

22. CONTAMINATION

Overview

Soil Contamination investigations have been undertaken along and adjacent to the proposed MSRFL and CSM2 alignment. The alignment passes over greenfields and orchards, and adjacent to railway and landfill sites. The investigations included a route inspection, the development of a soil sampling plan, soil sample collection, laboratory analyses and the assessment and reporting of laboratory results against the soil contaminant standards (SCS_(health)) of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the “Soil NES”).

A total of 33 soil samples were collected from near-surface depths and analysed for a range of contaminants based on past or current land uses. The results were assessed on a land use basis including risks to human health.

The concentrations of contaminants in all soil samples collected within the project area were less than the SCS_(health) for industrial land use. A Tier 1 Risk Assessment of the investigation results demonstrates that contamination arising from historic land use activities along the alignment has had little or no measurable effect on human health or the environment.

Several locations along the alignment are identified as HAIL (hazardous activities and industries list) sites. Accordingly, Regulation 9 of the Soil NES, identifies soil disturbance at these locations as a controlled activity requiring resource consent. Soil disturbance must be managed under a site management plan, and be monitored and reported on, including the transport, disposal and tracking of materials taken away in the course of the activity. The results of this investigation conclude that contaminants do not exceed the land use SCS_(health) and the activity therefore remains a controlled activity under this regulation. Under the Soil NES remedial action resulting from soil contaminant concentrations is therefore not required.

22.1. Introduction

This chapter summarises the presence of contaminated land within the alignment of MSRFL and CSM2, discusses the likely impacts of potential contamination and recommends mitigation measures.

The presence of contaminated land can potentially pose a risk to the environment and to construction workers. Through understanding the potential for contaminated land, appropriate mitigation and management measures can be implemented to control the potential risks (e.g. health and safety plans to reduce exposure to contaminants and environmental management plans to control movement and re-use of soils). Furthermore, the presence of contaminated land can be incorporated into the design of the Project to avoid disturbance of contaminated sites

where possible. The Contaminated Land Assessment Report, which outlines the scope of the investigations undertaken, is presented in Technical Report 16 appended in Volume 3.

22.2. Site sampling and analysis

22.2.1. Identification of potentially contaminated sites

The investigation of past and present land uses identified a number of potentially contaminated sites within the Project area (HAIL sites). These sites are summarised in the table below, and a sampling and analysis plan was developed with the primary aim of investigating the sites listed.

Table 37: Potential Sources of contamination – HAIL sites identified within the study area

Site ID	Description	Route	Potential Primary Contaminants of Concern	Extent of Impact	Potential to impact Project ⁹⁹
NA	Majority of CSM2 and MSRFL – Agricultural Land (Greenfield Soils)	MSRFL/ CSM2	Arsenic, lead, copper, mercury and organochlorine pesticides	Whole site potentially	Low
1	Larcombs Vineyard	MSRFL	Arsenic, lead, copper, mercury and organochlorine pesticides	Northern boundary	Low
2	Evergreen Garden Centre and Southern Woods Nursery	MSRFL	Arsenic, lead, copper, mercury and organochlorine pesticides	Northern boundary	Low
3	North east corner of Main South Road and Curraghs Road (Former Landfill)	MSRFL	Heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), petroleum hydrocarbons, Pentachlorophenol (PCP) and asbestos.	Southern boundary	Low/ Moderate

⁹⁹ Includes people and the environment.

Site ID	Description	Route	Potential Primary Contaminants of Concern	Extent of Impact	Potential to impact Project ⁹⁹
4	Former Applefields Orchards	CSM2	Arsenic, lead, copper, mercury and organochlorine pesticides	Northern corner	Low
5	Former Southbridge Branch Railway Line	CSM2	Heavy metals, PAHs, creosote and herbicides	Intersects	Moderate
6	Former Quarry (Springs Road)	CSM2	Heavy metals, PAHs, petroleum hydrocarbons, PCP and asbestos	Intersects	Moderate / High
7	McVicars Site – Timber Treatment (Halswell Junction Road)	CSM2	Arsenic, copper, chromium, boron, dioxins and furans, PCP	Southern boundary	Moderate / High

22.3. Site sampling

A site sampling investigation plan was put in place to guide the investigation of potentially contaminated sites. Some of the areas identified above were not investigated, primarily due to more detailed information becoming available on the proposed route resulting in lesser impact on some of the potentially contaminated sites. A sampling plan, sample identification and analytical suite was then applied to each remaining potentially contaminated site indicated in Table 38:

Table 38: Sampled sites

Site ID	Description	Sample ID	Analytical suite
'Greenfield Soils'	Rural/agricultural land throughout CSM2 and MSRFL	BG01 to BG15 (15 samples)	OCPs, HMs
4	Former Applefields Orchard	AS1 to AS3 (3 samples)	OCPs, HMs
5	Former Southbridge Branch Railway Line	RW1 to RW5 (5 samples)	PAHs, AH, HMs

Site ID	Description	Sample ID	Analytical suite
6	Former Quarry (Springs Road)	Q1 to Q9 (9 samples)	PAHs, HMs

Notes: Greenfield soils – relates to sites with no known use, apart from agricultural land use, based upon information reviewed during the Preliminary Site Investigation, April 2011.

OCPs – Organochlorine Pesticide Screen; HMs – Heavy Metals Screen (Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc); PAHs – Polyaromatic Hydrocarbons; AH – Acid Herbicides

22.4. Sampling results

Based on the findings of this investigation, for the majority of the route of the CSM2 and MSRFL, concentrations of contaminants in soil are comparable to published background soil concentrations and all are less than the $SCS_{(health)}$ of the Soil NES. Land disturbances in these areas are unlikely to result in any significant risk of adverse effects from contaminant discharge to the environment.

Apart from greenfield locations, a number of specific areas were identified as being potentially contaminated based on past or current land use. Parts of the selected study areas lie outside of the final Project designation boundaries (shown in the annotated drawings C62236-B-C1011 and C62236-B-C1012 appended to Technical Report 16). These areas are discussed in the following sections.

The potential environmental effects from contaminated soil were also evaluated by comparing the soil results with international based ecological guideline criteria (the USEPA Ecological Soil Screening levels or EcoSSLs). The EcoSSLs were derived to protect ecological receptors such as plants, soil invertebrates and wildlife (birds and mammals) that commonly come into contact with soil or ingest biota that live in or on soil.¹⁰⁰

22.5. Background sampling

Soil samples were collected along the northern verge of Main South Road between Robinsons Road and Rolleston and along the CSM2 alignment. There were no indicators of contamination in soils and no potential sources of contamination were identified. The concentrations of heavy metals in soils were generally consistent with published background concentrations, and concentrations of organochlorine pesticides were generally lower than published background concentrations.

¹⁰⁰ USPA (2005) Guidance for Developing Ecological Soil Screening Levels. OSWER Directive 9285.7-55. United States Environmental Protection Agency Office of Solid Waste and Emergency Response. November 2003; revised 205. Note: additional EcoSSLs were released by USEPA in 2007 for contaminants including DDT and PAHs.

A number of specific areas were targeted during the investigations that were deemed to be potentially contaminated based on past or current land use including:

- former Applefields Orchard (Shands Road);
- former Southbridge Branch Railway; and
- former Quarry on Springs Road.

22.5.1. Former Applefields Orchard (Shands Road)

The proposed Shands Road underpass will require earthworks adjacent to the former Applefields Orchard which has been redeveloped as a subdivision (Aberdeen Subdivision), located on the eastern corner of Shands Road and Blakes Road. Sampling results revealed no concentrations of contaminants above guideline values. Concentrations of organochlorine pesticides were below laboratory detection limits.

22.5.2. Former Southbridge Branch Railway

The proposed CSM2 alignment passes to the south of the former Southbridge Branch railway line which runs in a roughly north-south direction from Hornby towards Prebbleton.

Samples were analysed for heavy metals, PAHs and acid herbicides and the concentrations of heavy metals were below guideline values for the samples analysed within the designation boundaries.

22.5.3. Former Quarry on Springs Road

The former quarry site is located south of the CSM2 alignment, where filling had been known to occur. The soil contamination investigations focused on this area of the site, and elevated concentrations of some soil contaminants were identified. However, as this area is located outside of the designation area, it is not necessary to consider them further.

22.6. Mitigation and contingency planning

22.6.1. Risk register

A register outlining the risk assessment of the contamination results was developed. It was concluded that there were no areas where soil contamination would trigger remedial action.

22.6.2. Effects

Whilst the likelihood of presence of contaminated ground is considered to be minimal, contingency planning is required in the event of contamination being discovered during construction, particularly adjacent to the Springs Road quarry site and at the Curraghs Road landfill site.

it is considered that the risk to the health of workers involved in the construction of the Project is likely to be minimal. No special precautions are considered necessary.

The risk of adverse environmental effects arising from contaminated land is considered to be minimal as measured contaminant concentrations within the designation of the Project alignment are generally consistent with background concentrations.

Furthermore measured concentrations along the Project alignment were compliant with the adopted US EPA risk based ecological acceptance criteria. This indicates that an adverse effect from concentrations of contaminants measured in soil is unlikely. This is with the exception of one sample from the former Southbridge Branch Railway that falls outside the proposed alignment and will not be subject to earthworks for the Project.

Most of the land traversed by the alignment is agricultural in nature, which has been used for pasture and cropping. As such, while there are detectable traces of pesticide and fertiliser residues, this land is no different from any other area within the Canterbury Plains. The contaminants identified in some discrete areas of the Project alignment have concentrations of several contaminants that are elevated above natural “background” levels. The contaminants (trace elements and PAH hydrocarbons) partition to the soil particles because they are sorbed strongly to the mineral and/or organic fraction of the soil. These contaminants also have limited solubility so again they stay “stuck on” to the soil particles. These contaminants will be found in the topsoil because they are derived from surface spraying/fertiliser applications and because any cultivation is limited to about the top 30cm of the land. Furthermore, these agricultural contaminants sorb to the topsoil which is organic rich, and they do not “leach” downward in the soil profile. This is also true for contaminants like DDT which was detected in soil but measured within the background range for Christchurch soils. DDT is essentially ubiquitous in the topsoil of agricultural land throughout the country and particularly in Canterbury where it was used for grass grub control.

The fate of the contaminants is therefore controlled by the topsoil management for the Project. Topsoil will be stripped and stockpiled/stabilised as part of normal earthworks procedures. Erosion and sediment controls will effectively isolate this material from water bodies, meaning that there will not be contact between water and topsoil during construction. Upon completion of the earthworks, topsoil will be reused on site and stabilised with grass and landscaping. Erosion and sediment control devices will remain on site until the disturbed soil is stabilised, mitigating the risk of contaminants interacting with stormwater. During operation of the Project, the stormwater discharged will be from paved surfaces, so there will be no on-going risk.

22.6.3. Construction Environmental Management Plan

A draft CEMP has been prepared (refer to Volume 4) for this Project. The CEMP outlines details required to enable the NZTA and the Contractor to construct the Project with the least adverse environmental effects.

While this assessment demonstrates that hazardous contaminated land is not expected to be encountered during the construction of the Project, the CEMP details the management of emergencies, incidents and complaints insofar as they relate to the risk of unexpectedly encountering contaminated land during the construction phase. The CEMP also comprises the site management plan required by the Soil NES for the Project, and will monitor and report on contamination risk, including the transport, disposal and tracking of materials taken away in the course of the activity. Provided the CEMP is adhered to, adverse effects associated with contaminated land are expected to be less than minor.

22.7. Conclusion

It is concluded that concentrations of contaminants in all soil samples collected within the designated zone for the Project were less than the $SCS_{(health)}$ of the Soil NES for industrial land use.

The investigation results demonstrate that contamination arising from historic land use activities along the proposed route has had little or no measurable effect on human health and ecological risk to the environment is minimal.

As several locations along the route are identified as HAIL sites (Table 37), Clause 9 of the Soil NES, identifies soil disturbance as a controlled activity subject to the results of a soil investigation stating that the soil contamination does not exceed the applicable standard (the $SCS_{(health)}$) of Regulation 7. As a controlled activity, a resource consent has been sought and the activity will be managed under a site management plan, monitored and reported on, including the transport, disposal and tracking of materials taken away in the course of the activity (via the CEMP). It is confirmed that excess soils arising from the construction are likely to be cleanfill.