REPORT

Tonkin+Taylor

Healthy Waters - Te Ararata Flood Resilience Works - Walmsley Road Bridge Replacement

Te Ararata Flood Resilience Works – Walmsley Road Bridge Replacement

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1 Overview

1.1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Auckland Council's Healthy Waters department (Healthy Waters) to undertake an erosion and sediment control plan (ESCP) for the proposed Te Ararata Walmsley Road bridge replacement works (the Project). The Project is flood resilience works, with this plan developed to support a resource consent application under the Severe Weather Emergency Recovery (Auckland Flood Resilience Works) Order 2024.

This report assesses the erosion and sediment effects of the Project based on an indicative construction methodology and concept design developed to support the resource consent application.

A reasonable worst case and effects envelope has been assumed within this assessment to account for potential changes to activities and programme. Minor changes to the final methodology and detailed design are unlikely to change the overall envelope of effects as presented in this report.

1.2 Project background

The January 2023 floods, followed closely by Cyclone Gabrielle, marked a period of unprecedented weather challenges for Auckland. The floods, and the subsequent cyclone caused significant infrastructural damage, with an estimated 8,000 homes destroyed or damaged and thousands of residents' lives affected. The events underscored the city's vulnerability to extreme weather, prompting Auckland Council to endorse the "Making Space for Water Programme" developed by Healthy Waters. This initiative aims to mitigate flood risks through a series of blue-green networks, addressing critical flood-prone areas with sustainable stormwater solutions.

As part of the overall Programme, Healthy Waters identified a combination of interventions within the Te Ararata catchment (overall referred to as the Te Ararata Project) to collectively address the flood resilience issues further outlined in the Assessment of Effects on the Environment (AEE).

Please refer to the project and site description in the Assessment of Effects on the Environment (AEE) report submitted with the application.

1.3 Project overview

The first package of works within the overall Te Ararata Project is for the Walmsley Road bridge replacement works (i.e. the Project) and is the subject of this assessment. The Project seeks to achieve greater flow capacity and reduce blockage risk beneath Walmsley Road and within Te Ararata Creek.

A detailed description of the proposed work and indicative methodology is provided in the AEE prepared for the application. The Project is located within the existing Walmsley Road bridge, Te Ararata Creek, Black Bridge Reserve and Walmsley Road Reserve. Overall construction of the Project is anticipated to take approximately 10 – 12 months, with closure of the existing Walmsley Road bridge required for approximately 7 months during this period.

In summary, the Project includes the following key elements:

- Demolition and removal of the existing Walmsley Road twin culvert.
- Construction of a new replacement Walmsley Road bridge over Te Ararata Creek.
- Works to tie in the new replacement bridge with the existing road network.
- Recontouring of the stream banks under the bridge to achieve a wider stream channel.

- Relocation of the existing Watercare watermain pipe bridge foundations to achieve a wider clearance beneath the structure.
- Existing service relocation and/or realignment.
- Vegetation clearance, including within riparian margins and the removal of trees.
- Earthworks associated with temporary and permanent works, including within the riparian margins.
- Other temporary works and activities to facilitate the construction of the permanent Project including:
  - The formation and operation of laydown areas and a site compound predominantly within Black Bridge Reserve.
  - Works within and around the Te Ararata Creek including temporary stream diversion; and
  - Temporary traffic management measures including a temporary bailey bridge to facilitate pedestrian and active mode diversions between Coronation Road and Walmsley Road. Vehicular traffic will be diverted to the wider existing road network.

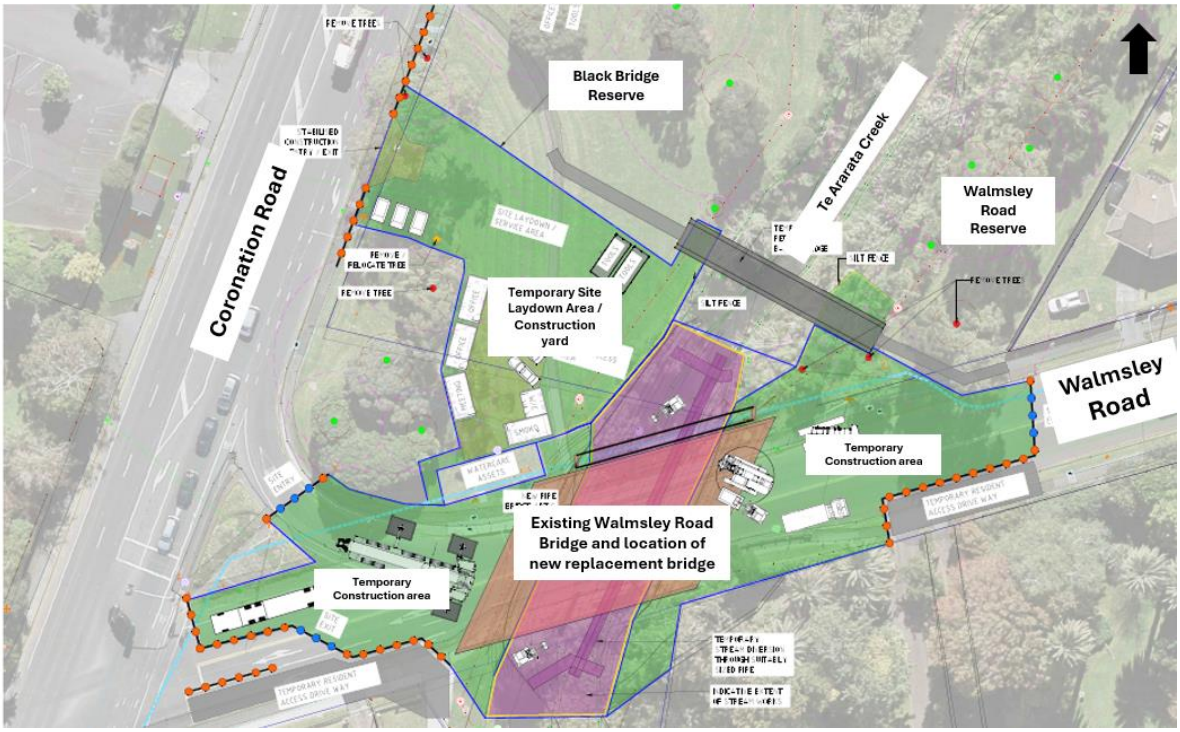


Figure 1.1: Proposed location and works extent for the Project.

1.4 Information sources

The following information sources have been used to inform this ESCP:

- HEB Te Ararata Culvert Replacement Construction Site Layout Plans[1], 23/10/2024.
- T+T Draft Programme - 'Te Ararata – Bridge Programme Rev E'[2], 02/10/2024.
- Tonkin & Taylor Ltd Preliminary Civil Design Drawings 1017033.2003-1122 Rev 1[3].

[1] HEB Te Ararata Culvert Replacement Construction Site Layout Plan drawing 'TACR-HEB-01-00-DR-Z002' received on 24/10/2024

[2] T+T Draft Programme - 'Te Ararata – Bridge Programme Rev E' 02/10/2024

[3] Tonkin & Taylor 'Te Ararata Preliminary Civil Design Drawings' issued on 24/10/2024

2 Proposed works

2.1 Site description

The existing Black Bridge Culvert is located on Walmsley Road in Mangere, Auckland. It is a two-lane structure that spans Te Ararata Creek, located at the southern edge of both the Black Bridge Reserve and Walmsley Road Reserve, which lie to the west and east of the creek respectively. Residential neighbourhoods are situated to the east of Walmsley Road and south of the bridge. The existing bridge was built with a concrete culvert, featuring two rectangular openings, each 2.5 m in width and 3.7 m in height. A solid pier separates the two openings as per Figure 2.2.

Figure 2.1: Aerial view of project location - Site Plan.

Figure 2.2: Te Ararata Creek Culverts.

2.2 Proposed development

The overall project generally comprises civil construction activities to upgrade the existing Walmsley Bridge, with plans to remove the existing double culverts, which have been restricting flood flows and caused significant blockages during the severe weather events of 2023. The project will also involve stream bank shaping and stabilisation to increase the flow capacity within the Te Ararata Creek.

During the construction of the new permanent bridge, Walmsley Road will be closed for approximately 7 months to allow the construction team to remove the existing bridge and install the new bridge.

The area to the west of the current bridge, Black Bridge Reserve is proposed to serve as a construction laydown area for material, site offices and vehicle parking. We understand that the contractor prefers to remove the topsoil, lay down geotextile fabric, and then cover it with compacted GAP65 aggregate. The topsoil will either be transported off-site to a suitable landfill or bunded around the site perimeter and protected with geotextile cloth pinned to its face.

An estimate of the construction timeline is shown on Table 2.1, for further information on the indicative construction methodology and timeline please refer to the AEE.

Table 2.1: Approximate earthworks durations

Construction Stage	Approximate Duration	General scope of works
Stage 1	Two months	Site establishment and temporary bailey bridge construction
Stage 2	Four months	Existing culvert removal, temporary stream works, and bridge substructure works
Stage 3	Four months	Watercare pipe strengthening and permanent stream works
Stage 4	Two months	Bridge superstructure, civil tie in road works and site disestablishment

Note: Approximate durations extracted from T+T Draft Programme - 'Te Ararata – Bridge Programme Rev E'[2], 02/10/2024

2.3 Extent of earthworks

The estimated volume and area quantities have been sourced from T+T Te Ararata Preliminary Civil Design Drawings[3].

The extent of earthworks for the finished design is estimated to be 820 m^2, with an approximate total cut volume of 1,771 m^3 and fill volume of 4 m^3. These estimates and those shown on Table 2.2 are based on the preliminary civil design surface compared with existing ground levels. An estimated additional 500 m^3 excavation off-site is required to reach the top of pile level and for the construction of the abutment cap. The earthworks will be conducted in stages to minimise the area of exposed soil at any given moment.

The extent of earthworks for the temporary works are split into three areas which are summarised on Table 2.3 below.

Note that the values presented below in Table 2.2 and Table 2.3 are preliminary and subject to change as the design progresses.

Table 2.2: Estimated cut and fill volumes for permanent works

Location	Cut (m^3)	Fill (m^3)	Balance (m^3)
Stream bed	111	4	-107
Riparian yard	526	0	-526
Sediment Control Protection Area (includes stream bed and riparian yard)	1,771	4	-1,767

Note: Volumes calculated by comparing existing ground surface to the T+T Te Ararata Preliminary Civil Design surface. Refer to T+T Drawing 1017033.2003-1122 for indicative extents of stream bed, riparian yard, and Sediment Control Protection Area. An estimated additional 500 m^3 excavation off-site is required to reach the top of pile level and for the construction of the abutment cap.

The permanent earthworks cut and fill volume estimations are based on a comparison of the existing surface and the proposed final surface.

Table 2.3: Estimated earthworks area and volumes for temporary works

Location	Earthworks Area (m^2)	Earthworks Volume (m^3)
Site access and laydown area	1,500	500
Bailey bridge structure including abutments	170 (eastern side) 100 (western side)	85 (eastern side) 50 (western side)
Approach pathways to the bailey bridge	50 (eastern side) 150 (western side)	10 (eastern side) 30 (western side)

Note: Temporary earthworks areas and volumes provided by HEB[4].

2.4 Design philosophy and process

This ESCP has been prepared to support the resource consent application, the contractor will prepare the final ESCP for certification by council prior to works commencing. All erosion and sediment control will be installed in accordance with GD05[1].

[4] Grafia, Adriene. "RE: Walmsley Bridge ESCP DRAFT" Received by Joanna Park, 24/10/2024

This ESCP has been prepared following consultation with the Contractor, to determine best practicable measures of mitigating erosion and sediment runoff into the receiving environment. All control measures will be installed and managed by the Contractor on site as required.

The construction works onsite will be staged and the earthworks will be conducted during winter months, (starting in March). Relevant winter works approvals will be obtained prior to commencing construction.

Based on the Contractors methodology the project comprises four key stages involving earthworks activities, listed below.

- Stage 1 – Site establishment and temporary pedestrian bailey bridge construction.
- Stage 2 – Existing culvert removal, temporary stream diversion, and bridge substructure works.
- Stage 3 – Watercare pipe strengthening and permanent stream works.
- Stage 4 – Bridge superstructure, civil tie in road works and site disestablishment.

2.5 Potential effects associated with the works

A list of the relevant potential effects associated with the works (temporary and permanent) related to the works undertaken in the Sediment Control Protection Area defined in the Unitary Plan are:

- Sediment could be tracked out onto local roads, which can enter road catch pits and into the stormwater network and discharged into the receiving environment.
- Working in and around an existing creek presents a higher risk that sediment laden runoff to enter directly into the Mangere inlet.
- As a portion of the site works is located within the 100-year flood plain there is a risk that sediment could potentially be washed from the site directly into the CMA.
- Dust generation onto neighbouring property and /or the public.

3 Erosion and sediment control methodology

3.1 Stage 1 - Site establishment and temporary bailey bridge construction

3.1.1 Site establishment

Works on site will commence by securing the western and eastern compounds at Black Bridge Reserve and Walmsley Road Reserve respectively. Tree felling and vegetation removal will commence and a 1.8 m high fence will be installed around the perimeter of the established compound areas.

A stabilised entranceway will be constructed on the western side of Black Bridge Reserve to allow construction vehicles to enter the western site compound off Coronation Road. Super silt fences will then be established along the northern and eastern site boundaries of the western compound. The topsoil will then be stripped and geotextile will be placed with 300 mm of compacted GAP 65.

The eastern compound at Walmsley Road Reserve will be established in a similar manner to the western compound, with super silt fences established along the northern and western site boundaries of Walmsley Road Reserve.

Overall, the total area of topsoil to be stripped, geotextile and GAP 65 to be placed in the western reserve is approximately 1700 m^2. Similarly, the eastern reserve will consist of approximately 400 m^2 of stripped topsoil, geotextile and GAP65 to be placed.

Please refer to Appendix B for the site layout.

3.1.2 Temporary Bailey bridge construction

Once the site has been established, the temporary Bailey bridge diversion for pedestrian and active mode works can then commence. The foundation system is expected to comprise shallow pad concrete abutments. Micro piles may need to be installed under the footprint of the abutments to provide additional slope stability measures. The bridge piles will be located at the top of the creek embankment.

It is expected that sediments generated from this activity will be limited and well controlled primarily due to the nature of the construction equipment being utilised, the installed environmental controls (silt fences and stabilised working areas), and the geological conditions of the site. Basalt, being a hard and dense rock typically produces minimal fine sediment when drilled compared to softer soils. This characteristic means that the drilling process is unlikely to generate significant volumes of loose material that could be easily transported by water runoff.

Following any piling that may be required, the construction of the temporary Western abutment piers can commence. The same activities will be undertaken on the Eastern Reserve. The Bailey bridge design typically involves modular steel structures that can be assembled quickly, making it suitable for temporary solutions. To further limit the spread of sediment, any spoil that may be generated from construction of the bailey bridge foundations will be immediately removed offsite, reducing the likelihood of sediment entering nearby watercourses or drainage systems.

The proposed super silt fences on either side of the Reserves are expected to contain the sediments generated from the above activities.

Once the temporary Bailey bridge abutments, piles, beams and decks have been installed, the tie in connection into Coronation Road and Walmsley Road can commence.

Firstly, all equipment and materials no longer required will be demobilised and transported offsite or put into storage within the western side of the established construction working area.

Construction of the temporary pedestrian and active mode footpath leading up to each of the temporary bridge abutments can commence. Both sides are expected to be tied in using a layer of geotextile cloth overlaid with stabilised GAP 65. This will use conventional civil works plants and equipment (e.g., truck, excavator, compactor).

Silt socks will be placed around all catchpits on the downstream side of the excavation extents on the western and eastern roadway connections to prevent sediment from this activity entering the public stormwater network.

Refer to Figure 3.1 below for the location of the pedestrian and active mode connections to the footpath on the western and eastern side of the reserve.

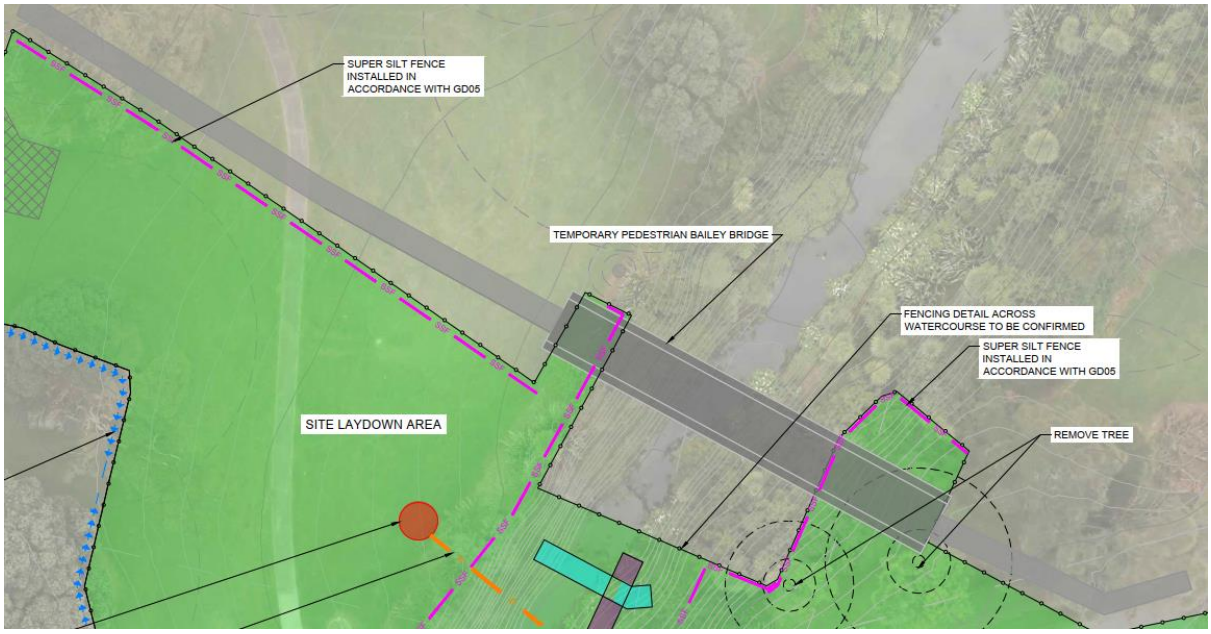


Figure 3.1: Indicative location of temporary Bailey pedestrian and active mode access bridge.

3.2 Stage 2 - Existing culvert removal, temporary stream diversion, and bridge substructure works.

3.2.1 Temporary stream diversion

Prior to removing the twin culverts, the construction team will need to establish a method of conveying the Te Ararata Creek flows along with providing for fish passage through the area of works. This will be achieved by inserting a suitably sized temporary PE or steel pipe through one side of the existing culverts and placing sandbags around the inlet and outlet of the temporary pipe to dam upstream and downstream flows. This will create a contained region in the vicinity of the existing culverts where any debris and sediment resulting from this activity will accumulate.

Once the stream diversion is in place and prior to any construction works commencing, the standing water contained between the sandbagged headwalls will be de-fished by the Project Ecologist[5]. The water will then be pumped out into a suitable treatment device such as a sediment tank or a DEB for water quality treatment prior to returning it to the receiving environment.

Erosion and sediment controls will be put in place before the demolition begins, including the installation of silt fences along the top of the stream banks to capture any sediment that could be dislodged during the works. These fences act as a barrier to prevent sediment from entering the stream from the disturbed areas above. Any temporary access tracks within the contained region of the stream bed will be constructed with clean, free-flowing aggregate which will be removed once the culvert has been excavated, and stream banks laid back and rip-rap placed along the banks.

Works in the stream bed will be undertaken during low flow conditions. Throughout the works, the weather forecast will be continuously monitored and if rainfall is predicted then appropriate measures will be taken to stabilise the works area and ensure that conveyance capacity of the watercourse is not impeded.

[5] The ESCP works will be undertaken in conjunction with the projects Ecological Management Plan which includes measures to address potential effects on fish, including salvage and relocation and security measures.

3.2.2 Removing existing twin culverts

The removal of the twin culverts will be carried out in two stages. First, with the temporary pipe in place on one side, the team will remove the first half of the culverts. Once that section is cleared, the pipe will be moved to the other side, allowing for the demolition of the second half without disrupting the streams flow. This phased approach minimises environmental impact, providing for fish passage, and sediment is contained throughout the process.

Figure 3.2: Two stage stream diversion and culvert demolition.

3.2.3 Bridge substructure works

Following the removal of the double culverts, the construction team will then move onto drilling the permanent bridge piles on the western and eastern sides of the proposed bridge, this should take approximately 3 - 4 weeks for each side.

A combination of heavy machinery will be used to carry out this activity including a piling rig to drill through the underlying basalt and a hydraulic hammer to drive close ended tube piles into the ground. Once the piles are set in place, they will be filled with concrete and the construction team will begin formation of the abutment caps for the permanent bridge. These operations will take place on both sides of the existing bridge.

To manage potential environmental impacts during piling and concreting, a range of erosion and sediment controls measures will be in place. Silt fences will be installed along the top of the stream banks to capture sediment that could be dislodged during construction and prevent it from washing into the stream below. Water that has been contaminated during the drilling process will be managed using a decanting earth bund (DEB) or sediment tank which will treat the water prior to discharging it into the stream.

To construct the abutment cap, temporary retention and excavation to depths of 2.3 - 2.5 m will be needed over the area of each abutment. Excavated soil will be removed from site immediately and any water will be pumped into the DEB.

Please refer to Appendix B for the layout of the associated erosion and sediment controls for the formation of the permanent bridge. For further information regarding piling methodology, please refer to AEE Indicative Construction Methodology.

3.3 Stage 3 – Watercare pipe strengthening and permanent stream works

3.3.1 Watercare pipe strengthening

The existing Watercare pipe abutments conflict with the widened stream profile. New abutments have been proposed further back on each side of the stream to allow the downstream section to be widened beneath the footprint of the existing Watercare pipe.

3.3.2 Permanent stream works

Prior to installing the bridge beams, the stream banks will be cut to their final profile. Once the first half of the existing double culverts have been removed, the construction team will begin excavating the stream bank to achieve the specified design levels. Heavy machinery, such as excavators will be used for efficient excavation. The work will be conducted gradually in sections to avoid destabilising adjacent areas, therefore, maintaining the integrity of the remaining culvert while allowing safe access for machinery.

After reaching the design levels specified, geotextile fabric and rip rap will be installed to provide stability to the stream bank and maintain water quality.

3.4 Stage 4 – Bridge superstructure, civil tie in road works and site disestablishment

3.4.1 Bridge superstructure

At this stage of the project, most of the activities that have the potential for significant sediment release have been completed. During this phase of the Project, once the final stream been profile has been constructed, the piped diversion and sandbag headwalls will be removed. Therefore, opening the stream up into the widened channel.

The bridge beams will then be lifted into place using a mobile crane. For more information pertaining to the superstructure construction methodology please refer to the AEE Indicative Construction Methodology.

3.4.2 Bridge tie-in to existing Walmsley Road

With the bridge superstructure in place, including the installation of beams, deck pours, and edge barriers, the focus will shift to the civil tie-in works. This phase involves connecting the existing road to the new bridge. Standard construction equipment, such as excavators, rollers, and graders, will be used to grade and prepare the roadway for a seamless transition onto the new bridge.

During this phase, the erosion and sediment controls will likely consist of silt fences and dirty water diversion bunds. These measures will continue to prevent sediment runoff and protect the surrounding environment from any residual impacts while the road preparation take place.

With the new bridge completed, attention will also turn to diverting the existing utility services onto the new bridge. Once the services are safely rerouted, the temporary Bailey bridge will be deconstructed.

3.4.3 Site disestablishment

This disassembly will follow the same methods described in earlier stages of the project, but in reverse order. Deconstruction activities will involve removing temporary piles, beams, decking, and other components using cranes and other heavy machinery, while maintaining control over sediment and debris during the process.

After the Bailey bridge has been fully dismantled, the final step will involve removing all erosion and sediment control measures. This will occur only after the site has been fully stabilised and no further risk of erosion and sediment runoff remains. Prior to the removal of these controls, inspections will be conducted to confirm that the surrounding environment is protected, and that conditions are stable enough to safely disestablish the temporary controls. Once confirmed, the water within the sandbagged area will be pumped out to a sediment tank and the temporary pipe can be removed.

Finally, silt fences, and other controls will be carefully taken down and reinstatement of both sides of the reserve will begin. This will involve removing site fences, aggregate, the geotextile laydown area followed by the topsoiling and re-grassing both sides of the reserves. The silt fences will be removed once sufficient grass strike has been achieved.

4 Erosion and sediment control approach

The following section outlines the principles which have been used to develop the methodology detailed in Section 3.

4.1 Key principles and approaches

The primary objective for an ESCP is to avoid causing or accelerating erosion and the subsequent generation of sediment.

The Auckland Council Guidelines, GD05, outlines the key principles that apply to earthworks for this project as follows:

1 **Minimise disturbance:** Only work those areas required for construction to take place.

2 **Stage construction:** Carefully plan works to minimise the area of disturbance at any one time.

3 **Protect steep slopes:** Where steep slopes exist within the works area, ensure that these are protected using geotextile cloth or similar.

4 **Protect receiving environments:** Existing stream should be indicated on the plans with specific stream works and methodologies provided in the finalised ESCP.

5 **Rapidly stabilise exposed areas:** Using either geotextile cloth or aggregate.

6 **Install perimeter controls:** Silt fences will be installed around the perimeter of all proposed earthworks to mitigate sediment runoff.

7 **Overland flow paths (OLFP):** There is an existing OLFP on the south-western side of the site which traverses down Walmsley Road heading east into Te Ararata Creek. This will be maintained and conveyed into the creek using a Novacoil pipe or similar, as per T+T drawings.

8 **Employ sediment retention devices:** Sediment laden water will be treated by retention devices such as turkeys nest / decanting earth bund / or pumping from sandbagged area into sediment tanks.

9 **Make sure the plan evolves:** The ESCP is considered as a 'live' document. The plan should be reviewed routinely and updated during the works to reflect changes associated with construction methodology and/or monitoring results.

10 **Adjust ESCP as needed:** As construction progresses and the nature of land disturbing activities change, the ESCP may need to be modified to reflect the changing conditions on site.

4.2 Ecology Principles

The approach of this ESCP is to minimise the effects to the receiving environment as far as practicable. The effects management hierarchy will be followed as per.

1 Avoid effects – such as the uncontrolled release of sediment into the receiving environment. Activities such as open earthworks cannot be avoided but the effects will be minimised by implementing controls such as silt fences, stabilised working areas, clean water diversions, etc.

2 Remediation – Once earthworks is complete, reinstatement of open earthworks areas and site laydown areas can commence by regressing / revegetating.

3 Offsetting and compensation – If any residual effects remain after all practicable measures have been taken to remedy the impacts of activities, and these effects cannot be fully addressed, they may be subject to offsetting by implementing positive ecological impacts elsewhere.

The main potential adverse effects in relation to our project will be the effects on water quality (including kaimoana and mauri) from sediment along with impacts on the local habitat. Impacts on water quality and habitat, particularly from sediment, can significantly alter habitat characteristics in the receiving environment. Suspended sediment in streams not only affects habitat features but can also harm aquatic life, such as fish, by causing physical damage to their skin. The proposed plan will align with the principles outlined in GD05, with all measures in place to minimise potential effects. As a result, no residual effects are anticipated, removing the need for offsetting or compensation.

5 General erosion and sediment control measures

5.1 Standard earthworks management controls

The following sections provide guidance on the selection of erosion and sediment control measures to be implemented over the course of the project. The control measures proposed are based on the controls and principles outlined in the Auckland Council GD05 guidelines.

Further to the over-arching principles in Section 4.1 of this report, the following information will apply to all earthworks on this Project:

a The development of the proposed sediment controls will be in general accordance with the principles of this ESCP and allow for adaptability throughout the construction earthworks phase.

b The proposed in-stream works will be undertaken on the basis that these are higher risk activities, and where practical will be undertaken off-line in ‘dry’ conditions, with tie-ins to be typically done by temporary dam and divert via flexible flat pipe, or over pumping.

c Sediment treatment devices will be fitted with floating decants with the ability to raise and lower decanting arms to manually control the outflow, if required.

This ESCP provides a suite of controls relevant to the type and scale of earthworks to be undertaken, based on the nature and scale of the activity. A description of the suite of ‘erosion control’ practices are listed in Table 5.1 below. Similarly, Table 5.2 provides appropriate ‘sediment control’ practices, and Table 5.3 ‘ancillary considerations’ for earthworks management.

Refer to typical erosion and sediment control maintenance checklist in Appendix C.

Table 5.1: Erosion control practices

Typical control	Key design criteria	Relevant section of GD05 guidelines
Runoff diversion channel or bund	Prevent clean surface water and stormwater from the surrounding area entering the work site (clean water diversion), or to divert sediment-laden runoff to an appropriate sediment control device.	E2.1 & E2.2

Typical control	Key design criteria	Relevant section of GD05 guidelines
	Use a bund constructed of stabilised material (e.g., compacted soil wrapped in geotextile cloth or rapidly vegetated) around the perimeter of the site to divert clean surface or stormwater run-off. Bund height should be a minimum of 550 mm high.	
Stabilisation of exposed areas	Stockpiles (e.g. topsoil) or large stripped areas (e.g. >250 m²) are to be stabilised if not worked for more than six weeks. Stockpiles and exposed areas are to be stabilised or covered using control measures such as seeding, hydroseeding, mulching, turfing, geosynthetic erosion control systems, aggregate etc.	E3.0

Table 5.2: Sediment control practices

Typical control	Key design criteria	Relevant section of GD05 guidelines
Secondary Treatment device	Options for a secondary treatment device are: • Decanting earth bund (DEB). • 20,000 litre rain tanks for use as settling tanks. • Portable open top steel rectangular settlement chamber (sizes vary, typically containerised). • Portable sediment tank with screens/baffles wall (approximate size similar to a 20-foot shipping container). • Turkeys nest (for smaller volumes). The use of flocculent should be considered.	F1.2, F1.5 & F2.0
Silt fence and Super Silt fence	• To be installed along the perimeter of the work area where 'dirty water' run-off from the work area will discharge. • Silt fence must be supported by a top-wire to be run between wooden battens / waratahs no more than 2 m apart, unless a strong woven material and wire support is used – then they can be extended to 4 m apart. • Super silt fence must be supported by a top wire and lower wire to be run between wooden battens / waratahs no more than 3 m apart. • Embedded a minimum of 200 mm into the ground. • Silt fence fabric is to be installed a minimum of 400 mm above ground level. • Super silt fence fabric is to be installed a minimum of 800 mm above ground level and trenched in 200 mm below ground. • The site side of the trench is to be backfilled and well compacted to secure the silt fence. Joins in lengths of silt fence fabric are to be done by doubling fabric around a waratah or stapling each fabric end to a batten and butting together.	F1.3 & F1.4

Table 5.3: Ancillary considerations

Typical control	Key design criteria	Relevant section of GD05
Dewatering	• Earthworks are to be undertaken in such a manner to minimise the accumulation / ponding of water. • If water from within the work area needs to be removed through pumping, then care must be taken to ensure such an activity is closely managed and monitored ensuring: – Sediment within the water has settled out with a minimum of 100 mm clarity required prior to pumping. – Pumps are to be set up to dewater from the top of the water and to minimise disturbance of the settled water. – Alternatively, ponded water could be pumped into secondary treatment devices, where batch dosing with chemical treatment could be considered to assist with silt settlement. • A variety of other options also exist in which sediment can be removed by pumping the water through a sediment tank with baffles, turkey's nest or pipe sock. • A sucker truck may be used if all other options for pumping and disposal on-site is unworkable, and if truck access is possible to remove water from the open quarry pit and take it to an appropriate off-site facility.	G1.0
Dust	• Generation of dust from the work area needs to be visually monitored and controlled. • Typically dust control measures include: – Limit vehicle movements and speed on unsealed areas. – Remove/clean fines from sealed areas. – Limit stockpiling work and/or cover stockpiles during sustained dry and windy conditions. – Minimise the extent of disturbed areas by undertaking works in a staged manner. – Dampen down work areas with water.	G9.0
Monitoring and maintenance	• Copy of ESCP should be held on site. • Weekly inspection (as a minimum) of all controls should be undertaken. • Additional inspection before and after heavy rainfall should also be undertaken. • Accumulated sediment should be cleaned out regularly and disposed of appropriately. • Any damaged or underperforming controls should be maintained and/or remediated.	C1.5
Decommissioning controls	• Only once the work area is permanently stabilised can the controls be removed. • During removal care is to be taken to ensure any built-up sediment is appropriately managed and any disturbed areas immediately stabilised. • The shed and tanks should be removed from the site and stored for reuse.	C1.6 F2.4

5.2 Specific erosion and sediment control measures

Further to the methodology detailed in Section 3 and the general control measures outlined in Section 5.1, the following section outlines specific erosion and sediment control measures applicable to the project.

The proposed ESC measures are shown on the Drawings in Appendix B and will be constructed in accordance with Auckland Councils Guideline GD05.

In summary, the proposed measures are:

1 Earthworks will be carried out in Stages 1 to 4.
2 All earthworks area will be enclosed with silt fences to prevent sediment-laden water to runoff untreated into the Te Ararata Creek.
3 Western and eastern working compounds will be stabilised aggregate.
4 All stockpiles will be placed over geotextile fabric and aggregate. The stockpile areas will be enclosed with silt fences. Alternatively, stockpiles will be covered with geotextile fabric.
5 Dirty water will be pumped out of excavation chambers and treated.
6 Clean water OLFP to be maintained through a Novacoil pipe.
7 Geotextile fabric to be used on cut batters to minimise dirty water runoff.
8 Exposed earthworks to be stabilised at the end of each working day.

5.2.1 Staged construction

The works on site will be carried out in approximately four key stages to minimise the duration of the exposure and risk of erosion and sediment runoff into the nearby Te Ararata Creek. All excavations must be stabilised prior to moving onto the next stage of the construction.

5.2.2 Super silt fences

Super silt fences will be established at various locations and will be progressively shifted according to the earthwork stages. Additionally, super silt fences will also be installed around exposed earthworks areas to prevent clean water entering the excavation along with dirty sediment-laden runoff from flowing back into the Te Ararata Creek prior to treatment.

Super silt fences will be installed in accordance with F1.3 GD05 and should be inspected at least once per week and after each rainfall event.

5.2.3 Dirty water management

It is expected that dirty water will need to be managed at various degrees during the construction stages. Depending on the volume of dirty water captured, different methods can be utilised to treat and release the water back into the environment.

For larger volumes of water, a Siltbuster or a DEB can be used to treat and release the water back into the receiving environment. For smaller volumes of water, a turkeys' nest or decanting earth bund can be utilised or similar approved method.

5.2.4 Clean water management

The existing OLFP at the southwestern end of Walmsley Road flows east towards the construction site. This OLFP will be maintained and conveyed via a Novacoil pipe discharging into the Te Ararata Creek.

A clean water diversion bund will also be established on the northwestern side of the proposed working area and discharge into the Te Ararata Creek (discharge point to be confirmed). Refer to T+T drawings in Appendix B.

5.2.5 Groundwater dewatering

Groundwater dewatering may be required at times during construction of the Project as set out in the AEE. A trade waste discharge consent may be applied for which would enable potentially contaminated water to be discharged to sewer once sediment had been settled out. In the event that this trade waste consent is not obtained, all dewatered material will be captured on site and transported off site by tanker for proper disposal.

Depending on the volumes of water requiring dewatering, a lamella clarifier maybe installed onsite to ensure the settling of sediment particles within the water prior to discharge.

5.2.6 Over-pumping

Over-pumping will be necessary at specific stages of the project, particularly during the installation and removal of the temporary stream diversion pipe. This method will help manage water levels and maintain a dry working area between the sandbagged sections of the stream. It is anticipated that over-pumping will be required for approximately one week during the installation of the diversion pipe, as well as during its relocation to the other side of the culvert and at the conclusion of the stream works. Over-pumping will allow excavation and construction activities to proceed without disruption from water infiltration, supporting both the efficiency of the construction process and the protection of the surrounding environment from uncontrolled water flow. This controlled dewatering is essential to prevent water from impacting the stability of the works and to facilitate the proper restoration of the streambed once the temporary diversion is removed.

5.2.7 Stabilisation

A stabilised surface is defined as inherently resistant to erosion or rendered resistant, such as by:

1 Applying geotextile or another method to cover the erodible surface.

2 Installing riprap.

Temporary stabilisation of exposed slopes before a rain event should be done by applying a geotextile or equivalent to prevent erosion of exposed works areas. It is important that, as this works area is in an active flood hazard area, preparation for rain at the work site be undertaken with extra care.

At the end of each working day, all exposed earthwork areas within the stream flow will be suitably stabilised. This is to reduce the risk of erosion should higher stream flows occur throughout the evening. At the start of each workday, the geotextile fabric will be removed, and construction works will commence.

Temporary stabilisation measures should be inspected after each rainfall event or periods of excessive wind. Once areas have been stabilised with riprap, they will be inspected weekly. Where there are signs of poor surface coverage, the areas will be repaired.

5.2.8 Stabilised construction access

Site access will be created via Black Bridge Reserve to the western compound. All access will be constructed to GD05 stabilised entrance standards.

A portable water blaster will be available on standby to prevent vehicles leaving the works site from spreading sediments along the public roadway.

5.3 Methods for control and management of dust emissions

The recommended dust controls have been developed in accordance with relevant recommendations of the Ministry for the Environment Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions (MfE, 2016).

The following dust control measures are suggested for all general activities:

- Sufficient water should be made available for dust control and used to wet excavation works / drilling works if necessary.
- Review daily forecast wind speed, wind direction and soil conditions before commencing activities with high dust potential.
- The area of surfaces covered with fine materials should be minimised and exposed surfaces should be stabilised wherever practicable, excavated material can be placed in skip bins or directly into trucks where possible to minimise the need for stockpiling if required.
- If required, dust shielding (such as shelter cloth on fences) could be installed where practicable.

6 Monitoring and maintenance

6.1 Onsite maintenance and monitoring

On-going monitoring during the construction programme will be required to assist with the on-going erosion and sediment control management. The monitoring will support an adaptive sediment management approach where it can provide feedback on the effectiveness of sediment controls and the need for modified or additional controls. Should there be any modifications to the ESCP measures, it will be discussed on site with a compliance officer, and the ESCP will be modified to reflect the change. Updates will be provided to council for approval prior to on-site implementation.

The frequency of the maintenance of the ESC devices will be conducted as required if the devices show signs of fatigue and failure to perform as per GD05 standards.

Refer to the maintenance checklist in Appendix C.

Current and long-term weather forecasts shall be monitored to enable construction activities to be planned and resourced to respond to changing weather conditions. All erosion and sediment control measures shall be inspected by the Contractor daily when works are occurring.

The contractor shall monitor and maintain all erosion and sediment control measures in accordance with GD05.

6.2 Extreme rainfall events

All erosion and sediment controls should be checked before and after extreme and heavy rainfall to ensure the controls are operating correctly. A rainfall event is considered to be extreme if the MetVUW[6] rainfall forecast in greater than 20 mm over six hours.

Monitoring of all erosion and sediment control devices will be undertaken regularly with elements inspected recorded and kept onsite.

Prior to commencing earthworks, weather conditions shall be monitored constantly to allow for advanced warning of rainfall event, and weather forecasts shall be used to plan the works. The works shall be planned for an appropriate fine weather window when there are no rainfall events (>5 mm rain in a 24-hour period) forecast for the next three days.

[6] https://www.metvuw.com/forecast/forecast.php?type=rain&region=nzni

If rainfall is predicted, appropriate measures will be taken to stabilise the works in the stream and ensure that conveyance capacity of the watercourse is not impeded.

6.3 Incident management

In the event there is an incident on site involving the release of excess sediment of harmful chemicals into the receiving environment, the incident is to be documented, council is to be notified and remediation of the incident / ESC device can take place.

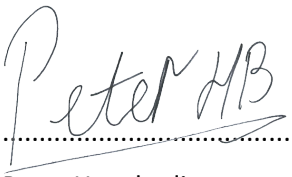
- Document incident, notify council, remediate the ESCP device.

7 Applicability

This report has been prepared for the exclusive use of our client Auckland Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:



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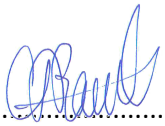
Peter Hanabadi
Civil Engineer

Authorised for Tonkin & Taylor Ltd by:



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Chris Bauld
Project Director

PEHA
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Appendix A Earthworks and HEB site layout plans

REMOVE TREES
OFFICE
TOOLS
TEMPORARY FOOTPATH
STABILISED CONSTRUCTION ENTRY / EXIT
SITE PERIMETER 1.8m HARRIS FENCING
SITE LAYDOWN / SERVICE AREA
TOOLS
TOOLS
TEMPORARY PEDESTRIAN BAILEY BRIDGE
SILT FENCE
REMOVE TREES
REMOVE / RELOCATE TREE
REMOVE TREE
OFFICE
OFFICE
SILT FENCE
SITE LAYDOWN / STREAM ACCESS AREA
MEETING
W.C
SMOKO
SITE ENTRY
WATERCARE ASSETS
NEW PIPE BRIDGE ABT'S
TEMPORARY RESIDENT ACCESS DRIVE WAY
SITE EXIT
TEMPORARY STREAM DIVERSION THROUGH SUITABLY SIZED PIPE
INDICATIVE EXTENT OF STREAM WORKS
TEMPORARY RESIDENT ACCESS DRIVE WAY

PRINT IN COLOUR

NOT FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
D4	TP	23.10.24	UPDATED TEMPORARY FOOTPATH EXTENTS	TP
D3	TP	10.10.24	UPDATED BRIDGE AND STREAM WORK EXTENTS	TP
D2	TP	13.08.24	DETAILED CONCEPT	TP
D1	TP	17.07.24	CONCEPT FOR REVIEW	TP

SCALES
2 0 2 4 6 8m
1 : 200 FULL SIZE A1

A1 Original | Co-ordinate System: NZTM2000 | Datum: mCD | This sheet may be prepared using colour and may be incomplete if copied

DESIGNER
HEB construction together @ VINCI

CLIENT
Auckland Council
Te Kaunihera o Tāmaki Makaurau

DISCLAIMER *The information shown on this drawing is for the purposes of the Nominated Project Only. No warranty is given or implied as to its suitability for any other purpose. The Service Providers accept no liability arising from the use of this drawing and the information shown thereon for any purpose other than the Nominated Project.*

SERVICE PROVIDERS

DRAWN T.PERVAN
DESIGNED -
DRG CHECK -
DESIGN CHECK -
APPROVED -

TE ARARATA CULVERT REPLACEMENT

CONSTRUCTION SITE LAYOUT
ROAD CLOSED

STATUS: CONCEPT | SHEET 1 OF 1 | ©

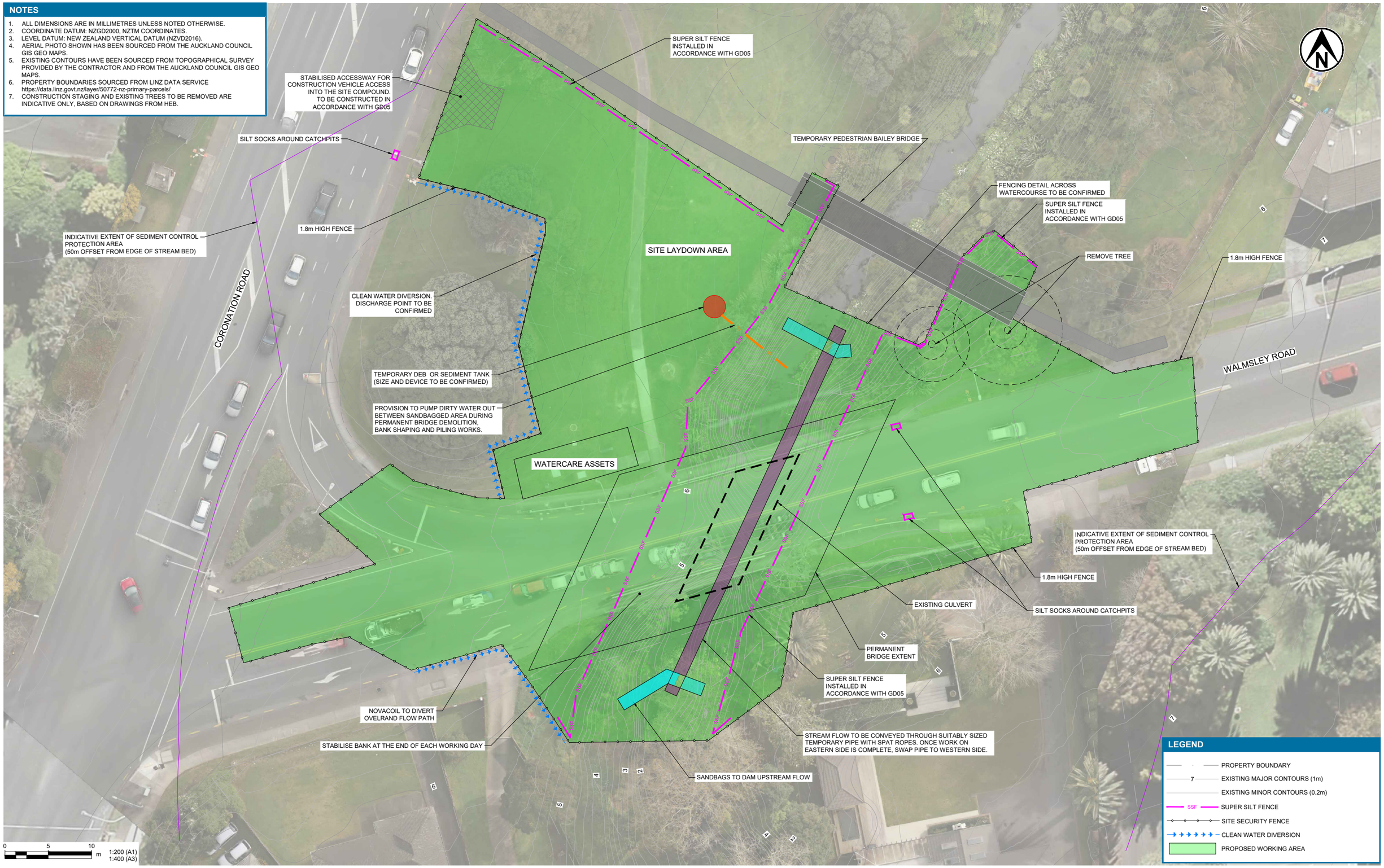
DRG No TACR-HEB-01-00-DR-Z002 | REV D4

Appendix B Erosion and sediment control plan

C:\12ds\data\ALBTCAD\Te Ararata Catchment Upgrades_1714\CAD\DWG\1017033.2003-1107.dwg 2024-Oct-24 1:14:58 pm Plotted By: JC

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. COORDINATE DATUM: NZGD2000, NZTM COORDINATES.
3. LEVEL DATUM: NEW ZEALAND VERTICAL DATUM (NZVD2016).
4. AERIAL PHOTO SHOWN HAS BEEN SOURCED FROM THE AUCKLAND COUNCIL GIS GEO MAPS.
5. EXISTING CONTOURS HAVE BEEN SOURCED FROM TOPOGRAPHICAL SURVEY PROVIDED BY THE CONTRACTOR AND FROM THE AUCKLAND COUNCIL GIS GEO MAPS.
6. PROPERTY BOUNDARIES SOURCED FROM LINZ DATA SERVICE https://data.linz.govt.nz/layer/50772-nz-primary-parcels/
7. CONSTRUCTION STAGING AND EXISTING TREES TO BE REMOVED ARE INDICATIVE ONLY, BASED ON DRAWINGS FROM HEB.



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REV	DESCRIPTION	CAD	CHK	DATE	APPROVED	DATE
1	ISSUED FOR INFORMATION	JC	JOPA	21.10.2024		

DESIGNED	PEHA	SEP.24
DRAWN	ASVI	SEP.24
DESIGN CHECKED	BBJC	OCT.24
DRAWING CHECKED	JABR	OCT.24

DRAWING STATUS: PRELIMINARY DESIGN

PROJECT PHASE

NOT FOR CONSTRUCTION

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED AS APPROVED

CLIENT **HEALTHY WATERS**

PROJECT **TE ARARATA BLUE GREEN NETWORKS - STAGE 2**

TITLE WALMSEY ROAD BRIDGE
EROSION AND SEDIMENT CONTROL PLAN

SCALE (A1) 1:200 DWG No. 1017033.2003-1107 REV 1

Appendix C Erosion and sediment control maintenance checklist

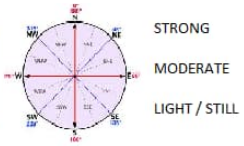
SITE EROSION & SEDIMENT CONTROL INSPECTION CHECKLIST

Site: **Walmsley Bridge** **Project No:** **1017033.2003**

Inspection by: …… **Date:** …… **Time:** ……

Current Weather Condition: (circle)

Wind Direction / Conditions



Area Inspected (tick)**:** ☐ Cleanfill ☐ Clay extraction ☐ Other (please specify):

……

ITEM / SCOPE OF INSPECTION	(circle)	COMMENTS
EROSION & SEDIMENT CONTROL		
- Are there any signs of scour at the piped outlet into the receiving environment?	Y N N/A	
- Does the visual appearance of the water in the receiving environment appear overly turbid or otherwise?	Y N N/A	
- Is there any evidence of uncontrolled dirty water discharge from the site?	Y N N/A	
- Is there any visible discolouration of waters leaving the site?	Y N N/A	
- Are there any rips, tears or holes over the length of silt fence fabric?	Y N N/A	
- Is there damage to silt fence waratahs and returns from machinery?	Y N N/A	
- Are previous repair to rips, tears and holes in silt fence fabric forming tight seal?	Y N N/A	
- Is the bottom edge of the silt fence fabric trenched in the required depth?	Y N N/A	
- Is the minimum height of the silt fence maintained?	Y N N/A	
- Are there bulges due to silt build ups? Has silt build up reached 50% of the fence height? Is so, de-silt is required.	Y N N/A	
- Has the silt fence fabric degraded or collapsed? If so, replace immediately.	Y N N/A	
- Has the area been appropriately stabilised where silt fence has been removed?	Y N N/A	
Are the catchment areas above clean water diversions maintained as clean?	Y N N/A	
Is the stabilised entrance needing maintenance to ensure the surface remains clean?	Y N N/A	

	SITE EROSION & SEDIMENT CONTROL INSPECTION CHECKLIST	

RECOMMENDATIONS			
Priority (H/M/L)	**Action**	**By whom**	**By when**

Reviewed and Accepted by **Date:**.....

……

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