

**Discovery Strategy, Remediation Strategy
and Verification Plan** | Residential Development



Report prepared at

Land at Johnson Drive
Finchampstead
RG40 3NW

On behalf of

Palatine Homes Limited

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Prepared by

Aviron Associates Limited

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1.0 PROJECT AND SITE INFORMATION

1.1 APPOINTMENT

Aviron Associates Limited (Aviron) was retained by Palatine Homes Limited (the “Client”) to prepare and complete a Discovery Strategy, Remediation Strategy and Verification Plan of the following premises:

Land at Johnson Drive, Finchampstead, RG40 3NW (hereafter referred to as the “site”).

The report shall present the summary of the recently issued Supplementary Site Investigation (SSI) and Generic Quantitative Risk Assessment (GQRA), referenced 23-176.02 version 2 and dated December 2024 enabling the preparation of the Discovery Strategy (DS), Remediation Strategy (RS) and Verification Plan (VP).

Aviron has relied upon information received from the Client and their agents as accurate, unless contradicted by written documentation or site observations.

1.2 THE SITE

Table 1.2 provides a summary of site details and surrounding area.

Table 1.2: Site Details	
Site Location	The site is located at the northern end of Johnson Drive, off Nine Mile Ride (B3430), approximately 2km to the north-east of Finchampstead. Figure 1 is presented as a Site Location Plan.
National Grid Ref.	Centred at 480592 165179.
Current Land Use	The site is split into two distinct areas, one in the north of the site accessed using a tree-lined gravel track leading off Johnson Drive in the south-west of the site, and the other in the south of the site via the garden of 6 Johnson Drive to the south. Northern two-thirds of the site: an area comprising disused land and woodland, used for the storage of building materials, a stockpile of crushed concrete and soil understood to have resulted from the excavation of a swimming pool to the adjacent home. Two buildings/workshops are also located in the south-east of this area. Southern third of the site: a section of the rear garden of the adjacent number 6 Johnson Drive, including landscaped borders and trees. An equestrian building is also located in the north-east of this area. Figure 2 is presented as the Existing Site Layout Plan.
Surrounding Land Use	The site is located within an urban area with homes to the south and west, and woodland to the north and east.
Proposed Land Use	The proposed development comprises the construction of eight new detached homes and garages with private gardens, and an access road running along the northern boundary and into the centre of the site at three locations. Figure 3 is presented as the Proposed Development Plan.

1.3 ENVIRONMENTAL RISK SUMMARY

Table 1.3 summarises the pertinent environmental risks providing advice on further works and assessment.

Table 1.3: Environment Risk Summary		
Item	Risk Description	To be addressed?
Aviron Recommendations		
1	Local Polycyclic Aromatic Hydrocarbon (PAH) contamination within Made Ground in the east of the site around existing workshops (Plots 3 and 4 gardens)	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to detail a remedial method to address the PAH soil contamination shown within Figure 4 .
2	Asbestos Containing Soils (ACS) detected in the north of the site (Plots 1 and 2 gardens) in 2017 but not in 2023.	ACS were encountered during this recent investigation within the re-worked Clay sampled at HP15 within the rear garden of Plot 1. A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to detail a remedial method to address the ACS soil contamination shown within Figure 4 .
3	Potential for undiscovered soil contamination during workshop removal	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to address this aspect.
4	Any imported Topsoil should be chemically suitable for use in private gardens.	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to provide a criterion for the re-use and import of suitable Topsoil and sub-soil.
5	Ensure material encountered is suitable for desired water main.	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared with the recommendation to consult local water authority prior to water main installation.
6	Ingress of hazardous ground gases (CH ₄ + CO ₂) into new homes and depleted oxygen.	A final round of worst-case round of ground gas monitoring has concluded the gas risk assessment and characterised the site as CS1. Gas protection shall not be necessary.
WBC Requests		
7	Review recently moved soil locations and historic burn sites to ensure they have been included in the site analysis.	Supplementary investigation has recorded acceptable concentrations of all determinants analysed, with the exception of ACS within HP15. Where HP14 was completed in the rear garden of Plot 6 where moved soil was present, determinant concentrations are acceptable and compliment previous investigation. In the area of historic burning to rear gardens of Plots 1 and 2 a remedial cover system is proposed.

The aim of the remediation is not necessarily to remove all contamination identified on site but to reduce the identified risk to an acceptable level with respect to human health.

This DS, RS and VP in addition to a Material Management Plan (MMP) remains a live document and as necessary may need update and amendment as and when required, should conditions or works change in response to any unexpected contamination uncovered as part of the DS. The essence of this report shall form a working document in line with the Definition of Waste Code of Practice (DOWCOP).

Verification of the works would be documented within a separate Verification Report for submission to the Local Planning Authority (LPA), other regulators and project stake holders.

2.0 RISK MITIGATION BY CONSTRUCTION DESIGN

The following should be completed during the design stage and well in advance of commencing remedial works on-site.

2.1 WATER MAIN SUPPLY

Special design for domestic water supply is unlikely to be required. However, to be certain, it is advised that the report should be provided to the local water authority to ensure the correct materials are chosen for water supply pipes. Following the formal withdrawal of WRAS Guidance Note No. 9-04-03 (October 2002), it is recommended that the following reference should be consulted:

Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21 by the UK Water Industry Research Ltd (UKWIR); ISBN: 1 84057 5697.

Generally, all services should be placed within dedicated runs, and then backfilled with clean imported material.

3.0 DISCOVERY STRATEGY

3.1 DISCOVERY STRATEGY

Whilst the investigations undertaken on the site to date have been as thorough as conditions allowed, it remains possible that previously unexpected soil conditions may be encountered during the construction process. Examples may include a potential for asbestos, remnant demolition materials containing deleterious substances, black ash materials, soils exhibiting strong odours, brightly coloured materials, and oily pockets within the soil.

During site clearance and groundworks all site operatives should be briefed on the discovery strategy, which provides an action plan should potentially contaminated materials be identified during the works.

The Discovery Strategy flow chart should be:

1. Affixed to the site office notice board;
2. Form part of the site induction for all operatives; and
3. Form part of the site health and safety file.

The Discovery Strategy flow chart is presented as **Appendix I**. This should be printed and laminated.

Each site operative should be aware of their duties in the event of a potential 'contamination' discovery.

Any discovery of previously undiscovered contamination should be reported to the LPA and appropriate management of this must be approved by the LPA.

The action of discovery applies in the event suspected soil contamination is discovered. Thus, variations to this plan may be necessary following the results of 'Discovery Works' and, should this be so, further revisions of this RS shall be prepared and consulted; hence this report remains a live document.

4.0 OUTLINE REMEDIATION AND VERIFICATION APPROACH

Laboratory analysis completed during two phases of investigation has recorded Lead, PAH and asbestos contamination, which is illustrated in **Figure 4**, which as a result it is considered that a remedial clean cover system shall be required to the side/frontage of Plot 4, rear garden of Plot 3 and front and rear gardens to Plots 1 and 2 as shown in **Figure 5**.

The basic concept to achieve the remedial objective shall follow the process outlined below:

1. Cutting of site levels to arrange levels in advance of construction.
2. Sorting and screening of arisings to determine waste streams for which there is likely to be material generated for off-site disposal and potentially re-used as engineering fill as a sub-capping layer beneath cover systems or beneath permanent hardstanding.
3. Stage 1 of verification, the selection and verification of soils (Sub-soil/Topsoil) suitable for (re)use within a clean cover system and also general soft landscaping and also as engineering fill.
4. Stage 2 of verification to inspect and verify the construction of clean cover systems

4.1 STEP 1 - CUTTING OF SITE LEVELS/GROUNDWORKS EXCAVATIONS

Advancement of the cut (and fill) process to facilitate development levels and groundworks excavations.

This process shall be managed by the Client's principal contractor, with any necessary support from the Client's remediation contractor and in accordance with an approved MMP.

4.2 STEP 2 - SOIL SCREENING FOR RE-USE OR DISPOSAL

Excavated soil resultant of the controlled source removal shall be managed by the Client's appointed contractor and involve continued controlled excavation, manual picking and processing to enable material re-use as engineering fill or off-site waste disposal. The process shall form part of the sites Materials Management Plan (MMP).

The process of soil screening is designed to:

-  render soils suitable for re-use, as engineering fill, below a cover system or permanent hardstanding;
or
-  licensed off-site disposal where any pockets of gross contamination or unpickable (ACMs) are encountered.

The criteria for re-use of engineering fill are documented within section 6.0.

4.3 STEP 3 – STAGE 1 VERIFICATION - SELECTION OF SOILS FOR COVER SYSTEM AND SOFT LANDSCAPING

The majority of the site is uncultivated grass land formerly used and generally overlain by a re-worked Topsoil supporting growth of the existing vegetation. Consideration of **Figure 4** indicates the majority of the northern and western areas of the site have not recorded chemical or asbestos contamination. Thus, in the interest of sustainability and subject to approval of a MMP it is proposed to undertake a process of re-worked Topsoil recovery and processing which may render the recovered re-worked Topsoil suitable for re-use in soft landscaped or garden areas as either Sub-soil or Topsoil.

This process shall be managed by the Client's principal contractor, with any necessary support from the Client's remediation contractor and in accordance with an approved MMP.

Areas of existing vegetation where overlying re-worked Topsoil is anticipated shall be subject to a controlled 'Topsoil strip' where segregation shall be completed according to visible quality of the material.

The criteria for re-use of engineering fill (and soft landscaping soil, if suitable) is documented within section 6.0.

4.4 STEP 4 – STAGE 2 VERIFICATION OF COVER SYSTEM

The overlying soils (south and east of the site) have recorded Lead, PAH and asbestos contamination and therefore a remedial cover system will be necessary as defined by **Figure 5**.

Any remedial cover system shall require verification of construction, thickness of soils, physical/chemical quality of soils and the presence of a suitable membrane or non-dig layer.

5.0 CONTAMINATED SOIL REMOVAL METHOD

It is the responsibility of the Principal Contractor and their appointed sub-contractors to implement and manage safe systems of work and prepare their own risk assessments in accordance with Health and Safety legislation in order to protect persons in their employ, as well as mitigate the risk of harm to others due to works in their control.

Special consideration should be given to the provisions of the Construction (Design & Management) Regulations 2015, Health and Safety at Work Act and the Control of Substances Hazardous to Human Health regulations to protect the safety of persons in their employment. Additional guidance can be sought from the CIRIA publications entitled "A Guide for Safe Working on Contaminated Sites" and "Environmental Good Practice on Site Guide (fourth edition)".

Given the presence of asbestos within the Made Ground soils, the contractor should also ensure their compliance with the Control of Asbestos Regulations 2012. All work with asbestos containing materials and asbestos containing soils should be undertaken by a suitably competent contractor (and as necessary licensed contractor) who should prepare an asbestos specific risk assessment and plan of work detailing the control measures to be applied when working with the asbestos containing materials/soils. The contractor should also assess whether the work would be considered licensable and/or notifiable under the Control of Asbestos Regulations 2012.

In addition to the safe systems of works to be implemented alongside appropriate risk assessments and method statements, all site personnel shall benefit from on-site hygiene facilities including wash area, toilets and drying room. Separate canteen areas and welfare facilities should be provided. All eating and drinking should be restricted to the canteen area and only once site personnel have removed outer PPE and washed exposed skin.

In the event of dry spells, or where the exposed surface becomes dry, regular damping down of the surface of the site will be required to prevent the release of soil dust which could impact on site operatives or migrate off-site, thereby mitigating both off-site exposure and nuisance for neighbours.

5.1 REMEDIATION METHOD STATEMENT – EXCAVATION OF CONTAMINATION

The following types of waste streams are anticipated:

1. Made Ground/re-worked topsoil/building debris with inclusions of Asbestos Containing Materials (ACMs) and Asbestos Containing Soils (ACS). These are shown on **Figure 4** with a yellow 'A'.

2. Made Ground without ACM/ACS.
3. Natural re-worked strata.

5.2 ANTICIPATED ACM/ACS – EAST OF SITE

Figure 4 identifies positions of known asbestos soil contamination. Given the pervasive nature of asbestos and the distribution of the contaminants it is considered the entire overlying unit of Made Ground should be considered as the Asbestos Remediation Area (ARA). The only area of the site which is presently shown not to be impacted by asbestos is the north-west corner, however, for the purpose of this exercise it should be assumed that ACS exist within the north-west of the site.

In compliance with CAR-SOIL™ Guidance, The CL:AIRE Joint Industry Working Group (JIWG) Decision Support Tool should be used in conjunction with other risk assessment to determine the Licensing Status of each area and required control measures, including RPE and decontamination requirements.

It is anticipated the majority of the works to be Non-Licensed Work (NLW), requiring only manual / localised dust suppression and basic personal decontamination facilities such as a 'staging' area for Personal Protective Equipment (PPE), boot washing etc.

A Dust Compression Unit (DCU) and plant / vehicle decontamination area are likely only necessary for Licensed Works (LW), which are expected to be minimal and shall be established by the appointed remediation contractor as part of their decision making using the JIWG and DST and risk assessments.

Following application of the JIWG DST it is anticipated works shall either be Non-Licensed Works or Licensed Works.

5.2.1 Non-Licensed Works

As a general approach the following shall be undertaken by the Client's appointed remediation contractor, following their own risk assessments and method statements:

1. Establish Asbestos Plan of Works (APoW) for Non-Licensed Works
2. Establishing a 'staging' area for donning PPE
3. Use of Cat-B trained personnel for hand-picking bonded asbestos fragments
4. Competent supervisor having attended CAR-SOIL course (or similar)

5. Reassurance / personal air testing to be carried out for respirable fibres, typically at a lesser frequency to Licensed Works
6. PPE worn in accordance with CAR-SOIL assessment, face-fit testing required for non-disposable half-face masks

5.2.2 Licensed Works

Works shall be completed under an ASB05 Notification by a Licensed Asbestos Removal Contractor (LARC) under the oversight of the principal Remediation Contractor by following their own risk assessments and method statements, which shall encompass:

- 🚧 Use of a Decontamination Unit, screened fencing to surround works area with viewing panels for clear transit of operatives into the ARA
- 🚧 Works under supervision of the LARC's certified Asbestos Supervisor
- 🚧 Consideration of plant / equipment decontamination within the ARA before leaving the area
- 🚧 Transit route for transport of waste from ARA to lockable storage skip required (unless within licensed ARA itself)
- 🚧 Higher frequency air testing to suit LARC asbestos licence requirements and Asbestos Plan of Works (APoW) – clearance test also required on site and in DCU prior to surrendering licence.

All works shall be continually assessed for changing conditions in relation to the presence / frequency / state of visible ACMs. Therefore, a Discovery Strategy shall implement situations 'where pockets of more frequent, higher-risk materials (such as pipe lagging or deteriorated AIB fragments), that are no longer deemed under CAR-SOIL Guidance to be sporadic and low intensity (SALIC), are encountered during the works, works shall cease, and the area shall be cordoned off / quarantined. The material should be subjected to bulk sample testing at a UKAS accredited laboratory and a decision made to up-grade the area to requiring Licensed Works under an ASB05 Notification to the HSE'.

5.3 NO ASBESTOS (ACS/ACM) CONTAMINATION ANTICIPATED

Following overlying Made Ground removal (presumed ACS) no special measures are considered necessary to remove the overlying (re-worked topsoil) and underlying natural soils which are currently not considered to contain (significantly) contaminated soils or ACM/ACS.

Notwithstanding the appointed contractor should ensure that:

1. The necessary material handling and waste segregation practices are observed to achieved material re-use.
2. In the event material is deemed unsuitable for re-use only registered waste carriers are used to dispose of materials at suitable and licenced waste management facilities.
3. All waste transfer notes are retained.
4. Advice presented within section 5.2 is considered in the event of an unsuspected ACM/ACS discovery. In the event of an unsuspected ACM/ACS discovery works should cease and a revised approach followed, which shall be compliant with the Control of Asbestos Regulations 2012. In such an event all work with ACM/ACS should be undertaken by a suitably competent contractor (and as necessary licensed contractor) who should prepare an asbestos specific risk assessment and plan of work detailing the control measures to be applied when working with the asbestos containing materials/soils. The contractor should also assess whether the work would be considered licensable and/or notifiable under the Control of Asbestos Regulations 2012.

6.0 VERIFICATION CRITERIA FOR SOIL RE-USE AND IMPORTED SOILS

This action forms Stage 1 of the Verification process.

Appendix II provides a criterion for the re-use of site-won soils required for both engineering fill, soft landscaping/gardens and also imported soils. Chemical and asbestos (contamination) Generic Assessment Criteria (GAC) are provided for the following types of soil for their re-use consideration:

-  Engineering fill to be used beneath any remedial cover system or permanent hardstanding.
-  Soft landscaping soils to be used in Public Open Space (POS).
-  Soft landscaping soils to be used in private gardens where homegrown produce can be grown.

6.1 RE-USED SOILS - ENGINEERING FILL

Excavated soil resultant of the cutting of site levels and groundworks shall be managed by the Client's appointed principal contractor/sub-contractor and involve continued controlled excavation and processing to enable material re-use as engineering fill or off-site waste disposal. The process shall form part of the sites MMP.

The process of soil screening is designed to:

-  render soils suitable for re-use, as engineering fill, below a cover system or permanent hardstanding;
or
-  licensed off-site disposal where any pockets of gross contamination or unpickable (ACMs) are encountered.

The criteria for **re-use of engineering fill** shall be as follows:

-  **Physical.** The material shall need to be void of anthropogenic and deleterious objects and also geotechnically suitable for proposed engineered fill use.
-  **Contamination.** The material should be sampled and laboratory tested, the results of which screened and be below the Public Open Space (POS) end use criteria set out in **Appendix II**. The POS criteria has been selected for use as engineering fill given this material is not intended for re-use in soft landscaping areas or cover systems. Therefore, as a means of confirming a suitable chemical composition the POS guidance has been selected. Furthermore, it is proposed that soils containing asbestos <0.1% (to confirm as non-hazardous) shall be suitable for re-use as engineered fill.

Appropriate material handling shall be required to prevent cross-contamination.

The environmental consultant or remediation engineer shall independently sample and test proposed engineering fill on-site and at a frequency of one composite test per 250cu.m of material designated for re-use. As a minimum at least three samples should be taken of the proposed engineering fill and submitted to a UKAS accredited laboratory for chemical testing as set out in **Appendix II**.

Should the soils destined for re-use as engineering fill fail the above criteria, they shall require off-site disposal.

6.2 RE-USED SOILS - LANDSCAPING SOIL

The majority of the site is uncultivated grassland, which generally overlain by a re-worked Topsoil supporting growth of the existing vegetation. Consideration of **Figure 4** indicates the majority of the northern and eastern area of the site have not recorded chemical or asbestos contamination. Thus, in the interest of sustainability and subject to approval within a MMP it is proposed to undertake a process of re-worked Topsoil recovery and processing which may result in the recovered re-worked Topsoil being suitable for re-use in soft landscaped or garden areas as either Sub-soil or Topsoil.

This process shall be managed by the Client's principal contractor, with any necessary support from the Client's remediation contractor and in accordance with an approved MMP.

The process of this soil screening is designed to:

-  render soils suitable for re-use, as soft landscaping soils within remedial cover systems or general soft landscaping areas; or
-  if soils fail the soft landscaping requirement, these may be suitable as engineering fill, below remedial cover system or permanent hardstanding; or
-  licensed off-site disposal where any pockets of gross contamination or unpickable (ACMs) are encountered or the soil is geotechnically unsuitable for (re)use.

Areas of existing vegetation where overlying re-worked Topsoil is anticipated shall be subject to a controlled 'Topsoil strip' where segregation shall be completed according to the visible quality of the material.

Excavated material visually classified as Topsoil/re-worked Topsoil may be subject to treatment by manual picking to improve the texture of the material. As necessary the recovered material may be blended with compost and imported 'clean' sand to improve the organic content and texture of the soil.

The criteria for **re-use of landscaping soils (sub-soil/Topsoil)** shall be as follows:

-  **Physical.** The material shall need to be void of anthropogenic and deleterious objects and present a suitable soft texture and organic content for use within soft landscaping and garden areas.
-  **Contamination.** The material should be sampled and laboratory tested, the results of which screened and be below the private gardens or communal gardens end use criteria set out in **Appendix II** whereby asbestos shall be recorded as 'no asbestos detected'. The private gardens and POS criteria shall be adopted and dependent on the destination/end use of the material.

The environmental consultant or remediation engineer shall independently sample and re-used landscaping soils at a frequency of one composite test per 50cu.m based on the soils being manufactured soils. As a minimum at least three samples should be taken of the imported soil types and submitted to a UKAS accredited laboratory for chemical testing as set out in **Appendix II**.

6.3 IMPORTED LANDSCAPING SOILS

Where re-used soils are insufficient or unsuitable imported soils can be procured on a suitable for use basis.

The following process is recommended:

1. Checking the suppliers test certificates/reports for any soils to be imported to site to confirm the provenance of the supply chain.
2. Performing a visual/olfactory inspection of the imported material prior to placement in the proposed areas to ensure the material is void of anthropogenic and deleterious objects. If the material is physically unstable it should be rejected.
3. The environmental consultant or remediation engineer shall independently sample and test Subsoils and Topsoil once on-site and at a frequency of one composite test per 50cu.m for manufactured Subsoil/Topsoil or 250cu.m for Subsoil/Topsoil from a Greenfield source. As a minimum at least three samples should be taken of the imported soils and submitted to a UKAS accredited laboratory for chemical testing as set out in **Appendix II**.
4. Should imported soils fail the criteria set out in **Appendix II** the material should be rejected, removed from site and returned to the supplier or suitability disposed. The Client should manage the contractual necessities of this action.
5. With regard to the chemical selection criteria in **Appendix II** the guidelines for private gardens and

POS criteria shall be adopted and dependent on the destination/end use of the material.

Any imported soils should be considered from either reputable manufacturers or CL:AIRE Donor Sites. In either event the above verification process to determine suitability for use should be completed.

7.0 REMEDIATION STRATEGY – CLEAN COVER SYSTEM

7.1 REMEDIATION METHOD STATEMENT – COVER SYSTEM CONSTRUCTION

Where any cover system is to be placed, a deter-to-dig membrane, such as a geotextile Hiz-Viz alert membrane, will be laid on the formation prior to placement of the cover system soils. This geotextile membrane acts as a visual barrier, inhibits excavation into the underlying soils and prevents burrowing activity within the cover system and native soil layers.

Any soils imported or re-used on site will need to be verified free from contamination with chemical testing undertaken to confirm their suitability for use within areas of soft landscaping. Soil re-use, and importation is discussed in Section 6.0.

7.1.1 Types of Clean Cover System

Two types of cover system are proposed across the site, depending on the proposed end use. The following systems are also subject to local authority approval:

1. Private Gardens (produce growing areas) with no asbestos risk. Layer thickness of 600mm comprising 'clean' Sub-soil and Topsoil upon a geotextile Hi-Viz alert membrane to deter digging beneath.
2. Communal Areas/Frontages/Amenity Areas (non-produce growing areas) with no asbestos risk. Layer thickness of 300mm comprising 'clean' Sub-soil and Topsoil over a geotextile Hi-Viz alert membrane to deter digging beneath.

Enclosed within **Appendix III** are cross-sectional drawings of the cover system methods above.

7.2.2 Cover System Construction Method Statement

For all private rear gardens where produce may be grown, references to 'private' and '600mm' shall be applied. For all POS and small landscaped frontages where produce will not be grown references to 'communal' and '300mm' shall be applied.

The following sequence of actions is recommended for cover system construction to soft landscaping:

1. Contact environmental consultant prior to undertaking works and request site attendance or remote advice. Should attendance be required ensure sufficient lead-in time is allowed.
2. Operatives undertaking remediation works should be provided with suitable PPE and observe safe systems of work.

3. The action of cover system construction is best completed following the formation of hard landscaping areas to 'frame out' the soft landscaping.
4. Excavate the area of soft landscaping to a depth of 600mm private below or 300mm communal below final levels using the aid of a laser level to achieve the necessary formation level.
5. Subject to the location of any protected trees consultation shall need to be made with an arboricultural consultant to ensure trees remain protected whilst ensuring the safeguarding of site users (specifically children).
6. During the excavation phase of development, the environmental consultant should over-see and supervise to ensure works are completed diligently and the final excavation depths are met. The environmental consultant should complete a diary of notes and observations as well as log, measure and photograph the works. The information obtained by the consulate can be used to verify the cover system and will be included as part of the final 'verification report' which will be needed by the local planning authority.
7. Excavated soils should be processed and managed as per the advice of section 6.0 if re-use is possible or section 8.0 if off-site disposal is subsequently necessary. The MMP shall require constant update and waste consignment notes should be retained as evidence to demonstrate that the excavated soil has been managed appropriately.
8. The cover system then requires construction as per the detail provided within **Appendix III** and be of suitable construction dependant upon the final land use; private gardens or POS.
9. The geotextile membrane should be of high visibility (orange/red) and act as an alert membrane (Terram Hi-Viz or similar). The membrane needs to rest upon the base of the excavation and lap up the sides of the excavation to cover all residual Made Ground which is exposed.
10. The soil layers of the clean cover system shall need to be placed in a manner which also achieves the desired finished site levels and as necessary, subject to new planting, accommodates new root systems (ie tree pits). In this regard consultation with the project's landscaping architect may be necessary to ensure both the remedial and landscaping/planting objective is met, by also meeting final site levels.
11. The remediation should be verified by a suitably qualified specialist and a report prepared which follows the lines of evidence, though not necessarily limited to, shown within section 9.0.

7.1.3 Cover System Verification Plan

This action forms Stage 2 of the verification process.

The cover system construction and quality should be verified, using the following methods.

1. Photographing the stripped landscaped formation to 600mm private or 300mm communal below final levels with a levelling staff set against a fixed point relating to finished levels.
2. Confirming soils to be used in the cover system are suitable, as defined within section 6.0.
3. Photographs should be taken of the laying and lapping up the sides of the geotextile alert membrane over the reduced formation.
4. When the full 600mm private or 400mm communal depth is met and layered with geotextile, clean and suitable for use Sub-soil and Topsoil should be placed upon the membrane, divided into layers and finished to final ground level(s). This process should be photographed.

An alternative to taking suitable photographs during construction of the cover system, may be to verify the cover system following its construction. If the latter method is used, it will be necessary to excavate to the full depth of the cover system and log the thickness/depth of the soil layers, take photographs and (possibly) samples of soil used for laboratory testing. Verification inspection and testing of gardens will be undertaken at a rate not less than 1 in 2 and in accordance with NHBC Technical Extra issue 8 or as requested by/agreed with the regulators/warranty providers.

8.0 WASTE MANAGEMENT

All materials unsuitable for re-use and leaving site should be conveyed by a registered waste carrier and waste transfer notes should be signed and held on file for submission upon completion of the project. This process shall be managed by the principal contractor as part of waste management diligence.

Given the requirements for re-use of materials and criteria set out which is to be approved within an MMP it is unlikely significant volumes of material shall be generated for off-site disposal. Such materials would be those which fail to meet the physical and chemical re-use criteria and in such an event the following guide should be considered:

-  Locate a suitable area on site where material destined for off-site disposal can be quarantined and stockpiled should it not be possible to directly load to wagons.
-  As necessary, once the stockpile(s) is formed, collect representative soil samples from the stockpile(s). Samples should be submitted for chemical testing and Waste Acceptance Criteria (WAC) testing.
-  For all materials to leave site the laboratory test results should be presented to haulage contractors to formally classify waste soils.

9.0 VERIFICATION RECORD KEEPING

Table 9.0 provides a check list of items (lines of evidence) which shall need to be documented or enclosed within the expected Verification Report, which have been chronologically itemised in terms operational progress and sequencing.

Table 9.0: Verification Report – Lines of Evidence Checklist		
Remedial Item	Description	Verification Method and Evidence
Production of MMP	Design phase. To be produced by principal contractor or their representatives	Seek approval of MMP and regularly update for final approval.
Water main	Design phase. Client to consult with local water authority for selection of correct water supply pipe work	Written confirmation and inspection physical connection to main
Source removal and Cutting of Site Levels	Enabling/groundworks phase. To be completed by appointed contractor.	Inspection, photographs, written site notes and laboratory test results (as necessary). Environmental consultant may be involved.
Soil treatment for re-use or waste disposal	Enabling/remediation phase. To be completed by appointed remediation contractor.	Inspection, photographs, written site notes, laboratory test results; update of MMP. Retain waste transfer notes (WTN). Environmental consultant to be involved.
Stage 1 Verification Selection of materials for re-use as engineering fill/landscaping soils	Groundworks/landscaping. To be completed by environmental consultant/remediation engineer with input from groundworker/client	Inspection, photographs, written site notes, laboratory test results; update of MMP. Environmental consultant to be involved.
Stage 1 Verification Selection of materials for import from off-site	Groundworks/landscaping. To be completed by environmental consultant/remediation engineer with input from groundworker/client.	Checking of Provenance, photographs, written site notes, laboratory test results; update of MMP Environmental consultant to be involved.
Stage 2 Verification Cover System Construction	Groundworks/landscaping. To be completed by principal contractor with support from environmental consultant/remediation engineer.	Checking quality of thickness of soil within cover system. Environmental consultant to be involved.

10.0 LONG TERM MONITORING

Suitability of the site for use will be verified by visual inspection and soil sampling/testing. Long term monitoring of any installed measures is not considered necessary.

Long-term monitoring typically applies to a groundwater treatment scheme, where variations in post-remedial groundwater quality may occur in the short and long-term. As previously indicated, groundwater (and surface water) is not considered to pose or be a risk.

11.0 PROJECT INSTRUCTION AND LIMITATIONS

11.1 SCOPE OF WORKS

Preparation of a Discovery Strategy, Remediation Strategy and Verification Plan formed the project brief with use of previously completed site investigation reports.

Aviron has relied upon information received from the Client and their agents as accurate, unless contradicted by written documentation or site observations.

11.2 PUBLISHED GUIDANCE

This report follows the technical approach presented on Land contamination risk management (LCRM), accessed on gov.uk website. The guidance replaced the Contaminated Land Report 11 (CLR11) “Model Procedures for the Management of Land Contamination” prepared by the Environment Agency in 2004. CLR11, which was withdrawn in 2020, provided guidance on the application of management processes when assessing potentially contaminated land.

This project and report have been designed to fulfil the information requirements set out in LCRM.

This report is additionally prepared in accordance with current guidance notes, standards and practices as set out by the Environment Agency and statutory organisations in order to establish potential and significant contaminant linkages as defined in Part IIA of the Environmental Protection Act 1990.

11.3 LIMITATIONS

Aviron’s scope of work has been designed to meet the timeframe and as such it may follow that further work would be prudent upon evaluation of the ground conditions. The scope of work provided shall provide a view of site conditions and understanding of potential geo-environmental risks and possible mitigation procedures.

The information used in this report has been derived from the site investigation, which in turn were based on known current and historical land uses identified at the site and surrounding area, available to Aviron at the time of the investigation.

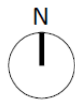
The intrusive points relate to the data collected; the risk assessment and recommendations will rely on these points only. It therefore follows that some areas of the site will not be examined. It is always possible that some areas not investigated may contain conditions which would be impossible to determine due to lack of evidence or time and budget restrictions.

Should changes in legislation, statutory requirements or industry practices occur following issue of this report, this report should be viewed in light of these changes.

Should a notable time period elapse between the date issue of this report and the date of application of this report, or changes to site dynamics, the site inspection notes may no longer be applicable should any change of use occur to the site in the interim.

Figures

- | | |
|---|--|
| 1 | Site Location Plan |
| 2 | Pre-Clearance Site Layout Plan |
| 3 | Proposed Development Plan |
| 4 | Soil Contamination Identification Plan |
| 5 | Remediation Cover System Plan |



Legend



Approximate Development Site Boundary

Landscape/Wildlife Corridor

Notes

Figure 1

Drawing Title

Site Location Plan

Project Number 23-176.03

Project Title

Land at Johnson Drive, Finchampstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Legend

-  Approximate Development Site Boundary
-  Landscape/Wildlife Corridor

Notes

Figure 2

Drawing Title

Pre-Clearance Site Layout Plan

Project Number 23-176.03

Project Title

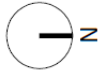
Land at Johnson Drive, Finchampstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to
accord with Tree Consultants
comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend

Notes

Provided by Client in 2024.

Figure 3

Drawing Title

Proposed Development Plan

Project Number 23-176.03

Project Title

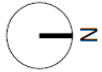
Land at Johnson Drive, Finchamstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to
accord with Tree Consultants
comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend

- ST Contamination Identification
- Asbestos Contamination
- Aviron Contamination Identification
- Aviron 'Uncontaminated' Location

Notes

Provided by Client in 2024.

ST. Southern Testing

Figure 4

Drawing Title

Soil Contamination Plan

Project Number 23-176.03

Project Title

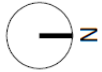
Land at Johnson Drive, Finchamstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to accord with Tree Consultants comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend

- ST Contamination Identification
- Asbestos Contamination
- Aviron Contamination Identification
- Aviron 'Uncontaminated' Location
- Cover System Area (soft landscaping only)
- Verification Trial Hole

Notes

Provided by Client in 2024.

ST. Southern Testing

Figure 5

Drawing Title

Cover System and Verification Plan

Project Number 23-176.02

Project Title

Land at Johnson Drive, Finchamstead, RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





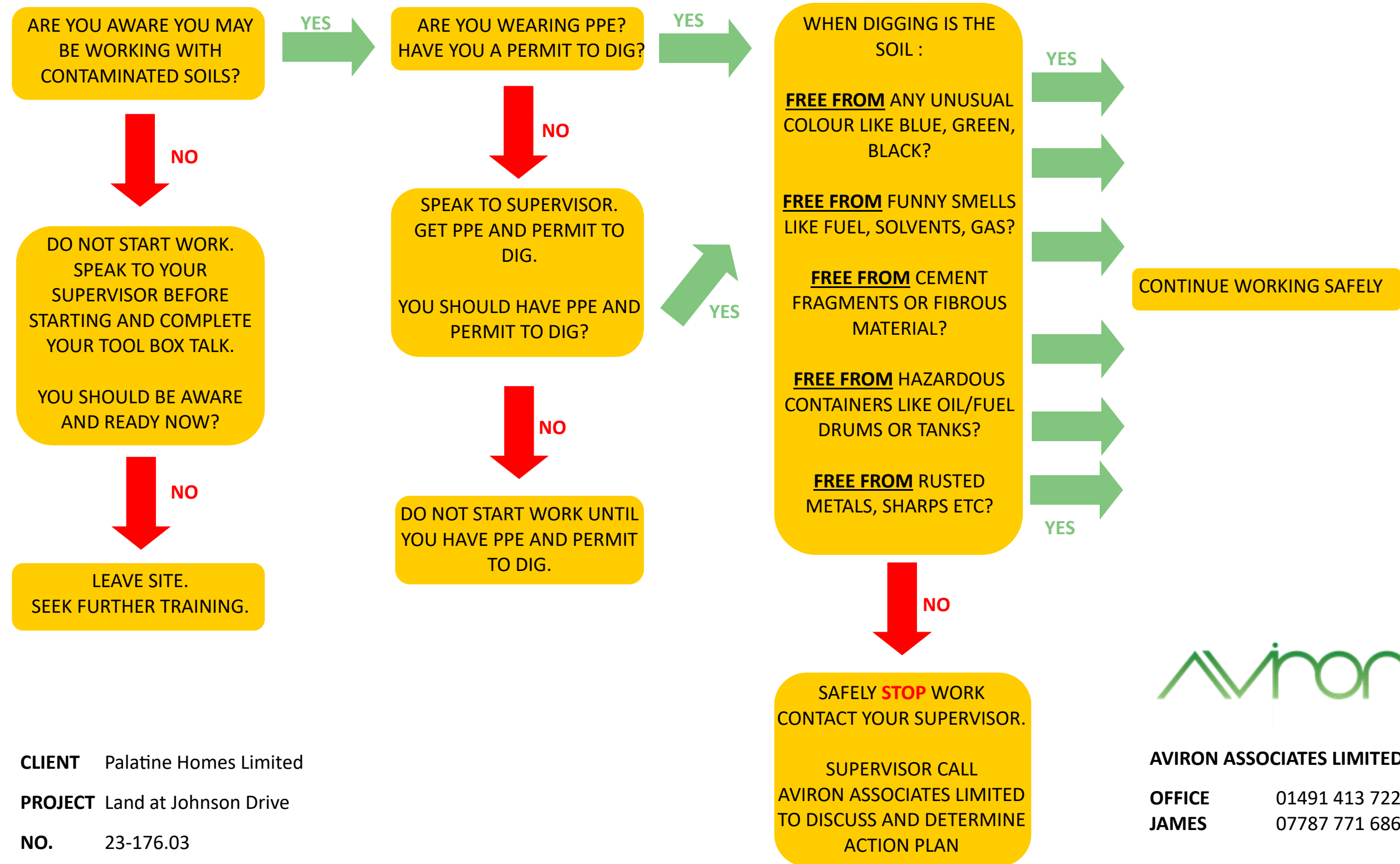
Appendices

- | | |
|-----|--|
| I | Discovery Strategy Flow Chart |
| II | Soil Re-use and Import Assessment Criteria |
| III | Clean Cover System Cross-Sections |

Appendix

I	Discovery Strategy Flow Chart
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HOW TO IDENTIFY CONTAMINATED SOILS AND WHAT TO DO?



CLIENT Palatine Homes Limited

PROJECT Land at Johnson Drive

NO. 23-176.03

ISSUE Version 1



AVIRON ASSOCIATES LIMITED

OFFICE 01491 413 722
JAMES 07787 771 686

Appendix

II Soil Re-use and Import Assessment Criteria

LAND CONTAMINATION REMEDIATION SELECTION AND USE OF RE-USED + IMPORTED SOIL

GENERAL

Soils laid as clean cover soft landscaped areas of private or communal gardens or public open space gardens should not only meet the necessary chemical criteria as defined by Land Contamination Risk Management (LCRM) or site specifically derived chemical targets; but they must also provide a suitable growing medium for plants and not contain deleterious objects (sharps/hard materials) which may cause physical injury

RE-USE OF SOILS

In accordance with CL:AIRE Code of Practice (2011) materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded by the holder'. Current guidance recommends the retention and re-use of site won soils where there is a need for the materials and where the risk is acceptable.

The Code of Practice therefore allows soils to be re-used on site where the following criteria are met:

-  The re-use of the soils will not present an unacceptable or increased risk to controlled waters, the environment and human health;
-  The soils are suitable both in terms of chemical and geotechnical properties for the intended use without prior treatment;
-  Only the required volume is used, and no more;
-  There is a required use and a certainty of use, not just a possibility.

In order to comply with the Code of Practice, a Material Management Plan (MMP) that confirms the above criteria are met has to be prepared in advance of excavation of soils. The material management plan must be reviewed by a 'Qualified Person' who then issues a declaration to the Environment Agency. Where a Remediation Strategy and Verification Plan is in place on the receiver site (under direct transfer) or site of re-use (site or origin scenario), the agreement of the use of the DOWCOP and of the RSVP would be required from the regulators (Environment Agency and Local Authority). Any associated planning conditions in this respect would also need to be complied with. At this stage and subject to regulatory agreement, it is proposed to re-use clean naturally occurring soils (as clean cover soils and general bulk fill) and Made Ground (as general bulk fill beneath a clean cover system) under a MMP for the site.

Where materials do not meet the required criteria, it may be possible to treat them under an environmental permit/appropriate treatment license so that they may be re-used on site.

In accordance with the Definition of Waste Code of Practice, the re-use of materials will need to be fully documented and included within the Verification Report produced on completion of the works.

In addition, any variation or deviation from the Materials Management Plan, where developed for the site, including change in volumes, change in materials or proposed source areas or area of re-use will need to be clearly documented for inclusion in the validation report for the site.

Failure to document and fully record the works may result in the EA and HMRC determining that waste has been deposited on site illegally, which may be subject to large fines and the requirement to subsequently remove the material from the site.

Should excess clean naturally occurring materials be identified on site, it may be possible for these to be re-used these soils on other sites through the CL:AIRE register of materials, as opposed to these materials being considered waste. However, it is understood that there is a deficit of materials on this site, such that this is unlikely.

It should be noted that the Definition of Waste Code of Practice cannot be applied to a site retrospectively.

If soils are to be stockpiled on site as part of the development for a period greater than 1 year for ongoing use under the Definition of Waste Code of Practice then regulatory confirmation should be sought in order to demonstrate and confirm an ongoing requirement and certainty of use of those materials in line with the guidance.

POSSIBLE SOURCES OF IMPORTED MATERIAL

Imported soils may be obtained from various sources, however, the source of the soils must be demonstrated to be from land of a non-contaminative history or a reputable manufacturing plant. It shall remain the responsibility of the Client or their Contractor to obtain soils complying with the specification which are likely to be subject to additional on-site/in-situ tests specified by the Consultant to accord with Local Planning Authority (LPA) and/or build warranty requirements.

TOPSOIL

Topsoil should meet the physical criteria set out by the projects landscape architect to ensure suitable growing media for selected planting. Soils should be inspected to ensure no deleterious (harmful to humans) objects, such as sharps or hard materials.

SUBSOIL

Sub-soil should meet the physical criteria set out by the projects landscape architect to ensure suitable growing media for selected planting. Soils should be inspected to ensure no deleterious (harmful to humans) objects, such as sharps or hard materials.

CHEMICAL CRITERIA

Chemical concentrations considered to appropriate for a tier 2 Generic Quantitative Risk Assessment (GQRA) as recommended by LCRM are appended for the following residential land uses:

-  Engineering fill (Public Open Space by residential development) with asbestos <0.1%.
-  Private gardens with homegrown produce.
-  Communal gardens without homegrown produce.
-  Public Open Space by residential development.

ACCEPTANCE/REJECTION OF MATERIAL

Where a material considered for procurement fails to meet the above criteria it should be rejected and an alternative source sought. Where material is tested in-situ/on-site and fails the necessary physical criteria (by testing or inspection) and chemical criteria (by testing) it should be removed from site and not used with soft landscaped areas or cover systems.

STORAGE OF RE-USED OR IMPORTED MATERIAL

Any re-used or imported material on to site must be kept in quarantine to prevent cross contamination from any residual soil contamination not yet encapsulated by hardstanding or from uncontrolled deposition of building materials; such as operatives throwing waste on a heap. Ideally quarantine should be upon a membrane and behind fencing/under a tarpaulin.



Soil Screening Values (GACs)
Engineering Fill

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH (SUITE 1)					Pyrene	7,400	7,400	7,400	LQM S4UL
Arsenic	79	79	79	C4SL/LQM S4UL	Phenols	760	1,500	3,200	LQM S4UL
Boron	21,000	21,000	21,000	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	120	120	120	LQM S4UL	Benzene	72	72	73	LQM S4UL
Chromium III	1,500	1,500	1,500	LQM S4UL	Toluene	56,000	56,000	56,000	LQM S4UL
Chromium IV	7.7	7.7	7.7	LQM S4UL	Ethylbenzene	24,000	24,000	25,000	LQM S4UL
Copper	12,000	12,000	12,000	LQM S4UL	o-xylene	41,000	42,000	43,000	LQM S4UL
Mercury	16	16	16	LQM S4UL	m-xylene	41,000	42,000	43,000	LQM S4UL
Nickel	230	230	230	LQM S4UL	p-xylene	41,000	42,000	43,000	LQM S4UL
Lead	630	630	630	C4SL	Aliphatic EC 5-6	570,000	590,000	600,000	LQM S4UL
Selenium	1,100	1,100	1,100	LQM S4UL	Aliphatic EC >6-8	600,000	610,000	620,000	LQM S4UL
Zinc	81,000	81,000	81,000	LQM S4UL	Aliphatic EC >8-10	13,000	13,000	13,000	LQM S4UL
Free Cyanide	34*	34*	34*	ATRISK	Aliphatic EC >10-12	13,000	13,000	13,000	LQM S4UL
Acenaphthene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >12-16	13,000	13,000	13,000	LQM S4UL
Acenaphthylene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >16-35	250,000	250,000	250,000	LQM S4UL
Anthracene	74,000	74,000	74,000	LQM S4UL	Aliphatic EC >35-44	250,000	250,000	250,000	LQM S4UL
Benzo(a)anthracene	29	29	29	LQM S4UL	Aromatic EC 5-7 (benzene)	56,000	56,000	56,000	LQM S4UL
Benzo(a)pyrene	5.7	5.7	5.7	LQM S4UL	Aromatic EC >7-8 (toluene)	56,000	56,000	56,000	LQM S4UL
Benzo(b)fluoranthene	7.1	7.2	7.2	LQM S4UL	Aromatic EC >8-10	5,000	5,000	5,000	LQM S4UL
Benzo(ghi)perylene	640	640	640	LQM S4UL	Aromatic EC >10-12	5,000	5,000	5,000	LQM S4UL
Benzo(k)fluoranthene	190	190	190	LQM S4UL	Aromatic EC >12-16	5,100	5,100	5,000	LQM S4UL
Chrysene	57	57	57	LQM S4UL	Aromatic EC >16-21	3,800	3,800	3,800	LQM S4UL
Dibenz(ah)anthracene	0.57	0.57	0.58	LQM S4UL	Aromatic EC >21-35	3,800	3,800	3,800	LQM S4UL
Fluoranthene	3,100	3,100	3,100	LQM S4UL	Aromatic EC >35-44	3,800	3,800	3,800	LQM S4UL
Fluorene	9,900	9,900	9,900	LQM S4UL	Aromatic EC >44-70	3,800	3,800	3,800	LQM S4UL
Indeno(123-cd)pyrene	82	82	82	LQM S4UL	ASBESTOS				
Naphthalene	4,900	4,900	4,900	LQM S4UL	<0.1%				Non-hazardous Adopted Value
Phenanthrene	3,100	3,100	3,100	LQM S4UL	*Apply residential without homegrown produce in absence of POS-resi				



Residential with Homegrown Produce
Soil Screening Values (GACs)
Private Gardens

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH					Pyrene	620	1,200	2,000	LQM S4UL
Arsenic	37	37	37	C4SL/LQM S4UL	Phenols	78	0.98	1.1	LQM S4UL
Boron	290	290	290	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	11	11	11	LQM S4UL	Benzene	0.087	0.17	0.37	LQM S4UL
Chromium III	910	910	910	LQM S4UL	Toluene	130	290	660	LQM S4UL
Chromium IV	6	6	6	LQM S4UL	Ethylbenzene	47	110	260	LQM S4UL
Copper	2,400	2,400	2,400	LQM S4UL	o-xylene	60	140	330	LQM S4UL
Mercury	1.2	1.2	1.2	LQM S4UL	m-xylene	59	140	320	LQM S4UL
Nickel	180	180	180	LQM S4UL	p-xylene	56	130	310	LQM S4UL
Lead	200	200	200	LQM S4UL	Aliphatic EC 5-6	42	78	160	LQM S4UL
Selenium	250	250	250	LQM S4UL	Aliphatic EC >6-8	100	230	530	LQM S4UL
Zinc	3,700	3,700	3,700	LQM S4UL	Aliphatic EC >8-10	27	65	150	LQM S4UL
Free Cyanide	34	34	34	ATRISK	Aliphatic EC >10-12	130	330	760	LQM S4UL
Acenaphthene	210	510	1100	LQM S4UL	Aliphatic EC >12-16	1,100	2,400	4300	LQM S4UL
Acenaphthylene	170	420	920	LQM S4UL	Aliphatic EC >16-35	65,000	92,000	110,000	LQM S4UL
Anthracene	2,400	5,400	11,000	LQM S4UL	Aliphatic EC >35-44	65,000	92,000	110,000	LQM S4UL
Benzo(a)anthracene	7.2	11	13	LQM S4UL	Aromatic EC 5-7 (benzene)	70	140	300	LQM S4UL
Benzo(a)pyrene	2.2	2.7	3	LQM S4UL	Aromatic EC >7-8 (toluene)	130	290	660	LQM S4UL
Benzo(b)fluoranthene	2.6	3.3	3.7	LQM S4UL	Aromatic EC >8-10	34	83	190	LQM S4UL
Benzo(ghi)perylene	320	340	350	LQM S4UL	Aromatic EC >10-12	74	180	380	LQM S4UL
Benzo(k)fluoranthene	77	93	100	LQM S4UL	Aromatic EC >12-16	140	330	660	LQM S4UL
Chrysene	15	22	27	LQM S4UL	Aromatic EC >16-21	260	540	930	LQM S4UL
Dibenz(ah)anthracene	0.24	0.28	0.3	LQM S4UL	Aromatic EC >21-35	1,100	1,500	1,700	LQM S4UL
Fluoranthene	280	560	890	LQM S4UL	Aromatic EC >35-44	1,100	1,500	1,700	LQM S4UL
Fluorene	170	400	860	LQM S4UL	Aromatic EC >44-70	1,600	1,800	1,900	LQM S4UL
Indeno(123-cd)pyrene	27	36	41	LQM S4UL	ASBESTOS				
Naphthalene	2.3	5.6	13	LQM S4UL	None Detectable				Aviron Adopted Value
Phenanthrene	95	220	440	LQM S4UL					



Soil Screening Values (GACs)
Public Open Space (resi)

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH (SUITE 1)					Pyrene	7,400	7,400	7,400	LQM S4UL
Arsenic	79	79	79	C4SL/LQM S4UL	Phenols	760	1,500	3,200	LQM S4UL
Boron	21,000	21,000	21,000	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	120	120	120	LQM S4UL	Benzene	72	72	73	LQM S4UL
Chromium III	1,500	1,500	1,500	LQM S4UL	Toluene	56,000	56,000	56,000	LQM S4UL
Chromium IV	7.7	7.7	7.7	LQM S4UL	Ethylbenzene	24,000	24,000	25,000	LQM S4UL
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Mercury	16	16	16	LQM S4UL	m-xylene	41,000	42,000	43,000	LQM S4UL
Nickel	230	230	230	LQM S4UL	p-xylene	41,000	42,000	43,000	LQM S4UL
Lead	630	630	630	C4SL	Aliphatic EC 5-6	570,000	590,000	600,000	LQM S4UL
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Acenaphthene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >12-16	13,000	13,000	13,000	LQM S4UL
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Benzo(ghi)perylene	640	640	640	LQM S4UL	Aromatic EC >10-12	5,000	5,000	5,000	LQM S4UL
Benzo(k)fluoranthene	190	190	190	LQM S4UL	Aromatic EC >12-16	5,100	5,100	5,000	LQM S4UL
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Fluoranthene	3,100	3,100	3,100	LQM S4UL	Aromatic EC >35-44	3,800	3,800	3,800	LQM S4UL
Fluorene	9,900	9,900	9,900	LQM S4UL	Aromatic EC >44-70	3,800	3,800	3,800	LQM S4UL
Indeno(123-cd)pyrene	82	82	82	LQM S4UL	ASBESTOS				
Naphthalene	4,900	4,900	4,900	LQM S4UL	<0.1%				Non-hazardous Adopted Value
Phenanthrene	3,100	3,100	3,100	LQM S4UL	*Apply residential without homegrown produce in absence of POS-resi				

Appendix

III Clean Cover System Cross-Sections

LAND CONTAMINATION REMEDIATION SELECTION AND USE OF RE-USED + IMPORTED SOIL

GENERAL

Soils laid as clean cover soft landscaped areas of private or communal gardens or public open space gardens should not only meet the necessary chemical criteria as defined by Land Contamination Risk Management (LCRM) or site specifically derived chemical targets; but they must also provide a suitable growing medium for plants and not contain deleterious objects (sharps/hard materials) which may cause physical injury

RE-USE OF SOILS

In accordance with CL:AIRE Code of Practice (2011) materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded by the holder'. Current guidance recommends the retention and re-use of site won soils where there is a need for the materials and where the risk is acceptable.

The Code of Practice therefore allows soils to be re-used on site where the following criteria are met:

-  The re-use of the soils will not present an unacceptable or increased risk to controlled waters, the environment and human health;
-  The soils are suitable both in terms of chemical and geotechnical properties for the intended use without prior treatment;
-  Only the required volume is used, and no more;
-  There is a required use and a certainty of use, not just a possibility.

In order to comply with the Code of Practice, a Material Management Plan (MMP) that confirms the above criteria are met has to be prepared in advance of excavation of soils. The material management plan must be reviewed by a 'Qualified Person' who then issues a declaration to the Environment Agency. Where a Remediation Strategy and Verification Plan is in place on the receiver site (under direct transfer) or site of re-use (site or origin scenario), the agreement of the use of the DOWCOP and of the RSVP would be required from the regulators (Environment Agency and Local Authority). Any associated planning conditions in this respect would also need to be complied with. At this stage and subject to regulatory agreement, it is proposed to re-use clean naturally occurring soils (as clean cover soils and general bulk fill) and Made Ground (as general bulk fill beneath a clean cover system) under a MMP for the site.

Where materials do not meet the required criteria, it may be possible to treat them under an environmental permit/appropriate treatment license so that they may be re-used on site.

In accordance with the Definition of Waste Code of Practice, the re-use of materials will need to be fully documented and included within the Verification Report produced on completion of the works.

In addition, any variation or deviation from the Materials Management Plan, where developed for the site, including change in volumes, change in materials or proposed source areas or area of re-use will need to be clearly documented for inclusion in the validation report for the site.

Failure to document and fully record the works may result in the EA and HMRC determining that waste has been deposited on site illegally, which may be subject to large fines and the requirement to subsequently remove the material from the site.

Should excess clean naturally occurring materials be identified on site, it may be possible for these to be re-used these soils on other sites through the CL:AIRE register of materials, as opposed to these materials being considered waste. However, it is understood that there is a deficit of materials on this site, such that this is unlikely.

It should be noted that the Definition of Waste Code of Practice cannot be applied to a site retrospectively.

If soils are to be stockpiled on site as part of the development for a period greater than 1year for ongoing use under the Definition of Waste Code of Practice then regulatory confirmation should be sort in order to demonstrate and confirm an ongoing requirement and certainty of use of those materials in line with the guidance.

POSSIBLE SOURCES OF IMPORTED MATERIAL

Imported soils may be obtained from various sources, however, the source of the soils must be demonstrated to be from land of a non-contaminative history or a reputable manufacturing plant. It shall remain the responsibility of the Client or their Contractor to obtain soils complying with the specification which are likely to be subject to additional on-site/in-situ tests specified by the Consultant to accord with Local Planning Authority (LPA) and/or build warranty requirements.

TOPSOIL

Topsoil should meet the physical criteria set out by the projects landscape architect to ensure suitable growing media for selected planting. Soils should be inspected to ensure no deleterious (harmful to humans) objects, such as sharps or hard materials.

SUBSOIL

Sub-soil should meet the physical criteria set out by the projects landscape architect to ensure suitable growing media for selected planting. Soils should be inspected to ensure no deleterious (harmful to humans) objects, such as sharps or hard materials.

CHEMICAL CRITERIA

Chemical concentrations considered to appropriate for a tier 2 Generic Quantitative Risk Assessment (GQRA) as recommended by LCRM are appended for the following residential land uses:

-  Engineering fill (Public Open Space by residential development) with asbestos <0.1%.
-  Private gardens with homegrown produce.
-  Communal gardens without homegrown produce.
-  Public Open Space by residential development.

ACCEPTANCE/REJECTION OF MATERIAL

Where a material considered for procurement fails to meet the above criteria it should be rejected and an alternative source sought. Where material is tested in-situ/on-site and fails the necessary physical criteria (by testing or inspection) and chemical criteria (by testing) it should be removed from site and not used with soft landscaped areas or cover systems.

STORAGE OF RE-USED OR IMPORTED MATERIAL

Any re-used or imported material on to site must be kept in quarantine to prevent cross contamination from any residual soil contamination not yet encapsulated by hardstanding or from uncontrolled deposition of building materials; such as operatives throwing waste on a heap. Ideally quarantine should be upon a membrane and behind fencing/under a tarpaulin.



Soil Screening Values (GACs)
Engineering Fill

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH (SUITE 1)					Pyrene	7,400	7,400	7,400	LQM S4UL
Arsenic	79	79	79	C4SL/LQM S4UL	Phenols	760	1,500	3,200	LQM S4UL
Boron	21,000	21,000	21,000	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	120	120	120	LQM S4UL	Benzene	72	72	73	LQM S4UL
Chromium III	1,500	1,500	1,500	LQM S4UL	Toluene	56,000	56,000	56,000	LQM S4UL
Chromium IV	7.7	7.7	7.7	LQM S4UL	Ethylbenzene	24,000	24,000	25,000	LQM S4UL
Copper	12,000	12,000	12,000	LQM S4UL	o-xylene	41,000	42,000	43,000	LQM S4UL
Mercury	16	16	16	LQM S4UL	m-xylene	41,000	42,000	43,000	LQM S4UL
Nickel	230	230	230	LQM S4UL	p-xylene	41,000	42,000	43,000	LQM S4UL
Lead	630	630	630	C4SL	Aliphatic EC 5-6	570,000	590,000	600,000	LQM S4UL
Selenium	1,100	1,100	1,100	LQM S4UL	Aliphatic EC >6-8	600,000	610,000	620,000	LQM S4UL
Zinc	81,000	81,000	81,000	LQM S4UL	Aliphatic EC >8-10	13,000	13,000	13,000	LQM S4UL
Free Cyanide	34*	34*	34*	ATRISK	Aliphatic EC >10-12	13,000	13,000	13,000	LQM S4UL
Acenaphthene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >12-16	13,000	13,000	13,000	LQM S4UL
Acenaphthylene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >16-35	250,000	250,000	250,000	LQM S4UL
Anthracene	74,000	74,000	74,000	LQM S4UL	Aliphatic EC >35-44	250,000	250,000	250,000	LQM S4UL
Benzo(a)anthracene	29	29	29	LQM S4UL	Aromatic EC 5-7 (benzene)	56,000	56,000	56,000	LQM S4UL
Benzo(a)pyrene	5.7	5.7	5.7	LQM S4UL	Aromatic EC >7-8 (toluene)	56,000	56,000	56,000	LQM S4UL
Benzo(b)fluoranthene	7.1	7.2	7.2	LQM S4UL	Aromatic EC >8-10	5,000	5,000	5,000	LQM S4UL
Benzo(ghi)perylene	640	640	640	LQM S4UL	Aromatic EC >10-12	5,000	5,000	5,000	LQM S4UL
Benzo(k)fluoranthene	190	190	190	LQM S4UL	Aromatic EC >12-16	5,100	5,100	5,000	LQM S4UL
Chrysene	57	57	57	LQM S4UL	Aromatic EC >16-21	3,800	3,800	3,800	LQM S4UL
Dibenz(ah)anthracene	0.57	0.57	0.58	LQM S4UL	Aromatic EC >21-35	3,800	3,800	3,800	LQM S4UL
Fluoranthene	3,100	3,100	3,100	LQM S4UL	Aromatic EC >35-44	3,800	3,800	3,800	LQM S4UL
Fluorene	9,900	9,900	9,900	LQM S4UL	Aromatic EC >44-70	3,800	3,800	3,800	LQM S4UL
Indeno(123-cd)pyrene	82	82	82	LQM S4UL	ASBESTOS				
Naphthalene	4,900	4,900	4,900	LQM S4UL	<0.1%				Non-hazardous Adopted Value
Phenanthrene	3,100	3,100	3,100	LQM S4UL	*Apply residential without homegrown produce in absence of POS-resi				



Residential with Homegrown Produce
Soil Screening Values (GACs)
Private Gardens

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH					Pyrene	620	1,200	2,000	LQM S4UL
Arsenic	37	37	37	C4SL/LQM S4UL	Phenols	78	0.98	1.1	LQM S4UL
Boron	290	290	290	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	11	11	11	LQM S4UL	Benzene	0.087	0.17	0.37	LQM S4UL
Chromium III	910	910	910	LQM S4UL	Toluene	130	290	660	LQM S4UL
Chromium IV	6	6	6	LQM S4UL	Ethylbenzene	47	110	260	LQM S4UL
Copper	2,400	2,400	2,400	LQM S4UL	o-xylene	60	140	330	LQM S4UL
Mercury	1.2	1.2	1.2	LQM S4UL	m-xylene	59	140	320	LQM S4UL
Nickel	180	180	180	LQM S4UL	p-xylene	56	130	310	LQM S4UL
Lead	200	200	200	LQM S4UL	Aliphatic EC 5-6	42	78	160	LQM S4UL
Selenium	250	250	250	LQM S4UL	Aliphatic EC >6-8	100	230	530	LQM S4UL
Zinc	3,700	3,700	3,700	LQM S4UL	Aliphatic EC >8-10	27	65	150	LQM S4UL
Free Cyanide	34	34	34	ATRISK	Aliphatic EC >10-12	130	330	760	LQM S4UL
Acenaphthene	210	510	1100	LQM S4UL	Aliphatic EC >12-16	1,100	2,400	4300	LQM S4UL
Acenaphthylene	170	420	920	LQM S4UL	Aliphatic EC >16-35	65,000	92,000	110,000	LQM S4UL
Anthracene	2,400	5,400	11,000	LQM S4UL	Aliphatic EC >35-44	65,000	92,000	110,000	LQM S4UL
Benzo(a)anthracene	7.2	11	13	LQM S4UL	Aromatic EC 5-7 (benzene)	70	140	300	LQM S4UL
Benzo(a)pyrene	2.2	2.7	3	LQM S4UL	Aromatic EC >7-8 (toluene)	130	290	660	LQM S4UL
Benzo(b)fluoranthene	2.6	3.3	3.7	LQM S4UL	Aromatic EC >8-10	34	83	190	LQM S4UL
Benzo(ghi)perylene	320	340	350	LQM S4UL	Aromatic EC >10-12	74	180	380	LQM S4UL
Benzo(k)fluoranthene	77	93	100	LQM S4UL	Aromatic EC >12-16	140	330	660	LQM S4UL
Chrysene	15	22	27	LQM S4UL	Aromatic EC >16-21	260	540	930	LQM S4UL
Dibenz(ah)anthracene	0.24	0.28	0.3	LQM S4UL	Aromatic EC >21-35	1,100	1,500	1,700	LQM S4UL
Fluoranthene	280	560	890	LQM S4UL	Aromatic EC >35-44	1,100	1,500	1,700	LQM S4UL
Fluorene	170	400	860	LQM S4UL	Aromatic EC >44-70	1,600	1,800	1,900	LQM S4UL
Indeno(123-cd)pyrene	27	36	41	LQM S4UL	ASBESTOS				
Naphthalene	2.3	5.6	13	LQM S4UL	None Detectable				Aviron Adopted Value
Phenanthrene	95	220	440	LQM S4UL					



Residential without Homegrown Produce
Soil Screening Values (GACs)
Communal Gardens

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH					Pyrene	3,700	3,800	3,800	LQM S4UL
Arsenic	40	40	40	C4SL/LQM S4UL	Phenols	750	750	750	LQM S4UL
Boron	11,000	11,000	11,000	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	85	85	85	LQM S4UL	Benzene	0.38	0.7	1.4	LQM S4UL
Chromium III	910	910	910	LQM S4UL	Toluene	869	1,900	3,900	LQM S4UL
Chromium IV	6	6	6	LQM S4UL	Ethylbenzene	83	190	440	LQM S4UL
Copper	7,100	7,100	7,100	LQM S4UL	o-xylene	88	210	480	LQM S4UL
Mercury	1.2	1.2	1.2	LQM S4UL	m-xylene	82	190	450	LQM S4UL
Nickel	180	180	180	LQM S4UL	p-xylene	79	180	430	LQM S4UL
Lead	310	310	310	C4SL	Aliphatic EC 5-6	42	78	160	LQM S4UL
Selenium	430	430	430	LQM S4UL	Aliphatic EC >6-8	100	230	530	LQM S4UL
Zinc	40000	40000	40000	LQM S4UL	Aliphatic EC >8-10	27	65	150	LQM S4UL
Free Cyanide	34	34	34	ATRISK	Aliphatic EC >10-12	130	330	770	LQM S4UL
Acenaphthene	3,000	4,700	6,000	LQM S4UL	Aliphatic EC >12-16	1,100	2,400	4,400	LQM S4UL
Acenaphthylene	2,900	4,600	6,000	LQM S4UL	Aliphatic EC >16-35	65,000	92,000	110,000	LQM S4UL
Anthracene	31,000	35,000	37,000	LQM S4UL	Aliphatic EC >35-44	65,000	92,000	110,000	LQM S4UL
Benzo(a)anthracene	11	14	15	LQM S4UL	Aromatic EC 5-7 (benzene)	370	690	1,400	LQM S4UL
Benzo(a)pyrene	3.2	3.2	3.2	LQM S4UL	Aromatic EC >7-8 (toluene)	860	1,800	3,900	LQM S4UL
Benzo(b)fluoranthene	3.9	4	4	LQM S4UL	Aromatic EC >8-10	47	110	270	LQM S4UL
Benzo(ghi)perylene	360	360	360	LQM S4UL	Aromatic EC >10-12	250	590	1,200	LQM S4UL
Benzo(k)fluoranthene	110	110	110	LQM S4UL	Aromatic EC >12-16	1,800	2,300	2,500	LQM S4UL
Chrysene	30	31	32	LQM S4UL	Aromatic EC >16-21	1,900	1,900	1,900	LQM S4UL
Dibenz(ah)anthracene	0.31	0.32	0.32	LQM S4UL	Aromatic EC >21-35	1,900	1,900	1,900	LQM S4UL
Fluoranthene	1,500	1,600	1,600	LQM S4UL	Aromatic EC >35-44	1,900	1,900	1,900	LQM S4UL
Fluorene	2,800	3,800	4,500	LQM S4UL	Aromatic EC >44-70	1,900	1,900	1,900	LQM S4UL
Indeno(123-cd)pyrene	45	46	46	LQM S4UL	ASBESTOS				
Naphthalene	2.3	5.6	13	LQM S4UL	None Detectable				Aviron Adopted Value
Phenanthrene	1,300	1,500	1,500	LQM S4UL					



Soil Screening Values (GACs)
Public Open Space (resi)

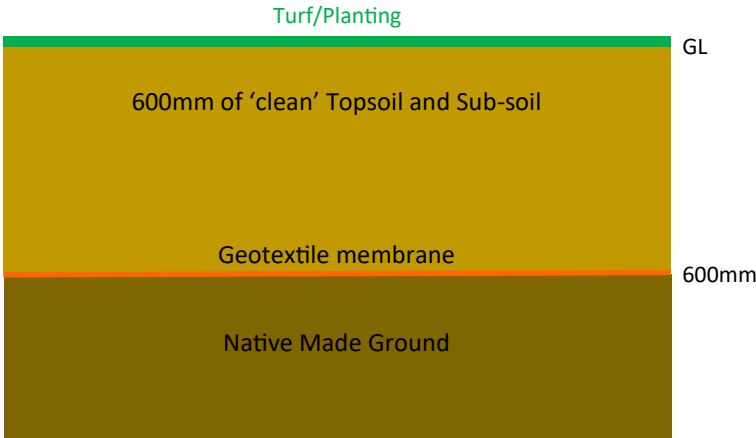
Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH (SUITE 1)					Pyrene	7,400	7,400	7,400	LQM S4UL
Arsenic	79	79	79	C4SL/LQM S4UL	Phenols	760	1,500	3,200	LQM S4UL
Boron	21,000	21,000	21,000	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	120	120	120	LQM S4UL	Benzene	72	72	73	LQM S4UL
Chromium III	1,500	1,500	1,500	LQM S4UL	Toluene	56,000	56,000	56,000	LQM S4UL
Chromium IV	7.7	7.7	7.7	LQM S4UL	Ethylbenzene	24,000	24,000	25,000	LQM S4UL
Copper	12,000	12,000	12,000	LQM S4UL	o-xylene	41,000	42,000	43,000	LQM S4UL
Mercury	16	16	16	LQM S4UL	m-xylene	41,000	42,000	43,000	LQM S4UL
Nickel	230	230	230	LQM S4UL	p-xylene	41,000	42,000	43,000	LQM S4UL
Lead	630	630	630	C4SL	Aliphatic EC 5-6	570,000	590,000	600,000	LQM S4UL
Selenium	1,100	1,100	1,100	LQM S4UL	Aliphatic EC >6-8	600,000	610,000	620,000	LQM S4UL
Zinc	81,000	81,000	81,000	LQM S4UL	Aliphatic EC >8-10	13,000	13,000	13,000	LQM S4UL
Free Cyanide	34*	34*	34*	ATRISK	Aliphatic EC >10-12	13,000	13,000	13,000	LQM S4UL
Acenaphthene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >12-16	13,000	13,000	13,000	LQM S4UL
Acenaphthylene	15,000	15,000	15,000	LQM S4UL	Aliphatic EC >16-35	250,000	250,000	250,000	LQM S4UL
Anthracene	74,000	74,000	74,000	LQM S4UL	Aliphatic EC >35-44	250,000	250,000	250,000	LQM S4UL
Benzo(a)anthracene	29	29	29	LQM S4UL	Aromatic EC 5-7 (benzene)	56,000	56,000	56,000	LQM S4UL
Benzo(a)pyrene	5.7	5.7	5.7	LQM S4UL	Aromatic EC >7-8 (toluene)	56,000	56,000	56,000	LQM S4UL
Benzo(b)fluoranthene	7.1	7.2	7.2	LQM S4UL	Aromatic EC >8-10	5,000	5,000	5,000	LQM S4UL
Benzo(ghi)perylene	640	640	640	LQM S4UL	Aromatic EC >10-12	5,000	5,000	5,000	LQM S4UL
Benzo(k)fluoranthene	190	190	190	LQM S4UL	Aromatic EC >12-16	5,100	5,100	5,000	LQM S4UL
Chrysene	57	57	57	LQM S4UL	Aromatic EC >16-21	3,800	3,800	3,800	LQM S4UL
Dibenz(ah)anthracene	0.57	0.57	0.58	LQM S4UL	Aromatic EC >21-35	3,800	3,800	3,800	LQM S4UL
Fluoranthene	3,100	3,100	3,100	LQM S4UL	Aromatic EC >35-44	3,800	3,800	3,800	LQM S4UL
Fluorene	9,900	9,900	9,900	LQM S4UL	Aromatic EC >44-70	3,800	3,800	3,800	LQM S4UL
Indeno(123-cd)pyrene	82	82	82	LQM S4UL	ASBESTOS				
Naphthalene	4,900	4,900	4,900	LQM S4UL	<0.1%				Non-hazardous Adopted Value
Phenanthrene	3,100	3,100	3,100	LQM S4UL	*Apply residential without homegrown produce in absence of POS-resi				



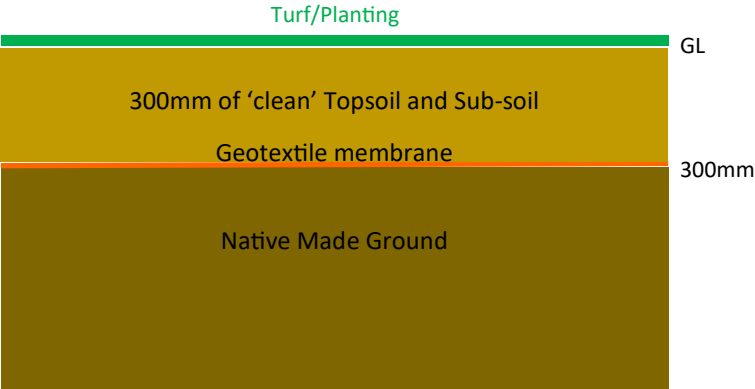
Remedial Cover System Cross-Sections

Project Number 23-176.03 Project Title Land at Johnson Drive, Finchampstead, RG40 3NW Drawn by JB

PRIVATE GARDENS
Scenario 1



COMMUNAL GARDENS/FRONTAGES/AMENITY AREAS
Scenario 2



AVIRON ASSOCIATES LIMITED

is a dynamic company of Chartered Environmental Surveyors and Geotechnical Engineers.

We continuously work hard to ensure our services are the most technically competent, efficient and viable in our market place. Our years of experience of vastly varied sites and projects compliment our ability to deliver assured and effective Ground Investigations and Risk Assessments of both Brownfield, Greenfield and Currently Developed Land.

Our clients choose Aviron to plan, design and manage their Ground Investigations and Land Remediation Schemes assisting in land procurement to deliver engineering requirements, discharge planning and ensure their sites are suitable, developable and sustainable.

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