



LUSTRE

CONSULTING

2 VALE ROAD - NORTHFLEET

REMEDIATION STRATEGY





PROJECT RECORD	
PROJECT NAME	2 VALE ROAD - NORTHFLEET
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DRAWINGS

LUSTRE DRAWING: 3869-001, 3869-002, 3869-003

BROWNFIELD SOLUTIONS LTD DRAWING: C3467/03

PETROLEUM OFFICER RECORD

APPENDICES

APPENDIX A: STATUTORY GUIDANCE

APPENDIX B: MANAGING ASBESTOS CONTAMINATED SOILS

APPENDIX C: APPROACH TO SELECTING REMEDIAL TREATMENTS AND CONTRACTORS

APPENDIX D: BACKFILL SPECIFICATION

APPENDIX E: NOTES ON LIMITATIONS

REGISTRATION OF AMENDMENTS

Revision and Date	Amendment Details	Revision Author	Revision Reviewer
Rev A (06/01/22)	Update of the report to support a new planning application of equal footprint with an increased number of dwellings.	RH	CM
Rev B (24/02/22)	Update of the report following comments from the Environment Agency dated 22/02/2022	GH	CM





1.0 INTRODUCTION

- 1.1 Lustre Consulting Limited (Lustre) has been commissioned by BRT Properties Ltd (Client) to prepare a Remediation Strategy to facilitate the proposed redevelopment of a site located off Vale Road, in Northfleet, Gravesend, Kent, as shown in Figure 1.
- 1.2 This report is required to ensure the appropriate management of issues previously identified (discussed in Chapter 2) that are considered to present unacceptable risks to receptors in the final development context. Due to the historical site use, there is also a potential for unforeseen contamination to be encountered during the clearance and construction. Approval of this report by the LPA Gravesham Borough Council will be required prior to the start of any remedial works.

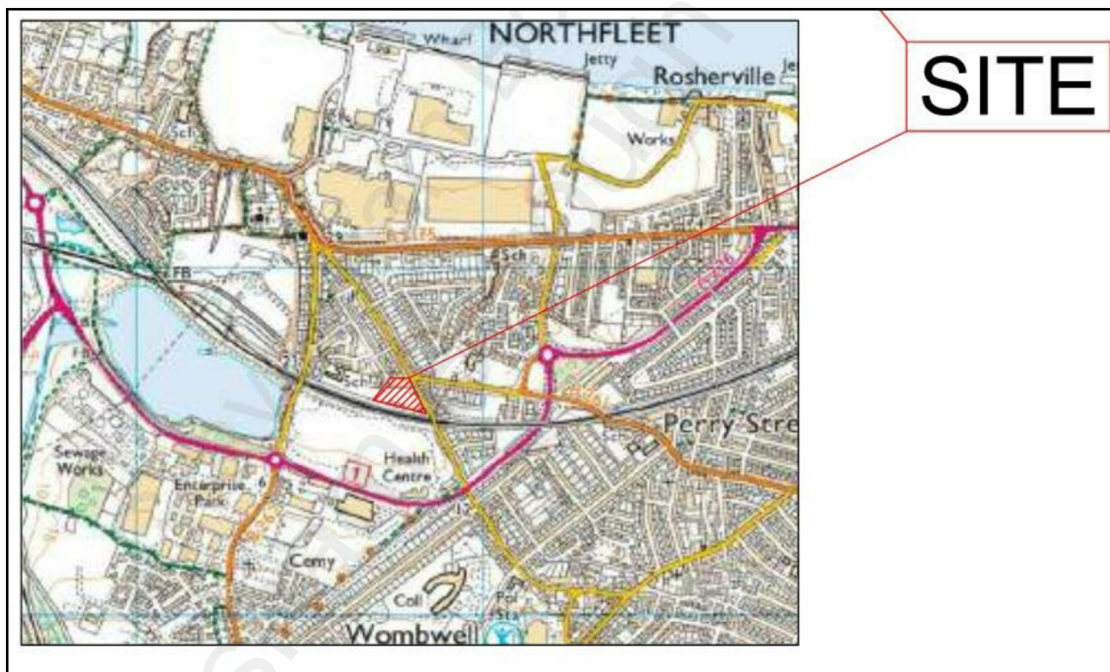


Figure 1: Extract from Desk Study Assessment Report undertaken by Brownfield Solutions Ltd showing wider site area owned by BRT Properties hashed in red

Proposed Development

- 1.3 It is understood that BRT Properties Ltd requires this Remediation Strategy to support a planning application for 'Erection of a three-storey building with rooms in the roof space to provide 14 x two bedroom self-contained flats with associated access, car parking and amenity space.'



1.4



Figure 2: Proposed site layout for subject site



Health and Safety, Environmental and Duty of Care Plan

Asbestos in Soils

- 1.5 Asbestos in soils has been identified on this site in the previous site investigation works.

ACUTE RISK FROM
ASBESTOS

Asbestos fibres / ACM have been identified within the Made Ground on site. The groundworks contractor should prepare a detailed method statement for the excavation, handling and storage of asbestos contaminated soil (ACS); this remediation strategy report does not provide a specific risk assessment /methodology for groundworkers who may be working with asbestos contaminated soils. Some general guidance is however provided in Chapter 4 and Appendix B on managing ACS.

Waste Soil Management

- 1.6 Validation works set out in this strategy, and therefore to be documented in the subsequent Verification Report, will relate to the off-site spoil disposal of arisings generated by the remedial tasks set out herein only and not for the general off-site soil disposal relating to general earthworks. The LPA or their planning consultee(s) should confirm in writing if the Client requires formal verification and provision of documentation/checks for any spoil requiring off-site disposal generated by non-remedial earthworks.
- 1.7 It is expected that the Client and their appointed contractors, as part of their Duty of Care under the (Environmental Protection Act (1990)) legislation, will record and retain suitable records and undertake appropriate due diligence checks relating to general off-site spoil disposal and importation of earthworks materials in accordance with the Environment Agency's Technical Guidance WM3.

Selection of Contractors

- 1.8 The Client is responsible for ensuring those commissioned to implement the various measures set out in this strategy are competent to do so and have the correct type and level of insurance suitable for the specific task. Where required by any regulations, laws or other such legislative controls, suitably licenced and approved specialists should be used (i.e. licenced waste carriers). Further information on the approach to selecting appropriate remedial measures and the expectations of contractors is detailed in Appendix C. It is recommended that, following approval of this report by the regulator and prior to the commencement of works, written





confirmation be sought by the Client from all relevant contractors to ensure their awareness and understanding of this document.

Report Structure

- 1.9 This report has been prepared in keeping with best practice and current planning guidance, such as the *National Planning Policy Framework (NPPF)*¹. A Remediation Strategy typically forms the third stage in an iterative risk-based approach to addressing land affected by contamination in the UK as set out in the Land contamination risk management guidance (LCRM, October 2020). Detail on the associated statutory guidance is provided within Appendix A. More information on Lustre's approach to remediation services can be found at the following link: www.lustreconsulting.com/service/remediation.
- 1.10 Chapter 2 presents a summary of environmental risk assessment upon which this strategy is based. Chapter 3 sets out the approach, staging and components of the remediation works including the validation plan, with and recommended health and safety and environmental control measures presented in Chapter 4.

Reliance and Limitations

- 1.11 This report has been prepared using published information, information obtained during any site visits and information provided by the Client which were made available at the time of writing only. No liability is extended to any information which has become available since this time.
- 1.12 No third-party liability or duty of care is extended without express permission in writing by Lustre. Third parties using information contained in this report do so at their own risk. For further details please refer to our terms and conditions.





2.0 ENVIRONMENTAL ASSESSMENT & STRATEGY OBJECTIVES

2.1 This Remediation Strategy has been prepared based on the following works/reports which should be read in conjunction with this strategy:

- Desk Study Assessment Report by Brownfield Solutions Ltd (reference BM/C3476/6655) dated February 2017;
- Geo-Environmental Assessment Report by Brownfield Solutions Ltd (reference PD/C3476/8382 Rev A) dated June 2019;
- Supplementary Phase 2 Site Investigation Report by Lustre Consulting (reference 3869 - 210913 – ML Rev A), dated January 2022; and
- Piling Risk Assessment Report by Lustre Consulting (reference 3869 – 211013 – CM Rev A) dated January 2022.

2.2 A Conceptual Site Model (CSM) was developed through the previous phases of investigation, which identified potential sources of contamination and a range of receptors. Based on the development proposals, these were investigated to determine the presence of any viable source-pathway-receptor pollution linkages. Any viable linkages were then subject to analysis and assessment. The findings of the various quantitative assessments are summarised below.

Geoenvironmental Assessment Table

Assessment	Key Findings	Risk
Generic quantitative risk assessment (human health)	Made Ground was identified to contain elevated concentrations of lead, PAHs, TPHs and asbestos above residential land use screening criteria. No gross contamination found around USTs and forecourt area.	Moderate/Low
Water pipeline suitability test	In accordance with UKWIR Guidance ² , PE / PVC pipes are not considered suitable for potable water supply.	Moderate/Low
Groundwater quality assessment	Groundwater quality not considered to pose a risk to human health or offsite receptors. However, a potential risk was identified to groundwater from the presence of leachable metals within infilled Made Ground (present to a maximum depth of 18.8m bgl).	Moderate/Low

² UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. 2010.





Assessment	Key Findings	Risk
Waste classification assessment (WM3)	Chemical assessment identified that a proportion of the Made Ground impacted by PAHs and lead would be classified as hazardous waste. Asbestos fibres were identified at concentrations below the hazardous waste threshold. Hazardous properties associated with PAHs were associated with shallow soils coinciding with asphalt whereas hazardous properties associated with lead were identified within deeper Made Ground. WAC testing was not undertaken.	Moderate
Ground gas assessment	A negligible ground gas regime was identified by Brownfield Solutions Ltd during their Phase 2 Site Investigation. Based on this, no gas protection measures were deemed necessary.	Low
Piling Risk Assessment	Due to the limited leaching potential of contamination within the Made Ground, the application of the proposed CFA piling methodology was considered adequate to prevent contaminant mobilisation and migration into the underlying Principal Aquifer. However, a dedicated groundwater monitoring programme will be required associated with any proposed piled foundation design and associated groundworks in order to demonstrate the protection of deeper groundwater during piling. This programme is detailed within this Remediation Strategy. Furthermore, to minimise the potential of grout / cement loss into the fast-flowing chalk aquifer, the use of permanent casing will be required and a retarder additive should not be added to the piling concrete / cement paste / grout to ensure that settling occurs quickly, minimising potential for migration of concrete/cement paste/grout to occur.	Moderate / Low

Strategy Objectives

- 2.3 The scope of this report is to consider remedial measures required to permit the safe development of the site and render it "suitable for use" under the planning system. Remedial measures are therefore only included which consider risk mitigation for future site users and other environmental receptors; this report does not specifically consider risks to construction workers or more generally from construction related activities.
- 2.4 The objectives of the proposed remediation works are to ensure:
- Validation of the removal of fuel transmission pipework and any associated contamination;





- Validation of the removal of contaminated soils from soft landscaped areas (clean cover system);
- Validation of any imported topsoil and subsoil for use in soft landscaping, to be tested against a backfill specification (clean cover system);
- Validation of the placement of suitable potable water pipes on site;
- Verification Groundwater monitoring to support the proposed piling works and associated groundworks;
- Overseeing the decommissioning of boreholes following the completion of all required verification groundwater monitoring;
- Review of drainage strategy to ensure that provisions to capture and discharge surface water within a closed drainage system that avoids infiltration through infilled Made Ground have been suitably addressed;
- Provide advice/undertake waste classification assessment(s) to inform the off-site disposal of any hazardous and non-hazardous soils depending on the suitability for reuse and waste classification (including pile arisings);
- Validation of the off-site spoil disposal of arisings generated by the remedial actions set out herein only; and
- Management of any 'unforeseen' potentially hazardous materials or areas of ground contamination.





3.0 REMEDIATION AND VERIFICATION STRATEGY

Introduction

- 3.1 This chapter provides detail on each remedial measure that is required to ensure the development is suitable for use. Information on how each remedial measure should be implemented, along with any relevant details on recommended materials, inspection requirements, the need for specialist contractors and third-party documentation. This chapter also sets out the proposed verification methodology including validation sampling and testing and completion reporting in line with the Environment Agency's *Evidence, Verification of Remediation of Land Contamination*³.
- 3.2 The remedial solutions set out in the following text have been selected based on their ability to meet all the objectives detailed within Chapter 2, with a consistent track record in similar conditions. In meeting these objectives, it is assumed that implementation of this Remediation Strategy is considered to be technically feasible and easily verified to ensure regulator acceptance, and that any residual contamination is deemed acceptable – i.e. that residual contamination is below publicly available guideline values, or that any barrier measures meet the necessary engineering requirements and is fit for purpose.
- 3.3 Typically, for simple and routine contaminated land issues or where prescribed remedial measures are available in the guidance, a shortlist of options or a single chosen remedial solution may have already been identified in the previous investigation. In addition, it is noted that other factors may have limited the initial options considered in the selection of remedial solutions such as the development programme, site constraints (such as available space), waste management options, financial, Client preference, construction type of buildings etc.
- 3.4 The approach to selecting appropriate remedial measures in accordance with the Land contamination risk management guidance (LCRM) and CIRIA Report C662⁴ is detailed within Appendix D.

³ Environment Agency, *Evidence, Verification of Remediation of Land Contamination*, SC030114/R1, 2010.

⁴ CIRIA *Selection of remedial treatments for contaminated land – A guide to good practice*, 2004





Overview of Remedial Tasks

3.5 The remedial measures that are required for this site are summarised below:

- Watching Brief and Review of Drainage Strategy
- Underground pipework removal associated with underground fuel storage tanks and Inspection of Soils
- Verification Groundwater Monitoring to support the proposed piling works and associated groundworks
- Borehole Decommissioning following the completion of all required verification groundwater monitoring
- Placement of Suitable Potable Water Pipes
- Clean Cover System (CCS)
- Management of Unforeseen Contamination

3.6 The remedial measures above have been selected based on our current understanding of the development layout, configuration and building construction methods. Where construction designs change, these details should be checked to ensure compliance with the overall objectives.

Notification to Environmental Consultant

3.7 Prior to implementing any remedial measure listed above, contact should be made to the Environmental Consultant to ensure the preparatory works are suitable.

General Verification

3.8 Following the completion of each remedial task, a photographic record will be collected by the Environmental Consultant and presented within the final Verification Report. A copy of all certificates / documents associated with the remedial tasks will be included within the Verification Report. Further detail on the structure of the Verification Report is provided within Chapter 4.

Sequence of Remediation

3.9 Based on the information available at the time of writing, the remedial measures have been set out in the order in which they are likely to be undertaken during development. However, the principal contractor's programme will ultimately determine when each element is carried out. As mentioned at the start of the Chapter, notes have been made where involvement or a site inspection will be required by the Environmental Consultant. Specific details on the need





for sampling or other third-party verification is also given for each measure/task, along with the requirement for the Client/ contractors to provide any verification documentation.

General Comments on Asbestos Contaminated Soils

- 3.10 As noted previously, asbestos fibres have been identified within the Made Ground on site. It is important that information on the presence of asbestos in soils is passed on to any groundworkers undertaking works on site, not just those involved in the implementation of remedial measures. The groundworks contractor should prepare a detailed method statement for the excavation, handling and storage of asbestos contaminated soil. The method statement and assessment must be undertaken by the groundworker who has an understanding of how the works will actually be carried out on this site. In short, the contractor's assessment and documentation will be required to ensure the safe excavation, storage and subsequent off-site disposal of asbestos contaminated soil. Due care is required when handling asbestos contaminated soils as part of the general earthworks, particularly noting that conditions may change as more of the ground is inspected during enabling and construction works. It is also noted that if asbestos contaminated soils are present on site and do not pose a risk to future users in the final development context, specific remedial measures may not be documented in this report. Lustre acknowledges that general earthworks may still encounter and process these contaminated soils without specific controls under this strategy and so further general guidance is provided in Appendix B to aid the contractor in this regard.

General comments on Waste Disposal and Imported Soils

- 3.11 The contractor should also provide a record of the volumes of soil removed from, and imported to, site. A copy of all the waste consignment notes and delivery receipts etc should also be provided by the site manager (or nominated person) to the Environmental Consultant as necessary throughout the works. Further details are provided in this section.

WATCHING BRIEF / UNFORESEEN CONTAMINATION

A non-specialist (full-time) watching brief will be maintained by an appropriate person on-site throughout the works who is experienced and capable of identifying signs of potential contamination, including discolouration/staining, unfamiliar odours and visual evidence of potentially contaminated/ hazardous materials. This person would normally be a site manager and/ or nominated sub-contractor carrying out groundworks, demolition and enabling works when unforeseen contamination may be encountered.





There is always a potential for unforeseen contamination to be encountered during any redevelopment works, particularly when groundworks are being carried out and the site cleared of existing structures and hardstanding. This will be particularly important when working within the vicinity of areas that were not investigated, or the method of investigation employed was limited.

Should any unforeseen contamination (material or potentially contaminated soils and/or water such as stained, oily or malodours materials, or possible asbestos etc.) arise during the development works, the appointed person and/or site manager must contact an Environmental Consultant (specialist watching brief see below) to arrange a site visit for inspection, assessment and sampling (if required). The Environmental Consultant should be contacted immediately to:

- Visually inspect the suspected contamination/ materials;
- Estimate the volume and extent;
- Note any corresponding odours and/or staining;
- Take samples for testing to confirm type/nature of materials/ contamination present; and
- Undertake a suitable risk assessment and addendum to the Remediation Strategy.

It may be recommended that the contamination is excavated and stockpiled in order to allow further assessment and classification whilst site works continue with minimal disruption to the construction programme. The nature and means of managing the unforeseen contamination will be recorded accordingly and included in the Verification Report. Following assessment of any unforeseen materials the client is to notify the LPA.

A **specialist** watching brief will be undertaken by the Environmental Consultant at key stages during the works, such as during key stages of the works as set out in the remainder of this Chapter. It is envisaged that the specialist watching brief will entail several site visits to address the above, and also to attend site at the request of the site manager if unforeseen contamination is encountered.

In addition, the contractor will be responsible for the management of contaminated surface water run-off and the protection of into nearby roads and drains.





SURFACE WATER DRAINAGE

There is a potential risk of leaching from lead, nickel and zinc within the infilled Made Ground into groundwater beneath the site where infiltration pathway remains open i.e., beneath areas of proposed soft landscaping, due to soakaways.

A closed system of surface water drainage will therefore be required as no infiltration of surface water will be allowed through the infilled ground as part of the proposed development.

A drainage strategy should be prepared by a suitably qualified specialist prior to the start of construction works to design the closed drainage system and identify appropriate method of surface water disposal. This will need to include provision of a capped drainage system to be implemented at the base of the clean cover system (detailed in later section).

Lustre should be provided a copy of the drainage strategy to review prior to the start of the remediation works. The groundworks contractor will be responsible for implementing the drainage strategy. Documentation should be provided to evidence suitable completion of key stages of works including capping of soft landscaped areas for inclusion in the verification report.

It is considered likely that the requirement to prevent infiltration will also be conditioned following grant of planning permission.





PLACEMENT OF SUITABLE POTABLE WATER PIPES

Soil data failed the tests relating to PE / PVC pipes.

Remedial Measure
In accordance with UKWIR Guidance ⁵ , installation of Barrier pipe will be required to prevent contamination of polymeric services.
Environmental Consultant Supervision Required?
✗ NO
Recommended Product / Material & Installation Guidelines
Barrier Pipe - The Client should notify the water company of their proposed selection of pipe material and details of installation. The specification and construction method should be agreed with the water authority prior to installation. Normally, any potable water pipes will need to be placed at least 750mm below ground level to protect against frost susceptibility and any trafficked loads in line with the statutory water company's guidelines.
Contractor/ Client Documentation Required
Material specification of the product used on site along with photographs of the placement of the water pipe indicating depth and construction/ placement method for inclusion into the Verification Report.
Validation Measures
Provided that the water pipes are extending through a known source of contamination that requires preventative measures to stop the creation of a preferential pathway, then inspection by the Environmental Consultant is not required.

⁵ UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. 2010.





GROUNDWATER VERIFICATION MONITORING

The Piling Risk Assessment undertaken by Lustre Consulting demonstrated that due to the limited leaching potential of contamination within the Made Ground, the application of the proposed CFA piling methodology would be adequate to prevent contaminant mobilisation and migration into the underlying Principal Aquifer in order to support the proposed development. However, a dedicated groundwater monitoring programme will be required associated with any proposed piled foundation design and associated groundworks in order to demonstrate the protection of deeper groundwater during piling, details of which are provided below.

Furthermore, to minimise the potential of grout / cement loss into the fast-flowing chalk aquifer, the use of permanent casing will be required and a retarder additive should not be added to the piling concrete / cement paste / grout to ensure that settling occurs quickly, minimising potential for migration of concrete/cement paste/grout to occur.

Remedial Measure

A dedicated groundwater monitoring programme will be required associated with any proposed piled foundation design. To demonstrate the protection of deeper groundwater during piling, an additional deep groundwater borehole will be required, located in the south-eastern part of the site (BH202); at present only a single groundwater monitoring borehole is available (BH201). Clean drilling techniques must be used in the advancement of this borehole in accordance with the British Drilling Associations clean drilling guidelines. This borehole must be included in the pre-piling monitoring rounds.

The location of the new groundwater monitoring borehole will take into account relevant site constraints relating to access and the construction phase works. The proposed location is shown on drawing 3689-003; this would position the well upgradient of the new building footprint in the south-eastern corner of the site. BH202 will be drilled to sufficient depth to install a monitoring well which responds to groundwater within the Chalk Aquifer only; likely completion depth based BH201 is between 25 and 30m bgl.

These wells must be maintained during these works and should not be destroyed or damaged, otherwise replacement wells will need to be installed.

The Piling Phase Groundwater Monitoring will be split into three phases – pre-piling, during piling and post-piling. The pre-piling monitoring will comprise one round of monitoring, with the monitoring undertaken during piling on a weekly basis for the duration of piling. Post-piling groundwater monitoring will comprise a minimum of two rounds of monitoring undertaken on a fortnightly basis until the completion of all foundation installation and associated groundworks.

Boreholes required for piling phase groundwater monitoring programme are as follows:

- BH201 (existing down gradient well, north-west of the proposed building)
- BH202 (new upgradient well)





During each Piling Phase Monitoring Round the following field observations, field parameters and laboratory analysis should be recorded / undertaken:

- Field observations: visual / olfactory evidence of contamination and visual observations of turbidity
- Field parameters: pH, temperature, conductivity, dissolved oxygen and redox potential
- Laboratory analysis: pH, Total Dissolved Solids (TDS), CLEA Metals, TPH CWG, speciated PAH

In addition, duplicate samples will be collected on each monitoring occasion as part of the contingency plan outlined below.

All nearby abstractors will be notified prior to the commencement of any groundworks or piling works and will be warned if any surveillance monitoring identifies a deterioration in groundwater quality.

Contingency Plan

In the event that the above monitoring programme identifies a significant deterioration in groundwater quality within the chalk aquifer, contingency measures will need implementing. This will include stopping of all intrusive works pending further risk assessment and identification of appropriate remediation and/or mitigation measures. First stage of the risk assessment will involve analysis of a duplicate sample(s) to confirm the initial result. If the original result is confirmed further assessment will be undertaken to determine what additional measures are required which will include consideration of the following potential options:

- Provision of additional monitoring and/or boreholes to fully characterise the issue
- Inclusion of more stringent piling mitigation measures

The EA will then to be contacted for their approval of the updated risk assessment and proposed mitigation measures. The frequency of ongoing groundwater monitoring will also be confirmed as part of the updated risk assessment.

If monitoring positions are destroyed or rendered inaccessible as part of the works, these should be replaced once the construction phase has been completed, with a similar well design and arrangement.

Furthermore, should any unexpected material be encountered during piling works, then additional investigation should be undertaken in order to fully understand the risks pose by this material. Such investigation could include the installation of additional monitoring wells and surveillance

Environmental Consultant Supervision Required?



YES





Validation Measures

As detailed above, groundwater sampling will be undertaken pre piling, during piling and post piling works. An initial comparative assessment will be undertaken comparing the previous data with that gathered each round, followed by an updated qualitative risk assessment. If the monitoring results indicate a reasonable deterioration in groundwater quality, then all intrusive works will be stopped and the contingency plans provided above put into action to ensure that appropriate remediation and/or mitigation measures are undertaken.





BOREHOLE DECOMMISSIONING

Boreholes (BH1, BH2, WS1, WS2, WS3, WS4 and WS5) installed by Brownfield Solutions Ltd during previous investigations can act as preferential pathways to deeper groundwater. Sensitive groundwater in the vicinity of the site means that the boreholes need formal decommissioning as part of the redevelopment works. These are shown on Brownfield Solutions Ltd drawing reference C3467/03, dated 18/02/19.

Boreholes excluded from decommissioning: BH201 installed by Lustre Consulting Ltd as well as any future boreholes installed to support construction phase works. These monitoring wells will need to be maintained and protected throughout development works.

Remedial Measure
Boreholes decommissioned (BH1, BH2, WS1, WS2, WS3, WS4 and WS5)
Environmental Consultant Supervision Required?
✓ YES
Recommended Material / Product
Bentonite Liquid Grout
Scope / Instructions
Borehole covers, caps and gas taps should be removed. Surrounding hardstanding should be removed and a pit to be excavated around the pipe to around 1m bgl. The pipe should then be cut at this depth. Considering the monitoring well design / arrangement and the geological and hydrogeological conditions, the residual filter pack may present a contamination short-circuit pathway to deeper groundwater. As such the remaining standpipe should be backfilled with a bentonite slurry / liquid grout to ensure the surrounding filter pack is also suitably decommissioned. Each borehole will be completed with a small concrete cap up to 0.5m below the finished levels to ensure minimal disturbance during the subsequent enabling works. Any wells to be retained during the works must be protected from damage.
Contractor/ Client Documentation Required
No documentation required. However enough notification must be given to undertake this work before site clearance, demolition and excavation works.
Validation Measures
Full-time attendance by the Environmental Consultant will be required for borehole decommissioning. Supervision will be required to ensure no pollution short-circuit pathways are created by the works and to verify appropriate decommissioning.





REMOVAL OF FUEL TRANSMISSION PIPEWORK

The previous investigation identified presence of fuel transmission pipework beneath the subject site. These are connected to two USTs located outside the subject site boundary as shown on Drawing 3869-001.

Features located within the subject site boundary should be removed in accordance with the Environment Agency's *PPG27 Installation, Decommissioning and Removal of Underground Storage Tanks*⁶ and the Association for Petroleum and Explosives Administration's *Guidance for the design, construction, modification and maintenance of Petrol Filling Stations*⁷. The Client may need to inform the Local Petroleum Enforcement Authority before work commences.

Remedial Measure
Appropriate removal and management of all fuel transmission pipework and any contaminated surrounding soils.
Environmental Consultant Supervision Required?
✓ YES
Scope / Instructions
Prior to undertaking any removal works, measures such as temporary bunding of proposed storage areas and sealing of any nearby surface water drains should be implemented to prevent any uncontrolled releases which may impact any nearby soils or drainage networks. The contractor should carry out checks to ensure that the tanks and any associated fuel lines are free from liquid fuels. If not, an appropriate specialist contractor should be commissioned to remove/pump all residual fuel or contaminated water from the tank and associated infrastructure. The liquid may need to be chemically tested prior to collection. Pipework will need to be cut at the site boundary and remaining pipework capped to prevent any leaks / spills. Once removed pipework should be placed on bunded hardstanding to await removal and disposal. Ideally the pipework should be transported from site on the same day they are excavated to minimise the risk of residual fuels being accidentally released. Any spillage will need to be contained and cleaned immediately.
Contractor/ Client Documentation Required
A copy of all waste consignment notes and waste haulier and recipient documentation and licenses. Consignment notes etc. should be clearly marked as to what part of the site/ remedial task the arisings relate to.

⁶ Environment Agency, Installation, decommissioning & removal of underground storage tanks: PPG27 (2012).

⁷ Guidance for the design, construction, modification & maintenance of Petrol Filling Stations, Association for Petroleum & Explosives Administration & Institute of Petroleum, 1999.





Validation Measures

Full-time attendance by the Environmental Consultant will be required. The surrounding ground conditions will be visually inspected by the Environmental Consultant to assess the nature of the soils and the presence of any residual contamination. A Photo-ionisation Detector (PID) will also be used to monitor levels of volatile organic compounds (VOCs) in the air and aid with the soil inspection. Should the surrounding soils appear to be impacted by any residual contamination (likely to be indicated by oily staining, strong odours and elevated PID readings), the soils will be vertically and laterally removed using an excavator until the condition of the ground has improved from visual and olfactory inspection and tested with a PID.

Validation samples collected from the base and the sides of any excavations with testing for TPH to verify the removal of all contaminated soils. Following receipt of the laboratory test results, the consultant will inform the contractor that backfilling can be undertaken with clean fill / soils.

Once it has been verified that all contaminated soils associated with the above excavations have been removed, these areas can be backfilled with clean imported materials. In the interim, the contractor should ensure any excavations are made safe prior to backfilling until the laboratory analysis results have been received and checked. If samples fail the validation, the excavation will be extended until testing indicates the absence of unacceptable contamination.





CLEAN COVER SYSTEM

A clean cover system (CCS) is required to mitigate the risks from shallow soil contamination to end users in areas of soft landscaping. The CCS will not only provide clean, safe soils for end users but also prevent exposure to any residual contamination at depth. The CCS mitigates the risk by breaking the exposure pathways between any contaminated Made Ground and future end users through the construction of a CCS.

Based on the pr

oposed development layout and the findings of the site investigation, the following thickness of clean soil are required:

- CCS-450 should be implemented in soft landscaped borders, communal garden areas and public open space.

Any soils imported to site to create the CCS must be proved to be suitable for use and undergo a verification testing at various stages of purchase, importation and placement. See the Flow Chart for the step-by-step process on importing soils.

It is noted that the above soil thickness would need to be provided in addition to the excavation thickness required to provide closed drainage system noted earlier in this report.

Remedial Measure
Implementation of a CCS within proposed soft landscaped areas. The anticipated configuration and extent of the CCS is shown on Drawing 3869-002.
Environmental Consultant Supervision Required?
✓ YES
Recommended Material / Product
Soils and materials used in the CCS (imported soils and imported aggregate) will require various stages of testing and validation. Material imported for the formation of the CCS shall be obtained from a validated source. All newly imported soils (not reused) should meet the minimum standards in BS3382:2015 ⁸ . Imported soils must meet the backfill specification in Appendix D for chemical suitability. Further information is provided on the Flow Chart.
Scope / Instructions

⁸ BS 3882:2015 Specification for Topsoil. 2015





STEP 1 – Reduction of site levels: Any area where the CCS is to be placed should be excavated to reduce the site level by the appropriate amounts. This will need to be sufficient to incorporate the closed drainage system and the appropriate thickness of soils for the usage required i.e. 450mm for CCS-450 based on the final formation level.

STEP 2 – Inspection of Reduced Dug Areas: Inspections will be required by the Environmental Consultant to ensure that the correct depths have been achieved for the CCS areas and also to ensure that no significant contaminated soils are left in-situ. Should grossly contaminated soils be encountered, further assessment may be required and potentially source removal or additional engineered barriers added to the CCS.

STEP 3 – Approval of Soils for CCS: See Flow Chart.

STEP 4 – Placement of CCS materials/soils: Placement of the following:

- Closed drainage system, potentially including impermeable barrier, pipework and granular bedding layer (as specified in drainage strategy)
- a high visibility geotextile marker layer
- approved subsoil material - a minimum of 300mm, overlain by
- a minimum of 150mm approved topsoil.

A high visibility marker layer is required at the base of the CCS to warn future site users of underlying contamination. This will be underlain by compacted coarse granular material which will provide a drainage layer as part of the closed drainage system as well as act as an anti-dig barrier.

Contractor/ Client Documentation Required

The Flow Chart provides details on the documents that should be provided to the Environmental Consultant regarding imported materials. For ease of reference, these are provided below:

- Provenance information and laboratory testing of soil source dated within last three month (from date of import)
- Waste tickets associated with excavation
- Delivery tickets for imported materials

Validation Measures

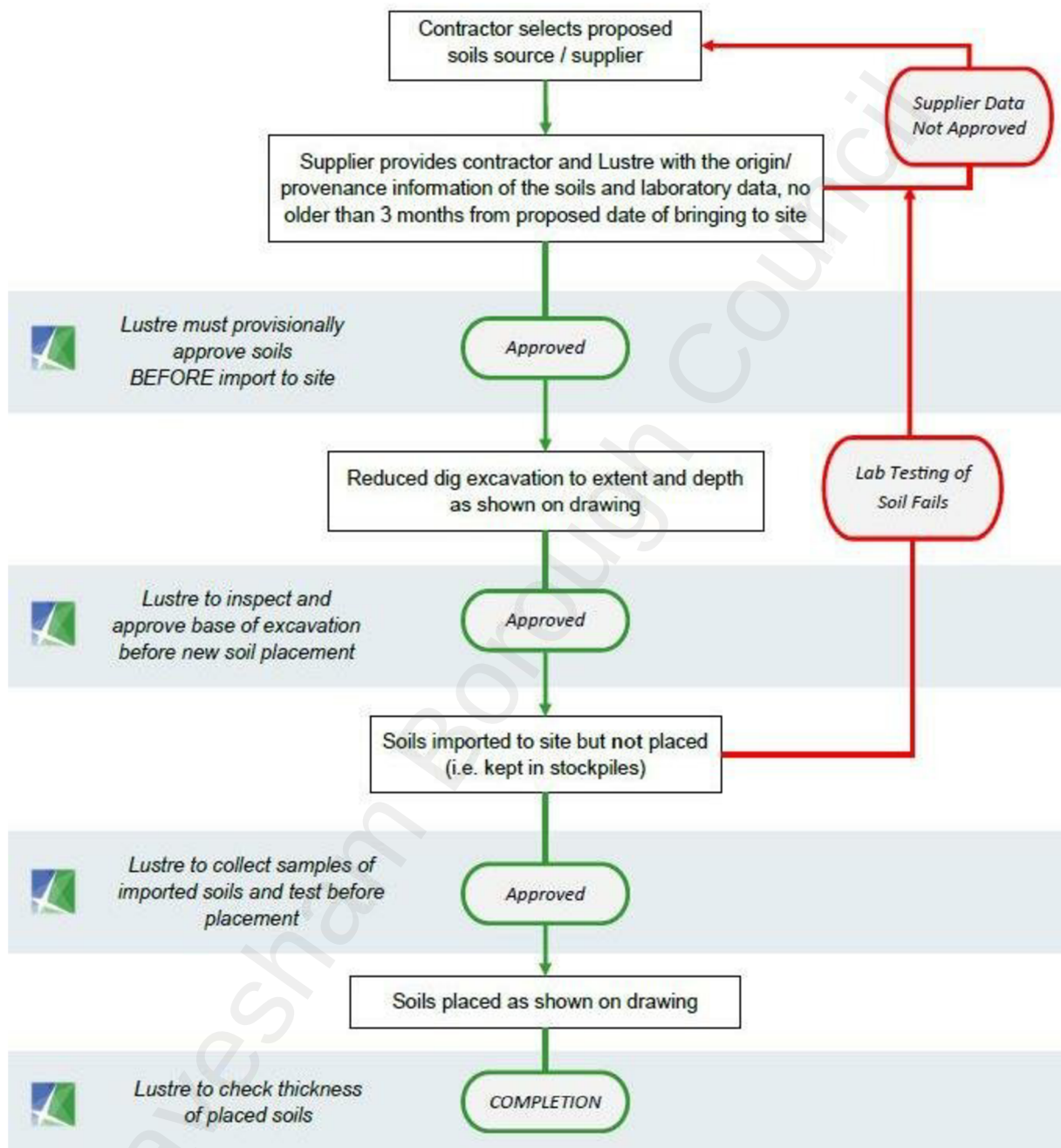
Part-time attendance by the Environmental Consultant will be required. Validation of the following elements as per the Flow Chart:

- Approve the soil source
- Approve laboratory data and provenance information from soil source against Backfill Specification (Appendix F)
- Inspection of reduced dig / excavation
- Chemical testing of imported soils (prior to placement)
- Thickness inspections of placed soils





CLEAN COVER SYSTEM FLOW CHART



NOTE 1:

Sample frequency of 1 sample per 150m³ imported soils (minimum 3 samples per source (type)).
Chemical testing on samples and compared against Backfill Specification (Appendix F).





WASTE MANAGEMENT AND DISPOSAL

Remedial Measure

The Client and their appointed contractors, as part of their Duty of Care under the (Environmental Protection Act (1990) legislation, must record and retain suitable records and undertake appropriate due diligence checks relating to general off-site spoil disposal and importation of earthworks materials in accordance with the Environment Agency's Technical Guidance WM3. Waste validation works associated with this "remedial measure", and therefore to be documented in the subsequent Verification Report, will relate to the off-site spoil disposal of arisings generated by the remedial tasks set out herein only and not for the general off-site soil disposal relating to general earthworks.

Chemical assessment identified that a proportion of the Made Ground impacted by PAHs and lead would be classified as **hazardous waste**. Asbestos fibres were also identified at concentrations below the hazardous waste threshold. Hazardous properties associated with PAHs were associated with shallow soils coinciding with asphalt whereas hazardous properties associated with lead were identified within deeper Made Ground. WAC testing was not undertaken.

As significant heterogeneity was encountered within Made Ground with respect to waste classification it is recommended that a targeted assessment is undertaken of soils at the time of excavation and prior to disposal. This would include both waste classification (i.e. hazardous or non-hazardous) and WAC (as appropriate), in line with the Environment Agency's Technical Guidance WM3. It should be noted that if the total quantity of hazardous waste material produced or taken off-site is 500kg or greater in any 12 month period then the developer will need to register with the Environment Agency as a Hazardous Waste Producer.

In the absence of further waste classification testing, all Made Ground would need to be classified as hazardous waste and undergo WAC testing to determine suitability for disposal at either a stable non-reactive hazardous waste in a non-hazardous landfill, hazardous landfill or requirement for pre-treatment prior to disposal.

Environmental Consultant Supervision Required?

✗ NO

Lustre's involvement in waste disposal includes for the classification of the waste materials (where allowed for in scope of works) and collation of contractor's waste records, with checks against haulers and waste recipients to ensure these parties are appropriately licensed to manage waste soils (based on classification).

Scope / Instructions

Any excavated arisings associated with development works should be carefully managed to prevent mixing of different soil/waste types. Stockpiles must be appropriately managed to prevent the generation of surface run-off and generation of dusts.

Measures should be implemented on site to segregate waste streams with natural material stockpiled separately from any Made Ground. Different materials/soils should be classified





separately. **Any oversized and non-soil materials (such as ACMs, plastics, metals etc within any Made Ground), will require segregation from the classified soils, and separate and appropriate disposal.** Remember for soils to be classified as 'inert' it must be both non-hazardous and be found to be 'inert' through WAC testing. An 'inert' soil cannot contain non-soil materials that could decompose or be chemically or biologically reactive. Any contaminated or potentially contaminated soils not specifically addressed in this Remedial Strategy should be separately stockpiled prior to further analysis.

If asbestos contaminated soils are present on site, specific measures need to be put in place to safely manage these arisings. This is documented in any remedial measures for managing ACS (if applicable), as well as in further guidance in Appendix B.

Pipework associated with the underground storage tank(s) must be disposed of in accordance with relevant regulations and all wastes disposed offsite in accordance with the Duty of Care. Such works should therefore be carried out by an appropriately licensed waste and haulage operator.

Contractor/ Client Responsibilities / Documentation Required

The Client and contractors involved in the excavation, segregation and off-site disposal are responsible for the correct management and pre-treatment of waste spoil generated by all earthworks. These parties have a duty of care which requires suitable management and disposal of wastes. Given that Lustre does not have any site presence during the earthworks phase, full responsibility for waste management rests with the principal contractor.

The Client must retain a copy of *all* waste consignment notes and waste hauler and recipient documentation and licenses. Documentation should be fully completed and clearly show the appropriate licenses and SIC number if applicable.

Waste documentation relating to the specific remedial measures set out in this strategy need to be immediately forwarded electronically to the Environmental Consultant.





4.0 VERIFICATION REPORTING

4.1 A Verification Report will be completed to provide evidence that the work has been undertaken in accordance with this Strategy and to the satisfaction of any planning requirements. The Verification Report will document the following items:

- a. A detailed description of the works completed and a photographic record.
- b. Groundwater Monitoring Verification.
- c. A description of imported soil including chemical analysis results from the supplier(s) and validation samples and comparison against the backfill specification.
- d. Verification of the placement and thickness of the clean cover system.
- e. A copy of the potable water pipe material used on site and a photographic record of installation.
- f. A description of the fuel transmission pipework removed and disposed off-site, including destination details along with soil validation.
- g. Verification of borehole decommissioning.
- h. Documentation related to the implementation of closed surface water drainage system and surface water disposal method
- i. Copies of all relevant plans, drawings, design specifications and site visit records.
- j. A description of the soils removed off-site and generated by the remedial works only for recycling /disposal including approximate volumes and destination details.
- k. Copies of all relevant waste and soil management paperwork for the soils removed off-site (soils generated by the remedial works only), including conveyance notes, waste consignment notes and delivery tickets where required.





5.0 HEALTH & SAFETY, ENVIRONMENTAL & DUTY OF CARE PLAN

Introduction

- 5.1 This chapter sets out the Health and Safety (H&S) and environmental duty of care associated with the proposed remediation work, including information and good practice guidance related to these potential environmental hazards. This information is for the benefit and action of the responsible contractor undertaking the works and is intended as a guide only.

A General Note on Asbestos Containing Soil (ACS) Management to Facilitate General Construction (outside any specific remedial area(s))

- 5.2 Where asbestos has been found on site within soils, a specific remedial solution may only be required in parts of the site where a pollutant linkage is viable to future users (i.e. where a development-related risk has been identified that requires remediation under planning to render the site "suitable for use"). Conversely, asbestos within soils could be safely retained by design of the development below areas of proposed hardstanding and therefore no specific remedial measures are required in these areas. However, Lustre acknowledges that construction activities will require such asbestos contaminated soils to be worked and managed on site to facilitate the construction of roads, buildings, service trenches etc and that these activities will not be confined to areas subject to specific remedial measures. As such, ACS excavation, handling and removal will likely be required across the entire site and adequate protection and management of this material is required throughout the development.
- 5.3 The management of ACS is likely to be deemed under CAR 2012 as Category B Non-Licensed works, however this will require constant review by the groundwork's contractor. All site personnel should be aware of the risks of working with asbestos contaminated soils and be appropriately.
- 5.4 A record of where known ACS are left undisturbed (if applicable) should be made and kept with the Construction Health and Safety file/ deeds of the property. Given the risk associated with asbestos in soils it is important that any work undertaken in ACS is carried out by competent contractors under Duty of Care with the appropriate insurance, asbestos awareness training and experience in dealing with asbestos in soils / Category B Non-Licensed works /CAR 2012. Reference can also be made to CIRIA C733 guidance. Further information on handling ACS during construction works is provided in Appendix B.





Environmental Duty of Care

- 5.5 All waste soil must be taken away to a licensed recycling and/or waste disposal facility by a suitably licensed haulier. Section 34 of the Environmental Protection Act (Duty of Care) should be maintained at all times, with a record of all loads kept (including conveyance and consignment notes) for inclusion into the Verification Report. All disposal facilities should be made fully aware of the nature of any waste soil including any evidence of asbestos containing materials (ACMs) by the contractor.
- 5.6 Provisions should be made by the contractor to contain any run-off generated from stockpiled soils, with prevention measures in place to protect surface water drains and other water courses and also to prevent cross-contamination. This should be undertaken in accordance with the recommended methods in CIRIA's technical guidance Control of Water Pollution from Linear Construction Projects⁹.
- 5.1 Any remediation must be carried out in a strictly controlled manner to ensure that contaminants are not exposed and releases allowed to air, land or controlled waters, which could cause pollution, harm or nuisance. Clearing areas must be done in a manner not likely to expose contaminants to flushing by incipient rainfall or surface water run-off from the site. Provision should be made by the contractor to control any surface water run-off and manage the movement of material onsite in order to protect control waters within the vicinity of the site. This should be undertaken in accordance with the recommended methods in CIRIA's technical guidance Control of Water Pollution from Linear Construction Projects¹⁰.

Construction (Design & Management) Regulations 2015

- 5.2 The CDM Regulations 2015¹¹ place responsibilities on all parties to a construction contract (including clients, designers, contractors and sub- contractors). Within this context the term "construction works" encompasses a broad range of activities including remediation. Under

⁹ Construction Industry Research and Information Association (CIRIA). Control of Water Pollution from Linear Construction Projects. Technical Guidance, 2006

¹⁰ Construction Industry Research and Information Association (CIRIA). Control of Water Pollution from Linear Construction Projects. Technical Guidance, 2006

¹¹ The Construction (Design and Management) Regulations 2015.





the regulations, whilst the client is not required to manage or supervise the works, it is recognised that the client exerts a significant influence over the way a project is carried out.

- 5.3 With respect to this remediation work, the CDM Regulations 2015 are applicable and since there will probably be more than one contractor carrying-out works then it is assumed that a Principal Designer and/or a Principal Contractor under the definition in the regulations has already been appointed. Therefore, it is presumed that Lustre Consulting Limited will be specialist sub-consultant/ sub-contractor under the CDM Regulations 2015. To ensure compliance, the contact details of the Principal Contractor and Principal Designer should be provided and a copy of this Remediation Strategy should be incorporated into the project Construction Phase Plan and Health and Safety File prepared by the Principal Contractor.

Health & Safety at Work

- 5.4 There is an obligation under the Health & Safety at Work Act 1974 and all other relevant health and safety legislation to safeguard employees and any persons which may be affected by their works. The contractor and any sub-contractors carrying out the elements of work related to the remediation of the site also have duties and responsibilities under any other legislation applicable to the work that they will be carrying out. The main contractor will need to be aware of, and comply with, such duties and responsibilities. It is beholden on all personnel themselves to work at all times in a safe manner and in accordance with the instructions given to them by the individuals with designated responsibility for health and safety/environmental matters.
- 5.5 The Health and Safety/Environmental hazards and proposed mitigation / control measures set out in this chapter should be incorporated into any contractor method statements as appropriate and supplied to all relevant parties before remediation work commences.
- 5.6 All site staff should have the right to stop any remedial activities, the movement of plant or equipment etc if it is considered that there is a risk to the health and safety of personnel or damage to the environment.

Emergencies

- 5.7 Site personnel should follow the health and safety procedures and site rules as set out by the Client / Principal Contractor. In any event, accidents are to be reported immediately to the site manager. At no time should personnel put themselves at risk.





Environmental Hazard Summary

- 5.8 The following table sets out general environmental hazards associated with remedial works. The responsible contractor should make suitable provisions to mitigate the risks from the identified hazards. Suggested control measures are provided.

Hazard	Recommended Mitigation / Control Measures
Asbestos contaminated soils (where ACS / ACM has been identified during previous site investigation).	Refer to above text and Appendix B.
Direct contact with potentially contaminated materials during remediation works	Contact with waste and potentially contaminated soils should be prevented where possible. Disposable gloves and/or rigger gloves should be worn where there is a risk of direct contact. Consideration of the nature and toxicity of the contamination may warrant clearly defined 'clean and dirty' working areas and a dedicated decontamination unit.
Accidental ingestion of contaminated soils during remediation works	Eating, drinking or smoking will only take place within designated breakout areas away from the working area. Good hygiene practice should be adopted to minimise the risk of hand to mouth transfer.
Inhalation of hydrocarbon vapours, ground gases or contaminated dust	Appropriate dust or vapour masks will be worn within the designated working area. If a vapour mask is required due to a high vapour risk, then a face fit mask should be worn. If there is an asbestos risk then FF3 masks should be worn as a minimum. Gas risk sites should consider the risks of asphyxiation and explosion associated with, but not limited to, carbon dioxide and methane especially where gases can build up in confined spaces.
Unforeseen asbestos within the soils (and other areas of the site – not previously identified).	Should any asbestos be identified during the works, works should cease and specialist advice may need to be sought to ensure appropriate management and off-site disposal. This will depend on the type and condition of any asbestos, such as those that are notifiable to the Health and Safety Executive including, but not limited to, friable insulation board or limpet that will require specialist handling and disposal to a suitable landfill site.
Slip and trip hazards in and around the designated working areas and falling into excavations	All staff should remain vigilant during the works and when moving around the site. Staff should ensure that the designated working area is kept clear with good housekeeping. Any excavations which are to be left open or unattended should be made safe and secure by the contractor.
Site traffic on operational site	All staff should wear appropriate PPE suitable for the hazards identified in their task specific risk assessment, including high visibility jacket or vest at all times whilst on site to make themselves visible to other site personnel. Ensure operators are aware of your presence around the site and working areas.
Hazards associated with underground services	All underground services should be cleared by the contractor prior to breaking ground.





Hazard	Recommended Mitigation / Control Measures
Elevated levels of dust generated during the remediation works	During dry windy conditions, stockpiled material should be dampened down using dust suppression methods or covered with sheeting. Measures should be implemented, such as dedicated haulage routes, wheel-washing etc to minimise dust/mud generated. This should be covered in the construction management plan.
Spillages and leakages of potential contaminants from plant during remediation work, removed USTs/interceptors (if applicable) and or from run-off from the site	Plant and equipment proposed for use should be maintained to a high standard to minimise the likelihood of oil or fuel leakage to the ground. Should a significant leakage occur, site personnel must prevent contamination of the drains. Preventative measures may include, but not be limited too, placing a temporary bund.
General nuisance and noise associated with mechanical excavators and lorries to surrounding residents during excavation works	Plant will be operated between the hours of local authority guidelines (as set out in the Decision Notice). Lorries transporting the waste materials off-site will also run during this time period.



DRAWINGS



Key

- Site Boundary
- Trial Pit
- Cable Percussive Borehole
- Underground Storage Tank (UST)

Notes
Do not scale from this drawing. Approximate positions only. Report all errors and omissions to author.

Rev	Date	Description

Client / Project	Drawing Title
BRT PROPERTIES LTD VALE ROAD NORTHFLEET	Site Investigation Plan

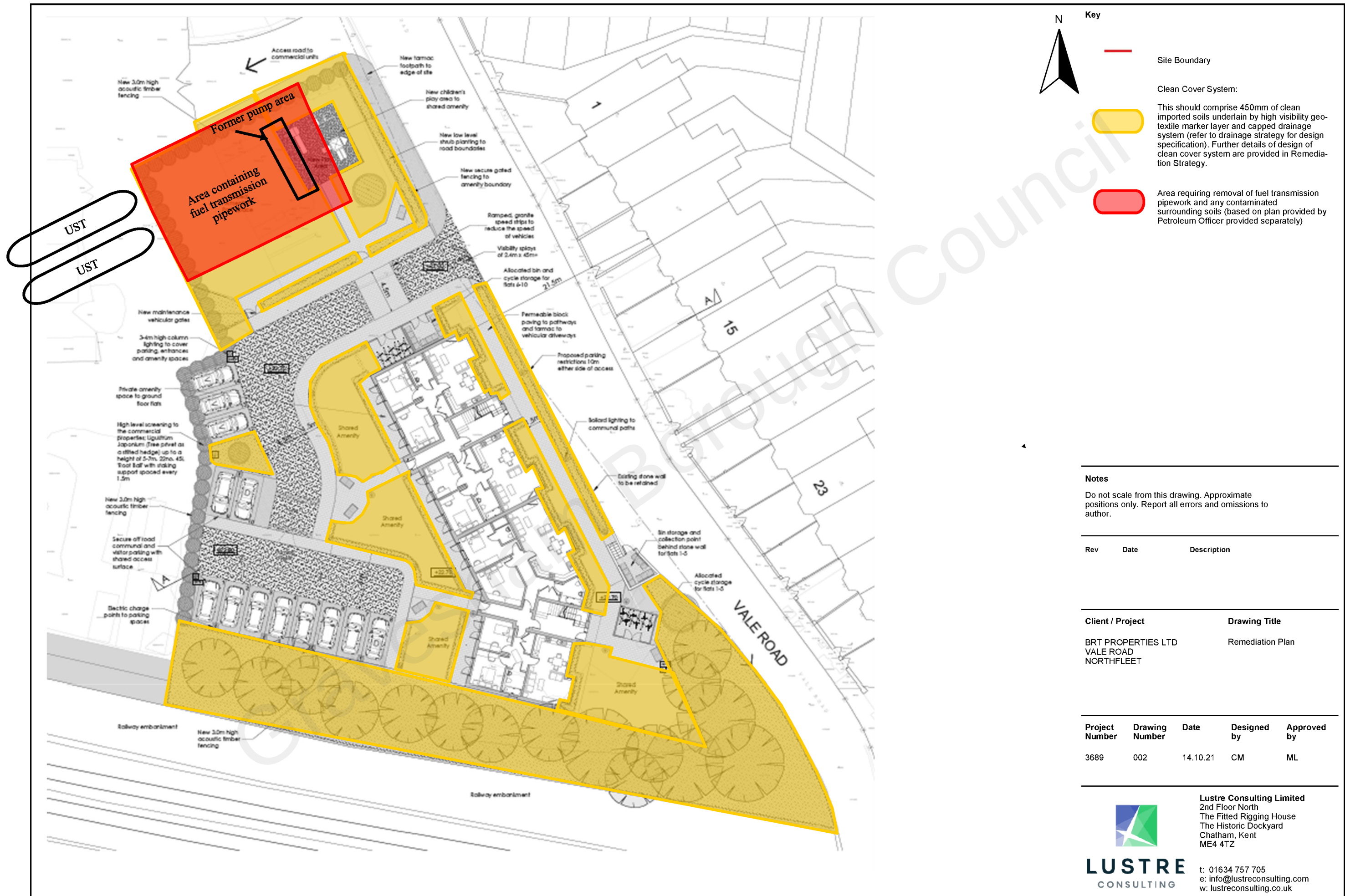
Project Number	Drawing Number	Date	Designed by	Approved by
3689	001	14.10.21	CM	ML



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N

Key

Site Boundary

Existing Down Gradient Borehole

Proposed Upgradient Borehole Location

Notes
Do not scale from this drawing. Approximate positions only. Report all errors and omissions to author.

Rev	Date	Description

Client / Project	Drawing Title
BRT PROPERTIES LTD VALE ROAD NORTHFLEET	Piling Work Groundwater Monitoring Wells

Project Number	Drawing Number	Date	Designed by	Approved by
3689	003	14.10.21	CM	ML

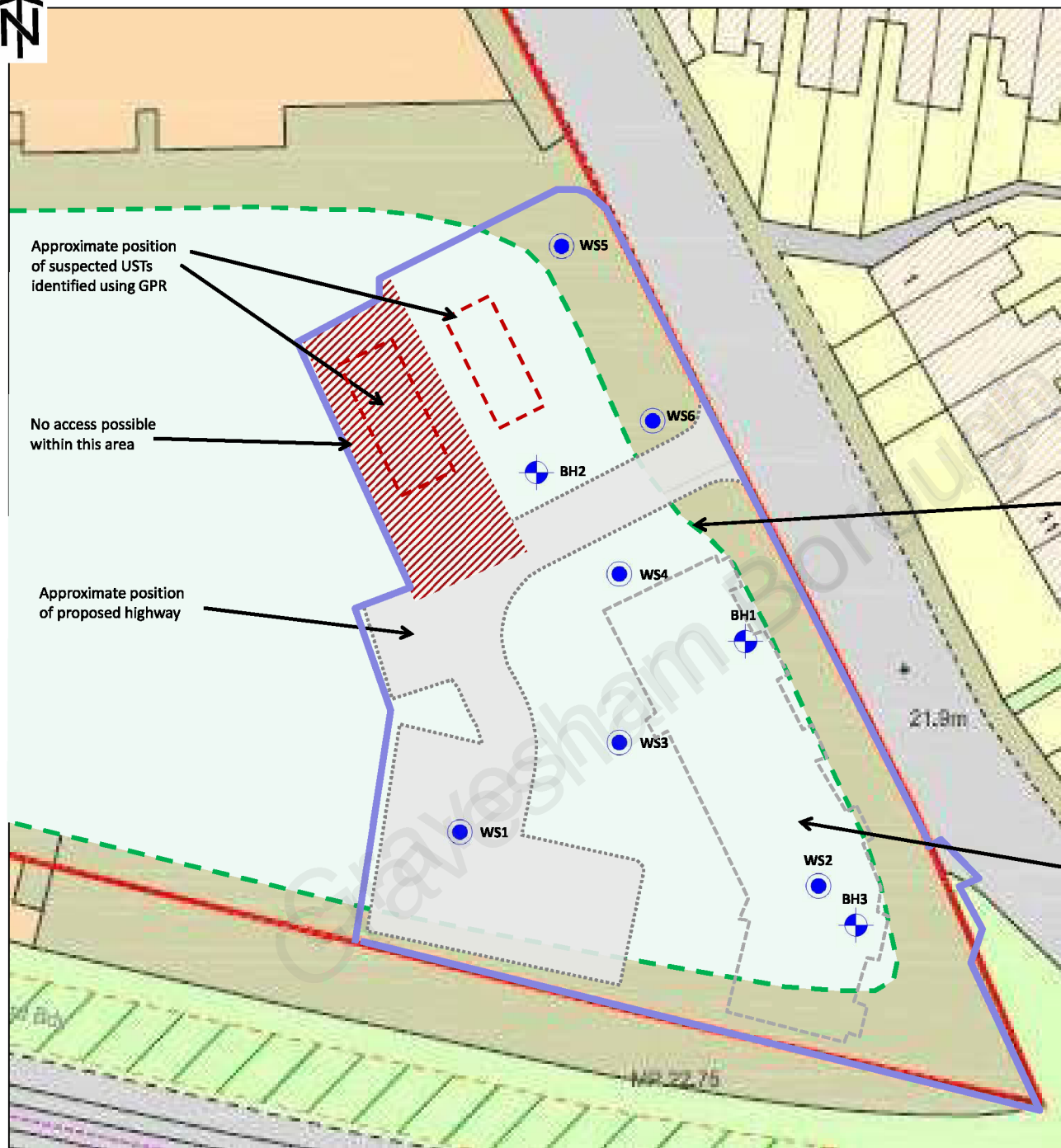


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 WS1 Window Sample Borehole

 BH1 Cable Percussive Borehole

 Approximate extent of study site for BSL's intrusive investigation

 Approximate extent of study site within BSL's Desk Study Assessment Report

1. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
3. DRAWING NOT FOR CONSTRUCTION PURPOSES.

REV	DATE	DESCRIPTION	BY	CHK



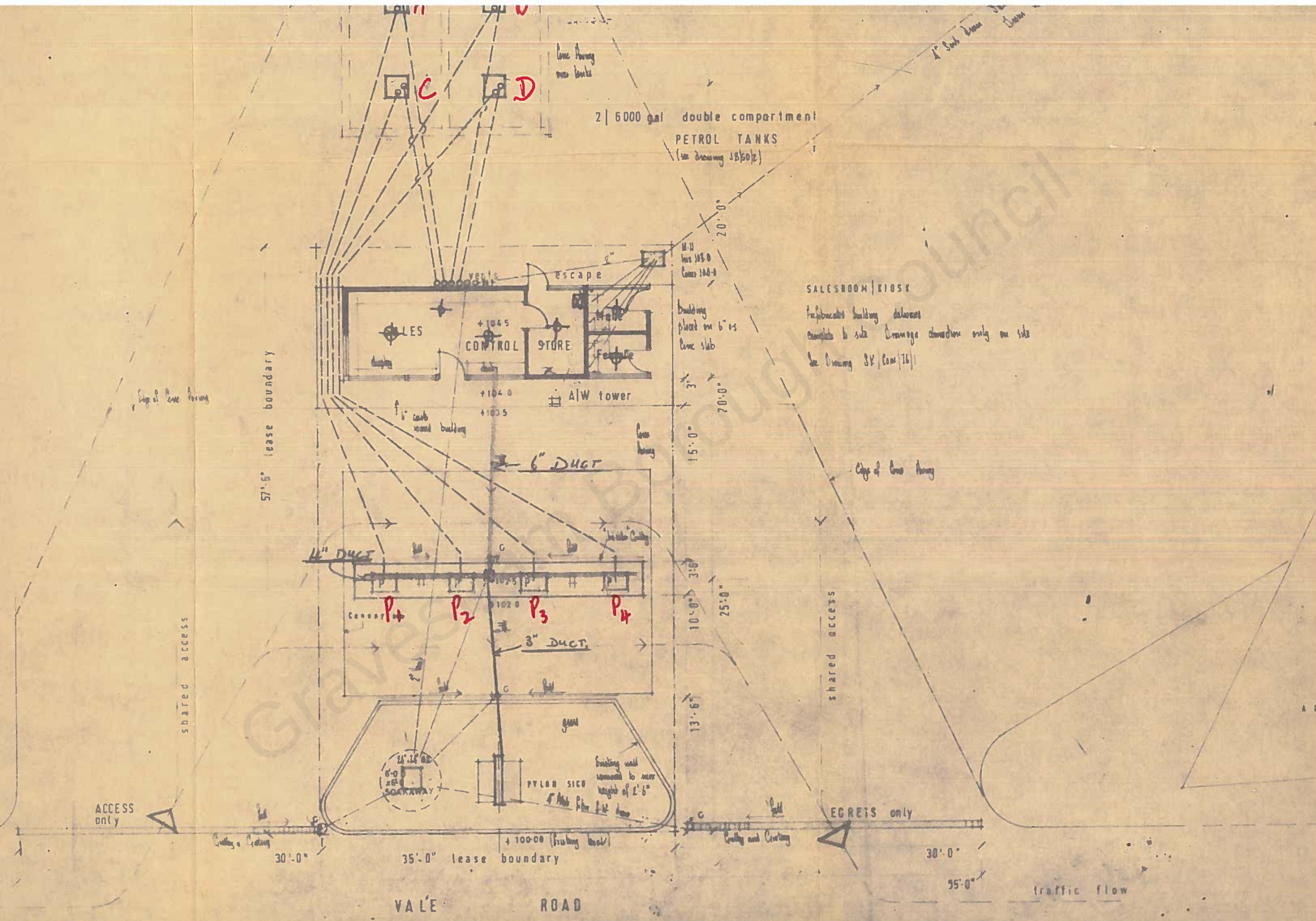
CLIENT
BRT PROPERTIES (KENT) LTD

PROJECT TITLE
VALE ROAD, NORTHFLEET

DRAWING TITLE

EXPLORATORY HOLE LOCATION PLAN

DRAWING No. C3467/03	REVISION -	SCALE NTS	DATE 18/02/19
DRAWN BY PD		CHECKED BY XXX	



**APPENDIX A:
INFORMATION ON
STATUTORY
GUIDANCE**

INTRODUCTION

References to the term “contaminated land” in this report relate to the statutory definition of contaminated land under the published Contaminated Land Statutory Guidance unless otherwise stated (also known as Category 1 and 2 under Part 2A). That definition is: *“any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances on in or under the land that –*

- a) Significant harm is being caused or there is a significant possibility of such harm being caused; or*
- b) Significant pollution of water environment is being caused or there is significant possibility of such pollution being caused”.*

Other terms such as “land affected by contamination” or “land contamination” refer to the much broader categories of land where contaminants are present but usually not at a significant level of risk to be classified as contaminated land under the definition Part 2A (also known as Category 3 or Category 4 under Part 2A).

**APPENDIX B:
MANAGING
ASBESTOS
CONTAMINATED
SOILS**

GENERAL GUIDANCE ON MANAGING ASBESTOS CONTAMINATED SOILS

INTRODUCTION

Asbestos contaminated soils (ACS) is increasingly becoming a problem on brownfield sites. The presence/ absence of asbestos on this site is confirmed in Chapter 1 of this report, as well as in more detail in Chapter 2 (as appropriate).

This Remediation Strategy provides guidance on mitigating the risks to the future receptors based upon the proposed development layout and configuration as required by planning. This report does not address the specific risks to construction workers dealing with ACS. It is noted that although asbestos may have been identified within shallow soils within the Phase 2 Site Investigation, if there is no unacceptable risk to future site users and therefore no specific remedial measures required under the planning framework, this report may not specifically discuss asbestos in terms of “remediation”.

It is important however to consider how the presence of asbestos in soils can present risks to construction workers and the general public during the development. Asbestos is also an emotive contaminant that can have public relation impacts.

However, as the extent of any ground disturbance, excavation, handling and disposal of asbestos contaminated soils as part of the wider construction/enabling activities are not known, Lustre cannot prescribe a safe methodology for this work. The groundworks contractor should therefore prepare a detailed method statement for this work and ensure that any works are undertaken in accordance with Control of Asbestos Regulations¹². Reference can also be made to CIRIA C733 guidance on asbestos in soils¹³.

GENERAL MANAGEMENT CONSIDERATIONS/GUIDANCE

Any arisings of ACS will need appropriate management, regardless of if the ACS is in an area subject to specific remediation activities. Construction management plans should consider the following:

- *Licencing: Will the works be classified as Category B Non-Licensed works and is the correct insurance in place for undertaking these works (if applicable)? If there is any uncertainty on the type or volume of material that should be handled under Category B Non-Licensed works, works should stop immediately and advice should be sought.*
- *Notification to HSE: Although the works may be non-licensed are they notifiable to HSE?*
- *Training: Suitably trained and competent site personnel should be used who have the correct level of asbestos training which is commensurate with the level of risk/work activity which is being considered (i.e. rare sporadic cement bound ACM in soils vs friable widespread ACM).*
- *Information: All staff should be aware of the risks of working with asbestos contaminated soils and be appropriately trained.*
- *PPE/RPE: Appropriate masks (minimum half face respiratory protective equipment (RPE) to FFP3 standard, or the required standard at the time of work) and disposable overalls may need to be worn when working with ACS. Are decontamination units required?*

¹² Control of Asbestos Regulations (CAR) 2012

¹³ CIRIA Asbestos in soil and made ground: a guide to understanding and managing risks (C733), 2014

- Signage: *The need for fencing and/or signage to notify site personnel of the hazard.*
- Cross-contamination (storage): *Excavated ACS may need to be placed in a designated area ideally on hard surfacing or thick plastic sheeting to prevent mixing with underlying soils depending on the nature any type of ACM/ACS present.*
- Cross-contamination (airborne): *The potential for dust generation containing asbestos fibres. During the excavation, handling and storage of ACS, consider dust suppression/minimisation techniques in the form of water sprinkling, sheeting and minimal handling/disturbance which could be employed to reduce the generation of airborne fibres.*
- Occupational health and off-site impacts: *The need, as appropriate, for background air monitoring. For example, it may be prudent to check/verify that any dust/fibre suppression controls ensure that an air quality limit of 0.1 fibres/cm³ in air is not exceeded.*
- Cross-contamination (transport): *If plant needs to be washed down to avoid tracking potential ACS to other areas of the site.*
- Waste disposal (pre-treatment): *ACS may require pre-treatment (i.e. hand picking) to reduce the hazardous nature from a waste disposal perspective. The Environment Agency's Technical Guidance WM3¹⁴ requires that for a mixed waste (such as Made Ground/ACS), the identifiable waste that may be more hazardous (such as ACMs, i.e. cement board etc) should be assessed and dealt with as a separate waste stream. If the soil contains identifiable fragments of asbestos (>50mm and visible to the naked eye) the fragments should, where possible, be separated from the soil by hand picking. This can be achieved during the excavation and placement of ACS in a controlled manner, for example ACS excavated/stripped off in 100mm layers. Any ACM should be double bagged and placed in a lockable asbestos skip.*
- Waste disposal: *Before disposal off-site, the ACS should have nil visible ACM and contain less than the hazardous weight threshold limit of 0.1%. Waste tickets should be retained.*
- Record keeping: *A record of where known ACS are left undisturbed (if applicable) should be made and kept with the Construction Health and Safety file/ deeds of the property.*

Remember that any work undertaken involving ACS is carried out by competent contractors under a Duty of Care with the appropriate insurance, asbestos awareness training and experience in dealing with asbestos in soils / Category B Non-Licensed works.

GENERAL GUIDANCE ON ASBESTOS IN BUILDINGS

INTRODUCTION

Under Regulation 4 of CAR¹⁵, those parties ("duty holders") who have control over the maintenance or repair of non-domestic premises are required to identify and manage any asbestos or presumed asbestos found in their premises. Where asbestos is or is liable to be present, the duty holder(s) shall ensure that they have an adequate management plan, undertake and review risk assessments and

¹⁴ Environment Agency, Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3

¹⁵ Control of Asbestos Regulations (CAR) 2012

maintain an Asbestos Register detailing the probable exposure to all employees and site users. The duty holder may be the business owner, landlord or tenant or others by virtue of a contract.

Regulation 5 requires duty holder(s) to identify asbestos prior to maintenance or any other work which exposes or is liable to expose employees to asbestos unless there has been a sufficient assessment. There is always a risk that asbestos will be present in soils, under hardstanding and below ground structures, and that it may spread particularly during clearance and demolition works. It is therefore essential that where any asbestos or presumed asbestos is identified, it is managed, removed and disposed of by a licenced remover (if licensable work) in accordance with relevant HSE guidance. It is the responsibility of the duty holder under Regulation 16 to ensure measures are put in place to prevent the 'spread' of asbestos.

This Remediation Strategy does not include the identification, assessment, removal or validation of asbestos within any structures both above and below ground (i.e. basements, services, floor slabs). A refurbishment and demolition survey should be carried out by an appropriately experienced and qualified asbestos surveyor, ideally with a license to undertake work with asbestos. This report is for the identification, management and remediation of asbestos containing soils, normally unlicensed work.

**APPENDIX C:
APPROACH TO
SELECTING REMEDIAL
TREATMENTS AND
CONTRACTORS**

APPROACH TO THE SELECTION OF REMEDIAL TREATMENTS

In accordance with good practice guidance, the selection of appropriate remedial measures has been undertaken using a systematic approach, as set out in CIRIA C662. Initially, a combination of technical and non-technical criteria have been adopted in the selection of the most suitable remedial options for the site, namely:

- The hazardous nature (i.e. toxic, carcinogenic) of the contamination;
- Risk management (particularly for construction personnel during remediation);
- Time constraints and the development programme;
- The technical feasibility of the selected remedial method;
- Cost-effectiveness;
- Sustainability (with least environmental impact such as minimising off-site disposal, transportation etc.);
- Waste management (such as generation of hazardous and not hazardous wastes); and
- Nuisance issues on-site and within the surrounding area (noise, air quality and impacts on land environments).

The primary objectives to address the identified risks were as follows:

- Ensure that following implementation of this strategy the site is rendered 'suitable for use' under the planning regime for the proposed / permitted end use. This must be to the approval of the local planning authority and other key stakeholders (such as the Environment Agency);
- Ensure that minimal residual liability both environmentally and financially remains, and that following remediation, the site will not be classified as contaminated land under the statutory definition (Category 1 and 2) under Part 2A of the Environment Act 1995; and
- Ensure that the proposed remedial solution can be readily accommodated in the development/ build programme and provide the most cost-effective, sustainable and durable solution, where practicable.

SELECTION OF CONTRACTORS

The Client is responsible for ensuring those commissioned to implement the various measures set out in this strategy are competent to do so and have the correct type and level of insurance suitable for the specific task. Where required by any regulations, laws or other such legislative controls, suitably licenced and approved specialists should be used (i.e. licenced waste carriers).

The remediation works set out herein are expected to be co-ordinated by a suitably qualified contractor who will hold all necessary environmental permits, licenses, insurances and implement any necessary Duty of Care to ensure the works are carried out diligently and to safeguard against any potential pollution incidents. Those undertaking any skilled trades as part of the implementation of this strategy, such as installing a gas or VOC barrier membrane for example, should be suitably trained, competent and hold any appropriate qualifications. As part of the verification process contractors will be required to provide evidence of this. Any contractors appointed by the Client will need to provide any relevant documentation prior to works commencing for inclusion in the Verification Report.

The remediation contractor/ demolition contractor and Client will also be responsible for ensuring that any waste generated by the remediation/construction works is properly segregated, treated, transported and disposed of using licensed contractors and at licensed waste disposal facilities (such as a landfill or treatment centre). A copy of any licenses should be obtained and kept on record, with the license number validated on the Environment Agency website (if regulated by the Environment Agency).

**APPENDIX D:
BACKFILL
SPECIFICATION**

Backfill Specification For Subsoils And Topsoils - Private Gardens

Determinand	Units	Residential End Use
Asbestos Screen	-	Detected
Total Cyanide	mg/kg	53.00
Arsenic	mg/kg	37.00
Cadmium	mg/kg	26.00
Chromium	mg/kg	910.00
Copper	mg/kg	2400.00
Lead	mg/kg	200.00
Mercury	mg/kg	170.00
Nickel	mg/kg	130.00
Selenium	mg/kg	250.00
Zinc	mg/kg	3700.00
Naphthalene	mg/kg	2.30
Acenaphthylene	mg/kg	170.00
Acenaphthene	mg/kg	210.00
Fluorene	mg/kg	170.00
Phenanthrene	mg/kg	95.00
Anthracene	mg/kg	2400.00
Fluoranthene	mg/kg	280.00
Pyrene	mg/kg	620.00
Benzo(a)anthracene	mg/kg	7.20
Chrysene	mg/kg	15.00
Benzo(b)fluoranthene	mg/kg	2.60
Benzo(k)fluoranthene	mg/kg	77.00
Benzo(a)pyrene	mg/kg	5.00
Indeno(1,2,3-cd)pyrene	mg/kg	27.00
Di-benzo(a,h)anthracene	mg/kg	0.24
Benzo(ghi)perylene	mg/kg	320.00
TPH CWG - Aliphatic >C5 - C6	mg/kg	42.00
TPH CWG - Aliphatic >C6 - C8	mg/kg	100.00
TPH CWG - Aliphatic >C8 - C10	mg/kg	27.00
TPH CWG - Aliphatic >C10 - C12	mg/kg	130.00
TPH CWG - Aliphatic >C12 - C16	mg/kg	1100.00
TPH CWG - Aliphatic >C16 - C21	mg/kg	32500.00
TPH CWG - Aliphatic >C21 - C34	mg/kg	32500.00
TPH CWG - Aromatic >C5 - C7	mg/kg	70.00
TPH CWG - Aromatic >C7 - C8	mg/kg	130.00
TPH CWG - Aromatic >C8 - C10	mg/kg	34.00
TPH CWG - Aromatic >C10 - C12	mg/kg	74.00
TPH CWG - Aromatic >C12 - C16	mg/kg	140.00
TPH CWG - Aromatic >C16 - C21	mg/kg	260.00
TPH CWG - Aromatic >C21 - C35	mg/kg	1100.00
Benzene	mg/kg	0.87
Toluene	mg/kg	130.00
Ethylbenzene	mg/kg	47.00
m & p-xylene	mg/kg	56.00
o-Xylene	mg/kg	60.00
Monohydric Phenols	mg/kg	120.00

All Units mg/kg

Based on 1.0% SOM in order to be conservative, organic thresholds may increase marginally if SOM >1%.

VISUAL SPECIFICATION

These soils must be clean with no significant quantity of putrescible material (incl. wood or paper), which may generate ground gases, and no hazardous materials such as ACM or general waste (such as glass, metals etc.)

Backfill Specification For Subsoils And Topsoils – Communal Open Space

Determinand	Units	Communal Open Space
Asbestos Screen	-	Detected
Total Cyanide	mg/kg	53
Arsenic	mg/kg	79
Cadmium	mg/kg	120
Chromium	mg/kg	1500
Copper	mg/kg	12000
Lead	mg/kg	630
Mercury	mg/kg	170
Nickel	mg/kg	230
Selenium	mg/kg	1100
Zinc	mg/kg	81000
Naphthalene	mg/kg	4900
Acenaphthylene	mg/kg	15000
Acenaphthene	mg/kg	15000
Fluorene	mg/kg	9900
Phenanthrene	mg/kg	3100
Anthracene	mg/kg	74000
Fluoranthene	mg/kg	3100
Pyrene	mg/kg	7400
Benzo(a)anthracene	mg/kg	29
Chrysene	mg/kg	57
Benzo(b)fluoranthene	mg/kg	7.10
Benzo(k)fluoranthene	mg/kg	190
Benzo(a)pyrene	mg/kg	5.70
Indeno(1,2,3-cd)pyrene	mg/kg	82
Di-benzo(a,h)anthracene	mg/kg	0.57
Benzo(ghi)perylene	mg/kg	640
TPH CWG - Aliphatic >C5 - C6	mg/kg	570000
TPH CWG - Aliphatic >C6 - C8	mg/kg	600000
TPH CWG - Aliphatic >C8 - C10	mg/kg	13000
TPH CWG - Aliphatic >C10 - C12	mg/kg	13000
TPH CWG - Aliphatic >C12 - C16	mg/kg	13000
TPH CWG - Aliphatic >C16 - C21	mg/kg	125000
TPH CWG - Aliphatic >C21 - C34	mg/kg	125000
TPH CWG - Aromatic >C5 - C7	mg/kg	56000
TPH CWG - Aromatic >C7 - C8	mg/kg	56000
TPH CWG - Aromatic >C8 - C10	mg/kg	5000
TPH CWG - Aromatic >C10 - C12	mg/kg	5000
TPH CWG - Aromatic >C12 - C16	mg/kg	5100
TPH CWG - Aromatic >C16 - C21	mg/kg	3800
TPH CWG - Aromatic >C21 - C35	mg/kg	3800
Benzene	mg/kg	72
Toluene	mg/kg	56000
Ethylbenzene	mg/kg	24000
m & p-xylene	mg/kg	41000
o-Xylene	mg/kg	41000
Monohydric Phenols	mg/kg	440

All Units mg/kg

Based on 1.0% SOM in order to be conservative, organic thresholds may increase marginally if SOM >1%.

VISUAL SPECIFICATION

These soils must be clean with no significant quantity of putrescible material (incl. wood or paper), which may generate ground gases, and no hazardous materials such as ACM or general waste (such as glass, metals etc.)

**APPENDIX E:
NOTES ON
LIMITATIONS**

LUSTRE CONSULTING, ENVIRONMENTAL AND GEOTECHNICAL CONSULTANCY SERVICES

NOTES ON LIMITATIONS

General

Lustre Consulting have completed the attached report for the use of the Client detailed on the front cover and those parties to whom Lustre Consulting has agreed to provide and has provided an executed warranty agreement, or to whom an assignment of the benefit of this report has been agreed.

Third parties are not entitled to use or rely upon the contents of the report unless written approval has been given by Lustre Consulting; (due to legal requirements, a charge may be levied as a condition of such approval, in which case approval shall not be effective unless and until such a charge has been paid in full).

Lustre Consulting accepts no responsibility or liability for:

- a) any use of this report for any purpose or project other than that for which it was commissioned, and
- b) any use of this report by any third party to whom approval for use has not been given and any conditions applicable to such use have been met.

Phase I Environmental Risk Assessments, Desk Studies and Site Audits

The work completed and utilised to provide this report comprises a study of available documentation. The opinions and results presented in this report have been arrived at by utilising the finite amount of data available at the time of writing and are relevant only to the purpose for which the report was commissioned. The data which has been reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative information pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, Lustre Consulting reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.

It should be noted that the risks which are identified in this report are perceived risks based on the available information at the time of writing and that the actual risks associated can only be assessed following a physical investigation of the site.

Phase II Site Investigations

The intrusive investigation has been completed to provide information concerning the type and degree of contamination present along with ground and groundwater conditions which facilitates a reasonable risk assessment to be completed. The stated objectives of the ground investigation have been limited to assessing the proven risks which are associated with potential human targets, building materials, the environment (including adjacent land), and to surface water and groundwater.

The amount of exploratory work, chemical testing and monitoring completed as part of this project has potentially been restricted by the short timescale available, and the locations of exploratory holes undertaken have potentially been restricted to areas unoccupied by buildings(s) and buried services. A more comprehensive post demolition / decommission investigation may be required if the site is to be redeveloped. For these reasons any costs included in relation to site remediation must be considered as tentative only at this time.

The exploratory holes investigate only a small volume of the ground in relation to the size of the site and therefore, can only provide a "snap shot" or general indication of ground conditions located on the site. The fact that the site has been investigated does not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided in this report take into account currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

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