



Ground Condition Consultants

SOUTHLEIGH PARK HOUSE, EASTLEIGH ROAD, HAVANT, PO9 2PE

REMEDIATION STRATEGY

JULY 2025

Prepared for
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0. EXECUTIVE SUMMARY

Brief	Ground Condition Consultants Ltd. (GCC) was commissioned by FSL Group Ltd in July 2025 to prepare a Remediation Strategy for a site located at Southleigh Park House, Eastleigh Road, Havant, PO9 2PE.
Current Site Status	The wider site, Southleigh Park House, is located off Eastleigh Rd, Havant, PO9 2PE. The study site, where existing building are to be converted, is currently not in use and is occupied by Southleigh Park House Old Mansion House (centre of site) and associated ancillary buildings (stables and coach house) adjacent to the north. A gate house is located in the north-eastern corner of the wider site and a more modern office building (dating to 1983) is also present in the north of the site, linked to the stables building, along with associated car parking areas (located in the western and northern end of the site).
Site History	The site comprised a stately home with associated out buildings until it was converted to office use in 1983, along with a new office building and associated car parking areas within the wider site. Gravel pits were historically present some 120m to the north of the wider site, some 225m from the study site, and were infilled as a landfill during the 1990s.
Geology	Reference to the British Geological Survey (BGS) Map extracts indicates the majority of the site to overlie Head Deposits (clay, silt, sand and gravel) over London Clay Formation (clay, silt and sand) with the southern end of the site shown to directly overlie the London Clay Formation.
Hydrogeology	The Environment Agency Groundwater Vulnerability Map extracts indicate the majority of the site to be overlying a superficial Secondary A Aquifer, interpreted as the Head Deposits. The underlying London Clay Formation is classified as an unproductive stratum.
Hydrology	The nearest identified surface water feature to the site is a pond located in the southern end of the site.
Contamination Risks	<p>The conceptual model, based on information obtained as part of the preliminary risk assessment and intrusive ground investigation, identified the following potential contaminant sources:</p> <ul style="list-style-type: none"> Localised lead in Made Ground in the walled area adjacent to the northwest of the mansion house (HP102) Residual potential for asbestos from the construction of the current buildings and demolition of the former buildings. While no asbestos has been identified in the soil as part of this investigation, due to the age of the structures, there is a significant potential for asbestos to be present in localised deposits of Made Ground. Potential for PCBs to have leaked from the electrical substation adjacent to the north of the west wing of the mansion house. <p>It should be noted that additional sources of contamination may become apparent during any future investigation and development of the site.</p> <p>The risks to the health of future site users from contamination have been assessed to be very low to moderate in the context of the conversion of the existing buildings and risks to controlled waters have been assessed to be very low.</p>
Remediation Strategy	<p>The most appropriate remedial option for the walled area adjacent to the north of the west wing of the mansion house is considered to be the placement of an engineered cover system in areas of soft landscaping.</p> <p>Hard covered areas, such as patios and paths, are not considered to require any additional cover measures.</p> <p>Clean corridors for services through Made Ground, lined with geotextile membrane, will also be required.</p>

	<p>Where Made Ground is thinner than the proposed cover system, source removal of the Made Ground would become the default remedial solution in these areas.</p> <p>Visible suspected asbestos containing material in soil, if present, should be removed and disposed of separately as hazardous waste, where practical and safe to do so, to reduce the quantity of asbestos in excavated and retained Made Ground.</p>
Verification Plan	<p><u>Cover System</u></p> <p>An essential element of the performance of a cover system is assurance that it has been installed in accordance with the design. Consequently, the installation of the cover system will be verified upon completion. This will involve two components. The first component is to confirm that a sufficient cover thickness has been installed. The second component is to sample the imported cover material delivered to site to confirm that the cover material delivered and placed on site is chemically suitable for use.</p> <p><u>Imported Soil Quality</u></p> <p>Any imported soil brought to site is to be inspected on arrival and any soil deliveries with more than trace amounts of man-made materials is to be rejected and returned to the supplier. It is recommended that the supplier is warned of this before dispatching the soil to prevent unsuitable soil being delivered to site.</p> <p>Site won soil from the wider development can be used in the cover system, subject to testing to confirm suitability for use.</p>
<p><i>This sheet is intended to provide a summary only of the initial indicative assessment study of the Site in relation to ground contamination. It does not provide a definitive engineering analysis for the purposes of costing or construction, and is subject to the limitation of the agreed brief.</i></p>	

1. INTRODUCTION

1.1 INSTRUCTION

Ground Condition Consultants Ltd. (GCC) was commissioned by FSL Group Ltd in July 2025 to prepare a Remediation Strategy for a site located at Southleigh Park House, Eastleigh Road, Havant, PO9 2PE.

This report should be read in conjunction with the GCC Ltd Generic Quantitative Risk Assessment Report (Ref: J25-046-R01 V1, dated June 2025).

This report is prepared in line with the agreed brief and is subject to the report conditions shown in Appendix 1.

1.2 LEGAL CONTEXT

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a regime for the control of specific threats to health or the environment from land contamination. In accordance with the Act and the statutory guidance document 'The Contaminated Land (England) Regulations 2000', the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only "contaminated land" where it appears to the Regulatory Authority, by reason of substances within or under the land, that:

- Significant harm is being caused, or there is a significant possibility of such harm being caused; or
- Pollution of controlled waters is being, or is likely to be, caused."

Inherent in this definition is the requirement for contamination risk assessment to be undertaken on a site specific basis, as the potential for harm is determined by the site's end use and its specific environmental setting.

The guidance defines "risk" as the combination of:

- The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and
- The magnitude (including the seriousness) of the consequences.

While Part IIA of the Environmental Protection Act provides a risk based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment, the regime does not take into account future uses. New developments are therefore controlled by the planning regime, with reference to the National Planning Policy Framework (NPPF), rather than directly by Part IIA of the Environmental Protection Act.

The NPPF is based on the principal that the site should be suitable for its new use, taking account of ground conditions, including from natural hazards or former activities and states that “Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner”. The NPPF also links the planning and Part IIA regimes by stating that “after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990”. Key components of the Part IIA regime, such as the definition of Contaminated Land and the associated risk based assessment approach, are therefore considered to also be applicable to the planning regime.

1.3 METHODOLOGY

This report has been prepared in accordance with published Environment Agency guidance (‘Land Contamination Risk Management (LCRM)’). LCRM provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme (of the former Department of the Environment) and the Model Procedures for the Management of Land Contamination – Contaminated Land Report (CLR) 11. LCRM has adopted and refined the well recognised methodology and terminology that has been used in contaminated land risk assessment for a number of years.

1.3.1. Pollutant linkage concept

In the context of land contamination, there are three essential elements to any risk:

- A **contaminant source** – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.
- A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a pollutant linkage.

1.3.2. Conceptual model

An important thread throughout the overall process of risk assessment is the need to formulate and develop a **conceptual model** for the site, which supports the identification and assessment of pollutant linkages. A conceptual model represents the characteristics of the site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors (pollutant linkages).

1.4 PROPOSED USE

It is currently understood that the existing Mansion House, stables, coach house and gate house are to be converted to residential use. These works are covered by the full application and grant of planning permission for Application Number: APP/17/00863.

The existing 1983 office building in the north of the site is to be demolished. The remainder of the site, including the footprint of the 1983 office building and associated car parking areas, is proposed for new build residential development. These works are covered as outline in Application Number: APP/17/00863 with all matters reserved, except means of access.

This assessment is intended to assess the conversion aspect of the development and the new build areas of the site will be subject to separate investigation and assessment.

A change in the site use from that currently proposed may result in the need for re-assessment of risk criteria and the conclusions and recommendations resulting from the risk assessment could therefore significantly change.

1.5 REPORT SCOPE AND LIMITATIONS

This report is based upon a review of the GCC Generic Quantitative Risk Assessment Report, dated June 2025, and the data presented within it. The assessment is based on the proposed use stated in Section 1.4 and the outcomes of this assessment could change if the end uses change.

The information contained in this report is intended for the use of FSL Group Ltd. GCC can take no responsibility for the use of this information by any other party or for uses other than that described in this report.

2. RISK ASSESSMENT

2.1 SITE LOCATION AND DESCRIPTION

The wider site, Southleigh Park House, is located off Eastleigh Rd, Havant, PO9 2PE. The study site, where existing buildings are to be converted and extended, is currently not in use and is occupied by Southleigh Park House Old Mansion House (centre of site) and associated ancillary buildings (stables and coach house) adjacent to the north. A gate house is also located in the north-eastern corner of the wider site and a more modern office building (dating to 1983) is also present in the north of the site, linked to the stables building, along with associated car parking areas (located in the western and northern end of the site). There are also a couple of electrical sub-stations/units within the wider site, one adjacent to the southeast wider site boundary and one adjacent to the rear of the mansion house, within the study site. The southern area of the wider site is predominantly laid to lawn with a pond in the southwest corner. Numerous large mature trees are located across the site, particularly around the perimeter of the site, along with other vegetation (trees & bushes). An in-ground chamber, possibly a well, was identified beneath the lawn area adjacent to the west of the coach house.

The mansion house was noted to have a basement containing gas fuelled heating systems and a generator was also noted adjacent to the west of the mansion house, similarly understood to be powered by gas. There was no remaining evidence of the historical fuel source for heating the mansion house and associated out buildings prior to the introduction of gas, although it is considered likely that coal was used. No evidence of bulk fuel storage was noted on site.

Eastleigh Rd forms the western site boundary, Bartons Rd forms the northern site Boundary and Horndean Rd forms the eastern site boundary. The area to the south is occupied by undeveloped parkland beyond which Southleigh Rd runs. The area to the immediate east of Horndean Rd is undeveloped (mainly woodland) with the area to the immediate west of Eastleigh Rd also undeveloped (grassland and woodland). Spire Hospital is located to the north of Barton Rd.

2.2 SITE HISTORY

The historical maps from 1859 to 2023 show the wider site, initially known as Woodland, on the early map extracts with a main building in the centre of the site and ancillary buildings and greenhouses across the site (mainly in the northern end of the site). A pond and a summer house are shown to be present on the early extracts in the southern end of the site. A lodge/gate house is shown in the north-eastern corner of the site.

By 1897, the wider site is known as South Leigh and smaller additions and alterations (removal of small scaled buildings and summer house and reference to a water tower in the west) are indicated on early map extracts until the 1960/80's.

In 1983, a new office building and associated car parking areas were developed in the north of the wider site, requiring the demolition of the majority of the small scaled buildings in the north of the site and the water tower in the west. It is understood that the mansion house and remaining associated outbuildings, within the current study site, were converted to office use at this time. No significant changes are shown on later map extracts.

The immediate surrounding areas, on the early map extracts, are shown as woodland/parkland and agricultural land with a couple of gravel pits (to the northeast), which were progressively extended during the 20th Century. Although not noted on the map extracts provided and reviewed, the Groundsure report indicates that the 1996 map extract (not provided in the map pack) identifies the gravel pits area to the north as a Refuse Tip. The landfill records presented in the Groundsure report also indicate the Southleigh Forest landfill to have been operated approximately 120m to the north of the wider site, some 225m north of the current study site. The 1999 aerial imagery indicates the nearest portion of the landfill to have been reinstated as open space, with reinstatement of the wider landfill (some 350m northwest of the site) completing by 2019. The immediate surrounding areas have largely remained undeveloped with the Spire Hospital, to the north of the site, first shown on a map extract from the 1980's.

2.3 DOCUMENTATED GROUND CONDITIONS

Ground conditions recorded in readily available sources are summarised below.

2.3.1. Geology

Reference to the British Geological Survey (BGS) Map extracts (see Desk Top Study) indicates the majority of the site to overlie Head Deposits (clay, silt, sand and gravel) over London Clay Formation (clay, silt and sand) with the southern end of the site shown to directly overlie the London Clay Formation.

GCC undertook a ground investigation in December 2020 to install monitoring wells for groundwater level monitoring using windowless sample drilling techniques. These boreholes encountered clayey Gravel and gravelly Clay of the Head Deposits or unrecorded River Terrace Deposits (RTD) across the site with localised subordinate Sand beds.

Many of the boreholes refused in the Head Deposits/RTD with depths of between 1.0m and 5.0m achieved. The underlying London Clay Formation was not proven.

Localised Made Ground, comprising reworked natural deposits with anthropogenic inclusions, were encountered and were associated with the profiling of the site, presumably during the 1983 redevelopment.

2.3.2. Hydrogeology

The Environment Agency Groundwater Vulnerability Map extracts (see Desk Top Study) indicate the majority of the site to be overlying a superficial Secondary A Aquifer, interpreted as the Head Deposits/RTD. The underlying London Clay Formation is classified as an unproductive stratum.

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

Unproductive Strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The site is not located within a Groundwater Source Protection Zone or within 250m of licenced water abstractions.

GCC undertook groundwater monitoring between December 2020 and April 2021. Due to the sloping character of the site, the shallowest groundwater was recorded in the south of the site at 0.53m bgl at its shallowest, while groundwater levels in the centre east were recorded at 1.86m and in the centre west at 2.06m bgl, at their shallowest. Groundwater was deeper than the base of the well (1.76m bgl) in the north of the site. With reference to ground levels shown on the topographical survey, the highest winter groundwater levels ranged from 31.67m AOD to 34.91m AOD with a general flow from northeast to southwest, following the local topography.

A below ground chamber was noted adjacent to the west of the coach house, where a water tower had been noted on the historical maps, with water measured in the chamber at 2.16m bgl in December 2020. The chamber was not accessible during following monitoring rounds. This depth is broadly consistent with the water levels recorded in a nearby monitoring well and is considered likely to be indicative of groundwater within the chamber.

The BGS borehole records, apparently dating from 1957, indicate the presence of a water well on site, measuring 5 feet (1.5m) in diameter and 38 feet (11.6m) in depth. No details of the ground conditions are presented. The Groundsure report indicates this well to be in the same area as the encountered chamber, suggesting they are the same structure and that the well and water tower may have been linked.

2.3.3. Hydrology

The nearest identified surface water feature to the site is a pond located in the southern end of the wider site.

2.3.4. Radon

Radon is a naturally occurring radioactive gas which may be harmful to human health. Radon is generally released into the atmosphere in areas underlain by granite and limestone. Harmful concentrations of radon may build up if it becomes trapped in an enclosed space such as a building.

BGS/Public Health England data presented within the Groundsure Report indicates that the percentage of houses exceeding the Action Levels for Radon in this area is less than 1%. Therefore, the property not in a Radon Affected Area, as defined by the Health Protection Agency (HPA), and radon protection measures are not necessary in new dwellings or extensions.

2.4 CONCLUSIONS OF RISK ASSESSMENT

The conceptual model, based on information obtained as part of the preliminary risk assessment and intrusive ground investigation, identified the following potential contaminant sources:

- Localised lead in Made Ground in the walled area adjacent to the northwest of the mansion house (HP102)
- Residual potential for asbestos from the construction of the current buildings and demolition of the former buildings. While no asbestos has been identified in the soil as part of this investigation, due to the age of the structures, there is a significant potential for asbestos to be present in localised deposits of Made Ground.
- Potential for PCBs to have leaked from the electrical substation in the walled area adjacent to the north of the west wing of the mansion house.

It should be noted that additional sources of contamination may become apparent during any future investigation and development of the site.

The risks to the health of future site users from contamination have been assessed to be **very low to moderate** in the context of the conversion of the existing buildings and risks to controlled waters have been assessed to be **very low**. It is therefore recommended that:

- Remediation is undertaken in the walled areas to the rear (north) of the west wing of the mansion house to address the lead and potential PCB risks in the proposed garden areas.
- Although no asbestos has been identified in the soil to date, vigilance should be maintained throughout the development for suspected asbestos containing materials and such material should be assessed by a specialist to determine appropriate mitigation measures.

A discovery strategy and appropriate PPE are recommended during any redevelopment of the site to address any as yet unidentified contamination that may be identified during the works.

While construction workers have been excluded from this assessment on the basis that they are subject to health and safety at work regulations and are expected to use appropriate personal protective equipment (PPE), any ground works contractors working on the site, including installing new underground services, should be made aware of the potential for contamination to be present within the ground underlying the site surfacing.

3. REMEDIAL OPTIONS APPRAISAL

The primary risk drivers on this site are considered to be the presence of lead and possible transformer oil, containing PCBs, in the walled area adjacent to the north of the west wing of the mansion house.

The elevated lead concentration was identified in the Made Ground only and was not present in the underlying natural soil.

The presence of leaked transformer oil, potentially containing PCBs, from the existing substation in the walled area has not been confirmed, due to the health and safety risks associated with investigating near live electrical apparatus. However, due to the high viscosity of transformer oil, the anticipated small quantities of leaked oil and the high sorption of PCBs to soil, it is anticipated that any leaks from the sub-station will not have migrated far into the soil. Any impacts are therefore anticipated to be lateral and vertically localised to the vicinity of the sub-station, potentially within the Made Ground. There is a potential residual vapour inhalation pathway, but this is not considered to be significant outdoors and contaminant migration is not anticipated to extend beneath the existing building.

The following table summarises the benefits of a number of options that have been evaluated during the reporting period. The most appropriate feasible options have been taken forward in the remediation strategy for the site.

The technologies reviewed during the options appraisal have taken into account the pollutant linkages present on site to provide an options summary in Table 3.1.

Table 3.1: Remedial options appraisal

Option	Applicable Contaminants	Advantages	Disadvantages
Barrier Implementation	All – containment rather than elimination	<ul style="list-style-type: none"> Relatively cheap Will allow site remediation to be completed in a reasonable timeframe 	<ul style="list-style-type: none"> Does not remove source areas and long term potential of risk. Investor confidence Affects site levels
Off-Site Disposal	All contaminants of concern	<ul style="list-style-type: none"> Quick Suitable for untreatable contaminants 	<ul style="list-style-type: none"> High cost Unsustainable Traffic impact

Option	Applicable Contaminants	Advantages	Disadvantages
Stabilisation/ Solidification	All contaminants of concern	<ul style="list-style-type: none"> Is able to stabilise all contaminants of concern 	<ul style="list-style-type: none"> High cost Contaminants are not eliminated Can cause drainage problems due to reduced permeability

As the lead and PCBs/transformer oil in the Made Ground does not present a significant risk to human health when covered by hard standing, the areas that require mitigation in the context of the proposed development are the areas of soft landscaping. A cover system or source removal are therefore viable options to address the lead and PCBs/transformer oil risks in the areas of proposed soft landscaping as these will break the direct contact and ingestion pathways.

Due to the contaminated Made Ground in the area of concern having been recorded to extend to a maximum depth of 0.5mbgl during the GCC investigation, it is considered to potentially be cost effective to remove all of the Made Ground and any evidence of oil contamination beneath it in the soft landscaped areas, as a remedial solution. A certain amount of source removal will be required to be replaced with Topsoil anyway to accommodate the imported soils of the cover system and this may require the removal of much, if not all of the contaminated soil anyway.

Stabilisation and solidification are not considered likely to be viable due to the cost and constraints created by the stabilised material.

In the event that asbestos containing materials are encountered in the soil during the development of the site, hand picking of visible asbestos containing materials (ACM) and off-site disposal of these materials could be a viable approach for reducing the asbestos content of the Made Ground on site, but it is not viable to remove all of the asbestos from the soil this way, including microscopic fibre bundles and debris, which would leave a residual risk from the soil. The fibre bundles and debris frequently give rise to greater risks than asbestos cement sheet fragments as there can be a greater risk of fibres becoming airborne from the degraded material. While hand picking and off-site disposal of ACM fragments may reduce the risks associated with exposed Made Ground, this is not considered to be a complete remedial solution.

4. REMEDIATION STRATEGY

4.1 GENERAL

The following Remediation Strategy is intended to address the risks associated with the identified lead and PCBs/transformer oil impacts to the Made Ground and possibly localised natural soils in the walled area adjacent to the north of the west wing of the mansion house.

The ground conditions and contamination regime on the site are considered to be sufficiently well understood from the investigation works undertaken to date that a detailed design of the remediation measures for the site can be presented.

4.2 REMEDIATION SOLUTION SELECTION

The primary contamination risk drivers for the site are lead and PCBs/transformer oil impacts to the Made Ground and possibly localised natural soils. The primary options for remediation of these contaminants are currently an engineered cover system or excavation and off-site disposal.

With regard to sustainability and cost criteria, it is preferable to retain as much material on site as possible and adjust the site levels accordingly. However, it is anticipated that the site levels can not be significantly adjusted and excavation of existing Made Ground will be required.

The most appropriate remedial option for the areas where residual Made Ground is present is therefore considered to be the placement of an engineered cover system in areas of soft landscaping as this is a relatively low cost solution that can be integrated with the proposed development works. Hard covered areas, such as beneath patios and pathways, are not considered to require any additional cover measures. Clean corridors for services through Made Ground, lined with geotextile membrane, will also be required.

Where Made Ground is thinner than the proposed cover system, source removal of the Made Ground would become the default remedial solution in these areas.

4.3 COVER SYSTEM DESIGN

The cover system is intended to be placed in areas of soft landscaping where Made Ground or evidence of transformer oil contamination remains at the base of the cover system excavation. Where a cover system excavation reaches natural soil prior to the target depth for the cover system excavation, no further remediation is required in these areas. i.e. remediation via source removal will have been considered to have been undertaken.

4.3.1. Guidance

Design guidance is available for simple cover systems, being uncompacted soil placed on contaminated soil, in Cover Systems for Land Regeneration (BRE 465, March 2004). However, to avoid soil mixing, the cover system is to include a geotextile membrane to prevent the migration of contaminated soil to the ground surface and to act as a marker layer for people excavating in the cover material.

The incorporation of a geotextile membrane makes the cover system an engineered system rather than a simple system, such that the calculations used in BRE 465 are no longer applicable. It is also noted that many regulators disapprove of the use of the approach in BRE 465. Reference has therefore also been made to Barriers, Liners and Cover Systems for Containment and Control of Land Contamination (CIRIA Special Publication 124, 1996).

BRE 465 does, however, provide some useful general guidance for cover system thicknesses that can be applied to the design of engineered cover systems. The first point of note is that a literature review undertaken as part of the preparation of BRE 465 determined that excavation depths by residential gardeners will typically not exceed 600mm (two times a standard spade length of 300mm) and that any digging by children or pets is also not likely to exceed 600mm. This dimension is used as the mixing zone in the design calculations for simple cover systems. The second point of note is that BRE 465 recommends that if a cover system is required, it should have a minimum thickness of 300mm.

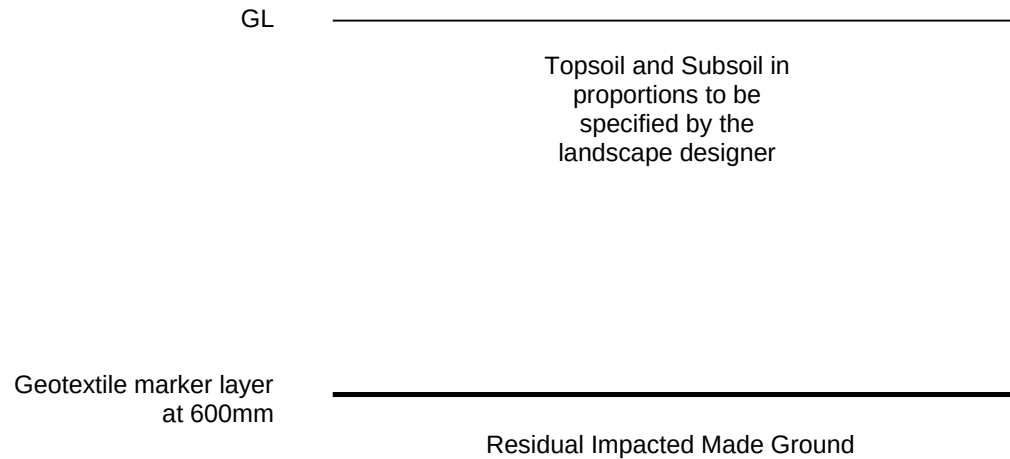
It is further understood that BS 3882 specifies a minimum rooting depth should be normally, 450mm for grass, 600mm for shrubs and 900 mm for trees. The depth of topsoil spread should not normally exceed 300mm, with suitable subsoil providing the remaining depth.

4.3.2. Main Cover System Design

Therefore, it is proposed that a cover system comprising 600mm of suitable for use topsoil and sub-soil (in proportion to be specified by the landscape designer) is placed over a robust permeable geotextile marker membrane (Terram Hi-Vis or similar) in the area where shrubs are proposed.

Where excavations into the existing Made Ground are required to create sufficient depth for the cover system to be installed, the geotextile is to be returned up the sides of the excavation to maintain separation between the imported cover material and the adjacent existing Made Ground.

Cover System Diagram for Areas with Shrubs:

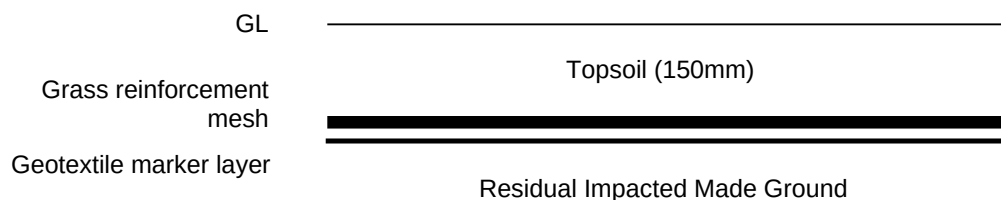


In areas of the proposed soft landscaping where residual Made Ground remains that overlap with the root protection areas (RPAs) of the remaining trees, it is not viable to install a 600mm thick cover system. These areas will therefore be laid to lawn with an underlying make up of 150mm of topsoil over a GR10 grass reinforcement mesh or similar over a permeable geotextile marker membrane (Terram Hi-Vis or similar).

The purpose of the reinforcement mesh is to create a thin permeable layer that will resist excavation and the permeable geotextile marker membrane will prevent soil mixing with the underlying Made Ground.



RPA Cover System Diagram:



4.3.3. Tree Pits

Where tree pits are required, designs are to be proposed by the landscape designers, on the basis of separation of the imported growing medium and any residual contaminated soil, and agreed with the geo-environmental consultant.

4.3.4. Imported Cover Material Quality

For imported cover material to be considered suitable for use at this site, from a human health risk perspective, the contaminant concentrations present within the soil are not to exceed the assessment criteria presented in Appendix 2. Chemical analysis is to be undertaken by a UKAS accredited laboratory and be MCERTS compliant, where possible. **The soil should also be free from asbestos with negligible quantities of metals, plastic, wood, glass, tarmac, paper and odours associated with contaminated soils** and topsoil should also comply with the requirements of BS 3882 – Specification for topsoil and requirements for use. It is noted that where soils are imported from anywhere other than a virgin source, there is a potential for minor quantities of anthropogenic inclusions, but these are to be kept to a minimum.

Any imported soil brought to site is to be inspected on arrival and any soil deliveries with more than trace amounts of man-made materials is to be rejected and returned to the supplier. It is recommended that the supplier is warned of this before dispatching the soil to prevent unsuitable soil being delivered to site.

Site won soil from the wider development can be used in the cover system, subject to testing to confirm suitability for use.

4.4 PHASING OF REMEDIATION

Source removal works and preparation of the ground levels to accommodate the cover system will follow the decommissioning and removal of the live electrical substation, which is anticipated to be towards the end of the development works. Excavation and replacement of imported soils are anticipated to be in quick succession to avoid damage to the existing perimeter wall.

Placement of cover system membranes and imported soils will be undertaken as part of the landscaping works, towards the completion of the development.

4.5 LONG TERM MONITORING AND MAINTENANCE

The source removal works do not require long term monitoring or maintenance.

The cover system has been designed such that penetration of the cover system is not anticipated as part of ongoing operation and maintenance of the site and associated soft landscaping.

5. VERIFICATION PLAN

5.1 SOURCE REMOVAL

This approach would be used where excavations to allow for the placement of a cover system remove all of the Made Ground and evidence of transformer oil contamination from a particular area of proposed soft landscaping.

Documentation detailing the movement of contaminated soils dispatched from the site will be collated and issued together with the results of confirmatory verification sampling works from completed remediation excavations. The Verification Report will include the following information as a minimum:

- As built drawings (illustrating the extent of remediation and verification works);
- Photographic records;
- The environmental suitability of any retained materials;
- Validation results of the excavations;
- Duty of Care confirmation of any materials removed from site; and
- Discovery strategy findings.

To demonstrate that any remaining material is chemically suitable for the intended residential end use of the site, verification of soil conditions at the margins of excavation will be required. Verification of the residual conditions will include laboratory sample collection at a frequency not less than:

- 1no sample from the base of the excavation.
- 4no samples from retained soil around the perimeter of the excavation

The distribution of sampling may be adapted if the site excavation is taken up to existing walls and foundations, such that there is a greater focus on the base of the excavation.

The soils verification criteria are provided in Appendix 2. These conservative screening criteria have been proposed based on current site knowledge that contamination is in a fairly limited area.

5.2 COVER SYSTEM

An essential element of the performance of a cover system is assurance that it has been installed in accordance with the design. Consequently, the installation of the cover system will be verified upon completion. This will involve two components.

The first component is to confirm that a sufficient cover thickness has been installed and will involve a minimum of two visits by a GCC engineer during the excavation works and on completion of the placement of the cover system to excavate through the cover in a number of locations to ensure a sufficient sub-soil and topsoil thickness has been placed. Evidence of level survey data before and after the placement of the cover system may also be used to verify the cover thickness.

The second component is to sample the imported cover material delivered to site to confirm that the cover material delivered and placed on site is chemically consistent with the material sampled by the supplier and to provide a baseline contamination status of the areas of soft landscaping prior to occupancy of the development to enable comparison to any possible future investigation of the site. The imported soil should be **free from asbestos with negligible metals, plastic, wood, glass, tarmac, paper and odours associated with contaminated soils** and topsoil should also comply with the requirements of BS 3882:2007 – Specification for topsoil and requirements for use.

Any imported soil brought to site is to be inspected on arrival and any soil deliveries with more than trace amounts of man-made materials is to be rejected and returned to the supplier. It is recommended that the supplier is warned of this before dispatching the soil to prevent unsuitable soil being delivered to site.

A sampling frequency of 1 sample per 40 m³ is required where the soils are from a natural source. A minimum of 2 samples are required for each soil type imported (topsoil, subsoil etc). For recycled or manufactured topsoil, or where the source of the soil is unknown, a sampling frequency of 1 sample per 20 m³ is required. Again, a minimum of 2 samples is required.

Site won soil from the wider development can be used in the cover system, subject to testing to confirm suitability for use.

All soil samples are to be analysed for the suite of contaminants identified in Appendix 2 and are to be analysed by a UKAS accredited laboratory and be MCERTS compliant, where possible.

The results of these verification procedures will be reported in a verification report following completion of the installation of the cover system. This verification report will also contain copies of the chemical analysis results for the imported cover material and an assessment of these results against the adopted assessment criteria to verify that the material is suitable for the proposed use.

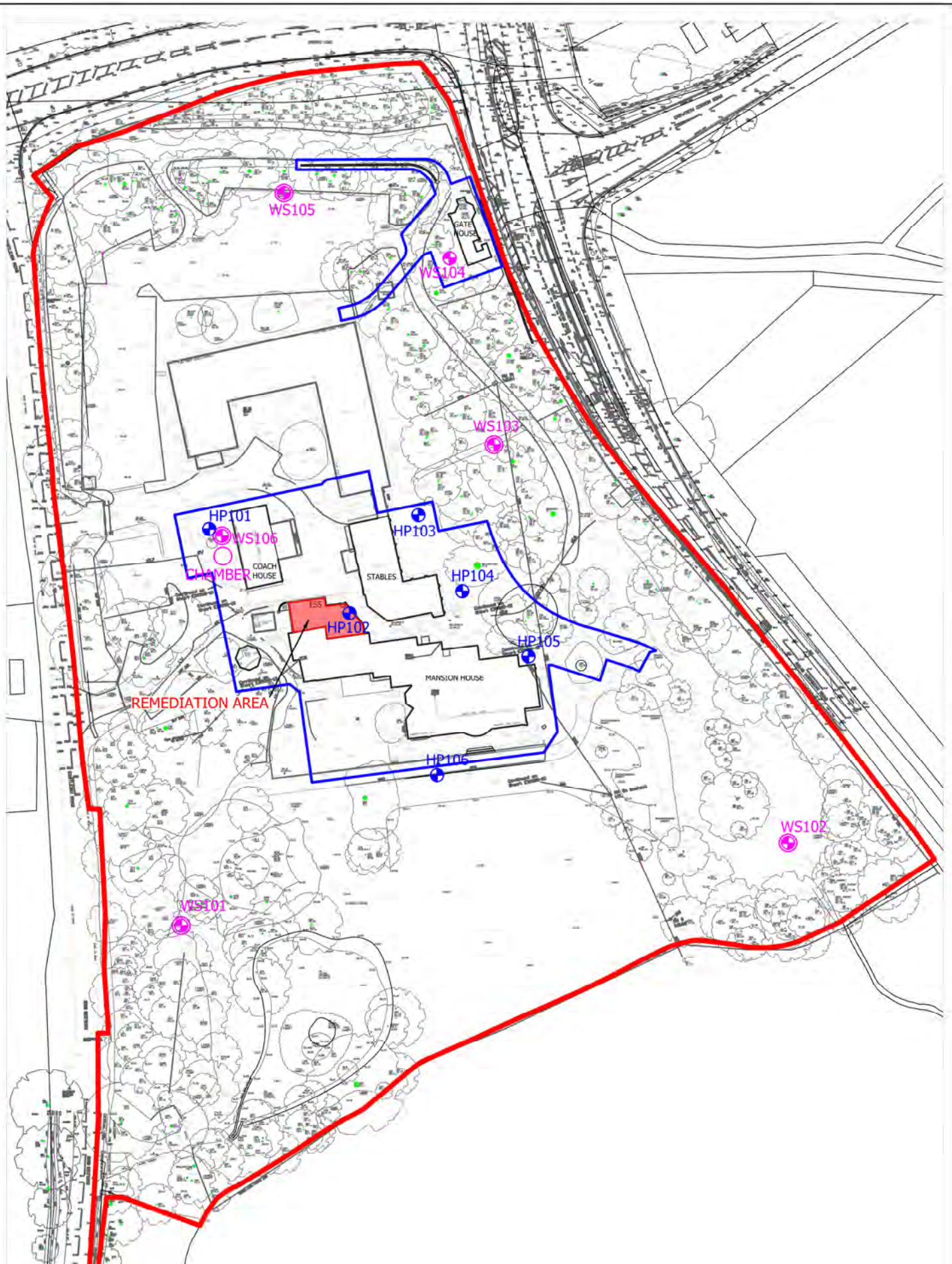
The final verification report should be a slim report that includes:

- The plan of soft landscaping, annotated with the as built cover depths and membrane details.
- The original chemical test certificates of the imported soil provided by the supplier.
- Transfer notes showing the source and quantity of the imported soil.
- Photographs of cover system soil and membrane placement works in progress.
- The original analysis results for the verification samples and screening results to demonstrate compliance with the assessment criteria presented in Appendix 2.

6. DISCOVERY STRATEGY

A Discovery Strategy is presented in Appendix 3 detailing the evidence of contamination all site personnel should be vigilant for during the development and the procedures to be followed in the event that such evidence of contamination is encountered. It is recommended that these procedures are included in the site induction for development workers and are available to site staff for reference during the development.

FIGURE 1: REMEDIATION PLAN



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client BARGATE HOMES
site SOUTHLEIGH PARK, HAVANT
title REMEDIATION PLAN

scale NTS	drawn by AP	checked by RP
date 15 JUL 2025	job no J25-046	
drawing number	FIGURE 1	
	0	

APPENDIX 1: REPORT CONDITIONS

This report is produced solely for the benefit of **FSL Group Ltd** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the Site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the Site.

This report is based on a visual Site inspection, study of readily accessible referenced historical records, information supplied by those parties noted in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented in good faith without exhaustive clarification. Where ground contamination is suspected but no physical Site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to detailed activities related to the Site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, not revealed by this research cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question, as such bodies may have unpublished, often more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Ground Condition Consultants Ltd. In time improved practices or amended legislation may necessitate a re-assessment.

The report is necessarily limited to those aspects of land contamination specifically reported on and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents that may occur. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous use and abuse of the Site and adjacent Sites. The report concentrates on the Site as defined in the report and provides an opinion on surrounding Sites. If migrating pollution or contamination (past or present) exists this can only practically be better assessed following extensive on and off Site intrusive investigations and monitoring.

APPENDIX 2: ASSESSMENT CRITERIA

SOIL - HUMAN HEALTH SCREENING VALUES

Status	End Use	Issue No	Issue Date
ISSUE	Residential with Homegrown Produce	1	June 2015

Determinand	Units	SOIL ORGANIC MATTER			SOURCE
		1 %	2.5 %	6 %	
pH		<5, >9			
Asbestos	%	Presence			
HEAVY METALS/METALLOIDS					
Arsenic	mg/kg	37			S4UL
Cadmium	mg/kg	11			S4UL
Chromium (III)	mg/kg	910			S4UL
Chromium (VI)	mg/kg	6			S4UL
Lead	mg/kg	200			C4SL
Mercury (Inorganic)	mg/kg	40			S4UL
Nickel	mg/kg	130			S4UL
Selenium	mg/kg	250			S4UL
Boron	mg/kg	290			S4UL
Copper	mg/kg	2,400			S4UL
Zinc	mg/kg	3,700			S4UL
GENERAL INORGANICS					
Easily Liberatable Cyanide (free)	mg/kg	36			Acute effects infant 1 dose 3g soil
US EPA PRIORITY PAHs					
Acenaphthene	mg/kg	210	510	1100	S4UL
Acenaphthylene	mg/kg	170	420	920	S4UL
Anthracene	mg/kg	2,400	5,400	11000	S4UL
Benzo(a)Anthracene	mg/kg	72	11	13	S4UL
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	S4UL
Benzo(k)fluoranthene	mg/kg	77	93	100.0	S4UL
Benzo(g,h,i)perylene	mg/kg	320	340	350	S4UL
Benzo(a)Pyrene	mg/kg	2.20	2.7	3	S4UL
Chrysene	mg/kg	15	22	27.0	S4UL
Di-benzo(a,h)anthracene	mg/kg	0.24	0.28	0.30	S4UL
Fluoranthene	mg/kg	280	560	890	S4UL
Fluorene	mg/kg	170	400	860	S4UL
Indeno(1,2,3-cd)pyrene	mg/kg	27.0	36	41.0	S4UL
Naphthalene	mg/kg	2.3	5.6	13.0	S4UL
Phenanthrene	mg/kg	95	220	440	S4UL
Pyrene	mg/kg	620	1200	2000	S4UL
Total PAHs	mg/kg	No Sum	No Sum	No Sum	
Phenolics					
Phenol	mg/kg	280	550	1100	S4UL
Chlorophenols	mg/kg	0.87	2.00	4.50	S4UL
Pentachlorophenol	mg/kg	0.22	0.52	1.20	S4UL
TPH					
TPH Aliphatic >C5-6	mg/kg	42	78	160	S4UL
TPH Aliphatic >C6-8	mg/kg	100	230	530	S4UL
TPH Aliphatic >C8-10	mg/kg	27	65	150	S4UL
TPH Aliphatic >C10-12	mg/kg	130	330	760	S4UL
TPH Aliphatic >C12-16	mg/kg	1100	2,400	4,300	S4UL
TPH Aliphatic >C16-35	mg/kg	5,000	5,000	5,000	Nominal Limit
TPH Aliphatic >C35-44	mg/kg	5,000	5,000	5,000	Nominal Limit
TPH Aromatic >EC5-7 (Benzene)	mg/kg	70	140	300	S4UL
TPH Aromatic >EC7-8	mg/kg	130	290	660	S4UL
TPH Aromatic >EC8-10	mg/kg	34	83	190	S4UL
TPH Aromatic >EC10-12	mg/kg	74	180	380	S4UL
TPH Aromatic >EC12-16	mg/kg	140	330	660	S4UL
TPH Aromatic >EC16-21	mg/kg	260	540	930	S4UL
TPH Aromatic >EC21-35	mg/kg	1100	1,500	1,700	S4UL
TPH Aromatic >EC35-44	mg/kg	1100	1,500	1,700	S4UL
TPH Aliphatic & Aromatic >EC44-70	mg/kg	1,600	1,800	1,900	S4UL
Total TPH	mg/kg	5000	5000	5000	Nominal Limit
BTEX					
Benzene	mg/kg	0.087	0.17	0.37	S4UL
Toluene	mg/kg	130	290	660	S4UL
Ethylbenzene	mg/kg	47	110	260	S4UL
m-Xylene	mg/kg	60	140	330	S4UL
o-Xylene	mg/kg	59	140	320	S4UL
p-Xylene	mg/kg	56	130	310	S4UL

NOTES

- 1) Compare individual samples values against Soil Screening Values (SSV). If exceedences are noted consider further in relation to averaging areas and statistical analysis.
- 2) These values are for initial screening for potential risk to human health only. They are **not remediation thresholds. Screening for other receptors to be done separately as appropriate for the site, e.g. for water, ecology, building materials.**
- 3) Screening criteria denoted with an asterix (*) were capped at the lower vapour/aqueous saturation limits for Tier 1 human health risk assessment purposes and considered conservative. Where concentrations are recorded at levels greater than the SSV, free phase (NAPL) contamination may be present and should be considered qualitatively. Further information to support the interpretation of assessment criteria that exceed theoretical soil saturation limits is provided in Section 4.12 of the CLEA Software Handbook (SR4).
- 4) Screening criteria denoted with hash (#) were capped at 1000000mg/kg. It is noted that aesthetic (e.g. odour) and other site specific factors may also be relevant when providing advice relating to these compounds.
- 5) LQM/CIEH S4ULs November 2014 - Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3439. All rights reserved.
- 6) SSVs derived for certain constituents may be low in relation to standard laboratory Limits of Detection (LoD). It is the responsibility of the project engineer to check with the laboratory that appropriate detection limits can be achieved. As a target, an LoD would be no larger than 10% of the SSV, but this is not practicable for some constituents. Clearly an LoD greater than the SSV would prevent use of this SSV screening and/or be interpreted as if all samples exceeded the SSV.
- 7) Human Health Soil Screening Values (SSV) were calculated using a Soil Organic Matter (SOM) value of 1.0%, 2.5% and 6%. This is equivalent to an Fraction Organic Carbon (FOC) values of approx. 0.6%, 1.45% and 3.5% respectively (For reference $FOC = 0.58 \times SOM$). Note that some soils have different SOM/FOC, which may require more stringent SSVs for organic compounds. It is the responsibility of the project engineer to check the SOM with the site specific conditions.
- 8) In general, SSVs above 100mg/kg are rounded down to 3 significant figures. Similarly, SSVs below 100mg/kg are rounded down to 2 significant figures

APPENDIX 3: DISCOVERY STRATEGY

Attn: Ground Works Contractors

Southleigh Park Conversion Area – Discovery Strategy

Background

This document presents a brief summary of the actions to be taken if suspected contamination of the soil or groundwater is encountered during the development of the site and follows on from the GCC Generic Quantitative Risk Assessment Report and Remediation Strategy.

Evidence of contamination

Any evidence of contamination is likely to be in the following form, although other indicators may be observed.

- Dark staining of the soil
- Ash in soil
- Oily sheen on soil or water
- Tanks and pipework
- Smell of oil/diesel/petrol
- Asbestos containing material fragments
- Large deposits of made ground (e.g. waste deposits)
- Broken glass on and in the ground

Actions following identification of evidence of contamination

Contractors encountering evidence of contamination are to report the discovery to the site office.

- Further development of the potentially contaminated area should cease and Site Engineer should contact the Client's Environmental Consultant to attend site and assess the implications of the discovered impact.
- The Environmental Consultant will in turn inform the Local Authority and/or the Environment Agency as appropriate.
- Potentially contaminated material is to be left in situ where possible, or stockpiled in bunded areas where it is not possible to leave in situ, until an assessment is complete and appropriate action is agreed with the relevant regulator. Bunds are to be lined with plastic sheeting to prevent leaching of contaminants to the underlying soil and to allow a clear distinction between the suspected contaminated soil and the material used to form the bund.
- Potentially contaminated material to be disposed of off site may require further chemical testing.