
Prepared by: A. Guise

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Approved by: D. Rollo

Checked by: D. Rollo

1 Introduction

1.1 Project description

The proposal involves the construction of new roads and upgrading of existing roads between Old Pine Valley Road, along Pine Valley Road and connecting into Dairy Flat Highway.

The proposed development involves the following:

- Construction of a realigned and widened Pine Valley Road;
- Decommissioning of an approximately 250m length of the existing Pine Valley Road alignment;
- Construction of an additional eastbound lane on Dairy Flat Highway;
- Construction of a new signalised intersection between Pine Valley Road and Dairy Flat Highway;
- Creation of new super raingarden to the west of Pine Valley Road;
- Creation of new raingardens within the road berms of new and upgraded roads;
- Connection into the existing stormwater line within the land to the south of the proposed road connection and alongside the Silverdale Off Ramp;
- Regrading and realignment of an existing intermittent stream;
- Establishment of a new culvert under the proposed realigned Pine Valley Road;
- Construction of retaining structures either side of the existing culvert under Pine Valley Road; and
- Construction of cycleways and footpaths adjacent to the realigned and upgraded Pine Valley Road.

The development is proposed in two stages.

Stage 1 is anticipated to be undertaken soon after obtaining all necessary permissions and acquiring the required land, and will involve:

- Realignment of a portion of Pine Valley Road and upgrade to a two-lane collector road with off-carriageway cycle and pedestrian pathways between the consented roundabout at the intersection of Argent Lane Extension and Old Pine Valley Road through to Dairy Flat Highway;
- An upgraded and signal-controlled intersection at the junction of Pine Valley Road and Dairy Flat Highway; and
- Widening and upgrading of Dairy Flat Highway to provide two eastbound lanes between the intersection of Pine Valley Road and Dairy Flat Highway through to the Silverdale Interchange.

Stage 2 will be undertaken in the future when traffic demand requires increased capacity and will involve:

- Upgrade of Pine Valley Road between the consented roundabout at the intersection of Argent Lane Extension and Old Pine Valley Road through to the Dairy Flat Highway intersection to a four-lane arterial road.

Details of the proposed development are shown in more detail in the drawing set included in the *Argent Lane Extension: Notice of Requirement, Resource Consent Application and Assessment of Environmental Effects* (document ref: 402828-MMD-XX-XX-RP-PL-001).

1.2 Purpose of this Document

This Indicative Erosion and Sediment Control Management Plan (ESCP) has been prepared to describe the potential erosion and sediment control measures for Stage 1 of the proposed Argent Lane Extension development which will avoid, minimise or mitigate adverse effects during the earthworks phase.

This report has been prepared in support of a resource consent application. It should be read in conjunction with the other reports submitted with the application. A final ESCP will be developed by the contractor (once engaged).

This document has been prepared in accordance with:

- Auckland Council Guideline Document 2016/005 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' (GD05)

1.3 Summary of Proposed Earthworks

Earthworks are proposed across most of the project extents to form the required levels for the formation of the road, the super raingarden, the installation of the stormwater network and the regrading of the stormwater conveyance channels along the sides of the new roads.

The bulk earthworks operation will primarily involve bulk fill for the road with minimal amounts of cut aside from the construction of the super raingarden and a short portion of Pine Valley Road. Additional minor earthworks will be carried out to allow construction of stormwater pipelines and raingardens.

The earthworks will cover an approximate area of approximately 10,600m³ of cut and approximately 28,600m³ of fill. This is a total net earthworks volume of approximately 18,000m³ of surplus fill.

Table 1.1: Total cut and fill earthworks volumes

	Volume (m ³)
Total cut	10,600
Total fill	28,600
Net earthworks volume = 18,000m ³ cut	

2 Erosion and Sediment Control

2.1 Erosion and Sediment Control Principles

Earthworks will be designed and constructed in such a way as to minimise soil erosion and sediment discharge. Where sediment discharge is unavoidable, erosion and sediment will be managed, and these controls will comply with the requirements of the Auckland Council Guideline Document 2016/005 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' (hereafter referred to as GD005).

To minimise the generation and discharge of sediment the following key principles will be applied in accordance with GD05:

- Construction will be staged to minimise the extent and timeframes of ground disturbance. By only exposing areas that are required for active earthworking this limits the duration of exposure and risk of erosion/sediment discharge.
- Catchpits within and adjacent to the works area will be protected.
- Installation of perimeter controls will occur to separate 'clean' water from outside the area of disturbance from 'dirty' water that has flowed through the disturbed area.
- Stockpiles will be stabilised.
- Progressive stabilisation of the earthworks area will take place as sections are completed using vegetation, mulching or other stabilisation methods.
- Stabilised construction entrances will be installed and will remain in place during the works in accordance with section E2.6 of GD005.
- Wheel wash facilities will be provided at the entrance if necessary. This will ensure that any vehicles leaving the site do not deposit earth on to the public roading network.
- Sediment control devices will be utilised progressively across the site and adapted to changing site and weather conditions.
- The ESCP will be amended as necessary to reflect changing site conditions as the project progresses.
- Erosion and sediment control measures will be inspected, monitored and maintained.

Erosion and sediment control measures will be set up to minimise the extent of soil erosion and sediment yield from the project site during construction and will be implemented and monitored in accordance with GD05. All silt control measures will be fully established prior to commencement of physical works. Clean water diversion bunds will be utilised to prevent clean water entering the site and trenches associated with pipe installation should not be open for longer than three days and stabilisation should be completed within two days of backfilling. For trenching works, cut and cover methodology recommended in GD05 G3.1 and G3.2 should be used.

2.2 Indicative Erosion and Sediment Control Measures

Prior to earthworks commencing, the site sediment controls will be established. The following actions/control devices are proposed for the site:

- Silt fences - During the initial stages of clearing and excavation, silt fences will be used around the perimeter of the construction extents to contain sediment laden runoff. Runoff will be captured and pumped to a treatment device such as a decanting earth bund or mobile detention tank. The type of device will depend on the catchment area draining to it. Following treatment, it will be discharged to a nearby catchpit. The silt fences will be maintained throughout the construction stage to prevent any water entering or leaving the works area. Use of hemp silt fences will be considered over traditional plastic fences, as a more sustainable alternative.
- Stabilised construction entrance - This will be constructed in accordance with GD05 E2.6 requirements. A wheel wash station will be utilised to prevent sediment leaving the site. There will be a stabilised entrance at the construction areas.
- Stockpiled material – Any material (such as topsoil) that is intended to be re-used on site (post construction) will be covered with a geotextile fabric at the end of the day or when rain is forecast. Silt fences will also be placed around the stockpiled material.
- Dewatering – Removal of water from excavations will be required during construction. The method of dewatering excavations will be dependent on the volume of water produced. Small volumes of sediment laden water could be pumped to a silt fence or decanting earth bund. Other dewatering options include settling tanks, dewatering bags, turkey nests and coagulant and flocculant treatment devices. It is proposed that a 'sump' (potentially in the form of an over-excavated area in the low point of the

excavation or a manhole) or sumps be provided at a low point of the site to provide a collection point for stormwater. A pump will transport this sediment laden water to settlement tanks where coagulant and flocculent treatment will be provided as and when required. The water will be recycled whenever possible for dust suppression. Treated water will be discharged to the nearest outlet (such as manhole or catchpit) or collected by mobile devices for disposal. Mitigation measures for pipeline trench dewatering include:

- Allowing water collected in the trench to settle before dewatering if possible.
- Skimming from the surface to avoid suction of accumulated sediment when decanting or using a pump.
- Discharge via a filter bag if dewatering using a pump.
- Ensuring pump rate does not exceed the capacity of the soil to soak in.
- Geotextile and erosion control blankets - Temporary erosion control covers are to be used prior to forecast rainfall events and at the end of daily trenching operations.
- Dust control - Possible measures include:
 - Staging earthworks operations to minimise the time that earthwork areas are exposed to drying.
 - Covering stockpiles with geofabric or sowing in grass.
 - Controlling the route and speed of trucks.
 - The spreading/spraying of water to dampen surface layers of soil to minimise dust suspension.
 - Selection of work areas and times to suit wind conditions.
 - Windbreaking barriers.
 - On-site truck manoeuvring areas will be sealed in order to reduce the probability of mud being deposited onto the road. Any mud that does happen to get tracked onto the road will be cleaned up immediately.
 - Regular monitoring of dust emissions.

Other actions that may be required during construction are contained in Table 2.1 below.

Table 2.1: Indicative erosion and sediment control actions

Issue	Action/Control
Erosion and sediment control	
Stockpiled material and open excavations could cause sediment runoff.	<p>Topsoil and Spoil should be stockpiled separately.</p> <p>Stabilise exposed areas as soon as possible.</p> <p>Silt fencing to be installed around excavation works.</p> <p>Appropriate stormwater inlet protection devices to be used, such as filter socks, during works.</p> <p>Stockpiled material will be stabilised if required.</p> <p>Backfill and compact trenches as soon as possible in a progressive manner.</p> <p>Open excavation to be kept to a minimum.</p> <p>Do not put stockpiles in overland flow paths or within 1m of a hazard area such as kerb and channels, stormwater inlets, paved footpaths or driveways.</p> <p>Any stockpiles that remain on site must be covered with a geotextile fabric at the end of each day or when rain is forecast.</p> <p>Remove excess spoil and/or undercut material from the site as soon as possible, or immediately incorporate it into other works on site.</p>
Wheel tracked sediments	<p>Stabilised construction entrances consisting of a stabilised pad of aggregate on a filter clothe base (in accordance with GD005) to minimise tracking of sediment on and off site.</p>

Issue	Action/Control
	A wheel washing facility will be provided at the entrance if necessary. This will ensure that any vehicles leaving the site do not deposit earth on to the public roading network.
Dewatering of excavations (if required)	
Dewatering may be required depending on the depth of groundwater levels. If any minor excavation fills with water and requires pumping of sediment laden water, sediment controls should be employed.	Excavations will be pumped onto an approved location, sock filters or to grassed areas/swales. Areas used for dewatering are to be checked daily.
Hydrocarbon management	
Machinery oil leak	Checks to ensure machinery is fit for use.
Spill	Spill kit to be available throughout the duration of works. Refuelling and lubrication activities are to occur away from surface water bodies, such that any spillage can be contained so it does not enter the adjacent surface water bodies or groundwater.
Storage of oil/fuel	Hydrocarbons will be appropriately stored in storage sheds or appropriately located or bunded areas.
Works near surface water bodies and watercourses	
Bank collapse due to works and machinery near stream	Works to be performed at an adequate distance from banks to minimise likelihood of collapse. Contractor to assess conditions prior to works.
Sediments enter stream as a result of work and machinery movements	Install sediment controls as per best practice. Select equipment location to minimise risk.
Surface water runoff	
Surface water runoff from site contributes to erosion and sediment runoff	Silt fence to be placed alongside stream banks if necessary. Surface water from general site works to be diverted away from excavation area using bunding and/or cut-off drains. Any surface water accumulated on potentially contaminated soils will be contained on site and disposed at a licensed facility.
Adverse weather conditions	
Silt controls cause water to pond near residential properties	Clean up site and replace sediment controls. Notify Auckland Council Pollution Control if ponding is to affect stormwater network or habitable buildings.
Maintenance and monitoring	
Contractor will be required to inspect all erosion and sediment control measures on a daily basis. Site monitoring will be undertaken before and immediately after any rain event as well as during heavy rainfall events. Any required maintenance and improvements to control measures will be undertaken and recorded by the Contractor. All erosion and sediment control measures will be maintained in accordance with GD005.	

2.3 Works within surface watercourse

The construction works from Old Pine Valley Road to Pine Valley Road will require the construction of one culvert crossing for an intermittent stream located in a pasture feeding a surface water feature (pond).

The new culvert may require diversion of the current intermittent stream whilst it is constructed, if it is not possible to construct the culvert during the summer months when the intermittent stream is likely to be dry. The GD005 Section G4.0 gives basic requirements for the construction of a temporary culvert to divert streamflows while the new culvert is being installed:

- As far as practicable the temporary culvert should be located in a section of the watercourse that is to be modified as part of the permanent design;
- Sizing to be designed so that no erosion or overtopping of the culvert occurs;

- The cross-section of the culvert should be sized for approximately 85% of the channel cross-section; and
- Structural stability, utility and safety must also be considered.

As an alternative to diversion, if the stream is in low flow, it may be more cost effective to create a dam and pump in the location of the intermittent stream, which will provide dry working conditions in the location of the intermittent stream as this is less harmful to the environment and more simple to carry out. See section G4.2.2 of GD005.

2.4 Staff compliance

All staff involved in the project shall be trained in the implementation of the procedures described in this document and will be required to adhere to these procedures and to contribute towards the review and improvement of the procedures on a continuing basis.

Any breach of these procedures for environmental protection could have adverse effects on the environment and can require costly remedial action to correct. It is the responsibility of all staff members to anticipate problems on the work site and to take prompt and effective measures to overcome them.

It is essential that all staff members are aware of the risks to the environment arising from these processes and are fully conversant with the measures described in this document to minimise those risks. This plan is open to adaptation and improvement over the duration of the works.

2.5 Indicative Maintenance and Monitoring

Sediment and Erosion Control monitoring will be undertaken by the contractor's project supervisor and an Auckland Council representative (if required by Auckland Council). All sediment control measures will be monitored in accordance with GD05 guidelines. The control measures will be checked regularly, to ensure that they are performing as intended by design.

Sediment and erosion control monitoring will include:

- Inspection for scour and breach of silt fences.
- Inspection of the stabilised construction entrance to check condition/wear.
- Inspection of silt fences for depth of sediment, tears, if the fabric is securely attached to the fence posts, and to confirm fence posts are firmly in the ground as well as for areas of collapse/decomposition/ineffectiveness.
- A full site 'walk over' inspection undertaken daily by the site supervisor before the end of each day to identify any corrective maintenance required. A more thorough inspection will be undertaken at the end of each week by the site supervisor, and before and after a forecast major storm event, to identify any preventative and/or corrective maintenance necessary.
- During a major rainfall event, the contractor will inspect the works to confirm that the ESC measures are working as required. Remedial measures are to be carried out if required. The Engineer will be advised by the Contractor of any maintenance or remedial works undertaken, or of any changes required to the ESCP to accommodate changes in conditions or work programme.

The Contractor shall maintain records on site of erosion inspections and will make available any reports at the request of the Engineer.