

To

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From

*Woods
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Reviewer: Brian Flood
Revision 1*

Memorandum - Covid-19 Fast Track Consent Referral - Earthworks

Weiti Bay Village 1, Ara Weiti Road, Redvale

1. Introduction

This memo has been prepared to support the Weiti Bay Village 1 Development for the referral process for a Covid-19 Fast Track Consent with the respect of earthworking activities.

1.1. Development Description

The Weiti Bay Village 1 Development consists of the earthworks and civil works in order to form 220 residential lots, a retirement village and a small commercial centre to support the development. In order to achieve this, approximately 28 Ha of bulk earthworks is required to form a developable landform.

1.2. Site Description

The site is located at Lot 172 DP513840 Ara Weiti Road, Redvale 0794

The site is currently covered by wilding pines and other regrowth (slash zone) following removal of the commercial forestry previously in place on the site several years ago. There are two watercourses within the property boundary on the eastern and western sides which discharge into the Karepiro Stream and eventually the Karepiro Bay which is noted as a sensitive receiving environment as part of the Long Bay – Okura Marine Reserve.

The site has access to Ara Weiti Road along the sites frontage. A now defunct forestry road runs through the middle of the site and connects to the forestry road network at the top of the site.

The site levels vary between mRL 10 at Ara Weiti Road to mRL 73 at the highest point of the site in the south western area.



Figure 1: Site Location & Description (Auckland Council Geomaps)

1.3. Earthworks Activities

The bulk earthworks will comprise of the following activities:

- Clearing of approximately 33.5 Ha of partially regrown pine forest slash zone
- Bulk cut to filling of approximately 600,000 m³ over 28 Ha staged over the development construction in approximately 3 earthworks seasons.
- Construction of 7 Sediment Retention Ponds sized for approximately 5 Ha each and other measures over and above industry standard in order to reduce erosion and sedimentation of the existing waterways and coastal environment.
- Construction of Geotechnical Remediation structures and drainage in order to stabilise the landform
- Protection and enhancement of existing drains, overland flow paths and wetlands within the lot area
- Culverting of approximately 20m of existing drains

1.4. Earthworks Stages

The works is proposed to be undertaken over 3 earthworks seasons:

- Earthworks 1 (2022-23) – the first season will largely consisting of enabling works and shear key construction within in a 5 Ha area in order to undertake more substantial works in the following earthworks season
- Earthworks 2 (2023-24) – the second earthworks season consisting of approximately 21 Ha shall enable the commencement of civil works in mid 2024.
- Earthworks 3 (2024-25) – the final earthworks season shall complete the final 15 Ha to enable civil works to be completed.

2. Bulk Earthworks

2.1. Earthworks Scope

The bulk earthworks required to form the roads and building platforms for the proposed development includes approximately 600,000 m³ of cut to fill plus further earthworks in order to complete geotechnical remediation works over approximately a 28 Ha area.

2.2. Earthworks Methodology

Each earthworks system shall consist of the following phases:

Phase 1 – Enable Controls

- Install 'Last Line of Defence' super silt fence along riparian margin extents.
- Install clean water cut off drains
- Install Super Silt Fences (SSF) or Decanting Earth Bunds (DEB) to areas where Sediment Retention Ponds (SRP) are to be constructed along with polishing ponds (if required).
- Construct SRPs then remove SSF or DEBs if required.
- Install monitoring (where required) and certify all controls.

Phase 2 – Bulk Earthworks Commencement

- Strip topsoil within catchments of SRPs and other controls and stockpile clear of the works.
- Undertake necessary geotechnical remediation works in fill areas prior to placement of fill.
- Undertake bulk cut to fill operations

Phase 3 – Bulk Earthworks Completion

- Complete cut areas and then undertake necessary geotechnical remediation works within cut areas.
- Complete fill to subgrade levels.
- Survey subgrade and provide to Engineer for approval.
- Scarify batters to ensure topsoil does not slump off and obtain signoff from Geotechnical Engineer.
- Place topsoil to depth outlined within specifications.
- Stabilise topsoil area with straw mulch (and seed/fertilise if required) or sow grass and wait for suitable grass strike.
- Stabilised areas will be diverted away from SRPs and other controls by the use of Clean Water Drains (CWD)
- Install clean water upstands at top of batters and bunded off areas to divert clean water and stop ponding.

Phase 4 – Removal of Controls

- Once areas have been mulched or suitable grass strike has been obtained, seek approval from AC Monitoring Officer for removal of controls.
- Install SSF or DEB for removal of SRPs.
- Remove structures within SRP
- Undertake cut to fill operation within SRP area.

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- Prepare for and topsoil area, then stabilise.

2.3. Open Area

The preferred strategy for bulk earthworks is to complete and close down (stabilise) open areas as quickly as possible. The works is intended to be staged so that no more than 20.0 Ha of site area is exposed at the peak of the earthworks construction. The lowest practicable open area will be maintained to keep the works productive.

Reducing open area also reduces the portion of the site which experiences erosion and sediment generation which lowers the risk of suspended solids discharge into the receiving environment.

2.4. Winter Works

The bulk earthworks operations are intended to be undertaken between the months of October to April within the normal earthworks with civil works being undertaken year round. Should there be delays in commencing the works or unforeseen delays, then approval will be sought for Winter Works to enable works outside those month.

3. Erosion & Sediment Control

3.1. Erosion & Sediment Control Philosophy

A four-step erosion and sediment control methodology is proposed to ensure that any potential effects resulting from land disturbance are appropriately avoided, remedied and/ or mitigated. This is particularly important as the watercourses within the sub-precinct ultimately flow into the sensitive Long Bay-Okura Marine Reserve.

Both structural (physical measures) and non-structural (methodologies and strategies) control measures are proposed, comprising of:

- Team Approach
- Erosion and Sediment Control Devices and Measures
- Last Line of Defence
- Monitoring

The proposed erosion and sediment control measures have been designed to and will be implemented to meet or exceed the guideline standards of Auckland Council (AC) "Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region" (GD05).

The methodology should be read in conjunction with the Appendices attached to this report.

3.2. Team Approach

The Team Approach ensures that adequate resources, commitment and expertise are provided to support the Erosion and Sediment Control Methodology from start to finish. Importantly this team undertakes pre and post storm surveys and at all times a significant resource and "expertise base" is utilised to ensure appropriate and technically sound decisions are made. Stakeholders involved in the project will include:

- Principal/Client
- Engineer to Contract
- Geotechnical Engineers
- Environmental Consultant/On Site Environmental Advisor
- Earthworks Contractor

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- Civil Works Contractor
 - Infrastructure Contractor
 - Statutory Authorities

3.3. Erosion & Sediment Control Devices and Measures

Onsite erosion and sediment control devices and measures make up the 'structural' aspects of the erosion and sediment control methodology. These devices and measures are designed to minimise the extent of erosion (sediment generation) and discharge of sediment (sediment yields) to the freshwater and marine receiving environments including the Long Bay-Okura Marine Reserve.

The proposed erosion and sediment control measures shall be designed to meet or exceed the guideline standards of GD05 and (legacy) TP90.

The Erosion Control Devices / Measures that are proposed are identified in Ridley Dunphy Environmental Ltd's report "Weiti Bay Village 1 Assessment of Erosion and Sediment Control Approach".

3.4. Last Line of Defence

The 'last line of defence' approach has been formulated as a backup to the proposed controls.

While the aforementioned primary erosion and sediment control measures will minimise the discharge of the sediment to the receiving environment, an extra line of defence is proposed.

For areas within 20m of a watercourse, a Super Silt Fence will be erected between the works and the stream. The Super Silt Fences will provide a backup protection in the unlikely event that the primary erosion and sediment control devices and measures fail.

For areas that are further than 20m of a watercourse, a vegetated filter strip will remain in place whereby uncontrolled discharges can be remediated should they occur.

3.5. Monitoring

Monitoring of the erosion and sediment controls shall be undertaken on a regular basis including:

- Weekly site walkovers involving all stakeholders to inspect and determine the effectiveness of all erosion & sediment control devices installed on site.
- Random sampling of inflows and outflows during storm events to test the effectiveness of controls.

By implementing a rigorous monitoring programme, the following benefits will result:

- Improved response times for rectifying any failures in erosion and sediment control devices with a focused response;
- Weather responsive monitoring/ storm preparedness;
- Compliance with resource consent conditions; and
- The minimisation of potential for adverse effects in the receiving environment.

The on-site environmental monitoring consultant/advisor shall provide daily erosion and sediment control direction and advice to all site personal and coordinate and report on monitoring for the erosion and sediment controls. Monitoring data and reporting will be taken in accordance with monitoring plan and shall provide for systematic review of the effectiveness of site environmental management and controls.

3.6. Potential Strategies for High-Risk Areas

As the Weiti Village 1 development area has significant areas of steep slopes which can generate higher levels of erosion during rain events, methods for reducing erosion will be critical in order to achieve the high standard of sediment removal required for this development. Potential methodologies for reducing erosion are:

- Benching the works and temporarily stabilising steep face – this can reduce the impact of steel slopes by benching the steeper slopes into terraced platforms suitable for machine movements during earthworks then draining water away from the slope and stabilising the steep face with hydroseed or other approved methodologies.
- Tracking of slope – prior to rain events, the slope is tracked with a treaded machine creating a series of pockets for water to sit on the slope and reduce energy as it flows down
- Stabilising steep areas – stabilisation pre storm with mulch or cloth will reduce erosion
- Contour drains – installed more frequent than required in normal calculations to reduce energy created between drains
- Soil Socks / Straw Wattles – installed on slope in lieu of contour drains.

3.7. Dust Management Plan

This Dust Management Plan (DMP) has been formulated to address the potential effects of the discharge of dust (dust nuisance) from proposed earthworks activities for the site.

To cater for the potential of dust nuisance from the proposed works, this plan has been formulated to:

1. minimise dust production in the first instance; and
2. identify the dust nuisance in the event of its production; and
3. to propose measures to mitigate the effects of dust if the situation eventuates.

This plan has been formulated in accordance with the “Ministry for the Environment. 2016. Good Practice Guide for Assessing and Managing Dust. Wellington: Ministry for the Environment.”

The proposed works on site have the potential to generate dust that may be regarded as a nuisance to surrounding landowners. Aspects of the works that may generate dust are:

- Topsoil stripping and stockpiling
- Excavating, spreading and compaction of soil
- Loading and unloading trucks and equipment
- The movement of vehicles across areas of the site that have been exposed, including stabilised access tracks within the larger development area, public roads and haul roads between earthworks operations (in accordance with the TMP).
- Wind blowing across the site picking up stockpile material and other exposed surfaces
- Application of lime or cement to roads and earthworks areas.

It should be noted that the potential for the generation of dust from the proposed works may be exacerbated at times of dry and windy weather. To avoid the generation of dust and to mitigate dust if the situation arises, this plan sets out specific control measures to be implemented on site as described below:

- A copy of the DMP is to be held on site and all contractors and subcontractors are to be made aware of its existence and their responsibilities in its implementation
- The Contractor is to monitor dust emissions on a daily basis and implement appropriate measures if necessary

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- The Contractor shall provide sufficient water carts (or sprinklers) that are capable to ensure that the exposed areas of the site are appropriately moistened to avoid dust generation throughout the day. The number of water carts on site are to be determined by the contractor with liaison with the supervising engineer.
 - The site is to be watered at the end of each working day when it is considered there is a significant risk of dust generation (unless there is sufficient rain or showers falling or forecast)
 - The site is to be watered if strong winds are forecast and these coincide with dry ground conditions
 - When strong winds are present during site works, earthmoving machinery and lime operations shall cease work or operations will be modified to reduce dust generation
 - To avoid suspension of dust, vehicle movements on site are to be restricted to no more than 15km/h if strong winds and dry conditions exist
 - A sign shall be erected on site clearly displaying a 24-hour contact telephone number for the site contractor for dust and other complaints
 - The Contractor is to promptly implement additional dust control measures when a complaint is received and note the complaint, outcomes and actions in the Health & Safety logbook.
 - A record of dust events or complaints is to be recorded in the Health and Safety logbook on site. The site Contractor and supervising Engineer is to review this log on a fortnightly basis and discuss the outcomes and remedial action taken
 - Earthworks on site are to be staged to allow for progressive stabilisation. Once areas of works are completed to finished ground, progressive revegetation to pasture is to be undertaken at these areas. Monitoring of this revegetation is to be undertaken to ensure good uptake
 - A 2m high dust fence will be erected where earthworks areas on site are within 100m of neighbour's buildings.
 - Stockpiles to be stabilised if not in use.
 - When loading trucks, materials to be dropped from as low a height as practicable.
 - Removal of sediment or dust generating materials from the access road, haul road and public roads with a suction sweeper.

Additional measures that may be considered if the standard measures are not sufficient include:

- Use of a wheel wash facility that also has capabilities to wash dust from vehicles.
- Use of chemical dust suppressants. These products must be applied in accordance with the manufacturer's recommendations for use on haul roads, and borrow areas, and use on stockpiles. It is anticipated that a Vital Bon-Matt product or equivalent approved is utilised on high activity haul roads. The use and frequency of these measures are to be determined by the contractor with liaison with the supervising engineer on site. Products will be trialled on site prior to adopting to determine effectiveness on site.
- Use of sprinklers along haul roads to suppress dust.
- Installation of a dust monitoring station to detect dust levels and wind direction.

The dust emission control procedures are to be monitored by the Contractor on a daily basis and reported in the site Health and Safety logbook. Particular attention is to be paid to the effectiveness of the measures as described above during times of extended dry weather or during high winds.

The purpose of the monitoring program is to identify areas of the site and methods employed that are and are not effective and make changes to the sites dust control appropriately.

The logbook of complaints and daily observations is to be checked on a fortnightly basis by the site Contractor and supervising Engineer.

Water is to be supplied to site by the means of an onsite bore, drawing from impoundment areas such as sediment control devices, or water supplied to site via tanker.

It is expected that there be good dialogue between the Council and Stakeholders in regard to minimising the dust emissions in line with the measures outlined in this DMP. This dialogue is to ensure dust control measures for the duration of the project is to the satisfaction of Council Monitoring staff in line with the following statement:

"No activity shall create dust which is, or is likely to be, either objectionable or offensive in the opinion of an enforcement officer, beyond the site boundary of the activity."

Water supply for dust suppression shall be taken from one of the following sources:

- Sediment Retention Ponds, Stormwater Management Devices and Secondary Polishing Devices.
- Rainwater collected from roofs – this shall be stored within water tanks for use as required. Some rainwater will be able to be drawn from the construction site office roofs.
- Existing freshwater pond located on the adjacent property.
- Water storage for a wheel wash.
- Water delivered to site – this shall be from a public network via a metered up-stand will be utilised for dust suppression.

The Contractor is responsible for providing suitable tanks for collection of rainwater and other supplies to minimise the generation of fugitive dust.

For the construction phase, specific Dust Management Plans shall be provided by the Contractor based on the works stage.

4. Geotechnical Remediation

4.1. Global Stability

In order to achieve global stability of the proposed landform, the following geotechnical remediation works are proposed:

- Shear Keys – these include undercutting the weak foundation material at the toe of the slope, providing drainage, and backfill to support the toe of the slope
- Palisade Walls – in ground pile walls in order to provide stability of the landform
- Retaining Walls
- Reinforced Earth Walls – grid reinforced slopes that are steeper than unreinforced slopes

4.2. Remediation in Cut

Other geotechnical remediation in cut areas may include:

- Capping of Rock Areas – undercutting and re-compaction of finished levels in rock areas to minimise infiltration into the exposed rock and assist house construction
- Slope remediation – cutting back and recompacting slopes with or without additional drainage to improve slope stability
- Slope Scarification – to improve topsoil placement.

4.3. Remediation in Fill

Other geotechnical remediation in fill areas may include:

- Counterfort and underfill drainage
- Undercuts
- Slope Scarification – to improve topsoil placement.

5. Works Adjacent to & Within Watercourses

5.1. Works Adjacent to Watercourses

The proposed earthworks operations shall be offset from the watercourses and wetlands by at least 10m. The works adjacent to watercourses shall include:

- Bulk earthworks at least 10m from wetlands or watercourse
- Geotechnical drainage outlets including the installation of erosion protection to watercourse banks
- Stormwater drainage outlets including the installation of erosion protection to watercourse banks
- Stormwater overland flow path outlets including the installation of erosion protection to watercourse banks
- Construction of stormwater treatment devices

5.2. Works Within Watercourse

The proposed works within watercourses is limited to a culvert on the eastern watercourse in order to access the community centre area and potentially an area of the upper western tributary.

5.2.1. Community Centre Culvert

In order to construct this, the watercourse shall be temporarily diverted to enable installation of the culvert and any fish passage measures. The construction of a watercourse diversion will take place during a period of settled weather long enough to encompass all the works and to ensure flows in the stream will be low and steady.

- 1) The diversion will be constructed up to within 5m of the bank of the existing watercourse and stabilized ready for flows. This step and step 2 will be constructed for both the upstream and downstream connections of the watercourse diversion
- 2) The watercourse will then be dammed off above and below the works and de-fished (in accordance with the ecologist's reporting) and dewatered. Additional flows from the watercourse will be temporarily:
 - a. pumped from above the upstream dam to below the downstream dam for works which will be completed within 1 day; or
 - b. diverted through novacoils laid beside the works from above the upstream dam to below the downstream dam for works which will be completed within 1 week; or
 - c. diverted in a temporary watercourse from above the upstream dam to below the downstream dam for works which will be completed in more than 1 week.

When all water has been removed from the watercourse area, the bed will be excavated to competent ground and cloth and hardfill will be placed up to the correct level of the culvert's invert. Then the culvert

will be placed and backfilled up to subgrade of the concrete crossing. Rock rip rap will be placed on the batters next to the inlet and outlet of the pipe to ensure there is no scour.

- 3) The last 5m of the diversion will be constructed including breaking through the bank of the existing watercourse and then appropriately stabilized.
- 4) When the culvert installation is complete, diversion will stop and be removed, then the downstream dam at the end of the watercourse diversion will be removed first followed by the upstream dam at the start of the watercourse, allowing it once again to flow.

The removal of a stream diversion shall undertake a similar methodology to the installation of the stream diversion, however the stream will be diverted back to its original alignment. A period of settled weather be required prior to the works being undertaken.

Upon backfill of the stream diversion, the stream bed and bank adjacent to the diversion will be stabilized with geotextile and rock rip rap placed to ensure there is no scour in this location. Landscaping can follow on after these works to further stabilize the area.

5.2.2. Upper Western Tributary

It has been identified through the earthworks and geotechnical reviews, that it may be preferable to realign (vertically &/or horizontally) a small section of the upper western tributary as part of the development and enhancement works. The detail of the realignment is subject to further earthworks design and geotechnical investigations of the development. However, any works will retain the stream length and hydrology, within a newly formed channel, and the riparian margin replanted and enhanced.

The methodology will likely be similar to the methodology used for the culvert above, utilising a temporary diversion while the works occur.

5.3. Ground Water

5.3.1. Counterfort & Underfill Drainage

As part of the geotechnical remediation, ground water will be diverted away from risk areas by the use of counterfort or underfill drainage. This will be diverted into outlets located on the banks of adjacent watercourses with appropriate scour protection provided.

The intention is to provide outlets within the same catchment areas to ensure that the effects to existing watercourses and wetlands are minimised.

5.3.2. Groundwater Recharge

With the creation of engineered fill areas with lower permeability, then ingress of stormwater to ground required to recharge groundwater systems will be lowered. It is the intention of the landform to discharge the network and overland flows from stormwater catchments into similar locations to the existing catchment to ensure effects to existing watercourses and wetlands are minimised.

5.3.3. Temporary Dewatering

During undercut and other geotechnical and earthworks activities, pumping of the ground water may be required. It is proposed that this is pumped to the nearest sediment & erosion control devices so that it can be returned to the ground or watercourse.

6. Other Works

6.1. Walking, Cycling & Bridal Tracks

Minor earthworks or temporary exposure of land may be required in order to construct the proposed walking, cycle and bridal tracks. The typical erosion and sediment control methodology for access roads,

bridleways and walking tracks shall be a cut and cover methodology. Sections will be opened and stabilised fully within the same working day.

Where areas are required to be open for longer than one working day, appropriate temporary erosion and sediment controls shall be installed in order to undertake these works.

Should access roads be required in order to provide machinery to these works, the installation of aggregate stabilised access tracks shall be undertaken utilising the same cut and cover methodology as the track methodology.

6.2. Enhancement Works

Typically stream and wetland restoration works should be undertaken in a manner that does not disturb the stream bed, banks, or create erosion or sediment discharge. Generally, works within the stream corridor will occur prior to or following other adjacent operations so that pressure is not placed on the controls.

The typical methodology shall be:

- Install controls to divert clean water away from works area. This may include installation of silt fence or bunds.
- Should works be required in the stream bed, then a stream diversion should be installed suitable for the duration and scope of works proposed. The Ecologist will require the stream to be de-fished prior to removal of water.
- Works should be undertaken from an enhancement methodology, where minimal impact to the stream operation and performance occurs during the works.
- On completion of the enhancement works, the works areas shall be stabilised and the controls removed.

7. Conclusion

The proposed earthworks required to complete the Weiti Village 1 works can be undertaken in such a manner that minimises impacts to the receiving environment including the Long Bay-Okura Marine Reserve. A four-step erosion & sediment control approach along with additional measures and considerations is suitable for a site of this size and location relative to the receiving environment.

Yours sincerely



Ben Pain

Associate Engineer



Brian Flood

Director