

MATAKANUI

GOLD LIMITED

Matakanui Gold Limited Soil Management Plan



Document Revision History

Version	Who	Revision Date	Section	Description of changes	Approved (name, organisation, role)	Date
1	D Cornish	03/06/2025	All	New Document-draft	J Palich, Geocontam Risk Management Ltd, Principal Consultant, CEnvP	08/09/2025

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1. Introduction

1.1 Background

Matakanui Gold Limited (MGL) is proposing to establish the Bendigo-Ophir Gold Project (BOGP), comprising a new gold mine, ancillary facilities and environmental mitigation measures on Bendigo and Ardgour Stations in the Dunstan Mountains of Central Otago.

Gold mineralisation in the BOGP is predominantly associated with the Rise & Shine Shear Zone (RSSZ) - a structural feature developed within the Otago Schist. The BOGP area (Figure 2) has been mined since the late 1800s and there are numerous historic mine workings throughout the Project area. The project site is located approximately 20 km north of Cromwell in the Dunstan Mountains of Central Otago, New Zealand (NZ) as depicted in Figure 1.

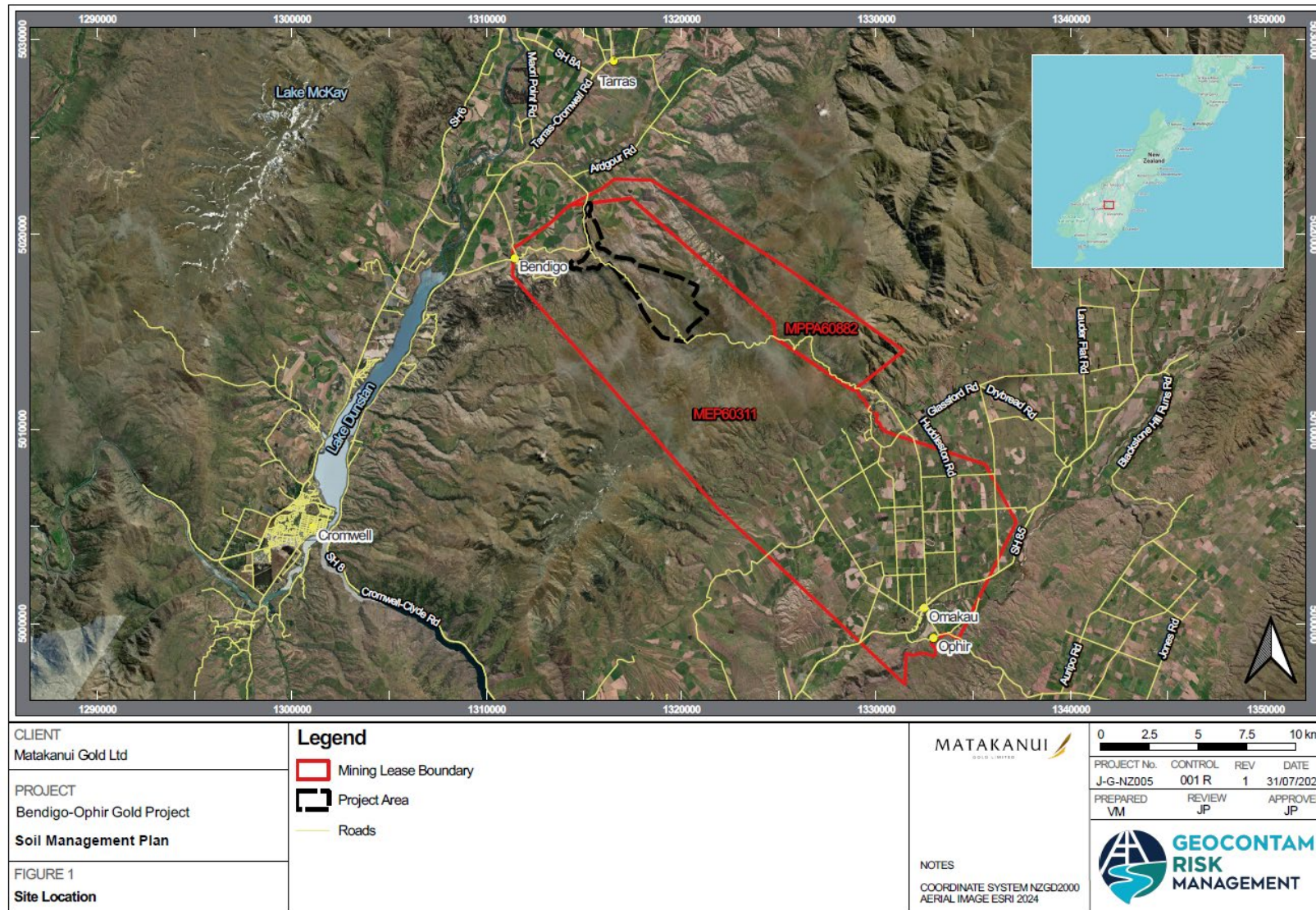
A preliminary site investigation (PSI) (Geocontam Risk Management Ltd, 2025) was undertaken at BOGP to review soil and water data and identify any existing and potential future risks to receptors associated with historic land-use and future mining activities.

Arsenic (As) is naturally associated with gold mineralisation in Otago Schist and measurement of the As content of soils has been used within the BOGP as an exploration tool to identify the surface expression of the RSSZ. Arsenic in soil geochemical anomalies and extensive drill evaluation has defined four deposits worthy of economic gold extraction. These include Rise and Shine (RAS), Come in Time (CIT), Srex (SRX) and Srex East (SRE). The majority of the mining activities, ancillary facilities and associated infrastructure will therefore be located in the Shepherds Valley; however, mining activities will also be undertaken in the Rise and Shine Valley. The defined orebodies are planned to be mined by open pit methods. Underground mining is planned for the deeper parts of the RAS orebody in the later years of development.

Previous soil sampling has identified elevated concentrations of As exceeding human health and ecological protection criteria for industrial land use, as well as cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb) and zinc (Zn) levels above ecological guidelines, predominantly within the historic mining areas of the Rise and Shine Valley.

If these are not appropriately managed, future mining activities within the project area have the potential to release contaminants present within soils to the environment, potentially resulting in adverse impacts to human health and terrestrial and aquatic ecosystems. This soil management plan (SMP) has been developed as part of a series of management plans that collectively identify the management strategies that will be undertaken to minimise adverse impacts to human health and ecosystems.

Figure 1: Site Location



1.2 Purpose and Objectives

This SMP forms part of a series of environmental management plans that collectively guide site management. The purpose of these environmental management plans is to outline strategies and procedures for the safe and effective management of potential environmental risks associated with the BOGP project as identified through the environmental studies undertaken for MGL as part of the consenting process.

The objective of this SMP is to outline the specific strategies and procedures for the safe and effective management of soils at the BOGP that have the potential to result in an adverse risk to human health and/or ecological receptors if inappropriately managed.

1.3 Regulatory Framework

Mine sites and associated workings are defined in the Hazardous Activities and Industries List (HAIL) under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESC). Disturbance of soil associated with developments on potentially contaminated land is a regulated activity under the Resource Management NESC Regulations 2011 (Ministry for the Environment [MfE], 2012).

The implementation of the NESC is supported by the MfE's Contaminated Land Management Guideline series (Volumes 1 to 5), which details appropriate strategies for the identification and management of contaminated soils.

1.4 Relationship with Other Management Plans

This plan should be read in conjunction with the following management plans, which together form part of the integrated site management which underpins BOGP's Environmental Management System:

- BOGP Air Quality Management Plan (AQMP)
- BOGP Erosion and Sediment Control Management Plan (ESCMP)
- BOGP Engineered Landform Management Plan
- BOGP Pond and Reservoir Management Plan
- BOGP Hydrology Management Plan
- BOGP Mine Impacted Water Management Plan
- BOGP Mine Closure Plan

2. Management Objectives

The objectives of this SMP are:

1. To ensure the effective management, preservation, and rehabilitation of soil resources taking into account preexisting soil quality, structure, and fertility.

2. To manage soils in a manner that enables successful future revegetation and long-term ecosystem recovery on disturbed sites.
3. To manage and monitor soils in a way that prevents exposure to harmful contaminants, reduces dust generation, and ensures safe conditions for workers and surrounding communities.
4. To manage soils in a manner that prevents erosion, contamination, and degradation, thereby protecting surrounding ecosystems, water quality, and biodiversity and ensuring long term environmental sustainability.

3. Roles and Responsibilities

The responsibility for soil management lies with the Consent Holder.

Key roles and responsibilities that are required for the management of soil are summarised in Table 1.

Table 1. Roles and responsibilities

Role/Responsibility
Site General Manager • Overall responsibility for ensuring compliance with relevant environmental and health and safety regulations. • Implementation and compliance of this SMP • Appoints qualified personnel and contractors
Environmental Manager and Environmental Team • Develop and implement SMP • Compliance with resource consent conditions • Environmental monitoring and reporting • Ensures environmental controls are in place and effective • Conducts regular inspections and audits
Health & Safety Manager • Accesses and manages health risks associated with arsenic exposure • Develops and enforces personal protective equipment (PPE) requirements • Trains workers on arsenic hazards, safe handling procedures, and emergency response
Site Supervisor/Construction Manager • Implements day to day controls on site as per the SMP and other relevant management plans • Coordinates with contractors and ensures arsenic soil management protocols are followed during earthworks • Maintains control over stockpiling, segregation and transport
Staff/Contractors • Follow all SMP procedures for handling, transporting, and disposing of arsenic impacted soil • Use appropriate PPE and follow safety protocols

Report any incidents or deviations from the plan to the site supervisor immediately
Regulatory Authority - Review environmental monitoring reports - Audit of compliance with resource consent conditions

4. Proposed Site Development

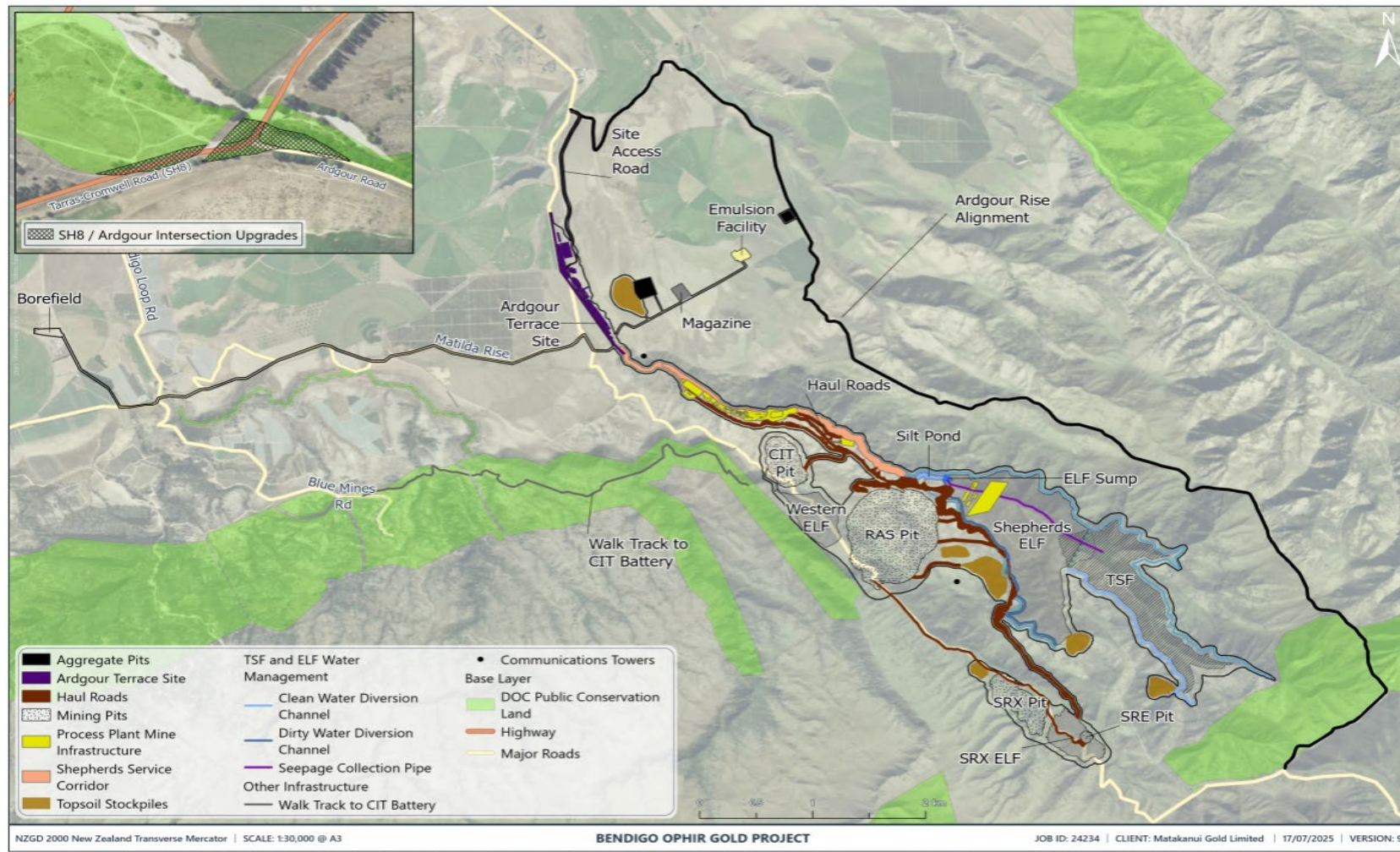
Table 2 provides a summary of the proposed site development components for the BOGP that may result in the disturbance of soil or provide a repository for the disposal of impacted soil. Figure 2 depicts the layout of the proposed future operations.

Table 2: Site development components.

Component	Description
Mining	The resources will be mined by both open pit (RAS, CIT, SRX, and SRE) and underground methods (RAS). Underground mining will use paste backfill, comprising a mixture of process tailings and cement.
Waste Rock Storage	Non-ore-bearing waste rock is planned to be backfilled into the CIT and SRE pits. The remainder of the waste rock is scheduled to be stored in an Engineered Landform (ELF). Waste rock storage areas may be a suitable option for the long-term disposal of soil unsuitable for reuse.
Engineered landform (ELFs)	Waste rock from RAS will be emplaced in the upper/middle Shepherds Creek Valley (Shepherds ELF). Waste rock from SRX and SRE will have a separate dedicated ELF (SRX ELF) located in the Rise and Shine Valley. A small ELF (Western ELF) will be located between the CIT and RAS Pits. Disposal of soil unsuitable for reuse may also be possible within the ELF.
Tailings Storage Facility (TSF)	The process tailings will be pumped to a conventional wet TSF facility (including clean water diversion drains) constructed in the upper reach of Shepherds Valley utilising waste rock from mining activities within the project site. The TSF will be buttressed by the Shepherds ELF.
Topsoil Management	Temporary and permanent topsoil stockpiles and biological rehabilitation resource storage areas will be established around the project site.
Site Infrastructure	Most site infrastructure will be located in the lower Shepherds Creek Valley and will include: Processing plant and associated infrastructure;

	• Open pit and underground mining fleet workshops; • Vehicle washing and refuelling facilities; • Warehouses and laydown areas; • Open pit and underground mining offices, crew meeting, lunchroom, and ablutions; and • Water treatment plant facilities. The underground portals, workshops, and offices will be located upstream of the main infrastructure but downstream of the RAS pit and the ELF/TSF. The main explosives magazines and emulsion mixing facilities will be located outside the project site on Ardgour Station.
Roads	Access roads will be developed for haulage within the project area.

Figure 2: Proposed Development



5. Identification of Environmental Hazards and Risks

5.1 Previous Soil Investigations

Between 2013 and 2024, various field programs were undertaken to determine metals concentrations in near surface soils, comprising the analysis of up to 1,589 samples described as loess, topsoil or outcrop, in the various prospect areas including CIT, RAS, SRX, SHE, and Thompson's Saddle (TSD). An additional investigation targeting the upper portion of Shepherd's Creek valley was undertaken in January 2025. Determination of soil concentrations was undertaken using a portable x-ray fluorescence (pXRF) which provided concentrations for a range of analytes.

Data were reviewed against the following environmental assessment criteria:

- The Standards for Contaminants in Soil (SCS) in an industrial land use scenario from the *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* (MfE, 2011) guidelines for the protection of human health in an industrial land use scenario.
- The Ecological Soil Guideline Values (Eco- SGVs) for As, Cd, Cr, Cu, Pb and Zn at three protection levels (95% for non-food production land, 80% for residential/recreational land and 60% for commercial/industrial area) from Landcare Research New Zealand Ltd and Hawke's Bay Regional Council (2023) *Determining background soil concentrations of trace elements across New Zealand*.

The key findings of this review indicated that:

- Only As was present at concentrations above the assessment criteria for the protection of human health.
- Most metals were below the ecological assessment criteria, except for As and Cd, which demonstrated widespread occurrence as presented in Table 2.
- Limited exceedances of Cr, Cu, Pb, and Zn coincided with soils that also exceeded the assessment criteria for As and/or Cd. The mean plus one standard deviation of Cr, Cu, Pb, and Zn were all below all ecological protection levels. As a result, Cr, Cu, Pb and Zn do not require specific management consideration during the project implementation.

Table 3: Arsenic Results

Area	No. of sampling Points	As Concentrations (ppm)	No. of Samples > SCS – Industrial (70 mg/kg)	No. of Samples > Eco-SGV (95%) (20 mg/kg)	No. of Samples > Eco-SGV (80%) (60 mg/kg)	No. of Samples > Eco-SGV (60%) (150 mg/kg)
SRE Pit	8	12 - 407	4	7	4	2
SRX Pit	106	11 - 8700	62	98	65	52
CIT Pit	78	7.8 – 10,000	19	42	20	15
RAS Pit	59	6 - 1229	5	21	6	4
Western ELF	40	8 - 83	2	29	3	0
SRX ELF	69	9 - 1050	12	55	13	9
Processing Plant Mine Infrastructure	31	4 - 1085	9	21	10	6

Table 4: Cadmium Results

Area	No. of sampling Points	Cd Concentrations (ppm)	No. of Samples > SCS – Industrial (1,300 mg/kg)	No. of Samples > Eco-SGV (95%) (1.5 mg/kg)	No. of Samples > Eco-SGV (80%) (12 mg/kg)	No. of Samples > Eco-SGV (60%) (33 mg/kg)
SRE Pit	8	0.08 - 6.2	0	4	0	0
SRX Pit	53	0.09 - 9	0	20	0	0
CIT Pit	21	0.2 - 10.7	0	6	0	0
RAS Pit	23	0.14 - 7.2	0	11	0	0
Western ELF	4	0.68 - 3.1	0	2	0	0
SRX ELF	57	0.13 - 11.1	0	24	0	0
Processing Plant Mine Infrastructure	24	1 - 9.7	0	10	0	0

* negative values were excluded from data ranges

Soil is essential for ecological health, supporting plant growth, providing a habitat for countless organisms, and plays a vital role in nutrient cycling, water filtration, and carbon storage. Healthy soil is an essential component for the rehabilitation of the BOGP by providing the foundation for re-establishing vegetation, restoring ecosystem functions and supporting long-term environmental outcomes.

In consideration of the soil results, historic land use and proposed site development, the key environmental hazard to the project is associated with the exposure and movement As and Cd impacted soil.

The following sections detail the project-specific understanding of these hazards and their associated risks.

5.2 Arsenic Bearing Soils

Arsenic (As) is a main pathfinder element for gold mineralisation and therefore is expected to be naturally present in elevated concentrations within the Project area, however, elevated As concentrations may also be present due to the historic alluvial mining practices. Arsenic (As) can be released to the environment through air or water, while the primary risk to human health is through soil ingestion (MfE, 2011).

For the purpose of this SMP, and in accordance with the PSI, soil As concentrations over 70 parts per million (ppm) are considered to be high (As-bearing) and require management. The 70 ppm threshold has been adopted as it will capture soils that may pose a risk to human health in an industrial landuse setting. This threshold will also ensure the management of soils that exceed the 60%-SGV (i.e. those soils that may pose a risk to ecological values in an industrial landuse setting), and the majority of soils that exceed the 80%-SGV.

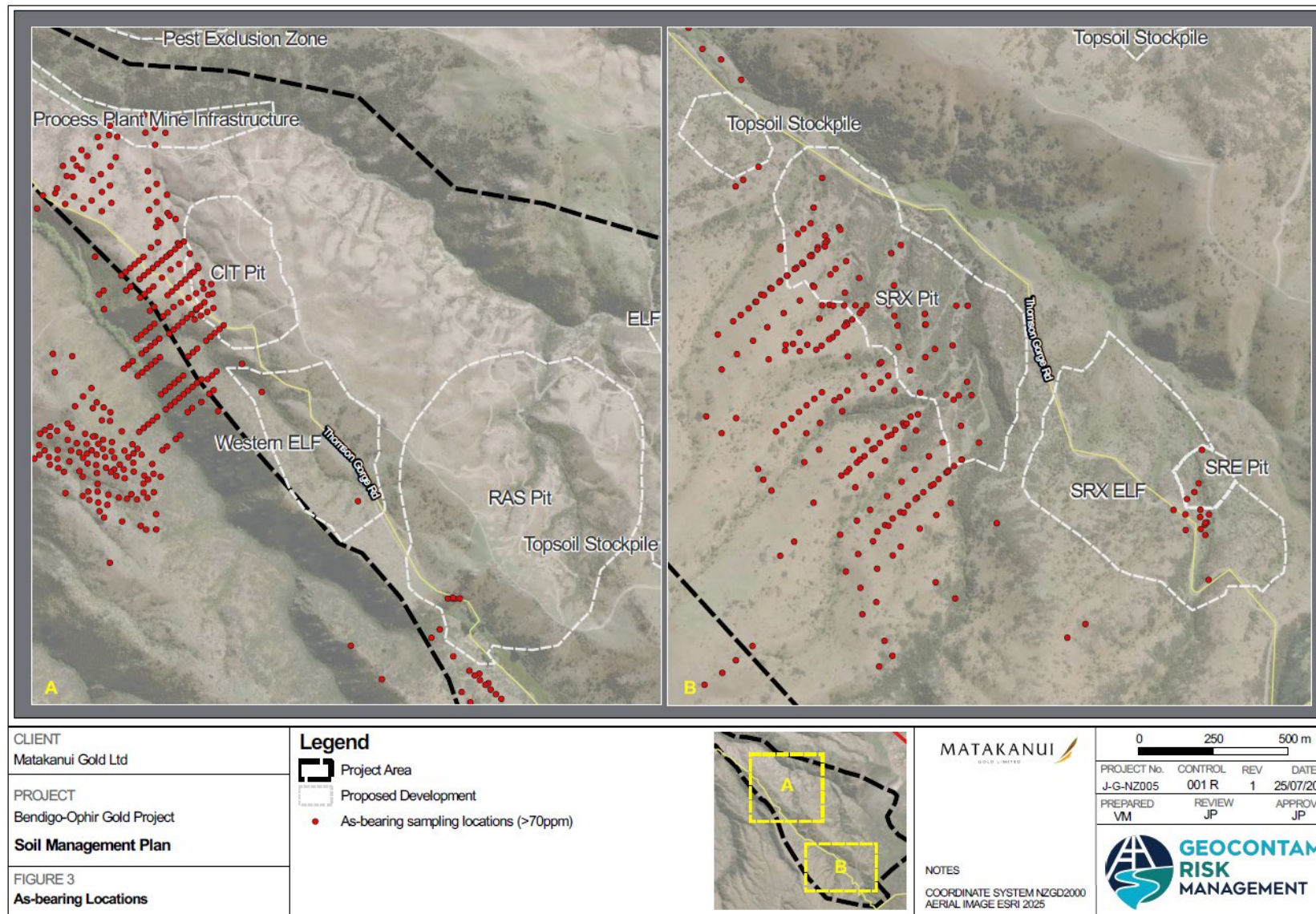
As-bearing soils were identified at the following locations:

- The western and central portion of the SRE Pit
- Across most of the SRX Pit, but remains undelineated within the north and eastern portion
- The southwestern portion of the CIT Pit
- The southern portion of the RAS Pit
- In one location to the north and one to the south at the Western ELF
- The central portion of the SRX ELF
- The central portion of the processing plant mine infrastructure

Exceedances of the Eco-SVG (95% and 80%) were also located across the western and southern portion of the SRX ELF, the southern portion of the RAS Pit, the western portion of the Western ELF, and CIT Pit.

Figure 3 below demonstrates the distribution of As-bearing soils (>70ppm) with respect to the project footprint, in particular the locations of the above-mentioned pits and ELF.

Figure 3: As-Bearing Locations



5.3 Cadmium Bearing Soils

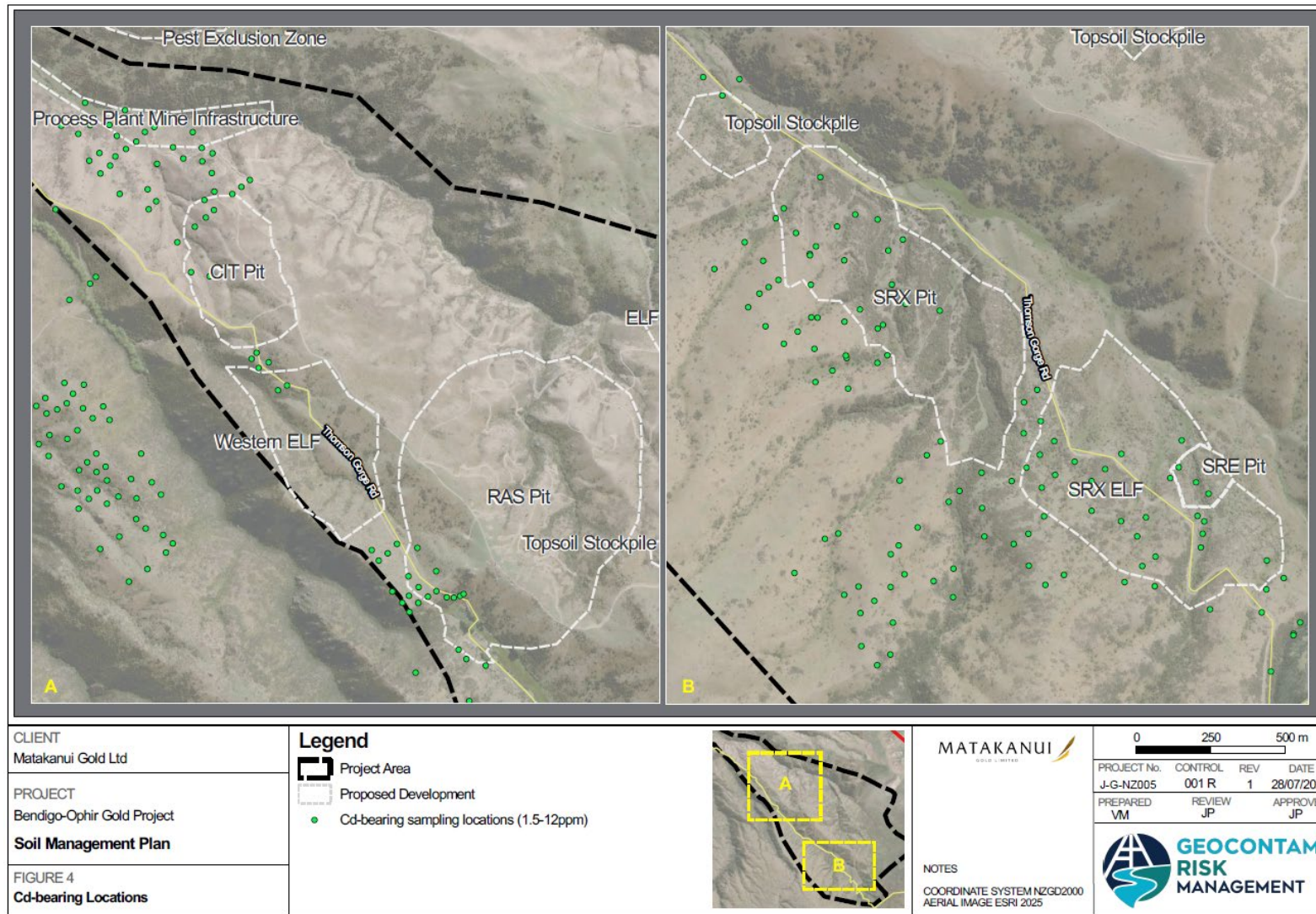
Cadmium (Cd) is not typically associated with gold mineralisation in the Otago Schist. Within the Project area, elevated cadmium concentrations in soils may be related to historical mining activity, where disturbance and oxidation of mineralised rock and mine waste may have mobilised trace metals into the surrounding environment. Although Cd poses less direct risk to human health via soil contact compared to As, Cd can pose long term ecological risks through uptake by plants and aquatic organisms and can be transported via leaching into surface or groundwater systems.

Cadmium (Cd) concentrations were reported above the Eco-SGV (95%) threshold for non-productive land use, but did not exceed the relevant human health criteria or the lower Eco-SGV thresholds (80% and 60%). However, several recorded concentrations were near the 80% Eco-SGV threshold. Given the relatively low sampling density, there remains a possibility that higher Cd concentrations may be present but undetected. Elevated Cd levels were generally co-located with arsenic (As)-bearing soils, indicating a potential spatial correlation between the two contaminants except for the following additional areas:

- Northern portion of the SRX Pit only
- The northern portion of the CIT Pit only
- Northern portion of the Western ELF
- Western portion of the SRX ELF

Figure 4 below demonstrates the distribution of Cd-bearing soils (>1.5 ppm) in the Rise and Shine Valley with respect to the project footprint, in particular the locations of the above-mentioned pits and ELF.

Figure 4: Cd-Bearing Locations



5.4 Arsenic and Cadmium Hazards

During the proposed development of the mine, vegetation removal and land disturbance will occur across the proposed pits, ELF, and infrastructure areas, which has the potential to expose and release As and Cd from soil and rock into the surrounding environment.

During construction, As and Cd can be released/mobilised through:

- Disturbance and removal of topsoil particularly in areas with elevated background concentrations, which may expose contaminated soils to erosion and runoff
- Dust generation from vehicle movement, excavation, and wind erosion, which can result in the airborne transport of fine particulates containing As, posing inhalation and deposition risks to workers and the surrounding environment.
- Surface water runoff potentially transporting soluble metals into adjacent land or water bodies.
- Stockpiling and handling of As and Cd-impacted soils.

During operations and closure, As and Cd have the potential to be released through:

- Haul road operation where continuous vehicle movement can generate dust and airborne dispersion
- Mining and excavation activities, which will result in the disturbance and stockpiling of topsoil.
- Replacement of As and Cd-impacted topsoil as rehabilitation material.

The primary human health risk is through soil ingestion, particularly for workers and future land users, while ecological risks include uptake by plants and exposure of soil invertebrates and aquatic species to potentially toxic concentrations.

Table 5 summarises the key hazards and risks associated with the project during the construction and operation that will require management.

Table 5: Summary of environmental hazards and risks

Hazard	Human Health Risk	Environmental Risk	Project Activity
Disturbance/removal of As and Cd impacted topsoil	Ingestion of impacted soil Inhalation of airborne As particulate Dermal contact	Bioaccumulation in future rehabilitation areas. Leaching into surface water or groundwater	Clearing/ removal of vegetation Topsoil stripping Excavation of pits and overburden Haul road construction and use

Hazard	Human Health Risk	Environmental Risk	Project Activity
			Earthworks in ELF and infrastructure areas
Dust generation	Inhalation of airborne As particulate	Airborne dispersion As and Cd-bearing particulates Dust deposition on surrounding land, vegetation, and water bodies	Haul road construction and operation Clearing/ removal of vegetation Excavation of pits and overburden Earthworks in ELF and infrastructure areas Stockpiling of As and Cd-bearing soil
Surface water runoff containing dissolved As and Cd	Impacts on downstream users	Transport of metals into nearby waterways Impacts on aquatic ecosystems	Inadequate drainage Rainfall
Stockpiling of As and Cd-bearing material	Inhalation of airborne As particulate Dermal contact Ingestion of impacted soil	Leaching into soil and groundwater	Earthworks (i.e., material movement associated with cut and fill activities) Construction of waste rock dumps or ELF Stockpiling of As and Cd bearing soil

6. Management of Risks

This section provides management options for As- and Cd-bearing soil. Effective management of these materials is essential to minimise environmental and human health risks associated with their disturbance and potential mobilisation.

For most soil disturbance areas, further delineation will likely be required to accurately define the extent and distribution of high As- and Cd-bearing soils. The previous soil investigation was conducted on a ~40-metre grid, which provides a general indication of

contaminant presence but lacks the resolution necessary for accurate segregation and management.

6.1 As- and Cd-Bearing Soil Management

The presence of As-bearing soils poses potential risks to human health and the environment, and therefore effective management is essential to minimise these risks and ensure compliance with environmental standards and land use objectives.

Table 6 presents the proposed management options for As- and Cd-bearing soil in the pits and infrastructure areas. All topsoil stockpile areas should be divided between high As- and Cd-bearing and low As- and Cd-bearing soil. The low As- and Cd-bearing soil being the non-impacted soil that does not require specific management.

Table 6: Management Options for As- and Cd-bearing soils

Area	Management Option
SRE Pit	As-bearing soil are located next to Cd-bearing soil across most of the SRE Pit, hence all shallow soil shall be removed and transported to the SRX ELF or to a dedicated high As- and Cd-bearing soil stockpile.
SRX Pit	As-bearing soil is located across most of the SRX Pit, but remains undelineated within the north and eastern portion. Additional pXRF sampling shall be undertaken in these areas to delineate the extent of As-bearing soils prior to ground disturbance/earthworks. Cd-bearing soil is located across the northern portion of the SRX Pit only. All impacted soil will be stripped prior to mining and transferred to the SRX ELF or the adjacent high As- and Cd-bearing topsoil stockpile.
CIT Pit	As-bearing soil are located across the western portion of the CIT Pit only whilst Cd-bearing soil are located across the northern portion of the CIT Pit only. The CIT pit should have its own dedicated impacted soil stockpile area. The shallow soil to the east and south (low As- and Cd-bearing) will be reused.
RAS Pit	Arsenic levels in the RAS Pit are located in isolated hotspots whilst Cd-bearing soils are located in the southern portion. Once removed, this soil can be transported to the adjacent topsoil stockpile into a dedicated high-As and Cd-bearing area. The rest of the shallow soil (low As- and Cd-bearing) will be reused.
Western ELF	High As- and Cd-bearing soil can be moved within the Western ELF into a dedicated area or left in-situ
SRX ELF	High As- and Cd-bearing soil can be moved within the SRX ELF into a dedicated area or left in-situ
Processing Plant Mine Infrastructure	High As- and Cd-bearing soil are located in the central portion of the processing plant mine infrastructure. This area should have its own dedicated impacted soil stockpile area or the soil shall be transported to the closest ELF or impacted soil stockpile area.

6.2 As and Cd Mitigation Measures

In addition to the above management measures for the proposed soil disturbance area, *Table 7* below outlines the additional mitigation measures to manage these soils, which will be employed at the BOGP. These measures should be adopted in conjunction with other standard soil management practices.

Table 7: Mitigation Measures for As- and Cd- bearing soils

Mitigation Measure	Applicable to:	Detail
Delineation	SRE Pit SRX Pit CIT Pit RAS Pit	In areas where impacts were not previously delineated (north and eastern portion of SRX Pit), implement a 40m grid screening using a pXRF. Targeted field screening using a pXRF at the edge of known impacted zones with a finer-resolution sampling grid (e.g. 10 m in areas of known variability). An area will be considered delineated when all perimeter results are below the trigger levels detailed in Table 9. Soils in these areas that are above the trigger levels will require management as per the additional mitigation measures detailed in Table 7.
Segregation	Stockpiles Topsoil-management ELFs	During topsoil stripping and earthwork, real-time readings to be taken using a pXRF. Minimum of 1 sample/reading per 100 to 200 m³ of soil stripped to be taken via pXRF to provide statistically defensible results. As- and Cd- bearing soils will be identified and kept separate from non As- and Cd-bearing topsoil during reclaim, storage, and placement. Refer to Table 9 for the trigger levels. No mixing of As- and Cd-bearing soil with non-As- and Cd-bearing soils during stockpiling.
Validation	Stockpiles Topsoil-management	Validation sampling to be undertaken on the ground surface under the footprint of the high As- and Cd-bearing stockpile once removed. Validation field screening using a pXRF. Minimum of 5-10 validation samples depending on the size of stockpile compared to the trigger levels (Table 9).
Rehabilitation	Rehab areas	As- and Cd-bearing topsoil can be used to rehabilitate areas from which As- and Cd-bearing topsoil was originally reclaimed or from areas with naturally elevated levels of As to prevent new locations becoming contaminated unnecessarily.

Mitigation Measure	Applicable to:	Detail
		Where there are insufficient volumes of As- and Cd-bearing soils to complete rehabilitation of areas where As- and Cd-bearing soil originally reclaimed, non As- and Cd-bearing topsoil may be used when As- and Cd-bearing topsoil supplies are exhausted.
Recordkeeping	Stockpiles Topsoil-management ELFs	Recordkeeping of As- and Cd-bearing topsoil volumes reclaimed, stored and placed shall be conducted. Records will include location and quantity of soil.
Vegetative cover	Stockpiles Topsoil-management ELFs	Establish a vegetative cover on a stockpile surface which is resistant to wind erosion to reduce dust and soil erosion.
Dust suppression	Stockpiles Topsoil-management ELFs	Dampen the surface of soil in response to any soil dust blowing over the site boundary.
Erosion	Stockpiles Topsoil-management ELFs	Ensure that any As- and Cd-bearing stockpiles have erosion and sediment controls in place. These controls should direct any run-off to dedicated sediment ponds, separate from the main ponds on site.
Time	Stockpiles Topsoil-management	Minimise the time topsoil is stockpiled. Where practical direct transfer As- and Cd-bearing soils to rehabilitation areas. This reduces the risk of contamination through temporary stockpiling.

6.3 Performance Criteria/Trigger Levels

The pXRF results obtained during delineation, segregation, and validation shall be compared to the assessment criteria presented in *Table 8* below:

Table 8: Performance Criteria/Trigger Levels

Activity	Analyte	Trigger Level	Performance Criteria
Delineation	As	SCS Industrial: 70 mg/kg Eco-SGV 60% (industrial): 150 mg/kg	Delineation required until all As concentrations at the perimeter of the investigation area are < 70 mg/kg.
	Cd	SCS – Industrial: 1,300 mg/kg Eco-SGV 60% (industrial): 33 mg/kg	Delineation required until all Cd concentrations at the perimeter of the investigation area are <33 mg/kg.
Segregation	As	SCS Industrial: 70 mg/kg Eco-SGV 60% (industrial): 150 mg/kg	As-bearing soil > 70 mg/kg to be sent to high As- and Cd-bearing stockpile or ELF.

Activity	Analyte	Trigger Level	Performance Criteria
	Cd	SCS – Industrial: 1,300 mg/kg Eco-SGV 80% (recreational): 12 mg/kg Eco-SGV 60% (industrial): 33 mg/kg	Cd-bearing soil >33 mg/kg to be sent to high As- and Cd-bearing stockpile or ELF.
Validation	As	SCS Industrial: 70 mg/kg Eco-SGV 60% (industrial): 150 mg/kg	All As concentrations are <70 mg/kg. Additional soil to be removed from beneath the topsoil stockpile areas if concentrations are >70 mg/kg.
	Cd	SCS – Industrial: 1,300 mg/kg Eco-SGV 60% (industrial): 33 mg/kg	All Cd concentrations are <33 mg/kg. Additional soil to be removed from beneath the topsoil stockpile areas if concentrations are >33 mg/kg.

7. Topsoil Management Principles

Topsoil is the uppermost layer of soil, rich in organic matter and nutrients essential for supporting plant growth and maintaining healthy ecosystems. Effective topsoil management is critical in land development and environmental restoration projects. The following principles for topsoil management aim to minimise degradation and ensure the sustainable re-use of this valuable resource.

Topsoil management at BOGP will consist of the following principles:

- Minimise areas of topsoil disturbance.
- Within areas of disturbance, maximise volumes of topsoil reclaimed during clearing activities.
- Reclaimed topsoil will be stored in appropriate temporary stockpiles.
- Stored topsoil will be emplaced during rehabilitation of disturbed surfaces.
- Record keeping of topsoil volumes reclaimed, stored and emplaced shall be maintained.
- As- and Cd-bearing topsoil will be identified and kept separate from non As- and Cd-bearing topsoil during reclamation, storage and placement.
- Ensure SMP integrates with the associated requirements of other BOGP management plans.

7.1 Topsoil Stockpile Management

Stockpile management involves careful handling, storage and preservation of topsoil and subsoils (e.g. alluvium, colluvium, loess) following land disturbance. The goal is to maintain the soil quality for future re-use in rehabilitation while minimizing risks to

human and environmental health. Key aspects of effective stockpile management include:

- Site selection and preparation
 - Choose stable, well drained areas away from permanent watercourses (>10m), wetlands or slopes to prevent erosion and runoff. Where set-off distances cannot be achieved, provide bunding and drainage that migrates away from the watercourse.
 - Minimise disturbance to undisturbed soils by selecting previously cleared or degraded areas, where possible.
 - Install sediment and erosion controls around the stockpile area before placement (in accordance with site-specific (ESCMPs) discussed above).
- Soil stripping and segregation
 - Topsoil and subsoil to be stockpiled separately.
 - Clearly record and separate stockpiles of high As- and Cd-bearing soil from non As- and Cd-bearing soil to prevent mixing.
- Stockpile construction
 - Where possible, limit stockpile height to <30m
 - Shape piles to a stable angle and avoid overly steep sides to reduce erosion risk
- Vegetation or covering
 - Where practical, vegetate stockpile to reduce erosion, prevent dust and maintain soil biology
 - Chemical dust suppressants such as polymers to create a surface crust and prevent dust generation
- Drainage and run-off control
 - Divert surface water away from stockpiles using bunds and channels (in accordance with site-specific ESCMPs)
 - Collect runoff in sediment retention ponds in accordance with site specific ESCMPs
- Monitoring and maintenance
 - Inspect stockpiles weekly and after rainfall for signs of erosion, or structural issues
 - Record observations and undertake corrective actions as required
- Reuse and rehabilitation
 - Use topsoil and subsoil in the reverse order they were stripped during site rehabilitation
 - As- and Cd-bearing topsoil used to rehabilitate areas where As- and Cd-bearing topsoil originally reclaimed to prevent new locations becoming contaminated unnecessarily.

- Use As- and Cd-bearing soil overburden for rehabilitation in areas with naturally elevated levels of As.
- Validation Sampling
 - Validation sampling to be undertaken on the ground surface under the footprint of the high As- and Cd bearing stockpile once removed. A minimum of 5 validation samples to be collected with a general sampling rate of 1:50 m².

8. Dust Management – Topsoil

Dust management aims to minimise airborne dust generated during land disturbance activities such as excavation, earthworks and transport. Excessive dust can lead to health risks, visibility issues, environmental damage and regulatory non-compliance.

The following tables outline good practices and dust mitigation strategies which are applicable to the high As- and Cd-bearing soils. For full details on air quality management, please refer to the BOGP AQMP.

Table 9: Dust Mitigation Measures

Mitigation and Design	Description
Design and location of dust-generating activities	Topsoil stockpiles have been located at a suitable distance away from sensitive receptors.
Management	The BOGP AQMP will be followed. Effective site management practices are critical to demonstrate the willingness of the operator to control dust emissions and provides a mechanism for auditing of site operations. Such management procedures are outlined within the AQMP. This includes recording of all dust and air quality complaints, identification of cause(s), appropriate measures taken to reduce emissions in a timely manner, and record of the measures taken.
Provision for water supply	Planning and design of the scheme has made provision for water supply to meet the site demand for dust mitigation and dampening.
Equipment and vehicles	The site has been designed to minimise haul route distances and to locate haul routes away from sensitive receptors.
Planting	Topsoil stockpiles will have surfaces stabilised to minimise dust generation by planting of vegetation.
Training	MGL will provide training to the site personnel on dust mitigation. Training will also cover 'emergency preparedness plans' to react quickly in case of any failure of the planned dust mitigation.

Mitigation and Design	Description
Monitoring	An appropriate monitoring scheme will be implemented. This includes a range of monitoring methods from visual inspections, wind monitoring and real-time PM ₁₀ continuous monitoring locations. MGL will undertake regular on-site inspections, audit the monitoring programme, carry out regular site inspections to monitor compliance with the AQMP and adjust the frequency of site inspections according to dust risk (higher frequency in dry and windy conditions)
Communication	MGL aims to maintain good communication to help alleviate concerns between the operators and the surrounding communities.
Planning of activities	Some activities should ideally be planned only during favourable weather conditions. Where possible, particularly dusty activities should be avoided during extended periods of dry and windy conditions. Excavation of topsoil will cease if winds are greater than 7.5 m/s and/or when dust can be seen blowing over the site boundary.

Table 10: Pit dust generating activities and dust mitigation strategies

Activity	Dust generation method	Mitigation measures
Soil overburden removal	Soil scraping by tracked dozer. Soil loaded into dump truck by backhoe excavator or wheeled FEL.	Not undertaking soil overburden removal when windspeeds are greater than 7.5 m/s and toward sensitive receptors within 500 m of the site boundary and when dust is seen blowing over the site boundary. Minimising drop heights from excavator to dump truck. Dampen surface of soil where dry soil is seen to be causing dust discharges. Maintain adequate buffer distance (500 m) to sensitive receptors.

Table 11: Topsoil stockpile dust generating activities and dust mitigation strategies

Activity	Dust generation method	Mitigation measures
Soil overburden	Dumping soil from dump truck	Targeting the topsoil stockpile building or disturbance for when the soil moisture and/or wind conditions are such that dust plumes are unlikely to be blown across the site boundary.

Activity	Dust generation method	Mitigation measures
	Shaping soil stockpile by backhoe excavator or tracked dozer. Wind erosion on unconsolidated surfaces.	Minimising drop heights from excavator and dump truck. Dampen surface of soil in response to any soil dust blowing over the site boundary. Maintain adequate buffer distance (500 m) to sensitive receptors. Where practical, establish vegetative cover on stockpile surface which is resistant to wind erosion.
Elevated As and Cd soil overburden		Keep elevated As and Cd soil overburden separated in the stockpile from other topsoil stockpiles. Document the location and quantity of soil within the topsoil stockpiles. Do not mix with uncontaminated topsoil. Establish a vegetative cover on a stockpile surface which is resistant to wind erosion. Locate topsoil stockpiles in locations which reduce the risk of dust blowing over boundaries Dampen the surface of soil in response to any soil dust blowing over the site boundary. Minimise time topsoil is stockpiled. Where practical direct transfer As- and Cd-bearing soils to rehabilitation areas.

9. Erosion and Sediment Control

Erosion and sediment control (ESC) measures are designed to prevent soil loss and protect surrounding environments during and after land disturbance activities. These controls minimise the movement of soil particles by water or wind, reducing sedimentation in waterways, protecting soil structure, and ensuring regulatory compliance. For full ESC measures refer to the BOGP ESCMP (EGL. 2025).

Key components of effective ESC include:

- Minimise soil disturbance- only disturb areas necessary for the activity and limit the duration of exposure to the elements to reduce erosion risk.
- Preserve existing vegetation where possible to stabilise soil and reduce run-off
- Surface stabilisation of exposed soils as soon as possible to prevent run-off
- Control water flow across site by the use of diversion drains, contour banks, swales etc.

- Keep clean water (i.e., water that is collected and diverted before reaching areas of land disturbance) separated from dirty water (i.e., water that has been transported through operational/disturbed areas with potential contamination sources)
- Minimise water velocity using check dams, rock aprons or vegetation to prevent erosion and allow sediment to settle.
- Capture and contain sediment using silt fences or sediment retention ponds to prevent sediment leaving the site. Dirty water from earthworks will flow to a sediment retention bund or pond prior to discharge to a watercourse.
- Weather monitoring to check that ESC devices and controls are set-up and ready for a rain event.
- Maintain and inspect controls on a regular basis, especially after a rain event. Repair or replace when required.
- Coordinate erosion and sediment control with other site practices like stockpile management, vehicle access and rehabilitation.

Site Specific Erosion Sediment Control Plan's (ESCP's)

- Site specific ESCP's are to be developed for each main area and approved by a suitably qualified experienced person (SQEP) in accordance with design methodologies set out in BOGP ESC MP (EGL. 2025).
- This SMP should be read and implemented in conjunction with the BOGP ESCMP, and site specific ESCP's.

ESC Device Design Methodology

- All sediment detention ponds, and clean and dirty water diversion channels shall be designed in accordance with the International Erosion Control Association (IECA) 'Best practice Erosion and Sediment Control' dated November 2008.
- All other ESC devices shall be designed in accordance with 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' referenced GD06, dated June 2016.

10. Monitoring and Adaptive Management

The following monitoring and adaptive management activities will be undertaken:

- Routine site inspections to be carried out to check that management measures are correctly installed, maintained and functioning as intended, and in accordance with this SMP.
- The Construction Manager/Supervising Manager is responsible for ensuring compliance with this SMP and addressing any issues that arise.

- Dust deposition monitoring sites have been installed to collect dust data, assess and manage the impact of dust discharged from BOGP. Please refer to the BOGP AQMP for more details on air quality monitoring programme.
- Compliance with any relevant consent conditions.
- Accurate records must be kept of inspections, incidents, complaints, and any corrective actions. These records provide accountability and support reporting obligations.
- Incidents, near misses, or breaches must be promptly reported, investigated and documented.
- When non-compliance is identified, immediate corrective actions must be taken. Lessons learned should inform updates to this SMP and onsite practices.
- All contractors and workers must follow MGL protocols. Violations may be addressed through site disciplinary procedures.
- This SMP should allow for updates based on monitoring findings, stakeholder feedback, weather conditions, or changes in site activities. Flexibility ensures continued safety and effectiveness.

11. Site and Emergency Contacts

Site and emergency contacts are detailed in Table 12

Table 12: Site and Emergency Contacts

Role/Responsibility	Name	Phone	Email/address
General Manager	Paul Miles		
Construction Manager	Dave Stretch		
Environmental Manager	Cheryl Low		
Health and Safety Manager	Mel Dunstan		
Site Supervisor	TBC		
Otago Regional Council	TBC	0800 474 082	consent.enquiries@orc.govt.nz
Central Otago District Council	TBC	03 440 0056	monitoring@codc.govt.nz
Medical	Cromwell Medical Centre	03 445 1119	192 Waenga Drive, Cromwell
Hospital	Dunstan Hospital	03 440 4300	29 Hospital Street, Clyde
Emergency Services	Police, fire and	111	

	ambulance services		
Police- non-emergency	Cromwell Police	105	157 Waenga Drive, Cromwell

12. Document Control

This SMP is intended to be a live document and will be reviewed and updated as required throughout the duration of the project.

As site conditions, construction activities and surrounding environments evolve, this plan will be adjusted to ensure continued safety, compliance with regulatory requirements, and effective soil management. Updates may be triggered by changes in work staging, stakeholder feedback, incidents, audits or directions from local authorities.

All revisions to the SMP will be documented, dated, and communicated to relevant parties, including site personnel, contractors, and regulatory bodies. The most current version will be maintained on-site and made available upon request.

The following table will be used to record changes.

Item	Section	Summary of change	Reason for change	Complexity of change	Date
1.				☐ Minor ☐ Moderate ☐ Major	
2.				☐ Minor ☐ Moderate ☐ Major	
3.				☐ Minor ☐ Moderate ☐ Major	
4.				☐ Minor ☐ Moderate ☐ Major	