DRAFT – Erosion and Sediment Control Plan

Homer Tunnel Avalanche and Rockfall Protection Structure Replacement Works

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1. Introduction

1.1 Purpose

This document is the Draft Erosion, Sediment Control Plan (ESCP) outlining the mitigation principles and methodologies to be adopted during the construction phase of the Homer Tunnel avalanche and rockfall protection works (the Project).

The purpose of the ESCP is to minimise adverse environmental effects associated with land disturbances during construction.

The ESCP is a "live document" and will be further developed by the appointed contractor for the Project to take into account their specific construction methodology and programme of works. The contractor updated ESCP will be submitted to the relevant authorities prior to the commencement of construction works occurring at the site. The principles and methodologies outlined within this draft ESCP will assist the Contractor in detailing the actual practices for erosion and sediment mitigation to be used on ground for site specific work areas.

Any updates to the ESCP shall be limited to changes that preserve or enhance measures to address controls for environmental protection only.

Waka Kotahi (as Principal) engage an independent professional to administer the physical works contract. This person is the 'Engineer' to Contract as defined under NZS3910. Contractor submissions are provided to the Engineer for review and acceptance and includes revisions of Management Plans. The roles and responsibilities for the Contractor, Principal and Engineer are further set out in NZS3910. The ESCP will be subject to the normal scrutiny and processes in place for managing the works meeting the contract and legislative requirements.

1.2 Objectives of the ESCP

The objectives of this ESCP are summarised as follows:

- To support the statutory approvals being processed by Environment Southland, Southland District Council and the Department of Conservation
- Provide an outline and context to the nature of the site being disturbed
- To outline the potential environmental impacts / sensitive receivers associated with earthworks activities at the site
- Define the appropriate standards and level of service with regards to ESCP for the Project
- To outline the ESCP principles to be adopted during construction
- Outline the risk-based approach that will be adopted for sediment control
- Summarise the stages of work proposed that have the potential to result in erosion of sediment
- Outline procedures for monitoring of ESCP practices during construction.

The ESCP will be a sub-management plan of the overarching Waka Kotahi Environmental Management Plan (EMP) for the Project. EMP's must be developed and implemented for all infrastructure delivery (capital works) and maintenance and operation (M&O) activities undertaken by Waka Kotahi (see Environmental and social management plans | Waka Kotahi NZ Transport Agency (nzta.govt.nz)).

1.3 Scope

The ESCP shall be applicable to all land disturbance works and stormwater run-off from within the Project Site (refer Figure 2-1) during construction.

1.4 Statutory Requirement

Statutory approvals are being sought from the Department of Conservation, Environment Southland, and Southland District Council. These respective statutory approvals will have associated conditions requiring measures to manage and minimise erosion and sediment transfer as documented in a management plan

(ESCP). It is expected that this ESCP will satisfy the requirements of all of these statutory approvals to ensure there is no duplication or inconsistency between such documents.

1.5 Best Practice Guidelines

The effects of erosion and transportation of sediment from areas disturbed by construction on and adjacent to the state highway can have adverse effects on downstream receiving environments. Adverse effects from construction related earthworks can be effectively managed within the confines of the construction zone through adoption of best practice guidelines.

During construction of the Project, the best practice ESC measures and principles outlined in the following guidelines/resources will be adopted:

- Erosion and Sediment Control Toolbox for Canterbury, Environment Canterbury Regional Council
- Erosion and Sediment Control Guidelines for State Highway Infrastructure - 'Construction Stormwater Management', NZ Transport Agency Waka Kotahi, 2014

Suitable to the site and scale of works, the principles and best practice measures to be adopted from these resources are summarised in Section 4 of this document.

Erosional and Sediment Control principles are universal across jurisdictions, whereas guidelines are developed to varying extents. Other guidelines may be reference for further enhancing mitigation measures. Environment Canterbury ESC guidelines have been specifically referenced for their comprehensive nature which are complimentary and commensurate to Waka Kotahi's ESC guidelines.

This draft ESCP adopts a risk-based management approach for the design of ESC practices. This approach prioritises the sensitivity of the receiving environment and will adopt design criteria using higher intensity storms for more sensitive receiving systems where identified.

2. Site Description

2.1 Overview

The Project Site is located at the eastern portal to the Homer Tunnel located approximately 96km north of Te Anau on State Highway 94. The project site is shown in Figures 2-1 and 2.2 below and encompasses a construction area both north and south of the existing road alignment (east to west) – refer Figure 2-3.

The site is situated within a remote and largely undisturbed alpine environment within the Fiordland National Park. Fiordland National Park is a national priority area for biosecurity monitoring to ensure the intrinsic values of the park are not threatened. It is an offence under Section 60 of the National Parks Act 1980 to plant any plant, sow or scatter the seed of any plant or introduce any substance known to be injurious to plant or animal life in Fiordland National Park.

The site in its natural state is characterised as being comprised of mostly exposed talus rock material. Vegetation cover across the project area is very limited and sparse which is expected due to a combination of the alpine nature of the site and the high influence of avalanche flows and other natural processes, including high rainfall intensity and runoff, frequently clearing the site (particularly to the south of the highway) and limiting the ability for natural regrowth.

The site is naturally exposed to weather events including significant rainfall which is routinely experienced at the site. On average 7 m of rainfall is experienced per year with approximately 200 rain days occurring per year[1].

[1] https://www.doc.govt.nz/parks-and-recreation/places-to-go/fiordland/places/fiordland-national-park/know-before-you-go/weather-and-climate-in-fiordland/

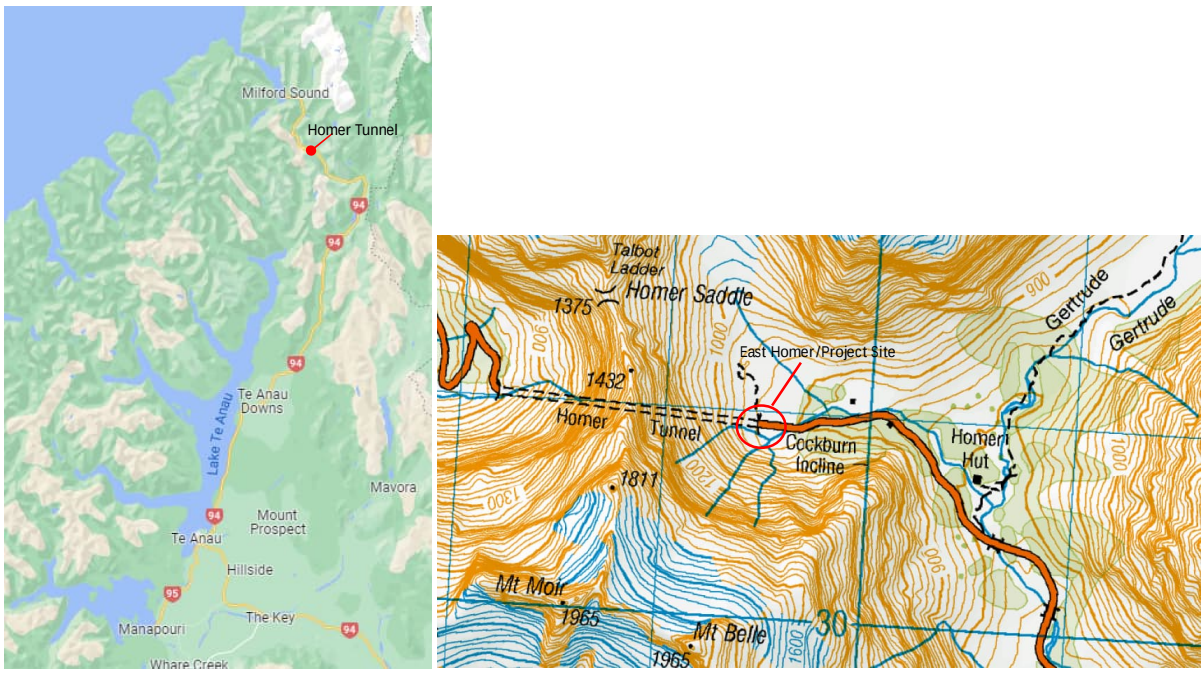


Figure 2-1 Project Site Location

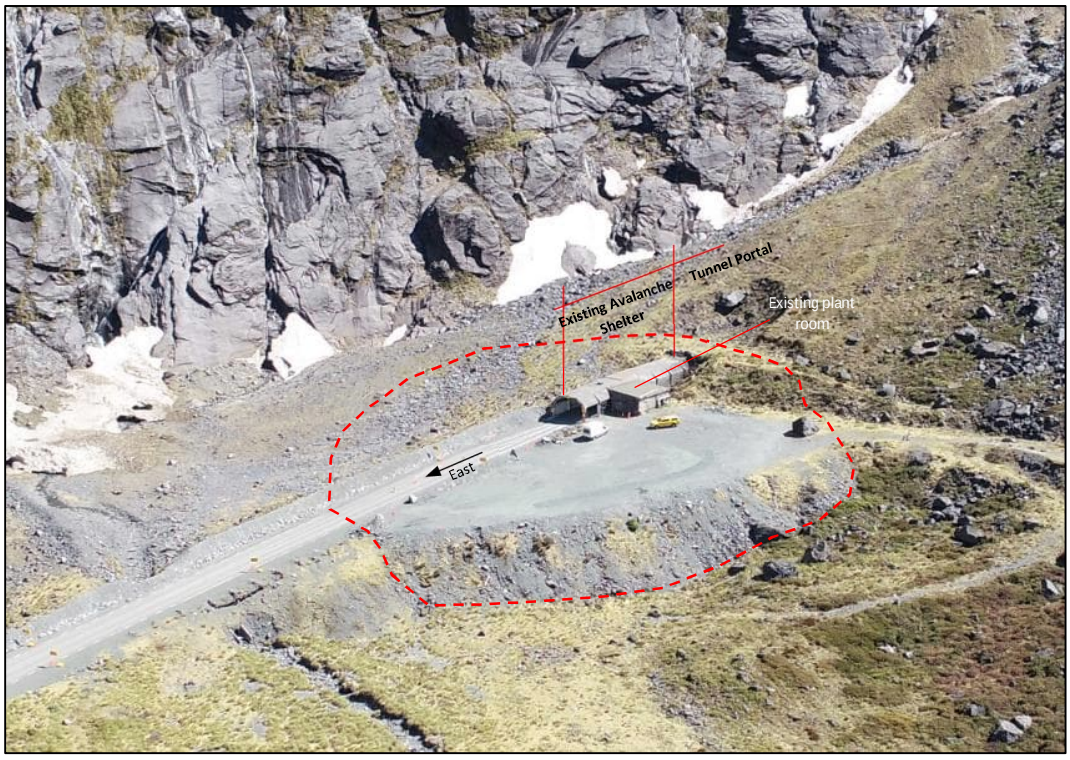


Figure 2-2 Project site

2.2 Geology and Topography

The area surrounding the eastern portal comprises material that has been transported by glacial processes, fluvial processes and avalanche and rockfall activity from the surrounding steep mountainsides.

The eastern tunnel portal extends horizontally through approximately 40m of talus material. Immediately surrounding the portal entrance north of the state highway is a bouldery gravel fill which forms an up to 9 m high pad and is approximately 60 m wide with most of the fill sourced from tunnel excavation spoil material.

Fill material at the site has either been blasted from the tunnel or excavated from local material and therefore originates from very strong rocks. The material is of a medium to coarse, medium dense to dense gravel comprising angular rock fragments and cobbles with occasional boulders <1.0m in diameter. The fill material of the outer 10 m of the 60 m pad comprises loose, silty sandy rounded gravels with some organic material (tree debris) and frequent large boulders.

By nature, the site has little to no soils. The dominant material at the site consists of bouldery gravel talus of various gradings which for the most part sit exposed at the ground surface under natural conditions. The existing talus material at the surface of the site is already exposed to significant rainfall volumes and is naturally less susceptible to erosion due to it having a lesser fines content (i.e., limited to no soils). Therefore, when the finer particles within the talus get entrained they will settle out more quickly.

A typical cross section of the site at a setback of approximately 35 m east from the tunnel portal indicating the topography of the project site is shown in Figure 2-3.

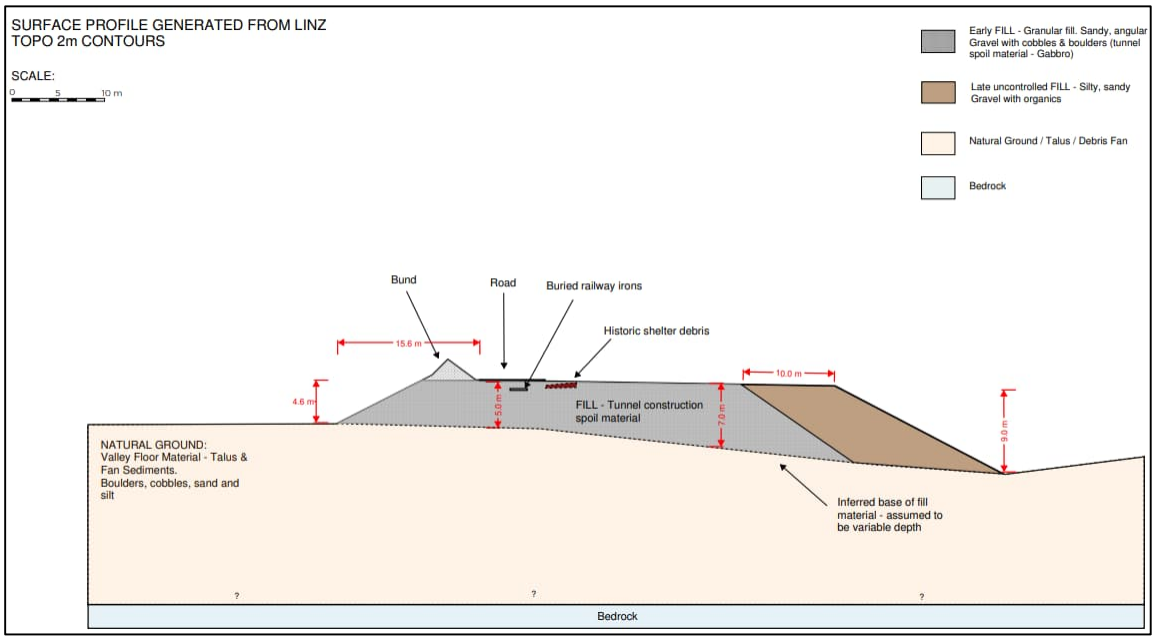


Figure 2-3 Schematic cross section 35m from the eastern portal looking west

2.3 Waterways

One primary and two secondary ephemeral waterways cut down through the talus fan to the south of the highway (refer Figures 2-4 and 2.5). The primary channel is located immediately south of the proposed site at the toe of the mountain slope whereas the secondary channels align through the proposed construction zone.

These channels flow during the spring (snow melt) and during rainfall events. The catchment area for these ephemeral waterways is immediately above the site and is approximately 0.634 km². These channels combine immediately before the state highway where surface flows pass beneath the road via a concrete culvert and flow into the upper Hollyford River.

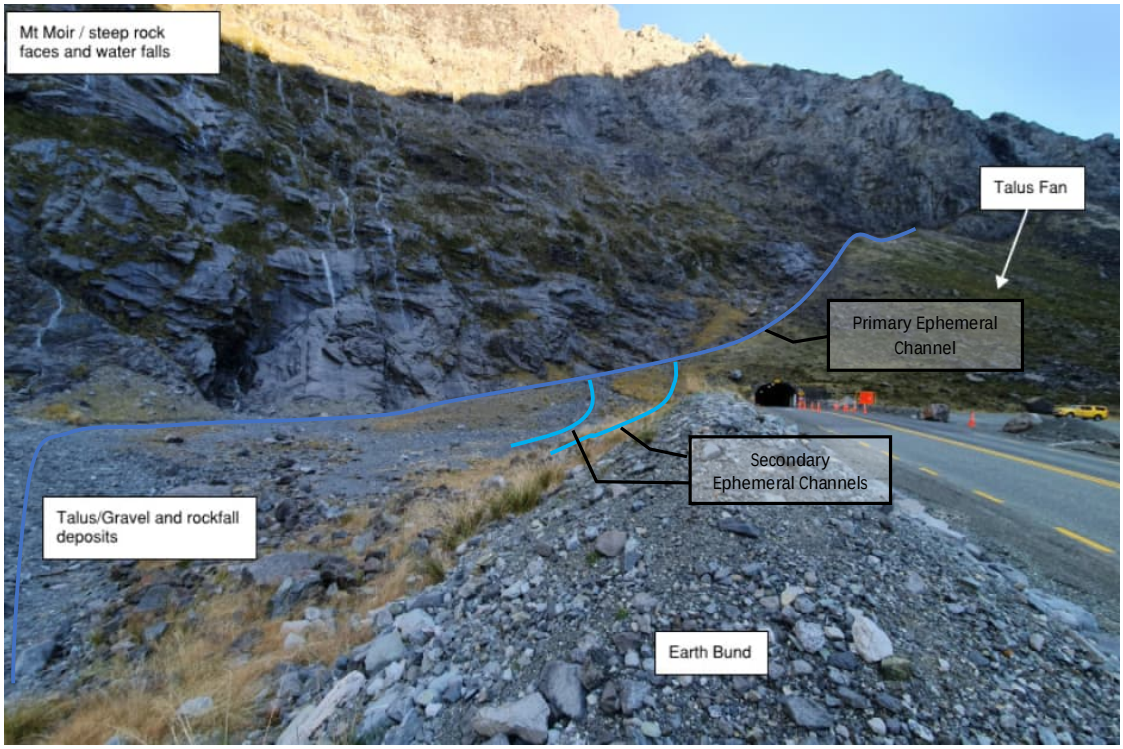


Figure 2-4 Surface waterbodies at the site

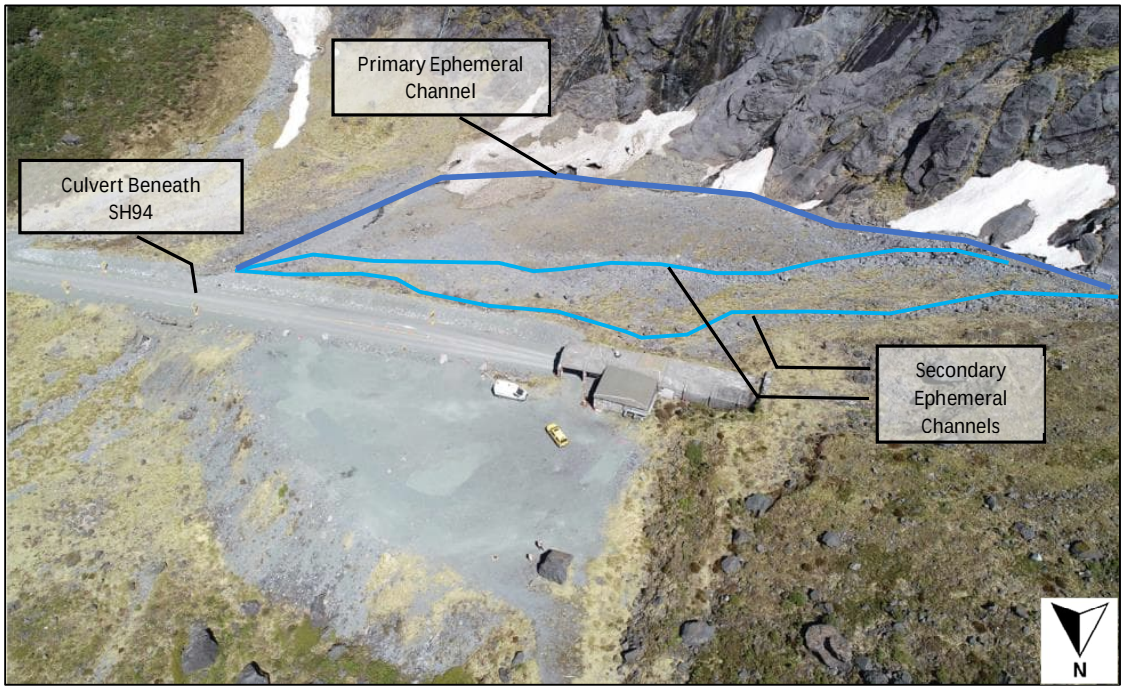


Figure 2-5 Surface waterbodies at the site

3. Project Description

3.1 Overview

The construction phase of the Homer Tunnel avalanche and rockfall protection works will be undertaken in three separate stages. Three stages of construction are required due to the limitations on the construction period posed by the seasonal avalanche risk at the site.

Stage one works included the building of a new generator shed and associated minor works at the 'Green Shed' concession site. These works are underway and subject to separate statutory approvals already in place.

This ESCP covers stage two and three works at the east Homer Tunnel portal. Stage two entails construction of a new plant and equipment room, site investigations and stabilisation of the stone masonry portal headwall, while stage three comprises the construction of the replacement avalanche and rockfall protection structure. The stage two works are demarcated by yellow outline while the stage three works are demarcated in red within Figure 3-1.

The sequencing / outline of the construction methodologies for both stages is outlined under relevant subheadings below.

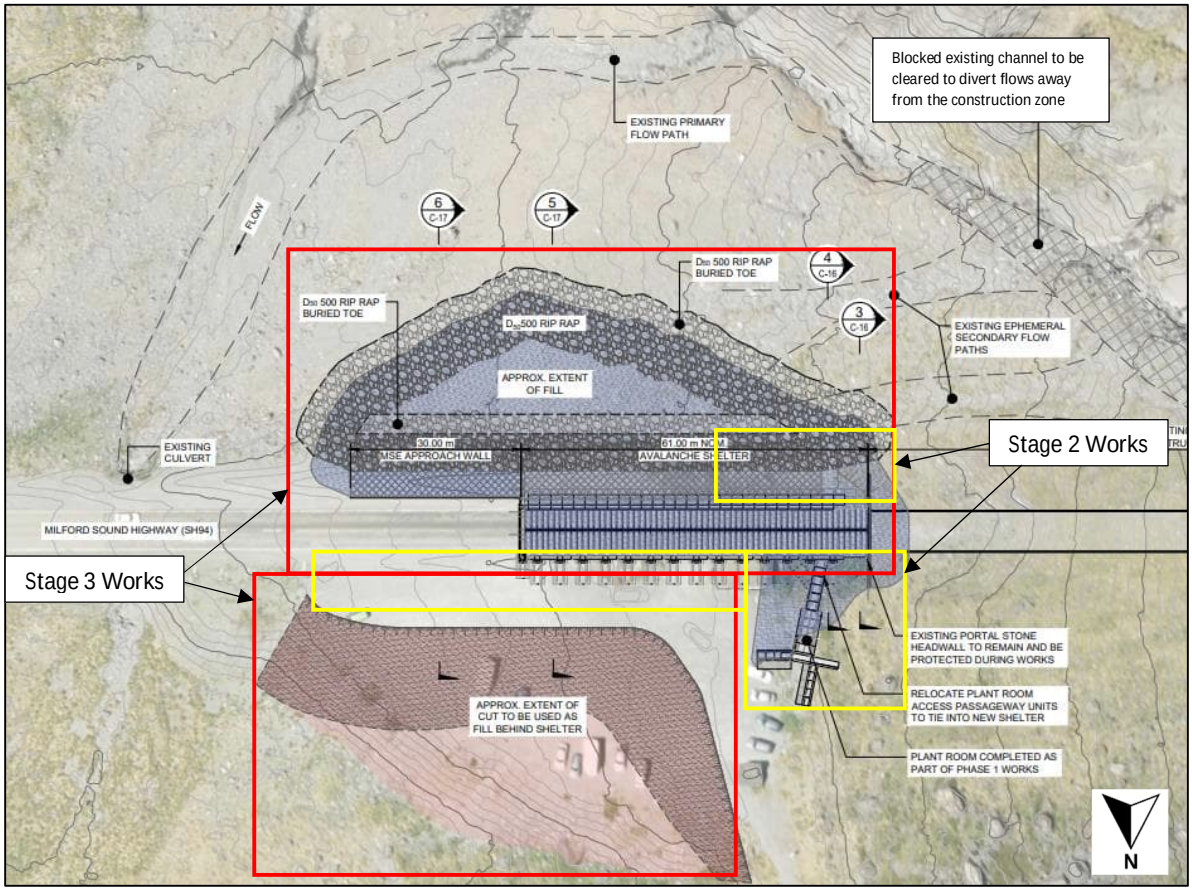


Figure 3-1 Location and stage of Works

3.2 Stage 2 – Plant Room Construction

A new equipment (plant room) building is proposed on the north side of the Homer Tunnel eastern entry/exit away from existing avalanche shelter and plant room attached to the Tunnel (refer figure 2.2 for current site layout and figure 3.1 above for location of new plant room). The new structure is being excavated and buried within the talus slope to reduce its exposure to rockfall and avalanche.

In addition to the construction of the new buried equipment building, the stage 2 works include the investigation and stabilisation (as required) of the Tunnel Portal stone masonry headwall either side of the existing avalanche shelter investigation and partial relocation of the remnant avalanche shelter debris and, services trenching along the along the old car park (northern edge of the highway).

The stage 2 works are proposed to be undertaken in the 2023 summer and autumn construction period (January to May) prior to anticipated snowfall and avalanche risk timeframe (late May to end of October). The avalanche season can extend from 1st May to 30th November). Subject to Concession and

Consent, some early investigation works are proposed to be carried out around the portal stone masonry headwall in November 2022. Below is a detailed breakdown of the contract works.

- Site Establishment
- Vegetation Disturbance and Earthworks
    - Refer to Figure 3-2 for approximate extent of vegetation disturbance and earthworks. The total area disturbed by the proposed new equipment building construction at the East Homer Tunnel site is 1000m2, made up of 400m2 of the existing modified gravel car park area and 600m2 of the vegetated talus slope around the north side of the Tunnel. Excavation of the talus to slope is required to the general extent shown on the drawings and to underside of the proposed plant room foundations including bedding layer.
    - The existing portal stone masonry headwall investigation and stabilisation also requires site excavation of the local batters in front of wingwalls, either side of the existing avalanche shelter, and immediately behind the top of the headwall. This is to confirm the extent, construction and condition of walls for protection and repair.
    - Material from the excavation will be temporarily stockpiled within the car park area.
- Construct new equipment building, including:
    - Foundation bedding and footings (generally below the existing adjacent gravel car park ground level)
    - Installation of modular box culvert plant room and passageway including temporary tie into the existing avalanche shelter
    - Installation of precast retaining walls, shear keys and cast insitu stitch and aprons.
- Stone Masonry Wall Stabilisation
    - The stone masonry wall façade at the eastern portal is proposed to be strengthening by coring, drilling and installing permanent grouted ground anchors. Steel pattress plates will be installed to bear against wall face on a mortar bedding.
- Avalanche Shelter Remnant Investigations
    - Earthworks are required to investigate remnant foundations of the destroyed avalanche shelter over the extent of the proposed new avalanche shelter foundations. Refer to Figure 3-2, for indicative location of site investigations.
    - Relocation of the existing heritage debris pile located at the end of the existing avalanche shelter. This is to be temporarily relocated within the carpark to a location that does not disrupt the future avalanche shelter construction and excavation of the carpark. This debris will be place back close to its original location following the stage 2 works.
- Reinstate Site:
    - The excavated stone masonry wall batters will be reinstated and the new equipment building, passageway and retaining walls backfilled and covered over with the stockpiled coarse talus material from the excavations. The vegetated surface material and select boulders removed from the talus slope and stockpiled will be place after Stage 2 to re-naturalise the slope and provide additional avalanche and rock fall protection for the new structures.
    - The carpark will be left tidy and consistent with its original appearance with the exception of the temporarily relocated heritage debris, and the stockpiling of the upper vegetated talus material and select ‘mossy’ boulders for reinstatement during stage 2 works.

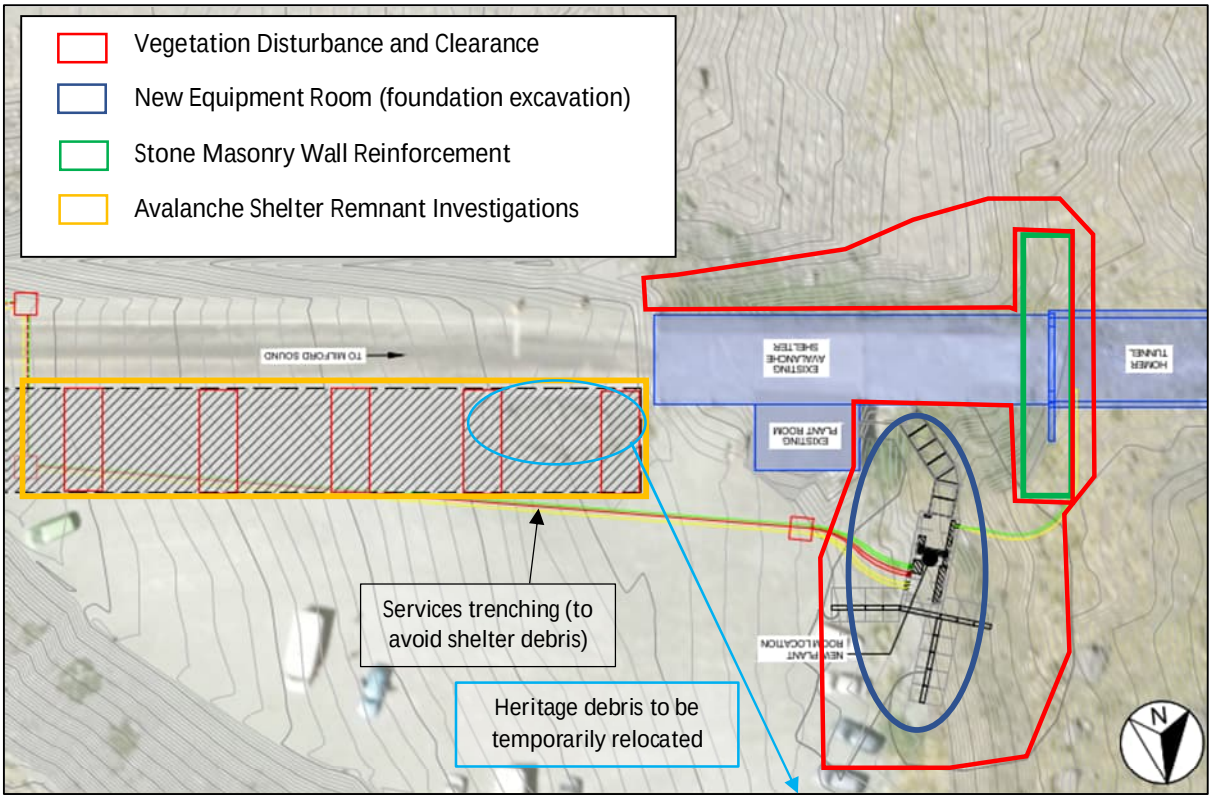


Figure 3-2 Stage 2 Works.

Note: The construction methodology and sequence are to be finalized by appointed contractor in agreement with the Engineer.

3.3 Stage 3 – Construction of Avalanche Shelter

A new avalanche shelter is proposed on the Homer Tunnel eastern portal.

The works are proposed to be completed in the 2023-2024 season from November to May. The extent of the stage 3 works is contained within the red indications on Figure 3-1. Below is a general breakdown of the proposed works.

- Site establishment including waterway diversion and establishment of silt fence at the downstream extent of the construction site to contain the site for erosion and sediment control.
- Other activities within the site include:
    - Demolition of existing Avalanche Shelter and Plant Room
    - Excavation of avalanche shelter foundation and footings
    - Construction of Avalanche Shelter and MSE wall
    - Earthworks including progressive southern embankment construction and cutting back of the northern carpark.
    - Rock rip rap placement for scour and erosion protection
    - Site reinstatement and disestablishment.

Appended to this ESCP are drawings outlining in more detail the envisaged sequencing for the construction of Avalanche Shelter.

Note: The construction methodology and sequence are to be finalized by appointed contractor in agreement with the Engineer.

4. Erosion and Sediment Control Measures

4.1 General Provisions

The overarching principle of ESC is to limit sediment detachment and transport. Depending on ground conditions, the climate and types of storm event, the combined effects of erosion and disturbed land from earthworks activities can result in the mobilisation of large amounts of sediment. Of fundamental importance is the implementation of appropriate (i.e., site specific) ESC practices to limit the effects of erosion and the resulting effect on the downstream receiving environment.

It is noted that the very nature of this site consisting coarse granular talus slopes and tunnel workings, which are substantially devoid of vegetation and consistently expose to high intensity rainfall, are relatively resistant to erosion and significant sediment transport.

Nonetheless, the following fundamental principles of ESC will provide the best practice guidance for minimising the adverse effects of erosion and sedimentation during project construction:

- Minimise disturbance
- Undertaking construction in stages
- Protecting slopes
- Protect waterways
- Stabilise exposed areas quickly
- Consider weather and forecasted changes
- Install perimeter controls and diversions
- Use sediment control tools
- Mix and match a combination of tools
- Make adjustments to the plan as needed
- Monitor and adjust the ESC tools

Various erosion and sediment control measures can be adopted to achieve these principles.

4.2 Key Principles Applicable to the Project

The best practice principles and philosophies for the provision of erosion and sediment controls to be adopted during the project at this site are broadly outlined below in Table 4-1. These methods have been identified based on the nature of the site as described in Section 2 and the works proposed as outlined within Section 3.

Key characteristics of the site which have been considered when taking into account the appropriate ESCP principles for the project have been the sensitivity of the site with respect to biosecurity risks and that there is limited to no soils at the site. Rather, the site is for the most part an already highly exposed site with limited vegetation cover and which consists of mainly coarse talus rock material.

The ESCP measures need to reflect that these works are being completed within the Fiordland National Park (FNP) and with reference to expectations and protection under the FNP Management Plan.

Table 4-1 Broad ESCP Principles for Homer Tunnel

Principle	Description of method
Construction Scheduling	Construction scheduling involves the coordination of three construction-planning activities: Site staging, limiting site disturbance, and construction sequencing. The contractor shall where possible: • Adopt a minimum site disturbance strategy by only clearing areas required for construction or access;

	• Minimise multiple work areas at any one time to avoid the amount of area being exposed; • Limit the tracking of construction machinery within the site and avoid tracking beyond the site; • Undertake "Construction staging", where site disturbance is undertaken in small units over time with progressive stabilisation to limit the scale of erosion. As per the methodology outlined above in Section 3.2 - 3.3 the project will incorporate construction scheduling principles.
Isolate waterways / divert surface flows around the site	Minimise clean water flowing through the site by isolating waterways above the construction zone to divert surface water away from the construction area. <u>Diversion of Surface Flows for Stage 3 Avalanche Shelter works</u> It is proposed to cut off the ability for surface water to flow within the secondary channels that align through the site during construction. This will be achieved by reopening the existing primary ephemeral channel through digging out existing talus debris built up within the channel to a minimum extent to accommodate a 10-year Average Recurrence Interval (ARI) flow (refer to Figure 4-1 below). Following the re-opening of the primary channel, the deepened primary channel will effectively divert any surface water flow from the secondary ephemeral channels and around the construction zone. Depending on the nature of the subgrade material, a small rock bund / battered embankment may also be required in some localised areas to ensure surface water flow remains within the re-opened channel during different rainfall events. The re-opened primary channel will be required to be inspected and maintained throughout construction to monitor for potential blockages and prevent the risk of subsequent breakout of surface flows across the project area in the event of a significant rainfall event. Channel clearing will be carried out during periods of no flow within the channel. Some flow may present during the snow melt period and, where this cannot be avoided, the contractor will work to minimise the works within flowing water. At low flows, any sedimentation from the active clearing out of the channel is anticipated to settle out within a short distance of the disturbance. <u>Buried Rip Rap Toe (Diversion Drain)</u> A keyed in rock rip rap apron is proposed around the toe of the new embankment forming the leading edge of the proposed partially buried avalanche and rockfall protection structure. This rock apron provides long-term scour and erosion protection (refer Figure 4-2). Waka Kotahi is sourcing suitable rock ahead of the stage three works commencing. It is proposed that the contractor install the buried rock rip rap toe as one of the first stages. This will enable the rip rap apron to provide separation to earthworks behind and early protection of the toe of the embankment during construction in the event the waterway diversion higher up the catchment fails during high rainfall. The buried rip rap toe will also act as a cut off from more local rainfall run-off entering the construction site which may run-off the talus between the waterway and the construction zone.

	Where sufficient rock is not available early in the construction, alternative measures will be used to provide separation including bunding coarse material along extremity of the earthworks zone and silt fencing.

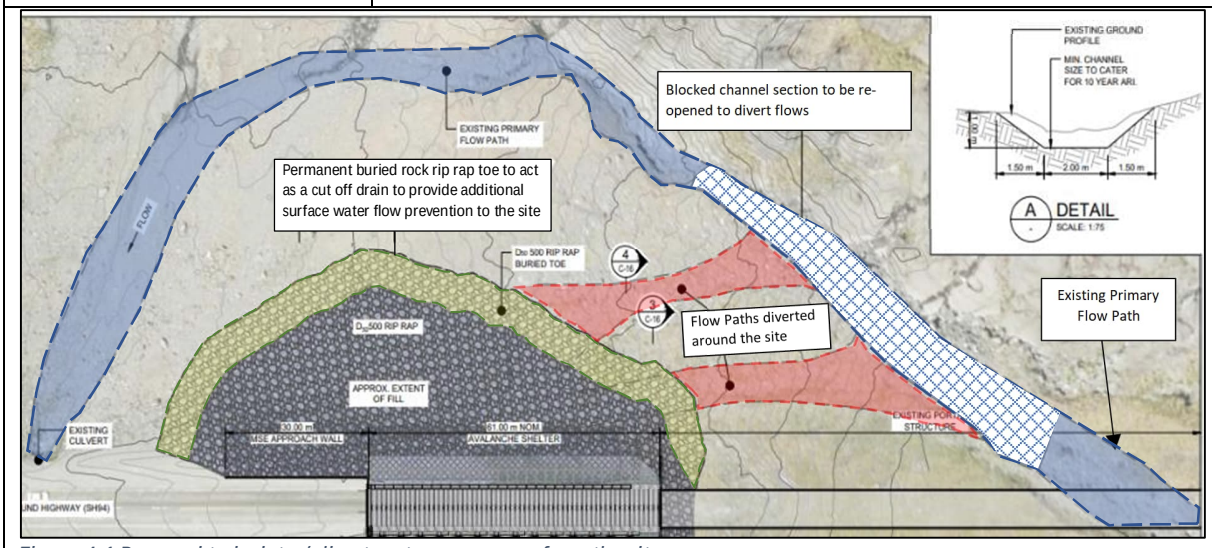


Figure 4-1 Proposal to isolate / divert waterways away from the site

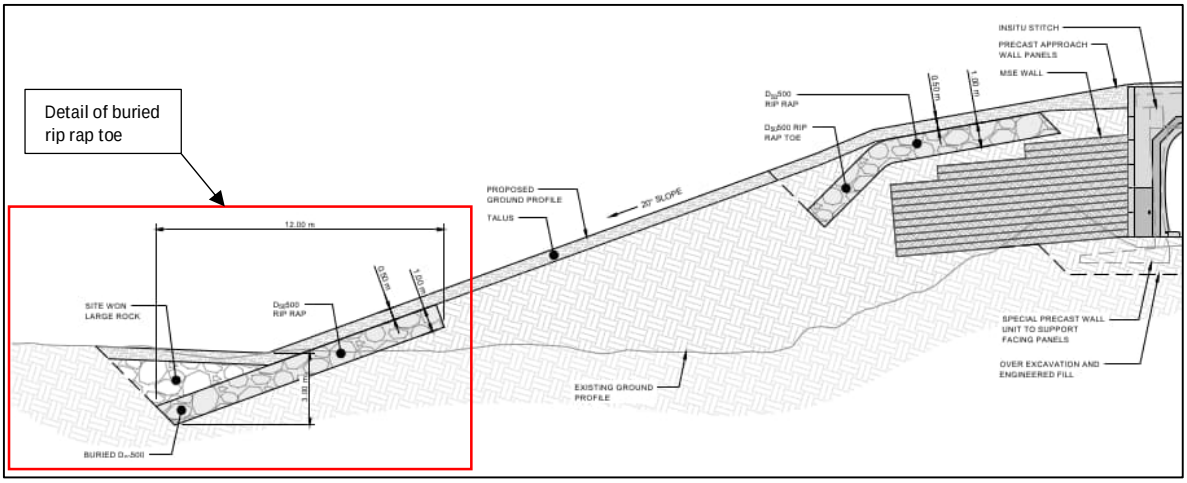


Figure 4-2 Buried rip rap toe detail (refer red demarcation)

Minimise sediment leaving the site	Install perimeter controls to retain or direct sediment laden runoff within the site. Common perimeter control methods for this project will include the installation of silt fences / super silt fences around the site boundary. <u>Silt Fences / Super Silt Fences</u> A silt fence is a temporary barrier of woven geotextile fabric that is used to capture predominantly coarse sediments carried in sheet flow. A super silt fence is also a temporary barrier of woven geotextile fabric but rather over a chain link fence. Silt fences and super silt fences will be used at the site to temporarily impound sediment laden runoff, reducing velocities and allowing sediment to settle out of the water. The purpose of a silt fence is to detain flows from runoff so that deposition of transported sediment can occur through settlement and some filtering. During stage 2 works (plant room excavation and stockpiling of material in the carpark), where run-off is possible silt fences will be employed to contain the work area to prevent sediment discharge. However, it is most likely that runoff will be contained within excavations providing detention,

	trapping any sediment, and allowing water to drain to the permeable ground which is not susceptible to tunnel gully erosion. For the Stage 3 works, silt fences will be installed along the southern and northern perimeters of the construction site (refer Figure 4-3). The southern fence contains any sediment run-off during the excavation and placement of the rock rip rap perimeter apron around the avalanche shelter fill embankment. The fence would be removed once the permanent erosion and scour protection is in place and effective. The northern fence contains any sediment run-off from the excavation of the carpark during stage 3 works. This also serves as a boundary to the worksite and the excavations are restricted to within the toe of the existing carpark batter. This is to avoid disturbing the vegetation beyond this zone. For both stage 2 and 3 works, where material is temporarily stockpiled on site within the project footprint, this will be located in areas that are least exposed to rainfall run-off and will also sit within the site perimeter silt fences. An example of a silt fence in practice and the silt fence construction detail is detailed in Figures 4-4 and 4-5. Silt fences or super silt fences are to be constructed in accordance with Waka Kotahi's Erosion and Sediment Control Guidelines for State Highway Infrastructure. The use of filter socks, hay bales or other imported organic material is not an appropriate methodology for the site due to the risk of introducing seeds/contaminants into the Fiordland National Park and the associated offence under Section 60 of the National Parks Act 1980.

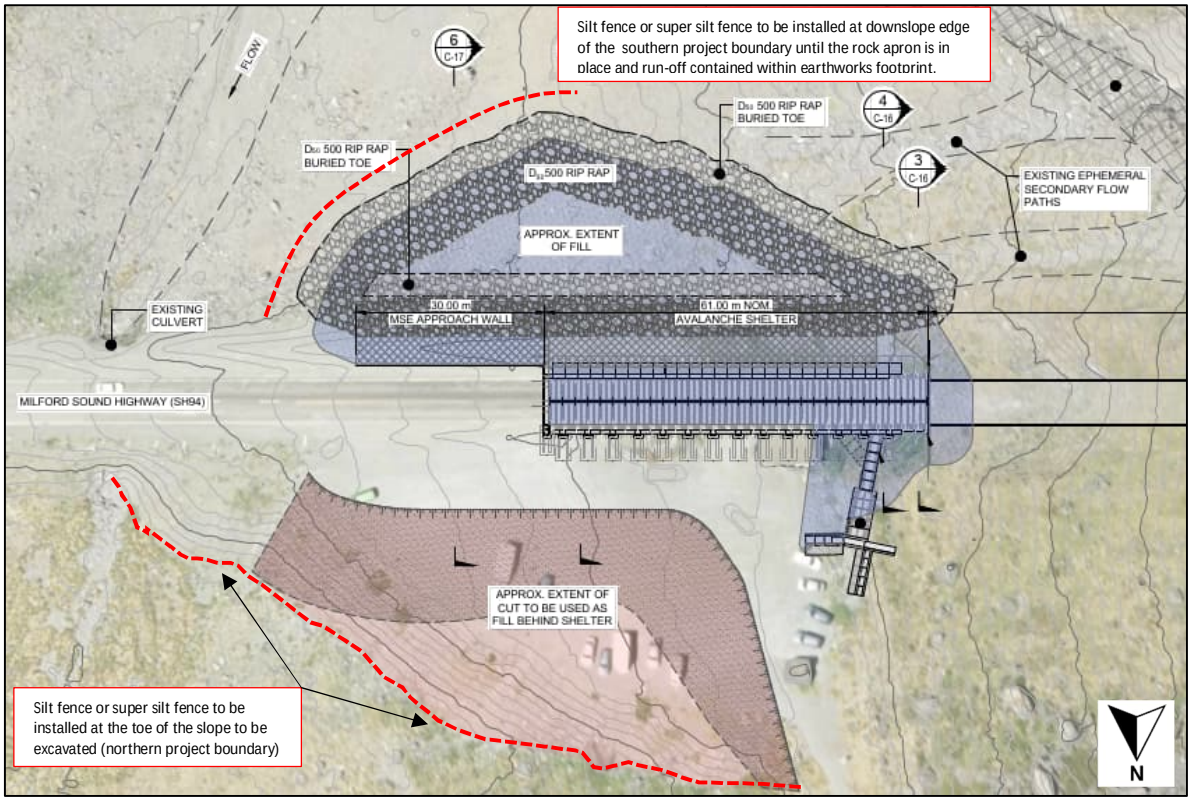


Figure 4-3 Proposed perimeter controls at the site

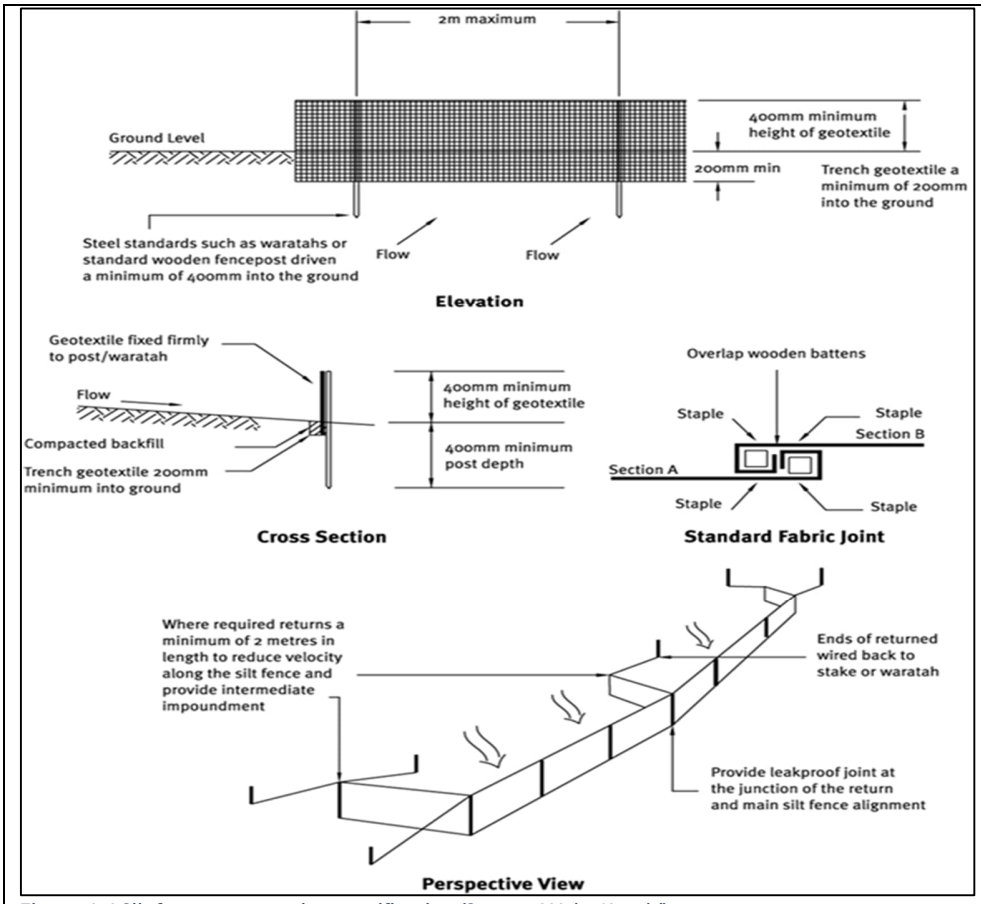


Figure 4-4 Silt fence construction specification (Source: Waka Kotahi)

Figure 4-5 Silt fence example (Source: ECan ESC Toolbox)

Onsite detention of rainfall	Below ground excavations required for foundations associated with new structures at the site can be excavated earlier in the project sequence to act as temporary detainment areas during high rainfall events. This will minimise runoff from the construction area ensuring that stormwater and sediment is contained within the site. Due to the underlying talus rock present at the site, it is expected that detained rainfall will drain to ground relatively freely and the ground conditions are not susceptible to tunnel erosion or mass instability.

Stabilisation	Temporary excavations will be cut to provide stable batters not exceeding a 35º slope angle from horizontal (1.4:1). Permanent batters shall be cut or formed to the profiles shown on the drawings for stage 2 and 3 works. Existing ground cover is very limited at the site with the site largely comprising of natural talus material which is exposed at the surface and is already naturally less prone / susceptible to erosion. Given the alpine nature of the site and frequent avalanche exposure, the ability to successfully plant/sow the site for the purposes of stabilisation is significantly constrained. Furthermore, the use of hydroseeding or sowing of grasses must be avoided due to the site being within the Fiordland National Park and being an area of sensitivity with respect to biosecurity (i.e., the introducing of weed species is an offence under the National Parks Act 1980). Post construction, stabilisation methods shall focus on the placing of heavier/coarser talus material and track rolling disturbed areas. It is expected that post works, a majority of the site will remain as exposed talus material as is the case under existing natural conditions. Where possible, organic material carefully lifted, stripped and stockpiled during the works will be reinstated on excavated slopes that are more protected from the scouring effects of avalanche and fluvial processes. Areas include above the new plant room and the reformed northern batter from the cutback carpark. Placement of this material and general stabilisation of formed batters using coarse site won talus material will occur as early as possible to progressively reduced exposure.

5. Weather Monitoring, Inspections & Remedial Actions

5.1 Weather Events

Weather forecasts will be monitored daily by the contractor. If heavy rain is predicted, extra control measures may be employed if deemed necessary and where required.

In the event of a heavy rain warning, the site staff will undertake an inspection of the sediment control measures employed at the site to ensure these are well maintained and secure.

Immediately after the rainfall event an inspection of the site will be undertaken and any repairs to the erosions and sediment control measures completed within 72 hours or as otherwise agreed with the Engineer.

5.2 Maintenance & Inspections

The contractor will be responsible for monitoring the entire work area on a regular basis to assess whether any maintenance is required to the erosion and sediment control methods implemented on site. Maintenance will include but are not limited to the checking of silt fences etc. and removal of any sediment build up to ensure their ongoing effectiveness.

Regular site inspections shall be undertaken and recorded by the contractor's on-site environmental representative. The contractor shall use the Waka Kotahi inspection forms onsite (see https://www.nzta.govt.nz/resources/erosion-sediment-control/erosion-sediment/). The inspection forms are designed to provide guidance on how to implement erosion and sediment control practices on the ground.

All contractor staff working on site are responsible for reporting any observed issues or defects regarding erosion and sediment control measures employed on site. The contractor's site foreman shall ensure the sediment control measures are maintained and shall action any maintenance required. The procedures, controls and responsibility to report damaged control measures will also be briefed to subcontractor staff.

[*contractor to detail specific maintenance and inspection procedures*]

5.3 Reporting

The contractor is to implement routine environmental performance reporting. The purpose of the reporting will be to provide a means of communication with regards to performance of ESC on site and compliance with associated resource consent or concession conditions.

6. Finalising the Erosion Sediment Control Plan

To successfully manage the potential for erosion and sediment generation during works at the site, the contractor appointed to undertake the Project will expand on the details outlined within this draft ESCP to prepare what will be the 'final ESCP'.

Where required by the consent conditions, The 'final ESCP' must be completed and submitted to the Department of Conservation, Environment Southland and Southland District Council prior to the contractor starting any construction activities authorised by the respective statutory approvals.

The 'final ESCP' is to be prepared in accordance with the best practice guidelines referred to in Section 1.5 of this document or an alternative guideline if deemed more appropriate for the site by the contractor.

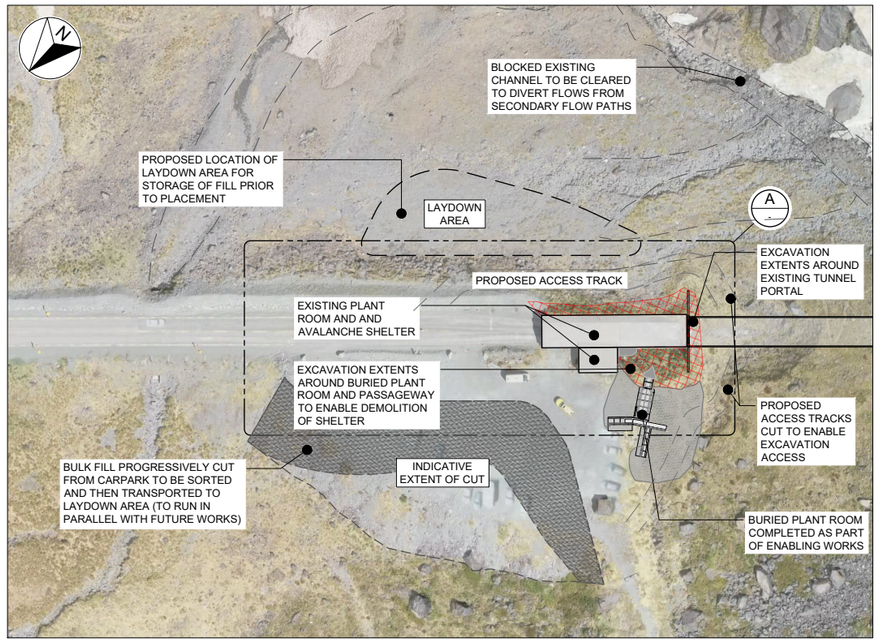
At a minimum, the Contractor is expected to include the following:

(a) A locality map detailing the location of site boundaries, surface waterways, the direction of stormwater flows and overland flow paths,
(b) A detailed programme of works identifying;
    - Each stage of construction including the likely duration
    - An estimate of the maximum disturbance area during each stage of construction, including progressive stabilisation and minimising areas of disturbance
    - Methods of vegetation removal, storage and disposal;
    - Volume of site disturbance proposed including a plan identifying the areas where material is to be cut and filled.
(c) Detailed description of site erosion and sediment control methods to be used including drawings of all erosion and sediment control measures (i.e., locations of cut-off drains, silt fences, and other mechanisms or techniques);
(d) Contingency provisions for extreme weather events, including any checks proposed to be undertaken;
(e) A schedule of the frequency and methods of inspection, monitoring and maintenance of all erosion and sediment control measures;
(f) Emergency procedures that set out measures that will be implemented if there is an accidental untreated sediment discharge to surface water;
(g) Outline steps to progressively stabilise the site throughout the contract and at completion of works, including maintenance /stabilisation of the site to minimise erosion;
(h) Procedures and timing of the reviews of the management plan;
(i) Reporting procedures;

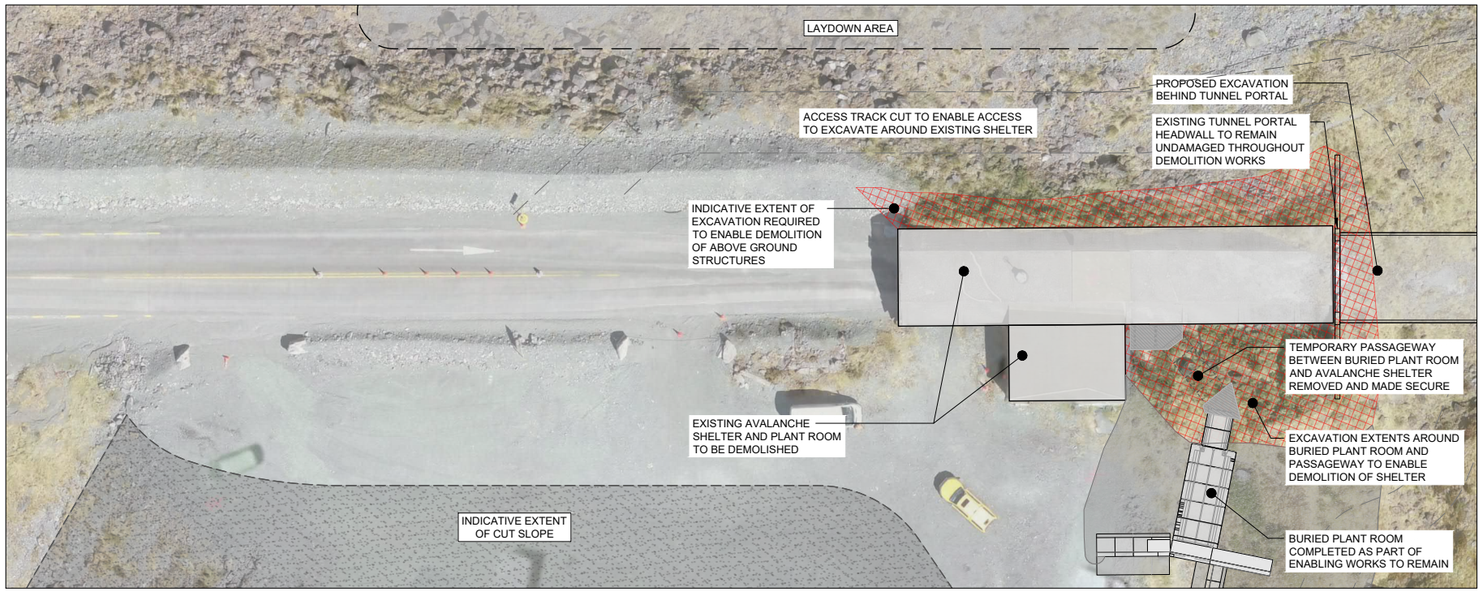
The required outcomes as per the Statutory Approval conditions are yet to be confirmed due to the stage of the project, however, these will likely include but not be limited to:

a) All controls in place, inspected and approved by the contractors' suitably qualified and experienced person in erosion and sediment control before the start of works in any area and at any changes of conditions in any area;
b) All site staff understanding and complying with all applicable Statutory Approval conditions;
c) Diversion of all clean water run-off via an appropriate diversion methodology;
d) All stormwater run-off contaminated by construction activities being appropriately treated prior to being discharged into any waterway;
e) Progressive stabilisation of the project site wherever possible;
f) Isolating / diverting upstream surface water catchments prior to works commencing;
g) Ensuring the required notices of proposed work, diversions and inspections are undertaken.

Appendix I: Stage 3 Avalanche Shelter Construction Staging



SITE PLAN (STAGE 1 SHOWN)
SCALE: 1:750



A - DETAIL - STAGE 1
SCALE: 1:250

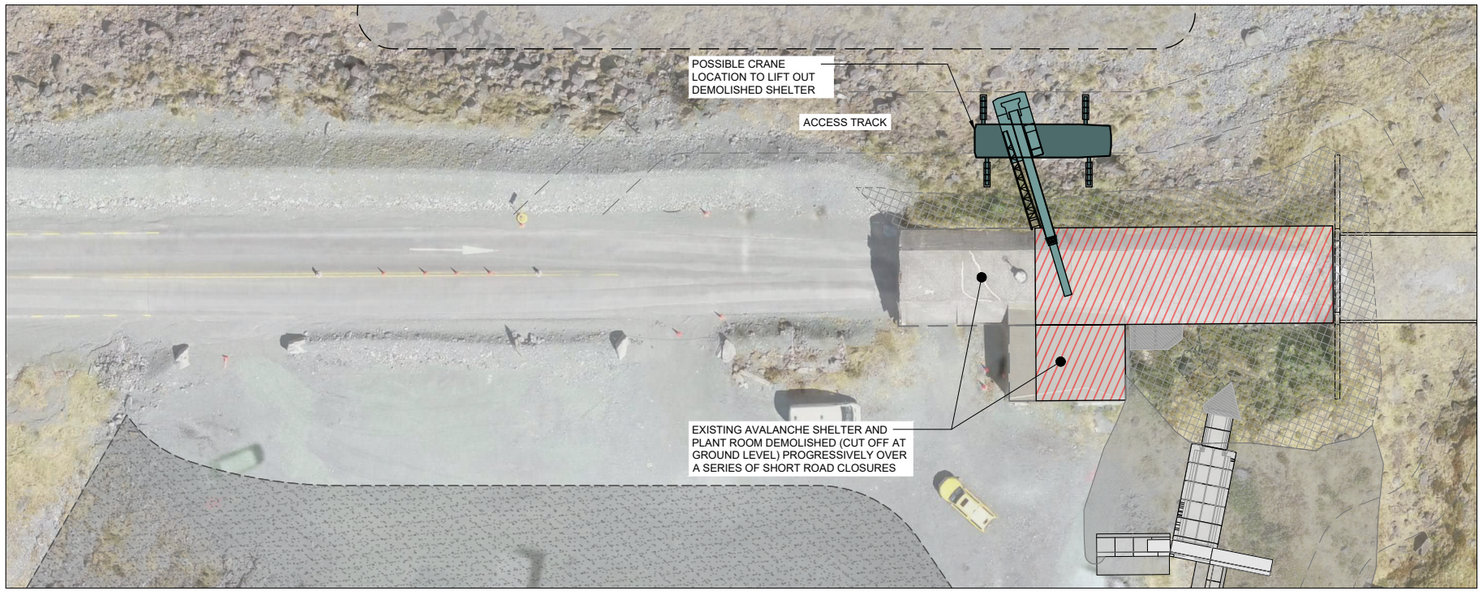
SEQUENCING OF WORKS

STAGE 1:

1. SITE ESTABLISHMENT
2. UNDERTAKE WORKS TO EPHEMERAL CHANNEL TO CUT-OFF FLOWS TO THE SECONDARY CHANNELS.
3. EXCAVATE AROUND EXISTING SHELTER AND PORTAL HEADWALL (TO APPROXIMATE ROAD LEVEL) TO ENABLE DEMOLITION.
4. MOVE TEMPORARY PLANT ROOM ACCESSWAY UNITS TO STORAGE LOCATION FOR FUTURE REINCORPORATION.
5. PROGRESSIVE EXCAVATION OF THE CARPARK, SORTING AND STORAGE WITHIN THE LAYDOWN AREA MAY COMMENCE.

STAGE 2:

1. ESTABLISH MOBILE CRANE IN POSITION FOR LIFTING OUT EXISTING SHELTER COMPONENTS. CRANE CAN BE LOCATED ON EITHER THE NORTH OR SOUTH SIDE OF THE HIGHWAY TO SUIT LIFTING OPERATION.
2. INSTALL LIFTING DEVICES INTO THE EXISTING SHELTER COMPONENTS TO SUIT DEMOLITION SEQUENCE AND ELEMENT SIZE.
3. DURING A SERIES OF SHORT ROAD CLOSURES (E.G. 50 MINUTE CLOSURES REOPENING HOURLY TO CLEAR TRAFFIC), HOOK-UP CRANE TO ELEMENT TO BE REMOVED, CUT ELEMENT FROM STRUCTURE AND CUT OFF AT GROUND LEVEL. LIFTOUT ELEMENT TO SPACE EITHER SIDE OF HIGHWAY.
4. DURING AND OUTSIDE ROAD CLOSURE, USING A COMBINATION OF DIGGER WITH PECKER ATTACHMENT AND MANUAL CUTTING TOOLS, BREAK UP THE REMOVED ELEMENTS INTO SMALLER ELEMENTS TO SUIT CARTING AWAY TO DUMP.
5. REPEAT STAGE 2, 3 AND 4 UNTIL EXISTING SHELTER AND PLANT ROOM IS REMOVED DOWN TO CARRIAGEWAY LEVEL.
6. PROGRESSIVE EXCAVATION OF THE CARPARK, SORTING AND STORAGE WITHIN THE LAYDOWN AREA CONTINUES.



A - DETAIL - STAGE 2
SCALE: 1:250

1:750 @ A1, 1:1500 @ A3: 0 10 20 30 40 50 60 70 m
1:250 @ A1, 1:500 @ A3: 0 4 8 12 16 20 24 m

REVISION	AMENDMENT	APPROVED	DATE
A			

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SCALES: AS SHOWN @ A1
ORIGINAL SIZE: A1

DRAWN	DESIGNED	APPROVED
J. MACDONALD	P. ROUTLEDGE	M. COWAN

DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
P. ROUTLEDGE	B. MCHAFFIE	2022-06-17

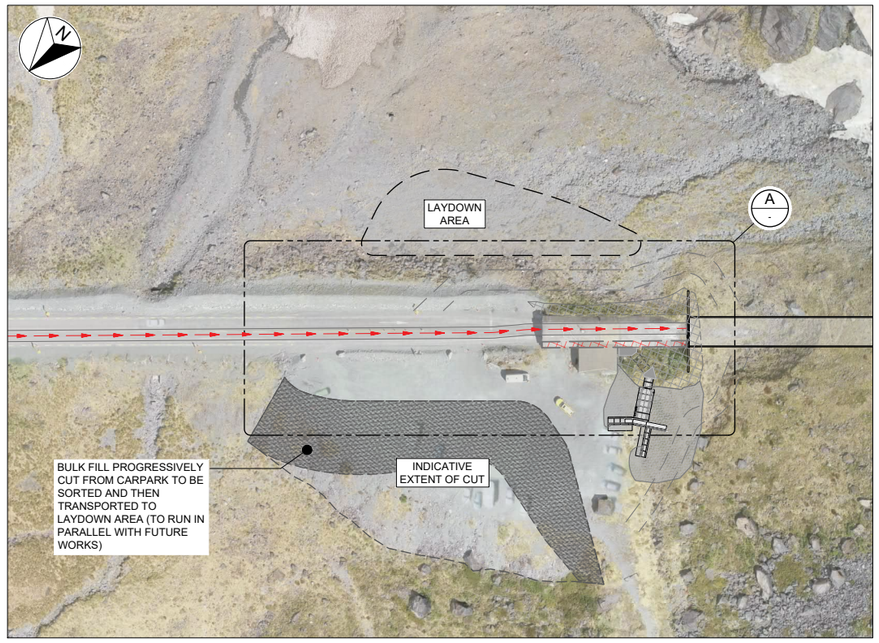
DRAFT

PROJECT
WAKA KOTAHI (NZ TRANSPORT AGENCY)
HOMER TUNNEL - SH94 RP 240 / 0.00
RESILIENCE IMPROVEMENTS - PHASE 2

TITLE
STAGING PLANS
STAGES 1 & 2

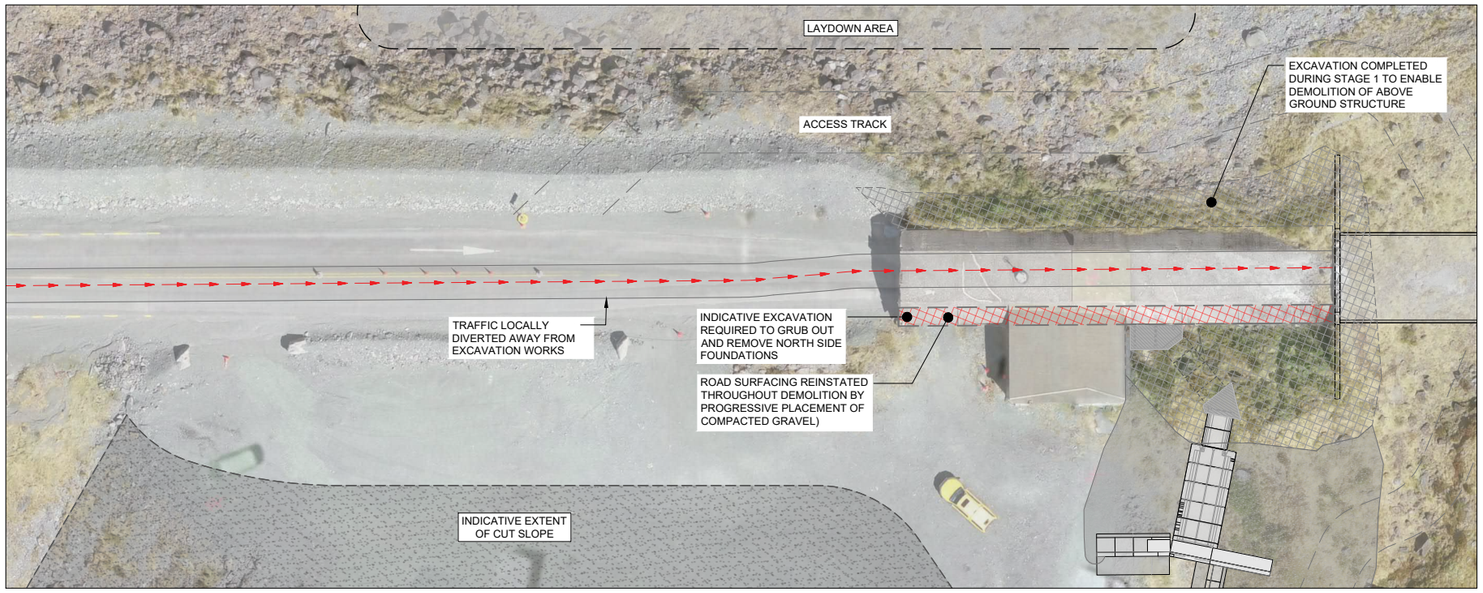
WSP PROJECT NO. (SUB-PROJECT): 6-DK546.00
SHEET NO.: C-21
REVISION: A

Original sheet size A1 (841x594) Plot Date 2022-06-17 at 1:41:03 PM \\corp.pbwan.net\ANZ\ProjectsNZ\6d\6-DK546.00 Homer Tunnel Avalanche Shelter Pre-imp &\Home\07_Drawings\CAD\6-DK546.00_C21-C30.dwg C-21



SITE PLAN (STAGE 3 SHOWN)

SCALE: 1:750



A - DETAIL - STAGE 3

SCALE: 1:250

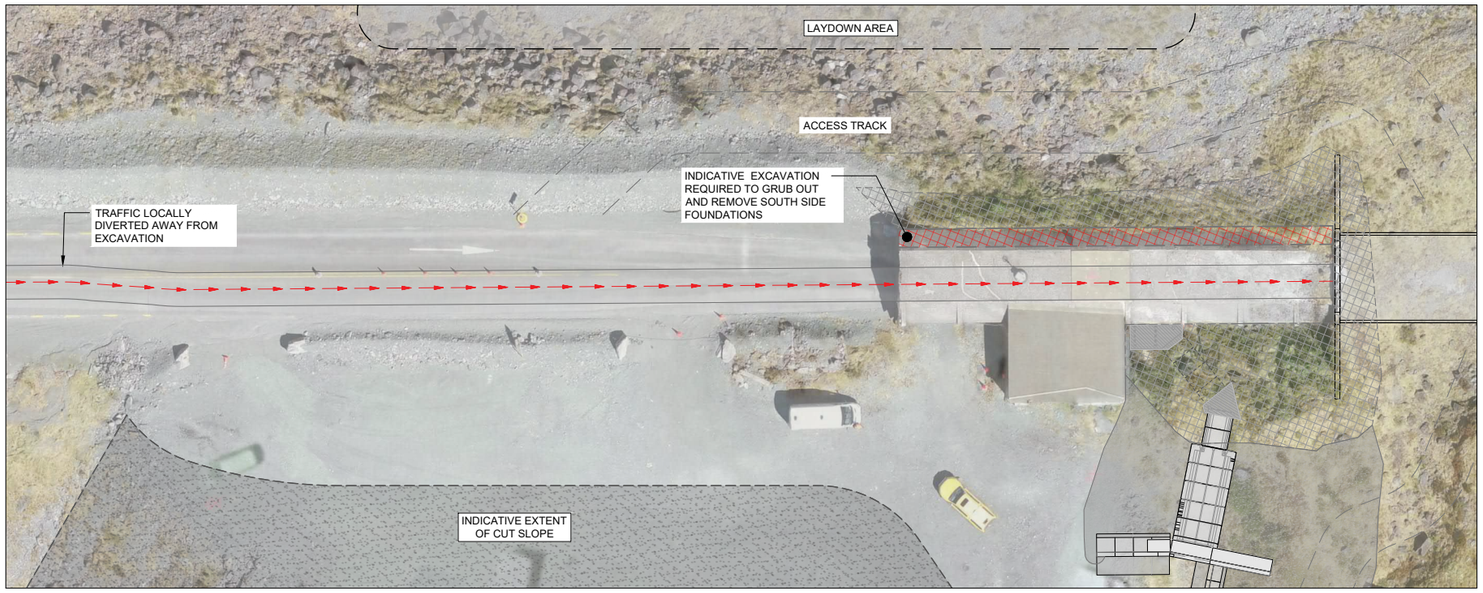
SEQUENCING OF WORKS

STAGE 3:

1. SET-UP TEMPORARY TRAFFIC MANAGEMENT TO MOVE TRAFFIC AWAY FROM THE EXISTING NORTHERN SHELTER FOOTINGS TO ENABLE THEIR EXCAVATION AND REMOVAL.
2. EXCAVATE AND REMOVE EXISTING SHELTER NORTHERN FOOTINGS.
3. REINSTATE A TEMPORARY ROAD SURFACE USING COMPACTED GRAVEL.
4. PROGRESSIVE EXCAVATION OF THE CARPARK, SORTING AND STORAGE WITHIN THE LAYDOWN AREA CONTINUES.

STAGE 4:

1. SET-UP TEMPORARY TRAFFIC MANAGEMENT TO MOVE TRAFFIC AWAY FROM THE EXISTING SOUTHERN FOOTINGS AND NEW SOUTHERN FOOTINGS TO ENABLE EXCAVATION TO REMOVE EXISTING AND CONSTRUCT NEW FOOTINGS.
2. EXCAVATE TO REMOVE THE EXISTING SHELTER SOUTHERN FOOTINGS.
3. PROGRESSIVE EXCAVATION OF THE CARPARK, SORTING AND STORAGE WITHIN THE LAYDOWN AREA CONTINUES.



A - DETAIL - STAGE 4

SCALE: 1:250

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1:250 @ A1, 1:500 @ A3: 0 4 8 12 16 20 24 m

REVISION	AMENDMENT	APPROVED	DATE
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AS SHOWN @ A1	A1

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DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
P. ROUTLEDGE	B. MCHAFFIE	2022-06-17

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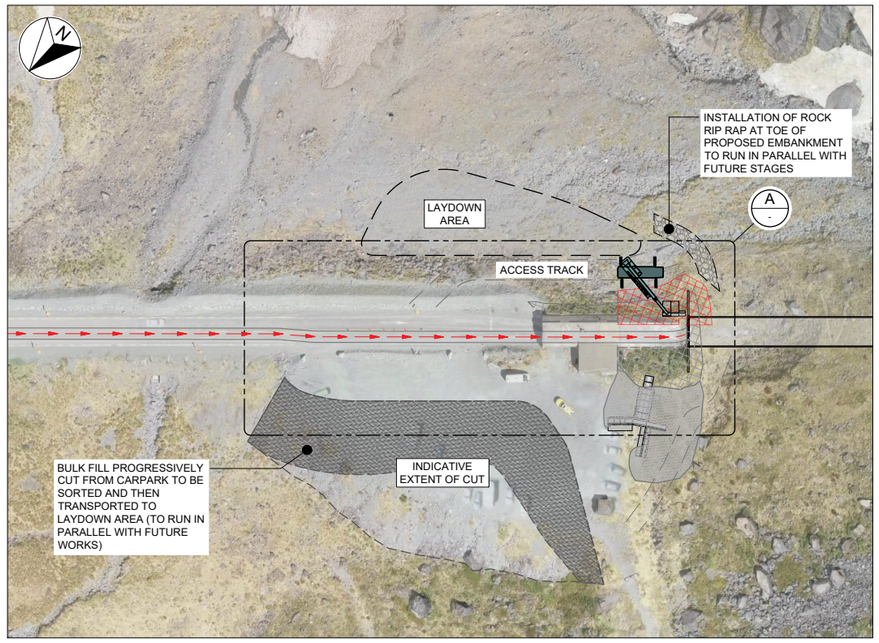
PROJECT
WAKA KOTAHI (NZ TRANSPORT AGENCY)
HOMER TUNNEL - SH94 RP 240 / 0.00
RESILIENCE IMPROVEMENTS - PHASE 2

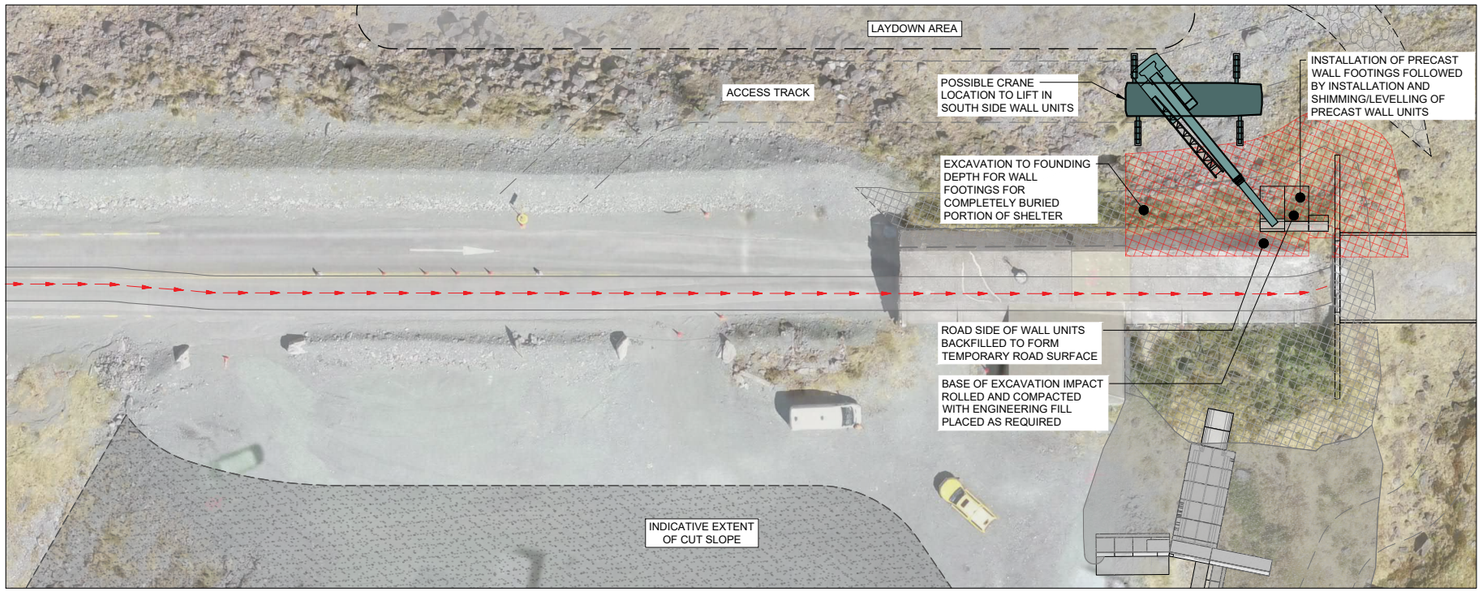
TITLE
STAGING PLANS
STAGES 3 & 4

WSP PROJECT NO. (SUB-PROJECT)	SHEET NO.	REVISION
6-DK546.00	C-22	A



SITE PLAN (STAGE 5 SHOWN)

SCALE: 1:750



A - DETAIL - STAGE 5

SCALE: 1:250

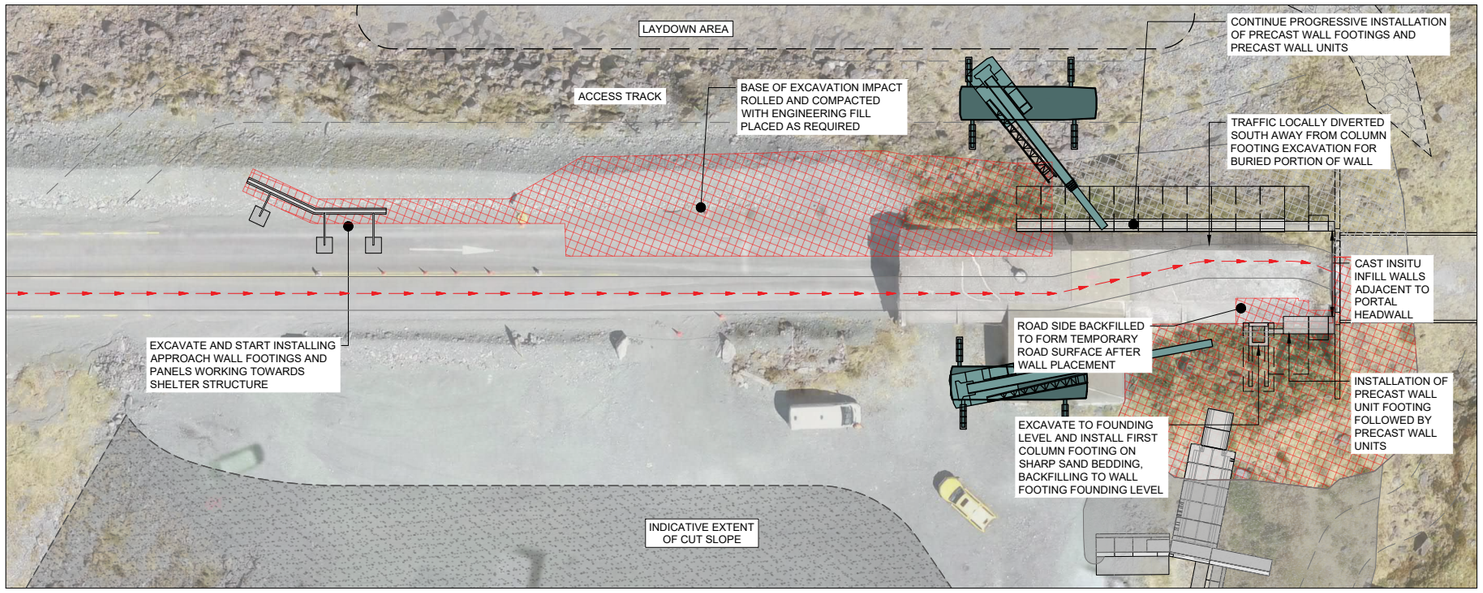
SEQUENCING OF WORKS

STAGE 5:

1. USING SAME TRAFFIC MANAGEMENT AS STAGE 4, EXCAVATE FOR NEW SOUTH WALL FOOTINGS FOR THE COMPLETELY BURIED PORTION OF THE SHELTER.
2. WHERE PRESENT, OVEREXCAVATE UP TO 500mm OF ANY TUNNEL SPOIL, (NOT EXPECTED WITHIN 5 TO 10 m OF THE EXISTING TUNNEL PORTAL), IMPACT ROLL THE BASE OF THE EXCAVATION AND REPLACE OVEREXCAVATION WITH COMPACTED ENGINEERED FILL.
3. PLACE SHARP SAND BEDDING TO LEVEL.
4. PLACE PRECAST WALL FOOTINGS.
5. PLACE PRECAST WALL UNITS ONTO FOOTINGS, SHIM TO LINE AND LEVEL AND TEMPORARILY PROP.
6. INSTALL SHUTTERS FOR STITCH (POTENTIALLY SHUTTERS COULD BE PRE-INSTALLED ONTO FOOTINGS PRIOR TO LIFTING INTO POSITION).
7. POUR INSITU CONCRETE STITCH BETWEEN PRECAST WALL AND FOOTINGS.
8. AFTER MINIMUM CURING, STRIP FORMWORK, REMOVE PROPS AND BACKFILL TO GROUND LEVEL.
9. ROAD SIDE OF WALLS TO BE BACKFILLED TO FORM TEMPORARY ROAD SURFACE WITH COMPACTED GRAVEL.
10. INSTALLATION OF ROCK RIP RAP AT TOE OF EMBANKMENT TO COMMENCE AND PROGRESSIVELY RUN IN PARALLEL WITH OTHER WORKS.
11. PROGRESSIVE EXCAVATION OF THE CARPARK, SORTING AND STORAGE WITHIN THE LAYDOWN AREA CONTINUES.

STAGE 6:

1. LOCALLY ADJUST THE TRAFFIC MANAGEMENT TO MOVE TRAFFIC AWAY FROM THE NORTHERN FOOTINGS FOR THE COMPLETELY BURIED PORTION OF THE SHELTER.
2. EXCAVATION FOR AND CONSTRUCTION OF SOUTHERN WALLS CONTINUES PROGRESSIVELY (WORKING FROM WEST TOWARDS THE EAST) AS PER STAGE 5 (2-9)
3. EXCAVATION FOR MSE APPROACH WALL COMMENCES AT THE EASTERN END (LOWEST FOUNDING LEVEL). START INSTALLING PRECAST MSE WALL FACING WITH TEMPORARY PROPS AS REQUIRED.
4. EXCAVATE FOR THE NORTHERN FOOTINGS FOR THE COMPLETELY BURIED PORTION OF THE SHELTER.
5. WHERE PRESENT, OVEREXCAVATE UP TO 500MM OF ANY TUNNEL SPOIL, (NOT EXPECTED WITHIN 5 TO 10 M OF THE EXISTING TUNNEL PORTAL), IMPACT ROLL THE BASE OF THE EXCAVATION AND REPLACE OVEREXCAVATION WITH COMPACTED ENGINEERED FILL.
6. FOR THE FIRST COLUMN FOOTING, PLACE SHARP SAND TO LEVEL AND LIFT IN THE FIRST PRECAST COLUMN FOOTING.
7. BACKFILL ON WEST SIDE OF FIRST COLUMN FOOTING TO THE FOUNDING LEVEL OF THE NORTHERN WALL FOOTINGS (I.E. BETWEEN THE FIRST COLUMN FOOTING AND THE EXISTING PORTAL.
8. PLACE SAND BEDDING AND PLACE PRECAST WALL FOOTINGS.
9. PLACE PRECAST WALL UNITS ONTO FOOTINGS, SHIM TO LINE AND LEVEL AND TEMPORARILY PROP.
10. INSTALL SHUTTERS FOR STITCH (POTENTIALLY SHUTTERS COULD BE PRE-INSTALLED ONTO FOOTINGS PRIOR TO LIFTING INTO POSITION).
11. POUR INSITU CONCRETE STITCH BETWEEN PRECAST WALL AND FOOTINGS.
12. AFTER MINIMUM CURING, STRIP FORMWORK, REMOVE PROPS AND BACKFILL TO GROUND LEVEL.
13. INSTALL SECOND AND THIRD PRECAST COLUMN BASES (AS PER STEP 6)
14. PLACE COMPRESSIBLE FILLER BOARD AGAINST EXISTING TUNNEL PORTAL HEAD WALL, INSTALL FORMWORK AND CAST INSITU INFILL WALLS
15. IMMEDIATELY ADJACENT TO THE EXISTING TUNNEL PORTAL.
16. PROGRESSIVE EXCAVATION OF THE CARPARK, SORTING AND STORAGE WITHIN THE LAYDOWN AREA CONTINUES.
17. PROGRESSIVE INSTALLATION OF RIP RAP CONTINUES.



A - DETAIL - STAGE 6

SCALE: 1:250

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1:250 @ A1, 1:500 @ A3: 0 4 8 12 16 20 24 m

REVISION	AMENDMENT	APPROVED	DATE
A			

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AS SHOWN @ A1	A1

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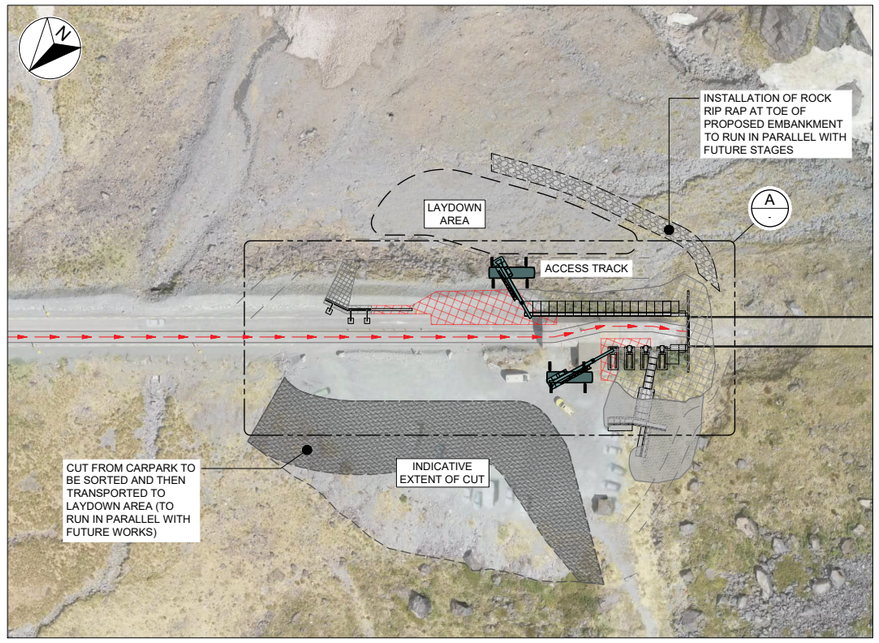
DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
P. ROUTLEDGE	B. MCHAFFIE	2022-06-17

DRAFT

PROJECT
WAKA KOTAHI (NZ TRANSPORT AGENCY)
HOMER TUNNEL - SH94 RP 240 / 0.00
RESILIENCE IMPROVEMENTS - PHASE 2

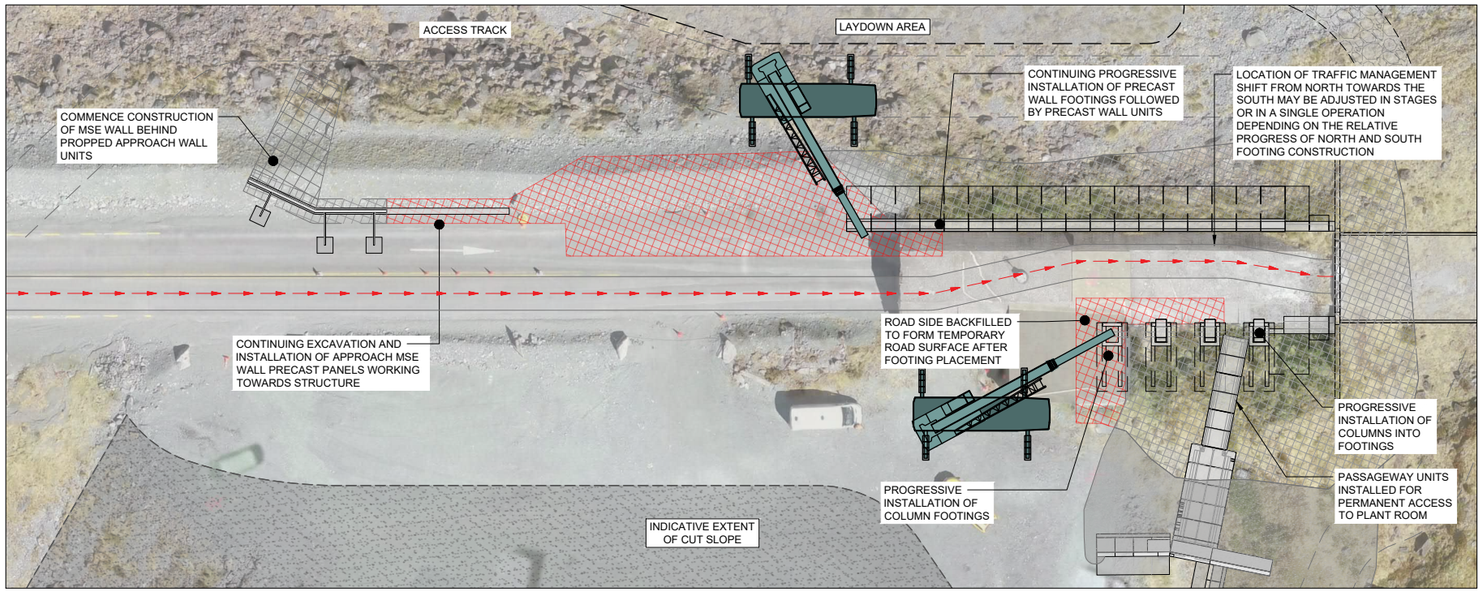
TITLE
STAGING PLANS
STAGES 5 & 6

WSP PROJECT NO. (SUB-PROJECT)	SHEET NO.	REVISION
6-DK546.00	C-23	A



SITE PLAN (STAGE 7 SHOWN)

SCALE: 1:750



A - DETAIL - STAGE 7

SCALE: 1:250

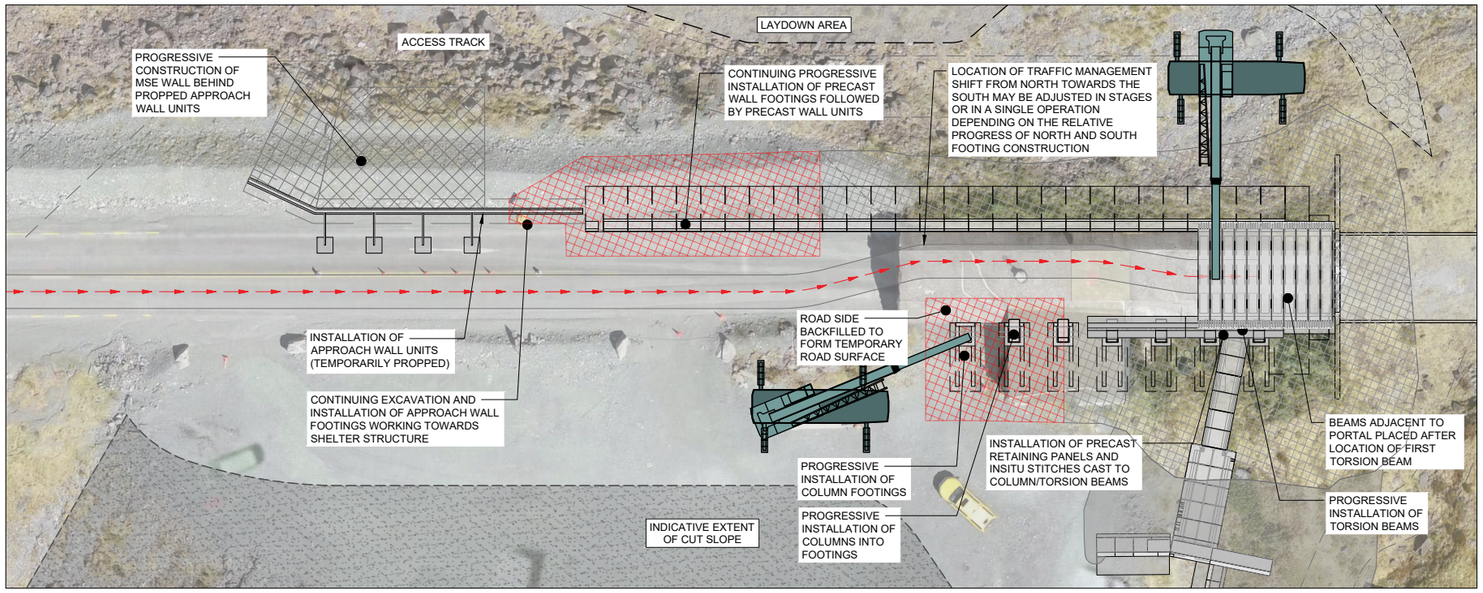
SEQUENCING OF WORKS

STAGE 7:

1. CONTINUE WITH ONGOING PARALLEL WORKS I.E. PROGRESSIVE INSTALLATION OF SOUTH WALL UNITS AS PER STAGE 5 (3-9); PROGRESSIVE INSTALLATION OF MSE APPROACH WALL PANELS WORKING FROM EAST TO WEST AS PER STAGE 6 (3); PROGRESSIVE INSTALLATION OF NORTHERN COLUMN FOOTINGS AS PER STAGE 6 (5-6); PROGRESSIVE CUT FROM CARPARK AND INSTALLATION OF ROCK RIP RAP TOE.
2. COMMENCE INSTALLING COLUMNS INTO THE COLUMN FOOTING SOCKETS (SHIM TO LINE AND LEVEL AND GROUT SOCKET ANNULUS).
3. INSTALL PLANT ROOM PRECAST PASSAGEWAY UNITS.
4. INSTALL FORMWORK TO PREPARE FOR THE SOUTH WALL TO BEAM STITCHES (POTENTIALLY THIS COULD HAVE SUBSTANTIALLY BEEN PREINSTALLED TO THE WALL UNITS PRIOR TO STAGE 5 (5).
5. COMMENCE CONSTRUCTION OF THE MSE APPROACH WALL BEHIND THE PRECAST FACING PANELS.

STAGE 8:

1. CONTINUE WITH ONGOING PARALLEL WORKS I.E. PROGRESSIVE INSTALLATION OF SOUTH WALL UNITS AS PER STAGE 5 (3-9); PROGRESSIVE INSTALLATION OF MSE APPROACH WALL PANELS AND MSE CONSTRUCTION WORKING FROM EAST TO WEST AS PER STAGE 6 (3); PROGRESSIVE INSTALLATION OF NORTHERN COLUMN FOOTINGS AS PER STAGE 6 (5-6); PROGRESSIVE INSTALLATION OF COLUMNS INTO FOOTING SOCKETS; PROGRESSIVE CUT FROM CARPARK AND INSTALLATION OF ROCK RIP RAP TOE. (IT MAY BE POSSIBLE TO COMPLETE THE INSTALLATION OF THE SOUTH WALL FOOTINGS AND WALLS PRIOR TO EXTENDING THE NORTHERN FOOTING CONSTRUCTION BEYOND THAT REQUIRED FOR THE COMPLETELY BURIED SHELTER AS THIS WOULD AVOID THE NEED FOR SHIFTING THE TRAFFIC MANAGEMENT IN STAGES AND MAY ALLOW MORE EFFICIENT EXCAVATION AND BASE PREPARATION ON BOTH THE NORTH AND SOUTH SIDES)
2. INSTALL PRECAST RETAINING PANELS BETWEEN COLUMNS FOR COMPLETELY BURIED PORTION OF SHELTER, SHUTTER AND POUR STITCHES.
3. COMMENCE INSTALLING PRECAST TORSION BEAMS ONTO COLUMNS, BOLT DOWN TO SECURE.
4. DURING A SERIES OF SHORT ROAD CLOSURES (E.G 50 MINUTE CLOSURES WITH A SHORT REOPENING TO CLEAR TRAFFIC) INSTALL THE PRECAST BEAMS FOR THE COMPLETELY BURIED PORTION OF SHELTER.
5. ONCE ALL BEAMS FOR THE COMPLETELY BURIED PORTION OF SHELTER ARE INSTALLED INSTALL THE PREFABRICATED COLUMN FORMWORK AND CAST STITCHES (IT IS SUGGESTED THAT A MINIMUM OF 4 PREFABRICATED COLUMN FORMS ARE MADE WHICH CAN BE REUSED ON LATER STITCH POURS).



A - DETAIL - STAGE 8

SCALE: 1:250

1:750 @ A1, 1:1500 @ A3: 0 10 20 30 40 50 60 70 m

1:250 @ A1, 1:500 @ A3: 0 4 8 12 16 20 24 m

REVISION	AMENDMENT	APPROVED	DATE
A			

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SCALES	ORIGINAL SIZE
AS SHOWN @ A1	A1

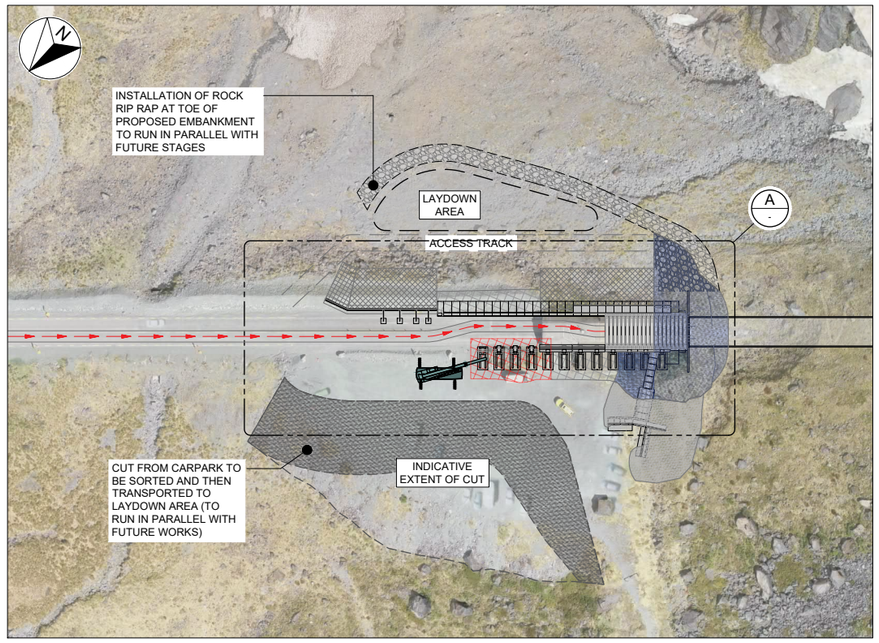
DRAWN	DESIGNED	APPROVED
J. MACDONALD	P. ROUTLEDGE	M. COWAN
DRAWING VERIFIED	**DESIGN VERIFIED**	**APPROVED DATE**
P. ROUTLEDGE	B. MCHAFFIE	2022-06-17

DRAFT

PROJECT
WAKA KOTAHI (NZ TRANSPORT AGENCY)
HOMER TUNNEL - SH94 RP 240 / 0.00
RESILIENCE IMPROVEMENTS - PHASE 2

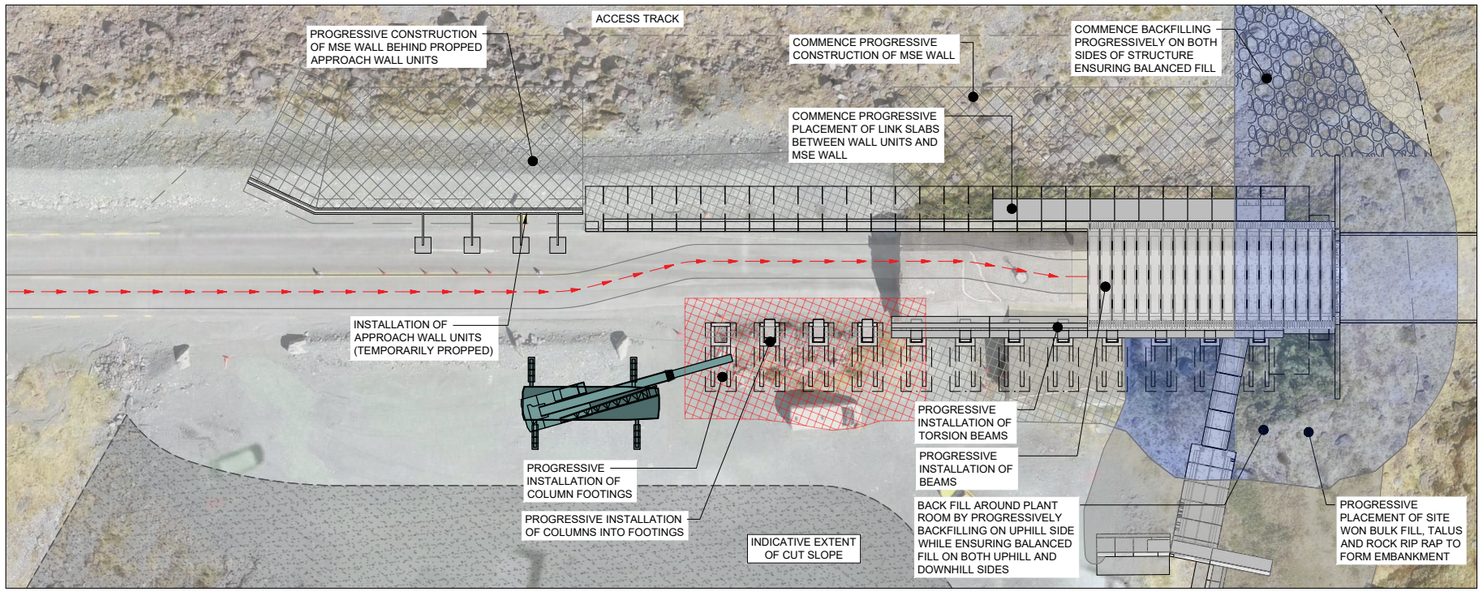
TITLE
STAGING PLANS
STAGES 7 & 8

WSP PROJECT NO. (SUB-PROJECT)	SHEET NO.	REVISION
6-DK546.00	C-24	A



SITE PLAN (STAGE 9 SHOWN)

SCALE: 1:750



A - DETAIL - STAGE 9

SCALE: 1:250

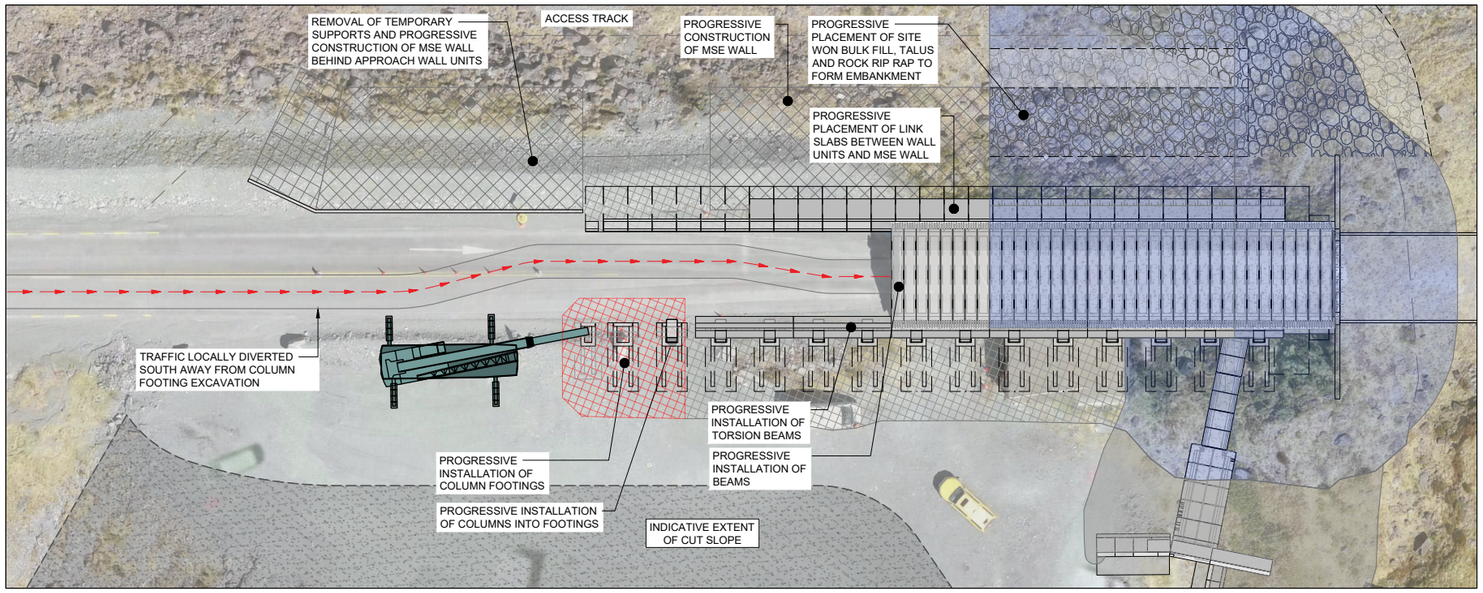
SEQUENCING OF WORKS

STAGE 9:

1. CONTINUE WITH ONGOING PARALLEL WORKS I.E. PROGRESSIVE INSTALLATION OF MSE APPROACH WALL PANELS AND MSE CONSTRUCTION WORKING FROM EAST TO WEST AS PER STAGE 6 (3); PROGRESSIVE INSTALLATION OF NORTHERN COLUMN FOOTINGS AS PER STAGE 6 (5-6); PROGRESSIVE INSTALLATION OF COLUMNS INTO FOOTING SOCKETS; PROGRESSIVE CUT FROM CARPARK AND INSTALLATION OF ROCK RIP RAP TOE. (IT MAY BE POSSIBLE TO COMPLETE THE INSTALLATION OF THE APPROACH MSE WALL PANELS PRIOR TO EXTENDING THE NORTHERN FOOTING CONSTRUCTION BEYOND THAT REQUIRED FOR THE COMPLETELY BURIED SHELTER AS THIS WOULD AVOID THE NEED FOR SHIFTING THE TRAFFIC MANAGEMENT IN STAGES AND MAY ALLOW MORE EFFICIENT EXCAVATION AND BASE PREPARATION ON BOTH THE NORTH AND SOUTH SIDES).
2. COMMENCE PROGRESSIVE PLACEMENT OF TORSION BEAMS BEYOND THE EXTENTS OF THE COMPLETELY BURIED SHELTER.
3. COMMENCE PROGRESSIVE PLACEMENT OF THE PRECAST BEAMS DURING A SERIES OF SHORT ROAD CLOSURES (E.G 50 MINUTE CLOSURES WITH A SHORT REOPENING TO CLEAR TRAFFIC).
4. COMMENCE BACKFILLING ON BOTH SIDES OF THE COMPLETELY BURIED STRUCTURE AND AROUND THE PLANT ROOM. ENSURING BALANCED FILL LEVELS ON ALL SIDES.
5. COMMENCE CONSTRUCTION OF THE MSE WALL ON THE SOUTH SIDE OF THE SHELTER.

STAGE 10:

1. CONTINUE WITH ONGOING PARALLEL WORKS I.E. PROGRESSIVE INSTALLATION OF MSE APPROACH WALL PANELS AND MSE CONSTRUCTION WORKING FROM EAST TO WEST AS PER STAGE 6 (3); PROGRESSIVE INSTALLATION OF NORTHERN COLUMN FOOTINGS AS PER STAGE 6 (5-6); PROGRESSIVE INSTALLATION OF COLUMNS INTO FOOTING SOCKETS; PROGRESSIVE INSTALLATION OF TORSION BEAMS; PROGRESSIVE INSTALLATION OF PRECAST BEAMS DURING A SERIES OF SHORT ROAD CLOSURES); PROGRESSIVE CONSTRUCTION OF THE MAIN MSE WALLS; PROGRESSIVE CUT FROM CARPARK AND INSTALLATION OF ROCK RIP RAP TOE. (IT MAY BE POSSIBLE TO COMPLETE THE INSTALLATION OF THE APPROACH MSE WALL PANELS PRIOR TO EXTENDING THE NORTHERN FOOTING CONSTRUCTION BEYOND THAT REQUIRED FOR THE COMPLETELY BURIED SHELTER AS THIS WOULD AVOID THE NEED FOR SHIFTING THE TRAFFIC MANAGEMENT IN STAGES AND MAY ALLOW MORE EFFICIENT EXCAVATION AND BASE PREPARATION ON BOTH THE NORTH AND SOUTH SIDES).
2. COMMENCE PLACING OF LINK SLABS BETWEEN WALL UNITS AND MSE WALL FILL.
3. INSTALL FORMWORK FOR BEAM INSITU STITCH POURS.
4. POUR BEAM INSITU STITCHES BETWEEN TORSION BEAM AND PRECAST BEAMS AND BETWEEN PRECAST BEAMS AND WALLS.
5. REMOVE TEMPORARY SUPPORT PROPS FOR THE MSE APPROACH WALLS.
6. COMMENCE PLACEMENT OF BULK FILL, UPPER ROCK RIP RAP AND TALUS CUSHION COMMENCING AT THE PORTAL AND WORKING TOWARDS THE EAST.



A - DETAIL - STAGE 10

SCALE: 1:250

1:750 @ A1, 1:1500 @ A3: 0 10 20 30 40 50 60 70 m

1:250 @ A1, 1:500 @ A3: 0 4 8 12 16 20 24 m

REVISION	AMENDMENT	APPROVED	DATE
A			

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New Zealand

CIVIL

SCALES: AS SHOWN @ A1

ORIGINAL SIZE: A1

DRAWN	DESIGNED	APPROVED
J. MACDONALD	P. ROUTLEDGE	M. COWAN
DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
P. ROUTLEDGE	B. MCHAFFIE	2022-06-17

DRAFT

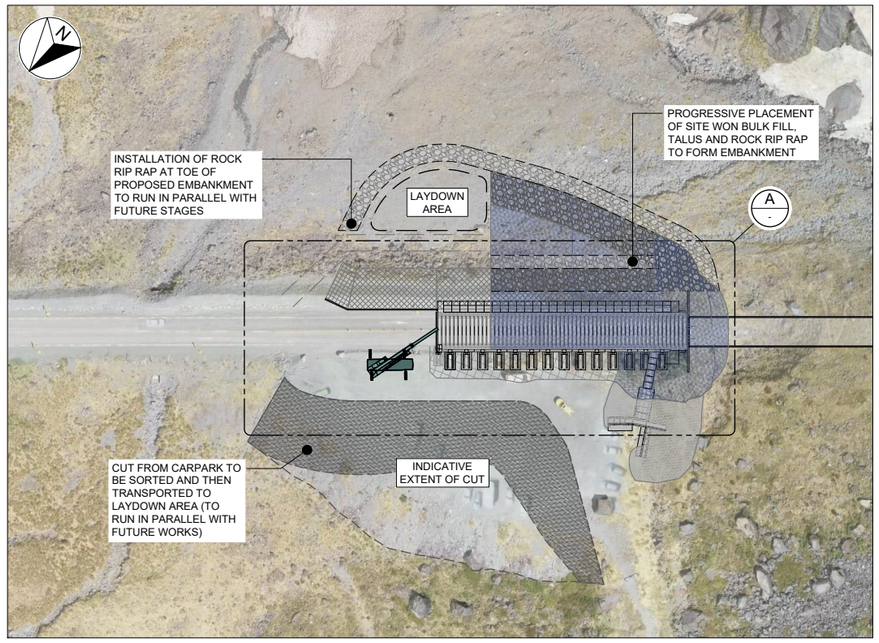
PROJECT: WAKA KOTAHI (NZ TRANSPORT AGENCY) HOMER TUNNEL - SH94 RP 240 / 0.00 RESILIENCE IMPROVEMENTS - PHASE 2

TITLE: STAGING PLANS STAGES 9 & 10

WSP PROJECT NO. (SUB-PROJECT): 6-DK546.00

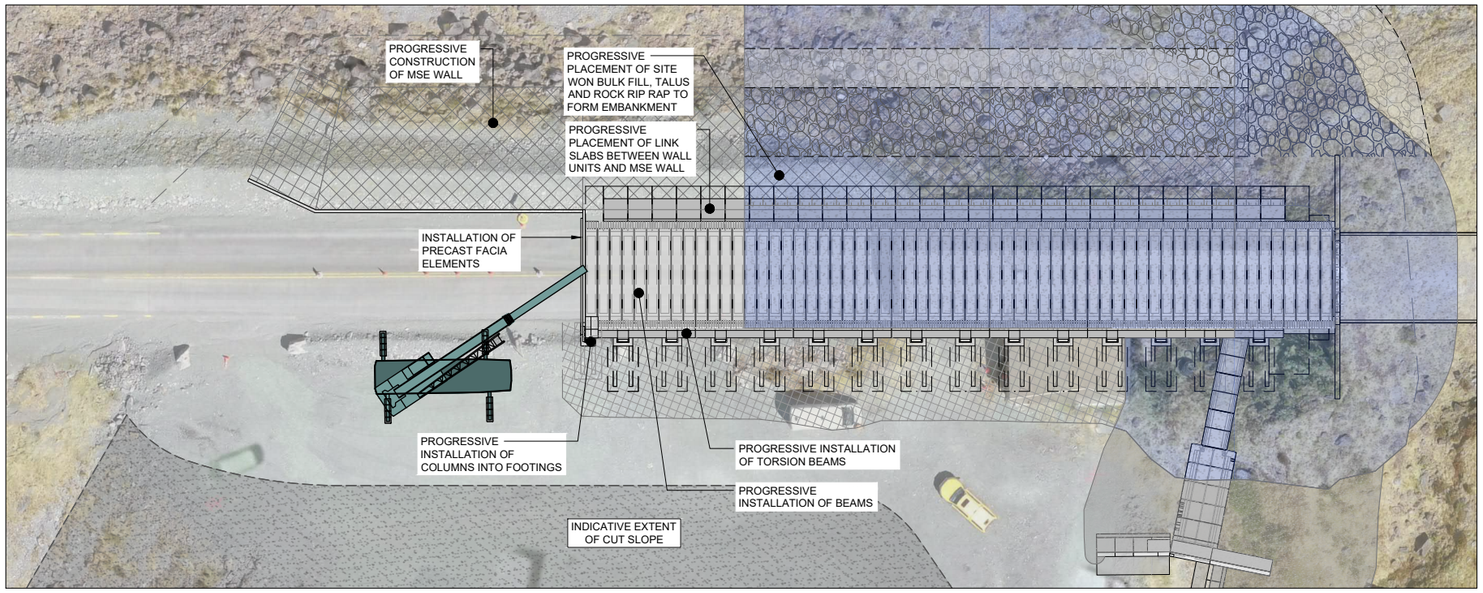
SHEET NO.: C-25

REVISION: A



SITE PLAN (STAGE 11 SHOWN)

SCALE: 1:750



A - DETAIL - STAGE 11

SCALE: 1:250

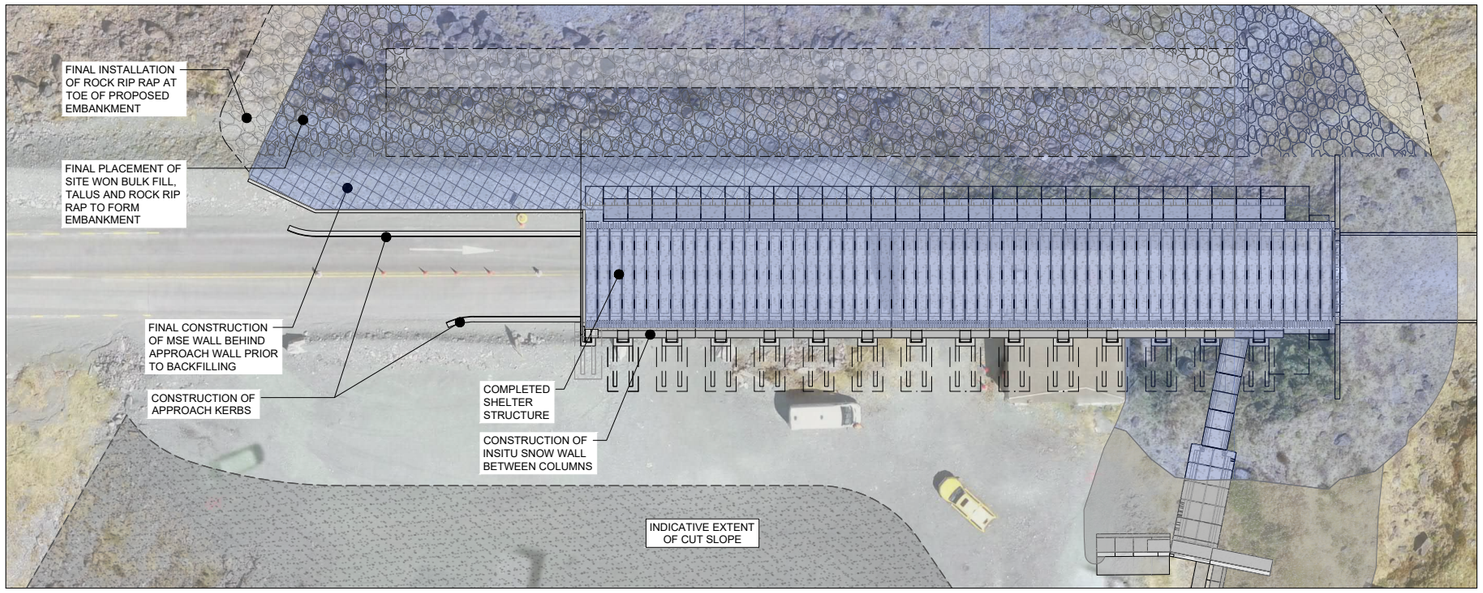
SEQUENCING OF WORKS

STAGE 11:

1. CONTINUE WITH ONGOING PARALLEL WORKS I.E. COMPLETE INSTALLATION OF NORTHERN COLUMN FOOTINGS AS PER STAGE 6 (5-6); COMPLETE INSTALLATION OF COLUMNS INTO FOOTING SOCKETS; COMPLETE INSTALLATION OF TORSION BEAMS; COMPLETE INSTALLATION OF PRECAST BEAMS DURING A SERIES OF SHORT ROAD CLOSURES; COMPLETE CONSTRUCTION OF THE MAIN MSE WALLS; COMPLETE PLACEMENT OF LINK SLABS; COMPLETE CONSTRUCTION OF INSTU STITCHES BETWEEN BEAMS AND THE SUPPORTS; COMPLETE CUT FROM CARPARK.
2. INSTALL PRECAST FACIA ELEMENTS.

STAGE 12:

1. COMPLETE OF ROCK RIP RAP TOE AND PLACEMENT OF BULK FILL, UPPER ROCK RIP RAP AND TALUS CUSHION.
2. CONSTRUCT INSITU SNOW WALLS BETWEEN COLUMNS (THIS COULD BE COMMENCED EARLIER ONCE THE RELEVANT COLUMNS HAVE BEEN INSTALLED.
3. CONSTRUCT THE KERBS.
4. COMPLETE MISCELLANEOUS FINISHINGS



A - DETAIL - STAGE 12

SCALE: 1:250

1:750 @ A1, 1:1500 @ A3: 0 10 20 30 40 50 60 70 m

1:250 @ A1, 1:500 @ A3: 0 4 8 12 16 20 24 m

REVISION	AMENDMENT	APPROVED	DATE
A			

WAKA KOTAHI NZ TRANSPORT AGENCY

WSP
Christchurch Office
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PO Box 1482
Christchurch 8140
New Zealand

CIVIL

SCALES: AS SHOWN @ A1

ORIGINAL SIZE: A1

DRAWN	DESIGNED	APPROVED
J. MACDONALD	P. ROUTLEDGE	M. COWAN
DRAWING VERIFIED	**DESIGN VERIFIED**	**APPROVED DATE**
P. ROUTLEDGE	B. MCHAFFIE	2022-06-17

DRAFT

PROJECT: WAKA KOTAHI (NZ TRANSPORT AGENCY)
HOMER TUNNEL - SH94 RP 240 / 0.00
RESILIENCE IMPROVEMENTS - PHASE 2

TITLE: STAGING PLANS
STAGES 11 & 12

WSP PROJECT NO. (SUB-PROJECT): 6-DK546.00

SHEET NO.: C-26

REVISION: A

0 10 mm 50 100 200 300 mm