

11 February 2026

Our ref: J2334/DB/c06a

LAND AT KNOWLE HILL, ALLBROOK, EASTLEIGH, HAMPSHIRE

REMEDIATION STRATEGY & VERIFICATION PLAN

This report provides a summary of the requirement for remediation and sets out the remedial steps that will be required, and the information that will be collected and submitted as part of a Verification Report on completion of the works.

The findings of the Desk Study and the multiphased Ground Investigation carried out at this site (report reference J202334 issue 4 dated January 2026) have confirmed a requirement for remediation with respect to soil gas and near surface elevated concentrations of arsenic.

As with all our work, this Remediation Strategy and Verification Plan is provided in accordance with our standard terms, conditions and limitations.

Site Contamination Summary

Whilst reference should be made to the above report for a full description of the site and the contaminated land discussion, this report provides a summary of the site, its contaminated land history and the findings of the desk study and multiphased ground investigation.

The site is a greenfield site, although historically the land to the west of the site has been used as a brickworks, with the former brick clay excavation subsequently backfilled with waste that was considered at the time to be Inert, although it is important to note that at the time of that landfilling, materials such as topsoil and organic matter would have been classified as Inert, although they are now recognized as presenting a potentially significant source of soil gas.

The results of soil contamination testing have indicated locally elevated concentrations of arsenic within the near surface apparently natural topsoil present within the southern part of the site, with the results from the balance of samples recovered from locations across the main northern part of the site not indicating elevated concentrations.

Requirement for Soil Gas Remediation

As part of the ground investigation a Ground Gas Risk Assessment has been carried out in accordance with the approach set out in BS8485. Peak carbon dioxide measurements of 14.8%v/v were recorded with a worst case flow rate of 14.8l/hr determined, which together indicate a Gas Screening Value of 2.2, which in turn equates with a Characteristic Situation CS3 classification of the site.

On the basis of this assessment, together with the identified presence of a viable source of carbon dioxide in the form of the nearby backfilled former clay extraction pit, a requirement for soil gas protection to new dwellings has been identified.

Whilst garages are necessarily designed to naturally ventilate vehicle fumes, careful consideration must be given to the potential use of integral garages as utility spaces that may be considered part of the residential occupation of the building. On this basis it is considered that integral garages should be installed with gas protection measures as standard.

Detached garages are routinely constructed with ground bearing floor slabs and single skin brickwork walls, such that they are not suitable for residential conversion or use. Providing that it is explicitly stated within the Homeowners Guide and that this standpoint is supported by the Council, gas protection to detached garages would not be deemed necessary to support their use as naturally ventilated garages.

Gas Protection Design Requirements

In accordance with BS84845, the proposed structures comprise Type A, (private housing), for which a gas protection score of 4.5 is required based on the site's gassing regime of CS3 (Table 4 of the BS). Tables 5 and 6 of the BS sets out how this score may be achieved.

Structural Element	Score
Precast suspended segmental subfloor (beam and block)	0
Passive sub-floor dispersal layer designed to a very good performance	2.5
Gas resistant membrane	2.0
Score	4.5

In accordance with the guidance provided by CIRIA, the British Standard, Building Regulations and the NHBC, the following remedial requirements have therefore been identified;

- Suspended ground floor slabs.
- Passively ventilated sub-floor void achieved through the use of air bricks placed at suitable intervals and locations. The volume flow-through rate is governed by the size and number of side vents. In order to achieve the necessary points awarded to a very good performance, the ventilation must be able to achieve the following;
 - For small to medium width buildings (up to 15 m wide), the minimum area of side ventilation should be 1500 mm²/m run of wall on at least two opposite sides.
 - For larger width buildings, the side ventilation provisions should be at least 2000 mm²/m run of wall.
- The minimum depth of the clear void space should be 100 mm. Where there are multiple internal obstructions to air flow (caused by beams), there should be four or five times the area of the side vents provided in the internal obstructions.
- The design shall ensure minimum penetration of the slab by services and sealing of all penetrations and joints using 'top hats' or bespoke/site formed top hat seals.
- Installation of a proprietary Carbon Dioxide resistant gas membrane across the whole of the ground floor from external wall to external wall, across wall cavities and sealed around service penetrations.
- All gas membrane joints shall be formed in accordance with the manufacturers guidelines and include an overlap.
- The membrane installation shall be undertaken by a suitability competent, experienced and qualified installer.
- Inspection and verification of installed measures either by an approved installation contractor or independent specialist.

The details of the gas protection measures and the materials selected that are incorporated into the construction of proposed dwellings will need to be confirmed by the Architect once specified.

Confirmation of the Specialist Installer will also need to be confirmed once appointed.

There will be a requirement for the provision of a Gas Protection Installation and Verification Report in due course to demonstrate the appropriate and adequate installation of protection measures to achieve the above requirements. The scope of this report is set out at the end of this report.

Requirement for Soil Remediation

The results of soil contamination testing have identified the presence of locally elevated concentrations of Arsenic within the near surface soils in two locations within the southern part of the site, with the results of testing carried out within the remainder of the site not indicating the presence of elevated concentrations of a wide range of potential chemicals of concern. The measured concentrations of arsenic within these two locations are assessed as elevated with respect to a Residential with Plant Uptake End Use and a Public open Space (Residential) End Use, such that a requirement for remediation has been identified within the southern part of the site with respect to the proposed residential development.

The key Remediation objectives with respect to soil remediation are the protection of human health of end users and site workers within areas of proposed private domestic gardens and the area of communal access soft landscaping that is to be formed surrounding the SUDS basins that are to be located within the southern part of the site.

Soil Remediation Actions

In order to satisfy the Remediation Objectives, the following Remediation Actions will be required.

Removal of Existing Topsoil and Made Ground

As part of the initial site works, the existing near surface topsoil and made ground shall be removed from the area indicated below.

The topsoil and made ground should be removed down to natural clay and the removed material shall be stockpiled separately from any other site arisings scheduled for reuse and shall be tested for waste disposal off site as necessary

Within the vicinity of trees, excavation and removal of the topsoil and made ground cannot be carried out and it is proposed that additional soil testing shall be carried out in these areas on the basis of one sample per 50m² to determine whether these soils may be locally left insitu.

If locally elevated concentrations of potential concern are identified in the root protection area to trees, then additional remediation approaches may need to be developed in discussion with the Council and the appointed Arboricultural Consultant.



Post Topsoil and Made Ground Removal Testing and Inspection

Following removal of the made ground and topsoil within the above identified area, soil testing of the reduced formation layer of natural clay soils shall be carried out at a rate on one sample per 50m² of open space with a sample also recovered from the propose private rear garden to Plot No, which is to be constructed in the northern part of this area.

If the results of this testing indicate that acceptable concentrations of potential chemicals of concern are present, then ground levels may be restored as required through the placement of site won topsoil and subsoil as necessary from the northern part of the site.

Should the results indicate that unacceptable concentrations of potential chemicals of concern remain at the formation level, then a Topsoil and Subsoil Capping system will be required within this part of the site.

Topsoil and Subsoil Capping System to Gardens and Soft Landscaping Areas

Should post soil removal testing indicate a requirement for a capping system, these works shall be carried out as follows;

- The depth of capping shall be 600mm within private gardens and 450mm within areas of proposed managed soft landscaping and planting.
- The imported soils shall be placed over a marker layer where made ground remains present at the reduced formation level.

Clean Topsoil and Subsoil may be site won from the northern part of the site, or may be directly imported from a certified source. Testing shall need to be carried out to confirm the chemical suitability of topsoil for reuse within the northern part of the site and placement as part of a capping system in the southern part of the site. Testing shall be carried out at a rate of not less than 1 sample per 100m³ of materials and the acceptability criteria to determine the suitability of any soils are presented below;

Determinant	Acceptability Criteria (residential with plant uptake) mg/kg	Determinant	Acceptability Criteria (residential with plant uptake) mg/kg
Asbestos	No quantifiable asbestos	Mercury (Hg)	1.0
Arsenic (As)	32	Nickel (Ni)	130
Cadmium (Cd)	10	Selenium (Se)	350
Chromium (hex)	4.3	Zinc (Zn)	3750
Chromium (Cr)	3000	Benzo(a)pyrene	5.0
Copper (Cu)	2330	Total Phenols (mono)	420
Lead (Pb)	200	Speciated Fuel Relation hydrocarbons (TPH)	Various species-specific values

Gas Protection Verification Reporting

The installation and verification report should present an accurate description of the measures actually applied and present the evidence gathered to confirm that installed measures are suitable for purpose. As a minimum, in accordance with the requirements of the British Standards, the report should include:

- A description and photographic records of the measures installed with any variations to the pre-construction design fully detailed and justified.
- Details of who installed the measures.
- Details of who inspected or verified the installation and a description of how this took place, together with any constraints or other issues of uncertainty.
- Verification test results, outcome of inspections and compliance data should be provided, either within the main text or as an Annex to the report.
- Any defects identified, together with corrective actions and subsequent verification checks.

Where appropriate, the report content should also include:

- Copies of regulatory correspondence/sign off.
- Manufacturers' specifications, warranties and/or guarantees.
- Personnel details (such as relevant qualifications).
- Maintenance requirements and/or limitations of the system.

In all circumstances, the Soil Gas Remediation Validation Report should provide a concluding comment about the suitability of installed gas measures and include the name of the author, company details and date of issue.

Soil Remediation Verification Reporting

The following key requirements of a validation and verification report are required with respect to Soil Remediation;

- Photographic records of the reduced level formation following removal of the near surface soils and the subsequent placement of verified clean and suitable topsoil and subsoil..
- Results of testing carried out upon clean natural subsoils exposed at formation level following a reduced level excavation together with a plan of the sampling locations
- Results of testing carried out on samples of the near surface soils present within root protection areas together with a discussion of the findings and together with a plan of the sampling locations
- If the results of soil verification sampling indicate raised concentrations of potential chemicals of concern, photographic confirmation of the incorporation of a geotextile marker layer will be required for plots within the southern part of the site and the area of southern communal access soft landscaping.
- If the results of the testing within areas of root protection ate raised concentrations of potential chemicals of concern the scope of further remediation actions carried out in agreement with the Council and the Arboricultural Consultant shall be set out and verified.

The Soil Remediation Validation Report shall provide a concluding comment to confirm the suitability of the areas of private garden and areas of soft landscaping.

This report shall also confirm the overall successful remediation of the site.

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