



REMEDIATION ACTION PLAN AND VERIFICATION PLAN

RESIDENTIAL DEVELOPMENT

**TCM HOUSE
NEWPORT ROAD
HAYES
UB4 8JX**

ON BEHALF OF
KEARNS PROPERTY MANAGEMENT LIMITED
REPORT 19-228.03 : REVISION A
MAY 2020

Aviron Associates Limited - Head Office

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SECTION 1

INTRODUCTION

1.1 Appointment

Aviron Associates Limited (Aviron) was instructed by Kearns Property Management Limited (the Client) to prepare a Remediation Action Plan (RAP) and Verification Plan (VP) which can be applied to discharge land contamination planning conditions and also used as a 'Site' document to be followed by site operatives.

This RAP and VP is based on the geo-environmental risk assessment prepared by Aviron and documented in the following report:

Phase II Geo-Environmental Risk Assessment

Ref: 19-2228.02

May 2020

Revision A

It is advised the above report is reviewed prior to reviewing this document.

1.2 Environmental Risk Summary

Table 1.2 summarises the pertinent environmental risks providing advice of further works and assessment.

Table 1.2 : Environment Risk Summary

Medium	Risk No.	Risk Description	Comments
Soils	1	Local asbestos fibres identified within shallow soils at WS1.	Ensure asbestos contaminated soils are removed from the site in a controlled suitable manner. Prepare Verification Plan
	2	PAH pervasive Made Ground contamination impact to new homeowners.	Construct suitable clean cover system to new gardens and soft landscaped amenity space. Prepare Remediation Method Statement.
	3	Made Ground soil quality may impact water main design.	Consult local water authority prior to water main installation.
	4	Made Ground to new planting.	Made Ground not physically suitable to sustain plant growth. Import suitable Topsoil (BS3882) to sustain planting.
Ground Gas	n/a	Ingress of hazardous ground gases (CO2) into new homes and depleted oxygen.	Six rounds of monitoring, including one round at worst-case indicate CS-1/NHBC Green (or otherwise).
Groundwater	n/a	Potentially impacted soil/groundwater contamination impacted controlled waters quality.	Groundwater encountered during monitoring visits considered to comprise the underlying Secondary A aquifer. No significant soil contamination encountered within overlying Made Ground and natural strata. Groundwater beneath the site is considered chemically acceptable.



1.3 New Water Main

During the early stages of design (and well in advance of installation) an application should be made to the local water authority in regard of new water supplies to new homes. The local water authority should be presented with the report referenced in section 1.1 to enable them to consider ground conditions and soil chemical quality in lieu of their specification for water main supply (pipe) materials.

It is the responsibility of the local water authority to ensure wholesome water is supplied to new homes as such they should specify the correct supply material prior installation and connection to the main supply.



SECTION 2

SITE CLEARANCE AND GROUNDWORKS ASBESTOS VERIFICATION DISCOVERY STRATEGY AND ENCAPSULATION

2.1 Asbestos Impacted Soil Removal and Verification

Following early stages of site clearance the appointed contractor should safely remove the Asbestos Impacted Soils (AIS) around positions WS1, which are shown on **Figure 1**. The method of removal may coincide with the overall site clearance of groundworks package.

The appointed contractor should determine their own specific strategy for the removal of AIS, though in generally the following strategy should form a basis to work:

- 🌱 Appoint specialist and licensed asbestos consultant/contractor to remove AIS and any Asbestos Containing Materials (ACMs) that may subsequently exist.
- 🌱 The asbestos consultant/contractor should prepare any necessary notifications to the HSE and any necessary Risk Assessments and Method Statements (RAMS).
- 🌱 The asbestos consultant/contractor should remove the AIS from situ and under controlled conditions to prevent fibre release to adjacent land users.
- 🌱 Waste soils should be and disposed a to a suitable waste management facility.
- 🌱 Once soils have been removed the asbestos consultant/contractor should collect soil verification samples from in and around the resultant excavations/stripped areas to confirm the absence of AIS/ACMs thus enabling construction works to progress without associated asbestos risks.
- 🌱 At least five samples per stripped area should be collected; that being the four sides/edges and the centre/base.

2.2 Discovery Strategy

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 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;
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.

Where discoveries of suspected and previously undiscovered soil contamination are made, these should be reported to the environmental consultant to enable a suitable risk management/remedial procedure to be determined and as necessary, approved by the Local Planning Authority.

The action of discovery applies in the event local 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 RAP shall be prepared and consulted; hence this RAP and VP remains a live document.



2.2 Encapsulation with Permanent Hardstanding

Figure 2 is enclosed as a Proposed Development Plan which identifies the areas of paving to the front of the development and the rear around the bike stores and patio areas.

The following method statement is presented to provide the necessary 'hardstanding' finish to the development which if undisturbed (un-penetrated) shall break the pollutant linkage pathway to any residual Made Ground beneath formation.

1. Contact environmental consultant prior to undertaking works and request site attendance. Ensure sufficient lead in time is allowed.
2. Operatives undertaking remediation works should be provided with suitable personal protective equipment (PPE).
3. Using line marker, spray out the perimeters of proposed hardstanding to provide operatives guidance.
4. Excavate areas of hardstanding to circa 300-400mm below ground level (as per civil engineer's design requirement) to enable construction of the necessary granular sub-base.
5. Complete with permanent hard landscaped detail which shall break pollutant linkage pathway.



SECTION 4

SOFT LANDSCAPING CONSTRUCTION OF CLEAN COVER SYSTEM AND VERIFICATION

4.1 Cover System Appraisal

The research undertaken to prepare BRE465 "Cover systems for land regeneration" indicates the maximum mixing depth of soils within a private garden is 600mm (section 5.4). This takes into account factors such as earth worm activity, burrowing animals, plant/tree roots, digging the garden, crop uptake and intermixing of leaf fall. Ingestion pathways for contamination soils (section 5.5) are likely to be limited to 500mm.

In consideration of the subject site limitations which may affect the design of the cover system (section 2) are:

-  Presence of the water table which may mobilise soluble soil contaminants;
-  Significant contamination;
-  Risk to controlled waters;
-  Deeper excavations for tree planting, fencing etc;
-  Excavation for buried services;
-  Slopes; and
-  Abundant rabbit/badger activity.

In this regard it is considered a conventional cover system is suitable because the water table rests at depth greater than 5.0m+ bgl, soil contamination is not considered significant, the risk to controlled waters is considered to be LOW, deeper excavations are unlikely, services are installed prior to cover system construction, there are no slopes and burrowing animal activity is likely to be limited in the residential development.

In order to determine the thickness of the cover system the BRE465 spreadsheet can be used. A 300mm thickness has been determined. Input values were the maximum contaminant concentration for the contaminant in the ground, current C4SL/S4UL for contamination of cover and since only one end use at the site target concentrations are commercial. The thickness of the cover system can vary by applying lower concentrations for the cover system (imported soils), however, given the practical difficulties of procuring imported soils with a specific chemistry it is assumed the concentrations shall be compliant with current C4SL/S4UL.

A typical 300mm clean cover system for communal soft landscaping and planting areas is considered suitable to both remove potential land contamination risks to new site occupants and also enable sustained plant growth.

Table 4.1: Cover System Requirement

Garden Type	Depth (bgl)	Description
Communal Soft Landscaping/Frontages	Ground Level - 300mm*	BS3882:2015 'clean' Topsoil
	At 300mm* coloured permeable geotextile membrane	Terram Hi-Vis or similar product

*The thickness of Topsoil (and sub-soil) may need to increase subject to planting (trees/shrubs) requirements.

4.2 Method Statement: Cover System Construction: Communal Gardens and Soft Landscaped Borders

Figure 2 is enclosed as a Proposed Development Plan which identifies communal gardens and soft landscaping borders to the front around parking spaces and in the rear.

The following method statement is presented to construct and verify a 300mm* thick 'clean cover' system within proposed communal soft landscaped borders.

Where permanent hard landscaping is proposed remediation shall not be necessary since the construction of permanent hardstanding shall break pollution linkages.



Communal Gardens and Soft Landscaped Borders Remediation Scheme

The following remedial method is recommended:

1. Contact environmental consultant prior to undertaking works and request site attendance. Ensure sufficient lead in time is allowed.
2. Operatives undertaking remediation works should be provided with suitable personal protective equipment (PPE).
3. This action is best completed following the formation of hard landscaping areas to 'frame out' the soft landscaping.
4. Excavate soft landscaping/frontage to a depth of 300mm* below final levels.
5. During the excavation process 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 diarise, log, measure and photograph works by means of verification of the cover system and include within the final 'verification report'.
6. Waste soils should be disposed off-site and not re-used. Waste consignment notes should be retained to evidence soil removal and disposal.
7. Layer the formation at 300mm* with geotextile membrane (Terram Hi-Viz or similar).
8. Upon laying of membrane borders can be landscaped with imported Topsoil.

In areas of tree and shrub planting the thickness of Topsoil may need to be increased to sustain root/species growth. The projects landscape architect should be consulted in this regard

Communal Gardens and Soft Landscaped Borders Verification Plan

The following plan is presented to verify the construction for the 300mm* thick cover system to soft landscaped borders.

Landscaped borders should be infilled with clean certified Topsoil to construct a 300mm* thick 'clean cover system' and during construction photographs should be taken of:

1. The stripped borders formation to 300mm* below final levels with a levelling staff set against a fixed point relating to finished levels.
2. The layering of the geotextile membrane (Terram Hi-Viz or similar) over the 300mm* formation.
3. The import of 300mm* of Topsoil back up to the aforementioned fixed point of finished levels.

The environmental consultant shall independently sample and test imported Topsoil once on-site and at frequency of one test per 50cu.m for manufactured Topsoil or 200cu.m for Topsoil from a Greenfield source. The laboratory testing results should be compared to current CLEA SGVs, C4SL and LQM S4ULs to ensure the Topsoil is residentially chemically suitable for use. **Appendix II** is enclosed as verification targets and associated chemical testing (laboratory suites) which should be completed to confirm the suitability of imported soils. A residential without homegrown produce end use has been selected for the verification targets.

Prepared by **James Burkitt** BEng (Hons) CEnv MRICS
Chartered Environmental Surveyor
Managing Director

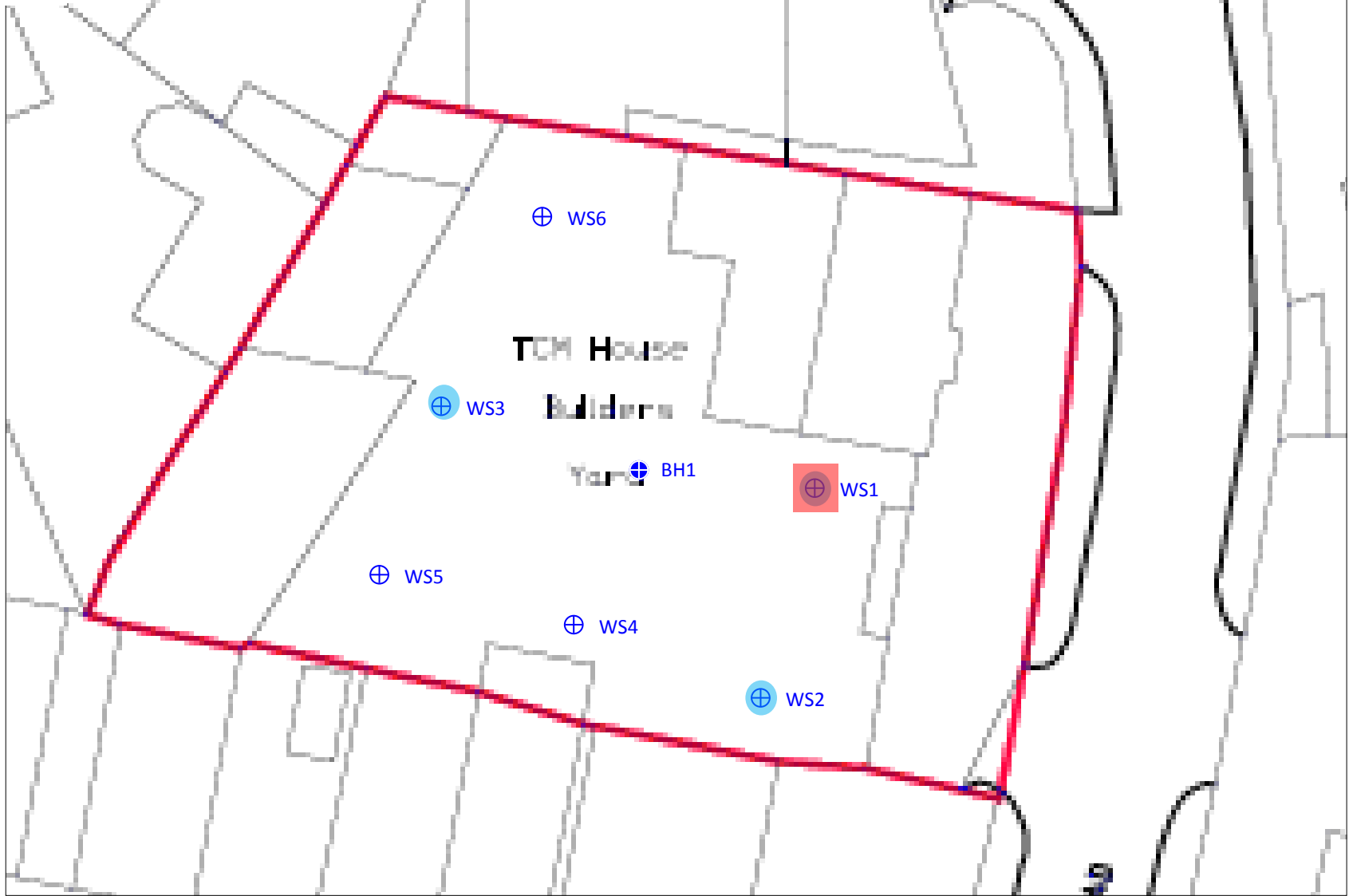
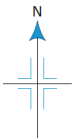
Date 12 May 2020



FIGURES

- 1 Asbestos Impacted Soil Plan
- 2 Proposed Development Plan





Legend

- ⊕ Window Sample Location
- ⊕ Borehole Location
- Monitoring Well
- Asbestos Impact Soil

Notes

Figure 1

Drawing Title
Asbestos Impacted Soil Plan

Project Number 19-228.03

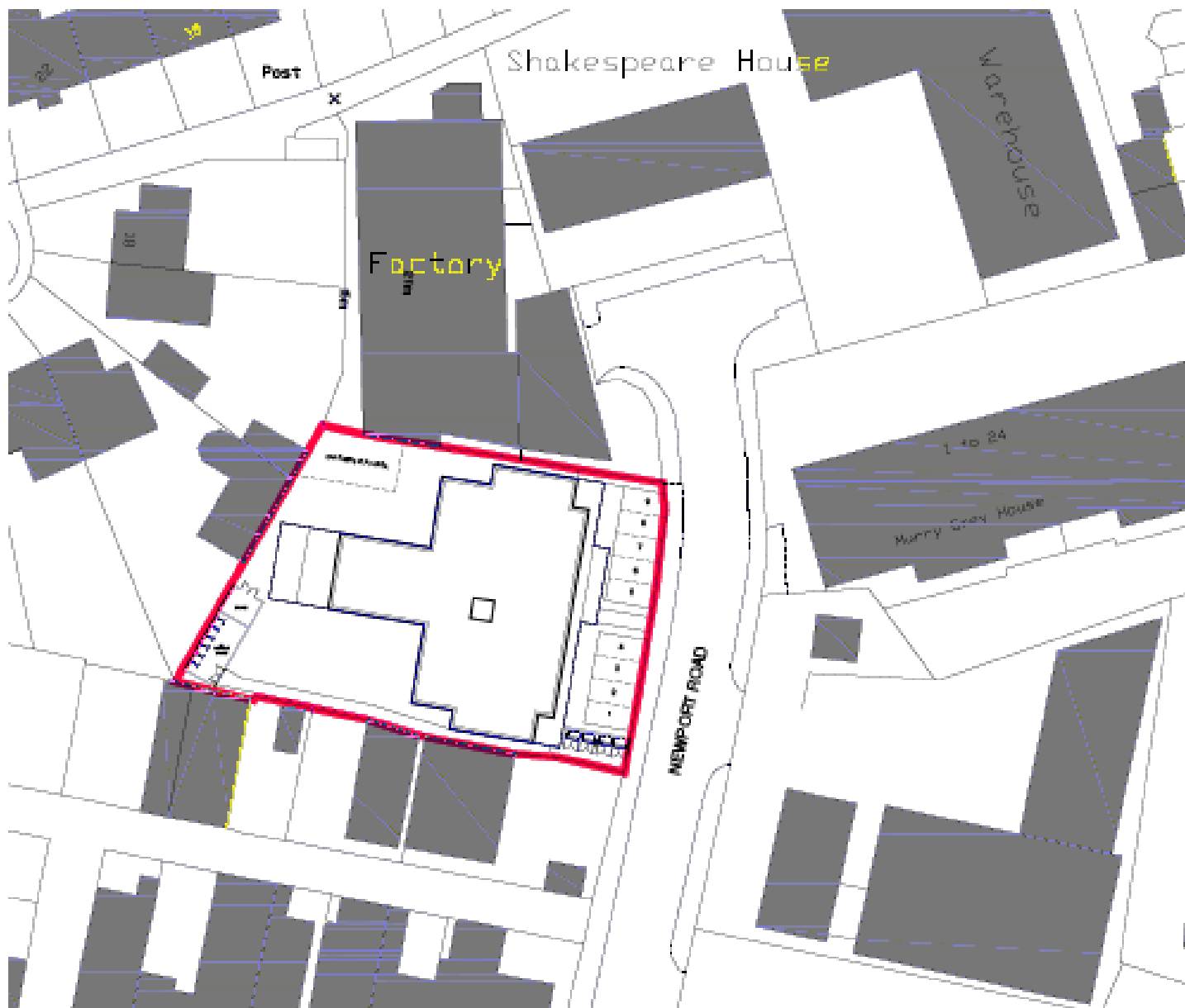
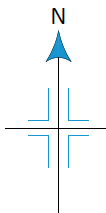
Project Title
TCM House, Newport Road, Hayes, UB4 8JX

Drawn by GR

Checked by JB

Scale NTS





Legend

Notes

Plan provided by client

Figure 2

Drawing Title

Proposed Development Plan

Project Number 19-228.03

Project Title

TCM House, Newport Road, Hayes, UB4 8JX

Drawn by GR

Checked by JB

Scale NTS

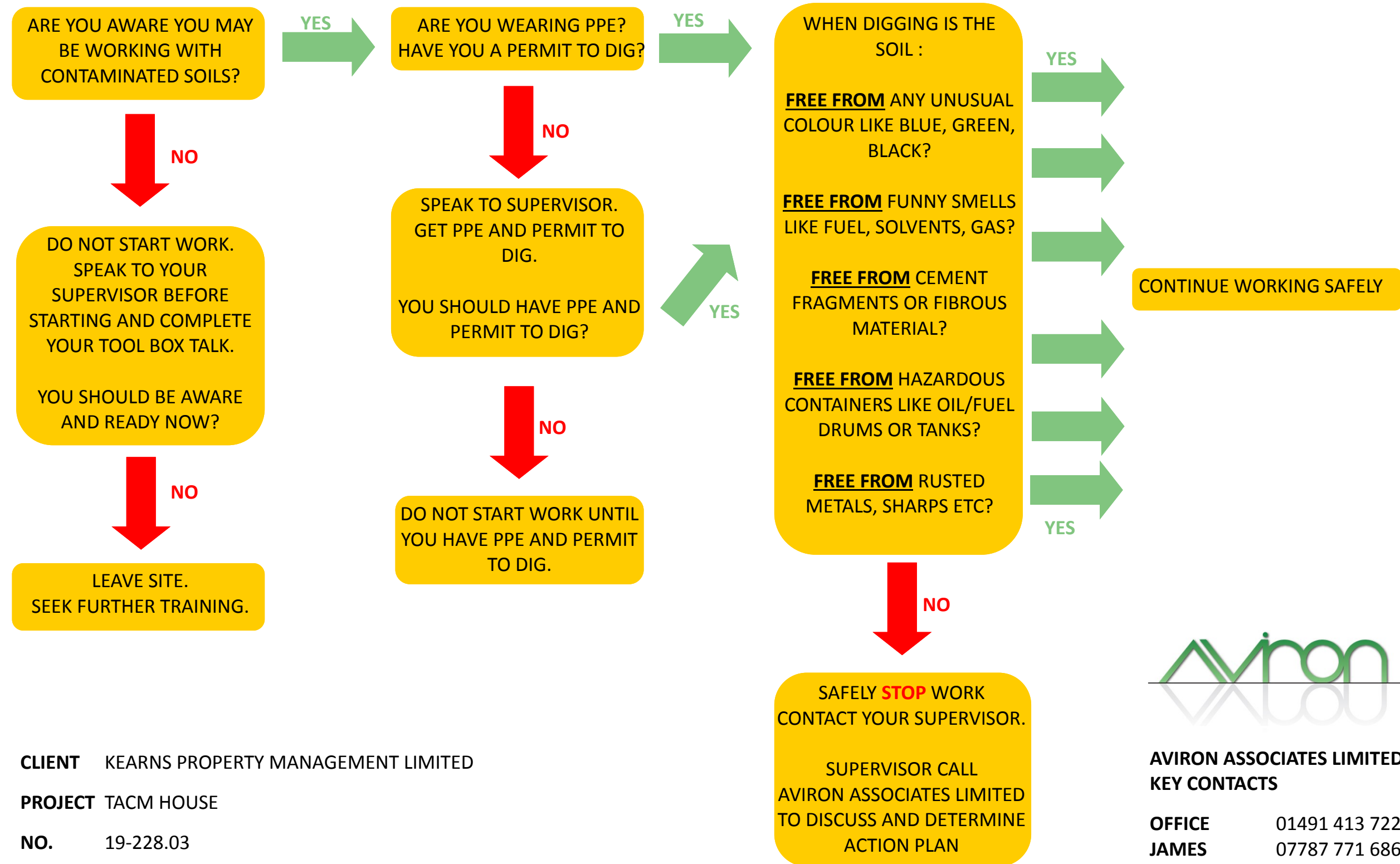


APPENDIX I

DISCOVERY STRATEGY FLOW CHART



HOW TO IDENTIFY CONTAMINATED SOILS AND WHAT TO DO?



CLIENT KEARNS PROPERTY MANAGEMENT LIMITED

PROJECT TACM HOUSE

NO. 19-228.03

ISSUE REVISION A



**AVIRON ASSOCIATES LIMITED
KEY CONTACTS**

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APPENDIX II

SOIL IMPORT CRITERIA VERIFICATION TARGETS





**Residential without Homegrown Produce
Soil Screening Values
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 (SUITE 1)					Pyrene	3700	3800	3800	LQM S4UL
Arsenic	40	40	40	C4SL/LQM S4UL	Phenols	750	750	750	LQM S4UL
Boron	11000	11000	11000	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	1900	3900	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	LQM S4UL	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	3000	4700	6000	LQM S4UL	Aliphatic EC >12-16	1,100	2400	4400	LQM S4UL
Acenaphthylene	2900	4600	6000	LQM S4UL	Aliphatic EC >16-35	65,000	92000	110000	LQM S4UL
Anthracene	31000	35000	37000	LQM S4UL	Aliphatic EC >35-44	65,000	92000	110000	LQM S4UL
Benzo(a)anthracene	11	14	15	LQM S4UL	Aromatic EC 5-7 (benzene)	370	690	1400	LQM S4UL
Benzo(a)pyrene	3.2	3.2	3.2	LQM S4UL	Aromatic EC >7-8 (toluene)	860	1800	3900	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	1200	LQM S4UL
Benzo(k)fluoranthene	110	110	110	LQM S4UL	Aromatic EC >12-16	1800	2300	2500	LQM S4UL
Chrysene	30	31	32	LQM S4UL	Aromatic EC >16-21	1900	1900	1900	LQM S4UL
Dibenz(ah)anthracene	0.31	0.32	0.32	LQM S4UL	Aromatic EC >21-35	1900	1900	1900	LQM S4UL
Fluoranthene	1500	1600	1600	LQM S4UL	Aromatic EC >35-44	1900	1900	1900	LQM S4UL
Fluorene	2800	3800	4500	LQM S4UL	Aromatic EC >44-70	1900	1900	1900	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	1300	1500	1500	LQM S4UL					