

# **-DRAFT-REMEDIATION ACTION PLAN (RAP)**

SPRINGHILL FARM LIFESTYLE DEVELOPMENT, STATE HIGHWAY 50,  
ONGAONGA



**Reference Number:** REP-H0151/SMP/APR21

**PREPARED FOR:** SPRINGHILL FARM HOLDINGS, C/- DEVELOPMENT NOUS LTD

09 APRIL 2021



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## STATEMENT

This plan has been prepared in acknowledgement of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. It has been authorised by a suitably qualified and experienced practitioner (SQEP); and has been prepared with the intention of providing practices and procedures for the management of potentially contaminated land that meets the criteria of the NES, the MfE guidelines and the requirements of Springhill Farm Holding's development plans.

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## 1 INTRODUCTION

It is proposed to develop the piece of land located at 1,152, 1,200, and 1,080 State Highway 50, and 604 and 612 Wakarara Road, Onga Onga through a large scale rural residential subdivision, forming rural residential lots ranging from 4,000 m<sup>2</sup> to 1.2 Ha. The full piece of land encompasses some 214 Ha of pastoral farmland.

While final scheme plans and earthworks plans are not available at the time of writing this draft remediation action plan (RAP), it is expected that some remedial earthworks will be required in order address areas actual and potential contamination on the site as detailed in the accompanying detailed site investigation (Ref: *Rep-H0151/DSI/Apr21*), alongside some site preparatory earthworks to prepare the site for the intended new structure as well as demolition activities and.

A detailed site investigation (DSI) conducted by Geosciences Ltd (GSL), and provided alongside this RAP, identified that the site has been subject to activities included on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) through the presence of a sheep dip / spray race, farm dump, historical use of lead based paints, and the presence of domestic wastewater treatment systems. Those HAIL activities have resulted in discernible impacts to soil on site that will require remediation to facilitate the proposed change in landuse.

This remediation action plan (RAP) has been prepared to provide a structured framework for further intrusive investigations of soil quality to be undertaken prior to earthworks commencing in order to fully delineate the extents of the impacted areas, alongside general practises to be in place for soil disturbance in order to ensure any risks to human and environmental health are managed to an acceptably low level. This RAP will require update following the return of analytical results in order to ensure that controls are of a scale and degree commensurate to the risks identified and to ensure that any areas of the site requiring remediation are appropriately addressed.

## 2 DETAILED SITE INVESTIGATION - GSL 2021

GSL undertook a detailed site investigation (DSI) of the site in April 2021, the DSI identified actual and potential for activities included on the MfE HAIL to have been undertaken on site. Soil sampling undertaken as part of the DSI indicated that historic landuses (sheep dip, lead based paint use and farm dump activities had resulted in elevated concentrations of arsenic and lead in excess of the rural residential soil contaminant standard (SCS) set by the National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

Concentrations of arsenic and lead also exceeded the commercial / industrial SCS in discrete portions of the site and as such a potential risk is present for end residential landusers and site workers during any soil disturbance activities. The location of the identified impacted areas around the sheep dip and historical structures are noted on Figure 2.

## 3 STATUTORY REQUIREMENTS

As a result of the findings of the DSI, and in order to ensure any risks to human or environmental health or the environment are managed to an acceptably low level, a remediation action plan is required that will provide practises and procedures to be followed during the earthworks to ensure the protection of human and environmental health and to ensure that any impacted soil from the

site is appropriately handled, managed onsite through sustainable remedial practises and, if required, appropriately disposed of at a suitably licensed facility.

The purpose of this RAP is to set out the location and extent of intrusive soil investigation required prior to earthworks commencing as well as providing an overarching set of general controls that have been implemented on sites with similar history. As part of the resource consent process, this SMP will require update prior to earthworks commencing to document the findings of the intrusive investigation and provide controls with respect to the exact nature of soil quality on site.

## 4 EXTENT OF IMPACTED AREAS

Based on the findings of this investigation, GSL has confirmed that HAIL activities have resulted in adverse impacts to soil quality and the following areas will require remedial action:

- Areas surrounding the oldest sheds and former residential dwelling have been impacted by lead to a level that exceeds the NES Rural Residential land use standard;
- The curtilage of the wool shed has been adversely impacted by lead to a distance not exceeding 3m;
- Sheep dip activities have resulted in elevated concentrations of arsenic and the eastern and southern extents of historic dip structure;
- A residual farm dump is present encompassing an area of approximately 100m with mixed refuse present within the void. The exact depth is unknown on account of the overgrown vegetation and age but is likely to extend approximately 5m below relative ground level; and
- Domestic wastewater systems attached to the dwellings have been identified and are considered low risk. However, should these require decommissioning and removal during demolition activities, appropriate controls should be in place and effective.

## 5 REMEDIATION ACTION PLAN

The practises and procedures in this remediation action plan are intended to ensure that health, safety and environmental risks associated with the proposed earthworks activities at the Springhill Farm Subdivision, 1200 State Highway 50 & 612 Wakarara Road, Onga Onga are managed to an acceptably low level. It is not intended that this RAP should replace the contractor's site-specific health and safety plan or earthworks and sediment control plan but should be enacted in conjunction with these documents.

This RAP has been prepared to document the proposed intrusive delineation soil sampling investigations required to fully characterise impacted soil across the farmyard supplemented with the inclusion of the expected controls required to manage low level impacted soil around the barn on site. This RAP should be revised following the completion of intrusive investigations and the specific requirements given to any contractor engaged to undertake earthworks.

### 5.1 PRE-REMEDIATION WORKS COMMENCEMENT REQUIREMENTS

Prior to remedial works commencing on site, the following aspects will be addressed by the appointed primary contractor.

### 5.1.1 HAZARDOUS BUILDING MATERIALS SURVEY AND ASBESTOS REMOVAL

As structures on site were constructed prior to 1 January 2000, should any demolition works be required, in accordance with the *Health and Safety at Work (Asbestos) Regulations 2016* all structures on site must be subject to a fully intrusive pre-demolition hazardous building materials survey undertaken by a suitably licensed asbestos assessor. The findings of the survey will indicate the location and extent of all asbestos containing materials on site. Following the completion of the survey a suitably licensed asbestos removal contractor will be engaged to undertake asbestos removal works on site using the findings of the building survey to form the basis of an asbestos removal control plan.

All asbestos removal work must be completed and given independent clearance by a licensed asbestos assessor prior to full scale demolition works commencing.

### 5.1.2 RESPONSIBILITIES AND SITE MANAGEMENT

Springhill Farm Holding's appointed earthworks contractor will assign a 'site manager' to the project that will be responsible for the implementation of this RAP, pending its acceptance by the Council Consents Team, for the proposed works at the site. The site manager will be responsible for liaising with a multitude of consultants during the works to ensure that numerous facets of risk management are achieved.

**Table 3: Responsible Parties**

POSITION	CONTACT NAME & COMPANY	TELEPHONE NUMBER	RESPONSIBILITY
Main Construction Contactor			Project Delivery
Project Manager			Management of Project, PCBU
Site Manager/supervisor			Implementation of RAP
Contaminated Land Advisor	Carl O'Brien Geosciences Ltd	0272285556 (06) 281 2454	Validation of Remedial Works On-call assistance

### 5.1.3 ENGAGEMENT OF CONTAMINATED LAND ADVISOR

GSL will act as Contaminated Land Advisor (CLA) and will provide on-call direction in relation to contamination / disposal issues for the project. GSL are a professional advisor, suitably qualified and experienced in the investigation, reporting, remediation, and validation of contaminated land.

GSL's main functions as CLA are to:

- Assist in inspecting / screening potentially contaminated material;
- Assess the effectiveness of environmental control measures;

- Manage the collection and analysis of any soil samples (if required) in accordance with the Ministry for the Environment's (MfE) Contaminated Land Management Guideline No 1, (Reference 5);
- Provide assessments of the investigation;
- Make recommendations based on findings; and
- Maintain regular liaison with the authorities if necessary.

#### **5.1.4 BRIEFING SESSIONS**

The site manager is to commission a briefing session for relevant staff and subcontractors prior to the commencement of works. The briefing session will include as a minimum:

- Known areas of impacted soil material;
- Appropriate PPE and safety measures;
- Familiarisation with the requirements of the SMP;
- Guidance for identifying contaminated material as works progress (Appendix A); and
- Procedures to be followed should contaminated material be encountered (Appendix A).

#### **5.1.5 HEALTH AND SAFETY PROCEDURES**

While this SMP provides steps that are required because of the concentrations of arsenic identified during the DSI, the earthworks contractor is ultimately responsible for the H&S procedures related to the earthworks.

Due to the detection of arsenic and lead in excess of the commercial / industrial landuse standard applicable to site workers as defined in the NES, soil in discrete areas of the site presents a potential risk to the health of site worker. As such, the following health and safety provisions will be required, and must be adhered to in order to ensure the health and safety of workers during soil disturbance activities.

The primary risks associated with the disturbance of arsenic impacted soil are inhalation and direct contact with skin or eyes. Primary risk reduction measures to be in place for the protection of site workers during remedial works are as follows:

- Mechanical excavation methods to limit the potential for direct contact of site workers with actually or potentially contaminated soil (documented in Section 6.2);
- appropriate dust suppression procedures in order to mitigate the potential generation of dust if works are undertaken in dry conditions (documented in Section 6.1.8 and Section 6.1.9);
- appropriate use of personal protective equipment (documented in Section 6.1.7)
- provision of staff washdown facilities and ensuring appropriate hygiene procedures prior to eating drinking or smoking on breaks (documented in Section 6.1.6);
- the provision of a designated clean area for staff to take meals or breaks (documented in Section 6.1.6)

The Health and Safety Guidelines on the Clean-up of Contaminated Sites developed by Occupational Safety and Health Services (OSH) provides reference to appropriate H&S measures that can be adopted for contaminated sites. A copy of this guideline can be provided on request.

#### **5.1.6 ESTABLISHMENT OF ON – SITE AMENITIES & COMMENCEMENT OF WORKS**

Prior to remedial earthworks commencing, the site manager will ensure that appropriate site amenities are available on site and will include as a minimum:

- Designated ‘clean’ area for personnel to take breaks away from the identified impacted areas; and
- An appropriate personal decontamination area such that all personnel have facility to wash hands and face prior to eating drinking or smoking.

Once the on-site amenities are established, the site manager will ensure that dust, erosion and sediment controls are in place and effective, and that all personnel undertaking the works have been briefed on their obligations and have appropriate PPE for the works being completed

#### **5.1.7 PERSONAL PROTECTIVE EQUIPMENT**

The minimum Personal Protective Equipment (PPE) which should be available on-site will be in accordance with the contractor’s specific health and safety plan. Additional PPE that may be required include:

- Protective leather or rubber gloves
- Safety glasses
- Dust masks

The site manager will use his discretion with regard to the use of the additional PPE and might call on the CLA for advice on this matter.

Any specific PPE that is required as a result of the findings of Section 5 below will be updated into this section following the return of analytical results.

#### **5.1.8 DUST CONTROL**

Dust controls are required to minimise pollutants becoming airborne and reduce stormwater sediment loads. If the proposed earthworks are undertaken in dry conditions, dust can be controlled by light frequent water spraying. Water spraying should be frequent enough to suppress the generation of dust but not as heavy as to generate sediment laden water run-off.

The site manager will use his discretion regarding dust suppression and will be ultimately responsible for ensuring the control of dust during earthworks on site.

#### **5.1.9 EROSION AND SEDIMENT CONTROL**

To prevent generation of contaminated sediment laden run-off, stormwater protection measures shall be incorporated around the perimeter of the proposed works in accordance with Hawkes Bay



Regional Council Document “*Hawkes Bay Waterway Guidelines Erosion and Sediment Control*” shall be sufficient to ensure compliance with these requirements. These controls shall include appropriate measures such as:

- Protection of the proposed works perimeter with silt-socks to trap sediment in stormwater; and
- the use of diversion trenches to direct surface water to a designated stormwater collection pond

## 6 PROPOSED DELINEATION SOIL SAMPLING INVESTIGATION

As part of the process for seeking resource consent for the proposed development, further intrusive investigation of all impacted areas is required to be undertaken in order to establish the full lateral and vertical extents of the impacted soil and prepare a suitable remedial strategy in accordance with the desired outcomes of the Resource Management Act 1991. The following intrusive investigation is required to be undertaken prior to works commencing. Indicative soil sampling locations as described below are shown on Figure 3.

The following indicative intrusive investigation will be undertaken in order to assess the risk associated with the potentially contaminated areas underlying the site:

- Farm dump:
  - five soil samples from base and side walls of the farm dump once excavated for the analysis of heavy metals and PAH;
- Lead paint impacted areas surrounding historic structures:
  - soil samples collected from 2.5 m out from each identified exceedance and then on and expanding 5 m spaced grid laterally out from each structure;
  - soil samples collected from 300 mm and 500 mm depth at one location from each structure;
  - the analysis of the above soil samples for lead only
- woolshed, sheep dip and holding pens:
  - soil samples collected on a systematic grid pattern infilling areas between previous exceedances and working out from the sheep dip on a 5 m spaced grid;
  - the collection of soil samples from 300 mm and 500 mm at the location of SS16 and SS17 where the highest arsenic concentrations were returned;
  - the analysis of the above soil samples for arsenic only.

Following the completion of the intrusive delineation investigation the results will be reported in a revised RAP to be submitted to Council to include any specific further controls required for any remedial works.

## 7 REMEDIATION STRATEGIES

In order to ensure that the site is made fit for purpose, remediation will likely be undertaken through two key methods:

1. Excavation and offsite disposal of soil impacted to a level in excess of the Commercial / Industrial SCS as well as all refuse and decommissioned septic systems; and
2. Vertical mixing of low level impacted soils to provide compliance with the Rural Residential SCS.

The exact remedial approach will be confirmed following full delineation and calculation of impacted soils and determination on potential mixing regimes.

### 7.1 GENERAL REMEDIAL EARTHWORKS METHODOLOGY FOR EXCAVATION AND DISPOSAL OF CONTAMINATED SOILS

While the exact extent of remedial works have not been fully defined, remediation of concentrations of arsenic and lead in excess of the commercial / industrial SCS will require remediation through excavation and offsite disposal to a suitably licensed landfill facility. In addition, the farm dump will require excavation of all refuse and subsequent disposal at a licensed landfill facility while the septic systems may require emptying by a liquid waste contractor followed by careful decommissioning of the systems themselves. The following general procedures are considered a standard approach for “dig and dump” methodology and will be updated following delineation soil sampling.

Prior to the commencement of any remedial works commencing, the extent of known impacted areas will be marked out in the field using fluorescent paint or marker pegs to clearly demarcate their extents and a pre-start discussion will be held by all relevant parties to ensure the requirements of this SMP are clearly understood. The following steps will generally be followed:

- erosion and sediment control measures will be installed in accordance with the earthworks contractor’s specific erosion and sediment control plan, and will be in accordance with Hawkes Bay Regional Council *Hawke’s Bay Waterway Guidelines - Erosion and Sediment Control* (as adopted by Horizons Regional Council) will be in place and effective until the land is returned to an erosion resistant state. Erosion resistance is considered achieved when the soil surface is placed under an impervious covering (i.e. paved), grass, gardens, or other vegetation;
- the site manager will arrange for disposal of all excess soil prior to works commencing to a facility licensed to accept material as defined by intrusive investigations;
- trucks will be covered prior to leaving the site and the site manager will be responsible for overseeing loadout to ensure that no debris will be discharged during transport on public roads;
- An area on site will be prepared for the temporarily stockpiling of material of suspicious nature that might be encountered during the earthworks;
- Temporary stockpiles will be managed (kept damp) to ensure that there is no excess dust generated from the stockpiles;

- Silt fencing will be placed around the temporary stockpiles to ensure that there is no excess sediment run-off from the stockpiles;
- The CLA will be notified and inspect any suspicious or noxious material that might be encountered during the earthworks. If necessary, the CLA will take soil samples for analysis of any foreign material that is discovered. The CLA will advise on the disposal of any such material;
- Upon completion of the excavation the site manager shall ensure that plant and equipment are cleaned and decontaminated appropriately; and
- A landfill manifest or weigh bridge dockets of all material disposed of at a managed fill or landfill facility will be kept;
- prior to any machinery leaving the site, it will be cleaned and decontaminated appropriately. Decontamination will generally involve the use of a soft soap solution and water to remove all visible dirt and debris. Machinery will be parked on geotextile fabric for decontamination and all used geotextile will be disposed of as refuse.

#### 7.1.1 DUST CONTROL

Dust controls are required to minimise pollutants becoming airborne and reduce stormwater sediment loads. If the proposed earthworks are undertaken in dry conditions, dust can be controlled by light frequent water spraying. Water spraying should be frequent enough to suppress the generation of dust but not as heavy as to generate sediment laden water run-off.

The site manager will use his discretion with regard to dust suppression and will be ultimately responsible for ensuring the control of dust during earthworks on site

#### 7.2 REMEDIATION METHODOLOGY FOR VERTICAL MIXING

Where lower level exceedances of the NES rural residential standard are noted and given the volume of available 'clean' soil from the surrounding paddock areas of the site, alternative and more environmentally sustainable remedial approaches can be undertaken. Given the natural underlying sediments at depths of 300mm and deeper are likely to contain concentrations of heavy metal well below the adopted background concentrations. It is therefore concluded that by blending the 0-500mm horizon of soil across the site in accordance with the procedures described in the document; *Guidelines for Contaminated Land Remediation by Soil Mixing* prepared for Hawkes Bay Regional Council by Pattle Delamore and Partners (2015) will likely produce a resultant mix that comply with cleanfill criteria. It is further noted that the loose and sandy nature of the surface soil provides a product ideal for mixing.

The mixing process of these areas will then proceed by scrapping off and stockpiling of the grass surfaces. The underlying soil will then be mixed by using an excavator fitted with a wide bucket. It will excavate soil to 500mm deep by digging and lifting the bucket approximately a metre high then dropping the soil while turning the bucket around. Based on experience, by repeating this process three times at one location a perfect mix can be obtained.

Alternative mixing methodologies can be undertaken using mechanical tilling of the soil on multiple intersecting transects in order to blend the topsoil with underlying clean horizons, or excavation of

low level impacted soil and emplacement in windrows where it can be blended with clean soil from other areas of the site.

Regardless of the mixing methodology, further sampling of the resultant mixture should be undertaken in order to ensure the compliance of the soil with the relevant landuse standards of the NES. Soil should be re-sampled at a rate of 1 soil sample per 500 m<sup>3</sup> of soil mixture.

## 8 CONTINGENCIES

In the event that other contamination is encountered on the site during the works, the site manager, in consultation with the CLA, will either:

- Identify the material in situ if possible (staining, odour, visible fibres or refuse etc.); or
- Excavate the material to a suitable leak proof and covered skip-bin or truck and take representative samples for analysis, placing the material on hold for appropriate disposal; or
- Halt excavations in the immediate vicinity of the discovery while the material is sampled in-situ, and removal / disposal options explored once the analytical results are returned.

An appropriate log will be kept by the site manager of any unidentified contamination encountered during the excavations.

GSL has produced a contaminated soil discovery guideline (CSDG) document that outlines the signs, risks, and remedial actions required for contamination scenarios that may be encountered during remedial earthworks (Appendix A).

Suspicious material will be investigated by the CLA and laboratory analysed if deemed necessary. The CLA will advise on the disposal options of any uncertain materials. Disposal options can include:

- remove to an appropriate temporary stockpile area for further testing and analysis; or
- disposal at a cleanfill, managed fill or landfill facility.

The appointed contractor might have their own discovery procedures based upon their specific experiences in working with contaminated land of various natures (urban to rural). Contractor specific documents may be used alongside or in conjunction with this SMP.

If any staff, contractors, or consultants discover contamination, they should notify the site manager immediately, who should enact the provisions of the plan.

### 8.1 FIBROUS MATERIAL (ASBESTOS)

It is not anticipated that any asbestos materials will be encountered on the site. However, where asbestos containing materials (ACM) are identified in the soil matrix, all works shall cease (including the excavation and disposal of affected materials) until the provisions of the *Health and Safety at Work (Asbestos) Regulations* are exercised.

ACM identification will primarily be through visual identification by a suitably competent person. Any fibrous material observed during excavations will be visually inspected, photographed and representative sample submitted to an accredited laboratory for analysis. Following receipt of results, the site manager in conjunction with the CLA shall determine what, if any, further remedial

steps may be required, including the provisions of asbestos removal control plans, semi-quantitative analysis, or site assessment under the WorkSafe endorsed *BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soils* (November 2017).

## 9 REPORTING AND RECORD KEEPING

At completion of the earthworks, the site manager shall provide records of the:

- volume and nature of any material removed from site and all managed fill / landfill disposal dockets;
- a log of any unknown or suspicious materials encountered during the earthworks;
- laboratory transcripts, if any;
- any complaints or incidents; and
- site photographs of all excavations and re-instatement works.

### 9.1 SITE VALIDATION REPORT

Depending on the findings of the DSI detailed above, and upon completion of the remedial works, a site validation report (SVR) may be required. If required, the SVR will be completed and provided to Auckland Council. The SVR will include:

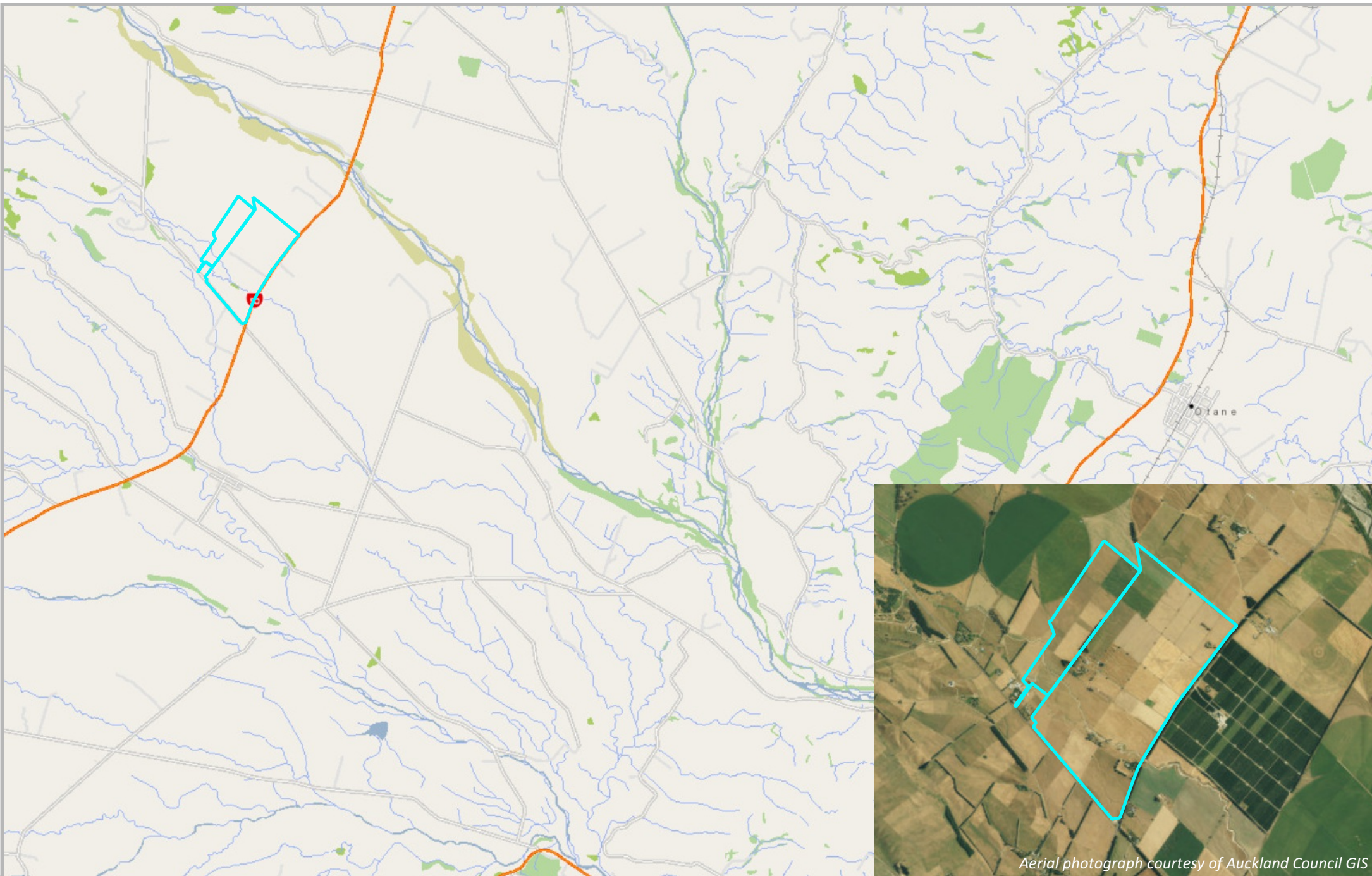
- The quantity of soil material removed from site, including copies of the disposal manifests;
- A description of any unforeseen contaminated soil material encountered during the remedial works;
- Laboratory analytical results from any soil testing that occurred during the remedial works; and
- Any incidences or complaints that occurred during the earthworks.

## 10 REFERENCES

1. Ministry for the Environment (2011) - Draft Users Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.
2. Ministry for the Environment (2011) – *Methodology for Deriving Standards for contaminants in Soil to Protect Human Health*. Ministry for the Environment, Wellington, New Zealand.
3. Ministry for the Environment (2011) — *Contaminated Land Management Guidelines No.1: Reporting on contaminated Sites in New Zealand*. Ministry for the Environment, Wellington, New Zealand.
4. Ministry for the Environment (2003) — *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils*. Ministry for the Environment, Wellington, New Zealand.
5. Department of Labour (1999) — *Health and Safety Guidelines on the Cleanup of Contaminated Sites*. Occupational Safety and Health Services. Department of Labour. Wellington. ISBN 0-477-03546-9.

## FIGURES









Aerial photograph courtesy of LINZ

**Figure 2 - Estimated Impacted Areas**  
**Wakarara Rd & SH50, Onga Onga**





Aerial photograph courtesy of LINZ

**Figure 3 - Delineation Soil Sampling Locations**  
**Wakarara Rd & SH50, Onga Onga**

## **APPENDIX A:      CONTAMINATED SOIL DISCOVERY GUIDELINES**

# CONTAMINATED SOIL DISCOVERY GUIDELINES (CSDG)



Reference Number: GSL/CSDG



Geosciences Limited  
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## DISCLAIMER

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## 1 INTRODUCTION

Contaminated land can be defined as, *'any land that has been adversely affected through the impact of human activity that has resulted in a significant alteration to the chemical, inorganic or organic characteristics of the naturally occurring soil material of the land'*.

Such a definition leaves a broad spectrum of potential physico-chemical characteristics which may apply. It is not the purpose of these guidelines to attempt to define all of the possible activities, characteristics, processes, or chemical compounds which may have an adverse impact upon naturally occurring soil material.

However, in the current field of contaminated soil investigation, disturbance, remediation and validation, and within the context of the *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (NES) there are situations that may be uncovered, or may present themselves in other ways, where the impact of man-made activities are both hazardous, in terms of human risk, and significant, in terms of environmental risk.

It should be noted that not all hazardous and significant contamination sources can be discerned by the eye, the ear or the nose and that any suspected occurrence of soil contamination should be scientifically investigated through the most appropriate means available.

It is hoped that this document can provide some additional guidance, examples, and discussion points around the investigation and assessment of particularly 'gross' or visually, olfactory and auditory significant contamination events, sources or plumes. It should not be taken that this document can replace suitable qualifications and experience, but rather can be used as general guide to the field practical methods used to immediately assess, prepare, and undertake the safe handling and immediate containment or excavation of contaminated soil materials.

## 2 PURPOSE

The practices and procedures in this report are intended to provide a field-practical process for the identification, assessment and management of grossly contaminated soil that may be encountered during earth breaking activities or other sub surface soil disturbance. These processes are intended to provide guidance on health, safety and environmental risks and risk management associated with earth breaking activities when gross evidence of contamination is encountered.

The practices and procedures outlined provide for first layer risk control and are one of many stages in the applicable health, safety and environmental risk management process. It is not intended to replace site specific health and safety plans, nor can it provide for every possible eventuality encountered in the field and cannot be reasonably expected to replace significant relevant on-the-job experience.

The *Health and Safety Guidelines on the Clean-up of Contaminated Sites* developed by Occupational Safety and Health Services (OSH) provides reference to appropriate H&S measures that can be adopted for contaminated sites and this is a key reference document when dealing with contaminated materials. These guidelines do not intend to replace the

guidance provided in that document and, if in doubt, it is the more preferable guidance document on provisions for Health and Safety when operating on contaminated soil sites.

### **3 INADVERTENT DISCOVERY OF CONTAMINATION**

It is assumed that a site which has already been identified as 'contaminated' has been assessed with respect of the inorganic or organic characteristics which exceed the applicable criteria or threshold values as defined by the relevant legislation, rules, or plans. Identified contaminated sites will therefore already have appropriate protocols in place for the ongoing assessment, investigation, remediation and validation of the areas that have been defined as contaminated and have plans and procedures in place to protect both human health and the environment.

It still remains possible however, that unknown, unidentified or even identified but underestimated, contamination may exist on such a site, or on a supposed 'non-contaminated' site. Such unknown contamination may be encountered as underground lenses (conglomerates of contamination in a localised zone), layers (widespread zone of contamination occurring along a stratified zone), hotspots (individual occurrences in a single location not otherwise connected), columns (vertical bands of contamination) or a plume (a zone of contamination moving along or through an aquifer / underground flow path and usually associated with seasonal or permanent groundwater flow).

In the event that 'unknown contamination' is encountered then it is advisable to have available some form of reference documentation that can provide insight to the frontline staff on the immediate signs, symptoms and actions that should be identified, assessed or considered while further advice is sought.

In all events encountering unknown soil contamination, a suitably qualified and experienced practitioner (SQEP) should be contacted for further advice, assessment and investigation.

### **4 GENERAL PROCEDURES**

Below is a summarized guide of applicable steps which should be considered if any grossly contaminated material is encountered. The contaminated soil discovery guideline factsheets at the back of the report provide further details on the explicit health, safety and environmental risks associated with particular contamination scenarios, and the procedures to follow, however, in all instances the following general procedures summarized within the headings below should be considered. The steps highlighted below should not be considered exhaustive nor considered solely in step-by-step fashion, it may be necessary to conduct one or more actions at the same time or in differing order as a result of changing circumstances 'on the ground'.

#### **4.1. STOP**

- Stop working immediately and exclude others from working in the immediate area.
- Switch off machinery, generators etc., and establish a safe zone around the area dependent upon the assumed risk.



- For example, a gas release from an old landfill can be considered potentially toxic and / or explosive and a zone of approximately 10m may be considered appropriate depending upon the scale of the event.
- A series of dark red, brown or black stains in a pit with no odorous or free liquid discharges is unlikely to be immediately hazardous and the safe zone may extend to only the excavation edges.
- Prevent ingress or egress of stormwater, rainwater or wash water and stop all further activity immediately associated with the area.
- At this stage the extent, type and risk to health as a result of contamination is unknown – proceed with care and caution.

#### **4.2. ADVISE THE SITE MANAGER**

The site manager (or designated person) is the person principally in charge of health and safety on the site. They should also be familiar with these guidelines. The following steps are generally completed by the site manager or completed on the manager's delegation.

#### **4.3. CONTAIN**

If the contamination is leaving the site, or has the potential to leave the work site, then it should be contained. At this stage, the exact nature and risk of the contamination may not be known, so appropriate care and caution should be exercised. Some or all of the following methods may be used to contain the contamination:

- Sediment fences and straw bales;
- drain covers and sandbags;
- absorbent booms, spill mats, 'kitty litter' etc. can all be utilized to protect the environment from further release; and
- If containment is not possible, immediately contact:
  - ***Auckland Pollution Hotline (09) 377 3107.***

#### **4.4. ASSESS THE RISK**

Not all contaminants, or all instances of contamination, will require special provisions or procedures. Similarly, an instance of contamination may be falsely or incorrectly reported. Not all stains are contamination, or all apparent plumes of oil on a liquid surface, are man-made occurrences.

- Refer to the factsheets at the back of these guidelines.
- Make a note of any or all of the following. It may be necessary to document and record some or all of the findings, for forwarding to the SQEP, as odours may dissipate and water may dry up or soak back into the soil:
  - Appearance – staining, trickling, flowing, bubbling (gas escape), thick, sticking to tools and equipment, sliding off tools etc.

- Odour – sweet, sour, petrol-like, tar-like, sharp etc.
- Colour or colours
- Miscibility i.e. does it or does it not mix with water. Oil / solvents etc. do not mix with water and creates a coloured sheen on the water surface.
- If gross contamination is confirmed (or strongly suspected) then the appropriate measures should be put in place, dependent upon the risks concerned as defined in the factsheets. A half buried rusted drum of waste batteries will require different safety procedures to the discovery of a buried pile of asbestos cement board, for example.

#### **4.5. CONTACT THE CLA (SQEP)**

Contact the on-call contaminated land advisor – provide digital photographs if safely possible to do so. Talk to the CLA. They may advise additional steps to follow; they may be required to come to site.

#### **4.6. RESTRICT ACCESS**

Following the assessment of the risk, the safety zone can now be better defined.

- With reference to the factsheets, restrict access to the safe zone to only those members of the team that need to be there. It may be necessary in the case of potentially explosive vapour release, to cordon off a significant sized area and prevent working, or vehicular access, within that area.
- Consider the potential flow paths of vapours along trenches, down slopes, through drains etc.
- Access can be restricted through purely visual means, e.g. warning signs, via fencing or by staff management (security guard for example) or a mixture of all three based upon the site manager's assessment and the extent of the contamination.

#### **4.7. ESTABLISH A WORKING TEAM AND PROVIDE WITH APPROPRIATE PPE**

Before continuing, establish a team of competent trained individuals who can deal with the matter and ensure that they have, and are correctly wearing, the appropriate PPE for the situation at hand as defined in the factsheets. Consider the following when establishing the team:

- Experience – have they handled such a situation before?
- Competence – are they familiar with the tools, equipment, PPE and procedures that will be employed?
- Comfort – not all staff are comfortable with unknown situations. Will they be comfortable in this situation?

#### **4.8. EXCAVATE**

At some point, the contamination is likely to be removed. This may not be the case in every instance and the regulations allow for other actions such as in-situ remediation, stabilisation, encapsulation etc. and the SQEP will advise on the specific methodologies required. In certain circumstances a more detailed remedial plan may have to be compiled which will document specific goals, validations and disposal actions. The SQEP will advise on the requirements of the regulations. In most cases of localised acute instances of gross contamination, they can be safely managed immediately in the interests of protecting human health and the environment. In this case, some or all of the following processes should be followed:

- Excavation / Isolation – solid contaminants, soil, drums, refuse etc. can be excavated, by machine or by hand, directly into a covered truck or sealed skip, preventing further potential spread and isolating the contaminants for assessment and disposal;
- Vacuum extraction – contaminated water may be sucked up into a vacuum tanker, provided that there is no risk of reaction or explosion, where it can be isolated for assessment and disposal. DO NOT MIX water / liquid from more than one event in a vacuum truck;
- Separation – large separate items, such as asbestos sheet fragments, can be collected by hand, separated from the soil matrix and placed in double skinned plastic bags for appropriate disposal; and
- Absorbance – contaminated water, hydrocarbons and chemicals can all be absorbed through the use of contaminated pads, pillows and booms which can then be placed in sealed skips or bags and isolated for appropriate disposal.

#### **4.9. DOCUMENT**

Keep written documents, including digital photographs, of all measures used to contain or cleanup the contamination. This might include some or all of the following:

- Assessment measures used e.g. laboratory analysis, in-situ analysis (e.g. XRF), smell, behaviour in water (miscibility etc.), pH indicator test etc.;
- Staff involved in clean-up and experience;
- Methods used, problems encountered, discussions with SQEP;
- Complaints by third parties (e.g. odours, colour changes to local waterways etc.);
- Excavation or separation methods used, names of contractors etc.;
- Volumes extracted;
- Conditions of cartage, e.g. skip bin, covered truck, closed wheelie bins etc.
- Location of final disposal and disposal documentation e.g. tip dockets, weighbridge receipts etc.

#### **4.10. DISPOSE**

In order to ensure that all material is disposed of correctly, ensure the safe and licensed disposal of the material in accordance with the requirements outlined by the SQEP. In the majority of cases, examples of gross contamination are likely to require disposal at a licensed landfill facility e.g. Redvale Landfill or Hampton Downs Landfill. Other licensed facilities may exist that can handle potentially contaminated material, that may also be able to provide assistance.

- Contaminated liquids will not be received at landfill for disposal and must go to a licensed liquid disposal facility. Sewerage contaminated liquids can probably go directly to the nearest local sewer treatment facility, but chemical contaminated liquid will be required to go to an appropriate liquid treatment plant.
- Drums of unknown or unidentified waste may have to go to a solid / liquid hazardous waste handling plant.
- Contaminated PPE will also require appropriate disposal.
- In all instances, the receiving facility will be unlikely to receive and handle the material without some form of analysis or assessment of the composition of the waste.
- Keep all transport and disposal dockets for the final report.

#### **4.11. REPORT**

Communications and documentation will be kept during the procedures but a final report should be provided to the project manager detailing all of the steps, communications and records as required.

This report provides assurance to the regulatory authority that all the necessary steps have been followed and the matter has been adequately and professionally dealt with.

## 5 FACTSHEETS

### 5.1. PETROLEUM HYDROCARBONS



#### ACTIVITY

- Petroleum service station
- Vehicle workshop
- Gasworks sites

#### POTENTIAL CONTAMINATION

- Total Petroleum Hydrocarbons (TPHs)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Benzene, Toluene, Ethylxylene, and Xylenes (BTEX)
- Heavy Metals

#### DESCRIPTION

Petroleum-contaminated soils have a brown / black discolouration and an 'oily' consistency. Petroleum products, such as diesel and petrol, are insoluble in water and can form oil slicks in excavated areas such as trenches. Petroleum products in soil can be detected by the characteristic odour of petrol and diesel. BTEX produces a much 'sweeter' odour similar to that of paint-thinners.

#### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Adverse reactions to strong hydrocarbon odours are possible, e.g. headaches, blurred vision, nausea. Contaminants can be absorbed into body via inhalation of dust, contact with skin, or ingestion. Leaked fuels can migrate into groundwater, potentially contaminating drinking water.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical / oil resistant steel-capped boots; (2) disposable coveralls; (3) chemical-resistant gloves; (4) safety glasses; (5) suitably graded half-face or full face respirator.

#### HANDLING AND DISPOSAL

Pooled hydrocarbon spills can be removed using suitable absorbent materials or collected by a suitably rated vacuum tanker. Spills can also be transferred to a sealed container by an appropriately rated vacuum pump or similar. Hydrocarbon contaminated soil can be placed in a sealed leak proof skip bin or truck for disposal at a facility authorised to receive material of that kind.

## 5.2. HEAVY METALS



### ACTIVITY

- Metal workshop
- Metallisation works
- Electroplating industries
- Timber treatment facilities

### POTENTIAL CONTAMINATION

- Heavy Metals

### DESCRIPTION

Gross contamination of heavy metals in soils can cause bands of discolouration within the soil profile. Pools of discoloured water (yellow, blue, red, orange) in excavated areas, such as trenches, are indicative heavy metal contamination. Solvents used for metal preparation, like BTEX, can form 'sheen' on the surface of water and produce a 'sweet' odour similar to that of paint-thinners.

### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Contaminants can be absorbed into body via inhalation of dust, contact with skin, or ingestion. Heavy metals have the ability to leach further into soil and eventually into groundwater, potentially contaminating drinking water. A consideration should be given to the potential of pH alteration as metal finishing plants often employ acidic solutions for metal preparation.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical / oil resistant steel-capped boots; (2) disposable coveralls; (3) chemical resistant gloves; (4) safety glasses; (5) suitably graded half-face or full face mask or respirator.

### HANDLING AND DISPOSAL

Heavy metal-contaminated soil can be placed in a truck and covered with tarpaulin for disposal at a facility authorised to receive material of that kind.



### 5.3. DRY CLEANERS



#### ACTIVITY

- Dry-cleaners

#### POTENTIAL CONTAMINATION

- Volatile hydrocarbons (trichloroethylene, tetrachloroethylene, carbon tetrachloride)

#### DESCRIPTION

It is difficult to distinguish soil contamination by solvents used for dry-cleaning. However, the solvents can form a bilayer with water they are less dense than water. The odours associated with dry-cleaning agents are very distinctive and can be described as 'sickly sweet', causing dizziness and nausea.

#### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Contaminants can be absorbed into body via inhalation of vapours, contact with skin, or ingestion. Depending on atmospheric conditions, dry-cleaning agents may readily evaporate. Extended exposure to dry-cleaning agents can affect the central nervous system. Gross contamination of dry-cleaning agents in soil can migrate past the water table, making remediation complex.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical / oil resistant steel-capped boots; (2) disposable coveralls; (3) chemical-resistant gloves; (4) safety glasses; (5) suitably graded half-face or full face respirator.

#### HANDLING AND DISPOSAL

Pooled hydrocarbon spills can be removed using suitable absorbent materials or collected by a suitably rated vacuum tanker. Spills can also be transferred to a sealed container by a suitably rated vacuum pump or similar. Solvent contaminated soil, including drums or containers, can be placed in a sealed leak proof skip bin for disposal at a facility authorised to receive material of that kind.

#### 5.4. TANNERY / LEATHER PROCESSING



##### ACTIVITY

- Leather manufacture / treating facility

##### POTENTIAL CONTAMINATION

- Heavy Metals (particularly chromium)
- Solvents
- Pesticides
- Bleaching agents

##### DESCRIPTION

Gross contamination of chromium in soils, caused in the tanning stage of treating leather, can cause orange and blue bands of discolouration within the soil profile. Pools of discoloured water (orange, blue, green) in excavated areas, such as trenches, are indicative chromium and metal contamination.

##### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Contaminants can be absorbed into body via inhalation of vapours and dust, contact with skin, or ingestion. Wastewater produced from the tanning process can have excessive levels of chromium and sulphides which can cause gross soil contamination if inadequately handled.

##### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical / oil resistant steel-capped boots; (2) disposable coveralls; (3) chemical-resistant gloves; (4) safety glasses; (5) suitably graded half-face or full face mask or respirator.

##### HANDLING AND DISPOSAL

Pooled liquid spills can be removed by using tailor-designed absorbent materials and via tanker or pump. Contaminated soil can be placed in a sealed skip bin or covered truck for disposal at a facility authorised to receive material of that kind.



## 5.5. ASBESTOS



### ACTIVITY

- Improper disposal of asbestos-containing building materials

### POTENTIAL CONTAMINATION

- Asbestos (fibres)

### DESCRIPTION

Asbestos in soil is most likely due to burial of building materials. Asbestos fibres are usually entrained in a substrate material, making identification difficult. Broken cement, floor tiles, roof shingles, insulation, heat shields, and textured ceiling tiles manufactured between the 1950s and 1980s are likely to contain asbestos.

### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Asbestos can be absorbed into the lungs via inhalation of fibres. A significant acute or chronic exposure can lead to mesothelioma, asbestosis and lung cancer. Buried asbestos is relatively stable; however, disturbing asbestos during excavations could lead to the production of harmful fibres.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) disposable coveralls; (2) washable PVC gloves; (4) safety glasses; (5) suitably graded full face or half face P3 respirator.

### HANDLING AND DISPOSAL

KEEP DAMP to suppress fibre generation. Large fragments may be collected by hand and place in double skinned plastic bags. Asbestos-contaminated soil can be placed in a sealed skip bin for disposal at a facility authorised to receive material of that kind. Soil of this kind can also be transported via sealed doubled bags or a sealed skip bin.

## 5.6. REFUSE



### ACTIVITY

- Inorganic / Organic refuse disposal

### POTENTIAL CONTAMINATION

- Variable, dependant on the type of refuse
- Contaminants could arise from liquid waste, putrid organic waste, and any material that would normally be sent to a licensed landfill

### DESCRIPTION

Refuse in soil is most likely due to burial of waste materials that should have normally been sent to landfill. Waste could include, but not limited to, paint cans, oil / hydrocarbon containers, and putrid household waste. The odour of buried refuse is likely to be extremely pungent.

### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Due to the variability of types of refuse and waste, it is difficult to distinguish human health and environmental risks. Individual assessment of the risks will be required.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical-resistant steel-capped boots; (2) disposable coveralls; (3) chemical-resistant gloves; (4) safety glasses; (5) suitably graded half-face or full face mask or respirator.

### HANDLING AND DISPOSAL

Handling and disposal of refuse will be dependent upon the waste material identified.

## 5.7. PESTICIDES



### ACTIVITY

- Horticultural activity
- Pesticide manufacture

### POTENTIAL CONTAMINATION

- Pesticides, including DDT, dieldrin, and other organochloride pesticides (OCPs)

### DESCRIPTION

Persistent use and storage of pesticides associated with horticultural activities are the main contributors to pesticide-related contamination in soil. Illegal burial of pesticide drums and containers may be encountered on production and agricultural sites. Pesticides are often found as fine, white powders.

### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Pesticide contaminants can be absorbed into body via inhalation of dust, contact with skin, or ingestion. Extended exposure to organochloride pesticides can disrupt the endocrine system as well as affecting DNA. DDT and its breakdown products, DDD and DDE, are highly persistent and do not breakdown easily in soil. DDT and its isomers have the ability to magnify through the food chain (bioaccumulate).

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical-resistant steel-capped boots; (2) disposable coveralls; (3) chemical-resistant gloves; (4) safety glasses; (5) suitably graded half-face or full face mask or respirator.

### HANDLING AND DISPOSAL

If bulk pesticide storage containers are found, the site manager must be advised. Pesticide-contaminated soil can be placed in a truck and covered with tarpaulin for disposal at a facility authorised to receive material of that kind.

## 5.8. SEWAGE



### ACTIVITY

- Underground sewage tanks / pipelines

### POTENTIAL CONTAMINATION

- Raw sewage
- Bacteria / pathogens  
(*Escherichia coli*, *Vibrio cholerae*, etc.)

### DESCRIPTION

Sewage in soil is most likely due to leaking underground septic tanks and / or sewer pipelines. The odour of sewage is likely to be extremely pungent.

### HUMAN HEALTH AND ENVIRONMENTAL RISKS

Pathogens in sewage-contaminated soil can be absorbed into body via contact with skin or ingestion. Exposure to raw sewage can infect a person with an array of harmful pathogens, such as *E. coli*, which originate from faecal matter in wastewater. Gross contamination of raw sewage can lead to eutrophication of lakes, rivers, and other receiving bodies of water.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Required PPE for handling soil of this kind: (1) chemical-resistant steel-capped boots; (2) disposable / liquid repellent coveralls; (3) chemical-resistant / waterproof gloves; (4) safety glasses; (5) suitably full face mask or face shield.

### HANDLING AND DISPOSAL

If raw sewage is encountered, the site manager must be advised. Sewage-contaminated soil can be placed in a truck and covered with tarpaulin for disposal at a facility authorised to receive material of that kind.