

SITE MANAGEMENT PLAN

39630 / STAGES 3-5 OAKBRIDGE SUBDIVISION,
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QUALITY ASSURANCE

Title: Site Management Plan – Stages 3 To 5 Oakbridge Subdivision
(Subdivision of Lot 4000 Stage 2B RMA/2020/3053; Lot 100
RMA/2021/2570; and Lots 4, 5 and 6 DP 23089)

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DISCLAIMER

This Site Management Plan has been prepared at the specific instruction of Sovereign Palms Ltd. It is designed to manage the risks related to disturbing copper impacted soil during development earthworks within each lot at Stages 3 to 5 of the Oakbridge Subdivision (Subdivision of Lot 4000 Stage 2B RMA/2020/3053 and Lots 4, 5 and 6 DP 23089).

Davis Ogilvie did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited investigation of the site and have not been taken into account in the report.

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1.0 INTRODUCTION

Davis Ogilvie Ltd was engaged by Sovereign Palms Ltd to produce a site management plan (SMP) for future earthworks associated with residential development of lots within Stages 3 to 5 of the Oakbridge subdivision, Christchurch (herein referred to as 'the site'). The Oakbridge Subdivision was previously Lot 4000 Stage 2B RMA/2020/3053 and Lots 4, 5 and 6 DP 23089. The purpose of this report is to outline recommended procedures and management options for the handling, re-use or disposal of copper impacted soils identified at the site. The recommended procedures are to allow for the proper handling and disposal of impacted soil and to minimise discharges of contaminants to stormwater receptors.

This SMP is designed to manage the risks related to disturbing copper impacted soil during the proposed residential development earthworks described in Section 3.0 and to accompany the CCC global consent application for disturbing soil. This SMP is for every residential lot in Stages 3-5 with the exception of Lots 133, 136 and 161 (Stage 3) and Lots 231-246 (Stage 5). In addition to this SMP, additional health and safety considerations related to earthworks and construction sites will need to be considered by the principal contractor and controls applied where applicable.

This SMP although providing details on recommended erosion and sediment control procedures does not constitute as an erosion sediment and control plan (ESCP) and a site specific ESCP is likely to be required by CCC/ECAN as part of any building consent application.

This SMP has been prepared and supervised by a suitably qualified and experienced practitioner (SQEP) in accordance with the NES Regulations (2011) and MfE guidance document CLMG No.1: Reporting on Contaminated Sites in New Zealand.

1.1 Objectives

The objectives of this site management plan are to provide procedures for the proposed handling and potential re-use or disposal of the copper impacted soils.

The scope of the plan is to provide procedures for managing the following:

- Earthworks and controls to manage exposure to the impacted soil;
- Temporary soil stockpiling procedures and controls, if required;
- Soil disposal waste acceptance criteria and requirements;
- Recommended erosion and sediment controls; and
- Environmental monitoring requirements during the works;

2.0 SITE IDENTIFICATION

The Oakbridge Subdivision is located approximately 6.6 km north of Christchurch CBD and located between Selkirk Place and Hawkins Road, in the suburb of Marshland (as shown in Figure 1). Access to the site is via Hawkins Road. Site information is presented in Table 1.

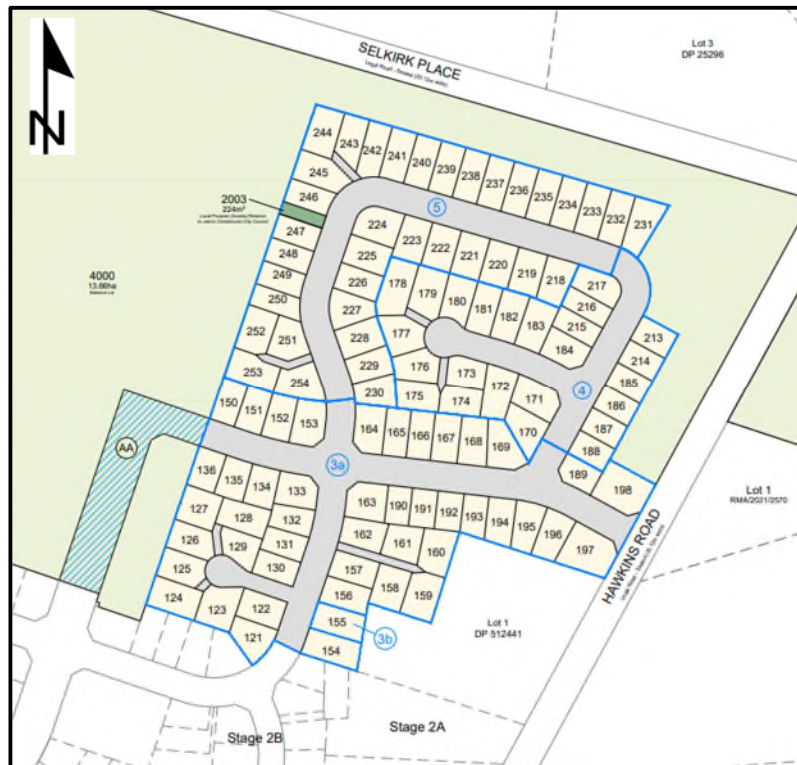
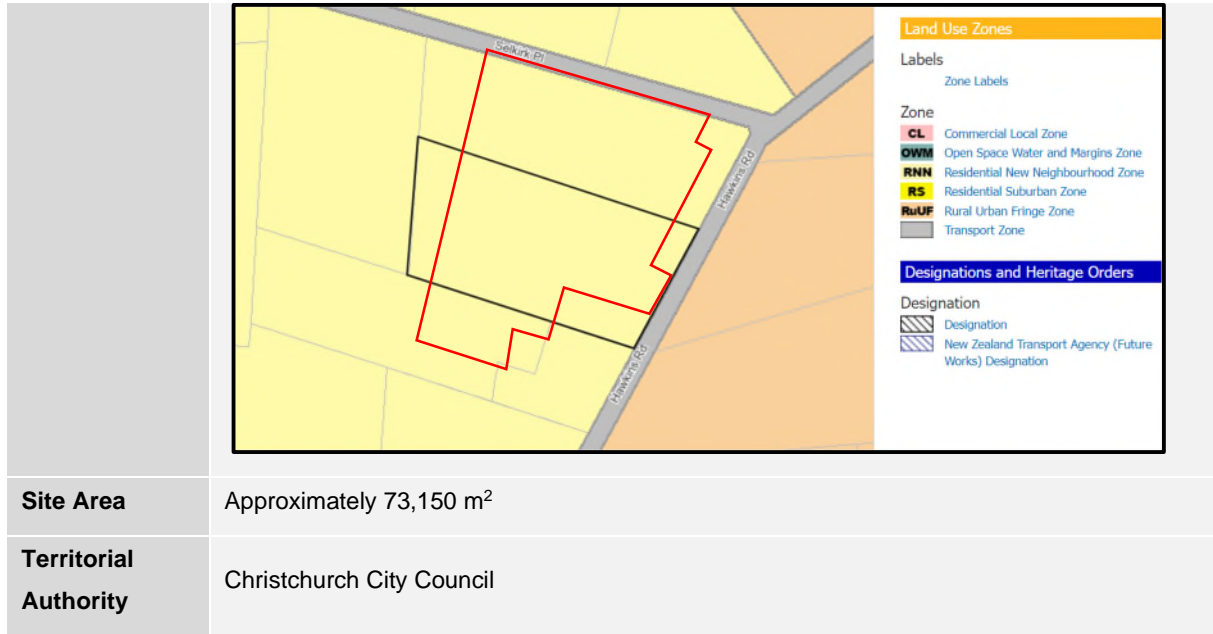


Figure 1: Extract from the Oakbridge Scheme Plan – Stages 3-5 (overall plan) (DWG 350/D). Not to scale.

Table 1: Site Information

Item	Description
Location	Stages 3 to 5 Oakbridge Subdivision, Marshland, Christchurch (previous address of 1 Selkirk Place and 47 Hawkins Road, Christchurch)
Legal Description	Lot 4000 Stage 2B RMA/2020/3053; Lot 100 RMA/2021/2570; and Lots 4, 5 and 6 DP 23089
Land Use	Rural to Residential (existing lot boundary shown in black, approximate location of Stages 3-5 shown in Red)



3.0 PROPOSED ACTIVITY

Stages 3 to 5 of the Oakbridge subdivision have undergone earthworks and construction for a new residential development. Due to the previous land use, Davis Ogilvie completed a preliminary and detailed site investigation (DSI) in 2017 to evaluate the potential for soil contaminants to be present. Elevated concentrations of copper and zinc above background concentrations were identified in the DSI and the subsequent topsoil investigation in 2023 within proposed lots in Stages 3 to 5.

Soil disturbance and/or removal of soil containing contaminants above background concentrations is regulated by the National Environmental Standards (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health. We understand a global land use resource consent application – RMA/2023/1945 has been submitted to Christchurch City Council and the need for a SMP has been triggered. Residential lots generally range in size between 300 m² and 600 m².

At the time of writing, the majority of lots have been constructed and topsoil has been placed, but no structures have been built. Lots that were not ready, and so are currently excluded from this management plan include: Lots 231-246 (Stage 5).

4.0 CONTAMINATION CHARACTERISATION

4.1 Site History and LLUR

The site history of the Oakbridge subdivision is outlined in the 2017 Detailed Site Investigation by Davis Ogilvie. The area currently occupied by the Oakbridge Subdivision has previously been historically host to an orchard and market gardening. Rural-residential properties were also located on the site. HAIL activities identified on the ECan LLUR include A10 – Persistent pesticide bulk storage or use.

4.2 Summary of previous Site Investigation Works

A detailed site investigation (DSI) was carried out over the wider Oakbridge development area over the period December 2016 to May 2017 and is described in a Davis Ogilvie report dated 26 May 2017: Detailed Site Investigation Report, Oakbridge, Reference 34300. The report identified that most of the sites sampled had concentrations of predominately copper and occasionally arsenic, copper and zinc in excess of background levels but typically below human health tier 1 assessment criteria. Several isolated areas were identified that required remediation. These areas within Stages 3-5 have been remediated and the contaminated soil disposed at appropriate facilities¹. The topsoil containing elevated copper and zinc concentrations exceeding natural background levels was stripped as part of the sub-division earthworks, stockpiled, and respread on site and therefore remains on site.

4.3 Topsoil Investigation

Davis Ogilvie undertook a post-construction soil investigation in 2023, which involved the sampling of topsoil placed following earthworks.

Laboratory results from soil samples collected during the Davis Ogilvie topsoil site investigation indicated that the site topsoil in the majority of lots sampled within Stages 3 -5 contained elevated copper that exceeded the established background levels but did not exceed the NES SCS values for residential (10% Produce) land use. In addition, several lots also contained elevated zinc above background, while eight lots contained concentrations of chromium at background (23 mg/kg) and two lots contained concentrations of arsenic also above background but below residential SCS.

The elevated copper concentrations were encountered on every lot with the exception of Lots 133, 136 and 161, which contained heavy metal and OCP concentrations below background level. Surplus topsoil generated from earthworks at Lots 133, 136 and 161 can therefore considered to be cleanfill.

¹ Davis Ogilvie & Partners Ltd. (July 2023) Site Validation Report - Version 2: 1 Selkirk Place And 47 Hawkins Road Stages 3 - 6 Oakbridge Subdivision (Lots 4 and 5 DP 23089 and Lot 4000 DP 575457)

Lots 231-246 (Stage 5) were not yet constructed and therefore soil from these lots is to be assessed in the future (when complete).

On the basis of the topsoil sampling results it was considered that the topsoil is suitable for residential land use and that the risk to human health is acceptable. However, as copper results consistently exceed background levels, the topsoil on site does not meet background concentrations nor the definition of 'cleanfill' and is therefore considered a piece of land as defined by the NES.

According to the NES Regulations (8.3), the expected soil disturbance/removal volumes associated with the residential development of each lot is likely to exceed the criteria for a permitted activity and therefore required an NES land use resource consent to authorise it. Topsoil that leaves site must also be taken to an accredited facility authorised to receive it.

4.4 Contaminant Properties

According to the Ministry of Environment², copper is an essential element however adverse effects on human health can occur from copper deficiencies and excess copper and is therefore a potential soil contaminant. Inhalation is anticipated to be a negligible route of exposure as copper is not volatile and the amount of dust considered to be inhaled typically represents a very small fraction of exposure. Dermal exposure to copper is also considered to be negligible. Gastrointestinal effects are the primary manifestations of toxicity arising from excess copper intake, although these effects are reversible (WHO, 1998; IOM, 2001). Liver damage is the critical endpoint for intake of high levels of copper in animal and human studies (WHO, 1998; IOM, 2001). The NES:CS SCS for a residential land use is 10,000 mg/kg, while concentrations identified on site within stages 3-5 range between 18 – 104 mg/kg with the average being 34 mg/kg. Background copper concentrations for the two soil types on site are 16.4 and 20.3 mg/kg.

According to the Australian Government Department of Climate Change, Energy, the Environment and Water³, Zinc is an essential trace element in the diet of all living organisms from bacteria to humans. Zinc is relatively abundant and natural levels of zinc are found in rocks, soil, air, waters, plants, animals, and humans. It is present in all foods. Either too little zinc or too much zinc can be harmful, causing health problems. The severity of health effects will depend on how much zinc a person has been exposed to, for how long, the nature of the zinc compound(s), and current state of health. A human body (70 kg) contains about two grams of zinc. The toxicity of zinc and many zinc compounds to plants and animals is generally low compared with the significance of zinc deficiency.

² Ministry for the Environment. 2011. Toxicological Intake Values for Priority Contaminants in Soil. Wellington: Ministry for the Environment.

³ <https://www.dcceew.gov.au/environment/protection/npi/substances/fact-sheets/zinc-and-compounds>

Reported background zinc concentrations in the two soil types on site range between 77.1 – 94 mg/kg while the range identified in soil samples analysed was between 61 – 128 mg/kg. The adopted human health soil guideline value for a residential site is 7,400 mg/kg.

5.0 SITE MANAGEMENT PRACTICES

5.1 Introduction

Based on the soil contamination identified within the topsoil across the residential Lots, a site management plan is required for the disturbance and removal of soil at the site. This site management plan is intended to assist the site owner and their appointed contractors manage the soil appropriately during the proposed earthworks and construction. The below sections describe recommended procedures for soil disposal, imported fill, site wide controls, chemical hazard controls and health and safety management.

5.2 Site Disturbance

The existing topsoil onsite contains elevated heavy metals, predominantly copper and zinc, which exceed natural background levels. Heavy metal concentrations do not exceed SCS guideline values for residential land use (10% produce) and therefore the risk to human health is acceptable. Soil disturbance exceeding volumes of 25 m³/500 m²/year and soil removal exceeding 5 m³/500 m²/year will be a controlled activity and require consent from CCC. Soil disturbance under these volumes may be considered as a permitted activity by CCC and not require consent.

5.3 Soil Disposal/Re-use

Soil may be reused on site where it can be done in a manner that does not lead to one or more of the following:

- a significant risk to the health of site occupants; and
- a significant risk to the health of neighbouring residents; and
- lead to erosion and sediment loss from the site that could cause a nuisance to surrounding land users or negatively affect identified environmental receptors at and beyond the site.

The relevant soil assessment criteria used to establish the appropriate destination for surplus soil is summarised in Table 2.

Table 2. Stages 3-5, Oakbridge Subdivision SMP; Soil Assessment Criteria

Contaminants of concern	Soil Assessment Criteria (mg/kg)				Disposal Options	
	Heavy Metal Concentrations in Topsoil*	(NES SCS Residential)	Background**	ANZG Sediment GV-high	Burwood Landfill Screening criteria (mg/kg)	Hororata Landfill Screening criteria (mg/kg)
Arsenic	6-16	20	11 - 12.58	70	80	140
Cadmium	<0.10 – 0.19	10	0.19 - 0.28	10	400	55
Chromium (IV)	16 - 23	370	19.3 - 22.7	370	2,700	375
Copper	21 - 104	270	16.43 - 20.3	270	> 10,000	500
Lead	18 - 34	220	19.3 - 40.96	220	880	500
Mercury	<0.10 – 0.15	NA	0.07 - 0.11	NA	1,800	0.2
Nickel	14 - 20	52	16.1 - 20.7	52	400	2,000
Zinc	64 - 128	410	77.1 - 93.94	410	7400	1,800

* Lab testing of individual stockpiles may be undertaken to confirm the expected heavy metal concentrations. Should heavy metal concentrations be below background level, they may be considered as 'clean fill', subject to approval by the receiving site.
** Two background levels apply to the Oakbridge subdivision – GLEY and RECENT.

Surplus topsoil generated from earthworks are to remain onsite (on the individual lot the material was derived) and either taken directly to a facility authorized to accept it or reused on the residential lot site. The topsoil must not be taken to a cleanfill site or re-used on any other land without the express permission of Sovereign Palms. Inorganic soils underlying the topsoil should be segregated from the topsoil and placed in separate stockpiles. Non-topsoil material is likely to meet background concentrations and may be considered as cleanfill, subject to stockpile sampling and the conditions of acceptance from the receiving site.

It should be noted that the Contractor shall obtain the necessary approvals/permits from the landfill prior to transportation of any materials off-site.

5.4 Environmental Control (Air, Land and Water)

A site log of the weather and earthworks completed should be recorded using the site log (Appendix A) or similar. To minimise the potential for adverse effects resulting from site works, a series of protective measures should be put in place during any soil disturbance activities:

5.4.1 Minimising off-site tracking

Site vehicles accessing and leaving the site should pass over rubble strips to dislodge soil from the tires prior to them leaving and entering the road network.

- Trucks shall have their wheels either swept down or washed before they leave site.

- Trucks shall have their loads covered during transport of material to the approved disposal site.
- Each truck should have a tracking document signed out onsite and collected at the landfill / disposal facility to track each load of material.
- All weighbridge soil disposal docketts shall be retained by the contractor and provided to Sovereign Palms at the completion of all earthworks including house foundation through to landscaping works on the residential lot.

5.4.2 Dust Control

Site works shall be carried out so that they do not result in any airborne and deposited dust beyond the property boundary of the site that is determined to be objectionable, or a nuisance. Generation of dust shall be appropriately managed by employing standard dust suppression techniques which at a minimum should include the following:

- Don't complete earthworks during or when wind speeds over 10 km /h are expected/occurring.
- Dampening down exposed soil using water sprays such as a sprinkler system.
- Where stockpiling is necessary, the material will be kept damp to avoid dust generation and covered if left for a prolonged length of time.
- Dust netting on site boundaries if appropriate.
- Reducing drop heights from the excavator bucket to the truck or other location.
- Tracking over loose or exposed soil to compact at the end of the workday.
- Additional relevant dust mitigation measures such as those described in the Ministry for the Environment (2016) Good Practice Guide for Assessing and Managing Dust should be followed as applicable.

5.4.3 Sediment and Erosion

Earthworks shall be undertaken in accordance with the Environment Canterbury Publication - Erosion and Sediment Control Guidelines for Small Sites (2007) and Erosion & Sediment Control Toolbox for Canterbury. CCC may require a lot specific erosion and sediment control plan be produced and submitted with the building consent application. As a minimum the following control measures related to the trace elements identified in soil are recommended to be undertaken:

- Effort shall be made to undertake the excavation works in a period of dry weather to minimise the risks of stormwater entering the excavations or sediment contaminated water escaping from the excavations.
- Erosion and sediment controls shall be put in place around the site boundary as necessary to inhibit soil/sediment from being transported away from the area.

- Trucks used to transport impacted soil (if any) must be covered, and as reasonable, any loose contaminated material on the side of the trucks or on the wheels shall be removed before the truck leaves the site.
- The site shall be sealed with aggregate/hardstanding as soon as possible to minimise the amount of time soils are exposed.
- Stockpiles shall be covered, and run-off controlled when rainfall is anticipated.
- Loose soil shall be left in an erosion resistant state.
- Frequent checks should be made on any stormwater leaving the earthworks site to ensure it is clear and does not contain significant amounts of sediment (>50 mg/L Total Suspended Solids (TSS)).

6.0 CHEMICAL HAZARD CONTROLS

6.1 Potential Exposure Routes

As the topsoil on site contains heavy metal and OCP concentrations that are below the NES SCS Residential standards and adopted guideline values, the heavy metal concentrations are considered sufficiently low to pose an exposure hazard to temporary or long-term site users, or the environment. Copper and zinc are both naturally occurring elements in soil and biology as described in Section 4.4.

7.0 SITE MONITORING

As works on site, primarily residential development, will generate surplus soils, waste characterisation of underlying inorganic soil may be required by disposal locations. Additionally, should owners wish to undertake additional sampling of a topsoil stockpile, this should be completed by a SQEP and provided to CCC.

On-going monitoring during the earthworks by a SQEP will not be required.

8.0 REPORTING

A post construction completion report is not required to be completed. Waste disposal dockets are required to be provided to Christchurch City Council following completion of the earthworks.

APPENDIX A

Site Conditions Log



Site Conditions Log

Date	Weather Conditions	Site Conditions	Progress/Problems associated with site works	No. of personnel on site	Record of Soil taken Offsite	Record of Soil Imported Onsite	Environmental non-compliances	Complaints and Corrective Measures	Comments