category 4 Screening Level
CBR	California Bearing Ratio
CDM	Construction Design and Management regulations
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLEA	Contaminated Land Exposure Assessment model
CSM	Conceptual Site Model
EA	Environment Agency
EQS	Environmental Quality Standards
FOC	Fraction of Organic Carbon
GAC	Generic Assessment Criterion
GQRA	Generic Quantitative Risk Assessment
mbgl	Meters Below Ground Level
NHBC	National House Building Council
mOD	Metres above Ordnance Datum
PAHs	Polycyclic Aromatic Hydrocarbons
PHE	Public Health England
PID	Photo-Ionisation Detector
PQRA	Preliminary Quantitative Risk Assessment
PSD	Particle Size Distribution Test
RMS	Remediation Method Statement
S4UL	Suitable for Use Level
SOM	Soil Organic Matter
SPZ	Source Protection Zone
SPT	Standard Penetration Test
SSSI	Sites of Special Scientific Interest
ST-WEL	Short Term Workplace Exposure Limit
SVOCs	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRRL / TRL	Transport Road Research Laboratory
TWA-WEL	Time Weighted Average Workplace Exposure Limit
UK HBF	United Kingdom House Building Federation
VOCs	Volatile Organic Compounds
WAC	Waste Acceptance Criteria



TITLE:	Site Location Plan	REF:	LS8779	PREPARED:	JM
PROJECT:	Westons Farm Trust, Dorking Road, Warnham RH12 3QQ	FIGURE:	1	CHECKED:	MR
CLIENT:	Batchellor Monkhouse	DATE:	17/11/2025	VERSION	V1



	TITLE:	Existing Site Plan	REF:	LS8779	PREPARED:	JM
	PROJECT:	Westons Farm Trust, Dorking Road, Warnham RH12 3QQ	FIGURE:	2	CHECKED:	MR
	CLIENT:	Batchellor Monkhouse	DATE:	01/12/2025	VERSION	V1



	TITLE:	Proposed Site Plan	REF:	LS8779	PREPARED:	JM
	PROJECT:	Westons Farm Trust, Dorking Road, Warnham RH12 3QQ	FIGURE:	3	CHECKED:	MR
	CLIENT:	Batchellor Monkhouse	DATE:	01/12/2025	VERSION	V1

APPENDIX A

TIER 1 SOIL SCREENING (HUMAN HEALTH)



Project: Westons Farm
 Reference: L59080
 Assessor:

Soil Organic Matter (calculated): 0.17%
 Soil Organic Matter (adopted): 1.00%
 Scenario: Residential (with vegetation)

Lab Sample Ref.
Location Ref.
Depth (m)
Sample Number
Date sample taken
Time sample taken

Determinand	Source	Value	Units	Detection Limit
Asbestos (Identification)	N/A	Not-detected	Type	N/A
Herbicide and Pesticide Screening	N/A	Absent	P/A	-
General Inorganics				
pH	NONE	-	pH Units	N/A
Total Cyanide	NONE	-	mg/kg	1
Water Soluble Sulphate (Soil Equivalent)	No health risk	-	g/l	-
Water Soluble Sulphate as SO ₄ (2:1)	No health risk	-	mg/kg	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	No health risk	-	g/l	0.00125
Sulphide	NONE	-	mg/kg	1
Fraction Organic Carbon (FOC)	No health risk	-	N/A	0.001
Total Organic Carbon (TOC)	No health risk	-	%	0.1
Loss on Ignition @ 450°C	NONE	-	%	0.2
Acid Neutralisation Capacity	No health risk	-	±/- mol/kg	-100
Total Phenol				
Total Phenol (monohydric)	SAUL	120	mg/kg	1
Speciated PAHs				
Naphthalene	SAUL	2.3	mg/kg	0.05
Acenaphthylene	SAUL	170	mg/kg	0.1
Acenaphthene	SAUL	210	mg/kg	0.1
Fluorene	SAUL	170	mg/kg	0.1
Phenanthrene	SAUL	95	mg/kg	0.1
Anthracene	SAUL	2400	mg/kg	0.1
Fluoranthene	SAUL	170	mg/kg	0.1
Pyrene	SAUL	620	mg/kg	0.1
Benzo[a]anthracene	SAUL	7.2	mg/kg	0.1
Chrysene	SAUL	15	mg/kg	0.05
Benzo[b]fluoranthene	SAUL	2.6	mg/kg	0.1
Benzo[k]fluoranthene	SAUL	77	mg/kg	0.1
Benzo[e]pyrene	SAUL	2.2	mg/kg	0.1
Indeno[1,2,3-cd]pyrene	SAUL	27	mg/kg	0.1
Di-benzo[a,h]anthracene	SAUL	0.24	mg/kg	0.1
Benzo[ghi]perylene	SAUL	320	mg/kg	0.05
Coronene	NONE	-	mg/kg	0.05

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Determinand	Source	Value	Units	Detection Limit
Total PAHs				
Total WAC-17 PAHs	NONE	-	mg/kg	1.6
Heavy Metals / Metalloids				
Arsenic	SAUL	37	mg/kg	1
Barium	NONE	-	mg/kg	1
Beryllium	SAUL	1.7	mg/kg	0.06
Boron	SAUL	290	mg/kg	0.2
Cadmium	SAUL	11	mg/kg	0.2
Chromium (VI)	SAUL	6	mg/kg	-
Chromium (III)	SAUL	910	mg/kg	1
Copper	SAUL	2400	mg/kg	1
Lead	CASL	200	mg/kg	1
Mercury (elemental)	SAUL	1.2	mg/kg	0.3
Mercury (inorganic)	SAUL	40	mg/kg	0.3
Mercury (Methylmercury)	SAUL	11	mg/kg	0.3
Nickel	SAUL	130	mg/kg	1
Selenium	SAUL	250	mg/kg	1
Vanadium	SAUL	410	mg/kg	1
Zinc	SAUL	3700	mg/kg	1
Monos aromatics				
Benzene	SAUL	87	µg/kg	1
Toluene	SAUL	130000	µg/kg	1
Ethylbenzene	SAUL	47000	µg/kg	1
Xylene (p & m) [note - values for p used]	SAUL	56000	µg/kg	1
Xylene (o)	SAUL	60000	µg/kg	1
MTBE (Methyl Tertiary Butyl Ether)	NONE*	1	µg/kg	1
Total BTEX	NONE		µg/kg	10

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Determinand	Source	Value	Units	Detection Limit
Petroleum Hydrocarbons				
Mineral Oil (C10 - C40)	NONE	-	mg/kg	10
TPH (C10 - C40)	NONE	-	mg/kg	-
Aliphatic EC 3-6	SAUL	42	mg/kg	0.1
Aliphatic EC >6-8	SAUL	100	mg/kg	0.1
Aliphatic EC >8-10	SAUL	27	mg/kg	0.1
Aliphatic EC >10-12	SAUL	130	mg/kg	1
Aliphatic EC >12-16	SAUL	1100	mg/kg	2
Aliphatic EC >16-35	SAUL	65000	mg/kg	16
Aliphatic EC >35-44	SAUL	65000	mg/kg	-
Aromatic EC 3-7	SAUL	70	mg/kg	0.1
Aromatic EC >7-8	SAUL	130	mg/kg	0.1
Aromatic EC >8-10	SAUL	34	mg/kg	0.1
Aromatic EC >10-12	SAUL	74	mg/kg	1
Aromatic EC >12-16	SAUL	140	mg/kg	2
Aromatic EC >16-21	SAUL	260	mg/kg	10
Aromatic EC >21-35	SAUL	1100	mg/kg	10
Aromatic EC >35-44	SAUL	1100	mg/kg	-
Hazard Index (Aliphatic)				
Hazard Index (Aromatic)				
Hazard Index (Combined)				
PCBs by GC-MS				
PCB Congener 28	NONE*	0.001	mg/kg	0.001
PCB Congener 52	NONE*	0.001	mg/kg	0.001
PCB Congener 101	NONE*	0.001	mg/kg	0.001
PCB Congener 118	NONE*	0.001	mg/kg	0.001
PCB Congener 138	NONE*	0.001	mg/kg	0.001
PCB Congener 153	NONE*	0.001	mg/kg	0.001
PCB Congener 180	NONE*	0.001	mg/kg	0.001
Total PCBs	NONE*	0.007	mg/kg	0.007

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Determinand	Source	Value	Units	Detection Limit
VOCs				
1,2,3-Trichlorobenzene	SAUL	1500	µg/kg	1
1,2,4-Trimethylbenzene	NONE*	1	µg/kg	1
1,3,5-Trimethylbenzene	NONE*	1	µg/kg	1
Bromobenzene	NONE*	1	µg/kg	1
Butylbenzene	NONE*	1	µg/kg	1
Chlorobenzene	SAUL	460	µg/kg	1
Isopropylbenzene	NONE*	1	µg/kg	1
n-Propylbenzene	NONE*	1	µg/kg	1
sec-Butylbenzene	NONE*	1	µg/kg	1
tert-Butylbenzene	NONE*	1	µg/kg	1
2-Chlorotoluene	NONE*	1	µg/kg	1
4-Chlorotoluene	NONE*	1	µg/kg	1
p-Isopropyltoluene	NONE*	1	µg/kg	1
Styrene	NONE*	1	µg/kg	1
Chloroethane	NONE*	1	µg/kg	1
Chloromethane	NONE*	1	µg/kg	1
Chloroethene (Vinyl Chloride)	SAUL	0.64	µg/kg	1
1,1-Dichloroethane	NONE*	1	µg/kg	1
1,2-Dichloroethane	SAUL	7.1	µg/kg	1
1,1-Dichloroethene	NONE*	1	µg/kg	1
Trans-1,2-dichloroethene	NONE*	1	µg/kg	1
Cis-1,2-dichloroethene	NONE*	1	µg/kg	1
1,1-Dichloropropene	NONE*	1	µg/kg	1
Cis-1,3-dichloropropene	NONE*	1	µg/kg	1
Trans-1,3-dichloropropene	NONE*	1	µg/kg	1
1,2-Dichloropropane	NONE*	1	µg/kg	1
1,3-Dichloropropane	NONE*	1	µg/kg	1
2,2-Dichloropropane	NONE*	1	µg/kg	1
Bromodichloromethane	NONE*	1	µg/kg	1
1,1,1-Trichloroethane	SAUL	8800	µg/kg	1
1,1,2-Trichloroethane	NONE*	1	µg/kg	1
1,1,2-Trichloro 1,2,2-Trifluoroethane	NONE*	1	µg/kg	1
Trichloromethane	NONE*	1	µg/kg	1
Trichlorofluoromethane	NONE*	1	µg/kg	1
Trichloroethene	SAUL	16	µg/kg	1
Tetrachloroethene	SAUL	180	µg/kg	1
Tetrachloromethane	NONE*	1	µg/kg	1
1,1,1,2-Tetrachloroethane	NONE*	1	µg/kg	1
1,1,2,2-Tetrachloroethane	NONE*	1	µg/kg	1
Bromomethane	NONE*	1	µg/kg	1
Dibromomethane	NONE*	1	µg/kg	1
Dibromochloromethane	NONE*	1	µg/kg	1
1,2-Dibromoethane	NONE*	1	µg/kg	1
1,2-Dibromo-3-chloropropane	NONE*	1	µg/kg	1
Tribromomethane	NONE*	1	µg/kg	1

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Determinand	Source	Value	Units	Detection Limit
SVOC's				
Phenol	SAUL	120	mg/kg	0.2
Azobenzene	NONE*	0.3	mg/kg	0.3
Hexachlorobenzene	SAUL	1800	µg/kg	0.3
Nitrobenzene	NONE*	0.3	mg/kg	0.3
1,2-Dichlorobenzene [derived by GC/MS]	SAUL	23	mg/kg	0.1
1,3-Dichlorobenzene [derived by GC/MS]	SAUL	0.4	mg/kg	0.2
1,4-Dichlorobenzene [derived by GC/MS]	SAUL	61	mg/kg	0.2
1,2,4-Trichlorobenzene [derived by GC/MS]	NONE*	0.3	mg/kg	0.3
Bis[2-chloroethoxy]methane	NONE*	0.3	mg/kg	0.3
Bis[2-chloroethyl]ether	NONE*	0.2	mg/kg	0.2
Bis[2-chloroisopropyl]ether	NONE*	0.1	mg/kg	0.1
1,2,4-Trichlorobenzene	SAUL	2.6	mg/kg	-
Hexachlorobutadiene [derived by GC/MS]	SAUL	0.29	mg/kg	0.1
Hexachloroethane	NONE*	0.03	mg/kg	0.05
2-Methylphenol	NONE*	0.3	mg/kg	0.3
4-Methylphenol	NONE*	0.2	mg/kg	0.2
2-Chlorophenol	SAUL	0.87	mg/kg	0.1
2-Nitrophenol	NONE*	0.3	mg/kg	0.3
4-Chloro-3-methylphenol	NONE*	0.1	mg/kg	0.1
2,4-Dichlorophenol	SAUL	0.87	mg/kg	0.3
2,4,5-Trichlorophenol	NONE*	0.2	mg/kg	0.2
2,4,6-Trichlorophenol	SAUL	0.87	mg/kg	0.1
2,4-Dimethylphenol	NONE*	0.3	mg/kg	0.3
2,4-Dinitrotoluene	NONE*	0.2	mg/kg	0.2
2,6-Dinitrotoluene	NONE*	0.1	mg/kg	0.1
2-Chloronaphthalene	NONE*	0.1	mg/kg	0.1
2-Methylnaphthalene	NONE*	0.1	mg/kg	0.1
Aniline	NONE*	0.1	mg/kg	0.1
4-Chloroaniline	NONE*	0.1	mg/kg	0.1
4-Nitroaniline	NONE*	0.2	mg/kg	0.2
4-Chlorophenyl phenyl ether	NONE*	0.3	mg/kg	0.3
Anthraquinone	NONE*	0.3	mg/kg	0.3
Isophorone	NONE*	0.2	mg/kg	0.2
Carbazole	NONE*	0.3	mg/kg	0.3
Dibenzofuran	NONE*	0.2	mg/kg	0.2
Bromophenyl phenyl ether	NONE*	0.2	mg/kg	0.2
Butyl benzyl phthalate	NONE*	0.3	mg/kg	0.3
Dibutylphthalate	NONE*	0.2	mg/kg	0.2
Diethylphthalate	NONE*	0.2	mg/kg	0.2
Dimethylphthalate	NONE*	0.1	mg/kg	0.1

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Sample Number
Date sample taken
Time sample taken

Determinand	Source	Value	Units	Detection Limit
Environmental Forensics				
Organochlorine Pesticides				
Aldrin	SAUL	5700	µg/kg	10
Hexachlorocyclohexane (α iso)	SAUL	230	µg/kg	-
Hexachlorocyclohexane (β iso)	SAUL	85	µg/kg	-
Chlordane (sum of cis & trans isomers)	NONE*	10	µg/kg	10
Hexachlorocyclohexane (δ iso)	NONE*	10	µg/kg	10
Dieldrin	SAUL	970	µg/kg	10
Endosulfans (α iso)	SAUL	7400	µg/kg	-
Endosulfans (β iso)	SAUL	7000	µg/kg	-
Endrin	NONE*	10	µg/kg	10
Hexachlorocyclohexane (ε iso)	SAUL	60	µg/kg	-
Heptachlor	NONE*	10	µg/kg	10
Heptachlor Epoxide	NONE*	10	µg/kg	10
Isodrin	NONE*	10	µg/kg	10
pp-Methoxychlor	NONE*	10	µg/kg	10
o,p'-DDE	NONE*	10	µg/kg	10
p,p'-DDE	NONE*	10	µg/kg	10
o,p'-DDT	NONE*	10	µg/kg	10
p,p'-DDT	NONE*	10	µg/kg	10
o,p'-TDE (o,p'-DDD)	NONE*	10	µg/kg	10
p,p'-TDE (p,p'-DDD)	NONE*	10	µg/kg	10
Thifluralin	NONE*	10	µg/kg	10
DDD (dichlorodiphenyldichloroethane)	HIDE DIV*	34	mg/kg	-
DDE (dichlorodiphenyldichloroethylene)	HIDE DIV*	2.3	mg/kg	-
DDT (dichlorodiphenyltrichloroethane)	HIDE DIV*	1.7	mg/kg	-
Organonitrogen Pesticides				
Bentazone	NONE*	0.1	µg/kg	0.1
Fendimethalin	NONE*	0.1	µg/kg	0.1
Thiobacpyr	NONE*	0.1	µg/kg	0.1
Thidimeton	NONE*	0.1	µg/kg	0.1
Organophosphorus pesticides				
Azinphos-methyl	NONE*	10	µg/kg	10
Chlorfenvinphos I (cis)	NONE*	10	µg/kg	10
Chlorfenvinphos II (trans)	NONE*	10	µg/kg	10
Chlorfenvinphos-methyl	NONE*	10	µg/kg	10
Diazinon	NONE*	10	µg/kg	10
Dichlorvos	SAUL	32	µg/kg	10
Dimethoate	NONE*	10	µg/kg	10
E-mevinphos	NONE*	10	µg/kg	10
Z-mevinphos	NONE*	10	µg/kg	10
Fenitrothion	NONE*	10	µg/kg	10
Fenthion	NONE*	10	µg/kg	10
Malathion	NONE*	10	µg/kg	10
Parathion-ethyl	NONE*	10	µg/kg	10
Parathion-methyl	NONE*	10	µg/kg	10
Phorate	NONE*	10	µg/kg	10

APPENDIX B

TERRAM

Hi Vis Geotextile



TERRAM Hi Vis is a non-woven orange geotextile used for separating contaminated/uncontaminated soils.

TERRAM Hi Vis geotextiles have a dual effect: its vivid colour warns of potential danger at the point of any future excavations and it can also prevent the upward movement of contaminated soil particles.

Preventing intermixing of granular materials and soils

TERRAM Hi Vis geotextiles provide an effective solution to the problem of constructing a stable granular layer over soft foundation soils. When stone is placed directly on a soft subgrade, the imposed load often causes intermixing of two layers. This results in contamination of the stone layer and a resulting loss in bearing strength, surface rutting and deformation at the sub-base/subgrade interface.

Preventing the ingress of fines into drainage media

Whether it's a granular drain or a geosynthetic alternative such as open geocellular units, TERRAM Hi Vis geotextiles are ideal for preventing the ingress of fines.

TERRAM filters/separators are used extensively in the construction of

- Paved and unpaved roads
- Railways
- Car parks and hardstandings
- Cycleways and footpaths
- SuDS installations
- Green roofs

Features

- Engineered to provide high strength and high elongation at break
- Manufactured from high tenacity UV stabilised virgin polypropylene fibres to provide long term durability in all soil types
- Manufactured using a randomly orientated web to provide completely isotropic properties
- Excellent uniformity with high permeability and low pore size for soil filtration

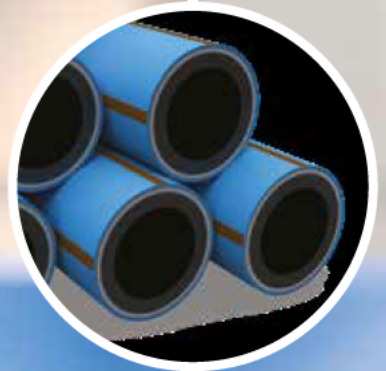
PRODUCT GRADE	T1000 Orange Geotextile
Roll Width (*) m	4.5/6
Roll Length (**) m	100

TERRAM product specifications can be downloaded from www.terram.com

APPENDIX C

PROTECTA-LINE

THE TRIED & TRUSTED BARRIER SYSTEM



WHY RISK IT?

THE ORIGINAL, TRIED AND TRUSTED BARRIER PIPE SYSTEM

Protecta-Line is the original barrier pipe system that you can trust to transport drinking water through contaminated land. It has been tried and tested by water companies and housebuilders for more than 20 years.

It has been proven over that time to maintain long term safety of supply and keep water safe from surrounding contaminants.

It is the most widely installed barrier pipe system in the UK.

There is no other system that has been developed hand-in-hand with contractors and installers over such a long term. The present day system has attained the highest standards of quality approval and represents a comprehensive barrier pipe solution, incorporating a full range of dedicated, approved fittings.

Put simply, why would you risk using anything else?

BENEFITS



Protection against all known contaminants



No expensive soil samples



Excellent lifetime cost savings



Cost savings during installation



Kitemarked system

Flexible material properties



Save on landfill costs



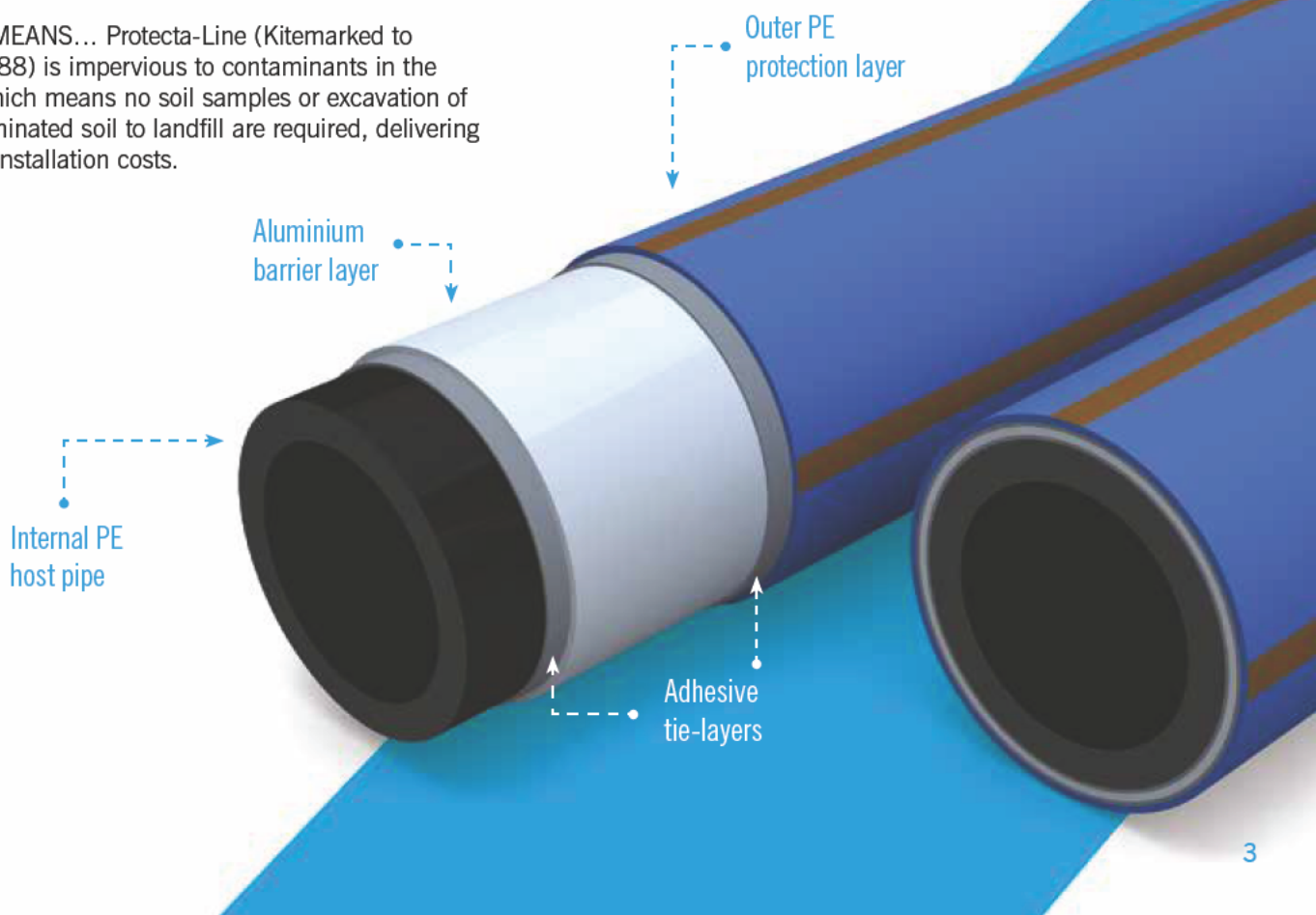
PROTECTA-LINE...

- ▲ provides proven protection against all recognised brownfield contaminants, both organic and inorganic, even in their maximum reported concentrations.
- ▲ is suitable for corrosive conditions.
- ▲ ensures peace of mind. As a proven solution for more than 20 years, water companies and other installers can be confident in its performance.
- ▲ includes a fully integrated range of pipe and approved dedicated fittings.
- ▲ may be used for trenchless installations or subjected to cold bending.

SAFE, EFFECTIVE AND PROVEN TO PROTECT

Protecta-Line's double bonded five-layer construction consists of an internal standard PE host pipe (PE80 or PE100 conforming to BS EN 12201) for carrying water, an impermeable aluminium barrier layer to stop the ingress of contaminants, an outer polyethylene protection layer and two adhesive tie-layers.

THIS MEANS... Protecta-Line (Kitemarked to BS 8588) is impervious to contaminants in the soil which means no soil samples or excavation of contaminated soil to landfill are required, delivering lower installation costs.



PRODUCT RANGE OVERVIEW

in contaminated land. The approved pipe range is from 20mm to 630mm diameter with working pressures up to 16 bar.

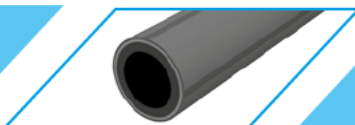
It is a complete, approved system, used with confidence by installers for more than 20 years.

Over the following pages you can see the full range of pipe and fittings available.



DESCRIPTION

PROTECTA-LINE PIPE



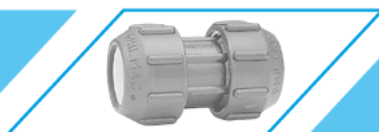
PE barrier pipe for water distribution through contaminated land

PROTECTA-LINE 3^C & 3^{CTH} COILS



Clean, capped and coiled PE barrier pipe for installation without pre-chlorination

MECHANICAL COMPRESSION FITTINGS



Mechanical compression fittings for service connections

FERRULE OFF-TAKES



Ferrules for live off-takes with minimal flow restrictions

MECHANICAL FITTINGS



Mechanical compression fittings for mechanical jointing without the need for pipe preparation or welding

ELECTROFUSION FITTINGS



Electrofusion fittings with a bar coding system for rapid and convenient jointing

PUPPED FITTINGS



Extended spigots suitable for electrofusion and butt-fusion jointing



STANDARDS/APPROVAL

MATERIAL

SIZE RANGE

BS 8588
WRAS

WIS 4-32-19 Regulation 31/33
BS EN 12201 (core pipes)

Polyethylene
Aluminium

25mm – 630mm (SDR11)
90mm – 630mm (SDR17)

BS 8588
WRAS

WIS 4-32-19 Regulation 31/33
BS EN 12201 (core pipes)

Polyethylene
Aluminium

90mm – 180mm

BS 8588
WRAS

WIS 4-32-19

Acetal

25mm – 63mm

BS 8588
WRAS

WIS 4-32-19

Gunmetal
Acetal
Stainless steel

25mm & 32mm
(for 63mm – 355mm mains)
63mm (for 90mm - 355mm mains)

BS 8588
WRAS

WIS 4-32-19

Stainless steel
Rilsan coated steel

63mm – 180mm

BS 8588*
WRAS

WIS 4-32-19*

Polyethylene

90mm – 630mm

WRAS (pipes and spigots)

Polyethylene

90mm – 630mm

*90mm - 355mm electrofusion fittings are Kitemarked

FITTINGS

MECHANICAL COMPRESSION FITTINGS

For 25mm to 63mm Protecta-Line



BENEFITS

- Proven barrier protection against contamination
- No contact between the pipe's protective aluminium layer and drinking water
- No risk of joint corrosion
- Easy and rapid all weather installation

FERRULE OFF-TAKES

For 63mm to 355mm Protecta-Line



BENEFITS

- No disruption to water supply
- Secure isolation of drinking water from ground contaminants
- Simple, all-weather installation with no scrapping or pipe preparation required
- Excellent headloss and flow characteristics
- Proven mechanical compression connections
- Innovative self-locking thimble design



MECHANICAL FITTINGS

For 63mm to 180mm Protecta-Line



BENEFITS

- Fast and easy all-weather jointing by a single installer
- No need for elastomeric seals, pipe-end preparation or welding.
- Only a torque wrench with an Allen (hex) bit socket is required
- No need for specialist tooling (eg. hydraulic pump) or external power supply – reduced health & safety risk
- Can be installed in the tightest of spaces

ELECTROFUSION FITTINGS

Electrofusion fittings for Protecta-Line



BENEFITS

- Easy and rapid installation
- Can be carried out in a trench, especially useful for repairs or tie-ins
- Proven barrier protection against contamination
- No risk of joint corrosion
- No contact between the pipe's protective aluminium layer and drinking water

PUPPED FITTINGS

Prefabricated fittings for Protecta-Line



BENEFITS

- Bespoke fabrications can be made
- Full barrier performance
- Flexibility to construct a pipeline to individual project needs
- Fully homogeneous pipeline (with fused joints)

CASE STUDIES

WIXAMS DEVELOPMENT

CHALLENGE

One of the largest developments created in the UK since World War 2 will house 4,500 families and include homes, amenities and educational facilities. The site was previously used as a munitions works and Anglian Water identified elevated levels of ground contamination.

Due to potential risks of water contamination, Anglian Water stipulated that barrier pipe must be installed for the water mains.

SOLUTION

Anglian Water has turned to us for help. As a result, more than 4km of Protecta-Line barrier pipe is being installed by Anglian Water's approved contractors, Achiva Limited, to cater for all of the water distribution needs for the development.

More than 3km of a mix of larger diameter 450mm and 355mm Protecta-Line has been installed through the spine of the development, with smaller spurs of 225mm and 180mm coming off into the housing estates, before dropping down to 90mm as it goes into the cul-de-sacs to supply each individual property.

Currently all open field land, there was no space or logistic restrictions with the installation, which has allowed the pipeline to be installed using an open cut installation and butt fusion jointing technique, which offered a quick and simple installation process.

Commenting on the scheme, Simon Pink, Project Engineer at Anglian Water, said: "We have used Protecta-Line successfully on other schemes, so we knew that it would provide a reliable and safe solution for Wixams. **The pipe system was much easier to handle on site, compared with ductile iron, and offered us a much quicker and simpler installation process.**"



PEMBROKE REFINERY

CHALLENGE

As with all industrial chemical sites, Valero's Pembroke Refinery faced the risk of soil contamination, which had health and safety implications for the supply of drinking water to the facility. In addition, many of the original metallic pipes had deteriorated and become prone to leaks and bursts. The refinery needed to implement a water network renewal programme.

SOLUTION

The refinery selected Protecta-Line barrier pipe system to replace existing metallic pipes. In some areas of the site, putting a bypass in place was simply not viable, therefore, the project team opted to slipline some of the existing metallic pipes with Protecta-Line which proved to be an efficient and cost-effective solution that minimised operational disruption.

On these sections, 110mm Protecta-Line pipe was inserted into the existing, corroded six inch carbon steel pipe using a cable to pull the new pipe into position. A range of Protecta-Line fluid compression fittings were also installed to ensure the integrity of the contamination barrier, without the need for any special procedures, including couplers, elbows, tees and stub flanges.

Protecta-Line stop cocks and self-tapping ferrule off-takes were also used, which enabled live off-takes of Protecta-Line service connections without any flow restrictions. **Alongside the need to renew the infrastructure, there was a clear focus on upgrading the pipeline to ensure it met the current regulatory requirements; fully WRAS and Regulation 31 approved for supply of drinking water, Protecta-Line was the ideal solution.**

MORRISONS BRIDGEWATER

CHALLENGE

This 75,000 square metre distribution centre serves the supermarket chain's network of stores in the South West and forms part of an £11 million regeneration scheme, including up to 2,000 new homes. The development is located on a mixed brownfield and greenfield site, which combines redundant industrial land with farmland.

The mains connection for the scheme is at the front of the site where there is a railway line and a chemical factory. Bob Wood from Wessex Water explained: "While stringent controls limit the contaminants from the factory now, historically they have been varied and significant. Trial holes across the site were tested for contamination and, while contaminants were not found over a large proportion of the site, the high water table did present the risk of migration of contaminants across a wider area."

SOLUTION

It was these concerns over the potential for contaminants to be carried to 'safe' soil areas by tidal waters on the flood plain site that prompted Wessex Water to specify 355mm Protecta-Line pipe system for a new main running across the distribution centre site, including the footprint of the building and access roads.

Around 1,200m of Protecta-Line was used in SDR17, providing up to 10 bar pressure capability which allows for additional capacity to be factored into the installation.

Wessex Water installed the pipe into open trenches, incorporating T-joints to allow take-offs of supply to be added at a future date. All joints were made by butt-fusion and the installation team prepared the pipes using the Protecta-Line Surprep tool to scrape away the outer layers. Wessex Water continued its practice of wrapping the joints using aluminium foil and Denso tape throughout the Protecta-Line installation.

Away from the Protecta-Line spine main, the site is not at risk of contamination so ordinary PE pipe was used with steel mechanical fittings to create the joints between the two materials. Bob adds: **"Even a small risk of contaminant migration makes it prudent to specify an effective barrier pipe. Protecta-Line safeguards against ingress of all known contaminants and is our preferred barrier pipe solution so this specification means that we can be confident of a safe water supply."**

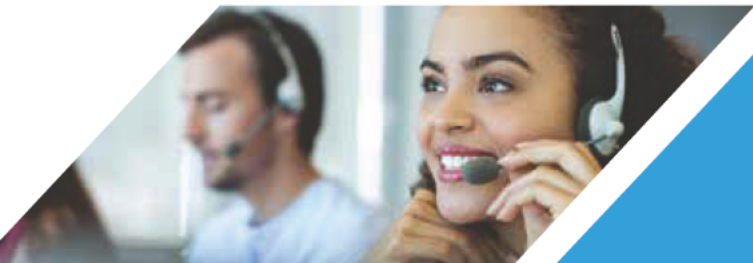
ADDED VALUE SERVICES



SPECIFICATION & DESIGN ADVICE



Our experienced pipeline engineers offer specification guidance and material estimates, and provide advice and recommendations during the design stage of a new pipeline scheme to ensure the most appropriate system is designed for each individual application.



CUSTOMER SERVICES

We pride ourselves on the high level of customer service we provide to each and every customer. Our Customer Service team offers support at every stage of a project, advising on lead-times, logistics and delivery requirements, managing the supply chain process from the point of order through to installation.



TECHNICAL SUPPORT



Providing assistance to the entire customer supply chain, our experienced technical support team offer product training, jointing demonstrations and installation advice to support the successful completion of every project.

ALL YOU NEED TO KNOW ABOUT HEALTH, SAFETY, QUALITY & ENVIRONMENT

STANDARD/APPROVAL	TITLE	APPLICABLE TO GPS PRODUCTS
Regulation 31/33	The Water Supply (Water Quality) Regulations (England/Wales/Scotland/NI)	All drinking water pipes
The (Water) Regulators Specification & The Water Supply (Water Fittings) Regulations 1999	The (Water) Regulators Specification & The Water Supply (Water Fittings) Regulations 1999	All pipe materials. All fitting materials. All PE100 fittings and matching pipes. All Protecta-Line fittings and matching Protecta-Line pipes
BS EN 12201	Plastics piping systems water supply, and for drainage and sewerage under pressure – Polyethylene (PE)	Blue and black PE80 and PE100 pipes and fittings in sizes up to 1200mm
WIS 4-32-19	Polyethylene pressure pipe systems with an aluminium barrier layer for potable water supply in contaminated land sizes	25mm to 630mm – Protecta-Line pipe and fittings
BS 8588	Polyethylene pressure pipe with an aluminium barrier layer and associated fittings for potable water supply in contaminated land	25mm to 630mm - Protecta-Line pipe and fittings
WIS 4-32-08	Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials	Butt fusion and electrofusion jointing of blue and black PE80 and PE100 pipes and fittings
BS 6920 Part 1	Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on water – Part 1: Specification	All pipe materials. All fitting materials. All PE100 fittings and matching pipes. All Protecta-Line fittings and matching Protecta-Line pipes All pipe materials. All fitting materials.
BS 6920 Part 2	Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on water – Part 2: Methods of test	All PE100 fittings and matching pipes. All Protecta-Line fittings and matching Protecta-Line pipes. All pipes
BS 6920 Part 4	Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on water – Part 4: Method for the GCMS identification of water leachable organic substances	All pipes
ISO 4427	PE pipes for water supply	Blue and black PE80 and PE100 pipes and fittings
BS EN 15494	Specifications for polyethylene components and systems	Blue and black PE80 and PE100 pipes and fittings up to 1200mm
BS EN 805	Water supply – requirements for systems and components outside buildings	External water supply installations
BS 5306 – Part 2	Fire extinguishing installations and equipment on premises	Blue and black PE80 and PE100 for external buried fire mains
WIS 4-22-02	Specification for ferrules and ferrule straps for underground use	Protecta-Line ferrules
WIS 4-24-01	Specification for mechanical fittings and joints including flanges for polyethylene pipes for the conveyance of cold potable water for the size range 90 to 1000mm including those made of metal or plastics or a combination of both	Stub flanges, SlimFlange and Protecta-Line Mechanical Fittings

ENVIRONMENT

GPS operates an environmental management system in accordance with the requirements of BS EN ISO 14001. The system is audited twice a year by the BSI.

GPS continually monitors its business activities with the aim of minimising their impact on the environment. A number of on-going waste minimisation projects have been implemented in areas such as energy usage, product packaging and landfill waste.

A continual improvement culture is promoted within the company by setting environmental targets and objectives that are regularly monitored and reviewed.





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 **GPS**
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Distributor

APPENDIX D

Gas Protection Verification Requirements

Gas protection measures should be verified in accordance with directions supplied in BS8485:2015+A1:2019 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'; CIRIA C748:2014 'Guidance on the use of plastic membranes as VOC vapour barriers'; and CIRIA C735:2014 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases.'

As a minimum the following should be undertaken.

In accordance with the recommendations made in Annex 1, Table A1, A2 and A3 of CIRIA Report C735, the membrane may be installed either by the Ground Worker for the scheme or by a Specialist Contractor under a Low or Intermediate risk site.

Regardless, the membrane installation should be subject to independent inspection by an independent verifier who should be able to demonstrate their competence, training and relevant experience.

The inspection process should include a thorough visual inspection of the membrane, including photographic records. The recommended membrane verification approach is provided below.

Inspection and Testing Regime – Floor Slab, non-reinforced

If the membrane is installed by the Ground Worker the independent inspection should cover 100% of the membrane surface area.

If the membrane is installed by a Specialist Contractor (at least one operative being qualified with an NVQ Level 2 in Gas Protection Installation), it is recommended that 100% of the first plot/building is independently inspected. The regime of inspection may be reduced to 1 in 5 plots/buildings provided that the Specialist Contractor continues to provide sufficient evidence to demonstrate the compliance, including as a minimum sign off sheets and photographs.

All joints, pipe penetrations etc. of the inspected membrane area should be independently air lanced to ASTM D4437.

Inspection and Testing Regime – Floor Slab, reinforced

If the membrane is installed by the Ground Worker the independent inspection should cover 100% of the membrane surface area.

If the membrane is installed by a Specialist Contractor (at least one operative being qualified with an NVQ Level 2 in Gas Protection Installation) the regime of independent inspection may be reduced to 50% of the membrane surface area. The regime of inspection may be reduced to 1 in 10 plots/buildings provided that the Specialist Contractor continues to provide sufficient evidence to demonstrate the compliance, including as a minimum sign off sheets and photographs. All joints, pipe penetrations etc. of the inspected membrane area should be independently air lanced to ASTM D4437.

Summary of Verification Recommendations: Residential Low/Intermediate Risk¹

Installer	Verification Recommendation	Non-reinforced concrete slab	Reinforced concrete slab ⁴
Groundworker ²	Thorough visual inspection completed by competent and suitably experienced consultant or qualified installer ³ prior to concrete pours.	✓ (100%)	✓ (100%)
	Membrane joints, pipe penetrations etc. independently air lanced to ASTM D4437.	✓ (100%)	✓ (100%)
	Evidence of installation and verification provided to the independent verifier by the Ground Worker, including photographs demonstrating conformance.	✓	✓
Specialist Contractor ³	Thorough visual inspection completed by competent and suitably experienced consultant or qualified installer ³ prior to concrete pours.	✓ (100%)	✓ (100%)
	Membrane joints, pipe penetrations etc. independently air lanced to ASTM D4437	✓ (100%)	✓ (100%)
	Evidence of installation and verification provided to the independent verifier by the Ground Worker, including photographs demonstrating conformance.	✓	✓

(100%) – recommended percentage of the membrane surface independently inspected.

1 Assumes a site-specific gas risk assessment has determined that basic mitigation is required (i.e. passive ventilation and a proprietary gas membrane).

2 Installer holds no relevant qualification.

3 Operative (at least one) being qualified with an NVQ Level 2 in Gas Protection Installation.

4 Assumes well reinforced slab of minimum 150mm thickness.

It is noted that:

- The installer must be appropriately experienced and qualified to install the proposed mitigation system.
- Conflicts of interest should be avoided, for example a membrane supplier certifying their own work. If verification works are completed by the same company that completed the installation, then this work should be audited by an independent consultant.
- Reporting should be as per Section 5 of C735. As a minimum this should include the completion of sign off/inspection records detailing the site and plot/building inspected, quality of workmanship, membrane type, membrane detailing, integrity testing method, non-conformances and repairs, as well as good resolution photographs and any matters requiring further investigation and/or rectification.