



Report
Title:

Additional Phase 2 Contamination Assessment and Remediation Strategy

Project
Name:

Bartons Road, Havant



Report
Reference:

BRD4469-OR5-A

Date:

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BRD Environmental Ltd

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REPORT CONTROL SHEET

REPORT TITLE	ADDITIONAL PHASE 2 CONTAMINATION ASSESSMENT AND REMEDIATION STRATEGY
PROJECT	BARTONS ROAD, HAVANT
CLIENT	STONEBOND

REPORT REFERENCE	ISSUE DETAIL	DATE	PREPARED BY	CHECKED BY
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BRD Environmental Limited

Geotechnical and Environmental Services

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- Japanese Knotweed Removal
- Soil, Water and Gas Testing
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Additional Phase 2 Contamination Assessment and Remediation Strategy
Bartons Road, Havant
BRD4469-OR5-A Havant Add CA&RS

REPORT LAYOUT

This report is divided into the following four sections: Summary Report, Technical Report, Supporting Information and Appendices.

SUMMARY REPORT

This expanded executive summary provides the main findings of the work undertaken in brief non-technical language. This section provides an overview of the key outcomes for the benefit of non-specialists and concludes with the main recommendations for any further work required. This section should only be relied upon in the context of the whole report and the detailed within the Technical Report should be referred to with respect to any design decisions.

TECHNICAL REPORT

The main report section is intended to provide the technical detail of the works completed and meet the information required by current guidance and practice. The Technical Report is written in a language that, in part, assumes knowledge of the subject matter so that it can be written in as concise a form as possible. Its primary audience is clients, peers, regulators and other professionals in related disciplines.

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<p>This section of the report provides background details of a generic nature together with specific technical approaches adopted by BRD and details of the guidance documents that are commonly referenced in the report. The section also includes explanations of technical terms to assist non-specialist readers in understanding the Technical Report. It should be noted that not all the information within this section is necessarily applicable to this specific report.</p>	

APPENDICES

The final section of the report presents the factual data collected and employed as part of the preparation of the report.

APPENDIX 1 SITE PLANS & PHOTOGRAPHS

Site Location Plan	Ref. BRD4469-OP2-A
Proposed Development Layout	'Proposed Block Plan - Former SSE Offices, Bartons Road, Havant', Edgingtons Architects, Job No. 6087, drawing No. 1110, revision E, dated 05/01/2026.
Exploratory Point Plan	Ref. BRD4469-OD1-E
Revised Conceptual Site Model	Ref. BRD4469-OP6-E
Soil Contamination Plan	Ref. BRD4469-OD3-A
Proposed Pre-Construction Phase Remediation Plan	Ref. BRD4469-OD4-A
Proposed Construction Phase Remediation Plan	Ref. BRD4469-OP12-A

APPENDIX 2 BRD EXPLORATORY HOLE & MONITORING RECORDS

Logs of trial pits.	Ref. TP315-TP324
Photographic records of trial pits.	Ref. BRD4469-OP11-A
Groundwater monitoring records.	2 x A4 pages

APPENDIX 3 LABORATORY TEST RESULTS

DETS reports 26-15654.1 & 26-16365.1	16 x A4 pages
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SUMMARY REPORT- GENERAL INFORMATION

SUBJECT	COMMENTS
CURRENT SITE CONDITION	The site is currently unoccupied and derelict. The former SSE offices have been demolished leaving a surface of demolition rubble across the site in the location of the former offices. A large stockpile of crushed concrete is located in the centre of the site.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed as a residential housing estate comprising 58No. semi-detached and terraced houses and an apartment block containing 32No. apartments, with private and shared gardens and off-street parking, all served by a network of estate roads.
HISTORICAL SUMMARY	<p>The earliest available map from 1867 shows the site as agricultural. A stream was shown in the eastern and southern areas of the site, however by 1957 it was no longer present. By 1972, office buildings had been constructed on site. By the same time, a petrol station had been constructed to the southwest and an electricity substation to the east.</p> <p>By 1991 the offices had been extended and an above ground fuel tank installed centrally. The offices were then demolished at some point between 2016 and 2019, with the crushed arisings remaining on site.</p>
PUBLISHED GEOLOGY	<p>No superficial deposits are indicated to be present. However, Head Deposits are shown adjacent to the east and River Terrace Deposits approximately 160m south. Both deposits can be composed of clay, silt, sand or gravel.</p> <p>The shallowest bedrock is shown to be the Bognor Sand Member, which is typically described as a fine- and medium-grained sand.</p> <p>The Bognor Sand Member is underlain by the London Clay Formation, which typically comprises grey-brown silty clay.</p>
ACTUAL GROUND CONDITIONS	<p>This investigation encountered a variable cover of Made Ground overlying Head Deposits across most of the site, in turn overlying the Bognor Sand Member. Alluvium was also encountered in an isolated area of the site in the centre west.</p> <p>The London Clay Formation was encountered underlying the Bognor Sand Member at depth, with one of the deep boreholes reaching the likely interface between the London Clay Formation and the underlying Lambeth Group.</p> <p>Beneath the former above ground fuel tank, some form of soakaway structure was encountered at depth and the natural sandy soils of the Bognor Sand Member beneath this feature displayed evidence of more significant hydrocarbon staining and also emitted hydrocarbon odours.</p>
HYDROGEOLOGY	<p>The Bognor Sand Member is designated as a Secondary A Aquifer.</p> <p>The site is located within a groundwater Source Protection Zone 1 (Inner Protection Zone) - Subsurface activity only (1c). This means the aquifer is confined and will only be affected by deep subsurface activity such as deep drilling.</p>

SUBJECT	COMMENTS
HYDROLOGY	<p>The closest identified surface water feature to the site is a stream approximately 311m east of site.</p> <p>The site is not at risk from flooding.</p>

SUMMARY REPORT - CONTAMINATION ISSUES

SUBJECT	COMMENTS
SOIL RISKS TO HUMAN HEALTH	A risk is presented to future residents from a localised hotspot of microscopic asbestos insulation debris within the near surface Made Ground around the former fuel tank location.
HYDROCARBON VAPOUR	A risk to future residents has been identified from elevated concentrations of hydrocarbon vapours from the contaminated soils at depth in the location of the former above ground fuel tank.
LANDFILL GAS	The gas monitoring completed previously has shown that landfill gas protection measures are not required.
RADON GAS	Radon gas protection measures are not required.
RISKS TO THE WATER ENVIRONMENT	<p>A localised risk to water environment has been identified by this investigation from some elevated concentrations of diesel fuel hydrocarbons recorded both in the deeper soils and in the surrounding groundwater around the former fuel tank.</p> <p>However, there is also evidence to suggest that there is some residual background TPH and PAH contamination in the groundwater derived from off-site sources, as contamination has been identified in one of the boreholes on the northern boundary. As the anticipated groundwater flow is to the south can only have migrated onto the site from elsewhere.</p>
RISKS TO BUILDING MATERIALS AND SERVICES	The presence of elevated PAH, TPH and BTEX on the site will likely dictate that new water supplies will need to incorporate specialist protective pipes incorporating a foil barrier, as per the requirements of the local water supply company.
REMEDIATION STRATEGY	<p>The remediation strategy proposes the following:</p> <ul style="list-style-type: none"> the removal of the asbestos contaminated Made Ground soils, the in-situ biological treatment of the hydrocarbon contaminated soils, the installation of vapour barriers into the affected plots and the installation of protective water supply pipes. <p>A detailed remediation strategy is set out within the main report.</p>

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	Stonebond Properties (Guildford) Limited trading as Stonebond.
SITE	Land situated at the former SSE offices off Bartons Road, Havant.
CLIENT'S ADVISORS	BRD Environmental Limited (BRD) has been commissioned directly by the Client.
REPORT CONTEXT	It is understood that the Client owns the site and intends to develop it for residential housing.
REPORT TYPE	Additional Phase 2 contamination assessment and remediation strategy.
REPORT OBJECTIVES	<p>The site has been the subject of a desk study and three phases of ground investigation undertaken by BRD, referenced as follows:</p> <ul style="list-style-type: none">• 'Phase 1 Environmental Desk Study - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR1-A, dated August 2024.• 'Phase 2 Geo-Environmental Investigation - Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.• 'Soakage Investigation - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR3-C, dated July 2025.• 'Additional Geo-Environmental Investigation - Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR4-A and dated June 2026. <p>The additional Geo-Environmental Investigation report has identified some risks arising from some localised microscopic asbestos insulation debris identified within the Made Ground located in the centre north of the site. Likewise, the investigation identified the potential for some localised fuel contamination to be present in the location of a former above ground fuel tank, which could in turn present risks to future residents, the water environment and to water supply pipes. Following comments received from the environmental control officer at Havant Borough Council, the area around the former fuel tank needed some further investigation but required part of the large stockpile to be moved.</p> <p>Further investigation has now been completed around this area, in terms of delineating both the asbestos and fuel contamination areas. The purpose of this report is to present the findings of that investigation and to then complete an updated Phase 2 contamination assessment and from that a remediation strategy to address the identified contamination risks.</p> <p>This report will look to address the outstanding requirements of Parts 1, 2 and 3 of Condition 20 of planning permission ref. APP/25/00639, issued by Havant Borough Council.</p>

1.2. SCOPE OF WORKS

The agreed scope of works was:

- Mobilisation to site and production of health and safety documentation.
- Setting out of the works area and determination of the accurate location and level of exploratory points by topographical grade GPS unit.
- Provision of a ~20T tracked excavator for two days to undertake the works
- Relocation of crushed concrete stockpile using the excavator to expose the footprint of the former fuel storage tanks.
- Trial pitting using the excavator to expose the soils and possible pile caps to a nominal depth of up to 3m, ground conditions permitting.
- All exploratory points will be logged and sampled in general accordance with BS5930:2015+A1:2020 by supervising Geo-Environmental Consultant. A photo-ionisation detector (PID) will be used during the site works to assist in identifying and delineating any volatile organic contamination.
- Geo-Environmental Technician to undertake a further groundwater monitoring visit with the collection of groundwater samples for testing using sampling equipment dedicated to each well. Purging of boreholes will be undertaken during the site works.
- Chemical testing of soil samples with the budget based on the following testing schedule:
 - 2No. Metals Suite - As, Cd, Cr, CrVI, Hg, Pb, Se, Cu, Ni and Zn.
 - 2No. Inorganics Suite - water soluble sulphate, pH, organic matter.
 - 6No. Speciated Polycyclic Aromatic Hydrocarbons (PAH).
 - 6No. Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
 - 6No. Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.
 - 6No. Asbestos screen with quantification (if positive).
- Chemical testing of up to 7No. water samples (from the existing monitoring wells) for the following testing schedule:
 - Speciated Polycyclic Aromatic Hydrocarbons (PAH).
 - Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
 - Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.
- Chemical testing of 1No. soil sample for Waste Acceptance Criteria (WAC) to assist in establishing landfill type for soil disposal purposes.
- Provision of a Remediation Strategy report in general accordance with Land Contamination Risk Management (LCRM) Stage 3 government guidance. Report to include specifying the objectives of the remediation, summarise the remedial options appraisal, detail the remedial techniques to be employed, and the provision of a verification plan including testing requirements and the necessary supervision / inspections required throughout the works.

1.3. REPORT LIMITATIONS

Any site boundary lines depicted on plans included within this report are approximate only and do not imply legal ownership of land. Any observations of tree species, asbestos containing materials within structures or invasive weeds, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. In the case of Japanese Knotweed and other non-aqueous invasive weeds, BRD can undertake separate surveys for this plant undertaken by a Property Care Association qualified surveyor.

The report does not consider whether sensitive ecology or archaeology is present as these require consideration by professionals specialising in these matters. For excavations planned within six metres of a third part structure then separate professional advice should be sought in respect of the requirements of the Party Wall Act.

It should be recognised that the collection of desk study information may not be exhaustive and that other information pertinent to the site may be available.

The recommendations, interpretations and conclusions of this report are based solely on the ground conditions found at the exploratory holes. Due to the variability in the nature of ground, conditions between exploratory holes can only be interpreted and not defined. The description of the site and the ground conditions is accurate only for the dates of the field works. In particular, groundwater levels can vary due to seasonal and other effects.

The assessment and interpretation of contamination risks is based on the scope of works agreed with the Client together with the budgetary and programme constraints imposed. Further investigation, analysis and assessment of contamination may be required by regulators or other third parties with an interest in the site. An ecological risk assessment of contaminated soils is beyond the scope of this report. This report is concerned with assessing those contamination risks which apply to the future use of the site through the proposed development as part of the planning regime. The assessment does not consider the risk to current site users or continued future use of the site in its current state. If development of the site should occur that differs from that proposed, then the findings of the contamination assessment would need to be re-evaluated.

This report is restricted to a contamination assessment only and does not include any form of geotechnical advice. A geotechnical assessment has been completed in the previous reports for this site and this should be referred to.

2. SITE CHARACTERISTICS

2.1. SITE SETTING

SITE ADDRESS AND POST CODE	Former SSE offices, Bartons Road, Havant, Hampshire, PO9 5TH.
NATIONAL GRID REFERENCE	472160E, 108010N.

2.2. SITE DESCRIPTION

SUBJECT	COMMENTS
CURRENT SITE DESCRIPTION	<p>The site is currently unoccupied and derelict. The former SSE offices have been demolished leaving a surface of demolition rubble across most of the site and a large stockpile of crushed concrete in the centre of the site.</p> <p>The site slopes down in level by just over 3m from the north to the south. However, the natural slope of the site has been changed due to the historical development and the also the recent demolition works. Along the northern edge is a retaining wall.</p> <p>The boundaries of the site are generally overgrown with vegetation, with some areas of grass and other low vegetation and saplings across the site. Off-site, but bordering the northern boundary, are a number of mature trees.</p>
SURROUNDING LAND USE	<p>The site is set in a mixed residential and commercial area within Havant.</p> <p>Directly north of the site is Bartons Road, beyond which are residential houses. Directly east of the site is a football ground, with associated infrastructure, and an electric substation and office building. A storage tank is located next to the electric substation, but the contents are unknown.</p> <p>Directly south of the site is Martin Road, beyond which are residential houses and another small electric substation. There is a garage just to the southwest of the site with a road, the B2149, forming the rest of the western boundary. Beyond this road are residential houses and flats.</p>
PROPOSED DEVELOPMENT	<p>It is proposed that the site will be developed as a residential housing estate comprising 58No. semi-detached and terraced houses and an apartment block containing 32No. apartments, with private and shared gardens and off-street parking, all served by a network of estate roads.</p>
HISTORICAL SUMMARY	<p>The earliest available map from 1867 shows the site as agricultural. A stream was shown in the eastern and southern areas of the site, however by 1957 it was no longer present. By 1972, office buildings had been constructed on site. By the same time, a petrol station had been constructed to the southwest and an electricity substation to the east.</p> <p>By 1991 the offices had been extended and an above ground fuel tank installed centrally. The offices were then demolished at some point between 2016 and 2019, with the crushed arisings remaining on site.</p>

SUBJECT	COMMENTS
PUBLISHED GEOLOGY	<p>No superficial deposits are indicated to be present. However, Head Deposits are shown adjacent to the east of the site, and River Terrace Deposits approximately 160m to the south. Both of these deposits can be composed of clay, silt, sand or gravel.</p> <p>The shallowest bedrock is shown to be the Bognor Sand Member, which is typically described as fine- and medium-grained sand. The London Clay Formation underlies the Bognor Sand Member and typically comprises silty clay. Beneath the London Clay Formation is the Lambeth Group, which is an alternating sequence of clays, silts and sands.</p>
HYDROGEOLOGY	<p>The Bognor Sand Member is designated as a Secondary A Aquifer.</p> <p>The site lies within a Zone 1 (Inner Protection Zone) - Subsurface activity only (1c). This means the aquifer is confined and will only be affected by subsurface activity such as deep drilling. As the aquifer is confined at depth, the risk to the SPZ from surface activities would typically be negligible, unless deep subsurface activity exposing the aquifer is to occur.</p> <p>Based on the BGS maps for the area, the SPZ1c will relate to the deeper Chalk aquifer which forms a drinking water resource. However, the Chalk is present at a significant depth beneath the site and is confined by the overlying Lambeth Group and London Clay Formation.</p>
HYDROLOGY	<p>The closest surface water feature to the site is a small stream located approximately 311m east of site.</p> <p>The site is outside of areas classified at risk from Extreme Flooding from Rivers or Seas without Defences.</p>

2.3. PREVIOUS INVESTIGATIONS

2.3.1. Introduction

Prior to BRD's involvement, the site had previously been subject to two ground investigations. The first was completed prior to the demolition of the on-site buildings and the second was completed following the demolition. These are referenced as follows:

- 'Ground Investigation Report', Soiltechnics, ref. STM3168D-GD1, dated May 2016.
- 'Interpretive Site Investigation and Remedial Strategy Report', Forge Environmental Management Ltd, ref. HAV164.D/SI/002, rev. 1, Dated March 2020.

These two investigation reports have been reviewed within the BRD desk study report, which should be read in conjunction with this report, referenced as follows:

- 'Phase 1 Environmental Desk Study - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR1-B, dated July 2025.

BRD then undertook two different phases of site work, comprising a Phase 2 geo-environmental site investigation and soakage investigation. The investigation reports from these works are referenced as follows:

- 'Phase 2 Geo-Environmental Investigation - Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.
- 'Soakage Investigation - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR3-C, dated July 2025.

2.3.2. BRD Phase 2 Geo-Environmental Site Investigation

The main BRD Phase 2 Geo-Environmental Site Investigation was undertaken in July and August 2024, with 6No. follow on gas and groundwater monitoring undertaken in September and October 2024. The investigation comprised 16No. trial pits (ref. TP201-TP216) to depths of between 2.90m below ground level (bgl) to 3.10m bgl and 8No. windowless sample boreholes (ref. WS201-WS208) to depths of between 3.00m bgl and 4.00m bgl. Chemical and geotechnical laboratory testing was also undertaken on soil and groundwater samples.

The ground conditions generally comprised a layer of crushed demolition waste across the northern and central areas, extending down to a typical depth of 0.4m bgl. From near surface in the southern area and beneath the demolition waste across the rest of the site, variable Made Ground soils were encountered, extending down to depths typically ranging from 0.4m to 1.4m bgl, but locally down to 2.3m bgl. The nature of the Made Ground ranged from slightly gravelly slightly sandy clay through to clayey sandy gravel, with the gravel including concrete, brick, plastic, metal, glass and ceramics. Some whole bricks and cobble sized fragments of concrete were encountered within the Made Ground.

The natural strata beneath the Made Ground generally comprised superficial Head Deposits, which varied from clayey sandy gravel to slightly gravelly slightly sandy clay, with the gravel generally comprising flint. In addition, in the central area some Alluvial clay, likely associated with the old ditch/stream crossing the site, was encountered between the Made Ground and Head Deposits. These superficial soils were collectively encountered down to depths between 0.7m and 2.6m bgl and were most prominent in the southern and western sections of the site.

The superficial deposits were then underlain by bedrock soil of the Bognor Sand Member, which extended down to the base of these investigation points, at 4.0m bgl. The Bognor Sand Member generally comprised slightly clayey fine sand.

Throughout the various phases of investigation, groundwater was recorded at depths ranging between 1.1m and 2.4m bgl depth.

The investigation did not identify any significant contamination risks at the site from the general site soils.

The report concluded that most of the site is suitable for conventional shallow/trench fill foundations, but due to the variation in the surface soils, the foundations should be reinforced. However, in localised areas of the site underlain by thicker Made Ground (in excess of 1.5m depth) then an alternative deeper foundation solution, such as piling, may be required.

The report recommended further ground investigation to allow a more detailed assessment of the extent of the localised deeper Made Ground in the central and northwestern areas as well as to more accurately delineate the extent of the shallow Bognor Sand Member in the northeastern section and some peripheral areas. Should the need for piling be identified then the report also recommended further deep boreholes to determine pile design parameters. Finally, longer term groundwater monitoring over the winter months was recommended to allow record groundwater levels during the wetter months of the year.

2.3.3. BRD Soakage Investigation

The BRD soakage investigation was undertaken in April 2025 and comprised 3No. trial pits (ref. TP301-TP303) to depths of between 1.80m bgl and 2.10m bgl with 2-3No. repeat BRE365 soakage tests undertaken in each trial pit.

The ground conditions encountered were in keeping with the previous investigations with a surface cover of Made Ground generally overlying superficial Head Deposits onto bedrock soils of the Bognor Sand Member. At TP302, Alluvium was encountered beneath the Made Ground and above the Head Deposits, and at TP301, no superficial deposits were encountered with the Made Ground extending to a greater depth and directly overlying the Bognor Sand Member.

The soakage tests were taken to depths from 1.8m to 2.1m bgl and targeted the silty fine sand of the Bognor Sand Member. The soakage testing from this investigation has recorded infiltration rates between 2.04×10^{-6} m/s and 2.51×10^{-5} m/s, with good repeatability at each test location. It was considered that the lower end of the infiltration rates (i.e. 2×10^{-6} m/s) would be appropriate for design purposes.

2.4. **REGULATORY CORRESPONDENCE**

The BRD Phase 2 Site Investigation report was submitted to Havant Borough Council in support of the planning application for the proposed development at the site.

In their review of the report, the Environmental Control Officer (ECO) for Havant Borough Council provided a memorandum (ref. PR202510-105034, dated 15th December 2025). This states that the ECO undertook additional research into the above ground fuel tank previously identified, which showed it to be a large fuel storage tank serving an adjacent high-capacity containerised generator. The ECO noted that fuel derived contaminants were identified potentially down-gradient of the former diesel tank in 2020 Forge Environmental Management investigation.

The memorandum goes on to state that the ECO had not been provided with a copy of the 2016 Soiltechnics investigation report and whilst no significant contamination had been identified to date, the ECO considered that the former above ground diesel tank located in the centre north of the site had not sufficiently been investigated to date and required further assessment.

Subsequently, the ECO advised Havant Borough Council to insert a planning condition requiring further investigation, a remediation strategy and verification plan to be produced and submitted to Havant Borough Council for the area of the former tank (Plots 16-20 plus a 5m buffer). This is Condition 20 of planning permission ref. APP/25/00639, issued by Havant Borough Council.

2.4.1. BRD Comments

To address the ECO's concerns as well as some of the other recommendations made within the BRD Phase 2 Site Investigation report, a further phase of additional investigation was undertaken. The findings from the additional investigation are summarised below, however, we have also addressed some of the other comments raised in the review.

The 2016 Soiltechnics investigation report will be submitted to Havant Borough Council along with the additional BRD reports for the ECO to review. However, in summary, the Soiltechnics borehole undertaken closest to the fuel tank location (ref. DTS07) did not identify any visual evidence of contamination and the soil and the groundwater testing did not identify any contamination (albeit is noted that the groundwater sample was only analysed for PAH and not TPH).

In terms of the fuel contamination identified in the 2020 Forge report, this was discussed in the previous BRD desk study report. The 'groundwater' sample referred to was in fact taken from trial pit TP2 after it had filled with water from the surround to an abandoned pipe at 1.10m bgl.

Therefore, this water is not groundwater and is not representative of the true groundwater contained within the natural aquifers underlying the site.

2.4.2. BRD Additional Geo-Environmental Investigation

As alluded to above, some additional investigation was undertaken to address the ECO's concerns as well as addressing some other recommendations made within the Phase 2 report. Due to the findings of this additional investigation and the need for some further site works and monitoring, the reporting on the additional investigation works has been phased to enable the design team to commence with the engineering aspects of the development whilst the contamination issues are bottomed out. Consequently, the main phase of additional investigation is reported in the following document:

- 'Additional Geo-Environmental Investigation - Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR4-A and dated June 2026.

A summary of the pertinent findings from this additional investigation report are provided below, however, the full report should be referred to alongside this report.

The additional site works were undertaken in April 2026 with follow-on groundwater sampling monitoring visits undertaken on 22nd and 28th April and 19th May 2026, with gas and vapour monitoring also undertaken during the visit on 19th May 2026. It should be noted that following the initial Phase 2 investigation in 2024, an initial programme of groundwater level monitoring visits over the winter period was undertaken from December 2024 to April 2025. These additional visits are formally documented within this report.

The additional investigation comprised 10No. trial pits (ref. TP304-TP314) to depths of between 0.80m bgl and 3.80m bgl, 4No. windowless sample boreholes (ref. WS209-WS212) to depths of between 2.00m bgl and 4.00m bgl, 2No. cable percussive boreholes to depths of between 10.00m bgl and 17.45m bgl. Chemical and geotechnical laboratory testing was also undertaken on soil and groundwater samples. Due to access restrictions from the stockpile of crushed arisings, it was not possible to fully investigate the full footprint of the former fuel tank location at this time.

The ground conditions encountered were in keeping with the previous investigations with a variable cover of Made Ground overlying Head Deposits across most of the site, in turn overlying the Bognor Sand Member. As with the previous investigation, alluvium was also encountered in an isolated area in the centre west of the site.

The deeper boreholes confirmed the deeper geological sequence. The London Clay Formation was encountered underlying the Bognor Sand Member, with one of the deep boreholes reaching the likely interface between the London Clay Formation and the underlying Lambeth Group at around 17.5m bgl.

The additional investigation identified TPH and BTEX compounds above the limits for the use of conventional polyethylene (PE) water supply pipes in some of the soils around the former above ground fuel tank. Some microscopic asbestos insulation debris were also identified within the near surface Made Ground soils around the former above ground fuel tank. No significant soil contamination was identified anywhere else on the site.

The additional investigation did, however, record elevated concentrations of TPH within the groundwater around the former above ground fuel tank as well as at lower levels sporadically in the north and south of the site but with none detected in wells between these locations. This would suggest that the TPH was likely to be derived from several sources and not all related to the same contamination plume from the former fuel tank, albeit that the more significant TPH contamination was localised to the location of the former above ground diesel tank.

As a consequence of these findings, it was proposed that some additional trial pits were needed beneath the concrete stockpile (once it's been relocated) in order to delineate the source area of the contamination as well as undertaking some additional groundwater monitoring to supplement the existing analytical dataset and identify any variation in the fuel contaminant concentrations. These further works are the subject of this report.

The additional investigation report referenced above will need to be submitted to the council alongside this report as the ECO will need to review both.

2.5. PRELIMINARY CONCEPTUAL MODEL

2.5.1. Valid Potential Contamination Sources

Based on the review of previous ground investigations, the following valid potential contamination sources have been identified:

- Previous above ground diesel fuel tank in the centre of the site
- Associated surface Made Ground around the fuel tank footprint containing asbestos fibres / microscopic debris.

2.5.2. Preliminary Conceptual Model

The preliminary risks, based on the potential contaminant linkages, are detailed in the table below.

SOURCES AND CONTAMINANTS	PATHWAYS	RECEPTORS	POTENTIAL RISK
Previous above ground fuel tank in centre of site. Diesel fuel hydrocarbons. Asbestos fibres within the Made Ground around the fuel tank footprint.	Direct contact Inhalation of vapours Ingestion (1)	Future residents	Low risk.
	Vertical and horizontal migration (2)	Groundwater and surface water	Moderate to Low risk.
	Direct contact (3)	Building materials and services	Moderate to Low risk.
	Inhalation of fibres (4)	Future residents	Moderate risk.

3. ADDITIONAL GROUND INVESTIGATION

3.1. INVESTIGATION DESIGN

METHODOLOGY	<p>In order to provide the necessary delineation of the contamination sources, trial pits were selected as they expose more soils which enables a more reliable record of the ground conditions encountered.</p> <p>A large tracked 22 tonne 360° excavator was used as this also enabled part of the large stockpile of crushed concrete in the centre of the site to be moved allowing access to the former footprint of the fuel tank.</p> <p>Alongside the additional trial pits, further groundwater monitoring visits were undertaken on the existing borehole wells to collect water samples for laboratory chemical testing.</p> <p>In addition to the contamination aspects, the Client had also requested an additional trial pit to try and identify whether the pile caps from the previous building still remained in the ground.</p>	
DATES OF SITE WORKS	<p>The relocation of the stockpile and the additional trial pits were undertaken on 23rd and 24th June 2026.</p> <p>Groundwater monitoring visits were undertaken on both 23rd and 30th June 2026, with the purging of the wells on the initial visit and sampling on the latter visit.</p>	
CONSTRAINTS TO EXPLORATORY HOLE LAYOUT	No exploratory holes were undertaken in close proximity to any of the services present on the site.	
EXPLORATORY HOLE SPACING	Approximately 3m grid around the former fuel tank location.	
LAYOUT RATIONALE	SOURCE / FEATURE	EXPLORATORY HOLE
CONTAMINATION SOURCES TARGETED	The surface Made Ground around borehole WS209 where microscopic asbestos insulation debris has been recorded.	TP315-TP318
	Potential fuel contamination around the former above ground diesel fuel tank.	TP316, TP319-TP323
GROUND FEATURES TARGETED	Location of reported pile caps.	TP324
CONTAMINATION SAMPLING PLAN	<p>The sampling and analysis plan is more biased towards those samples likely to be contaminated. This includes the surface Made Ground soils in the location of the asbestos contamination and any deeper fuel impacted soils in the location of the former fuel tank.</p> <p>Groundwater samples have been obtained from all boreholes during a single monitoring visit.</p> <p>Samples from aggregates haven't been analysed as these are unlikely to be contaminated.</p>	

ANALYSIS PLAN	<p>The samples from around the fuel tank area have been analysed for polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene (BTEX) compounds.</p> <p>The Made Ground samples from around borehole WS209 where microscopic asbestos insulation debris has been recorded have been analysed for asbestos screen and identification if positive.</p> <p>Some selected general samples have also been tested for a fuller range of commonly occurring contaminants in soils including heavy metals, asbestos and polycyclic aromatic hydrocarbons (PAH).</p> <p>Given the potential for fuel contamination, the groundwater from across the site has been analysed for PAH, TPH and BTEX compounds.</p>
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3.2. BRD FIELDWORK

TRIAL PITS	
REFERENCES	TP315 to TP324
DEPTH RANGE	From 1.30m to 3.00m.
EXCAVATOR	Tracked 22 Tonne 360° excavator.
BACKFILL	All the trial pits were backfilled with arisings upon completion and compacted with rams of the excavator bucket.

MONITORING	
TYPE	Groundwater monitoring.
DATES	23 rd and 30 th June 2026.
GROUNDWATER SAMPLING METHOD	<p>The borehole wells were purged of three volumes of well water (or to dryness) on the 23rd June visit using a sampling bailer dedicated to each well.</p> <p>Samples were retrieved on the 30th June visit using a sampling bailer dedicated to each well.</p>

3.3. LABORATORY TESTING

SOIL CHEMICAL TESTING	
The soil samples for contamination testing were forwarded to the laboratory of DETS Ltd and the testing suite is detailed below. The UKAS or MCERTS accreditation of the individual test methods is shown on the laboratory test report included in the Appendices.	
SOIL TESTS	NUMBER OF SAMPLES TESTED
Arsenic, Cadmium, Chromium, Chromium VI, Copper, Lead, Mercury, Nickel, Selenium, Zinc.	2
Speciated Polycyclic Aromatic Hydrocarbons (PAH).	6
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split.	6
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE).	6
Asbestos Screen and quantification, if positive.	6
Waste Acceptance Criteria (WAC) testing.	1

GROUNDWATER CHEMICAL TESTING	
The water samples for contamination testing were forwarded to the laboratory of DETS Ltd and the testing suite is detailed below. The UKAS or MCERTS accreditation of the individual test methods is shown on the laboratory test report included in the Appendices.	
WATER TESTS	NUMBER OF SAMPLES TESTED
Speciated Polycyclic Aromatic Hydrocarbons (PAH).	7
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split.	7
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE).	7

4. GROUND CONDITIONS

4.1. OVERVIEW

Generally, the ground conditions encountered were as anticipated from the previous investigations with a variable cover of Made Ground overlying Head Deposits across most of the site, in turn overlying the Bognor Sand Member.

In the area of the former above ground fuel tank, no significant visual or olfactory evidence of any hydrocarbon contamination was recorded in the near surface soils. However, what it considered to be the aggregate fill to some form of soakaway structure was encountered at depth in the location of the former tank and the natural sandy soils of the Bognor Sand Member beneath this feature displayed evidence of more significant hydrocarbon staining and also emitted hydrocarbon odours.

Details of the various stratigraphic units are given in the following sections.

4.2. ARTIFICIAL GROUND

4.2.1. Buried Structures

Trial pits TP316, TP319, TP321 and TP322 all encountered at depth what it considered to be a soakaway located in the centre of the site where the above ground fuel tank was formerly located. These trial pits encountered loose, grey brown, coarse, sub-angular to sub-rounded flint gravel with approximately 20mm diameter plastic drain pipes also present at depths from between 1.30m bgl and 1.40m bgl to depths of between 1.70m bgl and 2.20m bgl.

Trial pit TP324 targeted the reported location of a pile cap to the former building that had been identified on the as-built survey provided by the demolition contractor. A likely concrete pile cap was encountered at a depth of 1.60m bgl.

4.2.2. Made Ground

The surface Made Ground was relatively consistent in nature, comprising crushed demolition arisings encountered to depths of between 0.50m and 1.30m bgl. This was typically described as compacted, light grey brown, sandy, gravel and cobbles of concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.

In the centre north of the site, a second deeper Made Ground stratum was encountered in trial pits TP315-TP323 to depths of between 0.90m bgl and 1.80m bgl and underlying the crushed demolition arisings. This deeper Made Ground strata was typically described as either:

- a firm, dark grey with occasional orange brown, slightly organic, slightly gravelly, silty clay with gravel of flint, brick and occasional decaying rootlets and roots up to 25mm in diameter, or;
- a firm, wet in parts, organic, dark brown to black, slightly gravelly, silty clay with gravel of flint, occasional plastic fragments, rare decaying plant remains, many rootlets and roots up to 35mm in diameter.

4.3. SUPERFICIAL DEPOSITS

4.3.1. Head Deposits

During this phase of investigation, Head Deposits were encountered in the centre north of the site in trial pits TP317, TP318, TP320 and TP323 and to depths of between 1.50m and 1.80m bgl. The Head Deposits were typically encountered as either:

- a firm, orange brown mottled light grey, silty, sandy, gravelly clay with gravel of flint, or;
- an orange brown mottled light grey, silty, slightly gravelly, fine sand with gravel of flint.

4.3.2. Alluvium

During this phase of investigation, Alluvium was not encountered in any of the exploratory holes undertaken.

4.4. BEDROCK

4.4.1. Bognor Sand Member

During this phase of investigation, the Bognor Sand Member was encountered underlying the Made Ground and, where present, the Head Deposits in trial pits TP316, TP319, TP320, TP321, TP322, TP323 and TP324. The Bognor Sand Member was typically described as orange brown mottled light grey, silty, fine sand and was proven to a maximum depth of 3.00m bgl.

4.5. CONTAMINATION OBSERVATIONS

As discussed above within the trial pits undertaken around the former fuel tank location in the centre of the site, hydrocarbon odours and staining were noted in trial pits TP316, TP319, TP320, TP321 and TP322 at depths of from between 1.70m bgl and 2.60m bgl within the natural soils of the Bognor Sand Member. Strong hydrocarbon odours and staining were encountered in trial pits TP319 and TP322 at depths of from between 2.40m bgl and 2.50m bgl, also within the natural soils of the Bognor Sand Member. However, no significant visual or olfactory evidence of any hydrocarbon contamination was recorded in the near surface Made Ground soils in this area, with the hydrocarbon odours and staining only recorded within the natural soils at depth.

Given the location and distribution of the contamination, it is considered that the soakaway encountered beneath the former fuel tank footprint has acted as a pathway for the hydrocarbon contamination to migrate from the former above ground fuel tank to the Bognor Sand Member soils at depth. Given the depth range, this band of soil contamination within the natural sandy soils is considered to be the smear zone around the surface level of the groundwater as the levels rise and fall through the seasons.

In terms of the general surface Made Ground across the site, occasional tarmac fragments were encountered within the Made Ground. The presence of tarmac in soils can give rise to elevated concentrations of PAHs and TPH, albeit, that none had been recorded during the previous investigations.

4.6. OBSERVED GROUNDWATER BEHAVIOUR

During the forwarding of these additional exploratory holes, the following groundwater observations were made.

Slight perched groundwater seepages were recorded in the Made Ground within trial pits TP316, TP319, TP320, TP321 and TP322 at depths of between 0.50m and 0.80m bgl.

Groundwater seepages were also encountered within the Bognor Sand Member within trial pits TP319 and TP322 at depths of between 2.40m and 2.60m bgl.

4.7. GROUNDWATER MONITORING

DATE	RESTING GROUNDWATER RANGE	COMMENTS
23/06/26	From 1.76m to 3.11m bgl.	Groundwater recorded in all boreholes except WS202 and DTS06, which were dry. The groundwater levels remained similar to the previous monitoring visit undertaken on 19 th May 2026. The monitoring visit followed a period of mixed wet and dry weather.
30/06/26	From 1.84m to 3.19m bgl.	Groundwater was slightly deeper across all the wells. WS202 and DTS06 remained dry. This monitoring visit followed a period of dry weather.

5. RISK ESTIMATION - SOILS

5.1. HUMAN HEALTH

In the first instance, the soil results are compared to Generic Assessment Criteria (GAC) to establish if the soils are contaminated or not. The GAC employed below are for residential land use as this is appropriate to the proposed form of development. It should be noted that the table below only summarises the results from this additional phase of investigation, however, the findings from the previous investigations, where applicable, are discussed in the subsequent sections.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
Arsenic	mg/kg	2	6.4	37	0
Cadmium	mg/kg	2	0.7	22	0
Chromium (total)	mg/kg	2	20	910	0
Chromium (hexavalent)	mg/kg	2	<1.0	21	0
Copper	mg/kg	2	150	2,400	0
Lead	mg/kg	2	44	200	0
Mercury	mg/kg	2	<0.05	11	0
Nickel	mg/kg	2	13	180	0
Selenium	mg/kg	2	<0.5	250	0
Zinc	mg/kg	2	180	3,700	0
pH	Units	2	8.1	<5-10>	0
Naphthalene	mg/kg	6	12	2.3	3
Acenaphthylene	mg/kg	6	11	170	0
Acenaphthene	mg/kg	6	110	210	0
Fluorene	mg/kg	6	17	170	0
Phenanthrene	mg/kg	6	17	95	0
Anthracene	mg/kg	6	1.5	2,400	0
Fluoranthene	mg/kg	6	3.3	280	0
Pyrene	mg/kg	6	1.1	620	0
Benzo(a)anthracene	mg/kg	6	<0.1	7.2	0
Chrysene	mg/kg	6	<0.1	15	0
Benzo(b)fluoranthene	mg/kg	6	<0.1	2.6	0
Benzo(k)fluoranthene	mg/kg	6	<0.1	77	0
Benzo(a)pyrene	mg/kg	6	<0.1	2.2	0
Indeno(1,2,3-cd)pyrene	mg/kg	6	<0.1	27	0
Dibenzo(a,h)anthracene	mg/kg	6	<0.1	0.24	0
Benzo(ghi)perylene	mg/kg	6	<0.1	320	0
TPH Aliphatic C5-C6	mg/kg	6	<0.01	42	0
TPH Aliphatic C6-C8	mg/kg	6	<0.01	100	0
TPH Aliphatic C8-C10	mg/kg	6	<0.01	27	0
TPH Aliphatic C10-C12	mg/kg	6	380	130	2

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
TPH Aliphatic C12-C16	mg/kg	6	1100	1,100	0
TPH Aliphatic C16-C35	mg/kg	6	2800	65,000	0
TPH Aromatic C5-C7	mg/kg	6	<0.01	70	0
TPH Aromatic C7-C8	mg/kg	6	<0.01	130	0
TPH Aromatic C8-C10	mg/kg	6	<0.01	34	0
TPH Aromatic C10-C12	mg/kg	6	380	74	0
TPH Aromatic C12-C16	mg/kg	6	1300	140	0
TPH Aromatic C16-C21	mg/kg	6	2100	260	0
TPH Aromatic C21-C35	mg/kg	6	730	1,100	0
Benzene	mg/kg	6	<0.01	0.87	0
Toluene	mg/kg	6	<0.01	130	0
Ethylbenzene	mg/kg	6	<0.01	47	0
Xylene (total of all types)	mg/kg	6	<0.01	56	0
Methyl Tert Butyl Ether (MTBE)	mg/kg	6	<0.01	49	0
Asbestos Quantification	%	6	None Detected	0.001	0
Hydrocarbon Vapour (PID)	ppm	26	205.7	50	5
Notes: *Limit of detection: Given the large amount of compounds in this group, coupled with the lack of GAC for certain compounds, any concentrations above the limit of detection will be highlighted in the first instance.					

DISCUSSION OF RESULTS

METALS	None of the metal compounds are elevated above the human health assessment criteria. This was also the case for the previous phases of investigation.
PAH	<p>When compared to the GAC of 2.3mg/kg, three elevated concentrations of Naphthalene were recorded in the Bognor Sand Member from samples that all recorded hydrocarbon odours and staining from the deeper soils in the location of the former above ground fuel tank in the centre of the site. The Naphthalene concentrations were 7.1mg/kg, 12mg/kg and 3.3mg/kg in trial pits TP319 at 2.60m bgl, TP320 at 2.70m bgl and TP322 at 2.50m bgl, respectively.</p> <p>During the previous phases of investigation none of the PAH compounds were elevated above the human health assessment criteria. It should therefore be noted the PAH contamination is restricted to the visually stained soils in the smear zone at depth beneath the former fuel tank.</p>

DISCUSSION OF RESULTS

TPH	<p>When compared to the GAC of 130mg/kg, two elevated TPH concentrations of Aliphatic C10-C12 were recorded in the Bognor Sand Member, also associated with the hydrocarbon odours and staining in the location of the former above ground fuel tank in the centre of the site. The total TPH concentrations were 190mg/kg and 380mg/kg in trial pits TP319 at 2.60m bgl and TP320 at 2.70m bgl, respectively.</p> <p>It is worth noting that concentrations of the TPH compounds in the range Aliphatic C12-C16, C16-C34 and Aromatic C10-C12, C12-C16, C16-C21 and C21-C35 were recorded at their respective GAC threshold in the Bognor Sand Member with hydrocarbon odours and staining, in the location of the former above ground fuel tank in trial pit TP320 at 2.70m bgl.</p> <p>The distribution of the TPH banding is very typical of diesel fuel with C10-C21 being the predominant bands. This would be expected given the only fuel source is the diesel within the fuel tank.</p> <p>During the previous phases of investigation none of the TPH compounds were elevated above the human health assessment criteria, although as with the PAH, the TPH contamination is restricted to the visually stained soils in the smear zone at depth beneath the former fuel tank.</p>
BTEX & MTBE	<p>None of the BTEX or MTBE compounds are elevated above the human health assessment criteria. This was also the case for the previous phases of investigation. This is not unexpected as diesel does not contain an abundance of BTEX compounds. Certainly the lack of any BTEX discounts any petrol source.</p>
ASBESTOS	<p>During the previous phase of investigation one of the two laboratory asbestos quantification tests (WS209 at 0.6m) identified Chrysotile asbestos fibres to be present as microscopic insulation debris with a quantification of 0.024%. This sample was from the deeper Made Ground strata that correlates to the original Made Ground associated with the previous development (as opposed to that from the recent demolition).</p> <p>However, asbestos has not been detected in any of the additional samples analysed or visually identified in any of the soils at the site during this phase of investigation, including in trial pits TP315-TP318 which were located around borehole WS209. It is therefore considered that this additional investigation has successfully delineated the previously identified asbestos contamination in borehole WS209.</p> <p>BRD has employed the JIWG 'Decision support tool for the qualitative risk ranking of work activities and receptors involved in or exposed to asbestos in soil and Construction & Demolition materials' (Version 2, February 2017) for the purposes of risk assessment. This confirmed the risk ranking to be medium.</p>
HYDROCARBON VAPOUR (PID)	<p>5No. of the 26No. PID readings taken during the excavation of the trial pits recorded values above the assessment criteria of 50ppm. These readings were from trial pits TP319 at 2.60m bgl and 2.70m bgl, TP320 at 2.70m bgl, TP321 at 2.40m bgl and TP322 at 2.50m bgl, which were all in the location of the former above ground fuel tank and from olfactory or visually stained soils. The elevated PID readings ranged from 114.9ppm to 205.7ppm.</p>

5.2. WATER ENVIRONMENT

It is not appropriate to consider human health assessment criteria for human health in relation to the risk to the water environment, but currently there are no generic soil assessment criteria in respect of the water environment. In the first instance it is more appropriate to consider groundwater analysis, which has been undertaken and presented in the following Section 8. However, the soils testing cannot be ignored and therefore the recorded concentrations should be initially assessed based on professional judgement.

More significantly elevated PAH and TPH concentrations have been recorded in the stained soils at depth in the location of the former above ground fuel tank in the centre of the site (trial pits TP319, TP320 and TP322). Total Petroleum Hydrocarbons (TPH) concentrations of up to 8,700mg/kg and Polycyclic Aromatic Hydrocarbons (PAH) of up to 180mg/kg were recorded in these soils. As discussed, the carbon banding of the elevated TPH compounds would suggest a diesel source, as would be expected given the former diesel tank.

It should be noted that diesel fuel compounds are a light non-aqueous liquid (LNAPL) and will therefore float on the surface of the groundwater, with any diffusion largely in the upper few metres of the aquifer. This band of soil contamination is considered to be the smear zone around the surface level of the groundwater as the levels rise and fall through the seasons. At these concentrations it does suggest this localised hotspot of diesel contaminated soils could offer an ongoing source of contamination to the surrounding aquifer.

It should be noted that the contaminant concentrations recorded in the soils elsewhere at the site are not considered to be at such levels that they would present any significant risk to the underlying water environment.

5.3. BUILDING MATERIALS

It should be noted that the table below only summarises the results from this additional phase of investigation

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
pH	units	2	7.5	<5.5	0
Sulphate (w/s)	mg/l	2	310	500	0
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	mg/kg	6	None Detected	2	0
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	mg/kg	6	7360	10	3
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	mg/kg	6	1430	500	3
Sum of BTEX + MTBE above detection limits	mg/kg	6	None Detected	0.1	0
Naphthalene	mg/kg	6	12	0.5	3
Benzo(a)pyrene	mg/kg	6	<0.1	0.5	0

RESULTS EXCEEDING BUILDING MATERIALS ASSESSMENT CRITERIA

PAH	<p>The concentrations of PAH recorded in the deeper contaminated soils in the location of the former above ground fuel tank in the centre of the site (trial pits TP319, TP320 and TP322) are above the limits for the use of conventional polyethylene (PE) water supply pipes.</p>
TPH	<p>The concentrations of TPH recorded in the deeper contaminated soils in the location of the former above ground fuel tank in the centre of the site (trial pits TP319, TP320 and TP322) are above the limits for the use of conventional polyethylene (PE) water supply pipes.</p> <p>During the previous phase of investigation, the concentrations of TPH recorded in borehole WS209 at 1.20m and trial pit TP313 at 3.10m (also in the location of the former above ground fuel tank) are above the limits for the use of conventional polyethylene (PE) water supply pipes.</p>
BTEX	<p>During this phase of investigation, no BTEX and MTBE compounds were detected above the laboratory detection limit.</p> <p>During the previous phase of investigation, the total concentrations of the BTEX compounds recorded in borehole WS209 at 1.20m (in the location of the former above ground fuel tank) were above the limits for the use of conventional polyethylene (PE) water supply pipes.</p>

6. RISK ESTIMATION - WATER

6.1. GROUNDWATER

It should be noted that the table below only summarises the groundwater test results from the extra monitoring visit undertaken as part of this additional investigation. The findings from the previous investigations and monitoring, where applicable, are discussed in the subsequent sections. The BRD additional investigation report should be referred to for detailed assessment of the previous monitoring visits.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	AQUEOUS SOLUBILITY	GAC	NUMBER EXCEEDING SOLUBILITY / GAC
Naphthalene	µg/l	7	<0.05	25,000	130	0/0
Acenaphthylene	µg/l	7	0.03	3,800	-	0/-
Acenaphthene	µg/l	7	0.43	16,100	-	0/-
Fluorene	µg/l	7	0.01	1,900	-	0/-
Phenanthrene	µg/l	7	1.8	1,100	-	0/-
Anthracene	µg/l	7	0.13	45	-	0/-
Fluoranthene	µg/l	7	2.6	230	-	0/-
Pyrene	µg/l	7	2.4	130	-	0/-
Benzo(a)anthracene	µg/l	7	1.1	3.8	-	0/-
Chrysene	µg/l	7	1.8	2	-	0/-
Benzo(b)fluoranthene	µg/l	7	3.3	2	-	1/-
Benzo(k)fluoranthene	µg/l	7	1.0	0.8	-	1/-
Benzo(a)pyrene	µg/l	7	2.1	3.8	0.27	0/3
Indeno(1,2,3-cd)pyrene	µg/l	7	1.8	0.2	-	2/-
Dibenzo(a,h)anthracene	µg/l	7	0.13	0.006	-	2/-
Benzo(ghi)perylene	µg/l	7	2.5	0.26	-	2/-
Total PAH	µg/l	7	<20.25	-	-	-/-
TPH Aliphatic C5-C6	µg/l	7	<0.1	36,000	15,000	0/0
TPH Aliphatic C6-C8	µg/l	7	<0.1	5,400	15,000	0/0
TPH Aliphatic C8-C10	µg/l	7	<0.1	430	300	0/0
TPH Aliphatic C10-C12	µg/l	7	150	34	300	1/0
TPH Aliphatic C12-C16	µg/l	7	<10	0.76	300	0/0
TPH Aliphatic C16-C21	µg/l	7	<10	0.003	-	0/-
TPH Aliphatic C21-C35	µg/l	7	<10	-	-	-
TPH Aromatic C5-C7	µg/l	7	<0.1	1,800,000	10	0/0
TPH Aromatic C7-C8	µg/l	7	<0.1	590,000	700	0/0
TPH Aromatic C8-C10	µg/l	7	<0.1	65,000	300	0/0
TPH Aromatic C10-C12	µg/l	7	<10	25,000	90	0/0
TPH Aromatic C12-C16	µg/l	7	<10	5,800	90	0/0
TPH Aromatic C16-C21	µg/l	7	<10	650	90	0/0
TPH Aromatic C21-C35	µg/l	7	<10	6.6	90	0/0

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	AQUEOUS SOLUBILITY	GAC	NUMBER EXCEEDING SOLUBILITY / GAC
Benzene	µg/l	7	<1.0	1,800,000	50	0/0
Toluene	µg/l	7	<1.0	590,000	380	0/0
Ethylbenzene	µg/l	7	<1.0	180,000	300	0/0
Xylene (total of all types)	µg/l	7	<1.0	200,000	30	0/0
Methyl tert-butyl ether (MTBE)	µg/l	7	<1.0	-	15	-/0

RESULTS EXCEEDING GROUNDWATER ASSESSMENT CRITERIA

PAH

During the recent visit, marginally elevated concentrations of Benzo(a)pyrene, Indeno(1,2,3-c,d)pyrene, Dibenzo(a,h)anthracene and Benzo(g,h,i)perylene have been recorded in boreholes WS201 and WS207 with Dibenzo(a,h)anthracene also recorded in borehole WS210. Marginally elevated concentrations of Benzo(b)fluoranthene and Benzo(k)fluoranthene were also recorded in borehole WS201. The total PAH concentrations recorded in these boreholes were reported as <20.25µg/l in WS201, <12.05µg/l in WS207 and <1.10ug/l in WS210.

Whilst WS210 is in the vicinity of the former above ground diesel tank, boreholes WS201 and WS207 are located in the north and south of the site, respectively. The two other boreholes located close to the former tank (WS204 and WS209) did not record any significant elevated concentrations of PAH during this monitoring visit. As with some previous visit, this would seemingly suggest that these marginal PAH concentrations are not related to the local diesel contamination and potentially reflect the state of the wider aquifer in the local area.

During the previous visits undertaken as part of the previous 2026 BRD additional investigation, no elevated concentrations of PAH were recorded during the first groundwater monitoring visit. However, during the second groundwater monitoring visit, some marginally elevated concentrations of Indeno(1,2,3-c,d)pyrene were recorded in WS201, WS206 and WS209 at concentrations of between 0.21µg/l and 0.25µg/l with Dibenzo(a,h)anthracene also recorded in WS201 at a concentration of 0.06µg/l.

It should be noted that the GAC used are the highly stringent drinking water standards. As has been previously discussed in the additional investigation report, given the minor exceedances of the stringent GAC, these recorded elevated concentrations of PAH are not considered to present any significant cause for concern to the wider aquifer.

RESULTS EXCEEDING GROUNDWATER ASSESSMENT CRITERIA

<p>TPH</p>	<p>Generally no elevated concentrations of TPH were recorded during this recent visit. In particular, boreholes WS209 and WS210 located close to the fuel tank did not record any significantly elevated concentrations of TPH during this recent monitoring visit. This would suggest that the contamination within the smear zone is not an 'active' source and likely just reflects an ongoing residual source.</p> <p>However, whilst no fuel contamination was recorded during the most recent visit, there is clearly still the potential to encounter significant TPH concentrations in the vicinity of the former fuel tank. As discussed in the recent BRD additional investigation report, a total TPH concentration of 1,710µg/l was recorded in WS209 close to the former fuel tank.</p> <p>The only more elevated TPH from this current visit was recorded in borehole WS207 with an Aliphatic C10-C12 concentration of 150ug/l. This borehole is located close to the north site boundary and therefore up hydraulic gradient of the former tank. This would therefore suggest that this sporadic contamination is not associated with the former tank and instead represents some off-site contamination migrating onto the site.</p> <p>Likewise, in previous visits, some elevated concentrations of TPH were also recorded sporadically to the north (WS206) and to the south (WS203), yet WS204 and WS210, located between WS209 and WS203, WS206 and WS207 did not record any elevated TPH. Furthermore, WS210 also targeted the location of the former above ground diesel tank yet did not record any elevated TPH concentrations. As discussed above, boreholes WS206 and WS207 are considered to be up hydraulic gradient of the former tank and therefore more likely reflect some off-site contamination.</p> <p>As has been previously discussed in the additional investigation report, this further suggests that the elevated concentrations of TPH (and PAH) recorded in the groundwater are not likely to be from the same contamination source and potentially reflects the state of the wider aquifer in the local area.</p> <p>However, there clearly some fuel contamination in the groundwater local to the former above ground diesel tank. This groundwater contamination would appear to be directly associated with the contaminated soil smear zone. The implication of this contamination is discussed further in Section 8.</p>
<p>BTEX & MTBE</p>	<p>Across all of the monitoring visits undertaken during the additional phases of investigation, BTEX and MTBE compounds were not elevated above their aqueous solubility or above their respective GAC.</p>

7. RISK ESTIMATION - GAS

7.1. RADON GAS

The site is not situated within an area where radon gas protection measures are required in new buildings.

7.2. GROUND GAS

The original BRD Phase 2 Site Investigation included a programme of 6No. gas, vapour and groundwater monitoring visits that was undertaken through September and October 2024. These visits and subsequent assessment demonstrated that landfill gas protection measures are not required at the site.

Given that some fuel odours were noted and that hydrocarbon contamination was identified in the groundwater underlying the location of the former fuel tank, an additional gas and vapour monitoring visit was undertaken (including the new boreholes around the tank; WS209-WS212) in order to confirm that there are no significant concentrations of vapours present at this location, or the wider site. No significant concentrations of landfill gases or vapours were recorded during this additional gas and vapour monitoring visit for both the existing and new boreholes. These findings are in keeping with the previous gas and vapour monitoring visits undertaken in 2024.

It is therefore considered that the previous assessment of “Characteristic situation 1 - Very low” remains valid and as such general ground gas protection measures are not required in the new dwellings. However, vapour protection measures are proposed for some plots as discussed below.

7.3. VOLATILE ORGANIC COMPOUNDS

Whilst elevated PID readings have not been previously recorded across the site, the more targeted investigation around the former fuel tank location has with head space readings from the soil samples ranging from 114.9ppm to 205.7ppm. All of the elevated PID readings coincide with visual and olfactory evidence of hydrocarbon contamination in the soils, as well as the elevated concentrations of PAH and TPH recorded by the laboratory soils testing.

No significant vapours have been recorded during the gas monitoring to date at the site, suggesting that there is no significant vapour migration to the surface. However, given the potential vapours from the soils and that they might be disturbed during construction, it is considered that the localised hydrocarbon impacted soils in the location of the former above ground fuel tank could give rise to unacceptable indoor inhalation risks associated with Volatile Organic Compounds (VOC) and semi Volatile Organic Compounds (SVOC).

As such, it is considered that the new buildings in this localised area of the site will require a continuous membrane resistant to VOC/SVOC to be incorporated into the floor construction and a ventilated sub-floor void or granular blanket. There is no evidence that the wider site is affected by significant Volatile Organic Compounds (VOC) contamination and therefore does not require such a membrane.

8. RISK EVALUATION

8.1. REVISED CONCEPTUAL MODEL

The revised conceptual site model plan is presented in the Appendices.

INVALID CONTAMINANT LINKAGES	<p>Whilst elevated concentrations of TPH and PAH have been recorded in the location of the former above ground fuel tank, they are only present at depths of between 2.50m bgl and 2.70m bgl associated with the smear zone around the groundwater table. Consequently, these contaminated soils will not be accessible to future residents via direct contact and therefore there is not a valid pollutant linkage between this source and this receptor.</p> <p>All of the other potential contamination linkages identified at the start of this additional ground investigation were proven to be valid.</p>
ADDITIONAL CONTAMINANT LINKAGES	<p>However, it is considered that the localised hydrocarbon impacted soils in the location of the former above ground fuel tank could generate vapours that could migrate into the overlying buildings. This could give rise to unacceptable indoor inhalation risks associated with Volatile Organic Compounds (VOC) and semi Volatile Organic Compounds (SVOC).</p>
LIMITATIONS AND UNCERTAINTIES	<p>Whilst it was not possible to undertake any exploratory holes in close proximity to any of the services present on the site, all of the potential contamination sources have been targeted by the exploratory holes and therefore it is considered that a sufficient number of exploratory points have been completed for contamination assessment purposes.</p> <p>Likewise, it is considered that a sufficient number of groundwater monitoring visits have been completed to enable an appropriate assessment of the groundwater risk to enable remediation options to be considered.</p>

8.2. UPDATED CONTAMINATION RISK ASSESSMENT

The contamination linkages identified in the revised conceptual site model will now be evaluated as to their severity:

SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	POTENTIAL RISK
Petroleum hydrocarbons associated with the previous above ground fuel tank in centre of site. (known to store only diesel).	Direct contact	Future residents	Negligible risk.
	Ingestion		
	Inhalation of vapours (1)		Moderate to Low risk.
	Vertical and horizontal migration (2)	Groundwater and surface water	Moderate risk.
	Direct contact (3)	Building materials and services	Moderate to Low risk.

SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	POTENTIAL RISK
Asbestos fibres within the Made Ground around the fuel tank footprint.	Inhalation of fibres (4)	Future residents	Moderate risk.

The contamination risks that are presented to the various receptor groups are discussed further in the following sections:

SOIL RISKS TO HUMAN HEALTH

Whilst elevated concentrations of TPH and PAH have been recorded in the location of the former above ground fuel tank with regards to human health, they have only been recorded at depths of between 2.50m and 2.70m bgl. It is therefore considered that there is not a valid pollutant linkage between this source and this receptor and therefore the risk to human health from direct contact with the soils is negligible. However, a vapour risk does exist, as discussed in the next section.

A moderate risk to future residents has been identified from the microscopic asbestos insulation debris identified within the Made Ground strata in WS209 around the fuel tank footprint. Asbestos has not been detected in any of the samples analysed or visually identified in any of the soils at the site during this supplementary phase of investigation, including in trial pits TP315-TP318 which targeted borehole WS209. This additional phase of investigation has therefore successfully delineated the previously identified asbestos contamination in borehole WS209. It is reiterated that no asbestos contamination has been identified anywhere else on the site to date.

GROUND GAS & VAPOUR RISKS

During this phase of investigation elevated PID readings have been recorded from the localised hydrocarbon impacted soils in the location of the former above ground fuel tank. No significant vapours have been recorded during the gas monitoring to date at the site, suggesting that there is no significant vapour migration to the surface.

However, given the potential vapours from the soils and that they might be disturbed during construction, it is considered that the localised hydrocarbon impacted soils in the location of the former above ground fuel tank could give rise to unacceptable indoor inhalation risks associated with Volatile Organic Compounds (VOC) and semi-Volatile Organic Compounds (SVOC).

As such, it is considered that the new buildings in this localised area of the site will require a continuous membrane resistant to VOC/SVOC to be incorporated into the floor construction and a ventilated sub-floor void or granular blanket. There is no evidence that the wider site is affected by significant Volatile Organic Compounds (VOC) contamination and therefore does not require such a membrane.

RISK TO WATER ENVIRONMENT

A moderate risk to the water environment has been identified from the elevated TPH concentrations recorded in the soils in TP319, TP320 and TP322, and in the groundwater in WS203, WS206, WS207 and WS209. Whilst the trial pits and borehole WS209 were exploratory points that targeted the location of the former above ground diesel tank, boreholes WS203, WS206 and WS207 were located elsewhere across the site and in the case of WS206 and WS207, were boreholes up hydraulic gradient of the fuel tank.

Whilst the highest concentrations of TPH have been recorded in WS209 during the first monitoring visit, which, it is noted that in subsequent monitoring visits, the concentrations of TPH recorded in borehole WS209 have reduced significantly.

The elevated concentrations of TPH sporadically recorded in the north (WS206 and WS207) and in the south (WS203) of the site, along with a lack of elevated TPH in boreholes WS204 and WS210 (located between borehole WS209 and borehole WS203) would suggest that the elevated concentrations of TPH recorded in the groundwater are likely to be from several sources and not all related to the same contamination plume from the former fuel tank.

Given the findings from the additional investigation and the subsequent monitoring visits, it is considered that the more significant TPH contamination is localised to the location of the former above ground diesel tank and this should be considered as the main on-site contamination source presenting a risk and requiring remedial work.

RISK TO BUILDING MATERIALS AND SERVICES

A moderate to low risk to water supply pipes has been identified at the site from the elevated concentrations of PAH, TPH and BTEX recorded in WS209, TP313, TP319, TP320 and TP322 associated with the fuel contamination beneath the former fuel tank.

Hydrocarbons can denature and permeate plastic services, which is a particular concern for water supply pipes. This could lead to both the taste and quality of drinking water supplies being compromised. Whilst the elevated concentrations are predominantly at depth, the local water supply company will be concerned about potential migration and even just their very presence on the site.

This associated risk can be easily managed through the use of hydrocarbon resistant pipes, for example plastic 'barrier' pipes incorporating an aluminium foil layer or metal pipes. It should be noted that the water pipe specification should always be confirmed with the local water supply company as they may insist on such protective pipes regardless of the level of contamination or remediation.

8.3. RISK MANAGEMENT

8.3.1. Introduction

The investigations to date have identified a number of contamination risks on the site.

A moderate risk is presented to future residents from a localised hotspot of microscopic asbestos insulation debris within the near surface Made Ground around the former fuel tank location.

Some localised fuel contamination has been identified at depth beneath the former fuel tank associated with the smear zone around the surface of the groundwater. The contamination appears to have migrated to depth via a soakaway in this location. This contamination presents a risk to future residents from the hydrocarbon vapours, as well as to the local water environment. The contamination also dictates the need for barrier water supply pipes in the location of the former tank.

A remediation strategy to manage the identified contamination risks present at the site is presented in the following sections of this report.

8.3.2. Further Contamination Assessment

It is not considered that any further ground investigation is required for contamination assessment purposes.

Likewise, it is not considered that any further groundwater monitoring visits are needed at this stage as there is sufficient information to design an appropriate remediation strategy. As set out in the following sections, further groundwater monitoring will form part of the long-term monitoring programme.

9. DEVELOPMENT OF REMEDIATION STRATEGY

9.1. INTRODUCTION

The overall aim of a remediation strategy is to design the remediation works necessary to mitigate the potentially unacceptable contamination risks identified through the various desk study and investigation reports. The remediation process begins with development of the remediation objectives and the options appraisal process, although the appraisal process must be proportionate to the degree and extent of remediation required. A verification plan will need to be documented that can be implemented as the remediation works are completed.

The processes of remediation design, implementation and verification comprise:

- Definition of remediation objectives.
- Appraisal of the options for remediation and selection of a preferred strategy.
- Planning and implementation of the preferred strategy.
- Long term monitoring and maintenance.
- Preparation of a verification report.

The previous assessments have identified all of the unacceptable contamination risks. The remediation strategy must present a clear methodology for managing the risks associated with each pollutant linkage that has been identified.

9.2. IDENTIFIED CONTAMINATION RISKS

From the previous contamination assessments, the following pollutant linkages have been identified:

- A moderate risk to future residents from microscopic asbestos insulation debris identified within the near surface Made Ground around the former fuel tank location, located in the centre north of the site.
- A moderate to low risk to future residents from the elevated hydrocarbon vapours from the soils at depth beneath the former fuel tank associated with the smear zone around the surface of the groundwater.
- A moderate risk to the water environment has been identified from the elevated TPH concentrations recorded in the in the soils and groundwater local to the former above ground fuel tank associated with the smear zone around the surface of the groundwater.
- A moderate to low risk to water supply pipes has been identified from the elevated hydrocarbons in the location of the former fuel tank.

The Revised Conceptual Site Model that illustrates the location of these pollutant linkages is included in Appendix 1.

9.3. OBJECTIVES

On some sites a range of objectives may be established in response to the different nature of the risks associated with different pollutant linkages. These fall into the following three categories:

- Contamination remediation objectives must be based on the conceptual model for the site and must define the desired end condition. They can be qualitative or quantitative but must always relate to the risk assessment. Contamination related objectives are the most important of the three types of objectives and wherever possible, should drive the selection of a remediation option.
- Engineering related objectives consider the need for improvement, maintenance or modification of the engineering properties of the physical ground conditions on a site. Improvements in stability of the site or changes in ground levels may be required in order to construct the proposed development.
- Management related objectives often relate to the aspects of the remediation process itself, but also to the site after remediation has been completed. For example, the costs of a particular remediation option may exceed the budget making the project not financially viable. Programme constraints may conflict with the use of particular remediation technology. On sites where there are existing buildings or structures to be retained, remediation activities will have to be designed and carried out to avoid unnecessary disruption.

Accordingly, all three categories of objectives need to be considered in developing the strategy.

The remediation objectives for this project are as follows:

- To ensure that future residents and site visitors do not come into contact with the identified asbestos contaminated soils.
- To ensure that future residents are not exposed to any hydrocarbon vapours that could cause a health or odour risk in the location of the former above ground diesel tank.
- To ensure that the TPH and PAH contamination recorded at depth in the location of the former above ground diesel tank does not present any on-going risks to the wider groundwater environment.
- To ensure that the water supply pipes will not be adversely affected by any contamination in the former above ground diesel tank.
- To complete the remediation works in a timely cost effective manner.
- To conform with current guidance regarding contamination remediation and gain regulatory approval.

9.4. REMEDIATION OPTIONS APPRAISAL

9.4.1. Introduction

Having identified the remediation objectives an appraisal of potentially suitable remediation options must be carried out. Conceptually, remediation action will involve breaking the pollutant linkage or linkages by use of one or more of the following methods:

- Source control: technical action to either, remove or in some way modify the source(s) of the contamination for example excavation or bioremediation.
- Pathway control: technical action to reduce the ability of the contaminant source to pose a threat to receptors by inhibiting or controlling the pathway for example cover systems or gas membranes.
- Receptor control: non-technical actions or controls that alter the likely likelihood of receptors coming into contact with the contaminants, for example altering the site layout.

A wide range of different techniques can be used individually or in combination in order to break a pollutant linkage. The options appraisal will consider a technique's effectiveness in dealing with the contaminants of concern but will also give consideration of the wider circumstances of the site.

9.4.2. Mitigation options for risks to Human Health

9.4.2.1. *Asbestos Contamination*

The risk to future residents from the microscopic asbestos insulation debris contamination identified in and delineated around borehole WS209 between 0.50m and 0.80m bgl could either be managed either through the total removal of the affected contaminated Made Ground soils or through the placement of a clean soil cover layer into those new garden and landscaping areas straddling the affected area.

The contaminated Made Ground soils have been delineated to an area covering approximately 10m², as shown on the Soil Contamination Plan included in Appendix 1. On the basis of the 0.3m thick affected stratum, this gives an approximate volume of 3m³ of contaminated soils.

Given this small volume of contaminated soils, it is considered that the most appropriate remedial option would be to remove these contaminated soils in their entirety. The associated costs from managing the soils through the development phases and then ensuring that they remain at depth and capped would far exceed the disposal costs.

9.4.2.2. *Hydrocarbon Vapours*

The risk to future residents from the elevated concentrations of hydrocarbon vapour recorded in the soils at depth in the area of the former above ground fuel tank will be mitigated by the installation of a continuous membrane that is resistant to VOC/SVOC along with associated sub-floor ventilation within those plots either overlying or straddling the affected area (namely Plots 16-20).

On the basis that a residual risk from hydrocarbon vapours will remain regardless of the chosen remediation (see below), it is not considered that any other remedial options need to be considered for this element.

9.4.3. Mitigation options for risks to the Water Environment

In terms of the remediation of the fuel contamination present in the deeper soils and groundwater in the area of the former above ground fuel tank, the following mitigation options are considered:

- In-situ enhanced biological treatment of the contaminated groundwater and soils.
- Excavation and off-site disposal of the identified contaminated soil to remove the 'source' to the groundwater contamination.
- Ex-situ treatment of the identified contaminated soil to remove the 'source' to the groundwater contamination.
- Dual phase soil vapour extraction.
- Monitoring natural attenuation of the contaminated area and wider groundwater environment.

Before going through these options, it should be noted that the affected area is quite localised and does not appear to be having any significant impact beyond its extents, as evidenced by the various rounds of groundwater monitoring. Consequently, the remediation option only needs to be one of betterment whereby the contamination source is reduced as far as is reasonably practical, as opposed to complete removal of the contamination.

9.4.3.1. *In-situ biological treatment*

Given the need to provide some level of betterment and remediation to both deeper soils and to the groundwater, some form of in-situ enhanced biological treatment would present a viable remediation option for this site. The objective of the treatment is groundwater betterment through the reduction of dissolved-phase hydrocarbon mass and the mitigation of ongoing contaminant loading from residual impacts within the smear zone.

The direct injection of specialised chemical remediation compounds into the contamination soils and groundwater would stimulate and enhance the biodegradation of the fuel hydrocarbon compounds. A number of treatment products have been developed that are specifically designed for remediating petroleum hydrocarbons. The application of such products can be achieved via direct application where it remains in the saturated zone of the aquifer and essentially 'sets' into the soil pores where it absorbs the petroleum hydrocarbons before then stimulating their biodegradation. This in-situ treatment offers a faster, more cost-effective alternative such as soil vapour extraction.

The benefits of in-situ treatment are that there is no excavation required, there are no soil disposal and the groundwater is treated alongside the soils.

9.4.3.2. *Excavation and off-site disposal*

Whilst excavation and removal of the contaminated soils would present a 'total' remediation solution, in this case, that is not possible to achieve without extensive temporary works and dewatering. The contaminated soils extend from depths of 1.7m bgl down to around ~3.0m bgl which also coincides with the resting groundwater level within the silty fine sands of the Bognor Sand Member. The bulk of the contaminated soils will therefore be saturated with contaminated groundwater.

Any excavation at this depth below the water table would be practically very difficult to achieve with the sides of the excavation prone to collapse and washing out of fines within the soils, which could in turn still lead to contaminated soils washing out and into the ground, leading to increased mobilisation of the contamination.

Whilst the area could be sheet piled and dewatered, this would be a very costly exercise and the water removed from the excavation would also be contaminated and so would have to be treated as such and likely tinkered off-site for treatment or disposal.

Any excavation would also lead to a void that would need to be filled in a controlled manner prior to construction, which would again involve a further layer of costs.

Given the small volume and that in-situ treatment will cost less and likely result in better treatment results, it is not considered that excavation and off-site disposal will be a viable option for this contamination.

9.4.3.3. Ex-situ Treatment of Contaminated Soils

Systematic excavation of the contaminated soils and enhanced bio-remediation of contaminated soil stockpiles can be a potential remediation solution for this type of contamination. However, for same reasons discussed above for excavation, the constraints of the deeper soils means that it is not a viable remediation solution.

9.4.3.4. Dual Phase Soil Vapour Extraction

As alluded to above, dual phase soil vapour extraction could be a consideration for this type of contamination. This method would involve a series of extraction wells and air sparging wells drilled into the aquifer and the both the volatile gases and heavier fuel related contamination extracted and treated ex-situ. Typically, a twelve month programme would be required for such a method to deal with this contamination.

The method requires a constant power source and working treatment plant so tends to be more costly compared to an in-situ treatment, plus the area would need to be quarantined throughout the treatment process to prevent inadvertent damage to the wells and pipework. Although this solution offers a potential option, the operating costs and programme make it less viable than an in-situ treatment option.

9.4.3.5. Monitored Natural Attenuation

Monitored natural attenuation relies on natural attenuation process to achieve the improvement in the contaminant concentrations compared to more active approaches such as the enhanced bio-remediation. Long term monitoring is required to determine if the concentrations are behaving as predicted.

Given the hydrocarbon concentrations recorded within the source zone on the site, combined with the more sensitive environmental setting of the aquifer, it is considered that monitored natural attenuation on its own would not present a sufficient remedial option in this case. Instead, some form of betterment of the source area will be required. As this betterment would likely reduce the hydrocarbon contamination to more acceptable concentrations, it is not considered that any formal monitored natural attenuation would then be needed going forward.

9.4.3.6. Summary of Proposed Options

On the basis of the above appraisal of remediation techniques, it is considered that the most appropriate remedial option is for the in-situ biological treatment of the contaminated groundwater and soils. This method is considered to offer a suitable level of betterment of the source area but alongside a shortened programme of works with no ongoing implications to the follow-on construction works or proposed development.

9.4.4. Mitigation options for risks to Building Materials and Services

The presence of elevated PAH, TPH and BTEX on the site will likely dictate that new water supplies will need to incorporate specialist protective pipes incorporating a foil barrier, as per the requirements of the local water supply company. On this basis it is not considered that any other remedial measures need to be considered for this risk item.

10. REMEDIATION WORKS

10.1. OVERVIEW

The remediation works will be undertaken over two phases;

- the removal of the asbestos contaminated Made Ground soils and the in-situ biological treatment of the hydrocarbon contaminated soils being undertaken during a pre-construction / site clearance phase, and
- the installation of the vapour barrier and the installation of protective water supply pipes being undertaken during the construction phase.

10.2. GENERAL

10.2.1. Liaison with Regulatory Authorities

This remediation strategy document shall be submitted to and agreed with the ECO at Havant Borough Council prior to commencing any works. This in turn should enable Parts 1, 2 and 3 of Condition 20 of planning permission ref. APP/25/00639 (as issued by Havant Borough Council) to be discharged.

During the remedial works, BRD will continue to liaise directly with the regulatory authorities. They will be consulted over any deviation from the remediation strategy and their representatives will be welcome to visit the site on any occasion throughout the site works.

10.2.2. Professional Supervision

The remediation works shall be undertaken under the supervision of a suitably qualified and experienced environmental consultant from BRD.

10.2.3. Safety

The remediation and subsequent construction of the new development will fall within the remit of the Construction (Design and Management) Regulations 2015. Adherence to these regulations provides a framework for the management of health and safety during the redevelopment of the site.

10.2.4. Photographic Survey

Photographs documenting the remediation shall be taken throughout the works and copies included within the verification report.

10.3. FURTHER GROUND INVESTIGATION

Based on the findings of this report, no further ground investigation is considered necessary to facilitate the remediation works.

10.4. EXCAVATION OF ASBESTOS CONTAMINATED SOILS

10.4.1. Overview

The asbestos contaminated Made Ground soils have been delineated to an area covering approximately 10m², as shown the Proposed Pre-Construction Phase Remediation Plan in Appendix 1.

As discussed previously the contaminated Made Ground soils are present between 0.50m bgl and 0.80m bgl in borehole WS209 giving an approximate volume of 3m³. This area extends up to the four trial pits excavated around the original borehole location. The testing from these trial pits already confirms the lack of asbestos contamination.

10.4.2. Proposed Methodology

In the first instance, the overlying uncontaminated crushed demolition arisings Made Ground soils should be removed from the remedial area in order to expose the underlying the asbestos contaminated Made Ground soils. These deeper soils are visually different from the recent demolition arisings and therefore can be easily identified.

The deeper layer of asbestos contaminated Made Ground soils should be then excavated under controlled conditions. In respect of managing the works involving this soil, BRD has used the JIWG 'Decision support tool for the qualitative risk ranking of work activities involved in or exposed to asbestos in soil and Construction & Demolition materials' (Version 2, February 2017). This confirmed that the works would be classified as 'Non-Licensed Work' with asbestos.

During the remediation of the asbestos contaminated soils, the soil excavation works should be completed with the following control measures:

- Only undertaken by operatives trained in 'Non-Licensed Work' with asbestos.
- All operative to use EN140 compliant masks with P3 filters.
- Use manual/localised dust suppression.
- Have appropriate personal decontamination facilities.

Once excavated, the asbestos contaminated soils should be stockpiled on top of areas of hard standing or plastic sheeting ready for off-site disposal to an appropriately permitted landfill or treatment facility.

The asbestos contaminated soils contain asbestos fibres at 0.024%. Providing no asbestos fragments (larger than a 5p piece) are encountered during their excavation, then the soils would be classified as non-hazardous waste. However, given that the soils contain asbestos, then the landfill site would need to confirm that they could accept asbestos contaminated soils under the terms of their licence. Further information regarding waste soil disposal and classification are set out below in Section 10.7.

10.4.3. Constraints to Remediation Excavation

Constraints to the excavation of contaminated soil at the site are likely to include:

- Excavation will not be undertaken on land outside of the Client's ownership.
- Excavation that potentially affects the stability of structures to be retained, i.e. any services to be retained, will not be undertaken.
- Excavation that potentially affects third party property will not be undertaken i.e. excavation adjacent to the site boundaries may be limited.
- The sides of the excavation will be unsupported and so will be required to be battered back to a safe angle, typically 45°.

Where remedial excavations have been constrained, then justification of these constraints should be detailed with the remediation verification report.

If other constraints are encountered during the course of the excavation works, then discussion with the local authority shall be held to resolve the situation and ensure the objective of the remediation are still achieved.

10.5. EXCAVATION OF CLEAN SOILS

As part of the construction works there may be excavations undertaken for other reasons than remediation that will generate clean soils i.e. natural subsoil. Soils that have been identified as clean from investigation data can be reused on the site as appropriate provided that they are kept segregated for use as such.

10.6. IN-SITU BIOLOGICAL TREATMENT

The contamination source area in the location of the former above ground fuel tank covers an area of approximately 80m².

As set out in the remediation options, it is considered that some form of in-situ biological treatment offers the most cost-effective solution to achieve the required level of betterment of the diesel contamination source area in the location of the former above ground fuel tank.

To provide the most appropriate method, BRD has approached Regenesi Ltd to design the remedial treatment. Regenesi is a global expert in chemical and biological treatment of various contamination sources, in particular fuel related contamination.

Based on the site parameters and nature of the contamination, Regenesi consider their PetroFix product to be the most appropriate bio-remediation product for the site conditions. PetroFix is designed specifically to address petroleum hydrocarbon contamination in the subsurface. It consists of a highly concentrated water-based suspension containing micron-scale activated carbon particles and inorganic electron acceptors. The activated carbon particles in PetroFix adsorb the hydrocarbons from the dissolved phase, while the electron acceptors stimulate biodegradation of the hydrocarbons by providing the necessary electron acceptors for microbial activity.

The activated carbon used in PetroFix has a small particle size of 1-2 microns, which enhances its surface area and adsorption capacity. Additionally, PetroFix contains both slow and quick-release inorganic electron acceptors, providing a continuous and sustained source of electron acceptors to the microbial population in the subsurface.

Regenesi propose to treat the contaminated area by direction injection of a PetroFix slurry at 20No. locations at depths of between 2.50m bgl and 4.50m bgl. The injection grid will cover an area of approximately 10m x 10m, centred over the contamination. Due to the design of the PetroFix compound, this injection can be undertaken over just one injection campaign that will then provide long-term treatment of residual dissolved-phase contamination and mitigating ongoing contaminant loading from the identified smear zone.

Whilst chemical oxidation products are also available that could be used, they tend to require at least three rounds of injection to achieve a suitable level of betterment (due to contaminant rebound), whereas Petrofix is a single injection solution. For smaller contaminated areas, this makes Petrofix a far more cost-effective solution.

It is proposed that the in-situ treatment works would be undertaken and managed on site by Regenesi using their injection rigs, mixing tanks and operatives.

It should be noted that Petrofix is chemically benign and does not present a pollution issue to the aquifer or drinking water supplies. Its use has been approved on many sites by the Environment Agency. Likewise, the presence of Petrofix within any excavated arisings will not have an impact on the waste classification of those soils (which will still be based on the geochemical content).

10.7. SOIL REUSE AND WASTE SOIL DISPOSAL

10.7.1. Overview

It is considered that uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated is not waste. Accordingly, the planned re-use of such soils on site to form the development landform that has been determined through the planning process is excluded from waste regulation by the Waste Framework Directive (2008).

Made Ground and other materials such as recycled aggregate are also not waste unless they are discarded, intended to be discarded or required to be discarded.

Any soils that are surplus to requirements and/or are unsuitable for re-use to be disposed of from site are recognised as 'waste' according to the Environment Agency and the European Waste Framework Directive.

It is a legal requirement to correctly assess and classify waste. There are specific technical requirements for waste sampling such that it is proportionate to the volume of the waste type in question and its nature. The preliminary assessment provided below is based only upon the available data and may not be sufficient to adequately classify the waste.

All soils will be disposed of to an appropriately permitted landfill or treatment facility specific to the requirements of the waste classification of the soils / materials, as set out below.

In all cases, the chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils.

10.7.2. Contaminated Soils

As discussed, the asbestos contaminated Made Ground soils would be classified as 'non-hazardous waste' for disposal purposes as the asbestos is only present as microscopic asbestos debris. Should any asbestos fragments (larger than a 5p piece) be encountered during the excavation of these soils, then they would be classified as hazardous waste.

Given that the soils contain asbestos, then in all cases the landfill site would need to confirm that they could accept asbestos contaminated soils under the terms of their licence. The chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils.

On the basis that the hydrocarbon contaminated soils are derived from diesel, they would be classified as 'non-hazardous waste' for disposal purposes. The nature of the contamination source (i.e. a leaking diesel fuel tank) and the TPH banding from the soils testing confirm the fuel is diesel based.

In all cases, the chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils.

10.7.3. Uncontaminated Made Ground & Natural Subsoil

It is considered that the other soil streams would be classified as 'non-hazardous waste' and would be characterised for disposal to landfill as 'inert waste'. Waste Acceptance Criteria (WAC) has been completed and confirms the soil tested complies with the inert waste limits.

The chemical results should always be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils.

10.8. VAPOUR BARRIER

A continuous membrane resistant to VOC/SVOC will be incorporated into the floor construction along with a ventilated sub-floor void or granular blanket within those plots straddling the hydrocarbon contamination area (this related to Plots 16-20).

At this stage it is envisaged that a conventional floor slab construction will be adopted utilising a ventilated sub-floor void and block and beam floor slab construction. On this basis, it is proposed that the vapour protection measures will be achieved by:

- Pre-cast suspended segmental subfloor, i.e. beam and block.
- ‘Good’ or ‘Very Good’ performance passive clear void sub-floor dispersal layer. Ventilated clear void of at least 100mm thickness/depth. For buildings up to 15m wide the minimum area of side ventilation should be 1,500mm²/m run of wall on at least two opposite sides. For larger width buildings the side ventilation provisions should be at least 2,000mm²/m.
- Proprietary hydrocarbon vapour resistant membrane fitted by a specialist contractor who will provide certification that the membrane has been installed correctly. All joints and penetrations sealed. Gas membrane must meet the equivalent requirements as set out in Table 7 of BS8485:2015+A1 2019.

The installed gas protection measures will need to be independently verified in accordance with CIRIA C735 as set out in Section 11.5.

10.9. WATER SUPPLY PIPES

Specialist protective pipes, either plastic incorporating a foil barrier or metal, will be required and fitted on the site. The specification of pipework used should be confirmed with the local water supply company.

10.10. PREVIOUSLY UNIDENTIFIED CONTAMINATION

Throughout the development there remains the potential for further unidentified contaminated soil being exposed during the construction works.

In the first instance, if any anomalous material or unexpected / unidentified contamination is encountered during course of construction, then the following “discovery strategy” process is set out below:

- The potential for uncovering potential contamination / anomalous materials should be communicated as part of the general construction site induction undertaken to all site workers / operatives.
- Any “discovery” is to be reported to the Site Manager immediately and works at that location are to halt. The Site Manager / Client’s representative is then to consult with BRD in the first instance. Depending on the type, nature and extent of the discovery, it may be necessary to continue to halt works in that location. This shall be reviewed on a case specific basis and in conjunction with consultation with the Client.
- A BRD Consultant shall attend the site to record the location, extent and nature of the discovery and, where necessary, will undertake appropriate sampling and/or supervision of any immediate remedial works.
- If warranted, BRD shall discuss the “discovery” with the Local Authority and if considered necessary, arrange to meet their representative on site. It should be noted that some minor

/ straightforward contamination finds will just be dealt with without any regulatory involvement, e.g. removal of a pocket of some asbestos fragments or ashy material, etc.

- Where more significant remediation is required, approval will be sought from the Local Authority.
- All the remediation / verification works to address the discovery will be documented within the main remediation verification report to be produced at the completion of the works.

This discovery strategy will be retained on site by the Site Manager and it is their responsibility to follow it and act on any potentially anomalous material or unexpected / unidentified contamination encountered during the course of the development.

11. VERIFICATION PLAN

11.1. INTRODUCTION

The verification plan for the remediation works will be completed in a phased approach as and when the remedial works are completed. The details of the proposed verification works are described in the following sections.

11.2. REMOVAL OF ASBESTOS CONTAMINATED SOILS

As the asbestos contaminated Made Ground soils have already been delineated by the surrounding trial pits (TP315-TP318), where no asbestos was recorded, it is proposed that the remedial excavation will extend up to these trial pits. On this basis, it is not considered that any further verification samples are deemed necessary.

The remedial excavation will be surveyed so that the location and extents of the remediation are recorded.

Copies of waste transfer tickets and disposal records for the contaminated soils will be provided for inclusion within the verification report.

11.3. IN-SITU BIOLOGICAL TREATMENT

The aim of the in-situ bioremediation treatment is the betterment of the groundwater through the reduction of dissolved-phase hydrocarbon mass and the mitigation of ongoing contaminant loading from residual impacts within the smear zone. Consequently, the aim is not to demonstrate that the soil concentrations drop to a particular level. To confirm the efficacy of the treatment, Regenesis will produce an operational completion report following their works, for inclusion in the main verification report.

However, as a means of monitoring the effectiveness of the remediation, it is proposed to retain and protect 7No. monitoring / injection wells from across the treatment area and immediate surroundings in order to monitor the concentrations of the contamination in the groundwater within and immediately surrounding the contaminated area.

The water samples from these wells will be analysed for a suite comprising speciated PAH, TPH and BTEX compounds. The chosen wells will be those located in future garden areas so that they can be protected throughout the construction process. Should an unacceptable number of wells be destroyed during the course of the construction works, then the wells will be reinstated.

Following the treatment works it is proposed that three separate visits are completed at intervals of 1 month, 3 months and 6 months to confirm the reduction in contaminant concentrations in the groundwater.

In the unlikely event that groundwater concentrations have not significantly reduced to acceptable levels then the need for further remedial works will need to be assessed and discussed with the local authority.

11.4. VERIFICATION OF IMPORTED SOILS

There is no topsoil present on the site. Consequently, any topsoil or sub-soil imported to site will have to comply with the chemical acceptance criteria for the following contaminants, as outlined in the table below.

CONTAMINANT	UNITS	ASSESSMENT CRITERIA
Arsenic	mg/kg	37
Cadmium	mg/kg	22
Chromium (hexavalent)	mg/kg	21
Chromium (total)	mg/kg	910
Copper	mg/kg	2,400
Lead	mg/kg	200
Mercury	mg/kg	11
Nickel	mg/kg	180
Selenium	mg/kg	250
Zinc	mg/kg	3,700
pH	Units	<5-10>
Naphthalene	mg/kg	2.3
Acenaphthylene	mg/kg	170
Acenaphthene	mg/kg	210
Fluorene	mg/kg	170
Phenanthrene	mg/kg	95
Anthracene	mg/kg	2,400
Fluoranthene	mg/kg	280
Pyrene	mg/kg	620
Benzo(a)anthracene	mg/kg	7.2
Chrysene	mg/kg	15
Benzo(b)fluoranthene	mg/kg	2.6
Benzo(k)fluoranthene	mg/kg	77
Benzo(a)pyrene	mg/kg	2.2
Indeno(1,2,3-cd)pyrene	mg/kg	27
Dibenzo(a,h)anthracene	mg/kg	0.24
Benzo(ghi)perylene	mg/kg	320
Asbestos	presence	Not detected

The testing rate should be at a minimum of one test per 100m³ of topsoil and 150m³ of subsoils, with at least three results provided for each soil source. Test results should be provided by the soil supplier or alternatively samples taken by the attending geo-environmental consultant. It is recommended that testing to confirm the suitability of the soil is undertaken prior to the import to site. Sample density may need to be increased depending upon the consistency of the material and nature of the source. Alternatively, if a well-defined greenfield source is adopted then the sample density may be decreased.

It is not proposed to undertake TPH testing on imported soils as the source will likely be greenfield or a reputable topsoil supplier and as such asbestos or petroleum hydrocarbons would not be expected.

If topsoil is imported from another development site then this should be in accordance with a U1 waste exemption registered with the Environment Agency or a Material Movement Plan developed in accordance with “The Definition of Waste: Development Industry Code of Practice” Version 2, Contaminated Land: Applications in Real Environments (CL:AIRE), March 2011.

It should also be noted that any imported granular materials, such as crushed concrete or aggregate, do not require any verification sampling from a human health perspective.

11.5. VERIFICATION OF VAPOUR BARRIER

In order to verify that the hydrocarbon vapour protection measures set out in Section 10.8 are adhered to, the following verification items will be required in relation to each aspect of the protection measures in order to provide a clear methodology, in accordance with CIRIA C735.

VAPOUR BARRIER - PLOTS 16-20	
VENTILATION MEASURES	Verification needs to be undertaken by an independent qualified and experienced installer, separate to the installation contractor. As there is only a single terrace of dwellings (Plots 16-20), it is proposed that the vented void is inspected for all five plots to ensure adequate through-ventilation and the correct quantity of air bricks.
MEMBRANE	<p>Verification of the membrane installation to be undertaken by an independent qualified and experienced third party verifier, separate to the installation contractor.</p> <p>Verifier to undertake a thorough visual inspection of membrane prior to covering over with insulation / screed. If a perimeter and infill approach is adopted i.e. the edges are completed at an earlier stage than the inner infill membrane, then verification of the two stages will be required separately. Mechanical stress tests and / or air lance tests of membrane joints to be undertaken at the discretion of the verifier in line with ASTM D4437 on both buildings.</p> <p>An inspection report shall be provided by the verifier for row of buildings in line with Annex A5 of CIRIA C735.</p> <p>Should any punctures / failures be identified then the membrane will need to be repaired / replaced and verified again using the same procedures.</p>

11.6. VERIFICATION OF WATER SUPPLY PIPES

Verification of the installation of hydrocarbon resistant water supply pipes will be via the water supply company.

11.7. VERIFICATION REPORT

Upon completion of the remediation works, BRD will prepare a remediation verification report, which will include commentary on the following:

- Details on the asbestos contaminated Made Ground soil removal from site and copies of waste tickets for soils removed from site.
- Details on the in-situ biological treatment of the diesel contamination area, including final injection well plan, confirmation of treatment volumes, groundwater monitoring and verification analytical results.
- Details on any deviation from the remediation strategy.
- Confirmation of the suitability of any imported soils.
- Confirmation of the installation of hydrocarbon vapour protection measures, including:
 - Visual inspection records of ventilation measures.
 - Records / Certification of air lancing, integrity testing of hydrocarbon vapour resistant membranes and visual inspections.
- Confirmation on protective water pipe installation.
- Copies of any key regulatory correspondence during the works.
- As-built drawings and photographic records of remediation works.

The verification report will conclude with a statement confirming the site is fit for its intended use in respect of contamination. The verification report should be submitted to the regulatory authorities to confirm the successful remediation of the site.

12. HEALTH AND SAFETY FILE INFORMATION

12.1. INTRODUCTION

The aim of the following sections is to present pertinent Health and Safety information that has arisen from the current investigation/survey works discussed in this report. The aim is to identify health and safety controls that may be necessary during any subsequent maintenance, refurbishment, demolition or construction works. The information is not exhaustive and stems only from the aspects identified within the scope of the works undertaken by BRD.

Where BRD has been appointed as a Principal Contractor, then this information shall form the Health and Safety Files as required by the Construction Design and Management (CDM) Regulations 2015.

Reports are always forwarded to the Client and they shall be responsible for ensuring this safety information is disseminated to those who need it.

The works undertaken by BRD are detailed in the previous sections of this report.

12.2. HAZARDS

During the course of the BRD works the following noteworthy safety hazards have been identified:

12.2.1. Contamination

Contaminated soils and groundwater are present at the site. Construction workers will be at risk where they are exposed to these soils and groundwater, for example during demolition, utility services work and foundation construction. In particular, health and safety plans should identify the presence of the residual diesel contaminated soils in the location of the former fuel tank. Any contaminated pile arisings or spoil from deeper excavations will need to be segregated and disposed of separately to the uncontaminated arisings. It should be noted that the asbestos contaminated soils around WS209 should be removed from site in their entirety as part of the initial site works. As such, it is unlikely that any other contractor will be exposed to them.

During the redevelopment of the site, the presence of contaminated soils should be considered within health and safety plans. Measures to protect the health and safety of site workers should be implemented including use of appropriate personal protective equipment, education and good hygiene procedures.

As set out in the discover strategy within the earlier sections, if during the redevelopment any anomalous material is encountered that is different to those conditions revealed by this investigation, then expert environmental advice should be sought.

12.2.2. Asbestos

As discussed through the report, a localised area of asbestos contaminated soils is present within the deeper Made Ground strata in borehole WS209, located in the centre north of the site, at a depth of 0.60m bgl. This contaminated soil is proposed for remediation and disposal off-site as part of the initial site clearance works. No asbestos contamination has been identified anywhere else on the site.

12.2.3. Other Issues

During the BRD works the following safety hazards were identified:

- There are multiple slip, trip and fall hazards around the site.
- There are covers missing from manholes.

12.3. **HAZARDOUS MATERIALS**

BRD did not construct anything with hazardous materials.

12.4. **UTILITY SERVICES**

No previously unidentified utility services were encountered during the BRD works.

The utility services plans held by the Client should be referred to. The utility service companies should be contacted for records of their own equipment.

REPORT SPECIFIC REFERENCES

- British Geological Survey sheet 316 “Fareham” Solid and Drift edition (1:50,000) published 1972.
- ‘Ground Investigation Report’, Soiltechnics, ref. STM3168D-GD1, dated May 2016.
- ‘Interpretive Site Investigation and Remedial Strategy Report’, Forge Environmental Management Ltd, ref. HAV164.D/SI/002, rev. 1, Dated March 2020.
- ‘Phase 1 Environmental Desk Study - Bartons Road, Havant’, BRD Environmental Ltd, report ref. BRD4469-OR1-B, dated July 2025.
- ‘Phase 2 Geo-Environmental Investigation - Bartons Road, Havant,’ BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.
- ‘Soakage Investigation - Bartons Road, Havant’, BRD Environmental Ltd, report ref. BRD4469-OR3-C, dated July 2025.
- ‘Additional Geo-Environmental Investigation - Bartons Road, Havant,’ BRD Environmental Ltd, report ref. BRD4469-OR4-A, dated June 2026.



SUPPORTING INFORMATION

GROUND INVESTIGATION

Exploratory holes are logged by an experienced Geo-Environmental Consultant in general accordance with 'Code of practice for site investigations' BS5930:2015+A1:2020 (BSi, 2020). Soil samples for chemical and geotechnical analysis are taken from the exploratory holes at intervals dictated by the nature of the soils and the objectives of the investigation.

Where stated on the logs of inspection pits, trial pits or boreholes (where insitu testing has not been undertaken), the relative density of coarse (sand and gravel) soils is tentative only. Such assessments of density are on the basis of visual inspection only taking into consideration such factors as drilling rates, stability of pit side walls, appearance and behaviour under excavation.

Where Chalk strata is encountered it is logged and graded in general accordance with CIRIA guidance 'C574 - Engineering in Chalk' (CIRIA, 2002). It should be recognised that where percussive drilling methods are employed, the structure of the Chalk is destroyed and therefore the grading stated on such logs is either tentative or absent where it is not possible to assess the grade.

Hand Dug Inspection Pits

Hand tools are used to forward shallow inspection pits as a cost effective method of describing and sampling near surface soils. The technique is also used where exposure of existing footings is required. The depth reached by such techniques is a function of the nature of the ground and generally does not exceed 1.5m

Trial Pits

Mechanically excavated trial pits allow detailed inspection of near surface ground due to the large volume of soil exposed. A wheeled backhoe loader is the usual machine for digging trial pits that are typically 3 to 4.5m deep, 0.5m wide and 3m long. It is worth noting that due to the disturbance of the ground, this technique will leave visible pits scars, localised surface disturbance and may leave a mound of soils that can settle over time.

Windowless Sampling Boreholes

This type of borehole is formed by a small tracked dynamic percussion drilling rig with samples retrieved in thin plastic liners within the narrow diameter steel sampling tubes. Borehole depths of up to 5m are typical, but in exceptional circumstances up to 15m depth can be achieved. This is the smallest type of rig that is capable of undertaking Standard Penetration Tests (SPTs).

Hand Held Window Sampling

Hand held window sampling is a useful method of drilling narrow diameter boreholes particularly where access is difficult. Hand held mechanical percussive hammers are used to drive the sampling tube into the ground. The soil samples are collected within the hollow metal sampling tubes and inspected via the open window along one side. Window sampling boreholes can be forwarded to depths of 3m to 6m depending upon ground conditions.

Cable Percussive Boreholes

This form of drilling involves repetitive dropping of a tube into the soil under its own weight from a tripod support. The sample is obtained from the clay cutter head in fine soils or a bailer for wet granular soils. As the borehole progresses SPTs can be undertaken and relatively

undisturbed samples can be obtained. Typically these boreholes are 15 to 25m deep, but depths of double that can be achieved in soils, but only thin weak rock layers can be penetrated.

Rotary Boreholes

Where competent rock is required to be drilled then rotary drilling techniques are required. The drilling rigs can vary in size from small tracked units to larger units mounted on four wheel drive trucks. Rotary open hole drilling techniques break the rock into small fragments and so recovery of any samples is limited. In contrast, rotary coring generally retrieves excellent samples. Some rigs also allow dynamically driven windowless sampling to be undertaken through soil layers. There are no practical limits to the depths that this drilling method can achieve.

Dynamic Probing

Dynamic probing comprises a sectional rod with a sacrificial cone at the base of slightly larger diameter than the rod. The rod is driven into the ground by a constant mass falling through a set distance. The number of blows required to forward the rod per 100mm is then recorded and presented in a graph of N_{10} values. The standard applicable to dynamic probing is 'BS EN ISO 22476-2:2005 Incorporating corrigendum no. 1, Geotechnical investigation and testing – Field testing – Part 2: Dynamic probing' (BSi, 2007).

Static Cone Penetration Tests

Cone Penetration Tests (CPT) consist of pushing a conical 60° cone into the ground at a constant rate and recording the force required to do this. Sensors in the cone record other information and this data can be correlated to a number of different geotechnical parameters.

Dynamic Penetrometer

The Transport Research Laboratory Dynamic Cone Penetrometer (TRL DCP) uses an 8 kg hammer dropping through a height of 575mm to drive a 60° cone of 20mm maximum diameter into the ground. The depth driven either per blow or per several blows is recorded. The strength of each of the soil layer encountered is then calculated by converting the penetration rate into an approximate California Bearing Ratio (CBR) value employing the correlation proposed by TRL.

Light Weight Deflectometer

The falling Light Weight Deflectometer (LWD) test is a dynamic plate load test. It is a surface testing instrument and does not involve any penetration of the underlying soils. The plate used is 300mm diameter and so the results achieved are effectively an average of the ~450mm to 600mm soils beneath the plate. The LWD result can be correlated to a California Bearing Ratio (CBR) value and BRD's experience is that these results compare well with other insitu CBR test methods.

Gas Monitoring

Gas monitoring is undertaken with a portable gas monitor for Oxygen, Methane, Carbon Dioxide, Hydrogen Sulphide and Carbon Monoxide together with recording of atmospheric pressure and any flow rate.

Vapour Monitoring

Headspace tests and monitoring for Volatile Organic Compounds (VOC) or Semi Volatile Organic Compounds (SVOC) is undertaken using a Photo Ionisation Detector (PID). The MiniRAE models used have a 10.6 eV lamp calibrated for isobutylene. The PID is useful tool to indicate the presence of a wide range of volatile compounds, but only provides semi-quantitative data as different compounds provide a different response and thus the reading is not a true reflection of the actual concentration present.

Low PID readings can be recorded in natural uncontaminated organic soils or even as a result of atmospheric pollution. It is generally accepted by consultants and regulators that recorded values in excess 50 parts per million (ppm) represents the presence of organic compound pollutants and in excess of 100 ppm such contamination may be significant.

The headspace test procedure involves the collection of a sample of suspected contaminated soils and placing within a sample bag. A tight seal to the bag is formed with a similar volume of air trapped to that of the soil and the sample is left for fifteen minutes to allow volatilisation of any contaminants. The bag is then pierced by, and sealed around, the sample probe of the PID and a reading taken.

Borehole well monitoring is undertaken by connecting the PID directly to the gas tap on the monitoring well installation.

Groundwater Level Monitoring

Groundwater levels are recorded with an electronic dip meter that has a detector end that is lowered into the borehole well. An audible signal is made when water is reached and the depth recorded from the graduated tape used to lower the detector. Where there is potential for a separate Light Non Aqueous Phase Liquid (LNAPL) to be present floating on the groundwater an oil/water interface meter is used in preference to a conventional dip meter so that any such floating product can be detected.

Geotechnical Sampling

BRD schedule a range of geotechnical testing as appropriate to the identified ground conditions, available budget and the proposed development. Different types of soil samples are obtained as appropriate to the ground conditions and planned testing.

SAMPLE TYPE	LOG SYMBOL	DESCRIPTION
Disturbed	D	Small disturbed soil samples of about 1 to 2 kg are collected in plastic bags.
Bulk	B	Large disturbed bulk samples up to about 20 to 30 kg are collected in plastic bags
Undisturbed	U	'Undisturbed' samples generally collected in plastic or metal tubes within cable percussive boreholes of 100mm diameter for samples of fine soils of firm to stiff consistency. Can also be representative of samples taken by cutting plastic sample liners from windowless sampling drilling methods. It is recognised that such samples do not generally meet Eurocode sample quality requirements for the tests commonly employed. However, given the wealth of experience with these sampling methods this continues to be a common approach in United Kingdom practice particularly for less sensitive developments where more expensive sampling techniques are not economically justifiable.
Undisturbed	UT	A thin walled steel sampler developed by Archway Engineering called a UT100 in an attempt to gain better quality samples of soft to firm fine soils when using cable percussive drilling methods.

Contamination Sampling

BRD schedule contamination testing as appropriate to the ground conditions, available budget, potential contaminants and the proposed development. Samples are collected in single use laboratory supplied containers.

Soil samples are retrieved in plastic containers and/or amber glass jars with a lined plastic cap. Contamination samples are indicated by a 'J' on exploratory hole logs.

Water samples are collected in plastic bottles and/or amber glass jars with a lined plastic cap then placed in cool boxes together with freezer packs. Water samples are indicated by a 'W' on exploratory hole records, but generally such samples are not tested as testing from dedicated monitoring wells is preferred for sample quality reasons.

Samples retrieved from the exploratory holes are dispatched to the laboratory by overnight courier. Where samples cannot be transported directly from site they are temporarily stored in the BRD dedicated sample storage facility which includes refrigeration where necessary. The individual accreditation of the test methods is detailed in the laboratory test report.

GEOTECHNICAL ASSESSMENT

Under Eurocode 7 (EC7) the following risk ranking is applied to geotechnical projects:

GEOTECHNICAL CATEGORY	DESCRIPTION
1	<i>Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk. For example, straightforward ground conditions, local experience, no excavation below the water table unless this will be straight forward.</i>
2	<i>Conventional types of structures and foundations. No difficult soil or loading conditions. Quantitative geotechnical data and laboratory testing. Routine procedures for field and laboratory testing. Conventional structures and no exceptional geotechnical risk. For example, spread, raft and piled foundations, retaining walls, bridge piers and abutments, embankments, ground anchors, tunnels and excavations.</i>
3	<i>Those structures not in Categories 1 and 2 such as very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions. Structures in highly seismic areas. Structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.</i>

GEOTECHNICAL PARAMETERS

Soakage Tests

Soakage tests comprise the filling of a test pit with water and recording the time taken for the water to drain away. The tests are undertaken in general accordance with 'Digest DG 365: Soakaway design' (BRE, 2016). The test pits are usually gravel filled for safety with a slotted vertical pipe through which water observations are made. Water is generally supplied by a tanker to allow fast filling of the pits with water. Compliant tests are filled and allowed to drain near empty three times.

Standard Penetration Tests

The standard penetration test (SPT) determines the resistance of soils at the base of a borehole to the dynamic penetration of a split barrel sampler and the recovering of disturbed samples for identification purposes. In gravelly soils and some soft rocks a solid cone is used in preference to the sampler.

The basis of the test consists in driving a sampler by dropping a hammer of 63.5 kg mass on from a height of 760 mm. The number of blows (N value) necessary to achieve a penetration of the sampler of 300 mm is recorded. The test is described in 'Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test - BS EN ISO 22476-3:2005 Incorporating corrigendum no. 1' (BSi, 2007).

The uncorrected N values of the SPT tests are recorded upon the borehole logs together with a record of blows for each 75mm test portion including the seating blows. Where the full test depth cannot be achieved due to refusal on hard stratum, the number of blows and the distance achieved is recorded and the N value given as >50. The abbreviation SPT(c) is used on the logs indicates that the test was performed with a solid cone rather than a split spoon sampler.

It is necessary to apply a correction to the N values to account for the effects of energy delivery using the equation: $N_{60} = \frac{E_r}{60} N$ where E_r is the energy ratio of the specific test equipment.

In the case of tests in sand, for the effects of overburden and rod length the equation is modified to $N_{60} = \frac{E_r}{60} \times \lambda \times C_N \times N$ where λ is the correction factor for energy losses due to the rod length and C_N is the correction factor for vertical stress due to overburden of the soil.

Sulphate

In order to compare the laboratory soil test results with 'Concrete in aggressive ground. BRE Special Digest 1: 2005' (BRE, 2005) laboratory results are converted to SO_4 mg/l. Laboratory results expressed as SO_3 g/l and are multiplied by a factor of 1200 to express the results as SO_4 mg/l.

Index Property Tests

In accordance with National House Building Council (NHBC) 'Standards Chapter 4.2 - Building near trees', the laboratory plasticity indexes are assessed against their volume change potential. The Modified Plasticity Index is defined as the Plasticity Index of the soil multiplied by the percentage of particles with a nominal diameter of less than $425\mu\text{m}$. Whilst the NHBC Standards were developed for residential buildings, the advice is equally applicable to a large number of other types of low rise structures.

Hand Shear Vane

The undrained shear strength of the fine (i.e. clay) soils at the site can be established using hand shear vane apparatus. Usually three readings are taken at every depth tested and the uncorrected results recorded on the exploratory point log. Shear vane readings from depths below 1m depth in trial pits are from tests performed on excavated soil. In accordance with Eurocode 7 – Geotechnical design – Part 2: Ground investigation and testing EN 1997-2:2007 the results should be corrected. BRD employ only simple correction methods as the more complex correction methodologies imply undue accuracy to a test that has distinct disadvantages and limitations.

Pocket Penetrometers

The Pocket Penetrometer is a lightweight instrument for use by field personnel to check visual classification of soils. It is a simple test and there is inherent uncertainty related to the small volume of soil being tested and so the results should be used with appropriate caution. Pocket penetrometers are calibrated in terms of unconfined compressive strength and once converted to undrained shear strength (divide by two) the results are further reduced by a factor of 1.5 - 2.0 as the device tends to overestimate strengths.

<i>Instrument Reading (uncompressive strength in kg/cm²)</i>	<i>Indicative Undrained Shear Strength (kN/m²)</i>	<i>Indicative Consistency</i>	<i>Indicative strength</i>
1.0	25 - 33	Soft	Low
1.5	38 - 50	Soft to firm	Low to medium
2.0	50 - 67	Firm	Medium
2.5	63 - 83	Firm to stiff	Medium to high
3.5	88 - 116	Stiff	High
4.5	113 - 150	Stiff to very stiff	High to very high

CONTAMINATION ASSESSMENT METHODOLOGY

UK Policy

The UK Government's policy in relation to land affected by historic contamination is based on a 'suitable for use' approach. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Contamination risks therefore need to be assessed on a site-by-site basis. The 'suitable for use' approach limits requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to either the current use or future use of the land.

The three main drivers for contamination assessment and remediation are:

- Voluntary action.
- Development as part of the planning regime.
- Regulatory action to mitigate unacceptable risks e.g. Part 2A of the Environmental Protection Act 1990.

Contaminant Linkages

For a contamination risk to exist there must be a 'contaminant linkage' from the source (contaminant or pollutant) via a pathway (the route from contaminant to receptor) to a receptor (the entity that could be harmed). The absence of a source, pathway or receptor breaks the contaminant linkage and therefore no contamination risk exists.

Contamination is typically present at a site (in the ground and/or in the underlying groundwater) as a result of a historic or current industrial use, usually as a result of leaks, spills or disposal of residues, wastes and excess raw materials from the industrial processes. Contamination may also be present due to:

- The deliberate application of chemicals e.g. the spraying of herbicide/pesticide.
- Migration of pollutants from adjacent land.
- Naturally occurring processes e.g. elevated concentrations of particular heavy metals associated with specific geological strata.
- Atmospheric deposition.

Conceptual Site Model

The conceptual site model can be defined as a textual or graphical representation of the identified contaminant linkages for a given site. The model forms the basis for designing the investigation as the aim will be to target all of the potential contaminant linkages to determine, through the subsequent phases of risk assessment, whether or not they pose an actual risk.

It is important that the conceptual site model is updated with new information as the various investigation, risk assessment and remediation works are completed.

Technical Guidance

The technical and legal framework for contamination assessment is complex. The process adopted through this report for assessing contamination risks is in general accordance with the following guidance, as listed below:

- ‘Investigation of Potentially Contaminated Sites - Code of Practice - BS 10175:2011+A2:2017’, (BSi, 2017).
- Land Contamination Risk Management (LCRM) website, (Environment Agency, 2023).
- ‘Guidance for the safe development of housing on land affected by contamination - R&D66: 2008’, (NHBC/Environment Agency, 2008).

Land Contamination Risk Management: Stage 1 Risk Assessment

In line with the technical guidance, the contamination risk assessment follows a series of steps for each tier of risk assessment:

- *Identify the hazard* - A preliminary stage of risk assessment concerned with identifying and characterising the contamination source that may be associated with a particular site.
- *Assess the hazard* - Use a source-pathway-receptor (S-P-R) linkage approach to find out if there is the potential for unacceptable risk.
- *Estimate the risk* - predict what degree of harm or pollution might result and how likely it is to occur by using the tiered approach to risk assessment.
- *Evaluate the risk* - Decide whether a risk is unacceptable, taking into account the nature and scale of the risk estimates, any uncertainties associated with the assessment and the broad costs and benefits of taking action to mitigate risks.

The separate staged tiers of risk assessment are as follows:

TIER	DESCRIPTION
TIER 1: PRELIMINARY RISK ASSESSMENT	Generally limited to desk based research and a site walkover survey (site reconnaissance) to develop an initial conceptual site model and identify what risks, if any, are likely to be presented by the site. Occasionally it may include assessment of a limited exploratory ground investigation or previous investigation data.
TIER 2: GENERIC QUANTITATIVE RISK ASSESSMENT	This phase is concerned with establishing whether contamination is present, usually through intrusive ground investigation, and then evaluating the magnitude of the associated risks with test results compared to generic assessment criteria.
TIER 3: DETAILED QUANTITATIVE RISK ASSESSMENT	To further evaluate risks the development of site-specific assessment criteria are values for concentrations of contaminants derived using risk estimation models

Risk Classification

The objective of risk assessment is to identify the nature and magnitude of the potential risks and should be based on a consideration of both:

- The likelihood/probability of an event [taking into account both the presence of the hazard and receptor and the integrity of the pathway].
- The severity of the potential consequence [taking into account both the potential severity of the hazard and the sensitivity of the receptor].

There is a need for a logical, transparent and repeatable system in defining the categories of severity of consequence and likelihood as well as for the risk itself and therefore the following risk rating matrix is employed:

		SEVERITY OF CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
PROBABILITY	HIGH LIKELIHOOD	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	LIKELY	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	LOW LIKELIHOOD	Moderate Risk	Moderate/Low Risk	Low Risk	Negligible Risk
	UNLIKELY	Moderate/Low Risk	Low Risk	Negligible Risk	Negligible Risk

These risk classifications are defined as follows:

- **Very High Risk** - There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **High Risk** - Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **Moderate Risk** - It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
- **Low Risk** - It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst if any harm was realised any effects would be mild.
- **Negligible Risk** - The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

This risk assessment matrix and classification system is based on guidance produced by Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency in connection with contaminated land assessment.

TIER 2 RISK ESTIMATION - SOILS

Introduction to Soil Human Health Generic Assessment Criteria (GAC)

The Environment Agency (EA) and Department of Environment Food and Rural Affairs (DEFRA) had previously issued revised guidance following the consultation about the DEFRA publication 'Assessing risks from land contamination - a proportionate approach. Soil Guideline Values: the Way Forward'. This resulted in a revised version of the Contaminated Land Exposure Model (CLEA) model (version 1.06) and a few of the previously published Soil Guideline Values (SGVs) were revised.

The main legislative driver for dealing with historical land affected by contamination is Part 2A of the Environmental Protection Act 1990. Revised Statutory Guidance to support Part 2A was published in April 2012. This Guidance introduced a new four-category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health, where Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is acceptably low. The impact assessment for the new Statutory Guidance stated "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". The C4SLs are still derived using the CLEA model, but adopt a slightly different approach to toxicological assessment and exposure modelling.

In March 2014, the outcome of 'SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Final Project Report' (CL:AIRE) was published. Due to slightly ambiguous wording within this report, Lord de Mauley, Parliamentary Under Secretary, DEFRA wrote to all local authorities on 3 September 2014 to confirm that the published C4SLs were final and that they can be used in risk assessment undertaken under the planning regime.

Whilst there are proposals for the industry to develop C4SLs for other contaminants, these have only produced limited results to date. BRD do not believe that C4SLs could be developed by a single organisation with sufficient confidence. BRD has therefore employed other, more conservative guidance based on the CLEA model (detailed below) within this assessment for compounds where C4SLs are not available. However, it should be noted that the results of this investigation may need to be reinterpreted as new C4SLs become available.

Due to the limited number of published C4SL values at this time, the Chartered Institute of Environmental health (CIEH) and Land Quality Management Ltd (LQM) have produced Generic Assessment Criteria (GAC) known as Suitable for Use Levels (S4ULs), for use in contaminated land human health risk assessment. These S4ULs (2014) have been derived for a large number of substances using the current CLEA model and are therefore consistent with current guidance. They also incorporate the revised exposure parameters as adopted by the C4SL programme, but have not adopted the revised toxicological approach adopted by the C4SLs and so remain a more conservative assessment criteria. The substances for which SGVs were previously published have also been revised as new S4ULs in light of the new exposure parameters proposed by the C4SL programme, and therefore effectively replace the existing SGVs.

In addition, in December 2009, other GAC for less common substances were produced by the Environmental Industries Commission (EIC), The Association of Geotechnical and Geoenvironmental Specialists (AGS) and Contaminated Land: Applications in Real Environments (CL:AIRE) using the CLEA model. These are referred to as the EIC/AGS/CLAIRE GAC.

In summary, C4SLs have been used where these are available. For those substances where C4SLs have yet to be issued, then the S4ULs have been adopted or in some cases, the EIC/AGS/CLAIRE GAC. All of the previously produced SGVs have now either been withdrawn, or superseded by the respective C4SLs or S4ULs.

The only exception to this approach is the PAH compound benzo(a)pyrene (BaP) where a C4SL guideline value has been produced, whereas BRD has adopted the S4UL value. The C4SL for BaP relates to its use as a surrogate marker compound representing all of the genotoxic PAH compounds as a mixture, rather than this individual compound. BRD has therefore adopted the compound specific S4UL value as the initial screening value, for consistency with the other PAH compounds before then employing the C4SL is necessary.

It should be noted that unless otherwise stated, all the assessment criteria adopted within this report have been derived based on a sandy loam soil at pH 7 and the values quoted are for a conservative soil organic matter content of 1% where applicable (i.e. organic contaminants).

Human Health - Soil Generic Assessment Criteria

The results of the soils analysis have been compared to generic assessment criteria for the default exposure scenarios comprising either residential land with plant uptake, residential land without plant uptake, or commercial/industrial land use. The criteria values selected are listed in the table below and full details on the source are referred to above. Where deemed appropriate, the results have also been assessed with reference to the required statistical tests presented within CL:AIRE Professional Guidance: 'Comparing Soil Contamination Data with a Critical Concentration'.

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
Arsenic	37	40	640	C4SL
Cadmium	22	150	410	
Chromium (total) ⁵	910	910	8,600	S4UL
Chromium VI	21	21	49	C4SL
Lead	200	310	2,330	
Mercury*	11	15	320	S4UL
Selenium	250	430	12,000	
Nickel	180	180	980	
Copper	2400	7,100	68,000	
Zinc	3,700	40,000	730,000	
pH	<5 - 10> units			Professional judgement
Naphthalene	2.3	2.3	190	S4UL
Acenaphthylene	170	2,900	83,000	
Acenaphthene	210	3,000	84,000	
Fluorene	170	2,800	63,000	
Phenanthrene	95	1,300	22,000	
Anthracene	2,400	31,000	520,000	
Fluoranthene	280	1,500	23,000	
Pyrene	620	3,700	54,000	
Benzo(a)anthracene	7.2	11	170	
Chrysene	15	30	350	
Benzo(b)fluoranthene	2.6	3.9	44	
Benzo(k)fluoranthene	77	110	1,200	
Benzo(a)pyrene	2.2	3.2	35	
Indeno(1,2,3-cd)pyrene	27	45	500	
Dibenzo(a,h)anthracene	0.24	0.31	3.5	S4UL
Benzo(ghi)perylene	320	360	3,900	
TPH Aliphatic C5-C6	42	42	3,200	
TPH Aliphatic C6-C8	100	100	7,800	
TPH Aliphatic C8-C10	27	27	2,000	
TPH Aliphatic C10-C12	130	130	9,700	
TPH Aliphatic C12-C16	1,100	1,100	59,000	
TPH Aliphatic C16-C35	65,000	65,000	1,600,000	

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
TPH Aliphatic C35-C44	65,000	65,000	1,600,000	
TPH Aromatic C5-C7	70	370	26,000	
TPH Aromatic C7-C8	130	860	56,000	
TPH Aromatic C8-C10	34	47	3,500	
TPH Aromatic C10-C12	74	250	16,000	
TPH Aromatic C12-C16	140	1,800	36,000	
TPH Aromatic C16-C21	260	1,900	28,000	
TPH Aromatic C21-C35	1,100	1,900	28,000	
TPH Aromatic C35-C44	1,100	1,900	28,000	
Benzene	0.87	3.3	98	C4SL
Toluene	130	880	56,000	S4UL
Ethylbenzene	47	83	5,700	
Xylene [^]	56	79	5,900	
MTBE	49	73	7,900	EIC/AGS/CL:AIRE GAC

Notes:

* The S4UL for methyl mercury has been adopted as the worst case mercury compound as generally there is no desk study evidence to suggest the potential for elemental mercury on the majority of sites.

[^] The lowest S4UL of either p-xylene, o-xylene or m-xylene has been adopted for each land use as a conservative measure.

[§] S4UL for Chromium III adopted, as in the absence of Chromium VI it is likely that all of the chromium will be in this form as these are the two most common and stable forms of chromium in the soil environment.

Where no GAC is available, any concentrations exceeding the laboratory limit of detection are identified and discussed in more detail.

Water Environment - Soil Generic Assessment Criteria

There are no UK published Generic Assessment Criteria for soil test results in respect of the risk to the water environment and therefore risk estimation is on the basis of the professional judgement and experience of BRD to employ values that are a reasonable concentration above which concern for water resources is valid.

The Total PAH GAC employed is the sum of the 16No. priority PAH compounds regularly tested for in contaminated land analysis (i.e. US EPA 16PAHs). BRD employ a soil screening based upon the total PAH limit for 'inert waste' of 100mg/kg. The rationale is based on PAHs are recognised to be generally of low solubility and the risk to the water environment is correspondingly low.

In respect of Total Petroleum Hydrocarbons, BRD employ a value of 500 mg/kg as a screening value in comparison to the sum of the component aliphatic and aromatic TPH carbon bands. The employed soil screening value is based upon:

- In common with some other consultants, the professional judgement and experience of BRD suggests that this value is a reasonable concentration above which concern for water resources is valid. The rationale is based on the fact that lower concentrations of fuel based contaminants are more likely to naturally degrade than migrate any great distance.
- BRD is aware of regional Environment Agency groundwater and contaminated land teams historically employing 500 mg/kg as a screening value for considering whether or not TPH could represent a risk to water resources.
- The value mirrors the mineral oil Waste Acceptance Criteria limits for what is considered 'inert waste'.



Should elevated contaminants that pose a potential risk to the water environment be identified then site specific assessment criteria should be developed.

Building Materials and Services - Soil Generic Assessment Criteria

Some hydrocarbon compounds are known to both attack and permeate through certain plastic pipe materials, with the primary concern being the degradation and tainting of water supplies. The UK Water Industry Research (UKWIR) has therefore produced a document 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' (ref. 10/WM/03/21) that specifies threshold criteria for the adoption of 'standard' polythene (PE) or PVC pipes, protective barrier pipe and ductile iron/steel/copper pipes.

The UKWIR threshold assessment criteria from Table 3.1 of this document for standard PE pipes have been employed. It should be noted that the approach taken by UKWIR is very conservative, and both the document and research are flawed. However, it is these values that are being using to specify water pipe materials and therefore it is appropriate to consider them.

The UKWIR guidance is particularly flawed in respect of the chemical analysis it expects as it seeks a limit of detection that is generally below limits that are reasonable or commonly employed in contaminated land assessment. The UKWIR seeks that where a substance is below the limit of detection it should be taken as being present at half this concentration. For the larger suite of chemicals where the limit is against a sum of compounds, this approach would mean that a sample of virgin sub-soil from a greenfield site with absolutely no contamination would actually fail the criteria for using standard PE pipes. To avoid this situation, BRD have adopted the approach of summing only those compounds detected above their respective limits of detection.

In terms of building materials, the primary concern is in respect of concrete as certain commonly occurring natural ground conditions can adversely impact on buried concrete as discussed in 'Special digest 1:2005 Concrete in aggressive ground', BRE, 2005.

ANALYSIS	GENERIC ASSESSMENT CRITERIA	SOURCE
pH	<5.5	BRE Special Digest 1:2005
Sulphate (w/s)	500 mg/l	BRE Special Digest 1:2005
Sum of any VOC above detection limits	0.5 mg/kg	Relevant compounds adapted from UKWIR Table 3.1
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	2 mg/kg	
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	10 mg/kg	
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	500 mg/kg	
Sum of BTEX + MTBE above detection limits	0.1 mg/kg	
Phenols	2 mg/kg	
Cresols and chlorinated phenols	2 mg/kg	
Naphthalene	0.5 mg/kg	
Benzo(a)pyrene	0.5 mg/kg	

TIER 2 RISK ESTIMATION - SURFACE WATER AND GROUNDWATER

The initial assessment of the contamination risk to groundwater is by comparing dissolved groundwater concentrations with screening values (GAC) that are protective of surface water resources. Surface waters are supplied with a baseflow from groundwater and so shallow groundwater often enters the surface water. It is therefore appropriate to compare groundwater to these GAC.

The reference source for the target concentrations is generally the Environment Agency's maximum allowable concentration Environmental Quality Standard (EQS) (as accessed February 2025: <https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit#screening-tests-freshwaters>), the Water Supply (Water Quality) Regulations 2016 (WSR) and the DW1/DW2 criteria from the Surface Water (Abstraction for drinking water)(classification) Regulations 1996. The target concentrations are outlined in the table below.

The 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies'. CL:AIRE, 2017 has also been used as reference source for the values.

ANALYSIS	GENERIC ASSESSMENT CRITERIA (GAC)	SOURCE
Arsenic	50 µg/l	DW1 (& EQS annual average)
Cadmium	50 µg/l	DW1
Chromium (total)	32 µg/l	EQS
Chromium (VI)	3.4 µg/l	EQS
Copper	50 µg/l	DW1
Nickel	34 µg/l	EQS
Lead	14 µg/l	EQS
Mercury	1 µg/l	WSR
Selenium	10 µg/l	WSR
Zinc	10.9 mg/l	EQS annual average bioavailable
Cyanide	50 µg/l	WSR
pH	6 to 9 units	-
Benzene	50 µg/l	EQS
Toluene	380 µg/l	EQS
Ethylbenzene	300 µg/l	WHO guideline
Xylene	30 µg/l	EQS (annual average)
Methyl tert-butyl ether (MTBE)	15 µg/l	Taste and odour threshold.
Naphthalene	130 µg/l	EQS
Benzo(a)pyrene	0.27 µg/l	EQS
Total PAH	-	Benzo(a)pyrene can be considered as a marker for the other PAHs
TPH Aliphatic C5-C6	15,000 µg/l	World Health Organization (WHO) guide values for TPHCWG fractions in drinking water
TPH Aliphatic C6-C8	15,000 µg/l	
TPH Aliphatic C8-C10	300 µg/l	
TPH Aliphatic C10-C12	300 µg/l	
TPH Aliphatic C12-C16	300 µg/l	
TPH Aromatic C5-C7	10 µg/l	
TPH Aromatic C7-C8	700 µg/l	
TPH Aromatic C8-C10	300 µg/l	
TPH Aromatic C10-C12	90 µg/l	
TPH Aromatic C12-C16	90 µg/l	
TPH Aromatic C16-C21	90 µg/l	
TPH Aromatic C21-C35	90 µg/l	

TIER 2 RISK ESTIMATION - GROUND GAS

Introduction

A variety of potentially hazardous gases occur naturally in the ground environment. Microbial decay of organic matter under anaerobic conditions and geological processes can lead to the generation of Methane and Carbon Dioxide, but can also include traces gases such as Hydrogen sulphide and Carbon monoxide.

Methane is a colourless and odourless gas that has the hazardous properties of being flammable and, at certain air/Methane mixtures, explosive. Methane has a low toxicity, but can be a simple asphyxiant due to the displacement of oxygen.

Carbon Dioxide is a colourless, odourless and non-combustible gas that has the hazardous property of being a highly toxic chemical. At concentrations of 3% by volume, shortness of breath and headaches will occur becoming acute by 6%. At levels of above 10% by volume headache, visual distortion, tremors and rapid loss of consciousness occur. Concentrations of Carbon Dioxide above 22% by volume are likely to be fatal. The effects of Carbon Dioxide poisoning are made more severe if there is accompanying reduction in oxygen concentrations.

Hydrogen sulphide is a colourless and flammable gas that has an odour of rotten eggs. It is important that the sense of smell is over powered at higher concentrations. The gas is toxic and can be an asphyxiant.

Carbon monoxide is a colourless, odourless and explosive gas in air mixtures that has the hazardous property of being a highly toxic chemical.

Radon is a naturally occurring colourless and odourless gas that is radioactive. It is formed by the radioactive decay of radium which in turn is derived from the radioactive decay of uranium, both of which are minerals that can be found in many soil types. Whilst it is recognised that the air inside every building contains radon, some buildings built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken. The maps contained within BRE211:2015 'Radon: guidance on protective measures for new buildings' identify areas where no radon protection measures are necessary or where higher concentrations are present that either basic or full radon protection measures are required to be fitted to all new buildings, extensions or refurbishments.

Basis of Gas Assessment

In order to classify the level of risk and need, if any, for gas protection measures at a site with the potential for a gas problem, consideration of each of the following is necessary:

- *The source of the gas.*
- *The generation potential of the gas.*
- *The location of the source and the geological setting.*
- *Boreholes flow rate and estimated surface emission rate.*
- *The nature of the proposed development.*
- *Confidence in the knowledge of the gas regime.*

The gas assessment is made with reference to 'C665 - Assessing risks posed by hazardous ground gases to buildings', (CIRIA, 2007) and 'BS8485:2015+A1:2019 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (BSi, 2019).

Gas Screening Value

The methods within CIRIA C665 and BS8485 both use the gas concentrations together with the borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flow for Methane and Carbon Dioxide. This limiting borehole gas volume flow is called the Gas Screening Value (GSV) and is expressed below:

$$\text{Gas Screening Value (l / hr)} = \text{borehole flow rate (l/hr)} \times \text{gas concentration (fraction)}$$

The calculation of GSV is completed for both Methane and Carbon Dioxide and then the 'worse case' maximum values are used in the assessment. The assessment is to determine the gas regime at the site is dependent upon the nature of the development.

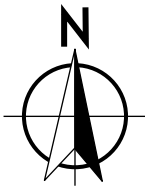
Characteristic Gas Situation

The characteristic situation for many sites is determined from evaluation of the Gas Screening Value derived against the criteria in the following table.

Characteristic situation	Hazard potential	Gas Screening Value (CH ₄ or CO ₂ l/hr)	Additional factors
CS1	Very low risk	<0.07	Typically Methane ≤1% and/or Carbon Dioxide ≤5%. Otherwise consider an increase to characteristic situation 2.
CS2	Low risk	0.07 to <0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider an increase to characteristic situation 3.
CS3	Moderate risk	0.7 to <3.5	-
CS4	Moderate to high risk	3.5 to <15	Quantitative risk assessment required to evaluate the scope of protection measures.
CS5	High risk	15 to <70	-
CS6	Very high risk	>70	-

APPENDIX 1

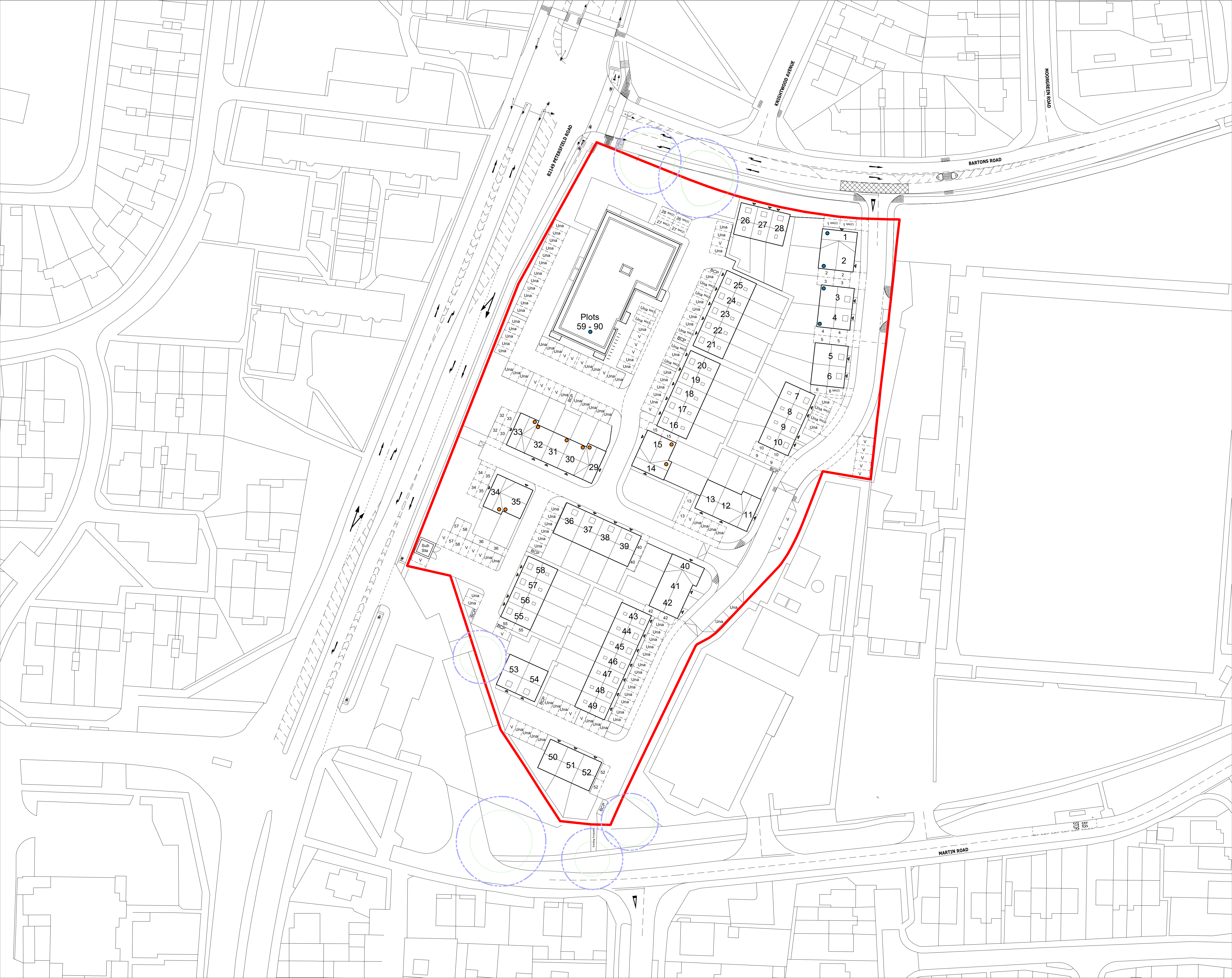
Site Location Plan



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Not to scale.

Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP2-A
Date Issued: July 2024



NOTES
ERRORS AND OMISSIONS TO BE REPORTED TO THE ARCHITECT.
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REVISIONS		
A	Issue for Planning	31/07/2025
B	Issue for Planning	01/08/2025
C	Issue for Planning	05/08/2025
D	Issue for Planning	04/12/2025
E	Parking numbers amended	05/01/2025

Key

- Application Site Boundary
- AR / SR Plot
- SO Plot

N

0m 10m 20m 30m 40m

SCALE 1:500 @ A1

EDGINGTONS
ARCHITECTS

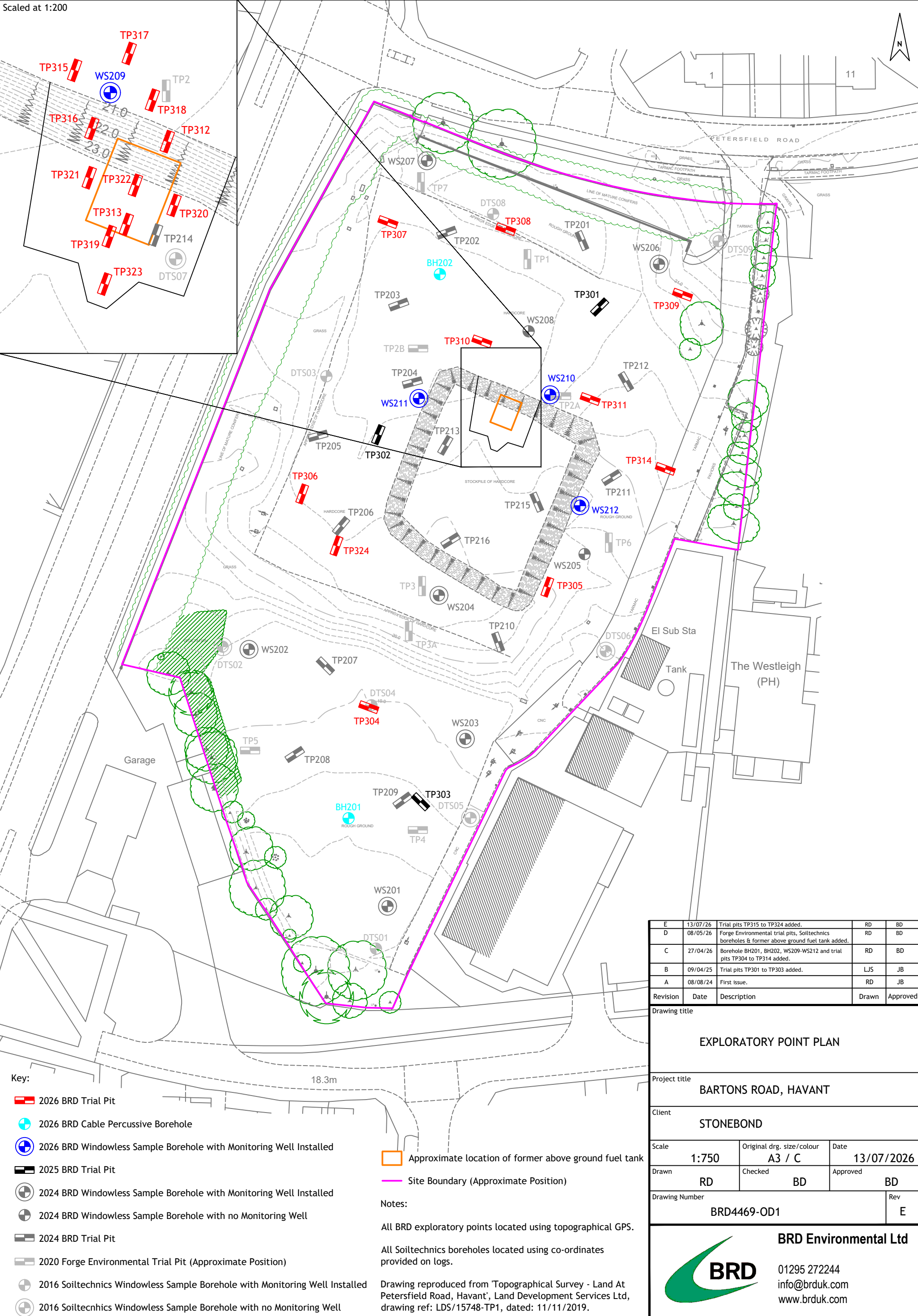
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web: http://www.edgingtons.co.uk

Stonebond Properties (Guildford) Limited
Former SSE Offices
Bartons Road, Havant

Proposed Block Plan

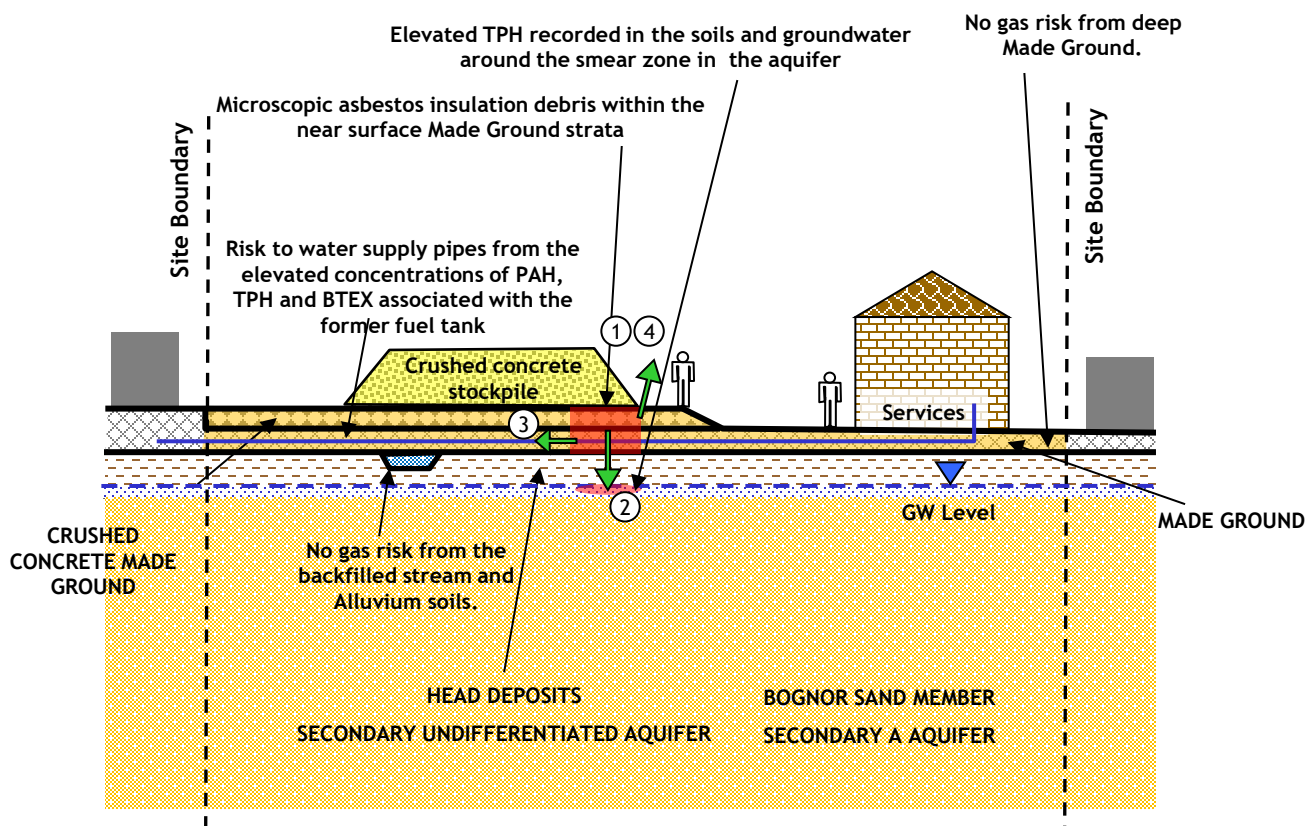
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DATE	31/07/2025	DRAWN	AG		
JOB No.	6087	DWG No.	1110	REV.	E

Scaled at 1:200

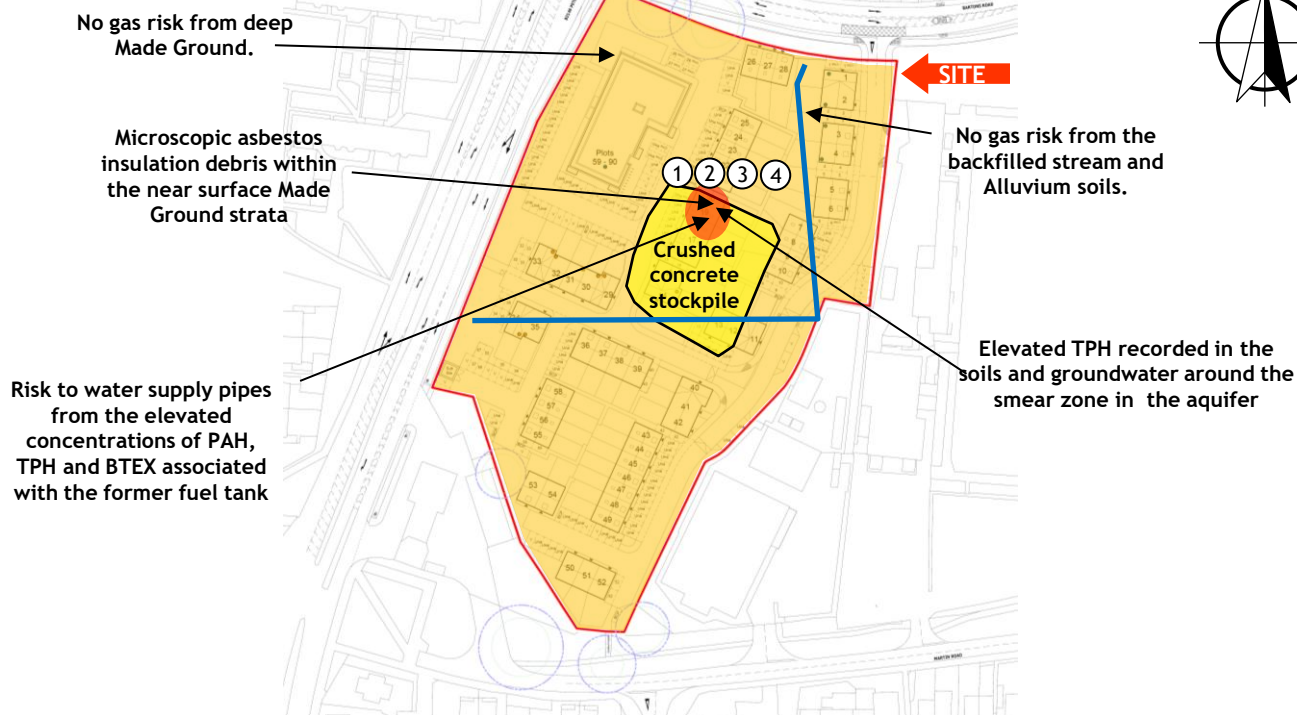


Revised Conceptual Model

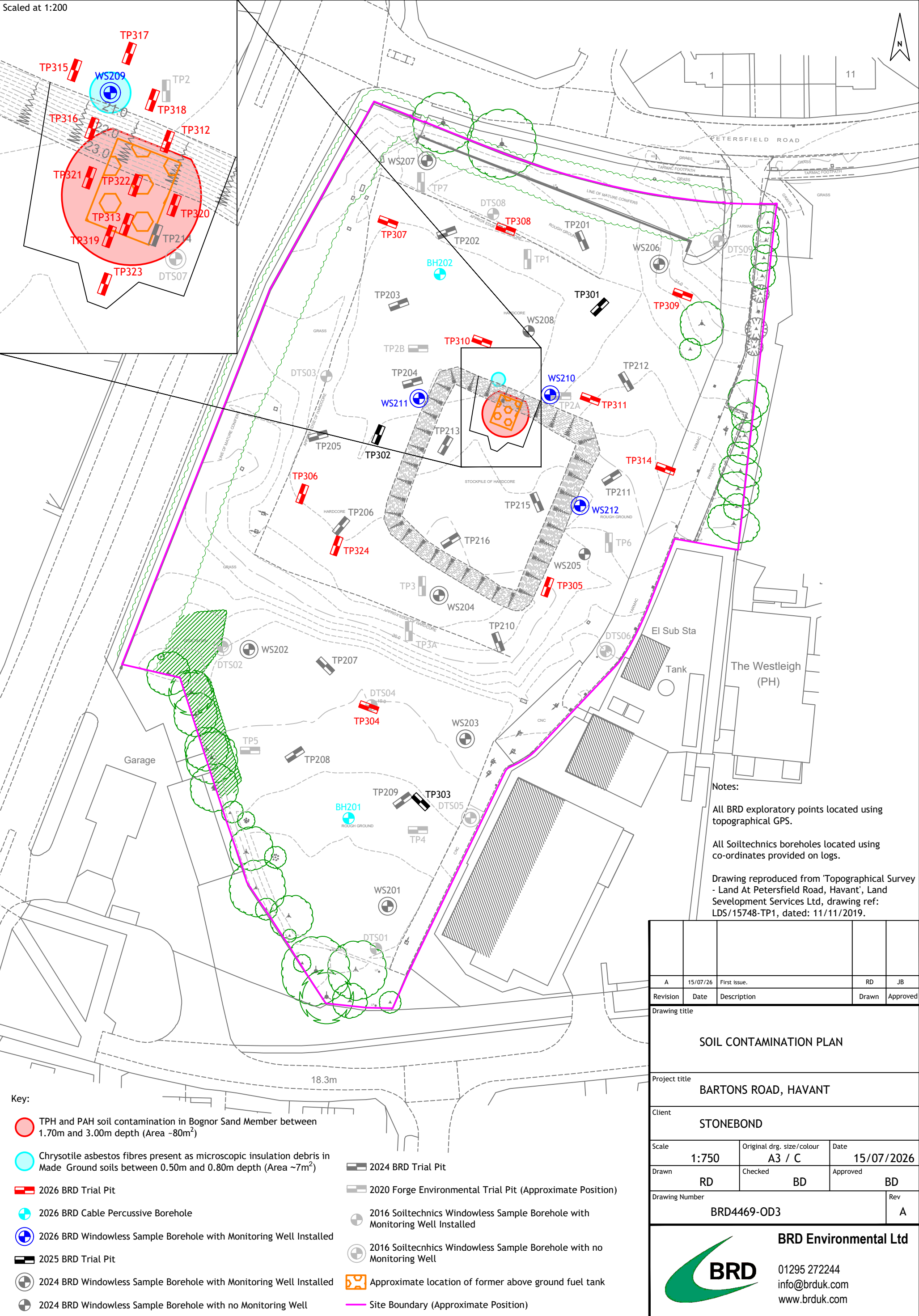
Proposed Development



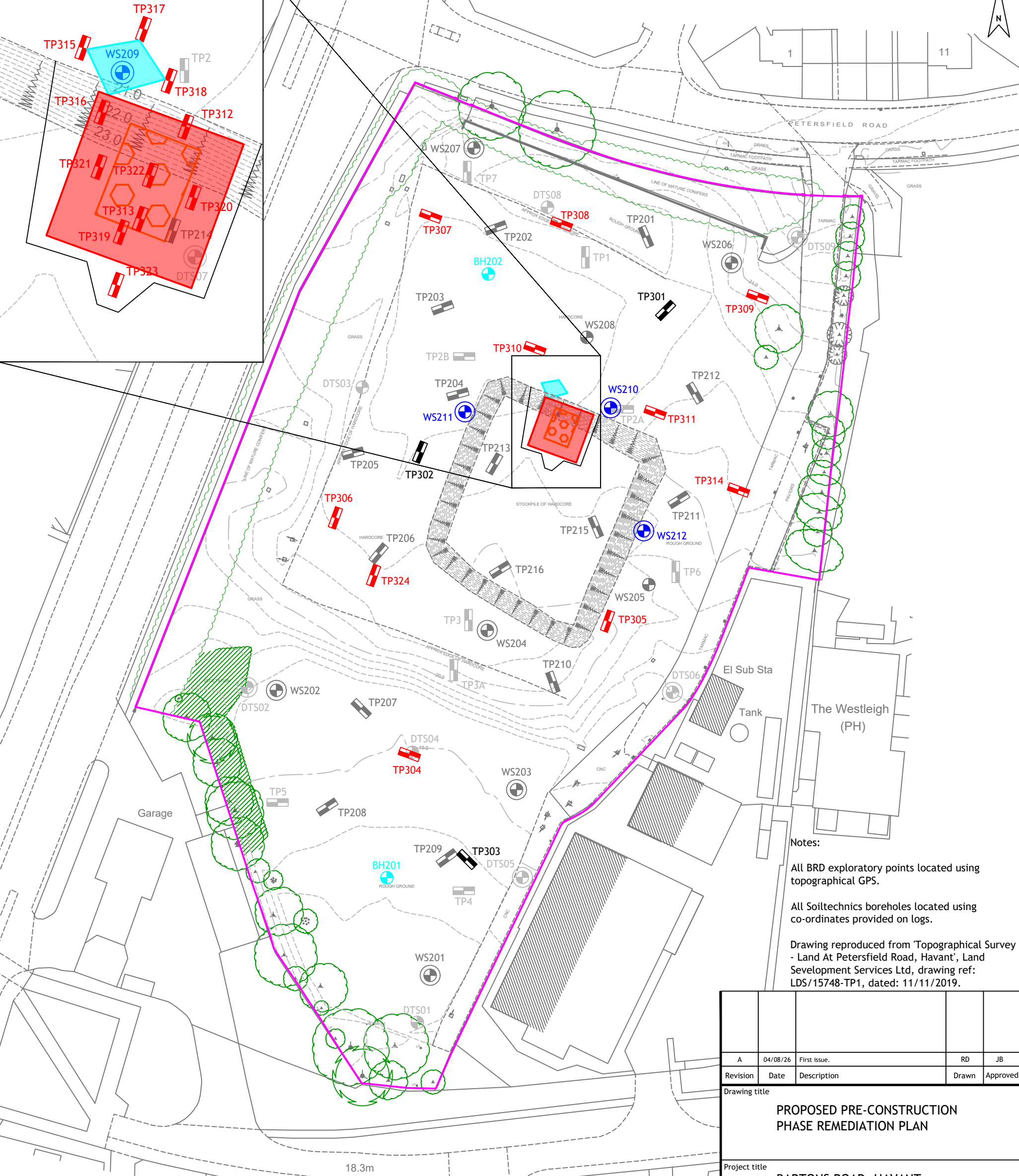
Proposed Development



Scaled at 1:200



Scaled at 1:200



Key:

- Proposed PetroFix bio-remediation injection treatment area. 20No. injection points between 2.40m and 4.50m depth.

Asbestos contaminated Made Ground soils between 0.50m and 0.80m depth to be removed from the site under controlled conditions.

2026 BRD Trial Pit

2026 BRD Cable Percussive Borehole

2026 BRD Windowless Sample Borehole with Monitoring Well Installed

2025 BRD Trial Pit

2024 BRD Windowless Sample Borehole with Monitoring Well Installed

2024 BRD Windowless Sample Borehole with no Monitoring Well

2024 BRD Trial Pit

2020 Forge Environmental Trial Pit (Approximate Position)

2016 Soiltechnics Windowless Sample Borehole with Monitoring Well Installed

2016 Soiltechnics Windowless Sample Borehole with no Monitoring Well

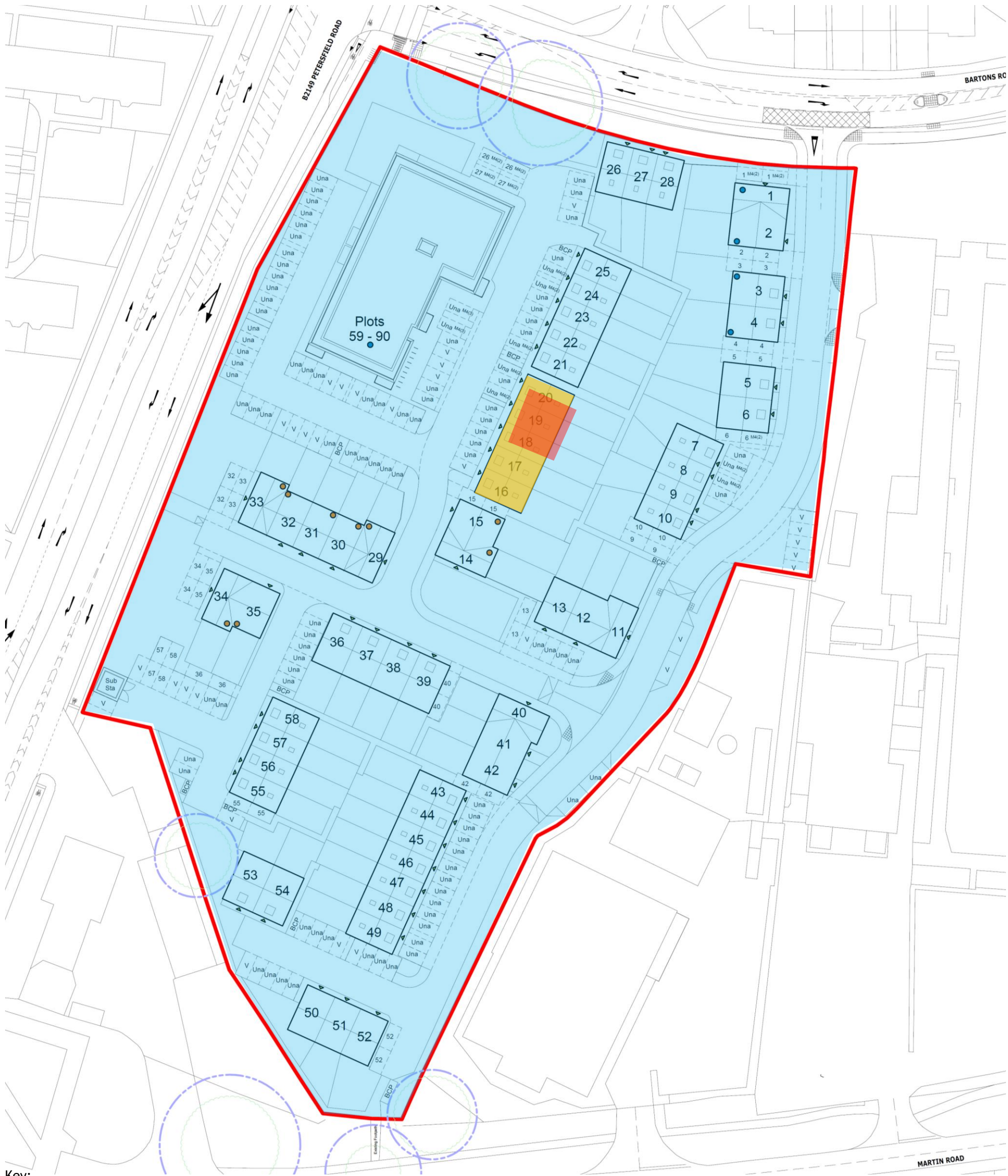
Approximate location of former above ground fuel tank

Site Boundary (Approximate Position)
- Notes:
- All BRD exploratory points located using topographical GPS.

All Soiltechnics boreholes located using co-ordinates provided on logs.

Drawing reproduced from 'Topographical Survey - Land At Petersfield Road, Havant', Land Development Services Ltd, drawing ref: LDS/15748-TP1, dated: 11/11/2019.
- | | | | | | | |
|---|---------------------------|--------------|-------|----------|--|--|
| | | | | | | |
| A | 04/08/26 | First Issue. | RD | JB | | |
| Revision | Date | Description | Drawn | Approved | | |
| Drawing title | | | | | | |
| PROPOSED PRE-CONSTRUCTION
PHASE REMEDIATION PLAN | | | | | | |
| Project title | | | | | | |
| BARTONS ROAD, HAVANT | | | | | | |
| Client | | | | | | |
| STONEBOND | | | | | | |
| Scale | Original drg. size/colour | Date | | | | |
| 1:750 | A3 / C | 04/08/2026 | | | | |
| Drawn | Checked | Approved | | | | |
| RD | BD | BD | | | | |
| Drawing Number | | | | Rev | | |
| BRD4469-OD4 | | | | A | | |
| BRD Environmental Ltd | | | | | | |
| <div><div></div><div>BRD</div></div> <div>01295 272244
info@brduk.com
www.brduk.com</div> | | | | | | |

Proposed Construction Phase Remediation Plan



Key:

-  Plots 16-20 requires vapour protection measures as set out in the remediation strategy.
-  Location of fuel contamination at depth beneath the footprint of the former fuel tank.
-  Specialist protective pipes, either plastic incorporating a foil barrier or metal, to be fitted.

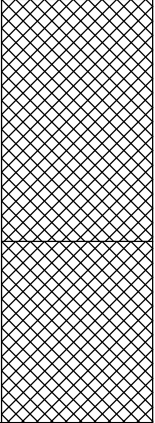
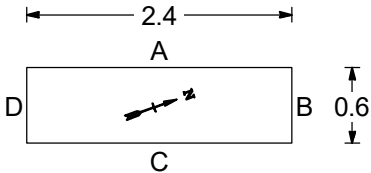
Reproduced from 'Proposed Block Plan - Former SSE Offices, Bartons Road, Havant', Edgingtons Architects, Job No. 6087, drawing No. 1110, revision E, dated 05/01/2026.

Not to scale.
All positions illustrative only.

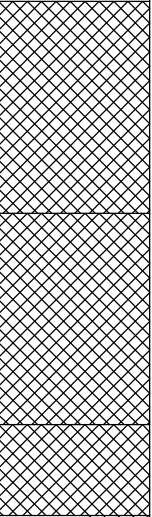
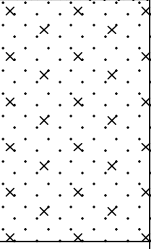
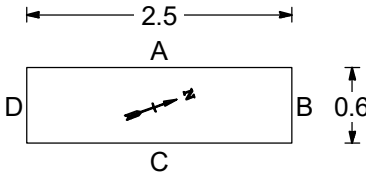
Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP12-A
Date Issued: August 2026

APPENDIX 2

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP315</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.60 0.60	PID J1	0.0 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.80 () 1.40 ()	MADE GROUND	
0.90 0.90	PID J2	0.0 ppm	MADE GROUND: Firm, grey with occasional orange brown, silty, slightly gravelly clay. Gravel is fine to coarse, angular to subrounded flint, brick, concrete and ceramic.			
			1.30 m: Concrete slab in Face D at end of trial pit.			
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.40m bgl. Trial pit undertaken approximately 3.00m to the west of borehole WS209.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

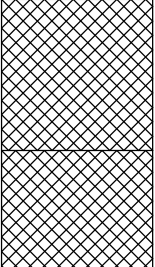
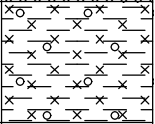
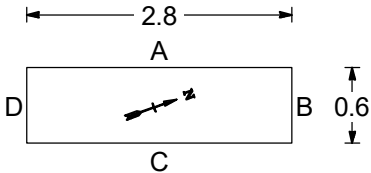
TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP316</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.60 0.60	PID J1	0.0 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.70 () 1 1.40 () 1.70 ()	MADE GROUND	
0.90 0.90	PID J2	0.7 ppm	MADE GROUND: Firm, wet in parts, organic, dark brown to black, slightly gravelly, silty clay with rare decaying plant remains, many rootlets and roots up to 35mm in diameter, and occasional plastic fragments. Gravel is fine to coarse, subangular to subrounded flint.			
2.20 2.20	PID J3	14.6 ppm	1.30 m: 2x 20mm diameter plastic drain pipes crossing trial pit from Face A to C. MADE GROUND: Loose, grey brown, coarse gravel of subangular to subrounded flint. Medium dense, orange brown stained dark grey and black in parts, silty, fine SAND with a hydrocarbon odour. 1.70 - 2.10 m: MADE GROUND: Loose, grey brown, coarse gravel of subangular to subrounded flint extended to 2.10m in Face A of trial pit.			
				2.50 () 3 4	BOGNOR SAND M.	
Pit Stability: See General Remarks Groundwater: Slight perched groundwater seepage at 0.80m				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl. Relative density based on visual assessment only. Unstable in Made Ground. Trial pit undertaken approximately 3.00m to the south of borehole WS209.			
				All dimensions in metres Log Scale 1:25  Telephone: 01295 272244 Email: info@brduk.com		

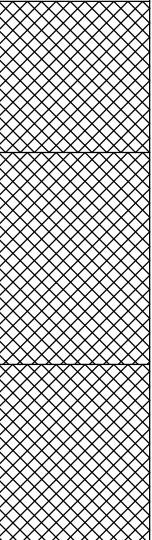
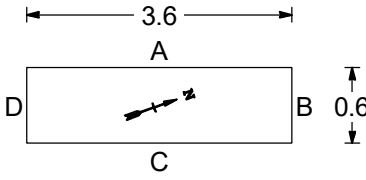
TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP317</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.60	PID	0.0 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.70 ()	MADE GROUND	
0.60	J1					
0.80	PID	0.3 ppm	MADE GROUND: Firm, grey with occasional orange brown, silty, slightly gravelly clay. Gravel is fine to coarse, angular to subrounded flint, brick, concrete and ceramic.			
0.80	J2			1.60 ()	HEAD	
			Medium dense, orange brown mottled light grey, silty, slightly gravelly, fine SAND. Gravel is fine to coarse, subangular to subrounded flint.	1.80 ()		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.80m bgl. Relative density based on visual assessment only. Trial pit undertaken approximately 3.00m to the north of borehole WS209.			
				All dimensions in metres Log Scale 1:25		
				 Telephone: 01295 272244 Email: info@brduk.com		

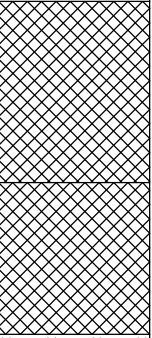
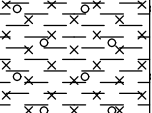
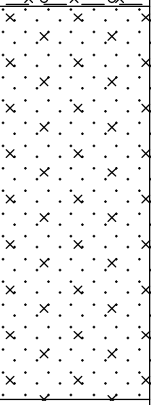
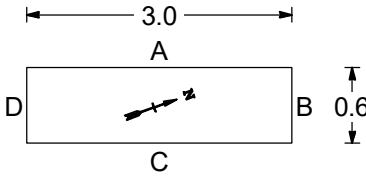
TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 24/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP318</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.30 0.30	PID J1	0.3 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coars, angular concrete, brick and occasional flint with occasional plastic and wine fragments, rare glass, metal and wood fragments.	0.50 ()	MADE GROUND	
0.60 0.60	PID J2	0.1 ppm	MADE GROUND: Firm, dark grey with occasional orange brown, slightly organic, slightly gravelly, silty clay with occasional decaying rootlets and roots up to 25mm in diameter. Gravel is fine to coarse, angular to subrounded flint and occasional brick.	0.90 ()		
			Firm, orange brown mottled light grey with occasional dark orange brown to black specks, silty, gravelly CLAY. Gravel is fine to coarse, subangular to subrounded flint.	1 ()	HEAD	
				1.30 ()		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.30m bgl. Trial pit undertaken approximately 3.00m to the east of borehole WS209.			
				All dimensions in metres Log Scale 1:25		
				 Telephone: 01295 272244 Email: info@brduk.com		

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 24/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP319</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.60 0.60	PID J1	0.0 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments. MADE GROUND: Firm, wet in parts, organic, dark brown to black, slightly gravelly, silty clay with rare decaying plant remains, many rootlets and roots up to 35mm in diameter and occasional plastic fragments. Gravel is fine to coarse, subangular to subrounded flint. 0.90 m: Disused concrete duct.	0.50 ()	MADE GROUND	
1.30 1.30	PID J2	0.1 ppm	MADE GROUND: Firm, dark grey with occasional orange brown, slightly organic, slightly gravelly, silty clay with occasional decaying plant remains, decaying rootlets and roots up to 25mm in diameter. Gravel is fine to coarse, angular to subrounded flint and occasional brick. 1.30 - 1.90 m: Face B at end of trial pit: MADE GROUND: Loose, grey brown, coarse gravel of subangular to subrounded flint.	1.20 ()		
1.90 1.90	PID J3	25.3 ppm	Medium dense, orange brown mottled grey, stained dark grey to black in parts, silty, fine SAND with a hydrocarbon odour.	1.80 ()		
2.60 2.60 2.70 2.70	PID J4 PID J5	205.7 ppm 114.9 ppm	2.50 - 2.70 m: Stained dark grey and black with a strong hydrocarbon odour.	2.80 ()		
				3		
				4		
Pit Stability: See General Remarks Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.80m bgl. Relative density based on visual assessment only. Pit sides unstable in Made Ground. Perched groundwater seepage at 0.50m. Groundwater seepage at 2.60m with a hydrocarbon odour and sheen. Trial pit targeted the location of a former above ground fuel tank.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 24/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP320</h2>		
Sheet 1 of 1						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.70 0.70	PID J1	1.1 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.60 ()	MADE GROUND	
			MADE GROUND: Firm, wet in parts, organic, dark brown to black, slightly gravelly, silty clay with rare decaying plant remains, many rootlets and roots up to 35mm in diameter, and occasional plastic fragments. Gravel is fine to coarse, subangular to subrounded flint.			
1.20 1.20	PID J2	0.4 ppm	Firm, orange brown mottled light grey, slightly sandy, silty, gravelly CLAY. Gravel is fine to coarse, subangular to subrounded flint.	1.10 ()	HEAD	
1.60 1.60	PID J3	0.9 ppm	Medium dense, orange brown mottled light grey, silty, fine SAND.	1.50 ()	BOGNOR SAND MEMBER	
2.70 2.70	PID J4	184.2 ppm	2.60 m: Becoming stained dark grey to black in parts with a slight hydrocarbon odour.	2.80 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.80m bgl. Relative density based on visual assessment only. Slight perched groundwater seepage at 0.60m. Trial pit targeted the location of a former above ground fuel tank.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 24/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP321</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.80 0.80	PID J1	0.3 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.70 ()	MADE GROUND	
			MADE GROUND: Firm, dark grey with occasional orange brown, slightly organic, slightly gravelly, silty clay with occasional decaying rootlets and roots with 25mm diameter. Gravel is fine to coarse, angular to subrounded flint, occasional brick and rare tarmac.	1.30 ()		
			MADE GROUND: Loose, grey brown, coarse gravel of subangular to subrounded flint.	2.20 ()		
2.40 2.40	PID J2	136.6 ppm	Medium dense, orange brown stained dark grey and black in parts, silty, fine SAND with a hydrocarbon odour.	2.50 ()	BSM	
				3		
				4		
Pit Stability: Pit sides collapsed Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl. Relative density based on visual assessment only. Slight perched groundwater seepage at 0.70m. Trial pit targeted the location of a former above ground fuel tank.			
					All dimensions in metres Log Scale 1:25	
					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 24/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP322</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.80 0.80	PID J1	1.2 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.70 ()	MADE GROUND	
			MADE GROUND: Firm, dark grey with occasional orange brown, slightly organic, slightly gravelly, silty clay with occasional decaying rootlets and roots up to 25mm in diameter. Gravel is fine to coarse, angular to subrounded flint and occasional brick.	1.40 ()		
			MADE GROUND: Loose, grey brown, coarse gravel of subangular to subrounded flint.	2.20 ()		
2.50 2.50	PID J2	144.4 ppm	Medium dense, moist, orange brown stained dark grey and black, silty, fine SAND with a strong hydrocarbon odour.	2.60 ()	BSM	
				3		
				4		
Pit Stability: See General Remarks Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.60m bgl. Relative density based on visual assessment only. Pit sides collapsed in Made Ground. Slight perched groundwater seepage at 0.70m. Groundwater seepage with a strong hydrocarbon odour and sheen at at 2.40m. Trial pit targeted the location of a former above ground fuel tank.			
					All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 24/06/2026 Method Used: 360° Mechanical Excavator				Trial Pit No. <h2>TP323</h2>		
Sheet 1 of 1						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.80 0.80	PID J1	0.0 ppm	MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	0.70 ()	MADE GROUND	
			MADE GROUND: Firm, wet in parts, organic, dark brown to black, slightly gravelly, silty clay with rare decaying plant remains, many rootlets and roots up to 35mm in diameter, and occasional plastic fragments. Gravel is fine to coarse, subangular to subrounded flint.			
1.30 1.30	PID J2	0.0 ppm	Firm, grey brown mottled orange brown, silty, slightly gravelly CLAY. Gravel is fine to coarse, rounded to subangular flint. 1.40 m: Becoming gravelly.	1.20 ()	HEAD DEPOSITS	
1.90 1.90	PID J3	0.0 ppm	Medium dense, orange brown mottled light grey, silty, fine SAND.	1.80 ()	BOGNOR SAND MEMBER	
2.50 2.50	PID J4	0.0 ppm		3.00 ()		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 3.00m bgl. Relative density based on visual assessment only.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

<div>Client: Stonebond</div> <div>Project Title: Bartons Road, Havant</div> <div>Project No: BRD4469</div> <div>Logged By: R Davies</div> <div>Date Completed: 24/06/2026</div> <div>Method Used: 360° Mechanical Excavator</div>						Trial Pit No.		
TP324								
Sheet 1 of 1								
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend		
Depth	Type & No	Value						
			MADE GROUND: Compacted, light grey brown, sandy gravel and cobbles of fine to coarse, angular concrete, brick and occasional flint with occasional plastic and wire fragments, rare glass, metal and wood fragments.	1 1.30 () 1.70 ()	MADE GROUND			
			Medium dense, orange brown mottled light grey, silty, fine SAND.				BSM	
			1.60 m: Concrete obstruction, likely a pile cap.					
				2 3 4				
<div>Pit Stability: Generally stable throughout</div> <div>Groundwater: Not encountered</div>					Surface Elevation Level:			
<div>Plan of Trial Pit:</div>			<div>General Remarks:</div> <div>Trial pit terminated at 1.70m bgl.</div> <div>Trial pit undertaken in reported location of pile cap.</div> <div>Trial pit extended at 90 degrees in Face C at the location of a concrete obstruction to confirm it extended laterally.</div>			<div>All dimensions in metres</div> <div>Log Scale 1:25</div> <div></div> <div>Telephone: 01295 272244</div> <div>Email: info@brduk.com</div>		

Trial Pit Photographs

TP315



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP316



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP317



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP318



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP319



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP320



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP321



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP322



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP323



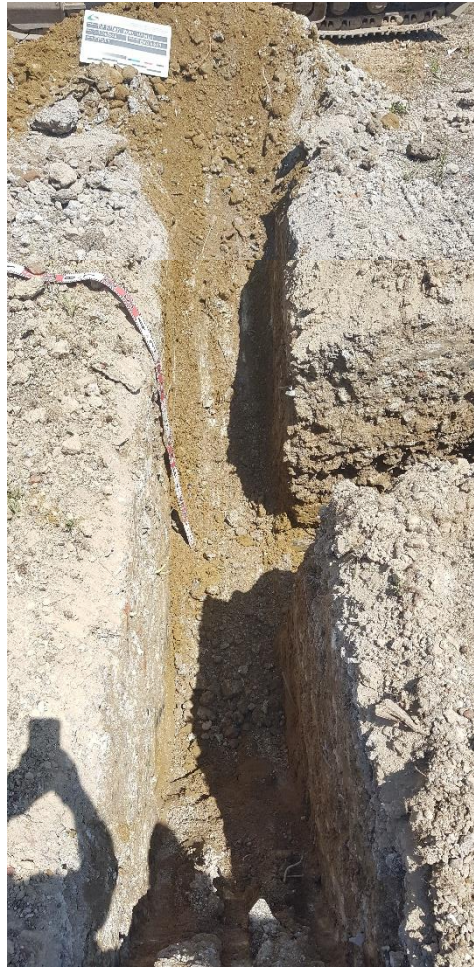
Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP324 (1)



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP324 (2)



Project Title: Bartons Road, Havant
Client: Stonebond Properties
BRD Reference: BRD4469-OP11-A
Date Issued: June 2026



01295 272244
info@brduk.com



Groundwater Monitoring Record

Project: Bartons Road, Havant
 Client: Stonebond
 Project No: BRD4469

Borehole name	Date	Monitored by (initials)	Borehole depth (m)	Qty free product detected (mm)	Groundwater level below ground surface (m)	Groundwater level below top of standpipe (m)	Amount purged (l)	Sample Volume (l)	Post purge groundwater level below top of standpipe (m)	Comments
WS201	23/06/2026	SW	2.31	0	1.91	1.86	1.50	Not taken	2.18	Orange brown, silty sediment load with no odours or sheen.
WS202	23/06/2026	RD	2.11	N/A	Dry	Dry	N/A	N/A	N/A	
WS203	23/06/2026	RD	2.34	0	2.08	1.97	0.25	Not taken	2.17	Dark brown, silty sediment load with slight organic odour.
WS204	23/06/2026	RD	3.67	0	3.11	2.97	1.00	Not taken	3.49	Orange brown, silty sediment load with no odours or sheen.
WS206	23/06/2026	RD	2.97	0	2.18	2.02	1.00	Not taken	2.68	Orange brown, silty sediment load with no odours or sheen.
WS207	23/06/2026	RD	2.00	0	1.81	1.63	0.15	Not taken	1.76	Orange brown, silty sediment load with no odours or sheen.
WS209	23/06/2026	RD	2.88	0	2.53	2.70	0.75	Not taken	3.04	Orange brown, slightly sandy with a slight hydrocarbon odour.
WS210	23/06/2026	RD	2.87	0	2.47	2.67	1.00	Not taken	3.07	Orange brown, silty sediment load with no odours or sheen.
WS211	23/06/2026	RD	2.94	0	2.70	2.94	0.15	Not taken	3.06	Orange brown, silty sediment load with no odours or sheen.
WS212	23/06/2026	RD	1.85	0	1.76	1.95	0.15	Not taken	2.04	Orange brown, silty sediment load with no odours or sheen.
DTS05	23/06/2026	RD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unable to locate monitoring well, destroyed during demolition
DTS06	23/06/2026	RD	1.89	0	Dry	Dry	N/A	N/A	N/A	
DTS07	23/06/2026	RD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unable to locate monitoring well, destroyed during demolition
DTS09	23/06/2026	RD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Unable to locate monitoring well, destroyed during demolition



Groundwater Monitoring Record

Project: Bartons Road, Havant
 Client: Stonebond
 Project No: BRD4469

Borehole name	Date	Monitored by (initials)	Borehole depth (m)	Qty free product detected (mm)	Groundwater level below ground surface (m)	Groundwater level below top of standpipe (m)	Amount purged (l)	Sample Volume (l)	Post purge groundwater level below top of standpipe (m)	Comments
WS201	30/06/2026	SW	2.32	n/a	2.01	1.90	0.10	0.10	1.93	Water was brown and silty.
WS202	30/06/2026	SW	2.10	n/a	Dry	Dry	n/a	n/a	n/a	
WS203	30/06/2026	SW	2.31	n/a	2.12	2.03	0.80	0.80	2.13	Water was brown and silty.
WS204	30/06/2026	SW	3.65	n/a	3.19	3.06	0.20	0.20	3.46	Water was brown and silty.
WS206	30/06/2026	SW	3.23	n/a	2.22	2.06	1.00	1.00	2.58	Water was brown and silty.
WS207	30/06/2026	SW	1.96	n/a	1.84	1.65	0.10	0.10	1.70	Water was brown and silty.
WS209	30/06/2026	SW	2.89	n/a	2.71	2.86	0.20	0.20	3.01	Water was brown and silty.
WS210	30/06/2026	SW	2.87	n/a	2.54	2.74	0.30	0.30	3.03	Water was brown and silty.
WS211	30/06/2026	SW	2.92	n/a	2.81	3.04	n/a	n/a	n/a	
WS212	30/06/2026	SW	1.84	n/a	1.83	2.03	n/a	n/a	n/a	
DTS06	30/06/2026	SW	1.88	n/a	Dry	Dry	n/a	n/a	n/a	

APPENDIX 3

Certificate of Analysis

Certificate Number 26-15654

Issued: 13-Jul-26

Client BRD Environmental Ltd
Hawthorne Villa
1 Old Parr Road
Banbury
Oxfordshire
OX16 5HT

Our Reference 26-15654

Client Reference ~ BRD4469

Order No ~ (not supplied)

Contract Title ~ Bartons Road, Havant

Description 11 Soil samples, 1 Leachate prepared by DETS sample.

Date Received 26-Jun-26

Date Started 26-Jun-26

Date Completed 13-Jul-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Reyhan Irfan
Operations Manager



Normec DETS Limited

Summary of Chemical Analysis

Matrix Descriptions

Our Ref 26-15654

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Sample ID	Depth	Lab No	Completed	Matrix Description
TP322	0.8	2708911	13/07/2026	Dark brown slightly gravelly, sandy CLAY including odd rootlets
TP322	2.5	2708912	13/07/2026	Brown SAND hydrocarbon odour

Summary of Chemical Analysis

Soil Samples

Our Ref 26-15654

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	2708906	2708909	2708910	2708911	2708912	2708914
Sample ID ~	TP316	TP319	TP320	TP322	TP322	TP323
Depth ~	2.20	2.60	2.70	0.80	2.50	2.50
Other ID ~						
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	24/06/2026	24/06/2026	24/06/2026	24/06/2026	24/06/2026	24/06/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Preparation									
Moisture Content	DETS 1004	0.1	%				17	17	
Metals									
Arsenic	DETS 2301#	0.2	mg/kg				6.4	4.5	
Cadmium	DETS 2301#	0.1	mg/kg				0.7	0.2	
Chromium	DETS 2301#	0.15	mg/kg				20	20	
Chromium, Hexavalent	DETS 2204*	1	mg/kg				< 1.0	< 1.0	
Copper	DETS 2301#	0.2	mg/kg				150	38	
Lead	DETS 2301#	0.3	mg/kg				44	8.4	
Mercury	DETS 2325#	0.05	mg/kg				< 0.05	< 0.05	
Nickel	DETS 2301#	1	mg/kg				13	8.9	
Selenium	DETS 2301#	0.5	mg/kg				< 0.5	< 0.5	
Zinc	DETS 2301#	1	mg/kg				180	60	
Inorganics									
pH	DETS 2008#		pH				7.5	8.1	
Total Organic Carbon	DETS 2084#	0.5	%				2.2	0.7	
Organic matter	DETS 2002#	0.1	%				2.6	1.9	
Sulphate Aqueous Extract as SO4 (2:1)	DETS 2076#	10	mg/l				310	68	
Petroleum Hydrocarbons									
Aliphatic C5-C6: HS_1D_AL	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETS 3072#	1.5	mg/kg	< 1.5	190	380	< 1.5	120	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETS 3072#	1.2	mg/kg	< 1.2	620	1100	< 1.2	500	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETS 3072#	1.5	mg/kg	< 1.5	1100	2100	< 1.5	880	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETS 3072#	3.4	mg/kg	< 3.4	310	700	< 3.4	260	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETS 3072*	10	mg/kg	< 10	2200	4200	< 10	1800	< 10
Aromatic C5-C7: HS_1D_AR	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETS 3072#	0.9	mg/kg	< 0.9	230	380	< 0.9	81	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETS 3072#	0.5	mg/kg	< 0.5	880	1300	< 0.5	520	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETS 3072#	0.6	mg/kg	< 0.6	1300	2100	< 0.6	970	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETS 3072#	1.4	mg/kg	< 1.4	400	730	< 1.4	320	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETS 3072*	10	mg/kg	< 10	2800	4500	< 10	1900	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETS 3072*	10	mg/kg	< 10	5000	8700	< 10	3600	< 10
Benzene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETS 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 26-15654

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	2708906	2708909	2708910	2708911	2708912	2708914
Sample ID ~	TP316	TP319	TP320	TP322	TP322	TP323
Depth ~	2.20	2.60	2.70	0.80	2.50	2.50
Other ID ~						
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	24/06/2026	24/06/2026	24/06/2026	24/06/2026	24/06/2026	24/06/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	7.1	12	< 0.10	3.3	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	11	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	0.89	75	110	< 0.10	41	< 0.10
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	12	17	< 0.10	6.2	< 0.10
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	8.6	17	< 0.10	3.3	< 0.10
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	0.69	1.5	< 0.10	< 0.10	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	3.3	2.3	< 0.10	1.0	< 0.10
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	0.83	1.1	< 0.10	0.51	< 0.10
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	110	180	< 1.6	55	< 1.6

Summary of Asbestos Analysis

Soil Samples

Our Ref 26-15654

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2708904	TP315 0.90	SOIL	NAD	none	Keith Wilson
2708905	TP316 0.90	SOIL	NAD	none	Keith Wilson
2708907	TP317 0.80	SOIL	NAD	none	Keith Wilson
2708908	TP318 0.60	SOIL	NAD	none	Keith Wilson
2708911	TP322 0.80	SOIL	NAD	none	Keith Wilson
2708913	TP323 0.80	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING

v20.26.05.07

Our Ref 26-15654

Client Ref BRD4469

Contract Title Bartons Road, Havant

Sample Id TP322 2.50

Sample Numbers 2708912 2708915

Date Analysed 13/07/2026

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	0.7	3	5	6
DETSC 2003# Loss On Ignition	%	2.1	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311* Mineral Oil (C10 - C40)	mg/kg	3200.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	55.0	100	n/a	n/a
DETSC 2008# pH	pH Units	8.1	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate			WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached mg/kg	Limit values for LS10 Leachate		
	10:1	LS10	Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.16	0.01	0.5	2	25
DETSC 2306 Barium as Ba	4.973	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.0300	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.5114	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.8585	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.0100	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.10	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5000	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.2608	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.1700	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.2500	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	1.88	0.02	4	50	200
DETSC 2055 Chloride as Cl	1900	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	170	1.7	10	150	500
DETSC 2055 Sulphate as SO4	6700	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	160000	1600	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	7400	74	500	800	1000

Additional Information	
DETSC 2008 pH	6.8
DETSC 2009 Conductivity uS/cm	229.0
* Temperature*	20.0

Mass of Sample Kg	0.109
Mass of dry Sample Kg	0.090

Stage 1	
Volume of Leachant L2	0.881
Volume of Eluate VE1	0.8

TBE - To Be Evaluated
 SNRHW - Stable Non-Reactive
 Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. Normec DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

Information in Support of the Analytical Results

Our Ref 26-15654
 Client Ref ~ BRD4469
 Contract ~ Bartons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2708904	TP315 0.90 SOIL	24/06/26	GJ 250ml, PT 1L		
2708905	TP316 0.90 SOIL	24/06/26	GJ 250ml, PT 1L		
2708906	TP316 2.20 SOIL	24/06/26	GJ 250ml, PT 1L		
2708907	TP317 0.80 SOIL	24/06/26	GJ 250ml, PT 1L		
2708908	TP318 0.60 SOIL	24/06/26	GJ 250ml, PT 1L		
2708909	TP319 2.60 SOIL	24/06/26	GJ 250ml, PT 1L		
2708910	TP320 2.70 SOIL	24/06/26	GJ 250ml, PT 1L		
2708911	TP322 0.80 SOIL	24/06/26	GJ 250ml, PT 1L		
2708912	TP322 2.50 SOIL	24/06/26	GJ 250ml, PT 1L		
2708913	TP323 0.80 SOIL	24/06/26	GJ 250ml, PT 1L		
2708914	TP323 2.50 SOIL	24/06/26	GJ 250ml, PT 1L		
2708915	TP322 2.50 LEACHATE	24/06/26	GJ 250ml, PT 1L		

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det

Aliphatic C5-C6

Acronym

HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
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Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report

Certificate of Analysis

Certificate Number 26-16365

Issued: 20-Jul-26

Client BRD Environmental Ltd
Hawthorne Villa
1 Old Parr Road
Banbury
Oxfordshire
OX16 5HT

Our Reference 26-16365

Client Reference ~ BRD4469

Order No ~ (not supplied)

Contract Title ~ Bartons Road, Havant

Description 7 Groundwater samples.

Date Received 06-Jul-26

Date Started 06-Jul-26

Date Completed 20-Jul-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "R. Irfan".

Reyhan Irfan
Operations Manager



2139

Sample Deviations present. See Deviation Table Section for details.

Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis

Water Samples

Our Ref 26-16365

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	2712536	2712537	2712538	2712539	2712540	2712541	2712542
Sample ID ~	WS201	WS203	WS204	WS206	WS207	WS209	WS210
Depth ~	2.04	2.24	3.58	2.73	1.88	2.86	2.83
Other ID ~							
Sample Type ~	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER
Sampling Date ~	30/06/2026	30/06/2026	30/06/2026	30/06/2026	30/06/2026	30/06/2026	30/06/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
Petroleum Hydrocarbons										
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	150	< 10.0	< 10.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 40.3	< 40.3	< 40.3	< 40.3	< 209.5	< 40.3	< 40.3
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 40.3	< 40.3	< 40.3	< 40.3	< 80.3	< 40.3	< 40.3
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 80.6	< 80.6	< 80.6	< 80.6	< 289.8	< 80.6	< 80.6
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PAHs										
Naphthalene	DETSC 3304	0.05	ug/l	< 5.00	< 0.50	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 1.00	< 0.10	< 0.01	< 0.01	0.03	0.02	0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 1.00	0.43	< 0.01	0.03	0.03	< 0.01	0.01
Fluorene	DETSC 3304	0.01	ug/l	< 1.00	< 0.10	< 0.01	< 0.01	0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	1.8	0.23	< 0.01	0.04	0.27	0.05	0.06
Anthracene	DETSC 3304	0.01	ug/l	< 1.00	< 0.10	< 0.01	0.01	0.13	0.01	0.02
Fluoranthene	DETSC 3304	0.01	ug/l	1.9	0.11	< 0.01	0.11	2.6	0.07	0.11
Pyrene	DETSC 3304	0.01	ug/l	2.4	< 0.10	< 0.01	0.11	2.3	0.10	0.11
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	1.1	< 0.10	< 0.01	0.06	1.1	0.04	0.10
Chrysene	DETSC 3304	0.01	ug/l	1.8	< 0.10	< 0.01	0.05	0.62	0.03	0.08
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	3.3	< 0.10	< 0.01	0.11	1.9	0.06	0.17
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	1.0	< 0.10	< 0.01	0.06	0.54	0.02	0.06
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	2.1	< 0.10	< 0.01	0.16	1.7	0.04	0.15
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	1.8	< 0.10	< 0.01	0.05	0.62	0.03	0.08
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 1.00	< 0.10	< 0.01	< 0.01	0.13	< 0.01	0.02
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	2.5	< 0.10	< 0.01	0.04	0.43	0.03	0.06
PAH Total	DETSC 3304	0.2	ug/l	< 20.00	< 2.00	< 0.20	0.84	12	0.51	1.0

Information in Support of the Analytical Results

Our Ref 26-16365
 Client Ref ~ BRD4469
 Contract ~ Bartons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2712536	WS201 2.04 GROUND WATER	30/06/26	G(other)	Aliphatics/Aromatics (5 days), PAH MS (4 days)	
2712537	WS203 2.24 GROUND WATER	30/06/26	G(other)	Aliphatics/Aromatics (5 days), PAH MS (4 days)	
2712538	WS204 3.58 GROUND WATER	30/06/26	G(other) x2	Aliphatics/Aromatics (5 days), PAH MS (4 days)	
2712539	WS206 2.73 GROUND WATER	30/06/26	GJ 250ml, G(other) x2	Aliphatics/Aromatics (5 days), PAH MS (4 days)	
2712540	WS207 1.88 GROUND WATER	30/06/26	G(other)	Aliphatics/Aromatics (5 days), PAH MS (4 days)	
2712541	WS209 2.86 GROUND WATER	30/06/26	G(other) x2	Aliphatics/Aromatics (5 days), PAH MS (4 days)	
2712542	WS210 2.83 GROUND WATER	30/06/26	G(other) x3	Aliphatics/Aromatics (5 days), PAH MS (4 days)	

Key: G-Glass J-Jar

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C5-C35	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C5-C35	EH_CU+HS_1D_AR
TPH Ali/Aro Total C5-C35	EH_CU+HS_1D_Total

Key:

~ Sample details are provided by the client and can affect the validity of the results

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-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report Ver 26.05.23