Appendix L

Environmental Management Plan

Environmental Management Plan

Mount Iron Junction

December 2025

Document Control	
Report title	Mount Iron Junction – Environmental Management Plan
Address	Mount Iron Junction, Cnr Wānaka-Luggate Highway and SH 6, Wānaka
Client	Mount Iron Junction Limited – Peter Green
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Appendices	
Appendix 1	Erosion and Sediment Control Plan Drawings
Appendix 2	Erosion and Sediment Control Plan Calculations
Appendix 3	Environmental Induction Handout
Appendix 4	Environmental Induction Register
Appendix 5	Weekly Environmental Inspection Form
Appendix 6	Environmental Incident Report
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Disclaimer

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Emergency Contacts

Contact made with any of the following shall be undertaken with due consultation of the Environmental Representative or Project Manager. These are outlined in **Table 1** below.

Table 1: *Emergency Contacts*

Element	Emergency Contact	Details
Pollution incident	Otago Regional Council (ORC) Spill Hotline	0800 800 033 pollution@orc.govt.nz compliance@orc.govt.nz
Environmental complaint	Environmental Representative	TBC
Discovery of contaminated land		
Unexpected heritage finds		
Human remains	New Zealand Police	111
Fire including bushfire	Fire and Emergency New Zealand (FENZ)	111
Public utilities	Queenstown Lakes District Council (QLDC)	(03) 441 0499 rcmonitoring@qldc.govt.nz
Internal contacts	Project Manager	TBC
Internal contacts	Environmental Consultant	Lucy Cramp Enviroscope 022 173 6902

1.0 INTRODUCTION

1.1 Purpose and Scope

On behalf of Mount Iron Junction Limited, Enviroscope has prepared this Environmental Management Plan (EMP) for the proposed residential development at Mount Iron Junction, Corner of Wānaka-Luggate Highway and State Highway 6, Wānaka. This EMP aims to reduce the effects of the project's construction activities on the environment and sensitive receptors.

This EMP is prepared to accompany the substantive Fast Track application and is required to be prepared in accordance with the local Territorial Council, Queenstown Lakes District Council (QLDC) and Regional Council, Otago Regional Council (ORC) Guidelines. This document aligns with the objectives and policies of the (ORC) Regional Plan, specifically, section 14.5 – Earthworks for Residential Developments and with the (QLDC) objectives and policies of Chapter 26 – Earthworks, of the Proposed District Plan.

This EMP is prepared in accordance with the ORC Residential Earthworks in Otago – A guide for developers, landowners, contractors and service providers, March 2023 (Guide — Residential Earthworks in Otago). As well as the QLDC Guidelines for Environmental Management Plans, June 2019 (EMP Guidelines).

The purpose of this EMP is to be an effective and practical reference manual for construction personnel that applies to all project activities during the construction phase and includes the following:

- Strategies to manage environmental aspects and risks, based on associated best practice.
- Provides for contingency planning.
- Provides a framework for monitoring, reporting, review and continual improvement.
- Defines roles and responsibilities.
- Procedures to investigate and resolve environmental non-conformances and initiate corrective and preventative actions.

This EMP has been prepared following best practice, based on the preliminary designs available at the time of the consent application. A detailed EMP and Erosion and Sediment Control Plan (ESCP), will be provided to the respective regulatory authority, once the engineering and survey plans are confirmed and contractors are appointed. Once appointed, the Contractor's details will be updated and the EMP amended in accordance with the Contractor's proposed methodologies of construction, programme of works. An overview of the project and sequencing can be found in the construction methodology at **Section 2.0**.

1.2 Site Overview

The subject site is located across three sections, legally known as Lot 6 DP 605028, Lot 2 DP 605028 and Lot 3 DP 359869, spanning 5.98 ha. The site can be accessed via the sealed Wānaka-Luggate Highway in the northwest boundary and State Highway 6 in the northeast corner boundary. It is situated approximately 2.5 km east of central Wānaka, with Mount Iron rising steeply to the north-west of the site. The surrounding area comprises residential dwellings to the north-east, State Highway 6 roading infrastructure to the east and south, and Mount Iron Reserve to the north.

This is further summarised in **Table 2,** and the site is shown in **Figure 1** below.

Table 2: *Site characteristics*

Site Name	
Legal Description	Lot 6 DP 605028, Lot 2 DP 605028 and Lot 3 DP 359869
Territorial Authority	Queenstown Lakes District Council (QLDC)
Regional Authority	Otago Regional Council (ORC)
Topography (site area)	The site is 5.98 ha and is predominantly flat, sloping at less than a 2% gradient west to east.
Geology and Soils	A geotechnical report has been prepared by Geosolve, dated March 2018, which details site investigations and reports on the geotechnical conditions including soakage. The report notes that 17 test pits were excavated to a maximum depth of 4.5 m below ground level (bgl), and concluded the following: • 0.1 to 0.2 m of **topsoil** predominately comprised of brown, organic SILT with roots and rootlets, overlying; • Isolated **uncontrolled fill** (1.2-1.7 m in TP6, SP1 and 2 only) comprised of light grey/grey, loose to medium dense, gravelly SAND with minor organic silt and trace sticks, rootlets and wire, SAND with some gravel and silt, and sandy GRAVEL with trace cobbles boulders and organic silt, overlying; • Isolated **buried topsoil** (0.1 - 0.4 m in TP 6, SP1 and 2 only) comprised of brown sandy organic SILT with minor rubbish and gravel, overlying; • 0.1 to 0.3 m of **loess** comprised of light brown, firm silty SAND with minor rootlets, overlying; • 0.3 to 4.2 m+ of **outwash gravel** comprised of brown, grey and dark grey medium dense, sandy GRAVEL with some to trace cobbles and trace boulders, interbedded with; • Lenses of **outwash sand**, 0.3 – 0.9 m thick were observed within the outwash gravel. They were found to typically be comprised of grey/brown, medium dense SAND with minor to some gravel and gravelly SAND • **Lake sediment** is inferred to underlie the outwash gravel at approximately 11 -12 m bgl in the area of DPH 1. The site is naturally free draining, and no seepages or ponding water were evident within the site boundary. The report details that soakage testing was undertaken at the base of soak pits SP1-4. The results found indicative soakage rates of 0.07 L/s/m^2 – free draining, meaning insufficient water was able to be introduced to establish a pool of water at the base of the pit due to high soakage.
Waterbodies	There are no surface waterbodies are identified within or nearby to the site boundaries. In addition, groundwater was not observed during the geotechnical investigations detailed within the Geosolve report, dated March 2018.

Climate	The majority of the information within this section was taken from NIWA's The Climate and Weather of Otago 2nd Edition (2015)[1]. The data and figures were compiled from observations over a 30-year period from 1981-2010. It is likely that present-day weather patterns have a slightly larger range and scale due to climate shifts. Unless otherwise noted, Wānaka specific data was taken from readings at the Wānaka airport. **Wind** The prevailing wind direction is predominantly from the West and the Southeast with a yearly average windspeed of approximately 9 km/hr in Autumn/Winter and 14km/hr in Spring/Summer. Wind velocity is typically highest later in the afternoon, and lowest in the early morning. Additionally, the Wānaka airport only experiences approximately three days per summer and spring season where average windspeeds exceed 30 km/hr; although, gusts exceeding 61 km/hr are experienced approximately 29 days per year. **Precipitation** The seasonal average rainfall ranges from approximately 50 mm/month in Autumn to 52 mm/month in Spring. The wettest month is shown to be December, with a 66 mm/month average rainfall. **Temperature** Daily average temperatures show a seasonal trend, with temperatures generally being higher through the summer and lower through the winter. The average daily temperatures range from around 5°C in July to 18°C in January.
Vegetation	The site was previously covered in kanuka but this was cleared for the recent State Highway 6 upgrades. Currently, the site is predominantly covered in pasture species such as tall fescue and revegetating weeds. A range of individual mature trees are scattered across the site, including both natives and exotics.
Contaminated Land	A search of the ORC Natural Hazards and HAIL databases has not provided any indication of the site being used in the past for a HAIL activity.

[1] Macara, G. R. (2015). Climate and weather of Otago (2nd ed.). National Institute of Water and Atmospheric Research (NIWA). https://webstatic.niwa.co.nz/library/NIWAsts67.pdf

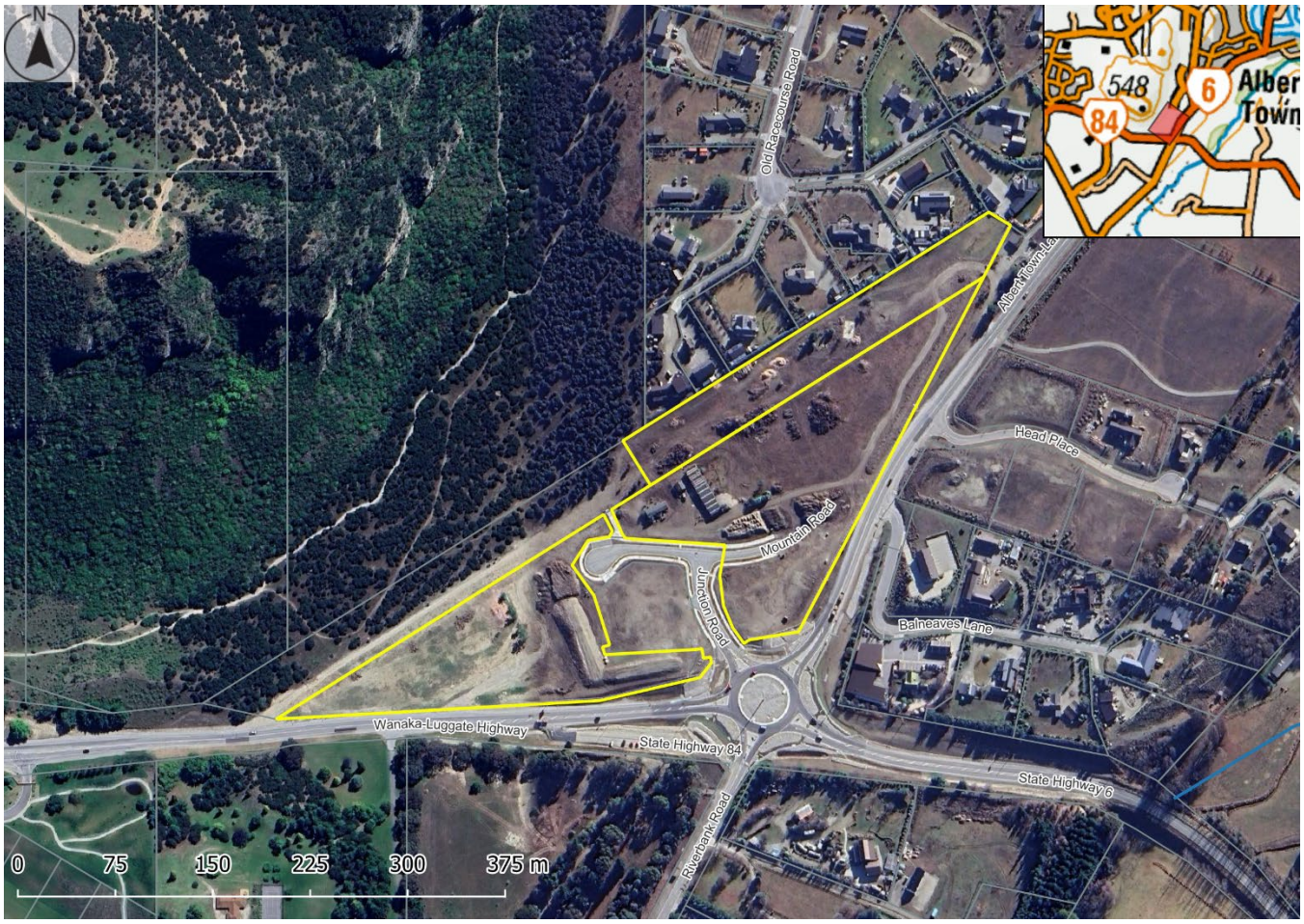


Figure 1: *Location of the site (Source: LINZ)*

1.3 Summary of Earthworks

Earthworks will consist of minor cut earthworks and bulk fill earthworks. **Table 3** summarises proposed earthworks volumes and excludes the quantities of imported materials required for road base construction and trench bedding and backfill materials. Topsoil stripping will form the majority of material cut from the site, and it is expected that site filling will comprise both site won and clean imported engineered fill materials.

Generally, earthworks will be undertaken in accordance with the recommendations and limitations of the Geotechnical Assessment Report. It is expected the Geotechnical Engineer will be onsite during earthworks to inspect and advise on the earthworks being undertaken and provide guidance to the contractor and civil engineering consultant on any impacts on the design of any findings on site. The extent of earthworks and staging is depicted on the Erosion and Sediment Control (ESCP) drawing in **Appendix 1**.

Table 3: *Earthworks Quantities*

Description	Volume m^3	Area m^2
Cut to waste topsoil	5,000	-

Description	Volume m^3	Area m^2
Cut to waste existing stockpiles	3,250	-
Cut to stockpile topsoil	7,000	-
Fill	5,770	-
Respread topsoil	5,600	-
Imported material	4,750	-
Imported roading material	3,885	-
Total	**35,255**	**59,768**

1.4 Associated Resource Consents and Permits

This EMP has been prepared in accordance with industry best practice to accompany the substantive fast-track resource consent application. Provided the activity is undertaken in accordance with this EMP, it will comply with the relevant conditions set within the associated resource consents. The resource consents associated with this project are given in **Table 4**.

Table 4: *Associated resource consents*

Resource Consent Number	Related Council	Activity Description	Date of Decision Issue
TBC	Fast Track	-	TBC

1.5 Suitably Qualified and Experienced Professional

This EMP has been partly prepared by Katy Bonacci and Lucy Cramp, both of Enviroscope Limited. Katy holds a Bachelor of Science degree, majoring in Environmental Science and Geography. Katy has experience preparing Environmental Management Plans and Erosion and Sediment Control Plans within the Queenstown Lakes District.

Lucy is a Certified Environmental Practitioner (CEnvP) and holds a Master's degree in Environmental Management. She has over seven years' experience in environmental consulting, with extensive expertise in preparing environmental reports for resource consent applications, as well as in the preparation, implementation, and monitoring of EMPs and ESCPs.

This EMP has been reviewed by Tom Grandiek of Enviroscope Limited. Tom is a Certified Environmental Practitioner (CEnvP) and recognised Suitably Qualified and Experienced Professional (SQEP), Tom brings senior-level experience in both public and private sectors. Tom has over nine years' experience in environmental management, regulatory

compliance, training, project leadership, and technical delivery across infrastructure, land development, and resource management sectors.

Both Lucy and Tom meet the criteria of a Suitably Qualified and Experienced Professional (SQEP) for the purposes of preparing this EMP and overseeing the environmental aspects of this project.

2.0 CONSTRUCTION METHODOLOGY

2.1 Sequencing of Works

The following sequencing will ensure the earthworks are undertaken efficiently while ensuring good environmental outcomes. This is a preliminary staging methodology and may be subject to change based on site conditions encountered during construction. This methodology has been prepared following best practice, based on the preliminary designs available at the time of the consent application.

A detailed EMP and Erosion and Sediment Control Plan (ESCP), will be provided to the respective regulatory authority, once the engineering and survey plans are confirmed and contractors are appointed. Once appointed, the Contractor's details will be updated and the EMP amended in accordance with the Contractor's proposed methodologies of construction, programme of works. This methodology shall be read in conjunction with the Erosion and Sediment Control Plan (ESCP) attached as **Appendix 1.**

Preliminary works and site establishment

- Ensure the current EMP and associated resource consents are available onsite and/or available electronically.
- Complete site induction with Environmental Consultant.
- Establish site laydown and hardstand.
- Install the stabilised access off the sealed Mountain Road as shown on ESCP-001, **Appendix 1.** Form the stabilised access with larger formed aggregate or a track mat. Refer to **Section 4.4.4** for design details.
- For each catchment (**C1**, **C2** and **C3**), construct the corresponding sediment basin as indicated on ESCP-001, **Appendix 1.** Calculations are provided in **Appendix 2.** A contingency submersible pump is to be installed within **SB3** to convey flows to the Albert Town – Lake Hawea Road.
- Install the dirty water diversion channels (DWDC), combined clean water diversion bunding (CWDB) and trafficable swales as depicted on ESCP-001, **Appendix 1**. All design details are provided in ESCP-005, **Appendix 1**, and calculations are provided within **Appendix 2**. Ensure each DWDC's outlets into their respective sediment basin.
- Install a silt fencing as depicted on ESCP-001, **Appendix 1.**
- Install stormwater inlet protection along Mountain Road and SH6 as depicted on ESCP-001, **Appendix 1.**

Vegetation and Stockpile Clearance and Dwelling Removal

Prior to bulk earthworks, the demolition of two existing buildings will need to be undertaken. In addition, the existing stockpiles on site will need to be removed and disposed of appropriately.

- Remove stockpiles from site and dispose of appropriately.
- Demolish the existing infrastructure on site, remove material from site immediately and dispose of it to the correct and approved locations.

Bulk earthworks – ESCP-001

Bulk earthworks are required to establish level building platforms, roading and associated parking areas.

- Stage works were practicable to minimise the total amount of exposed area at any one time. This will reduce the

likelihood of erosion occurring by the mobilisation of wind-borne sediment.

- Undertake bulk earthworks to form the road subgrade. Progressively apply aggregate to the road surface to reduce the erosive potential of the surface as design levels are reached.
- Undertake bulk earthworks to form building platforms. As design levels are reached, progressively stabilise the surface with aggregate or topsoil and revegetate to reduce the erosive potential of the surface.

Civil Works and Roading – ESCP-002

The main civil works consist of the development of the stormwater infrastructure, installation of the communications, stormwater, wastewater, and water supply networks within the road corridors, formation of access and sealing roads.

- Maintain erosion and sediment controls as per ESCP-002, **Appendix 1.**
- Undertake installation of civil services within the road corridor.
- Prepare the road and parking subbases by applying layers of aggregate and compacting. Form the associated kerb, channels and driveway crossings. Seal the associated road areas.
- During civils, only undertake concreate washing the designated concreate washout pit as outlined in **Section 10**. This is to be located within the laydown area.
- Once civil works have been completed, ensure that the areas have been backfilled and stabilised.

Civil Works and Roading Contingency Measures

- If water is observed to be pooling within the road cut alignment or trenching, pump flows to into the closest DWDC or respective sediment basin.
- If flows withinthe northern portion of catchment 1 are no longer able to gain fall to Sediment Basin 1 (**SB1**), construct an additional sediment basin (**SB4**) as shown on ESCP-002, **Appendix 1**. This should be formed to the same dimensions as **SB1**. Ensure that a section of DWDC is constructed to direct flows to the inlet of **SB4.**

Landscaping and revegetation

- Undertake final landscaping and revegetation of any remaining exposed areas.

Decommissioning

- Remove erosion and sediment control devices once stabilisation has occurred across the entire site. This is generally defined as 80% vegetative cover.

2.2 Hours of Operation

Construction activities and the associated hours of operation shall comply with *NZS 6803:1999 Acoustics - Construction Noise Guidelines*. Site works may be undertaken between 0730 and 1800 hours, Monday to Saturday. No works are to be undertaken on Sundays or Public Holidays. However, this does not preclude any emergency works or works required for incident investigation or response. Additional detail relating to noise-producing activities are to be undertaken in accordance with **Section 7.0** of this EMP.

3.0 EMP IMPLEMENTATION

3.1 Environmental Roles and Responsibilities

3.1.1 Project Manager

The Project Manager is responsible for the effective implementation of the EMP and has overall responsibility for the environmental performance of the project. Duties include:

- Ensuring adequate resources are in place to implement the EMP.
- Ensuring all staff and sub-contractors operate within the guidelines of the EMP.
- Ensuring that an EMP is prepared and that environmental standards, processes and procedures meet relevant resource consent conditions.
- Overseeing the successful implementation, monitoring and review of the EMP.
- Ensuring that inspections are carried out in accordance with the relevant EMP.
- Restricting or stopping any activity that has the potential to or has caused adverse environmental effects.
- Providing notification and reporting of Environmental Incidents to Council and other environmental reports as required by The Guidelines and/or conditions of resource consent.
- Delegating authority of the above responsibilities.

3.1.2 Environmental Representative

The Environmental Representative supports the Project Manager in the day-to-day implementation of the EMP. Duties include:

- Ensuring the installation of environmental controls as per the EMP.
- Undertaking environmental site inspections.
- Undertake water quality sampling during rainfall events.
- Overseeing the maintenance and improvement of defective environmental controls.
- Providing environmental inductions to all staff and sub-contractors.
- Assisting the project leadership in attending to Environmental Incidents and Complaints.

The Environmental Representative shall be familiar with environmental risks associated with the project, the EMP and best practice erosion and sediment control principles and practices.

3.1.3 Environmental Consultant

The Environmental Consultant (SQEP) will provide technical environmental management advice as required. Key tasks include delivering the Site Environmental Induction to core staff and providing as-built confirmation of erosion and sediment controls to Council. The Environmental Consultant shall undertake monthly monitoring of the site and submit Monthly Environmental Reports to QLDC and ORC.

3.1.4 All Staff and Sub-Contractors

All staff and sub-contractors have a responsibility to undertake all activities in accordance with the requirements of this EMP. This includes reporting any activity that has the potential to or has resulted in an Environmental Incident to the Project Manager or Environmental Representative.

3.2 Site Environmental Induction

All staff and subcontractors shall attend an Environmental Induction to ensure they are aware of the project's environmental risks as well as their responsibilities to help manage these risks. Prior to ground-disturbing activities, the Environmental Consultant will deliver the induction to core staff. During the project, the Environmental Representative will induct sub-contractors and new staff. The site induction handout is attached as **Appendix 3** and all persons inducted will be recorded on the Induction Register attached as **Appendix 4.**

3.3 Environmental Inspections

Table 5 outlines the regular environmental inspections to be undertaken.

Table 5: *Environmental inspections*

Environmental Inspection	Timing	Purpose
Weekly Inspection	Every seven days	• Confirm that all environmental controls are present, functional, and adequate. • Identify any activities that may cause an environmental incident or actual or potential environmental effects. • Identify maintenance requirements for implemented management measures. All weekly inspections shall be recorded on the Weekly Site Inspection form attached as **Appendix 5.**
Pre-Event Inspection	Prior to a significant rainfall and or/adverse weather event[2]	• To ensure that erosion and sediment controls are present, functional, and adequate for forecast rain event. • This inspection will inform any preventative work required and may result in the Rapid Response Procedure being implemented (see **Section 4.8**).
Adverse Weather Event Monitoring	During a significant weather event (if safe to do so)	• Erosion and sediment control devices continue to function correctly and inform any necessary emergency responses. • Complete water quality monitoring and sampling. • Record any non-conformances and identify any areas of improvement.

[2] A significant rain event is defined as any forecast/actual rain event of 20 mm within a 12-hour period (as per QLDC EMP Guidelines) or a rain event that can generate overland flow, noting that this varies seasonally. A significant or adverse weather events (damaging wind, snow, freezing conditions and/or rain) as referred to in the QLDC and ORC EMP and ORC Earthworks Guidelines.

Environmental Inspection	Timing	Purpose
Post-Event Inspection	Post a significant rainfall and or/adverse weather event	• Erosion and sediment control devices are repaired and/or maintained. • Any observations and corrective actions should be recorded in **Appendix 8**.

3.4 Monthly Environmental Inspection and Reporting by SQEP

The Environmental Consultant (SQEP) can (subject to consent conditions), monitor the site monthly to ensure that the EMP is correctly implemented, identify any unforeseen issues arising and advise on alternative environmental solutions.

The Environmental Consultant (SQEP) will also submit a Monthly Environmental Report to QLDC and ORC within five working days of the end of each month. The report will include the following information:

- Updates to the EMP and the Erosion and Sediment Control Plan (ESCP) during the month (if required).
- Number of weekly inspections completed.
- Summary of any water quality monitoring and/or sampling undertaken.
- Positive environmental outcomes achieved and opportunities.

3.5 Environmental Incident Management

Environmental incidents shall be responded to as soon as the project team becomes aware of them occurring. The response will generally involve oversight by the Environmental Consultant and will involve:

- Immediate cessation of the activity that caused the incident.
- Investigation into the cause of the incident.
- Initial response to bring the incident under control.
- Implement any remediation works.

The Project Manager must notify QLDC and ORC of the details of any Environmental Incident within 12 hours of becoming aware of the incident. Notification will be through a phone call to Council monitoring staff (see Emergency Contacts in **Table 1**). The Project Team shall provide an Environmental Incident Report within ten working days of the incident occurring. The Incident Report form is attached as **Appendix 6.**

3.6 Complaints Procedure

Any complaint received will be recorded and an investigation will be carried out. The complainant will be provided with a response acknowledging receipt of the complaint and outlining corrective actions to be implemented. After the investigation, any necessary corrective actions will be carried out and a follow-up of the original complaint is to be conducted to ensure the actions implemented have been effective. All complaints will be recorded on the Complaints Register attached as **Appendix 7.**

3.7 EMP Non-Conformance and Corrective Actions

EMP non-conformances found during site inspections, monitoring or as a result of environmental incidents or complaints shall be recorded in the EMP Non-Conformance Register. The non-conformance register attached as **Appendix 8** will detail when corrective actions are due, how they are to be carried out and the close out date. The non-conformance register ensures that issues do not escalate or are missed, as well as, providing a clear record of evidence that can be used to defend any potential complaint or formal enforcement action.

3.8 Records and Registers

The records listed below will be collated onsite. If a request is made by a QLDC and ORC official, the records shall be made available to the official within 24 hours of the request being made.

- Environmental Induction Register – **Appendix 4.**
- Weekly Environmental Inspection Form – **Appendix 5.**
- Environmental Incident Reports – **Appendix 6.**
- Complaints Register – **Appendix 7.**
- EMP Non-Conformance Register – **Appendix 8.**
- Water Quality Monitoring Results – **Appendix 9.**
- Rain event inspection observations – Job diary.

3.9 EMP Updates

The EMP will be regularly reviewed throughout the project to ensure the document remains fit for purpose and to drive continual improvement. This may be initiated by:

- Significant changes to the construction methodology.
- Improvements identified as a result of an Environmental Incident or Corrective Action.
- Where directed by QLDC and/or ORC's Monitoring and Enforcement team.

All EMP updates will be managed through the document control table on page one and shall be submitted to QLDC and ORC for acceptance.

4.0 EROSION AND SEDIMENT CONTROL

4.1 Guidelines and Standards

Erosion and sediment controls shall be designed and installed in accordance with current best practice guidelines, **to the extent practicable**, recognising the site's unique characteristics. The choice of which erosion and sediment control measures are used will depend on site-specific constraints and the project construction staging.

Generally, this is:

- Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region 2016 (Auckland Council Guideline Document GD2016/005).
- QLDC Guidelines for Environmental Management Plans, June 2019 (The Guidelines).
- ORC Residential Earthworks in Otago – A guide for developers, landowners, contractors and service providers March 2023 (Guide — Residential Earthworks in Otago)

GD05 ARC Guidelines

ORC Earthworks Guidelines

QLDC Environmental Guidelines

4.2 Erosion and Sediment Control Principles

Erosion and sediment control ('ESC') devices shall be installed, maintained and decommissioned in accordance with the following principles:

- Erosion and sediment controls are integrated with construction planning.
- Construction is staged to minimise the duration and area of exposed soil open at any one time.
- A 'treatment train' approach so that the sediment retention devices operate as efficiently and effectively as possible.
- Separation of 'clean' and 'dirty' water with clean water to be diverted around the site to minimise the volume of dirty water needing management onsite.
- The extent and duration of soil exposure is minimised.
- Controls are always maintained in proper working order.
- Progressively stabilise and revegetate disturbed or completed areas.
- The site is monitored, and erosion and sediment control practices are adjusted to maintain the required performance standard.
- Soil erosion is minimised as far as reasonable and practical.
- Avoidance of sediment discharge off-site and protection of receiving environments.

4.3 Erosion and Sediment Control Devices

These guidelines for the devices employed on this project shall be read in conjunction with the ESCP attached as **Appendix 1** of this document.

4.4 Erosion Control Practices

4.4.1 Site Definition

At the commencement of the project, the following components onsite will be clearly defined as detailed in **Table 6**.

Table 6: *Site definition specifications*

Site component	Method of Demarcation
Site boundaries	Temporary fencing or hoardings
Designated site access	Installation of stabilised access/signs

4.4.2 Non-Structural Controls

Non-structural approaches to erosion control are closely linked to the fundamental principles of ESC detailed in **Section 4.2**. The key principles (best practice management) of key relevance to erosion control are outlined below. These principles and concepts provide guidance for ESC throughout the planning, construction and maintenance phases of a project.

Staging

Only by exposing those areas that are required for active earthworks, the duration of exposure and risk of erosion and sedimentation can be minimised. 'Earthworks staging', where the site has earthworks undertaken in smaller units over time, limits erosion. This includes isolating work areas and completing them in manageable sections.

Timing of works

It is recommended that works are undertaken outside of significant or adverse weather events[3] e.g. during sustained periods of rainfall, or snow and ice, or dry and windy periods that are conducive to exacerbated rates of erosion and sedimentation.

Progressive rehabilitation

It is important that when completed, exposed or disturbed areas are progressively stabilised. Stabilisation methods will vary around the site due to differing gradients and growing mediums. Stabilisation and rehabilitation measures are shown in ESCP-002-003, and are outlined below:

[3] Significant or adverse weather events as referred to in the QLDC and ORC Earthworks and EMP Guidelines.

4.4.3 Stabilisation Measures

Hydroseeding / Hydromulching

- Hydroseed can be applied to flat lots surfaces once topsoiled to promote revegetation.
- Hydromulch is to be applied to all completed topsoiled batters, where practicable. Hydromulch provides a more robust medium that provides instant stabilisation.
- It is recommended that a diverse seed mix that provides both short and long-term stabilising properties is utilised.

Temporary Stabilisation – Soil Binders

- Erosion control, soil binders or polymers may be utilised as a short-term ground protection agent (generally less than 6 months) on exposed surfaces and/or stockpiles, prior to final shaping and treatment. Polymers help bind soil particles and produce a 'laminated' surface area, reducing susceptibility to erosion. A proven, environmentally safe product should be utilised.
- Use of soil binders is not considered appropriate where the established soil crust is likely to be damaged, or within areas of concentrated flow or periodic inundation is likely to occur. It is also emphasised that use of soil binders does not constitute long term stabilisation of the site, but rather as a temporary mitigation measure against the potential effects of raindrop and/or windborne erosion.

Aggregate

- Application of aggregate on the road corridors and/or building platforms reduces the erosive potential of the surface and the potential for windborne dust generation.
- Particularly applicable to the haul road surfaces where vehicle movements will be frequent.

4.4.4 Stabilised Entranceway

The stabilised accesses will be located off the sealed Mountain Road as indicated on ESCP-001, **Appendix 1**. The stabilised entranceway will be constructed in accordance with the schematic diagram in ESCP-004, **Appendix 1** (complete guidelines on pages 60-65 of GD05).

4.4.5 "Clean Water" Diversions

Existing roadside stormwater swales run along the adjacent roads (Wānaka-Luggate Highway and Albert Town-Lake Hawea Road) of the southern and eastern site boundaries. In addition, a low raised bund runs along a dirt track adjacent to the sites northwest boundary. These features act as clean water diversions for the site, as shown in ESCP-001, **Appendix 1.**

Due to the flat topography and residential dwellings located adjacent to the site boundary, overland flows are not anticipated to be encountered over the course of construction. However, if observed, clean water diversion bunds should be installed in accordance with the specifications noted in the schematic diagram in ESCP-005, **Appendix 1** (complete guidelines on pages 38-42 of GD05). Full calculations are included in **Appendix 2**.

4.4.6 "Dirty Water" Diversion Channels and Bunds

Dirty water diversion channels (DWDC) will be installed to capture and carry sediment-laden stormwater to the corresponding sediment basins. It is anticipated that the majority of overland flows generated across the exposed works area will fall into the road cut or towards the south-east, likely dissipating through the permeable soils. Even so, DWDCs have been calculated, conservatively based on the largest catchment size, and should be installed as shown on ESCP-005, **Appendix 1.** The DWDCs have been designed to a 5% AEP as required by GD05.

A combined clean and dirty water diversion bund will be installed in any areas where there is not a roadside swale adjacent to the site. This has been shown on ESCP-001, **Appendix 1.** The dirty water diversion channel should be installed as shown on ESCP-005, **Appendix 1.**

DWDCs will be constructed in accordance with the schematic diagram in ESCP-005, **Appendix 1** (complete guidelines on pages 43-46 of GD05). Full calculations are included in **Appendix 2**.

4.4.7 Trafficable Swale

Trafficable swales will be used across the site to allow dirty water overland flows to cross haul roads without the need for culvert installation. Trafficable swales shall be constructed in accordance with the reference image in ESCP-009, **Appendix 1.**

4.4.8 Stockpiles

Stockpiling of materials on site will be required for stripped topsoil stockpiled for respreading across the site, suitable cut materials stockpiled for filling other areas of the site and imported fill materials stockpiled for sequenced filling works.

Stockpiles will be located near the laydown area in the north-central portion of the site. It is recognised that the location of stockpiles may change with the progress of the earthworks. Most importantly is how stockpiles are managed. Ensuring they are placed on stable ground away from critical source areas is key. Stockpiles shall be constructed in accordance with the schematic diagram in ESCP-009, **Appendix 1.**

4.5 Sediment Control Practices

4.5.1 Sediment Basins

Sediment basins will capture and retain sediment-laden water from the contributing catchments, allowing it to soak away. While this solution deviates from GD05, sediment basins are appropriate on this site due to the flat, free-draining alluvial outwash gravels and sands present, as outlined in the geotechnical report prepared by Geosolve, dated March 2018. Sediment basins are commonly and effectively implemented across earthworks sites in Central Otago where alluvial outwash soil types are present. These soil types are porous in nature and, on flat sites, generate very limited overland flow during rainfall events, making sediment basins an effective sediment control measure.

The approximate soakage rate in the sediment basins is inferred from the test pit information based upon the tested soakage rates outlined in the geotechnical report by Geosolve, dated March 2018. The soil at the basin floor consists

of sandy GRAVELs. The soakage rates at the nearest test pits (SP3 and SP4) were found to be free draining. Given this, 1,000 mm/hr has been selected as a conservative input to represent the free draining soils present on site. This is consistent with infiltration rates recorded during nearby Three Parks development earthworks, where ground conditions are considered to be laterally continuous. The sediment basins have been designed to accumulate the surface water generated from the contributing catchment, up to a 1 in 20 annual recurrence interval (ARI), which has a 5% annual exceedance probability (AEP).

Sediment Basin 1 (SB1) is to be formed in the south-central portion of the site and will service Catchment 1 (1.95 ha) as shown on ESCP-001, **Appendix 1**.

Sediment Basin 2 (SB2) is to be formed near the north-east boundary of the site and will service Catchment 2 (2.7 ha) as shown on ESCP-001, **Appendix 1**.

Sediment Basin 3 (SB3) is to be formed at the northern most point of the site and will service Catchment 3 (1.32 ha) as shown on ESCP-001, **Appendix 1**. To provide operational contingency, a submersible pump will be installed within SB3. The pump will be capable of drawing water from the sediment basin's surface and discharging it to the roadside swale on the west side of the Albert Town – Lake Hawea Road. This will ensure that flows will not bisect the QLDC wastewater pump station located to the immediate east of SB3. It should be noted that no water may be released unless it meets the water quality discharge criteria specified in **Section 5.5**.

Sediment Basin 4 (SB4) can be formed as a contingency measure during civil infrastructure instatement shown on ESCP-002, **Appendix 1**. It is to be formed at within the northern most corner of Catchment 1 and will service the northern road cut area if flows are not able to gain fall to **SB1**. The sub-catchment it will service is approximately 1.15 ha. **SB4** will be made to the same dimensions as **SB1**.

In the event that water levels approach capacity during or following a significant storm event, they will overtop and discharge via a lined emergency spillway. The sediment basins will need to be cleared out sporadically to ensure that attenuated surface water can continue to permeate through the basin floor. This may require the scrapping of the floor to free fine silt clogged in the interstitial space of the soil beneath the basin floor. The sediment basins should be formed as per the schematics on ESCP-006 and ESCP-002, **Appendix 1**. All calculations are provided in **Appendix 2.**

4.5.2 Standard Silt Fence

A standard silt fence will be used to capture potential sheet flows from smaller catchment areas that cannot be effectively serviced otherwise. The silt fences will be installed in accordance with the schematic diagram in ESCP-008, **Appendix 1** (complete guidelines on pages 112-119 of GD05).

4.5.3 Silt Socks

Silt socks will be utilised to intercept runoff. These devices are essentially mesh or fabric tubes filled with sand. Silt socks will be utilised to intercept any runoff from the site entrances due the small catchment size and low gradients. Silt socks will be installed in accordance with the reference images in ESCP-009, **Appendix 1** (complete guidelines on pages 126-130 of GD05).

4.5.4 Stormwater Inlet Protection

Stormwater inlet protection installed to provide the last line of defence for any material that leaves the boundary of the site. The method used will be a slip of permeable geofabric material placed under the inlet grate and locked in place. Stormwater inlet protection will be installed in accordance with the reference image in ESCP-009, **Appendix 1** (complete guidelines on pages 131-133 of GD05).

4.6 As-Built Verification

The Environmental Consultant will provide the Council with as-built confirmation to verify that the erosion and sediment controls have been installed in accordance with the approved ESCP.

4.7 Maintenance of Erosion and Sediment Control Devices

Ongoing maintenance of the site shall be undertaken as follows:

Regular and Weather-Responsive Inspections:

- Daily visual checks during active earthworks.
- Prior to and Post-Rainfall Inspections: Mandatory within 24 hours before or after rainfall events.
- Weekly formal inspections by the Environmental Representative.

Prompt Corrective Action:

- Address any identified damage, blockage, or failure immediately and always before the next forecasted rainfall.
- Sediment removal and maintenance must prevent any reduction in treatment capacity.

Structural Integrity:

- Check for scouring, undercutting, collapsed batters, or overtopping.
- Ensure all outlet structures, spillways, and decant systems remain stable and functioning as per design specifications.

Access and Health & Safety:

- Maintain safe access routes for inspection and maintenance crews.
- Ensure no instability or unsafe conditions develop around ESC devices.

Table 7: *Typical Maintenance Requirements*

ESC Device	Maintenance Requirements
Sediment Basins	Remove sediment at 20–30% capacity and emergency overflow pathways.
Silt Fences / Super Silt Fences	Clear trapped sediment before it reaches 1/3 height, repair rips or leaning posts, ensure toe-in is maintained.

ESC Device	Maintenance Requirements
Diversion Channels	Remove sediment buildup, repair erosion or bank failures, keep linings (if any) secure.
Stabilised Construction Entrances	Maintain rock surfacing depth, clean any tracked sediment off public roads, maintain track matt regularly.

4.8 Rapid Response Procedure for Significant or Adverse Weather Events

The Environmental Representative (ER) will maintain active and ongoing monitoring of weather forecasts from reliable sources (e.g., MetService, NIWA) throughout the duration of earthworks. The ER will ensure that sufficient preparation time is allowed for site crews to inspect, maintain, and reinforce erosion and sediment control (ESC) measures prior to any significant or adverse weather event.

Weather Forecast Monitoring:

- The ER will check and document daily weather forecasts, including short-term severe weather warnings.

Pre-Rainfall ESC Inspections:

- Conduct thorough inspections of all ESC devices (e.g., sediment basins, silt fences, diversion channels) at least 24 hours prior to the forecast event to confirm functionality and available capacity.

Stabilisation of Exposed Areas:

- Apply temporary stabilisation measures (e.g., straw mulch, polymers/soil binders, hydroseeding, geotextiles) to any exposed, inactive, or at-risk areas.

Suspension of Earthworks:

- Temporarily cease earthworks activities on vulnerable areas prior to and during the forecast event to minimise active soil exposure.

ESC Maintenance:

- Undertake any necessary sediment removal (e.g., from sediment basins or silt fences) and repair any structural damage or undercutting identified.

Active Monitoring During Rainfall (Where Safe):

- During prolonged rainfall events, and where safe to do so, the ER or delegated site personnel will monitor key ESC measures for overtopping, bypassing, or failure.

Emergency Repairs:

- Be prepared to undertake immediate reactive maintenance if any ESC device shows signs of failure during the event.

Snow and Ice

- Remain vigilant of the forecast and inspect ESC devices prior to forecast snow events, during thaws.
- Where possible, avoid starting new earthworks just before snow or icy conditions.
- Direct meltwater away from exposed soil and toward the sediment basins.
- As soon as conditions allow, repair any damaged ESC devices and reapply mulch or geotextile fabric where needed.

Record Keeping and Reporting

All pre- and post-weather event inspections, maintenance actions, and site observations shall be recorded in the site's ESC inspection and maintenance log. Where required by consent conditions, notifications and significant event reporting (e.g., turbidity exceedances or ESC failures) will be provided to the relevant Regional Council Compliance Monitoring Officer (e.g., ORC, QLDC) in accordance with consent timeframes.

Spare erosion and sediment control products should be stored onsite at all times including but not limited to:

- Silt fencing (remainder of roll)
- Waratahs (x10)
- Spare high tensile wire
- Silt fence clips (x50)
- Pump and generator.
- Rock rip rap for stabilised access
- Geofabric x 2 rolls

4.9 Decommissioning and Removal

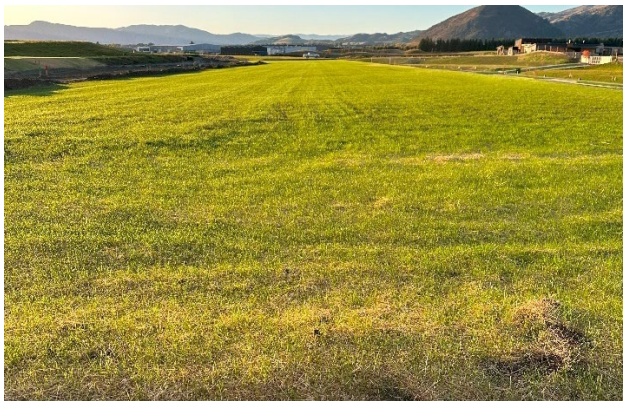
Erosion and sediment control devices will remain in place until 'stabilisation' of the site has been achieved. This is generally defined as 80% vegetative cover as depicted in **Figure 2**.

It is noted that the removal of controls may result in minor soil exposure. Any soils exposed during decommissioning will be stabilised with either grass, mulch or other appropriate erosion control.

0%

40%

80%



100%

Figure 2: *Visual cover estimation*

4.10 Inspections and Monitoring

Details of inspections and monitoring are stated in **Section 3.3**.

4.11 Contingency Measures

The following contingency measures in **Table 7** shall be deployed as required.

Table 7: *Erosion and sediment control contingency measures*

Issue	Contingency Measure
Sediment-laden stormwater flowing across the site boundary	• Cease all earthworks immediately in the contributing catchment. • Deploy sandbags, silt socks, or bunding to redirect and contain overland flow. • Install emergency silt fence or geofabric barriers where practical. • Divert clean water away from disturbed areas to reduce further mobilisation. • Employ a hydrovac truck to remove excess dirty water from the site to an approved disposal site. • Notify the Environmental Consultant (SQEP) and initiate a site-specific incident response plan. • Conduct incident documentation (location, cause, volume, response time). Submit to regulatory authority.

Issue	Contingency Measure
Controls do not appear to be working as intended	• Undertake immediate inspection of failed controls (e.g., collapsed silt fence, overtopped basin). • Reinstate or upgrade the control using materials on-site (e.g., double silt fence, reinforce batter). • Assess whether additional or alternative measures are required (e.g., temporary stabilisation). • Environmental Consultant (SQEP) to update the ESCP and record actions taken. • Notify QLDC and ORC.

The site is inappropriately exposed prior to imminent rain event	• Suspend further soil disturbance activities immediately.
	• Prioritise stabilisation of exposed areas using:
	  ○ Hydroseed/hydromulch if >48 hours before rain (subject to ground conditions)
	  ○ Polymer if <48 hours (subject to ground conditions)
	  ○ Geofabric or jute matting for slopes and channels
	• Inspect and reinforce existing ESC devices before rainfall.
	• Activate **Section 4.8** Rapid Response Procedure.

Sediment retention devices are near capacity and more rain is forecast	• Engage hydrovac truck if overtopping risk is imminent and discharge parameters are not met. • Document actions and notify the Environmental Consultant (SQEP) and Council.
Abatement notice issued by Council	• Notify the Project Manager and Environmental Consultant (SQEP) immediately. • Review abatement notice requirements and timelines. • Prepare and implement a corrective action plan to meet the requirements of the abatement notice. • Provide regular updates and photographic evidence to the Council until resolution. • Update the EMP and ESCP to reflect any system changes post-abatement.

4.12 Erosion and Sediment Control Incident

An erosion or sediment control incident is considered to have occurred where performance criteria outlined in **Section 4.1** is not met. The incident procedures outlined in **Section 3.5** shall commence.

5.0 WATER QUALITY MANAGEMENT

5.1 Waterbodies

Surface water bodies (rivers, streams, lakes and wetlands) provide important habitats for many species of plants, fish, birds and animals, some of which are endemic and/or threatened. To protect these values, water quality must be safeguarded, and the natural flow of the watercourse maintained to the greatest possible extent. Where flow must be reduced or diverted, mitigation is required to ensure the values of the watercourse are not degraded.

5.2 Sensitive Receptors

No surface waterbodies are located within the site boundaries; however, there are several present in the surrounding environment (refer to **Figure 3**). These are discussed in more detail below.

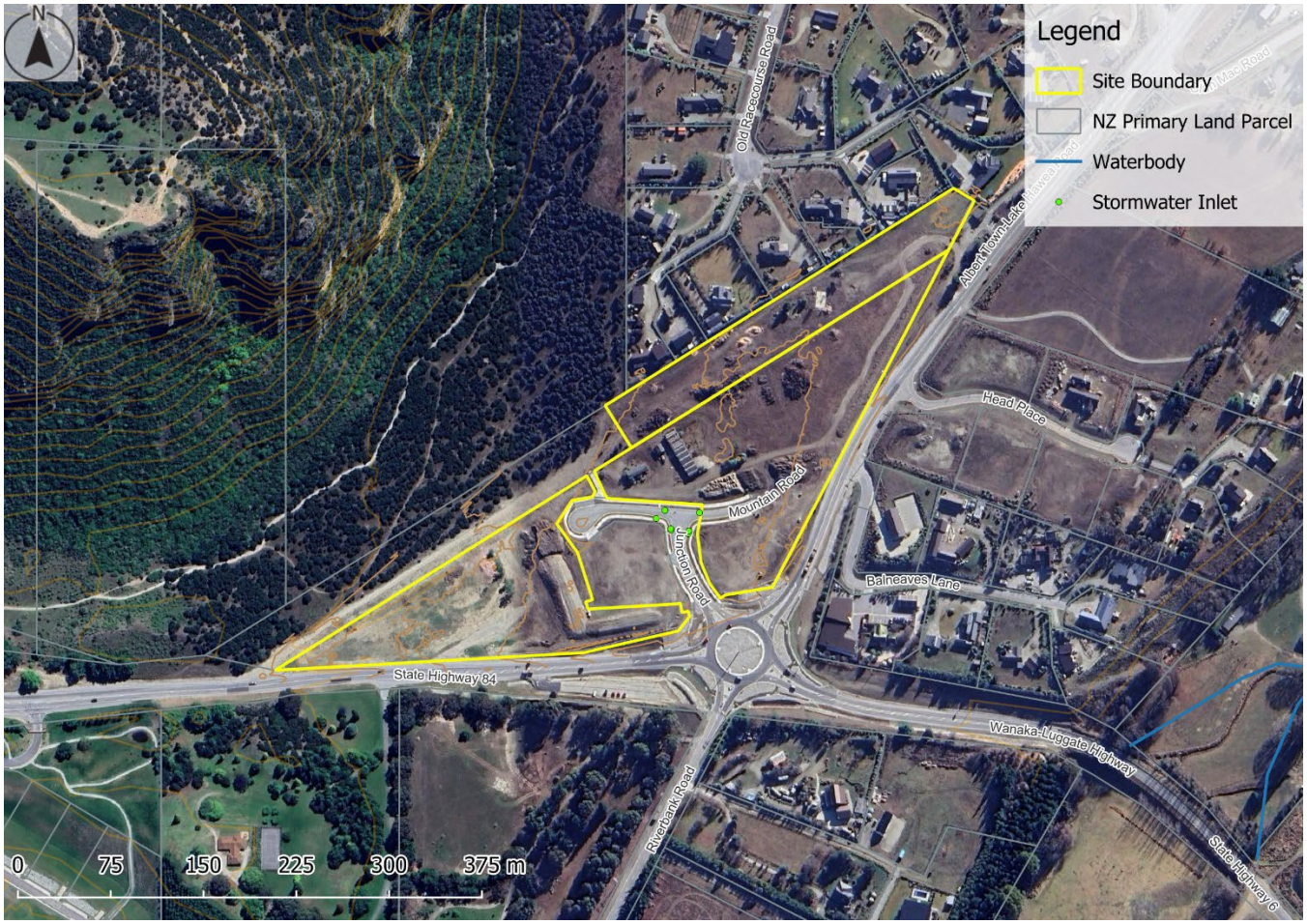


Figure 3: *Waterbodies within and in proximity to the site (Source: QLDC & LINZ)*

Overland Flow Paths

Numerous overland flow paths are present on Mount Iron Reserve to the north of the site; however, these are intercepted by the Mount Iron Walking Tracks and associated reserve area prior to intersecting the site.

QLDC Stormwater Infrastructure

Existing QLDC stormwater infrastructure is present along Junction Road and Mountain Road in the form of roadside mudtanks, which discharge to SmartSoak modules on Junction Road. Additionally, roadside swales are located adjacent to the site along State Highway 6 to the south and Albert Town–Lake Hāwea Road to the east.

Waterways

The nearest surface waterbody is an unnamed tributary of the Cardrona River, located approximately 430 m southeast of the site. The Cardrona River itself is situated approximately 630 m southeast of the site at its closest point. Neither waterway lies within the site boundary or immediate proximity.

Groundwater

Regional groundwater is anticipated to occur at depths below any proposed foundation levels and is not expected to be encountered during construction, as stated in the geotechnical report prepared by Geosolve, March 2018.

5.3 Legislative Considerations

5.3.1 NPS-FM

The Otago Regional Council has proposed a progressive implementation plan for meeting the NPS-FM 2017 and includes objectives and targets for FMUs in accordance with the requirements of the NPS-FM. However, it is noted that this process has been required by the current government to be ceased.

Given the industry best practice erosion and sediment control measures proposed, potential adverse effects on surface water bodies are considered to be appropriately managed and mitigated. Overall, the proposal is consistent with the objectives and policies of the partially operative NPS-FM.

5.4 Assessment of Effects

5.4.1 Effects on Waterbodies

There are no receiving waterbodies within or in direct proximity to the site. The soils are highly permeable, as noted in the geotechnical investigation, meaning that the generation of surface water, erosion and sediment generation is limited. Therefore, the actual and / or potential effects on waterbodies are expected to be negligible. Irrespective, any adverse environmental effects will be mitigated through the adoption and maintenance of best-practice erosion and sediment controls and environmental management measures that avoid erosion occurring and the generation of sediment and discharge of contaminates associated with earthworks and general construction.

Erosion and sediment control measures including clean water and dirty water diversion channels and bunds, sediment basins, silt fences, and silt socks - will be installed across the site to minimise the discharge of suspended sediment from the site. The sediment basins are designed to allow infiltration to ground, with emergency spillways incorporated to manage flows in the event that basin capacity is exceeded.

Although discharges may occur during or following a significant rainfall event, any overflow would migrate to flat land within the site boundaries. During such events, flows within the wider receiving environment would also be elevated. Any resultant increases in turbidity or pH concentrations due to the discharge are anticipated to be both minor in scale and temporary in nature.

In addition to the control measures outlined above, the effectiveness of erosion and sediment mitigation relies on the diligent implementation, monitoring and maintenance of the Erosion and Sediment Control Plan (ESCP) and the Management Measures prescribed in **Section 5.6**, and associated procedures such as staff inductions and adaptive management of control devices to ensure they perform as intended throughout the duration of works.

The discharge limits proposed in the Performance Criteria in **Section 5.5** are consistent with parameters prescribed with GD05 and the Local Authority District and Regional Plans.

5.4.2 Cumulative Effects on Waterbodies

Under the Resource Management Act (RMA), "cumulative effect" is defined as an effect that arises over time or in combination with other effects.

The proposed works are temporary in nature and are not expected to result in significant or lasting changes to the quality or quantity of water in the receiving environment. At the time of writing, there are no known concurrent earthworks activities within the surrounding catchment that would contribute to cumulative sediment or contaminant loading.

As detailed above, the site's erosion and sediment controls will be maintained and adapted throughout the project duration. Any discharges are expected to be minor and temporary in nature. Therefore, cumulative adverse effects on waterbodies, as a result of the proposed works, are not anticipated.

5.5 Performance Criteria

The assumed sediment retention efficiencies of control devices are averages. Sediment concentration of the discharge from a sediment basin varies throughout a rainfall/weather event. Unless a Turbidity or TSS limit is set very high, it is likely that the Turbidity/TSS will exceed an arbitrary threshold at some stage of a storm but will on average be within the envelope of acceptable effects anticipated for the Project. Turbidity and clarity are well understood proxies for water quality within sediment control devices and can be easily measured in real time along with the other site inspection and management activities that will occur during or immediately after a storm event.

The water quality parameters recommended have been determined following assessment of the activity and receiving environment to ensure adverse effects are suitably avoided. In this instance, there are no receiving waterbodies. Any discharge from the sites' works areas, or erosion and sediment control devices will meet the criteria in **Table 8**.

Table 8: *Water quality discharge criteria*

Parameter	Discharge Criteria
Turbidity	≤ 200 NTU
Visual Clarity (mm)[4]	≥ 100 mm (As per GD05)

Parameter	Discharge Criteria
If Turbidity or Visual Clarity are exceeded, test TSS…	
Total Suspended Sediment (TSS)	≤ 50 mg/L
pH[4]	5.5 – 8.5
Hydrocarbons or tannins	No visible trace
Waste	No waste or litter is visible

5.6 Management Measures

The following measures will be deployed to ensure the protection of water quality:

- Erosion and sediment controls will be implemented and maintained in accordance with the Erosion and Sediment Control Measures in **Section 4.0**.
- Refuelling, servicing and storage of hydrocarbons will be in accordance with the relevant procedures in the Chemicals and Fuels Management in **Section 10.0**.
- All concrete washing is to be undertaken in the designated concrete wash-out pit as per the design specifications in ESCP-010, **Appendix 1**.
- All plant and equipment onsite will be inspected regularly to ensure they are of an acceptable standard.
- Stockpiling of any organic, erodible or hazardous material onsite is not to be placed within close proximity of a watercourse/major drainage line, unless appropriate controls are in place

5.7 Water Quality Monitoring Plan

Water quality will be monitored in accordance with **Table 9** and outlined in further detail in **Appendix 9**.

Table 9: *Water quality monitoring measures*

Sampling Scope	
Objective	To assess whether controlled and uncontrolled discharge, meets the Discharge Criteria referred to in **Section 5.5.**
Responsibility	On site water quality sampling is to be completed by the nominated Environmental Representative.
Spatial boundaries	Discharges from within the sites' work areas and/or erosion and sediment control devices.

[4] pH to be tested only when chemical treatment is undertaken.

Frequency	When there is a discharge of water across the site boundary or from a sediment retention pond or decanting earth bund, and where a Significant Rain Event occurs through the night, monitoring must be undertaken the following morning by 8am. A significant rain event is defined as any forecast/actual rain event of 20 mm within a 12-hour period or a rain event that can generate overland flow, noting that this varies seasonally. Where a Significant Rain Event occurs through the night, monitoring shall be undertaken the following morning.
Sampling Design	
Water Quality Criteria	As outlined in the Discharge Criteria referred to in **Section 5.5.**
Sampling Locations	At boundaries of the site where any water is flowing, specifically the following point discharges: • **Sediment Basin 1** – Northing 5043662.46, Easting1296544.37 • **Sediment Basin 2** – Northing 5043880.60, Easting 1296725.62 • **Sediment Basin 3** – Northing 5044018.95, Easting 1296786.07 • **Sediment Basin 4** (contingency) – Northing 5043775.96, Easting1296494.85
Sampling Method	• TSS – Registered laboratory • Turbidity (NTU) – Nephelometer • Visual clarity – Clarity tube/Secchi disk • pH – pH meter, only if utilising chemical treatment • Gross pollutants – visual observations • Tannins – visual observations (any unusual darkening of waters?) • Hydrocarbons – visual observations (is there any oily film[5] on surface or smell?)
Quality Control	Any water quality meters will be calibrated according to manufacturer instructions.
Recording	
Recording Results	All results will be entered into a spreadsheet and kept onsite (form attached as **Appendix 9**).
Actions	
Non-conformances	Any exceedances observed will be reported to the Project Manager/ Environmental Consultant who will investigate and ensure appropriate corrective actions are implemented immediately.

5.8 Contingency Measures

The following contingency measures in **Table 10** shall be adopted if required.

[5] Some bacteria produce a naturally occurring film on the water surface. Bacteria films breaks apart in angular shapes when disturbed whereas hydrocarbon film separates as globules.

Table 10: *Water quality contingency measures*

Issue	Contingency Measure
Exceedance of water quality criteria	• Contact the Project Manager and Environmental Consultant (SQEP) immediately. • Works will cease or be modified to remove further risk of contamination. • QLDC and ORC will be verbally notified. • The Environmental Incident procedure will commence. • Remedial measures will be implemented and the Environmental Incident will be closed out by the Environmental Representative with a copy of an Environmental Incident report to the Project Manager, QLDC and ORC.

5.9 Water Quality Incidents

A water quality incident is considered to have occurred where the water quality performance criteria outlined in **Section 5.5** is breached. The incident procedures outlined at **Section 3.5** shall commence.

6.0 DUST MANAGEMENT

6.1 Dust

Dust from construction activities, vehicle movements and stockpiles can contribute to sediment runoff and create a nuisance to the public, neighbouring properties, adjoining roads and service infrastructure. The key risks associated with dust occur during the bulk earthworks phase of the project.

There are a range of activities that may produce dust onsite including:

- General disturbance of soil (particularly during drier months).
- Inappropriate staging that does not seek to minimise the extent of exposed soil.
- Vehicle movements along haul roads.
- Sediment-tracking onto surrounding roads.
- Stockpiling of topsoil or subsoil.
- Slow or ineffective revegetation procedures.

6.2 Sensitive Receptors

Key sensitive receptors include workers on site, neighbouring residential dwellings to the northeast, drivers of the Wānaka-Luggate Road and State Highway 6 to the south, and recreational users of Mount Iron Reserve to the north. The prevailing wind conducive to dust generation in warmer months is generally from the west and southest[1]. Katabatic winds descending from nearby slopes may also occur later in the day, particularly in warmer months when soil surfaces are prone to rapid drying.

The potential for dust nuisance will be actively managed through the implementation of the management measures outlined in **Section 6.3**, including the use of water carts and/or sprinklers, and surface stabilisation where required. In addition, due to the lack of developed topsoil within the soil stratigraphy and the dry climate, the risk of the mobilisation of soil particles is unlikely, reducing the likelihood of dust impacts. These measures are expected to ensure dust generation is minimised as much as reasonably practicable.

6.3 Performance Criteria

The project must ensure that reasonable and practical measures are taken to avoid dust moving across the boundaries of the site at all times.

6.4 Management Measures

The following measures will be deployed to ensure dust generation onsite is minimised:

- Stage works where possible to minimise soil exposure extents and timeframes.
- Revegetate disturbed areas progressively throughout construction.

- Dust suppression of exposed areas and stockpiles by water trucks or other methods (e.g., k-lines) approved by the Environmental Representative.[6]
- If dust activities cannot be controlled during high winds, works will cease until favourable conditions return.
- Only designated access points and haul routes are to be used.
- Site access to be constructed in accordance with GD05 (detail at **Section 4.4.4**).
- All site access and surrounding roads to be swept clean regularly.
- A speed limit will be posted as 20 km/hr, unless deemed otherwise by the Project Manager.
- To avoid spillage risks, trucks will not be overloaded.
- All trucks must have tail gates up and swept or cleaned prior to exiting to external roads.
- Stockpile heights are to be minimised where possible (< three metres) unless they are covered (e.g. an erosion blanket, chemical sealant, temporary cover crop or mulched).
- Long-standing stockpiles (greater than six weeks) shall be appropriately stabilised.
- Within two weeks of completion, all earth worked areas will be sown out with grass, landscaped or otherwise stabilised by an appropriate erosion control.

6.5 Monitoring

Site staff will maintain continual vigilance for any increases in wind to ensure measures are deployed prior to dust crossing site boundaries. Weekly Environmental Inspections and the Monthly SQEP Environmental Inspections will also ensure that the management measures described above are sufficient and performing effectively.

6.6 Contingency Measures

The contingency measures in **Table 11** shall be adopted if required.

Table 11: *Dust contingency measures*

Issue	Contingency Measure
Excessive dust creation from soil disturbance	• Increase frequency of water truck spraying or increase irrigation. • Spray down excavation areas and activities where excavator bucket is operating. • Cease excavation during high winds, particularly if wind direction is likely to impact sensitive receivers.
Excessive dust creation from hauling operations	• Reduce truck speeds. • Cover or spray down loads causing dust impacts. • Apply skim of aggregate over the haul road surface. • Install shakedown devices at entry and exit points.

[6] Ensure a consented water take permit is approved by the local authority. If taking water from lakes and or rivers, ensure that the permitted volume of water is taken.

Issue	Contingency Measure
Excessive dust creation from stockpiles	• Spray stockpiles with water or apply a temporary polymer. • Hydro-mulch, seed or stabilise stockpiles, cover stockpiles with geofabric. • Locate stockpiles further away from sensitive receptors.
Abatement notice issued by Council	Contact the Environmental Consultant (SQEP) immediately to advise on methods to meeting abatement notice requirements within the time stated by the abatement notice.

6.7 Dust Incident

A dust incident is considered to have occurred where:

- Dust is observed crossing the boundary into sensitive receptors or,
- A justified complaint is received regarding dust emissions across the boundary of the site.

The incident procedures outlined at **Section 3.5** shall commence.

7.0 NOISE AND VIBRATION MANAGEMENT

7.1 Noise and Vibration

Noise and vibration generated during construction has the potential to impact sensitive receivers by reducing comfort, impeding communication, causing cosmetic damage to structures and damaging household possessions.

The following assessment and management measures are intended for standard construction equipment that is not expected to induce noise or vibration beyond the maximum limits in the QLDC District Plan. Where upper noise and vibration levels of district plans will be breached, an Acoustic Specialist may need to be engaged to assist with the management of these nuisance effects.

Potential noise and/or vibration effects may be generated by the following:

- Excavation and earth moving plant.
- Light vehicles near sensitive receptors.
- Ancillary plant and equipment.
- Compaction equipment.
- Reversing alarms.

7.2 Sensitive Receptors

Key sensitive receptors include the workers on site, neighbouring residential dwellings to the northeast, drivers on the Wānaka-Luggate Road and State Highway 6 to the south, and the recreational users of Mount Iron Reserve to the north.

Based on geotechnical investigations, rock is not anticipated to be encountered during excavations. The extent of the bulk earthworks in relatively minor in regards to the shaping required across flat land.

The effects of noise and vibration will be actively managed through the implementation of the management measures outlined in **Section 7.3**, including working within the hours of operation and limiting engine revving and audible alarms where practicable. In addition, as minimal rock is anticipated within the work area, the potential for adverse noise and vibration effects is reduced. These measures are expected to ensure that adverse effects of noise and vibration are minimised as much as reasonably practicable.

7.3 Performance Criteria

1. Construction activities shall meet relevant noise limits specified under Rule 36.5.13 of the Queenstown Lakes Proposed District Plan. This rule requires Construction sound at any point within the site must comply with the limits specified in Tables 2 and 3 of *NZS 6803:1999 Acoustics - Construction Noise*, when measured and assessed in accordance with that standard (see **Table 12** below).
2. Construction activities shall meet relevant vibration limits specified under Rule 36.5.10 of the Queenstown Lakes Proposed District Plan. This rule requires vibration from any activity must not exceed the guideline values given in *DIN 4150-3:1999 Effects of vibration on structures* on any structures or buildings on any other site (see **Table 13** below).
3. Construction activities shall be undertaken in accordance with the permitted hours of operation outlined at **Section 2.2** of this EMP.

Table 12: *Upper limits in dB(A) for construction work noise in residential areas for more than 20 weeks*

Time of Week	Time Period	$L_{Aeq(t)}$	L_{Afmax}
Weekdays	0630 – 0730	55 dB	75 dB
	0730 – 1800	70 dB	85 dB
	1800 – 2000	65 dB	80 dB
Saturdays	0630 – 0730	45 dB	75 dB
	0730 – 1800	70 dB	85 dB

Table 13: *Vibration Thresholds for Structural Damage (PPV mm/s)*

	Short Term				Long-Term
	At Foundation			Uppermost Floor	Uppermost Floor
Types of Structures	0 to 10 HZ	10 to 50 Hz	50 to 100 HZ	All Frequencies	All Frequencies
Commercial/Industrial	20	20 to 40	40 to 50	40	10
Residential	5	5 to 15	15 to 20	15	5
Sensitive/Historic	3	3 to 8	8 to 10	8	2.5

Note: When a range of velocities is given, the limit increases linearly over the frequency range.

7.4 Management Measures

The following measures will be deployed to ensure noise and/or vibration associated with the project are appropriately mitigated:

- Notify surrounding sensitive receptors prior to commencing particularly noisy or vibration inducing activities.
- Where practicable, select lower noise producing equipment or use lower noise generating alternatives.
- Regularly service equipment to ensure plant is running optimally.
- Revving of engines will be limited. All plant and vehicles will be turned off when not in use and if safe to do so.
- The use of audible alarms on mobile equipment will be limited, and two-way communication will be used.
- Undertake activities that may lead to noise or vibration effects, during reasonable and practical hours.

7.5 Monitoring

All earthworks activity will be closely monitored by the operator to ensure that noise and vibration remains within the required limits. If monitoring finds the activity cannot comply with performance criteria, an Acoustic Specialist may need to be engaged to assess the project and provide appropriate mitigation measures and monitoring. Weekly Environmental Inspections and Monthly SQEP Environmental Inspections shall include an assessment of the site to determine the effectiveness of noise and vibration management controls.

7.6 Contingency Measures

The following contingency measures in **Table 14** shall be adopted if required.

Table 14: *Noise and vibration contingency measures*

Issue	Contingency Measure
Noise and/or vibration complaint received	Manage the complaint in accordance with the Environmental Complaints procedure in **Section 3.6.**
Exceedance of performance requirement criteria	The Environmental Consultant (SQEP), in consultation with the Environmental Representative, will investigate and implement actions to reduce noise and/or vibration levels to below criteria levels.
Ongoing noise and/or vibration issues	Where noise or vibration emissions consistently exceed the performance criteria despite the site staff's best efforts, an Acoustic Specialist will be engaged to assist.
Abatement notice issued by Council	Contact the Environmental Consultant (SQEP) immediately to advise on methods to meeting abatement notice requirements within the time stated by the abatement notice.

7.7 Noise and Vibration Incident

A noise or vibration incident is considered to have occurred when a justified complaint is received and on investigation is found to exceed the performance criteria. The environmental incident procedures outlined in **Section 3.5** shall commence.

8.0 CULTURAL HERITAGE MANAGEMENT

8.1 Cultural Heritage

The loss or damage of cultural heritage items could be caused by construction activities. The damage or loss of artefacts can lead to the loss of culturally or historically significant items and information.

Examples of cultural heritage items include:

- Koiwi tangata (human skeletal remains).
- Waahi taoka (resources of importance).
- Waahi tapu (places or features of special significance).
- Māori artefact material.
- A feature or archaeological material predating 1900.
- Unidentified archaeological or heritage site.

8.1 Location of Known Cultural Heritage Significance

A search of QLDC's database indicates there are no known items of cultural or heritage significance on the site.

8.2 Performance Criteria

- The protection of cultural heritage artefacts and places in accordance with the *Heritage New Zealand Pouhere Taonga Act, 2014*.
- Strict adherence to Heritage New Zealand's *Archaeological Discovery Protocol* (attached as **Appendix 10**) in the case of unexpected finds.

8.3 Management Measures

All works on this project will be undertaken in accordance with the obligations of the *Heritage New Zealand Pouhere Taonga Act*, 2014.

8.4 Monitoring

Weekly inspections shall include a visual assessment of the site to ensure that no new significant artefacts have been encountered. However, operators must remain vigilant for such encounters as they occur.

8.5 Accidental Finds

If any unknown artefacts are uncovered, the project will work to Heritage New Zealand's *Archaeological Discovery Protocol* (attached as **Appendix 10**). This will be undertaken with consultation of the Project Archaeologist.

9.0 VEGETATION MANAGEMENT

9.1 Vegetation

The site is predominantly covered in pasture species such as tall fescue and revegetating weeds. A range of individual mature trees are scattered across the site, including natives such as pittosporum tenuifolium and kānuka, and exotics such as pine, poplar and wild cherry.

This is shown in **Figure 4.**

Pasture grasses onsite

Individual mature trees across the site

Figure 4: *Vegetation cover onsite (Photos by Enviroscope)*

9.2 Sensitive Receptors

Some indigenous trees will need to be removed from to enable earthworks. However, due to the relatively small area of vegetation being removed and the lack of rare native species, the potential adverse effects associated with the earthworks are considered to be less than minor. Therefore, there are no other specific protections or management measures on this site.

9.3 Performance Criteria

- Undertake disturbance within the consented earthworks extent.
- Avoid the spread of noxious weeds onsite or to other sites.

9.4 Management Measures

The following measures will be deployed to manage vegetation:

- Treating weeds prior to disturbance of the natural surface.
- Weed free topsoil will be retained for reuse in site rehabilitation.

9.5 Monitoring

Weekly Environmental Inspections and Monthly SQEP Environmental Inspections shall include a visual assessment of the site to determine the effectiveness of vegetation management controls.

9.6 Vegetation Incident

A vegetation incident is considered to have occurred where:

- Protected vegetation is damaged or removed.
- A no-go zone is breached.

The environmental incident procedures outlined at **Section 3.5** shall commence.

10.0 CHEMICALS AND FUELS MANAGEMENT

10.1 Chemicals and Fuels

Hazardous substances can endanger both human health and the environment. Used incorrectly they can cause catastrophic accidents, such as fires and explosions, and serious harm to people who are exposed to them.

10.2 Sensitive Receptors

Key sensitive receptors include the workers on site, neighbouring residential dwellings to the northeast, drivers of the Wānaka-Luggate Highway and State Highway 6 to the south, recreational users of Mount Iron Reserve to the north, and nearby stormwater infrastructure.

The chemicals and fuel management measures in this EMP are expected to minimise adverse effects as far as reasonably practicable.

10.3 Performance Criteria

- Chemicals and fuels are stored and used in a manner that avoids contamination of site and surrounding environment.
- All spills are cleaned up immediately and the contaminated soils/waters disposed of appropriately.

10.4 Management Measures

The following measures will be deployed to ensure chemicals and fuels associated with the project are appropriately managed.

- All hazardous substances to be stored, transported and used according to the safety data sheet requirements.
- Storage of chemicals and fuels shall be located as far as practicably possible from waterways and concentrated flows.
- Refuelling of vehicles and plant onsite will occur in the designated refuelling bay as shown in ESCP-010, **Appendix 1**.
- All concrete washing is to be undertaken in the designated concrete wash-out pit as per the design specifications in ESCP-010, **Appendix 1**.
- One 240 L Oil and Hydrocarbon spill kit and one 240 L General Purpose spill kit will be located in close proximity to the location of liquid hazardous materials storage and refuelling areas.
- The volumes of the hazardous substances listed in **Table 15** will not be exceeded.

Table 15: *Maximum volumes of chemicals and fuels*

Chemicals and Fuels	Maximum Volume	Storage Location
Diesel	5,000 L	Portable fuel trailer/Fuel tank or Jerry cans in lockable container
Unleaded Fuel	100 L	Jerry cans in lockable container

Chemicals and Fuels	Maximum Volume	Storage Location
Oil	10 L	Packaging in lockable container
Lubricant (WD40 or similar)	Six Cans	Packaging in lockable container
Grease	5 L	Packaging in lockable container
Spot marking paint	2 L	Packaging in lockable container

10.5 Monitoring

Weekly Environmental Inspections and Monthly SQEP Environmental Inspections shall include a visual assessment of the site to determine the effectiveness of chemicals and fuels management.

10.6 Contingency Measures

The following contingency measures in **Table 16** shall be adopted if required.

Table 16: *Chemicals and fuels contingency measures*

Issue	Contingency Measure
Spills response	• Stop works in proximity to the spill and assess the safety of all personnel. • Take immediate action to contain the spill to prevent discharge into stormwater drains or natural waterways. • Use spill kits to contain and treat the spill. • Notify Environmental Consultant to advise on next steps. • If necessary, notify the Regional Council spill response unit. • Remove contaminated material to a suitable contained location for remediation/disposal (require any necessary approvals/permits from ORC). • The spill kits shall be replaced by an approved supplier.
Inappropriate storage	• Upgrade facility. • Clean-up of storage area. • Notify and train staff.
Inappropriate handling/transport	• Notify and train staff through toolbox meetings on the appropriate handling and transport methods.
Inadequate spill kit materials	• Order more materials. • Investigate types of chemicals onsite and consult a supplier for advice on appropriate equipment. • Develop or revise spill material monitoring and ordering system.
Inappropriate disposal of chemicals or fuels	• Provide appropriate disposal facilities or service providers. • Notify and train staff.

Issue	Contingency Measure
Inaccurate or insufficient records	• Advise staff and update records. • Monitor through inspections.

10.7 Chemicals and Fuels Incident

A chemicals and fuels incident are considered to have occurred where:

- A spill more than five litres has occurred.
- A situation is discovered where a spill of more than five litres would likely have occurred before it happens where the management measures listed above have not been followed.

The environmental incident procedures outlined at **Section 3.5** shall commence.

11.0 WASTE MANAGEMENT

11.1 Waste

Waste from construction activities can create a nuisance to the public, neighbouring properties, and adversely affect flora and fauna.

11.2 Sensitive Receptors

Key sensitive receptors include the users of the Wānaka-Luggate Highway and State Highway 6, recreation users of the Mount Iron Reserve, residential dwellings to the northeast and the workers on site.

The waste management measures in this EMP are expected to minimise adverse effects as far as reasonably practicable.

11.3 Performance Criteria

- Non-recyclable waste generation is minimised, and the site and surrounds are kept free from waste at all times.
- Wastes shall be stored safely and in an organised manner until recycling, reuse, or disposal.

11.4 Management Measures

The following measures will be deployed to ensure waste management associated with the project is appropriately mitigated:

- The Waste Management Hierarchy philosophy will be implemented, as illustrated in **Figure 5**.

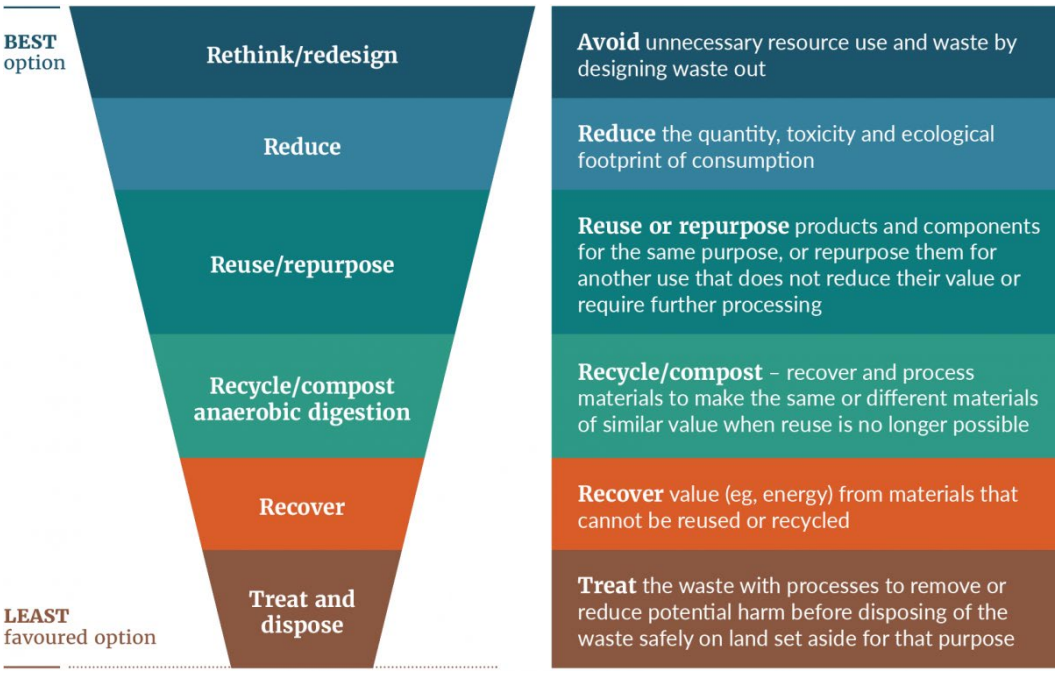


Figure 5: The Waste Hierarchy (Source: Ministry for the Environment).

- Measures will be implemented to ensure the site is maintained in a safe, clean and tidy state.
- Where possible, waste shall be segregated into labelled bins with lids: General, Hazardous and Recyclables.
- Wastes onsite shall be suitably contained and prevented from migrating offsite.
- The waste is to be contained so it doesn't contaminate soil, surface or ground water, create unpleasant odours or attract vermin.
- Any material dropped in or adjacent to open drains shall be recovered immediately after it occurs.
- Waste storage is not permitted in or near drainage paths.
- The burning of waste is strictly prohibited.
- No wastes shall be disposed of onsite.
- Wastes shall be removed from site regularly and at completion of works.

11.5 Monitoring

Site staff will be briefed on waste processes prior to works commencing and shall maintain continual vigilance for excess waste around the site and following appropriate disposal procedures. Weekly Environmental Inspections and Monthly SQEP Environmental Inspections shall include a visual assessment of the site to determine the effectiveness of waste management controls.

11.6 Contingency Measures

If waste items are accumulating or are stockpiled, the following contingency measures will be adopted:

- Arrange for collection by approved licensed contractor.
- Provide additional bins with lids if available.
- Remove waste offsite as soon as possible.

11.7 Waste Incident

A waste incident is considered to have occurred where:

- Waste from the site is found within a sensitive environment or where it may reasonably migrate to a sensitive environment,
- A complaint is received regarding inappropriate management of waste and on investigation is warranted.

The environmental incident procedures outlined at **Section 3.5** shall commence.

12.0 CONTAMINATED SITE MANAGEMENT

12.1 Contaminated Land

A search of the ORC Natural Hazards and HAIL databases has not provided any indication of the site being used in the past for a HAIL activity.

12.2 Sensitive Receptors

While contaminants are not anticipated to be encountered, if contaminants are accidentally uncovered, key sensitive receptors to protect include the nearby stormwater infrastructure, members of the public and workers on site.

The contaminated land management measures in this EMP are expected to minimise adverse effects as far as reasonably practicable.

12.3 Performance Criteria

- Effectively identify and manage any sites where contaminants are found and ensure they do not contaminate beyond the location they are found (including offsite) or present a risk to human health.

12.4 Management Measures

The following measures will be deployed to ensure contaminated soil associated with the project is appropriately mitigated:

- If any evidence of contamination be noticed in the field, the personnel noting the contamination shall immediately notify the Environmental Representative.
- Any known contaminated soil to be removed must be undertaken wearing appropriate PPE.
- All imported fill material from off-site sources will be procured from a project approved quarry/source. Records of quantity and location shall be managed by the Project Engineer.
- Many of the controls required to manage potential for effects associated with low level contaminated soil is based on best practice erosion and sediment control and dust management techniques. These are outlined in **Section 4.3** (erosion and sediment controls) and **Section 6.4** (dust controls). Both sections cover management of stockpiles.
- All surplus fill material requiring removal shall meet the Ministry for Environment definition of clean fill, as specified in Section 2.2 of the report “A Guide to the Management of Cleanfills”, prepared by *Beca Carter Hollings & Ferner Ltd for the Ministry for the Environment and dated January 2002*.
- If materials have been approved to be removed from site, materials will be transported to the approved disposal location.
- Trucks removing or transporting any soil from the site will be covered or sealed to prevent dust, leakage or loss of materials during transport.

12.5 Monitoring

Unless any higher-level contamination is accidentally found during earthworks, no specific monitoring of soil, groundwater or water quality will occur (other than what is detailed in the water quality criteria outlined in **Section 5.5**). If material is found it is expected that monitoring may be required but this shall be at the direction of the soil contamination expert.

12.6 Contingency Measures

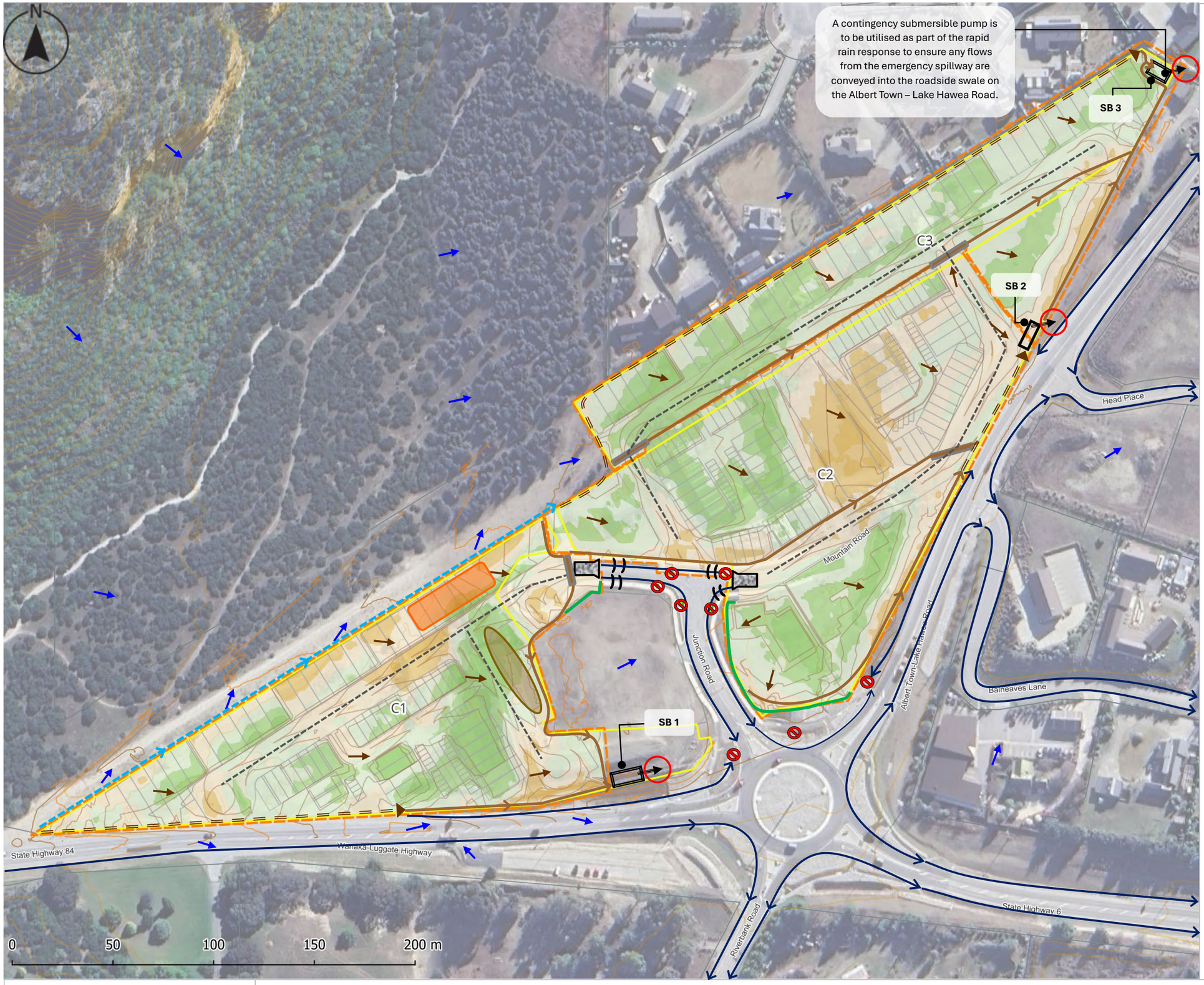
It is not expected that contaminated material will be encountered, however this cannot be ruled out. If a potential contaminated site is identified (e.g., by landfilled waste, odour) during construction works, the following contingency measures will be undertaken:

- Immediately notify the Project Manager.
- Prevent spread of contamination by installation of silt fencing, covering material with plastic or geofabric material. This will be done wearing appropriate PPE as outlined in the Health and Safety Management Plan.
- Engage the Environmental Consultant who will advise on the engagement of a Contaminated Soil expert.
- EMP to be amended to manage any new contaminated soil encountered in coordination with the contaminated soil expert (if engaged).

12.7 Contamination Incident

An environmental incident is considered to have occurred where inspection finds that excavation or other work continues within contaminated soil without report or remedial action. The environmental incident procedures outlined in **Section 3.5** shall be followed.

APPENDIX 1 Erosion and Sediment Control Plan Drawing



Legend

	Catchment boundaries
	Stabilised access
	Clean water overland flow
	Dirty water overland flow
	Existing kerb and channel / Roadside swale
	Existing bund acting as a clean water diversion
	Dirty water diversion channel (DWDC)
	Combined dirty water diversion channel and clean water diversion bund
	Laydown area
	Standard silt fence
	Trafficable swale
	Silt sock
	Temporary haul road
	Stockpile
	Sediment basin (SB)
	Direction of emergency spillway
	Stormwater inlet protection
	Water Quality Sampling Location

Notes

- This plan is to be read in conjunction with the Environmental Management Plan document prepared by Enviroscope.
- All locations of erosion and sediment control (ESC) devices are indicative and exact placement to be confirmed onsite.
- ESC devices to be installed and maintained in accordance with Auckland Council's 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05) and manufacturer's instructions where relevant.
- All devices are to be inspected daily and pre and post-rain event to ensure they are fully functional.
- The laydown area is a hardstand area where all plant, machinery, refuelling, chemicals and fuels, waste management measures should be located.

Sediment Basin	Catchment Name & Area (ha)
SB 1	**C1** - 1.95
SB 2	**C2** - 2.70
SB 3	**C3** - 1.32

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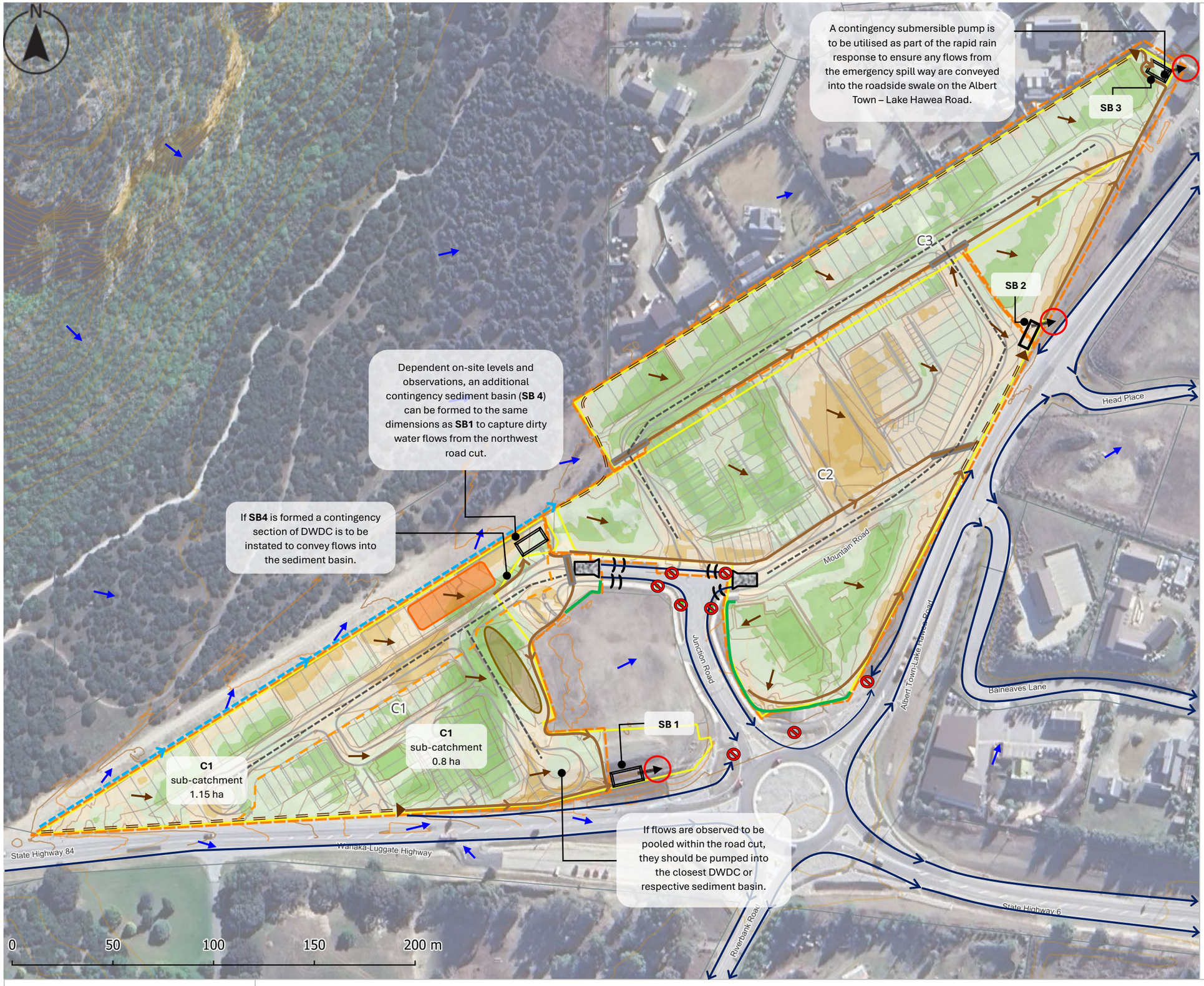
Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan – Bulk Earthworks

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 001	B



Legend

	Catchment boundaries
	Stabilised access
	Clean water overland flow
	Dirty water overland flow
	Existing kerb and channel / Roadside swale
	Existing bund acting as a clean water diversion
	Dirty water diversion channel (DWDC)
	Combined dirty water diversion channel and clean water diversion bund
	Laydown area
	Standard silt fence
	Trafficable swale
	Silt sock
	Temporary haul road
	Stockpile
	Sediment basin (SB)
	Direction of emergency spillway
	Stormwater inlet protection
	Water Quality Sampling Location

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- All devices are to be inspected daily and pre and post-rain event to ensure they are fully functional.
- The laydown area is a hardstand area where all plant, machinery, refuelling, chemicals and fuels, waste management measures should be located.

Sediment Basin	Catchment Name & Area (ha)
SB 1	**C1 sub-catchment** – 0.8
SB 2	**C2** - 2.70
SB 3	**C3** - 1.32
SB 4	**C1 sub-catchment** – 1.15

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Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan – Civil Works

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 002	B

TEMPORARY SOIL BINDERS

(Pages 166-170 of GD05)

- Soil binders or polymers can be used to form a cohesive membrane or protective crust over exposed earthworks. This reduces windblown dust generation and reduces raindrop impact to minimise erosion.
- Provides short-term protection (generally < 6 months). This does not constitute 'stabilisation'.

AGGREGATE APPLICATION

(Page 68 of GD05)

- Application of aggregate on road carriageways and/or building platforms reduces the potential for windborne dust generation and raindrop impact generating sediment run-off.
- Particularly applicable to haul road carriageways where vehicle activity will be frequent.

DUST SUPPRESSION

(Page 169-172 of GD05)

- Dust suppression is typically achieved via use of a water cart of a sprinkler system. This should be applied incrementally so maintain a moist surface, but without saturating the surface and resulting in sediment run-off.
- It is recommended that water captured within the sediment basins is reused on site for dust suppression purposes.

HAY MULCHING

(Images from Enviroscope)

- Application of hay mulch provides instant stabilisation for a short to medium term period (3-5 months).
- Hay mulch provides a warm micro-climate with optimal conditions to encourage establishment of vegetation cover. This is particularly useful for establishing vegetation in colder periods of the year.

HYDROSEEDING/HYDROMULCHING

(Source: Hydroseeding NZ and Images from Enviroscope)

- Application of hydroseed is designed to promote rapid stabilisation. While this is not considered instant stabilisation, this does provide limited protection from raindrop impact for a short duration until grass cover is established.
- The seed mix contained in the hydroseed should be considered relative to the soil type of each respective site. This should be determined at the direction of the SQEP.
- It is noted that newly sowed hydroseed may be mobilised by intense run-off and require re-application. This should be considered when assessing the timing of application, prioritising application during warmer seasonal periods.

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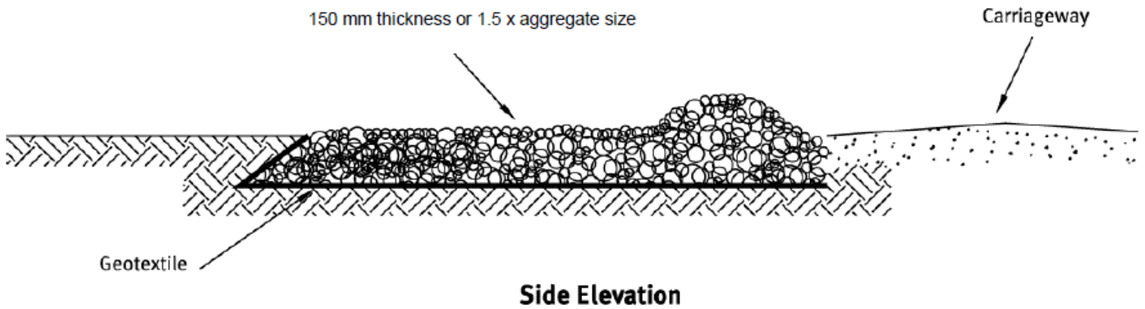
Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

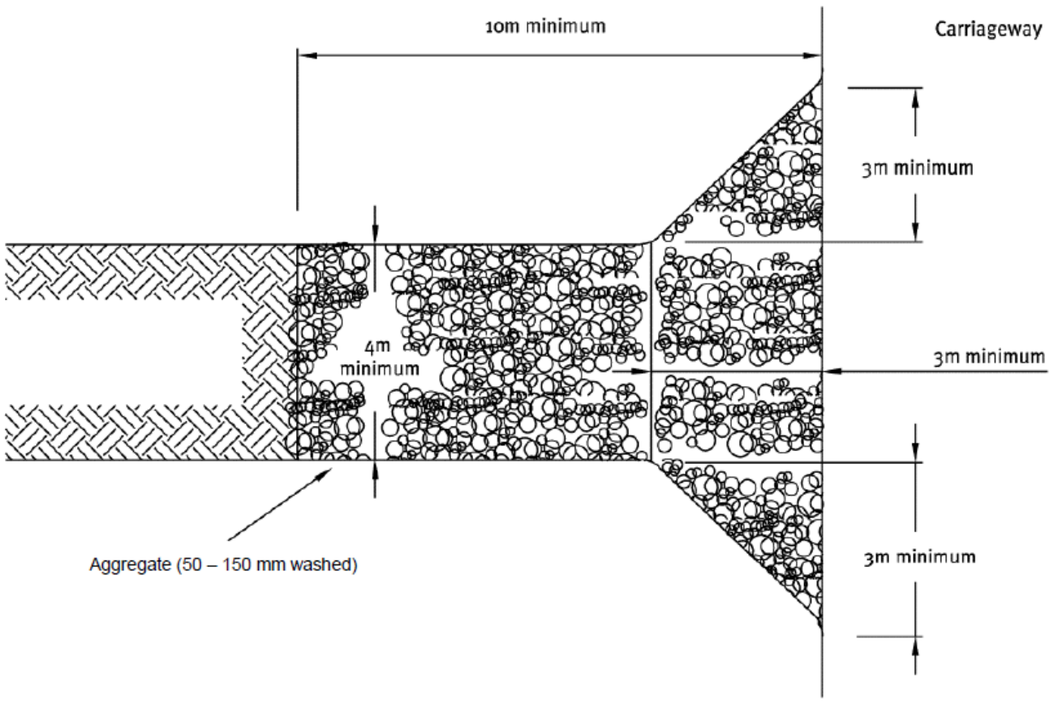
	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 003	B

STABILISED ACCESS

(Page 60 from GD05)



Side Elevation



Plan View

Design Parameter	Specification
Aggregate size	50-150 mm washed aggregate
Minimum thickness	150 mm
Minimum length	10 m
Minimum width	4 m

- Additional aggregate may need to be added to the stabilised entranceway throughout the project to maintain the thickness.
- Any sediment that has been tracked onto the surrounding roads must be swept away at regular intervals.

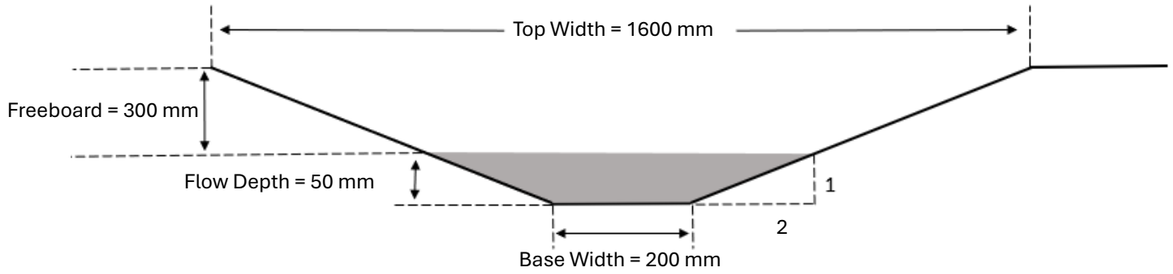
enviroscope

Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 004	B

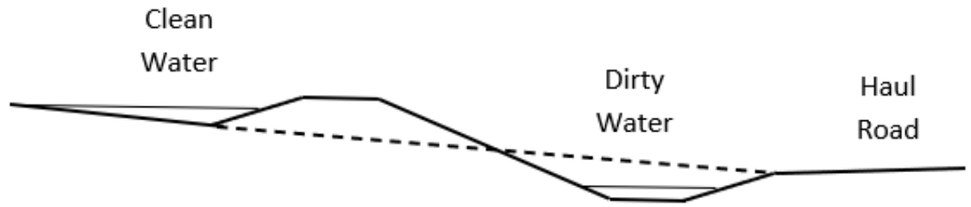
DIRTY WATER DIVERSION CHANNEL

(Pages 43-46 from GD05)



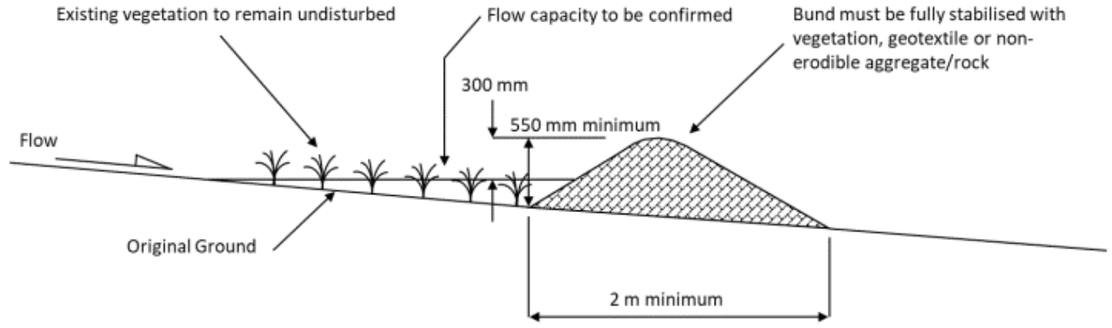
- This has been designed to convey up to a 5% AEP design event.
- Trapezoidal shape
- The DWDC has been calculated based on the largest contributing catchment.
- Full calculations are included in **Appendix 2**.

COMBINED CLEAN AND DIRTY WATER DIVERSION BUND



'CLEAN WATER' DIVERSION BUND (CONTINGENCY)

(Page 38-43 from GD05)



- Ensure bund is well compacted and stabilised.
- Monitor the inlet and outlet for scour.
- Ensure there are no areas of ponding or blockages along the length of the bund.

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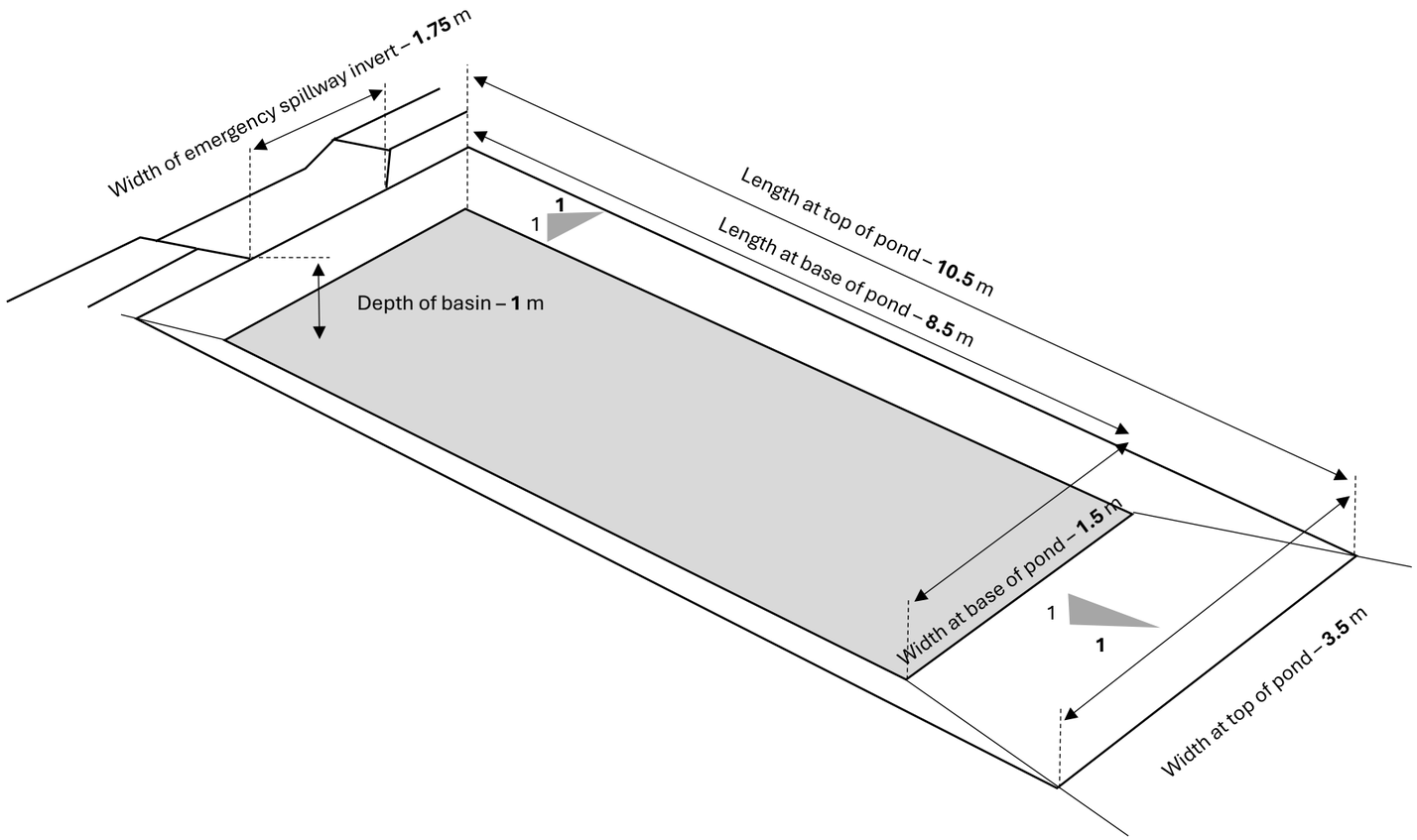
Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 005	B

SEDIMENT BASIN 1

Type D Sediment Basin from IECA, Image from Enviroscope



- **Sediment Basin 1** services **Catchment 1** (1.95 ha).
- Line the internal batter.
- To be cleaned out once 20% capacity is reached.
- Sizing and calculations in **Appendix 2**.
- **Sediment Basin 4** is to be formed to the same dimensions as **Sediment Basin 1.**

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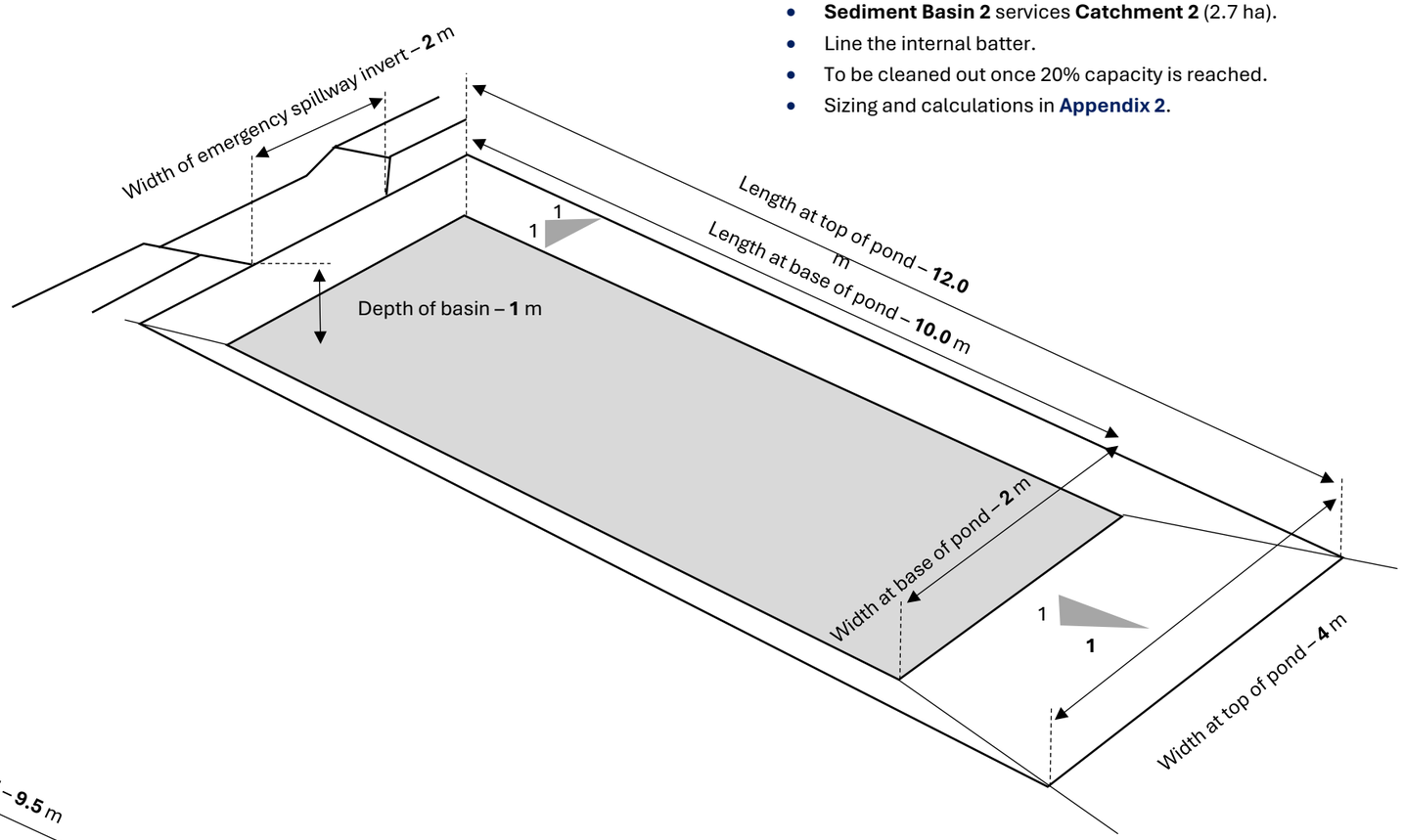
Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 006	B

SEDIMENT BASIN 2

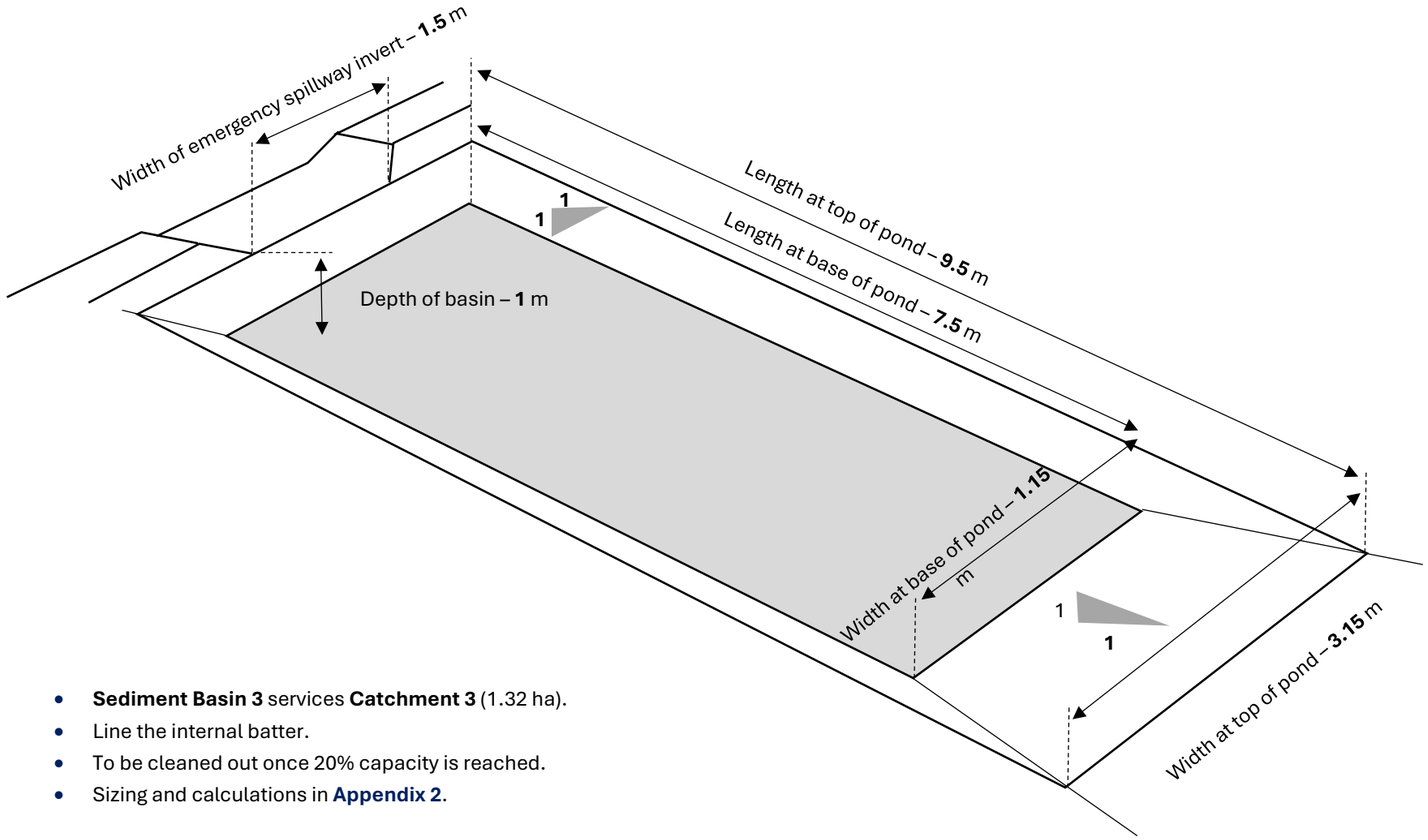
Type D Sediment Basin from IECA, Image from Enviroscope



- **Sediment Basin 2** services **Catchment 2** (2.7 ha).
- Line the internal batter.
- To be cleaned out once 20% capacity is reached.
- Sizing and calculations in **Appendix 2**.

SEDIMENT BASIN 3

Type D Sediment Basin from IECA, Image from Enviroscope



- **Sediment Basin 3** services **Catchment 3** (1.32 ha).
- Line the internal batter.
- To be cleaned out once 20% capacity is reached.
- Sizing and calculations in **Appendix 2**.

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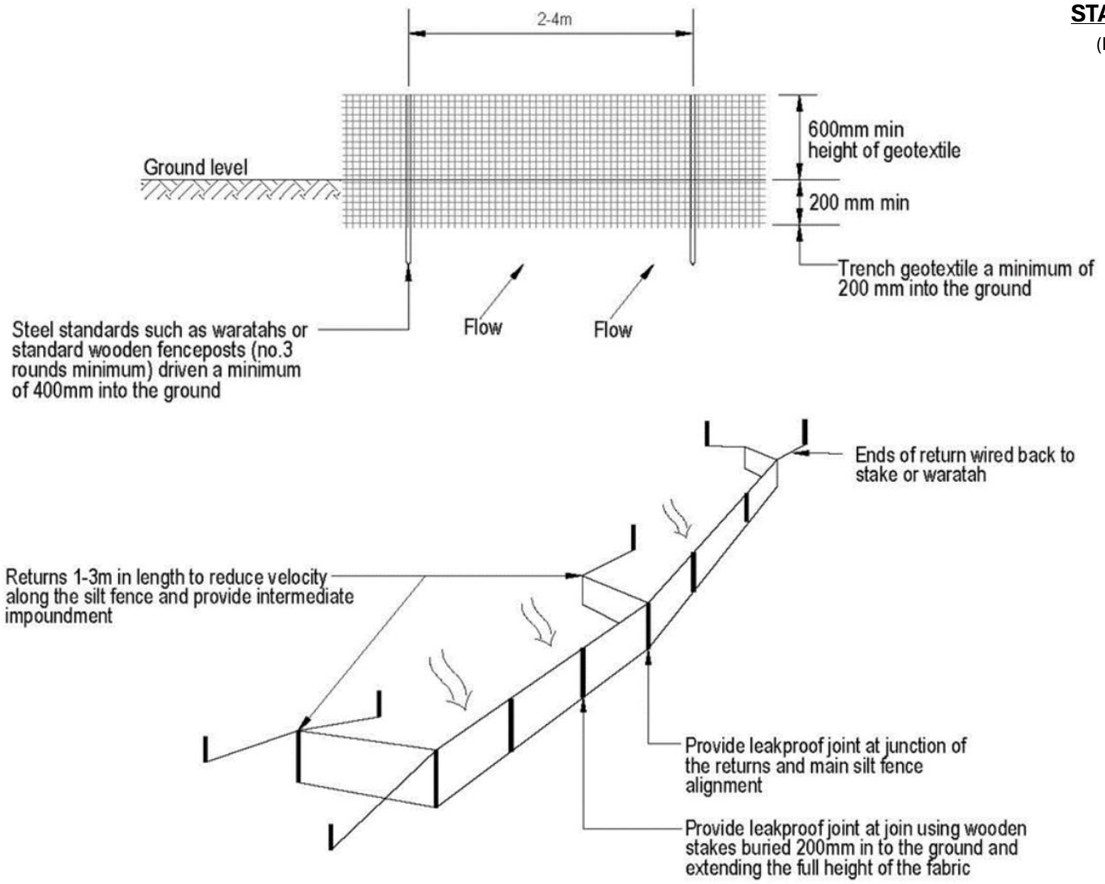
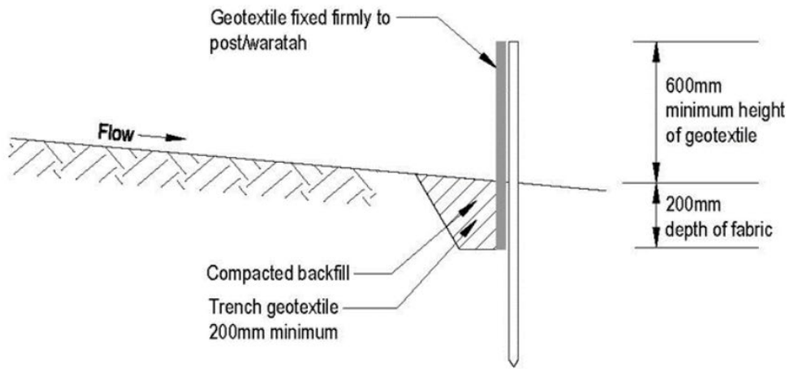
Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 007	B

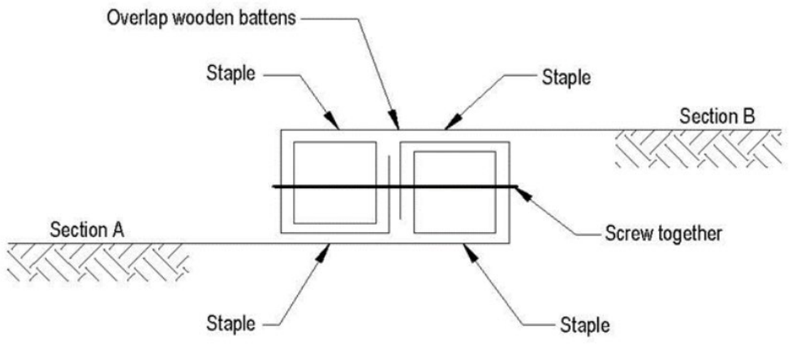
STANDARD SILT FENCE

(Page 112-119 from GD05)





Slope steepness (%)	Slope length (m) (maximum)	Spacing of returns (m)	Silt fence length (m) (maximum)
Less than 2%	Unlimited	N/A	Unlimited
2- 10%	40	60	300
10- 20%	30	50	230
20- 33%	20	40	150
33- 50%	15	30	75
Greater than 50%	6	20	40



- Ensure the silt fence is ‘keyed’ into the ground to form a good seal at ground level to capture water and avoid undermining.
- Silt fences should be 600 mm above ground level and 200 mm below ground level.
- Supporting waratahs should be placed at 2-4 m intervals.
- Install silt fence returns at either end of the silt fence, projecting up-slope to a sufficient height to prevent outflanking.
- It is also important that silt fences are installed along the contour of the slope to prevent ponding of water in a concentrated area of the fence.
- To be mucked out once 20% capacity reached.

enviroscope

Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 008	B

TEMPORARY STOCKPILES

- Temporary stockpiles should be a maximum height of two metres to mitigate wind effects and to preserve the quality of the topsoil as future planting media for revegetation.
- If the stockpile is to be left insitu for a period of 12 weeks or more it shall be seeded with grass or erosion control matting to provide erosion and dust protection.
- A silt fence should be installed on the downslope of the stockpile.

SILT SOCKS

Page 126-130 from GD05

Slope steepness (%)	Slope length (m) (maximum)	Spacing of returns (m)
Less than 2%	100	N/A
2- 10%	40	30
10- 20%	30	25
20- 33%	10	10
33- 50%	5	10
Greater than 50%	2	5

- It is important that the silt socks are secured flush with the ground to prevent sediment from undercutting the sock.
- Ensure silt socks are placed along the contour of a site.

STORMWATER INLET PROTECTION

Image from Enviroscope

- Inlet protection should simply consist of geofabric material placed in the grate as a filtering device.
- These should be monitored and cleaned out weekly and material should be replaced as soon as filtering capacity is lost.

TRAFFICABLE SWALE

Image from Enviroscope

- Trafficable swales should be constructed by mounding and compacting soil diagonally across the road to direct water in the direction required.
- Vehicles should be able to cross trafficable swales often.
- Rock-lining may need to be added if the swale structure is continuing to degrade by trafficking.

Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 009	B

REFUELING BAY

- Locate the hardstand as far as practicably possible from waterways and concentrated flows.
- Ensure spill kit is located nearby.

CONCRETE WASHOUT PIT

- The concrete wash out pit consists of a plastic-lined bunded pit constructed with fill or straw bales.
- After concrete washout any water shall be left to evaporate.
- Cured concrete is to be disposed of within the plastic sheet to a licensed facility.

SPILL KITS

- Spill kits should be located in the laydown area.

WASTE

- Where possible, waste shall be segregated into labelled bins.
- Wastes on site will be suitably contained and prevented from escaping off site. This may include covering skip bins during high winds.
- Waste storage is not permitted in or near drainage paths.
- Wastes will be removed from site when bin is full.

enviroscope

Project: Mt. Iron Junction
Description: Erosion and Sediment Control Plan Schematics

	Drawn	Approved	Date	Drawing Number	Revision
	KB	LC	15/12/2025	ESCP – 010	B

APPENDIX 2 Erosion and Sediment Control Plan Calculations

DIRTY WATER DIVERSION CHANNEL CALCULATIONS - MOUNT IRON JUNCTION

Specifications	Value 1	Value 5	Units	Reference/Notes
Site Details				
Contributing catchment		1.6	ha	QGIS + Pattersons Earthworks Plans - Conservatively calculated for the largest contributing catchment.
Design rainfall event		0.05	AEP	5% AEP as required by GD05
Time of Concentration				
Overland sheet flow path length (L)		115	m	
Hortons roughness value (n)		0.05		Gravely surface with sparce grass pockets.
Slope of surface (S)		1.2	%	Rise over run from furthest point to outlet of catchment
Time of Concentration (Tc)		7.8	minutes	
Rounded Tc to align with HIRDS		10	minutes	10 minute minimum required if Tc <10
Rational Method: Q = (C*I*A)/360				
Area ground cover	Grass	Bare soil		
Proportion of catchment	0.05	0.95		
Runoff coefficient (C)	0.4	0.2		Manning's Roughness Coefficient (n)
Rainfall intensity (I)	35.1	35.1	mm	NIWA HIRDS, 10 min (Tc), 5% AEP
Catchment Area (A)	0.08	1.52	ha	
Qp (Peak runoff flow)	0.0031	0.0296	m3/s	Rational Method: Q = CIA
Total Qp (Peak runoff flow)		0.0328		
Channel Design				Manning's Formula Uniform Trapezoidal Channel Flow
Bottom Width		200	mm	
Batter ratio= 1 to		3	ratio	
Manning's roughness coefficient of channel (n)		0.025		Gravelly earth channel
Channel slope		1.31	%	Slope=rise/run
Flow depth		50	mm	
Channel depth		350	mm	300 mm freeboard provided
Flow (Q)		0.0741	m3/s	
Buffer		126	%	
Top width		1600	mm	

SEDIMENT BASIN CALCULATIONS 1 - MOUNT IRON JUNCTION

Specification	Value3	Value4	Value5	Units	Source / Notes / Reference
Site details					
Contributing catchment			1.95	ha	QGIS + Pattersons Earthworks Plans
Project duration			2.0	years	
Design Storm Event			24-hr, 5% AEP		
Sizing Storage Requirements					Section 6.7 of NZTA ESC Guidelines, Peak runoff (Rational Method Q = 0.00278CiA)
Area groundcover	Subsoil	Topsoil	Grass		
Proportion of sub catchment	0.75	0.20	0.05	Proportion	
C (Runoff Coefficient)	0.15	0.30	0.20		The runoff coefficients have been conservatly estimated based on the site stratigraphy and ground truth observsations undertaken by Enviroscope in Novemeber 2025. (Flat Grass: 0.2, Subsoil: 0.15 (flat gravel), Topsoil: 0.3 (cultivated sandy soil))
I (Rainfall Intensity)	3.8	3.8	3.8	mm/hr	NIWA HIRDS 24-hr, 5% AEP
A (Catchment Area)	1.46	0.39	0.10	ha	
Qp (Peak runoff flow)	0.0023	0.0012	0.0002	m/s	
Storage volume required	8.38	4.47	0.74	m3	
Total storage volume required per hour of event			13.59	m3	
Duration of design event			24	hrs	
Total Storage required for design event			326.24	m3	
Sediment Basin Design Specifications					
Top length (A)			10.50	m	
Top width (B)			3.50	m	
Base length (a)			8.50	m	
Base width (b)			1.50	m	
Depth (h)			1.00	m	
Internal batter ratio= 1 to			1	ratio	Line internal batters
Actual volume (v)			24.08	m3	
Width to length ratio			3:1	ratio	Length to width ratio considered appropriate due high soakage rates
Soakage					
Duration of design event			24	hours	
Soakage rate			1000	mm/hr	1,000 mm/hr has been selected as a conservative input to represent the free draining soils present on site.
Soakage depth for design event			24	m	Depth = Soakage rate*duration of design rain event
Soakage volume for design event			306.00	m3	Volume = Base width * base length * soakage depth for design event
Effective volume including soakage			330.08	m3	Effective volume = Pond volume plus soakage volume
Buffer			1.18%		

SEDIMENT BASIN CALCULATIONS 2 - MOUNT IRON JUNCTION

Specification	Value3	Value4	Value5	Units	Source / Notes / Reference
Site details					
Contributing catchment			2.70	ha	QGIS
Project duration			2.0	years	
Design Storm Event			24-hr, 5% AEP		
Sizing Storage Requirements					Section 6.7 of NZTA ESC Guidelines, Peak runoff (Rational Method Q = 0.00278CiA)
Area groundcover	Subsoil	Topsoil	Grass		
Proportion of sub catchment	0.75	0.20	0.05	Proportion	
C (Runoff Coefficient)	0.15	0.30	0.20		The runoff coefficients have been conservatly estimated based on the site stratigraphy and ground truth observsations undertaken by Enviroscope in Novemeber 2025. (Flat Grass: 0.2, Subsoil: 0.15 (flat gravel), Topsoil: 0.3 (cultivated sandy soil))
I (Rainfall Intensity)	3.8	3.8	3.8	mm/hr	NIWA HIRDS 24-hr, 5% AEP
A (Catchment Area)	2.03	0.54	0.14	ha	
Qp (Peak runoff flow)	0.0032	0.0017	0.0003	m/s	
Storage volume required	11.61	6.19	1.03	m3	
Total storage volume required per hour of event			18.84	m3	
Duration of design event			24	hrs	
Total Storage required for design event			452.11	m3	
Sediment Basin Design Specifications					
Top length (A)			12.00	m	
Top width (B)			4.00	m	
Base length (a)			10.00	m	
Base width (b)			2.00	m	
Depth (h)			1.00	m	
Internal batter ratio= 1 to			1	ratio	Line internal batters.
Actual volume (v)			33.33	m3	
Width to length ratio			3:1	ratio	
Soakage					
Duration of design event			24	hours	
Soakage rate			1000	mm/hr	1,000 mm/hr has been selected as a conservative input to represent the free draining soils present on site.
Soakage depth for design event			24	m	Depth = Soakage rate*duration of design rain event
Soakage volume for design event			480.00	m3	Volume = Base width * base length * soakage depth for design event
Effective volume including soakage			513.33	m3	Effective volume = Pond volume plus soakage volume
Buffer			13.54%		

SEDIMENT BASIN 3 CALCULATIONS - MOUNT IRON JUNCTION

Specification	Value3	Value4	Value5	Units	Source / Notes / Reference
Site details					
Contributing catchment			1.32	ha	QGIS
Project duration			0.5	years	
Design Storm Event			24-hr, 5% AEP		
Sizing Storage Requirements					Section 6.7 of NZTA ESC Guidelines, Peak runoff (Rational Method Q = 0.00278CiA)
Area groundcover	Subsoil	Topsoil	Grass		
Proportion of sub catchment	0.75	0.20	0.05	Proportion	
C (Runoff Coefficient)	0.15	0.30	0.20		The runoff coefficients have been conservatly estimated based on the site stratigraphy and ground truth observsations undertaken by Enviroscope in Novemeber 2025. (Flat Grass: 0.2, Subsoil: 0.15 (flat gravel), Topsoil: 0.3 (cultivated sandy soil))
I (Rainfall Intensity)	3.8	3.8	3.8	mm/hr	NIWA HIRDS 24-hr, 5% AEP
A (Catchment Area)	0.99	0.26	0.07	ha	
Qp (Peak runoff flow)	0.0016	0.0008	0.0001	m/s	
Storage volume required	5.64	3.01	0.50	m3	
Total storage volume required per hour of event			9.15	m3	
Duration of design event			24	hrs	
Total Storage required for design event			219.71	m3	
Sediment Basin Design Specifications					
Top length (A)			9.50	m	
Top width (B)			3.15	m	
Base length (a)			7.50	m	
Base width (b)			1.15	m	
Depth (h)			1.00	m	
Internal batter ratio= 1 to			1	ratio	Line internal batter.
Actual volume (v)			18.61	m3	
Width to length ratio			3:1	ratio	Length to width ratio considered appropriate due high soakage rates
Soakage					
Duration of design event			24	hours	
Soakage rate			1000	mm/hr	1,000 mm/hr has been selected as a conservative input to represent the free draining soils present on site.
Soakage depth for design event			24	m	Depth = Soakage rate*duration of design rain event
Soakage volume for design event			207.00	m3	Volume = Base width * base length * soakage depth for design event
Effective volume including soakage			225.61	m3	Effective volume = Pond volume plus soakage volume
Buffer			2.68%		

APPENDIX 3 Environmental Site Induction Handout

ENVIRONMENTAL SITE INDUCTION HANDOUT

Key Roles and Responsibilities

Role	Responsibilities
Project Manager	The Project Manager is responsible for the effective implementation of the EMP and has overall responsibility for the environmental performance of the project. Duties include: • Ensuring adequate resources are in place to implement the EMP. • Ensuring all staff and sub-contractors operate within the guidelines of the EMP. • Ensuring that an EMP is prepared, and that environmental standards, processes and procedures meet relevant resource consent conditions. • Overseeing the successful implementation, monitoring and review of the EMP. • Ensuring that inspections are carried out in accordance with the relevant EMP. • Restricting or stopping any activity that has the potential to or has caused adverse environmental effects. • Providing notification and reporting of Environmental Incidents to Council and other environmental reports as required by The Guidelines. • Delegating authority of the above responsibilities.
Environmental Representative	The Environmental Representative supports the Project Manager in the day-to-day implementation of the EMP. Duties include: • Ensuring the installation of environmental controls as per the EMP. • Undertaking environmental site inspections. • Overseeing the maintenance and improvement of defective environmental controls. • Providing environmental inductions to all staff and sub-contractors. • Assisting the project leadership in attending to Environmental Incidents and Complaints. The Environmental Representative shall be familiar with environmental risks associated with the project, the EMP and best practice erosion and sediment control principles and practices.
All staff and sub-contractors	All staff and sub-contractors have a responsibility to undertake all activities in accordance with the requirements of this EMP. This includes reporting any activity that has the potential to or has resulted in an Environmental Incident to the Project Manager or Environmental Representative.

Environmental Receptors

Environmentally sensitive receptors:

Key sensitive receptors include the workers on site, neighbouring residential dwellings to the northeast, drivers of the Wānaka-Luggate Highway and State Highway 6 to the south, recreational users of Mount Iron Reserve to the north, and nearby stormwater infrastructure.

Associated Resource Consents

All resource consent conditions of TBC (issued by QLDC & ORC) are important to comply with in order to avoid or mitigate adverse environmental effects.

The site EMP has been prepared in response to all environmental-related conditions of consent and therefore provides direction for how compliance with these conditions will be achieved. Provided that the EMP is followed, the project will at the same time comply with all conditions of consent.

Sequencing

The sequencing of works is a key component to ensure that environmental effects of construction are appropriately managed. It is imperative that the sequencing outlined in **Section 2.1** of the EMP is followed so that the site is stabilised in the most efficient manner.

All staff should be familiar with this sequence. Any potential changes to that sequence need to be approved by the Project Manager which will be discussed first with the Environmental Consultant.

Key Environmental Management Measures in EMP

Erosion and Sediment Control (Section 4 of EMP)

- Direction provided in Erosion and Sediment Control Plan (ESCP) in **Appendix 1** of EMP.
- Separation of clean and dirty water is the most important principle to ensure that the contributing catchment of dirty water that needs to be treated is as small as possible.
- Progressive stabilisation (revegetation) of disturbed areas will ensure that the extent and duration of exposed soil is minimised. Keep it covered!
- All controls to be checked immediately before storm events to ensure they are in good-working order.
- Erosion and sediment control devices to remain in place until site is stabilised (defined as 80% vegetative cover).

Any works that disturb the controls outlined on the ESCP must be reinstated before moving to the next task.

Water Quality Management (Section 5 of EMP)

- Any water caught in the sediment devices to be re-used in dust suppression where possible and if required.
- Complete water quality monitoring and sampling as per resource consent requirements.

- Any observations of dirty water running offsite to be reported directly to the Project Manager.

Dust Management (Section 6 of EMP)

- Dust suppression should occur on any exposed soil on unsealed roads.
- Avoid all unnecessary vegetation clearing that exposes soil and work should be conducted in stages as this can increase the impact from dust in the event of strong winds.
- During high wind events and dust suppression is becoming difficult works must cease until more favourable weather conditions.
- Constant vigilance should be maintained onsite to ensure that dust is appropriately managed and weekly monitoring should be completed to ensure that management measures are effective.

Noise and Vibration Management (Section 7 of EMP)

- Noise producing works only be undertaken during the hours of 0730-1800 from Monday-Saturday and no works to be completed on Sundays or public holidays.
- Particularly noisy work should be completed during the middle of the day during business hours.
- Noise dampening should occur when possible.
- Weekly site inspections should be undertaken by the Environmental Representative to ensure the strategies in place are effective.

Cultural Heritage Management (Section 8 of EMP)

- If any artefacts are found works must stop within 20 meters of the discovery and the site manager notified immediately.
- The site manager must then secure the area and notify the Heritage New Zealand Regional Archaeologist, who will advise when works can begin again.

Vegetation Management (Section 9 of EMP)

- Maintain vegetated surfaces as far as reasonably possible.
- Maintain protected or indigenous vegetation.
- Complete all landscaping and or ecological restoration in accordance with approved plans.

Chemicals and Fuel Management (Section 10 of EMP)

- Chemicals and fuels are stored and used so not to cause contamination of works areas and surrounding environment.

Waste Management (Section 11 of EMP)

- Waste management on site will ensure wastes are stored safely and in an organised manner until recycling, reuse or disposal.

Contaminated Land Management (Section 12 of EMP)

- Prevent spread of contamination.

- Engage the Environmental Consultant (SQEP) to ensure that the site can be managed in accordance with statuary requirements (i.e., National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health).

Environmental Incidents

The procedure for managing environmental incidents is outlined in **Section 3.5** of the EMP, however these can be summarised as follows:

- Environmental incidents must be reported as soon as they occur, and the Project team must respond immediately to mitigate further environmental impacts.
- Investigation into the cause of the incident should be completed and a solution should be constructed to remediate the Environmental damage.
- The Project Manager must then notify the QLDC and ORC of the details of the incident within 12 hours of being made aware of the incident.

Rapid Response for Storm Events

The procedure for rapid response to storm events is outlined in **Section 4.8** of the EMP, however these can be summarised as follows:

- The Project Manager will observe and understand the **weather forecast** throughout the project to ensure appropriate preparation onsite.
- If a **significant storm** event is forecast all works should stop within an appropriate amount of time to inspect ESC devices and undertake any maintenance or site stabilisation required.
- The sediment controls should be in operating condition and fully functional.
- During the storm event the site should be monitored to sure the functioning of the ESC devices and maintained if required.

When storms are forecast it is crucial that tools are downed in time for the rapid response procedure to be implemented. This will help avoid environmental incidents, potential enforcement action and site shutdown.

APPENDIX 4 Environmental Site Induction Register

Mount Iron Junction

ENVIRONMENTAL SITE INDUCTION REGISTER

Name	Organisation	Date Inducted	Induction Delivered by	Signature

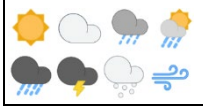
APPENDIX 5 Weekly Environmental Site Inspection Form

Mount Iron Junction

WEEKLY ENVIRONMENTAL SITE INSPECTION FORM

Environmental Representative: Date:

Item	Yes	No	Comment
General			
Is the EMP available onsite?	☐	☐	
Have any environmental incidents occurred during the week? If so, provide details	☐	☐	*If yes, complete environmental incident report.
Complete description of weather for upcoming week – circle applicable			

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
						

Are there any rain events forecasted for the coming week?	☐	☐	
Have pre rain event inspections been completed?	☐	☐	
Have post rain event inspections been completed?	☐	☐	
Water Quality			
Is water quality monitoring occurring when water is flowing across the site boundaries?	☐	☐	*If yes, complete water quality monitoring form
Erosion and Sediment Control			
Are works contained within the current site boundaries?	☐	☐	
Are completed areas being progressively stabilised?	☐	☐	
Is there any new evidence of erosion?	☐	☐	
Are erosion and sediment controls installed as per the ESCP?	☐	☐	
Is dirty water entering dirty water diversion channels during rain events?	☐	☐	
Do sediment controls have over 80% capacity?	☐	☐	
Cultural Heritage			
Have any finds of cultural significance been found?	☐	☐	
Noise and Vibration			

Mount Iron Junction

Item	Yes	No	Comment
Have any complaints been received during the week?	☐	☐	*If yes, complete Complaints Register
Are nearby sensitive receptors being notified before significant noise and/or vibration causing activities?	☐	☐	
Are works only occurring within the hours of operation?	☐	☐	
Dust			
Have any complaints been received during the week?	☐	☐	*If yes, complete Complaints Register
Have completed areas been revegetated or stabilised?	☐	☐	
Are works ceasing during high winds?	☐	☐	
Are only designated access points and haul routes being used?	☐	☐	
Is the site access and surrounding roads swept clean of sediment?	☐	☐	
Vegetation			
Are vegetated surfaces being maintained as far as reasonably possible?	☐	☐	
Contaminated Soils			
Have any contaminants been uncovered during excavations?	☐	☐	
Chemicals and Fuels			
Are all hazardous substances on site stored, transported and used according to the safety data sheet requirements?	☐	☐	
Are vehicles and plant being refuelled in the refuelling bay?	☐	☐	
Is concrete washing being undertaken in the concrete wash-out pit?	☐	☐	
Is there an adequate supply of spill kits onsite? Have any used materials been replaced?	☐	☐	
Waste			
Is the site in a safe, clean and tidy state?	☐	☐	
Are wastes segregated into labelled bins with lids?	☐	☐	
Are skip bins not overfilled?	☐	☐	
Is waste removed from open drains and drainage paths?	☐	☐	

Actions resulting from this inspection must be forwarded to the Project Manager any actions should be recorded in the Non-Conformance Register – **Appendix 8**.

Additional Comments:

Names and Signatures of inspection attendees:

APPENDIX 6 Environmental Incident Report Form

Mount Iron Junction

ENVIRONMENTAL INCIDENT REPORT FORM

Project Address:	**Consent Number:**
Brief Project Description:	

Instructions- Complete this form for all environmental incident that cause contaminants (including sediment) or environmental nuisance to leave the site. Be succinct, stick to known facts and do not make assumptions. Once completed submit to Queenstown Lakes District Council at RCMonitoring@qldc.govt.nz and Otago Regional Council at pollution@orc.govt and compliance@orc.govt.nz. Call the QLDC Regulatory team immediately on 03 441 0499 and ORC's Pollution Hotline on 0800 800 033 for any serious or ongoing incidents that cannot be brought under immediate control.

Date and Time	Date: XX/XX/XXX Time: XX:XX hours
Description? Provide a brief and factual description of what happened during the incident, include relevant details such as: - The activity being undertaken when the incident occurred - The estimated distance to nearest waterway (include stormwater and dry courses) - The estimated distance to the nearest sensitive receiver Sketches/diagrams/photos may be referenced and appended to this report to aid in the description of the incident.	
Exact Location of the incident? Include address, landmarks, features, nearest tree, etc. Maps and plans can be attached.	
Quantity or volume of material escaped or causing incident? (provide and estimate quantity)	
Who identified the incident?	Contractor ☐ Council ☐ Community ☐ Other ☐

What immediate actions/control measures were taken to rectify or contain the incident?
What initial corrective action will be taken to prevent similar incidents recurring in the near future?
Has the Queenstown Lakes District Council been notified? Yes ☐ No ☐ Will be notified ☐ **Has the Otago Regional Council been notified?** Yes ☐ No ☐ Will be notified ☐

Role of person making report: Project Manager / Site Supervisor / Environmental Representative / SQEP Name..... Signature..... Organisation..... Date..... Mobile phone number.....

APPENDIX 7 Environmental Complaints Register

Mount Iron Junction

ENVIRONMENTAL COMPLAINTS REGISTER

Complaint #	Date and Time Received	Complainant details (name, address, phone number)	Details of Complaint	Investigation and Findings	Outcome	Close out Date

APPENDIX 8 Environmental Non-Conformance Register

Mount Iron Junction

ENVIRONMENTAL NON-CONFORMANCE REGISTER

Ref Number	Date Observed	Found via (e.g., inspection, monitoring, complaint?)	Details of Non-conformance	Corrective Actions	Updated by	Close out Date

APPENDIX 9 Water Quality Monitoring Results Form

Mount Iron Junction

WATER QUALITY MONITORING PLAN

Objectives and Sampling Scope

The primary objectives of this Water Quality Monitoring Plan are to:

- Demonstrate compliance with consented water quality limits (e.g., turbidity, TSS, pH).
- Establish baseline water quality of receiving environment (if required).
- Monitor discharges during earthworks to assess potential impacts on receiving environments.
- Inform adaptive management and corrective actions where needed.

Spatial Boundaries:

- **Upstream (Background) Site:** To establish baseline water quality.
- **Discharge Point(s):** At locations where site runoff enters the receiving environment.
- **Downstream Site(s):** To assess site impacts.

Frequency: When there is a discharge of water across the site boundary or from a sediment retention pond or decanting earth bund, and where a Significant Rain Event occurs through the night, monitoring must be undertaken the following morning by 8am.

Monitoring Trigger	Frequency
Rainfall Events (20 mm within a 12-hour period or a rain event that can generate overland flow, noting that this varies seasonally	During or immediately post-event
Active Discharges	During each discharge
Routine Consent Monitoring (if required)	E.g., monthly or as specified
Complaint / Incident	Within 24 hours

Sampling Design What to Sample:

Parameter	Method	Purpose
Turbidity	Field meter (NTU/FNU)	Primary sediment indicator
Visual clarity	Clarity tube/Secchi disk	Primary sediment indicator
Total Suspended Solids (TSS)	Laboratory analysis (mg/L)	Verification of sediment load
pH	pH strips or pH meter	Water chemistry
Optional (e.g. D.O,Metals, Hydrocarbons)	Lab analysis	If required by consented or if observed visually during inspections

Where to Sample: Sampling locations are defined in the **ESCP drawing – Appendix 1**

- **Where water is flowing across the site boundaries.**

How to Sample: Refer to the overview in the proceeding pages. If in doubt, contact your site SQEP or local authority.

Reporting

- Monitoring results will be compiled into event-based inspection sheet (refer to table below) and compiled in the monthly reports (as required).
- Any exceedances will trigger immediate review, corrective action, and notification to [QLDC].
- Final summary reporting at project completion or as per resource consent requirements.

Mount Iron Junction

HOW TO: WATER QUALITY SAMPLING

1. Select a Sampling Location

Sampling a discharge

Collect sample where water crosses the site boundary or enters a sensitive receptor from a retention device. Always photograph the location you sample from.

Sampling a waterway

Collect sample from the centre of the flow and the top third of the water column where possible.

Sampling a from a Sediment Retention Device

Collect sample from the discharge location, this is either near the decanting arms, spillway, hose or the outlet pipe.

2. Collect a Water Sample

Taking a Water Sample

- ➔ Label container with site name, sampling location, date and time taken.
- ➔ Fill the container with water from the surface of your sampling location.

If you wade into the water to collect the sample, always collect the sample 'upstream' of where you're standing to avoid contamination by disturbed sediment.

3. Measure and Record Turbidity, Clarity, and pH

- ➔ Fill the turbidity pottle with the sampled water. Wipe away any moisture on the outside of the pottle and insert it into the meter. Turn the meter on and once the standby value appears press read. Record the turbidity

Measuring Clarity using a field testing seechi

- ➔ Lower the seechi disc into the water sample until you can no longer see the disc. Then lift the seechi disc back up until the disc is just visible. Record the number where the water level sits.

Measuring pH using a pH

- ➔ Submerge the probe of the pH meter into the water sample. Keep the probe in the water until the value on the meter is fixed. Swirling the probe can help the value fix faster. Record the pH value.

Mount Iron Junction

WATER QUALITY SAMPLING RESULTS

Date and time	Sampling Location	Sample Unit	Unit Result	Comments
	Sediment Basin 1	pH	pH ____	
		Turbidity	____ NTU	
		Visual Clarity	____ mm	
		TSS	____ mg/L	
		Hydrocarbons/Waste?		
	Sediment Basin 2	pH	pH ____	
		Turbidity	____ NTU	
		Visual Clarity	____ mm	
		TSS	____ mg/L	
		Hydrocarbons/Waste?		
	Sediment Basin 3	pH	pH ____	
		Turbidity	____ NTU	
		Visual Clarity	____ mm	
		TSS	____ mg/L	
		Hydrocarbons/Waste?		

Observations: Note weather conditions at the time of sampling, have baseline water quality parameters been exceeded? If so, additional testing may be required, and performance standards may have been exceeded. Notify Project Manager and SQEP.

APPENDIX 10 Archaeological Discovery Protocol

HERITAGE NEW ZEALAND
POUHERE TAONGA

Heritage New Zealand Pouhere Taonga Archaeological Discovery Protocol

Under the Heritage New Zealand Pouhere Taonga Act (2014) an archaeological site is defined as any place in New Zealand that was associated with human activity that occurred before 1900 and provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand. For pre-contact Maori sites this evidence may be in the form of bones, shells, charcoal, stones etc. In later sites of European/Chinese origin, artefacts such as bottle glass, crockery etc. may be found, or evidence of old foundations, wells, drains or similar structures. Burials/koiwi tangata may be found from any historic period.

In the event that an unidentified archaeological site is located during works, the following applies;

1. Work shall cease immediately at that place and within 20m around the site.
2. The contractor must shut down all machinery, secure the area, and advise the Site Manager.
3. The Site Manager shall secure the site and notify the Heritage New Zealand Regional Archaeologist. Further assessment by an archaeologist may be required.
4 If the site is of Maori origin, the Site Manager shall notify the Heritage New Zealand Regional Archaeologist and the appropriate iwi groups or kaitiaki representative of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (*Heritage New Zealand Pouhere Taonga Act*, *Protected Objects Act*).
5. If human remains (koiwi tangata) are uncovered the Site Manager shall advise the Heritage New Zealand Regional Archaeologist, NZ Police and the appropriate iwi groups or kaitiaki representative and the above process under 4 shall apply. Remains are not to be moved until such time as iwi and Heritage New Zealand have responded.
6. Works affecting the archaeological site and any human remains (koiwi tangata) shall not resume until Heritage New Zealand gives written approval for work to continue. Further assessment by an archaeologist may be required.
7. Where iwi so request, any information recorded as the result of the find such as a description of location and content, is to be provided for their records.
8. Heritage New Zealand will determine if an archaeological authority under the *Heritage New Zealand Pouhere Taonga Act* 2014 is required for works to continue.

It is an offence under S87 of the *Heritage New Zealand Pouhere Taonga Act 2014* to modify or destroy an archaeological site without an authority from Heritage New Zealand irrespective of

whether the works are permitted or a consent has been issued under the Resource Management Act.

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