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# Site Specific Environmental Management Plan

## – Peka to Ōtaki Project

SE1: Mary Crest to Te Kowhai Road

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FCCL-EV-MPN-0032

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August 2018 – Revision C

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## AUTHORISATION AND REVISION RECORD

Revision	Status	Author	Date	Description
A	Draft	Alice Naylor	29/05/18	For PA Review
A.1	Updated Draft	Alice Naylor	12/06/18	For PA Review
B	Updated Draft	Alice Naylor	5/7/18	For Review
B.1	Updated	Alice Naylor	31/08/18	For Final Review
C	Updated	Alice Naylor	10/09/18	For Council Certification

### Certification Record

Revision	Action	Name	Position	Date	Signature
	Approved by:	Richard Percy	Project Leader	11/9/18	
	On behalf of GWRC:				

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Revision	Action	Name	Position	Date	Signature
	Approved by:				
	On behalf of KCDC:				

**CERTIFIED**

M JAY SOMA

Resource Consents & Compliance Manager

Kapiti Coast District Council

DATE: 11/9/2018



# 1 INTRODUCTION

This Site Specific Environmental Management Plan (SSEMP) provides the necessary information to demonstrate how the project team plan to avoid or mitigate potential adverse environmental effects relating to construction of the Peka Peka to Ōtaki Expressway.

This document covers construction of the new Expressway between Mary Crest and Te Kowhai Road at the southern end of the project. The priority for this section is to first complete full construction of the proposed local arterial road that runs along the western boundary of the site. This local arterial road will become live to State Highway One (SH1) traffic upon completion mid-2019. This will allow the main alignment earthworks to be carried out within the current SH1 footprint and allow for future access to the Mary Crest Rail Overpass (Bridge 9). Traffic will remain on the new local arterial road until final completion of the Expressway main alignment works.

The scope of work covered under this document is as follows:

- Installation of two permanent Culvert's 59 and 61 (Cavallo Stream)
- Construction of the permanent Cavallo Stream Diversion
- Installation of one temporary culvert to allow access across the Awatea Stream
- Peat replacement using locally sourced sand to backfill progressively
- Preload at Awatea (Stage One) including removal of preload following required settlement period
- Local arterial road earthworks
- Local arterial road pavement and drainage
- Main alignment earthworks

The scope of works not covered under this document (and instead will be covered in subsequent SSEMPs) is as follows:

- Mary Crest Basin Preload (pending KCDC acceptance of the settlement monitoring proposal)
- Construction of the Mary Crest Rail Overpass (Bridge 9)
- Construction of Permanent Culvert's 50, 50A, 53, 64, and 66 (Jewell, Edwin, Awatea and Kumutoto Streams)
- Final tie-in works to Mackays to Peka Expressway at the southern end
- Awatea Preload Stage Two (which extends into the Existing SH1 footprint)
- Final main alignment surfacing and landscaping (except for the Cavallo Stream Diversion mentioned above)<sup>1</sup>

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<sup>1</sup> Condition G.35B requires that mitigation planting outside of the earthworks footprint be completed within one year of *commencement* of earthworks carried out under this SSEMP and that mitigation planting within the earthworks footprint must be completed within one year of *completion* of earthworks carried out under this SSEMP.

This SSEMP reflects the requirements of the Construction Environmental Management Plan (CEMP) and its appendices, and is intended to be utilised by the construction team to clearly identify any site specific environmental requirements that must be adhered to prior to, and during works. A suite of over-arching environmental management plans have been drawn from to inform the contents of this SSEMP. All works will be carried out in general accordance with these management plans.

Works are not to commence on site until certification of this SSEMP has been confirmed in writing by Kapiti Coast District Council (KCDC) and Greater Wellington Regional Council (GWRC).

## 1.1 Location of works

Works will take place between chainage 9500 and 12280 (Mary Crest to Te Kowhai Road), immediately west of existing SH1. This section is the most southern extent of the project footprint which will eventually tie into the existing Mackays to Peka Peka Expressway (M2PP).



**Figure 1:** Location of works outlined in yellow west of the existing State Highway.

## 1.2 Programme

Works are expected to commence in September 2018 and carry on into 2019. A detailed programme is included as Appendix D. Note that given the complexity and duration of works in this area, the detailed programme may adapt over the course of the works.



## 2 PLAN IMPLEMENTATION

### 2.1 Responsibilities

The following provides a summary of responsibilities relevant to the planning and implementation of this SSEMP.

**Table 2: Roles and responsibilities**

Role	Person	Contact Details	Responsibilities
Construction Manager	Steve Findlay	stevef@fcc.co.nz	<ul style="list-style-type: none"> <li>Ensures there is a system in place so that construction works do not proceed until required environmental sign-offs are completed.</li> <li>Overviews systems and processes to ensure consent requirements are captured for construction works.</li> <li>Ensures adequate resources are provided to ensure environmental issues are appropriately managed.</li> <li>Reviews environmental incidents and complaints with the Environmental Manager and acts to address issues where needed.</li> <li>Reviews and monitors construction work methods to ensure compliance with RMA conditions</li> </ul>
Environmental Manager	Alice Naylor	A.Naylor@Higgins.co.nz	<ul style="list-style-type: none"> <li>Develops, implements and reviews environmental management systems and environmental management plans.</li> <li>Coordinates all environmental auditing functions and ensures relevant records are maintained.</li> <li>Responds to and investigates all environmental complaints, issues or incidents.</li> <li>Coordinates the SSEMP implementation process and pre-works requirements to ensure that environmental requirements are adhered to.</li> <li>Provides training and briefings to site staff to ensure that there is sufficient</li> </ul>

			<p>knowledge of environmental requirements in the field.</p> <ul style="list-style-type: none"> <li>• Acts as the primary point of communication between regulatory bodies and the project.</li> <li>• Coordinates a team of experts in specialist disciplines such as contaminated land, ecology, groundwater, noise and vibration.</li> <li>• Communicates environmentally sensitive areas to the construction team.</li> </ul>
Environmental Coordinator	Sevasti Hartley	sevastih@fcc.co.nz	<ul style="list-style-type: none"> <li>• Supports the Environmental Manager and provides leadership to ensure all staff comply with environmental management systems.</li> <li>• Provides support in the formation of SSEMPs.</li> <li>• Undertakes as-building of environmental controls.</li> <li>• Undertakes regular site inspections and audits.</li> <li>• Coordinates all site monitoring including but not limited to groundwater, water quality, ecological, dust, noise, and vibration monitoring.</li> <li>• Manages maintenance and monitoring of Chemical Treatment Systems (if used).</li> <li>• Ensures spill kits are available and stocked and provides training on equipment use.</li> <li>• Conducts regular site inspections of erosion and sediment control devices and co-ordinates maintenance where necessary.</li> <li>• Monitors site controls during rain storms.</li> <li>• Trains staff in site specific environmental procedures.</li> </ul>
Stakeholder & Communications Manager	Ed Breese	ebreese@tonkintaylor.co.nz	<ul style="list-style-type: none"> <li>• Organises, co-ordinates and facilitates engagement with affected property holders and community prior to and during construction.</li> </ul>

			<ul style="list-style-type: none"> <li>Works in partnership with Environmental Manager on engagement and construction activities in accordance with RMA conditions</li> </ul>
Site Superintendent / Supervisors / Foreman	Simon Fifield	SimonF@fcc.co.nz	<ul style="list-style-type: none"> <li>Provides leadership to the site construction team.</li> <li>Ensures environmental controls including erosion and sediment control works are protected and maintained on a day to day basis.</li> <li>Ensures that the SSEMPs and Archaeological Authority requirements are implemented appropriately by the construction team.</li> <li>Maintains contactability 24/7 during construction and has authority to initiate immediate response actions.</li> <li>Reports all environmental incidents, compliance issues and complaints to the Environmental Manager.</li> <li>Reviews the need to use a water cart or sprinklers to control dust.</li> </ul>
Project Engineers	Richard Rakovics (Civil)  Craig Service (Structural)	RichardR@fcc.co.nz  CraigS@fcc.co.nz	<ul style="list-style-type: none"> <li>Responsible for ensuring environmental controls and erosion and sediment control works are installed and modified as appropriate for each stage of construction.</li> <li>Develop, implements and monitors construction methods and environmental protection measures to ensure compliance with the SSEMPs.</li> <li>Demonstrate understanding of major environmental and community issues and environmentally sensitive areas.</li> <li>Coordinate environmental interfaces with subcontractors and suppliers.</li> <li>Reports all environmental incidents, compliance issues and complaints to the Environmental Manager.</li> </ul>

Specialist support (contaminated land, ecology, noise and vibration)	Dean Miller (Principal Ecologist)	DCMiller@tonkintaylor.co.nz	<ul style="list-style-type: none"> <li>• Provide expert advice to the Environmental Manager and Environmental Coordinator regarding specific site requirements.</li> <li>• Submits reports to the Environmental Manager to fulfil requirements of consents relevant to their field.</li> <li>• Briefs the construction team of site specific requirements for environmentally 'sensitive areas'.</li> </ul>
Iwi	Te Waari Carkeek (Ngā Hapū o Ōtaki Kaiarahi)	TeWaariC@fcc.co.nz	<ul style="list-style-type: none"> <li>• Provide input into project documentation such as management plans, design processes, planning documents.</li> <li>• Reviews permits to work and coordinates the level of involvement of kaitiaki in site activities</li> <li>• Coordinates all aspects of iwi monitoring.</li> <li>• Key point of contact for Ngā Hapū o Ōtaki.</li> </ul>
	Caleb Royal (Ngā Hapū o Ōtaki Consents Processing Officer)		<ul style="list-style-type: none"> <li>• Reviews consent applications and coordinates cultural monitoring activities.</li> <li>• Provides specialist advice to Ngā Hapū o Ōtaki</li> </ul>
Iwi	Muaupoko Tribal Authority		<ul style="list-style-type: none"> <li>• Point of contact for any archaeological discoveries in accordance with the agreed accidental discovery protocols and MTA agreement.</li> </ul>

## 2.2 SSEMP Changes

In the event that changes in works scope or methodology are required, changes may need to be made to this document in accordance with resource Consent Condition's DC.18B and / or G.21A. Any 'major'

changes will be submitted to the respective Manager for certification at least 5 working days prior to implementation of that change.

In accordance with Condition G.21A, a 'minor change' may be submitted to the Manager for certification at least 2 working days prior to implementation of that change, unless an alternative process of approving a 'minor change' is agreed to by the Manager, Greater Wellington Regional Council.

## 3 GENERAL SITE MANAGEMENT

### 3.1 Site Access

Access to the site will be via Te Kowhai Road from the southern end of the site (approved Site Access Point SAP-1), Te Hapua Road North and South (SAP-2), SH1 (SAP-3), and Mary Crest (SAP-4).

The access/egress points will be stabilised using clean aggregate or sealed to avoid any construction related material leaving the site.

### 3.2 Site Establishment

Various areas of the site will be allocated for parking, sign-in sheds, and storage of miscellaneous materials (refer to Appendix C drawing for indicative laydown areas). The site will be maintained in a tidy state with redundant materials removed off-site once no longer required.

### 3.3 Construction Plant

The plant items to be used are generally as follows:

#### Earthworks:

- 6 – 20T excavators
- Motor scrapers
- Dump trucks
- Dozers
- Water cart as required
- Light vehicles
- Water pumps

#### Culvert Construction:

- 6 – 20T excavators
- Dump trucks
- Concrete trucks
- Concrete pumps

- 50T crane
- Truck and trailers for deliveries

**Pavement construction:**

- Grader
- Water cart
- 14t Single Smooth Drum Oscillating Roller
- 14t Single Smooth Padfoot Vibrating Roller
- 2.4m Hoe Stabiliser
- Cement Spreader Truck
- Large Loader
- Bottom Dump Truck and Trailer

Plant will remain outside of watercourses at all times during the works and where practicable, refrain from working within 10m of a live watercourse to minimise any risk of causing bank instability or spills to the receiving environment.

All plant is required to be inspected prior to commencing works and during construction activities at regular intervals. Unwanted vegetation, seeds or contaminants will be cleared prior to plant entering the site to avoid the introduction or spread of weeds or pest species.

Plant inspections will be recorded on daily plant inspection forms to demonstrate that all plant used on this project are in good working order and have been cleared of unwanted weeds and pest species. Any faulty equipment will be stood down until the necessary repairs are carried out and the given plant is fit for purpose.

Spill control kits will be available on site in areas where heavy machine is working. Refuelling activities will take place using a mini-tanker at least 10m away from any watercourse to prevent additional risk of spillage to water. Plant and machinery will not enter any waterway at any stage of works.

## 3.4 Pre-works Requirements

Prior to works commencing on site the following mitigation measures will be implemented to avoid or minimise adverse environmental effects:

- Site specific information, including environmental constraints and requirements, will be discussed at the relevant pre-construction site meetings with input from specialists as required.
- Prior to works commencing in this area, the project surveyors will use GPS to identify the extent of works. The works area will be clearly marked-out with regular input from the survey team throughout works as required.
- Areas identified as 'retained vegetation' as per the approved vegetation retention plans will be clearly delineated using physical markers on site.

- Environmental requirements for any given area will be noted on each project ‘Permit to Work’. These permits are required for any activity on site and must be in place and signed off by the environmental team prior to works commencement.
- Signage and safety fencing will be erected to clearly discourage the public from entering the site. Regular updates will be provided to the community regarding upcoming works and changes to works sequencing.

## 3.5 Water Supply

Water may be required to prevent dust discharge from site during works. Water required for these works will be collected from off-site.

Any water supply bores required on site must be constructed in accordance with BC.1 – 4 with any water take done so in accordance with GT. 4-7.

It is likely that a lined pond will be constructed within this section to provide for storage of water to be used for dust suppression as required. Water will be sourced from offsite, from within sediment control devices, or from dewatering activities during culvert construction. The location of this pond is shown in Appendix C Layout Drawings.

# 4 WORKS METHODOLOGY

## 4.1 Culvert Construction

Two permanent culverts (Culvert 59 and 61) are to be constructed between Chainage 10800 and 11000 to convey the Cavallo Stream flow beneath the Expressway and Local Arterial Road. The permanent Cavallo Stream Diversion will also be constructed as part of this package of works.

Culvert and stream diversion construction will typically be carried out as follows:

### 4.1.1 Cavallo Stream Diversion and Culvert’s 59 and 61

#### 4.1.1.1 Culvert 59

- Install necessary erosion and sediment controls to allow access across the site and certify in accordance with Condition E.6.
- Construct Culvert 59 and the Cavallo Permanent Stream Diversion) offline of the existing Cavallo Stream, leaving 2m earth plugs in place downstream of the diversion channel and upstream of the culvert inlet.
- Ensure that the necessary erosion and sediment controls have been installed and certified in accordance with Condition E.6.
- Ensure that the project ecologist has inspected and approved the culvert and stream diversion. Kaitiaki representing Ngā Hapu o Ōtāki must also be present on site prior to and during livening.

- Liven Culvert 59 by removing the downstream plug, followed by the upstream plug.
- Block off the existing section of Cavallo Stream between Culvert 59 and Culvert 61.
- Allow fish salvage and relocation to be undertaken (refer to section 5.3.2.1 for further details).
- Backfill the redundant stream section upon completion of fish salvage and relocation procedures (to be determined by Ngā Hapu o Ōtaki and the project Ecologists).

#### **4.1.1.2 Culvert 61**

- Construct majority of Culvert 61 offline of the existing Cavallo Stream, leaving 2m earth plugs at the inlet and outlet.
- Approximately 10m of the new culvert overlaps the existing culvert at the upstream end.
- Attach a 'flow-through stream plug' within the existing culvert to allow the stream to continue to flow if water is present.
- Complete the final upstream section of the culvert in the dry.
- Ensure that the project ecologist has inspected and approved the culvert. Kaitiaki representing Ngā Hapu o Ōtaki must also be present on site prior to and during livening.
- Liven the section of culvert by removing the downstream plug, followed by the upstream flow through plug.
- Block the original stream channel at the upstream and downstream end. Allow fish salvage and relocation to be undertaken (refer to section 5.3.2.1 for further details).
- Backfill the redundant stream section upon completion of fish salvage and relocation procedures (to be determined by Ngā Hapu o Ōtaki and the project Ecologists).

### **4.1.2 Awatea Stream**

#### **4.1.2.1 Un-named Drain Decommissioning**

The upstream section of an un-named tributary of the Awatea Stream at chainage 11340 is to be decommissioned as follows:

- Block the drain at the Designation boundary and carry out fish salvage and relocation methods (refer to section 5.3.2.1 for details).
- Upon approval from Nga Hapu o Ōtaki and the project ecologists, backfill the redundant channel.

#### **4.1.2.2 Awatea Stream Temporary Culvert – Stage 1 Preload**

Prior to the placement of material along the Local Arterial Road for the Awatea Stage One Preload, access will be required across the Awatea Stream by undertaking the following:

- Install the necessary erosion and sediment control measures to protect the existing Awatea Stream channel.
- Construct a temporary culvert immediately to the south, offline of the existing stream leaving existing earth plugs in at the inlet and outlet. Dimensions as follows:
  - Temporary PE Culvert
  - 1 x 1050 diameter PE - to convey 2 y ARI flow ~ 2.3m<sup>3</sup>/s.



- Any minor sections of open channel required to tie into the existing stream will be constructed as follows (based on advice from the Project Stormwater Lead Engineer):
  - Minimum base width of 2m, 2H:1V side slopes, and minimum depth of 1.0m (sufficient to convey)
  - If the in situ material exposed by excavation for the channel comprises relatively clean in-situ cobbles and shingles, erosion control lining will not be required. However, if the bed materials are erodible (finer than gravel), a suitable geotextile lining will be required.
- Ensure that the necessary erosion and sediment controls have been installed and certified in accordance with Condition E.6.
- Block the original stream channel at the upstream and downstream end between the Designation. Allow fish salvage and relocation to be undertaken (refer to section 5.3.2.1 for further details).
- Backfill the redundant stream section upon completion of fish salvage and relocation procedures (to be determined by Ngā Hapu o Ōtaki and the project Ecologists).

## 4.2 Design Requirements

### 4.2.1 Permanent Culverts

Culvert design details have been included in Appendix C 'Construction Drawings'. The following table provides a summary of relevant information:

Culvert no.	Location	Chainage	Type	Size	Fish Passage	Additional Requirements
59	Cavallo Stream	10,830	Concrete Pipe	1.2m dia	Yes – 0.15 embedment	Mudfish survey – complete with nil results
61	Cording Stream	10,970	Concrete Pipe	0.75m dia	No	Nil

### 4.2.2 Permanent Stream Diversions

Stream diversion design details have been included in Appendix C 'Construction Drawings'.

The geometry of the Cavallo Stream diversion channel has generally been developed to mimic the existing stream in terms of conveyance capacity, longitudinal grade, cross-sectional shape, tightness (bend radius) and frequency of meanders.

The final design details for the Cavallo Stream Diversion are as follows:

- 4m section of rip-rap armouring at the inlet and outlet of Culvert 59 and 3m at the outlet of Culvert 61.
- Voids in the rip-rap armouring will be filled with natural substrate material sourced from the existing stream bed excavation. The hyporheic zone within the channel will therefore comprise a mix of rip-rap and existing stream bed material thereby avoiding flows being consumed by the rip-rap voids.
- To achieve the proposed hyporheic zone the construction method will require rip-rap to be placed in a layer followed by natural material to fill voids progressively, and the process completed to the desired thickness as outlined on the attached drawing.
- The diversion channel will be formed with a cross fall to focus low flows.
- The remainder of the channel will not be lined and instead native riparian planting will be present along the stream banks (refer to the landscape details outlined in Appendix C).
- Planting will take place either prior to or as soon as practicable following livening.
- Hessian or coconut matting will be placed on the upper banks down to the water line as additional erosion protection.

## 4.3 Earthworks

The scope of earthworks covered under this SSEMP is diverse and therefore has been broken down into key stages of works as follows:

### 4.3.1 Northern Local Arterial Road tie-in and Mary Crest Undercuts (Ch. 9500 – 10600)

Earthworks will generally be carried out as follows:

- Topsoil will be stripped and used to form erosion and sediment controls (refer to section 5.2 below).
- Peat will be undercut from the Mary Crest approach, Mary Crest basin, and Valentine basin and stockpiled on site, typically along the main alignment footprint.
- Sand will be sourced locally from sand dunes within the Designation and used to backfill undercut areas, as well as build up the local arterial road, followed by the main alignment footprint at a later date.
- Longitudinal drainage will be installed as works progress.
- Any groundwater dewatering required during peat replacement will be carried out in accordance with section 4.5 below.

### 4.3.2 Te Hapua Undercut (Ch. 10600 – 11250)

- Topsoil will be stripped and used to form erosion and sediment controls (refer to section 5.2 below).
- Peat will be undercut from the Te Hapua Road undercut (leaving the existing Te Hapua Road section until a later date) and stockpiled on site, typically along the main alignment footprint initially.

- Any groundwater dewatering required during peat replacement will be carried out in accordance with section 4.5 below.
- Longitudinal drainage will be installed as works progress.

### 4.3.3 Awatea Preload (Ch. 11250 – 11680)

#### 4.3.3.1 Stage 1 – Local Arterial Road Preload

Note that this SSEMP covers Stage 1 preload only across the local arterial road footprint. Stage 2 preload will be covered under a separate SSEMP or SSEMP change at a later date.

- Topsoil will be stripped and used to form erosion and sediment controls (refer to section 5.2 below).
- Following the installation and livening of the temporary Awatea Stream diversion, approximately 60,000m<sup>3</sup> of sand will be sourced from the sand dunes between chainage 10250 – 10650 (within Designation) and use as preload surcharge along the local arterial road footprint.
- Temporary traffic management will be required at Te Hapua Road to allow for the safe carting of bulk materials across Te Hapua Road from north to south.
- Following the required settlement period of approximately 3 – 4 months, surplus material will be removed and temporarily stockpiled on site.
- The local arterial road will be fully constructed to allow traffic to switch onto the new road between Mary Crest and Te Kowhai Road.
- Longitudinal drainage will be installed as works progress.

### 4.3.4 Te Kowhai Road Undercut (Ch. 11680 – 12300)

- Topsoil will be stripped and used to form erosion and sediment controls (refer to section 5.2 below).
- Peat will be undercut from the Te Kowhai Road Undercut and stockpiled on site, typically along the main alignment footprint.
- Sand will be sourced from further north to backfill the peat undercut areas, as well as build up the local arterial road and main alignment footprint at a later date.
- Any groundwater dewatering required during peat replacement will be carried out in accordance with section 4.5 below.
- Longitudinal drainage will be installed as works progress.

## 4.4 Disposal Sites

Temporary stockpile locations have indicatively been marked on the drawing in Appendix C. Stockpiles will typically be located greater than 50m distance away from all watercourses. However, in instances where this is not practical due to space restraints then in accordance with D.C 25(g), appropriate treatment of stormwater runoff from this stockpile will be managed by use of dirty water diversion bunds to prevent sediment laden stormwater entering the adjacent watercourses. This level of protection is considered appropriate to provide sufficient treatment.

## 4.5 Dewatering

Groundwater dewatering may be required during culvert construction to maintain a dry working area. Groundwater will typically be pumped from a sump lined with drainage metal or similar to ensure that water remains as clean as possible prior to discharge offsite.

All discharge of groundwater offsite must meet the following discharge standards:

- The discharge must not result in a change of >20% NTU difference between upstream and downstream levels, measured using a calibrated hand-held NTU monitor.
- The discharge must not cause obvious visual discolouration of the downstream environment beyond 'reasonable mixing' (deemed as 30m from initial discharge point unless otherwise specified due to access restrictions).
- Permit to pump documentation must be available for inspection by GWRC upon request.

In the event that discharge standards cannot be met, additional controls may need to be set up such as dewatering tanks or ponds to allow for sediment to settle out prior to discharge. Any additional controls required will be submitted to the Manager in accordance with Condition G.21A.

The proposed lined water storage pond at chainage 10200 may also be used to discharge groundwater to, following which it can be used to spread across the site as a dust suppression measure.

# 5 ENVIRONMENTAL REQUIREMENTS

## 5.1 Contaminated Land

As part of the AEE for the Project, a Phase One Contaminated Land Assessment was prepared by URS. This report identified land parcels within the Project boundary that had the potential to be contaminated and required further investigation. The works proposed under this SSEMP do not encroach on any contaminated land sites at this time. However, site investigations have been undertaken at one site located immediately west of the site where contaminated soils may be present as a result of an historical 'sheep dip'. This contaminated area will be physically cordoned off on site until the level of contamination has been determined and associated mitigation requirements confirmed. Until this time, works will not commence in this location. Refer to Appendix C 'ESC / Layout Plans Sheet 1'.

## 5.2 Erosion and Sediment Control

- Location and heights of erosion and sediment control measures are outlined on Appendix C 'ESC / Layout' drawings.
- In some areas of the site, clean water will be accepted into the site and contained on the site within dirty water diversion bunds along the western extent.
- Dirty water diversion bunds have been sized in accordance with the project ESCP to convey the 5% AEP rainfall event.

- Floating T-Bar decants may need to be installed at the low points of dirty water diversion bunds with a stabilised emergency spillway in accordance with the ESCP to ensure that site runoff is sufficiently treated prior to discharge. The exact location of the floating T-Bar will be determined on site. Any decants will be held up using a pulley system or suitable alternative as the default position and be lowered as required following sufficient treatment. Any lowering of decants will be carried out under an approved permit to pump as specified in the project ESCP, and as a minimum must adhere to the following general conditions:
  - The discharge must not increase the downstream water quality within the receiving watercourse by >20% (compared to upstream levels if applicable).
  - The discharge does not cause obvious visual discolouration of the downstream environment beyond 'reasonable mixing' (deemed as 30m from initial discharge point unless otherwise specified due to access restrictions).
  - Permit to pump documentation must be available for inspection by GWRC upon request.
- In instances where it is not required to fit a decant at the low point (i.e. if ground soakage proves to be adequate) then this will be identified and documented through the Condition E.6 certification process.
- Silt fences will be utilised to isolate permanent culvert headwalls and permanent open stream diversions in some areas where space is restricted and where dirty water catchments are minor (less than 0.5 ha).

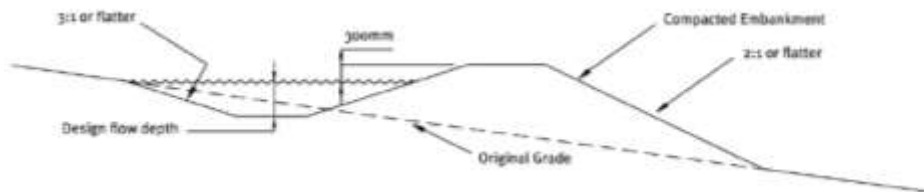


Figure 2: Typical cross section of dirty water diversion bund in accordance with the project ESCP.

### 5.2.1 Installation and decommissioning

ESCs will be installed prior to and during all construction activities. Upon completion of the installation of all approved structural ESCs as-built certification plans will be provided to Council in writing prior to the activity commencing. The Project will submit certification documentation 2 Working Days prior to the commencement of construction in that area of work as per condition E.6 and will retain the as-built record on site.

## 5.3 Ecological Requirements

Project ecological requirements are set out in the Ecological Management Plan (EMP) which outlines a number of locations that have specific requirements in regards to terrestrial and aquatic species that need to be considered prior to and during works. These have been further refined following input from the project ecologists to ensure that potential effects are minimised as far as practicable.

### 5.3.1 Terrestrial Ecology

All pre-works terrestrial surveys are now complete in this area. No further surveys are required prior to works under this SSEMP.

Existing vegetation to be retained (EVR) is identified in Appendix C 'Environmental Constraints Drawings'. Changes may be made and re-certified by KCDC in instances where design changes. The master EVR drawing set (FCCL-EV-MPN-0043) outlines the most up to date EVR plans which reflects any changes as works progress.

### 5.3.2 Aquatic Ecology

#### 5.3.2.1 Fish salvage and relocation methods

Fish salvage and relocation procedures will be required within a number of watercourses as outlined in the Appendix C ESC / Layout drawings. All fish salvage and relocation procedures will take place under the guidance of Ngā Hapu o Ōtaki and the project Ecologists.

The primary methods for capturing fish will be netting with baited nets set overnight, and electric fishing if appropriate. Fish salvage and relocation will typically take place as follows:

- A stop net will be deployed across the channel at the upstream and downstream ends of the works area at the commencement of the fish rescue operation to prevent fish from re-colonising the works areas. Alternatively, this first step will be removed and the channel blocked with earth plugs upstream and downstream.
- Fyke nets and gee minnow traps will be placed throughout the isolated section of water course. Nets will be left over night and cleared the next morning. If high numbers of fish are encountered following the second night of trapping further trapping may be required. Subsequent nights netting will be undertaken until the catch rate is below 50% of the previous pass or less than 10 individual fish captured (or as otherwise agreed with Ngā Hapu o Ōtaki).
- If appropriate, the length of stream will be electric fished by qualified technicians with repeat passes undertaken until the catch rate is below 50% of the previous pass or less than 10 individual fish captured.
- A freshwater ecologist and kaitiaki will be present on site at the time of dewatering the stream to ensure that any remaining fish are captured and relocated.
- All indigenous fish recovered will be transported and released to an appropriate relocation site (with input from Nga Hapu o Ōtaki regarding preferable locations).
- Appropriate handling methods will be used to minimise stress to the fish. Fish will be held in covered bins that will be regularly refreshed with stream water and transferred and released typically within 1 hour of being caught. Bubblers will be used if necessary to prevent asphyxiation.
- Exotic species captured through fish rescue exercises will not be transferred. Any exotic fish species captured will be euthanized humanely and disposed of appropriately.

Records of all fish relocated will be kept and provided in the written statement along with details on monitoring methodology, release location and monitoring dates.

### 5.3.2.2 Culvert and Stream Diversion Monitoring

The following monitoring is required by the Project Ecologists:

- Mudfish survey to take place within the Cavallo Stream and Cording Stream (now complete with no mudfish recorded)
- Culvert installation shall be supervised through construction and signed off by the Project Ecologist prior to livening
- Stream diversion construction shall be supervised and signed off by the Project Ecologist prior to livening
- Fish passage check to take place 1 year and 4 years post livening of the Culverts and diversion channel in accordance with WS.9.

## 5.4 Water Quality Monitoring

During livening of the temporary Awatea Culvert and livening of the permanent culverts / stream diversion, turbidity monitoring will be undertaken upstream and downstream of the work site. In accordance with the EMP, if the turbidity level downstream of the works has not returned to levels within 10% of upstream levels within 48 hours of livening then GWRC will be notified and an investigation will be carried out to address the source of sediment release. All practicable measures will be taken to reduce the turbidity downstream.

The following method will be applied for the livening of temporary diversion:

- Roaming turbidity loggers will be installed upstream and approximately 30m downstream of the temporary diversion / new culvert at least 24 hours prior to livening.
- The loggers will record continuously throughout the livening process to record to the peak discharge and the duration of increased turbidity.
- The loggers will continue to record turbidity until it can be demonstrated that downstream levels are within 10% of upstream levels.
- If downstream levels are elevated above 10% after 48 hours from livening then GWRC will be notified and an investigation will be carried out to address the source of sediment release.
- Monitoring results will be sent to GWRC within 10 working days of livening the diversion / culvert.

## 5.5 Cultural Monitoring

Pre-works baseline monitoring is to be undertaken by Ngā Hapu o Ōtaki in accordance with the Cultural Monitoring Plan (CMP) within selected watercourses.

A Kaiarahi (iwi guide / leader) is the key point of contact and coordination for Ngā Hapū o Ōtaki. The Kaiarahi will be involved in the design process, construction supervision and environmental monitoring. The Kaiarahi will be supported by Pūkenga (specialists / experts) and Kaitiaki (guardians) who provide support in supervision, monitoring activities and provision of specialist advice in regards

to cultural monitoring. Ngā Hapū o Ōtāki will be informed of all works on site and invited to be present for all works with particular emphasis placed on initial topsoil stripping and streamworks.

Contact must also be maintained with Muaupoko Tribal Authority (MTA) in accordance with MTA agreement and confirmed accidental discovery protocols.

## 5.6 Archaeology

All works under this SSEMP will be carried out in accordance with the approved archaeological authority and the Archaeological Site Management Plan. The Archaeological Site Management Plan outlines high, medium, and low probability archaeological areas across the project footprint.

Appendix E demonstrates the locations where monitoring by the Project Archaeologist is required. The following will be followed during works in these monitoring areas:

- The Project Archaeologist will be on site to monitor topsoil stripping in the areas highlighted for monitoring in Appendix E.
- If *in situ* archaeological features are encountered during monitoring or site visits, the Archaeologist will stop works immediately within that area.
- The archaeological site will be investigated, sampled and recorded in accordance with accepted best practice and in line with the Archaeological Authority.
- If kōiwi tangata (human bone) or taonga are unearthed the protocols outlined in the Archaeological Site Management Plan will be followed.

In all other areas in instances where the Project Archaeologist is not present, the on-call protocols outlined in the Archaeological Site Management Plan must be adhered to.

Refer to Appendix E for the monitoring locations.



## 5.7 Noise and Vibration

The Construction Noise and Vibration Management Plan (CNVMP) identifies the noise and vibration performance standards that must, where practicable, be complied with. It also sets out best practicable options for noise and vibration management for the Project, including mitigation measures, monitoring requirements, and communication and complaint procedures. All works under this SSEMP will be carried out in general accordance with the CNVMP.

High-risk areas in regards to potential noise and vibration effects as a result of works have been identified in Appendix C. Individual dwellings located within the high risk areas have also been listed below.

In accordance with the CNVMP, works carried out under this SSEMP will generally be restricted to take place between the hours of:

- 0630 and 2000hrs on weekdays; and
- 0730 and 1800hrs on Saturdays.

As far as practicable, works will be scheduled to avoid noisy activities in areas identified as sensitive receivers on the attached drawings between 0630 – 0730hrs in the morning, and between 1800 – 2000hrs in the evening to align with noise level criteria outlined in the CNVMP.

It is not anticipated that works will be required to take place outside of normal working hours for works outlined in this SSEMP. In the event that this changes, the procedures outlined in the CNVMP will be followed. Any works outside of the hours of 7am to 7pm require written approval from the Project Engineer.

The primary mitigation measure in regards to reducing the impacts from construction noise and vibration will be ongoing effective community consultation, particularly when transitioning from one works phase to another.

Noise and vibration monitoring will take place throughout the works to assess the impacts on adjacent properties at various locations. In the event that noise or vibration criteria is exceeded, mitigation options will be reassessed in an effort to comply with the construction limits, and a site specific noise 'schedule' will be submitted to Kapiti Coast District Council in accordance with the CNVMP.

Dwellings located within the noise and vibration boundary are as follows:

- 635 SH1, Te Horo (CNVMP ID R94/R95)

Dwellings within the vibration boundary only are as follows:

- 551 SH1, Te Horo (CNVMP ID R97)

### 5.7.1 Pre-condition building surveys

Section 7 of the CNVMP outlines activities that are expected to generate vibration that will potentially cause medium and high level vibration and therefore must be assessed to determine whether a pre-condition building survey is required.

One property (635 SH1, Te Horo – CNVMP ID R94/95) is located in close proximity to the works. This property is owned by NZTA and therefore is not required to undergo a pre-condition building survey.

## 5.8 Air Quality

There is potential for works to generate dust discharge if the site is not managed effectively. The Construction Air Quality Management Plan (CAQMP) outlines methods to be used to prevent dust and odour nuisance during construction from the site. All works under this SSEMP will be carried out in general accordance with the CAQMP.

To ensure that dust does not become an issue across the boundary of the site, the following measures will be implemented as a minimum:

- Use of water carts as required, particularly around public interface points such as site entry/exits to local roads
- Imposing a speed limit if required
- Use of stabilising agents such as polymers if required
- Assessing wind speed and direction on a daily basis

Certain properties fall within the 'high risk air quality' zone as identified in Appendix C drawings. Provided that the site is managed effectively, it is not anticipated that these works will cause an adverse impact in these locations.

## 5.9 Settlement Monitoring

Settlement monitoring will be undertaken in accordance with DC.43 – 48. A series of settlement monitoring marks are required to monitor potential settlement that might occur as a result of the works. Monitoring locations have been included in Appendix F, along with a memo from the Project Geotechnical Engineer which outlines the monitoring requirements for this area. Monitoring is to commence at least 4 weeks prior to preload activities in accordance with condition DC.45.

Until the proposed settlement monitoring proposal outlined in Appendix F has been accepted by KCDC, any placement of preload material associated with the 'Mary Crest Basin Preload' will not commence.

# 6 TRAFFIC

Existing site access points will be utilised for these works from Te Kowhai Road (SAP-1) and Te Hapua Road (SAP-2) as originally identified through SSTMP PW1 'Vegetation Clearance and Enabling Works'.

Temporary traffic management will be set up at Te Hapua Road to allow for safe passage of dumpers crossing between the north and south. A Site Specific Traffic Management Plan is included as Appendix H.

Final works within the Te Hapua Road corridor will require a more specific TMP to be submitted and approved by KCDC prior to works.

## APPENDIX A – SSEMP AUTHORS

Name	Role	Company	Input
Alice Naylor	Environmental Manager	Higgins	All
Richard Rakovics	Project Civils Manager	Fletcher Construction	General sequencing and works methodology
Macu Waqa	Site Engineer	Fletcher Construction	General sequencing and works methodology
Dewi Knappstein	Stormwater Lead Engineer	Tonkin & Taylor	Temporary stormwater design
Dean Miller	Lead Ecologist	Tonkin & Taylor	Ecological input
Stu Dunn	Landscape Architect	Studio Pacific	Landscape Drawings (Cavallo Stream Diversion)

## APPENDIX B – CONSULTATION RECORD

Group	Date
Community Liaison Group	Distributed to CLG Group for comment
Nga Hapu o Ōtaki	Distributed and meeting held to discuss

### Outstanding Queries

*The following outlines any queries (relevant to works covered under this SSEMP) that have not been resolved through the SSEMP preparation process, but will instead be closed out via alternative project stakeholder and communication channels:*

NIL

## APPENDIX C – DRAWINGS

Layout / Erosion and Sediment Control Plans

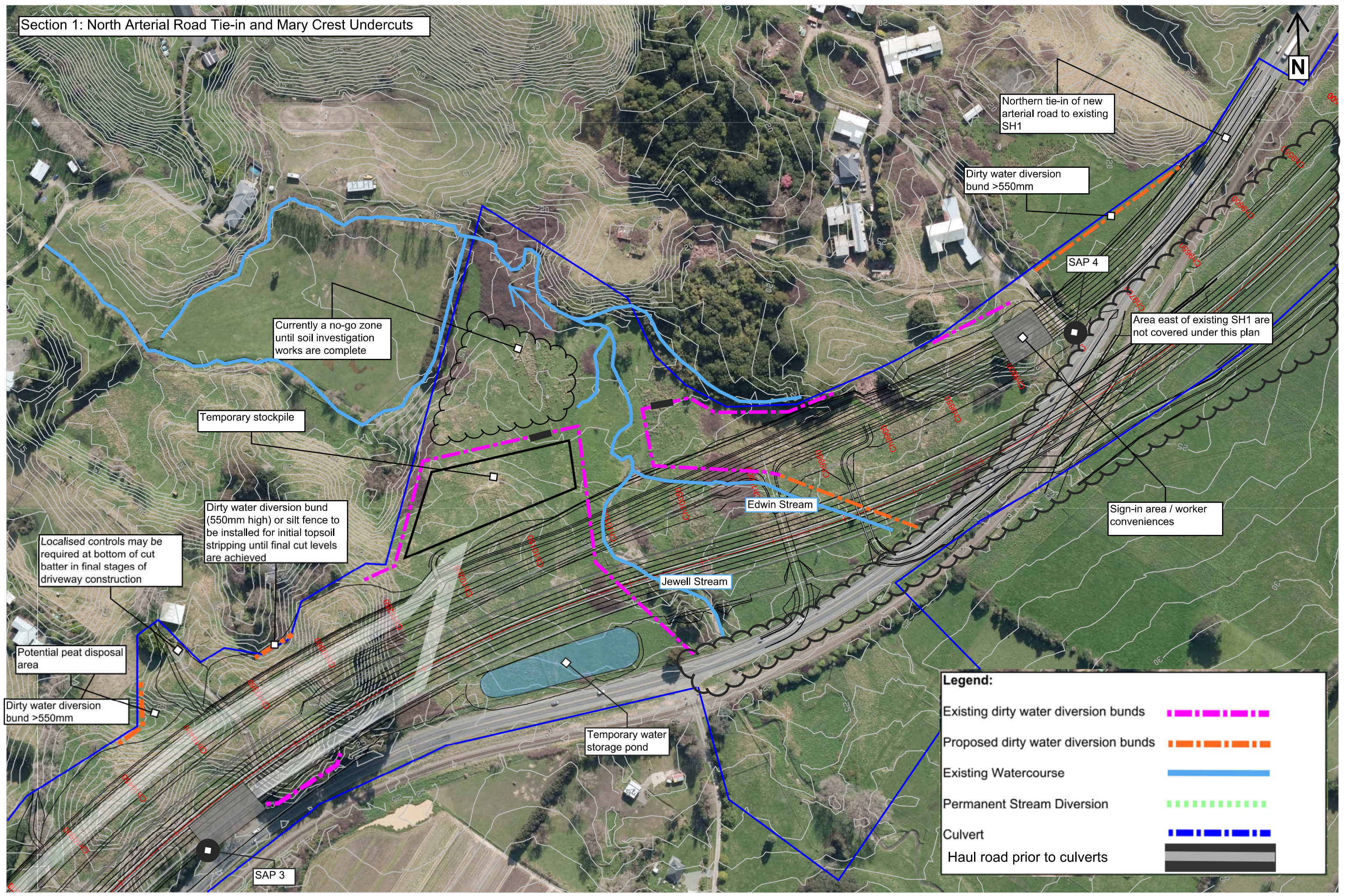
Environmental Constraints Drawings

Construction Drawings

Landscape Plans

## Layout / Erosion and Sediment Control Plan

Section 1: North Arterial Road Tie-in and Mary Crest Undercuts





Section 2: Mary Crest Preload and Te Hapua Undercuts

**Staging Culvert's 59 and 61:**

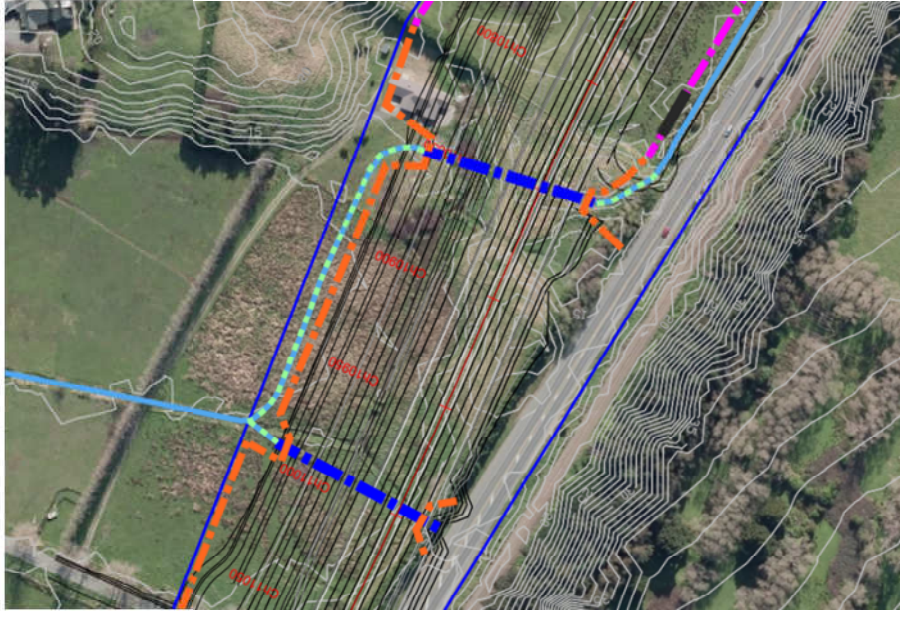
1. Install sediment controls to protect the existing stream.
2. Construct the permanent Cavallo Stream Diversion along the western boundary and Culvert 59.
3. Divert Cavallo Stream into Culvert 59 and the Permanent Stream Diversion.
4. Block the redundant stream channel and carry out fish salvage and relocation prior to full decommissioning.
5. Construct and live Culvert 61 and associated drainage linking to the inlet (note temporary over-pumping may be required to allow final inlet tie-in works).
6. Block the redundant stream channel and carry out fish salvage and relocation prior to full decommissioning.
7. Continue earthworks

Dirty water diversion bund >550mm

SAP 3

Sign-in area / worker conveniences (SAP 3)

Sediment control configuration following culvert construction / livening



Dirty water diversion bund >650mm with stabilised spillway

Permanent Cavallo Stream Diversion (refer to design details)

Cavallo Stream

Indicative discharge point during dewatering for Culvert 61

Culvert 61

Culvert 59

Indicative discharge point during dewatering for Culvert 59

Dirty water diversion bunds >650mm

Temporary over-pumping or minor stream diversion required to allow final tie-in works to be completed.

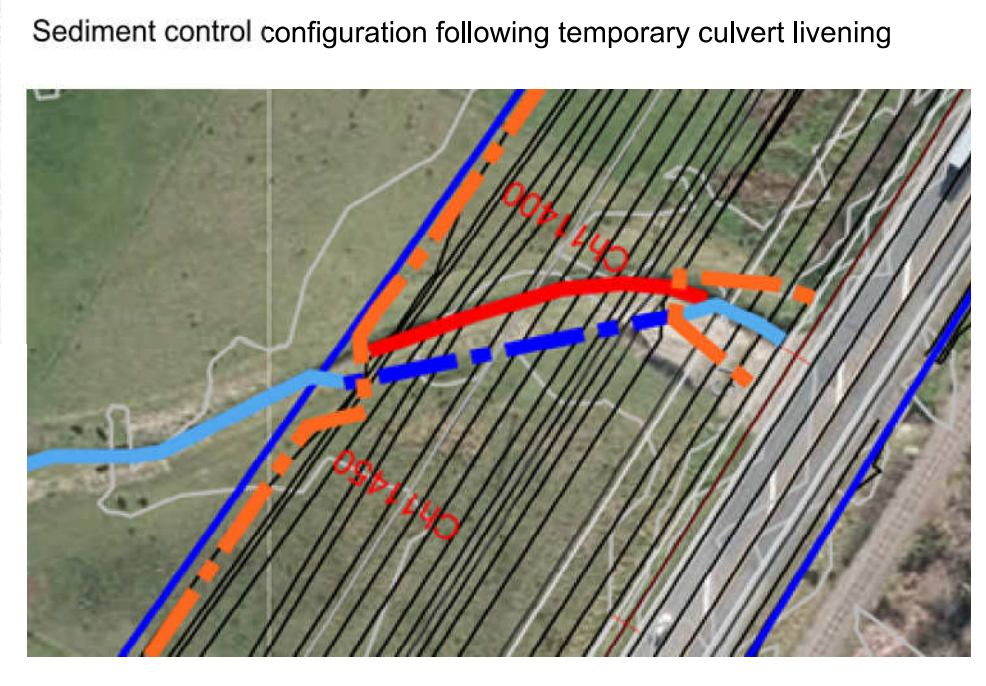
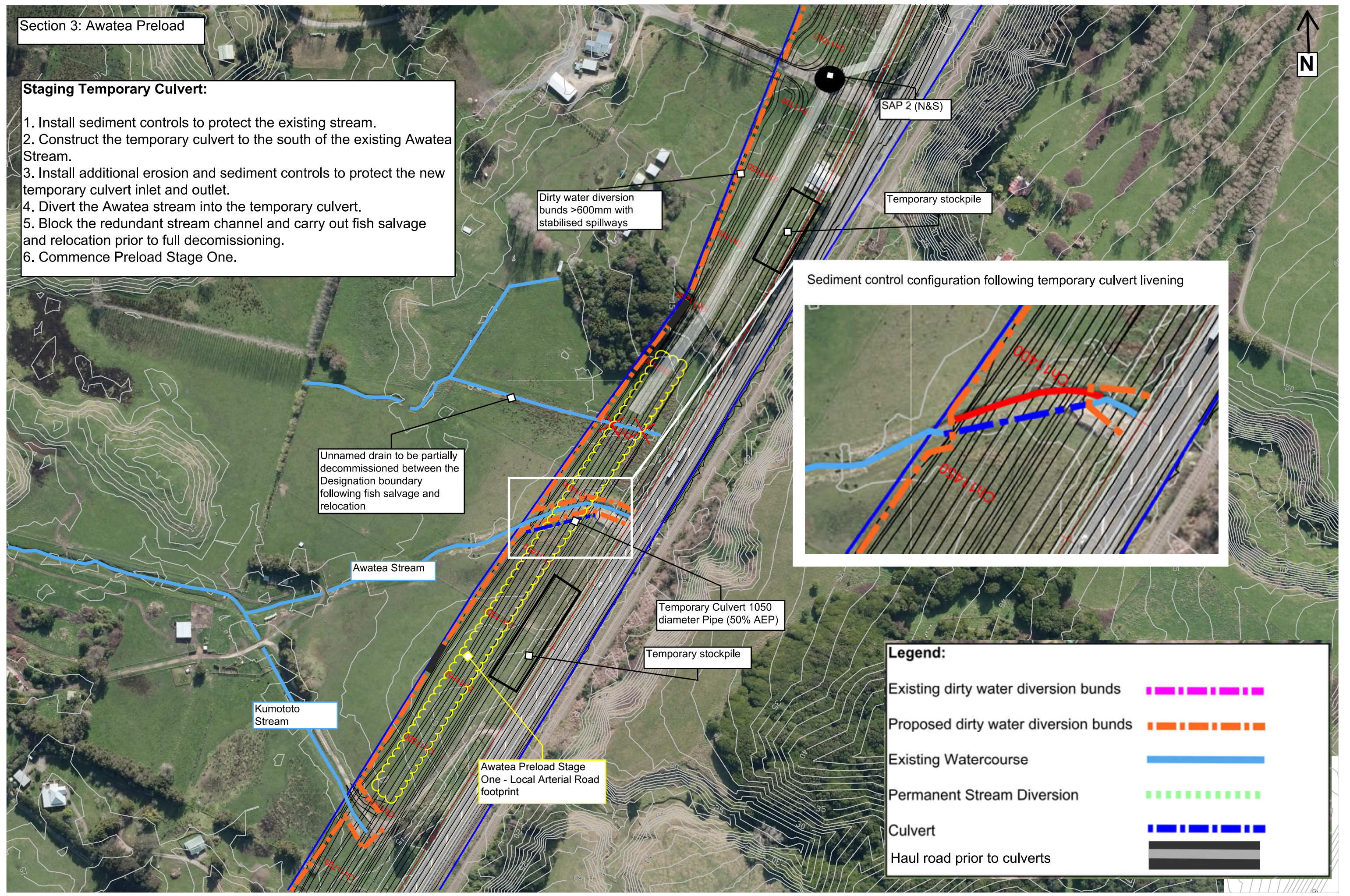
**Legend:**

- Existing dirty water diversion bunds - - - - -
- Proposed dirty water diversion bunds - - - - -
- Existing Watercourse —————
- Permanent Stream Diversion - - - - -
- Culvert - - - - -
- Haul road prior to culverts —————

Section 3: Awatea Preload

**Staging Temporary Culvert:**

1. Install sediment controls to protect the existing stream.
2. Construct the temporary culvert to the south of the existing Awatea Stream.
3. Install additional erosion and sediment controls to protect the new temporary culvert inlet and outlet.
4. Divert the Awatea stream into the temporary culvert.
5. Block the redundant stream channel and carry out fish salvage and relocation prior to full decommissioning.
6. Commence Preload Stage One.



**Legend:**

Existing dirty water diversion bunds	
Proposed dirty water diversion bunds	
Existing Watercourse	
Permanent Stream Diversion	
Culvert	
Haul road prior to culverts	

Section 4: Te Kowhai Undercut



Dig and replace for 'Te Kowhai Undercut'

Management of clean water catchment will be confirmed prior to works commencing along the existing State Highway corridor. Clean water to initially be allowed to inundate the site during construction of the local road.

Dirty water diversion bunds >700mm with stabilised spillways







Tie into high point or carry along southern boundary

Temporary stockpile

Sign-in area / worker conveniences

SAP 1

**Legend:**

- Existing dirty water diversion bunds 
- Proposed dirty water diversion bunds 
- Existing Watercourse 
- Permanent Stream Diversion 
- Culvert 
- Haul road prior to culverts 

## Environmental Constraints Drawings

**ECOLOGY LEGEND:**

-  TERRESTRIAL ECOLOGY REQUIREMENTS:
-  LIZARD SURVEYS, SALVAGING AND MONITORING
-  NATIVE TREE LOG SALVAGE
-  PERIPATUS MANAGEMENT
-  POWELLIPHANTA TRAVERSI OTAKI SURVEY
-  BIRD SURVEY
-  PIPIT SURVEY
-  BANDED DOTTEREL SURVEY

**NOISE VIBRATION LEGEND:**

-  VIBRATION - LOW RISK (RESIDENTIAL)
-  VIBRATION - LOW RISK (COMMERCIAL)
-  COMMERCIAL STRUCTURES WITHIN VIBRATION BOUNDARY
-  DWELLINGS WITHIN VIBRATION BOUNDARY
-  DWELLINGS WITHIN BOTH NOISE AND VIBRATION BOUNDARIES

**AIR QUALITY:**

-  AIR QUALITY SENSITIVE RECEIVERS

**DRAINAGE LEGEND:**

-  DESIGNATION
-  RAILWAY DESIGNATION
-  EXISTING STREAMS
-  STORMWATER WETLAND/POND

**SITE COMPOUNDS:**

-  HARD STAND AREA
-  SITE ENTRY AND EXIT

**LANDSCAPE:**

-  EXISTING VEGETATION RETAINED

 ORIGINAL IN COLOUR

**FOR INFORMATION  
NOT FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
B	SSEMP FOR INFORMATION	WW			14.08.17
A	SSEMP FOR INFORMATION	AK	GD	AN	20.07.17

Scale (A1)	1:1000		
Scale (A3)			
Design	AN	13.07.17	Approved For Construction
Drawn	AK	13.07.17	
Design Checker			
Dwg Check			

\* Refer to Original Handcopy for Signature



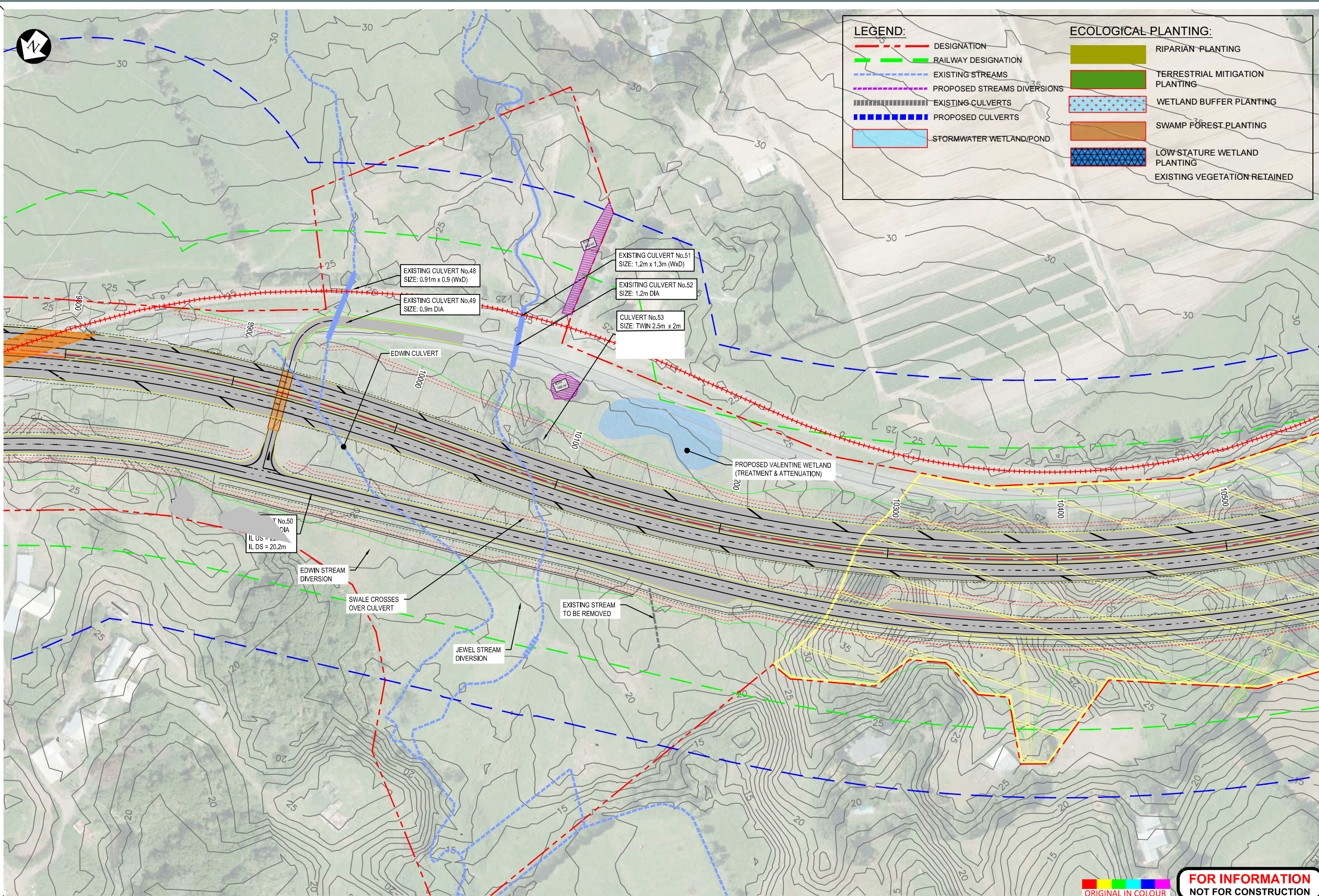




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Title	LEGENDS

Discipline	CIVIL
Drawing No.	SSEMP PW2-00
Rev	B





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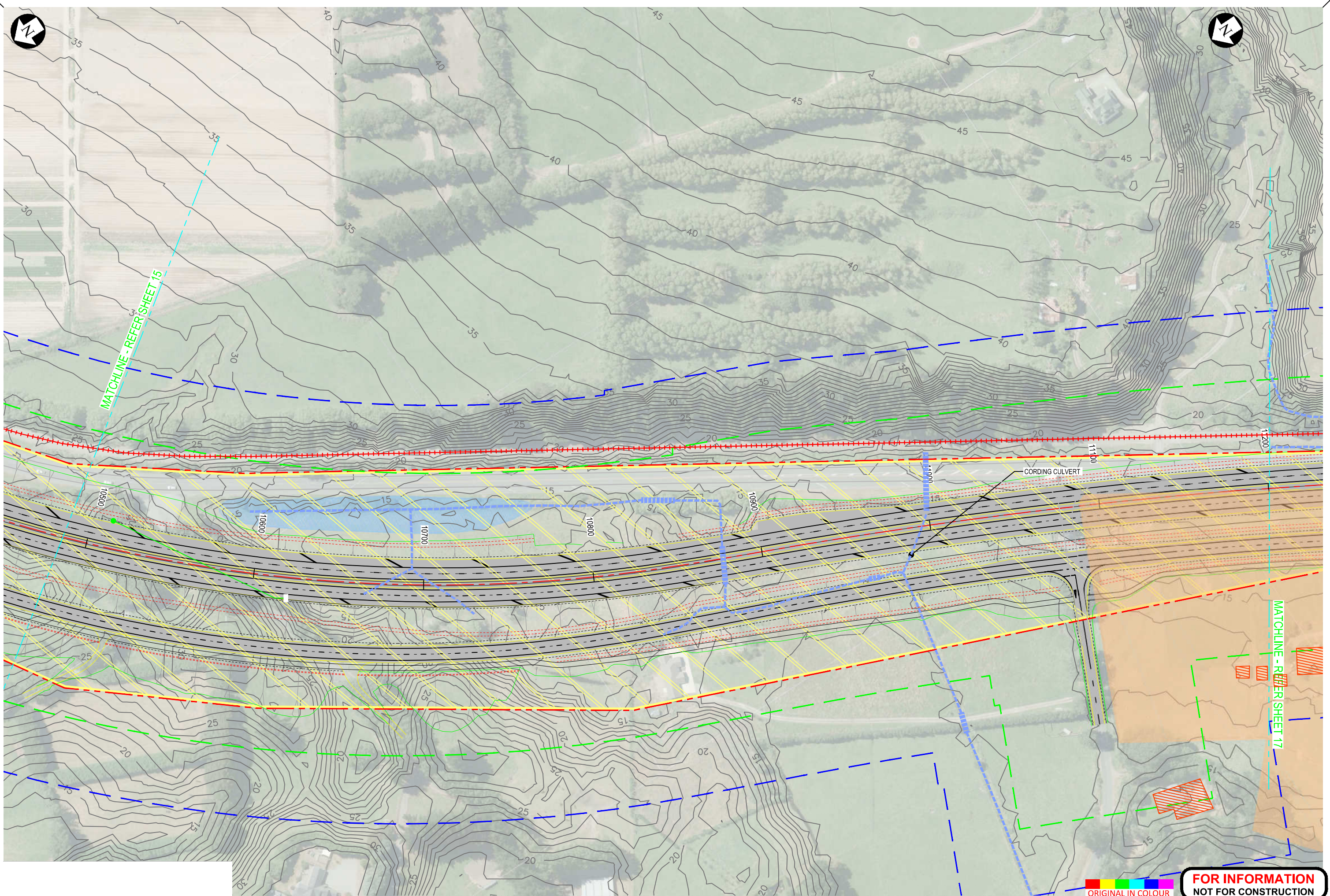
NZ TRANSPORT AGENCY  
Peka Peka to Ōtaki Expressway

HIGGINS  
BECA  
Tonkin+Taylor

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Discipline:	CIVIL
Drawing No.:	PP20-DR-CE-0815
Rev.:	B

Document No. WPPSP-FCC-INTERNAL\DWG\ROOT\2020\2020 SECTOR GENERAL PRECAST WORKING SHOP DRAWINGS\PP20\DR-CE-0815-0818-29-09-SET2.DWG



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No.	Revision	By	Chk	Appd	Date

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		Dag Check			
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\* Refer to Original Handcopy for Signature



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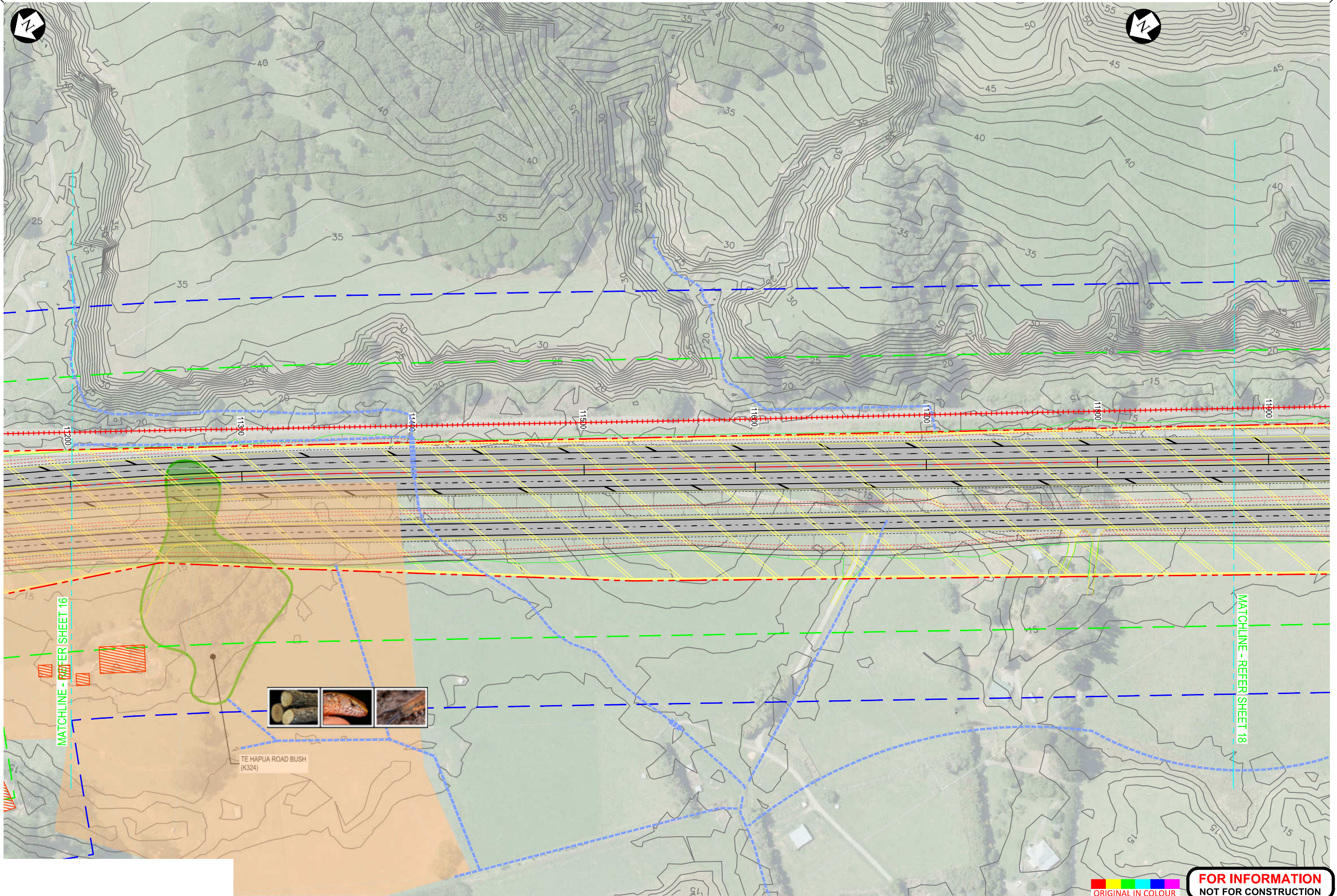


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TE HAPUA ROAD BUSH (K324)

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**FOR INFORMATION  
NOT FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
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A	SSEMP FOR INFORMATION	AK	GD	AN	20.07.17

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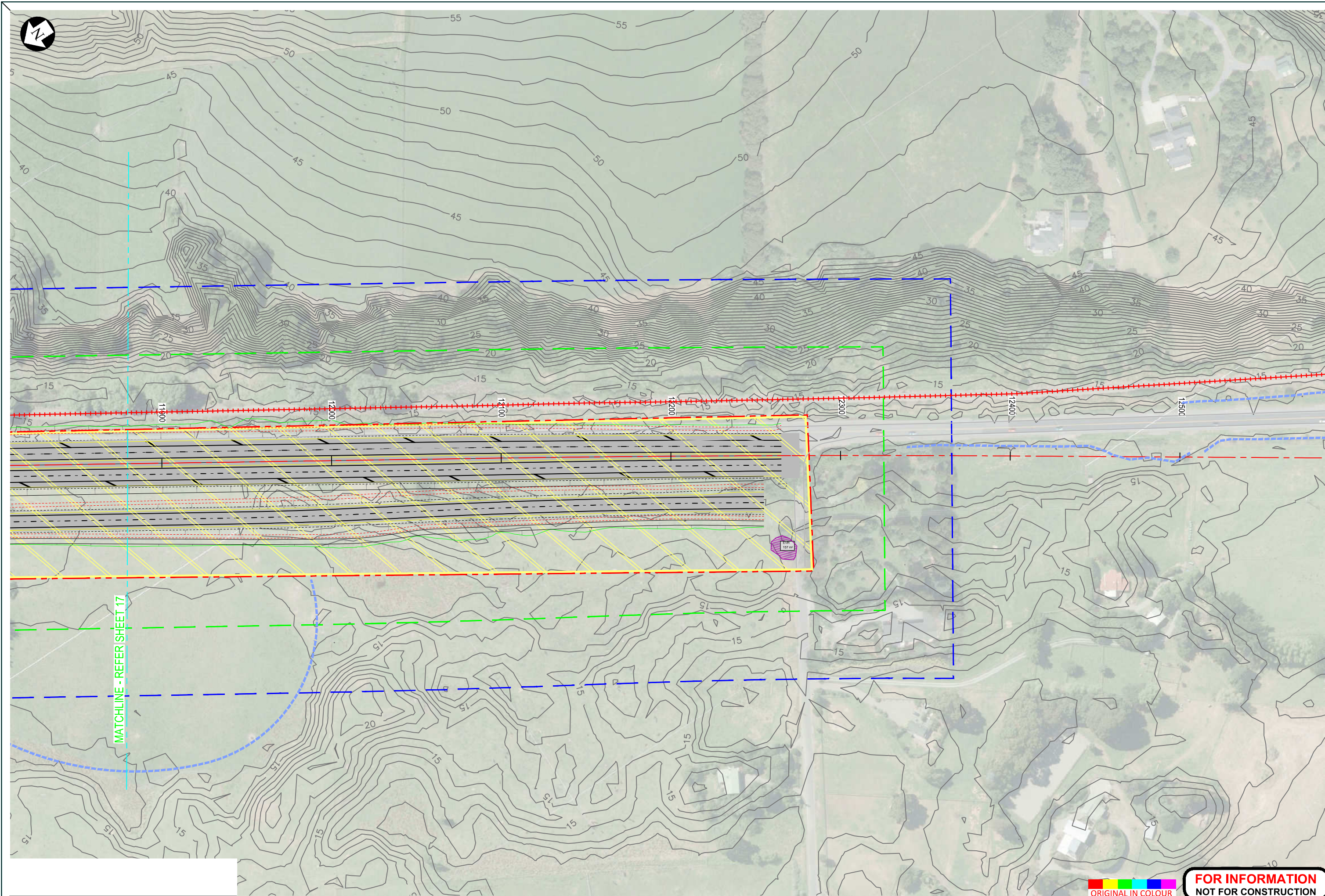


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MATCHLINE - REFER SHEET 17

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NOT FOR CONSTRUCTION**

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A	SSEMP FOR INFORMATION	AK	GD	AN	20.07.17

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Approved For Construction	
Date	

\* Refer to Original Handcopy for Signature



**Peka Peka to Ōtaki Expressway**



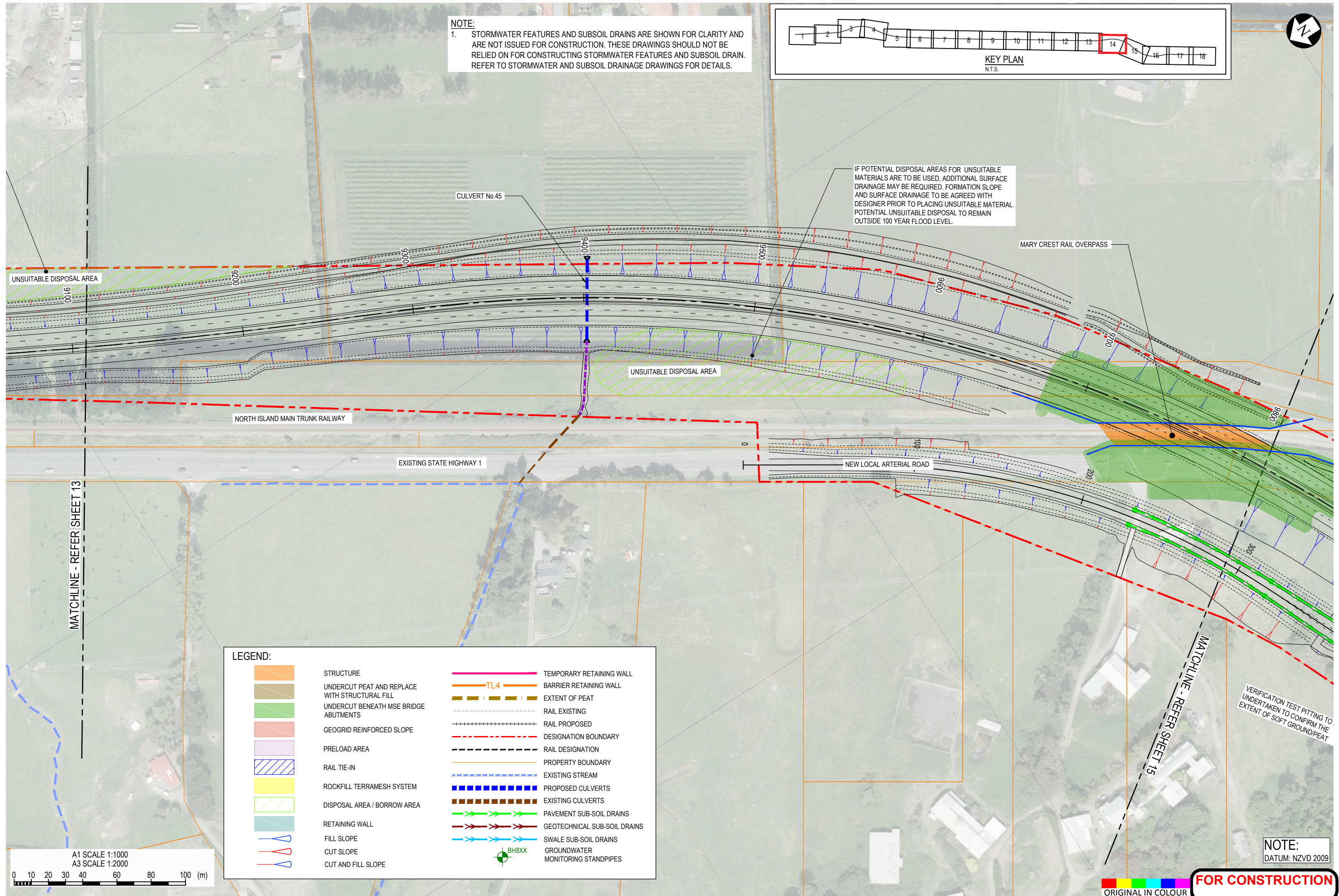
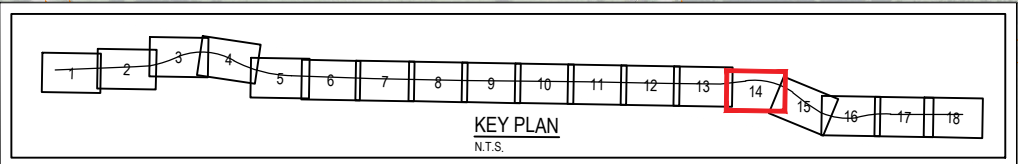
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Discipline:	CIVIL
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Rev.:	B

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## Construction Drawings

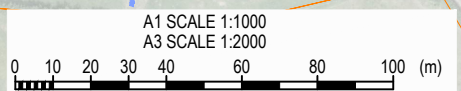
**NOTE:**  
 1. STORMWATER FEATURES AND SUBSOIL DRAINS ARE SHOWN FOR CLARITY AND ARE NOT ISSUED FOR CONSTRUCTION. THESE DRAWINGS SHOULD NOT BE RELIED ON FOR CONSTRUCTING STORMWATER FEATURES AND SUBSOIL DRAIN. REFER TO STORMWATER AND SUBSOIL DRAINAGE DRAWINGS FOR DETAILS.



IF POTENTIAL DISPOSAL AREAS FOR UNSUITABLE MATERIALS ARE TO BE USED, ADDITIONAL SURFACE DRAINAGE MAY BE REQUIRED. FORMATION SLOPE AND SURFACE DRAINAGE TO BE AGREED WITH DESIGNER PRIOR TO PLACING UNSUITABLE MATERIAL. POTENTIAL UNSUITABLE DISPOSAL TO REMAIN OUTSIDE 100 YEAR FLOOD LEVEL.

**LEGEND:**

	STRUCTURE		TEMPORARY RETAINING WALL
	UNDERCUT PEAT AND REPLACE WITH STRUCTURAL FILL		BARRIER RETAINING WALL
	UNDERCUT BENEATH MSE BRIDGE ABUTMENTS		EXTENT OF PEAT
	GEOGRID REINFORCED SLOPE		RAIL EXISTING
	PRELOAD AREA		RAIL PROPOSED
	RAIL TIE-IN		DESIGNATION BOUNDARY
	ROCKFILL TERRAMESH SYSTEM		RAIL DESIGNATION
	DISPOSAL AREA / BORROW AREA		PROPERTY BOUNDARY
	RETAINING WALL		EXISTING STREAM
	FILL SLOPE		PROPOSED CULVERTS
	CUT SLOPE		EXISTING CULVERTS
	CUT AND FILL SLOPE		PAVEMENT SUB-SOIL DRAINS
	GROUNDWATER MONITORING STANDPIPES		GEOTECHNICAL SUB-SOIL DRAINS
			SWALE SUB-SOIL DRAINS



VERIFICATION TEST PITTING TO UNDERTAKEN TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT

**NOTE:**  
 DATUM: NZVD 2009

**FOR CONSTRUCTION**

1	ISSUED FOR CONSTRUCTION	AK	RC	BS	1.03.18
No.	Revision	By	Chk	Appd	Date

Design	R.Ramilo	22.08.17	Approved For Construction
Drawn	A.Kochar	22.08.17	B.Symmans
Dwg Verifier	R.Hillier	1.03.18	
Dwg Check	G.Down	1.03.18	Date 1.03.18

Scale (A1) 1:1000  
 Scale (A3) 1:2000  
 \* Refer to Original Hardcopy for Signature

**NZ TRANSPORT AGENCY** WAIKATO REGION

**Peka Peka to Ōtaki Expressway**

**Fletcher HIGGINS**

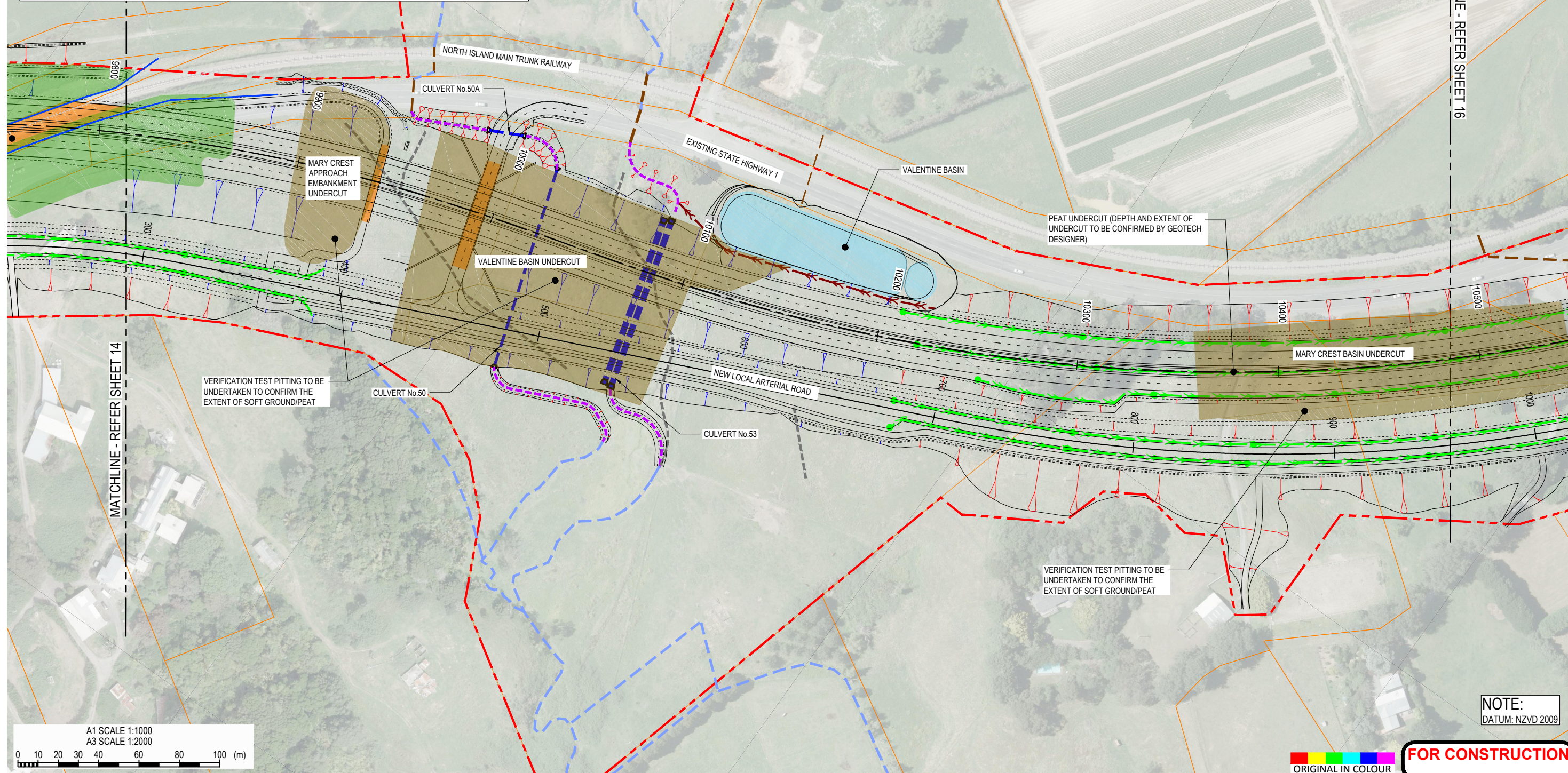
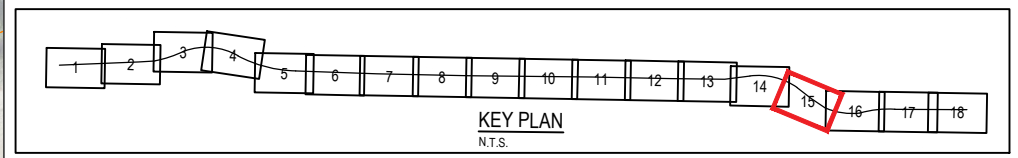
**BECA** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GENERAL ARRANGEMENT PLAN	Drawing No.:	PP20-DR-GE-0014
	SHEET 14 OF 18	Rev.:	1

Document No. PP20-DR-GE-0014 - DESIGN DEVELOPMENT GENERAL/09 CAD/DRAWINGS/GE/UPDATES/PP20-DR-GE-0014-0018.DWG

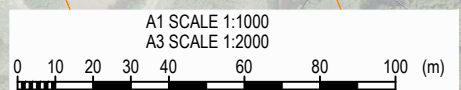
LEGEND:	
	STRUCTURE
	UNDERCUT PEAT AND REPLACE WITH STRUCTURAL FILL
	UNDERCUT BENEATH MSE BRIDGE ABUTMENTS
	GEOGRID REINFORCED SLOPE
	PRELOAD AREA
	RAIL TIE-IN
	ROCKFILL TERRAMESH SYSTEM
	DISPOSAL AREA / BORROW AREA
	RETAINING WALL
	FILL SLOPE
	CUT SLOPE
	CUT AND FILL SLOPE
	TEMPORARY RETAINING WALL
	BARRIER RETAINING WALL
	EXTENT OF PEAT
	RAIL EXISTING
	RAIL PROPOSED
	DESIGNATION BOUNDARY
	RAIL DESIGNATION
	PROPERTY BOUNDARY
	EXISTING STREAM
	PROPOSED CULVERTS
	EXISTING CULVERTS
	PAVEMENT SUB-SOIL DRAINS
	GEOTECHNICAL SUB-SOIL DRAINS
	SWALE SUB-SOIL DRAINS
	GROUNDWATER MONITORING STANDPIPES

**NOTE:**  
 1. STORMWATER FEATURES AND SUBSOIL DRAINS ARE SHOWN FOR CLARITY AND ARE NOT ISSUED FOR CONSTRUCTION. THESE DRAWINGS SHOULD NOT BE RELIED ON FOR CONSTRUCTING STORMWATER FEATURES AND SUBSOIL DRAIN. REFER TO STORMWATER AND SUBSOIL DRAINAGE DRAWINGS FOR DETAILS.



MATCHLINE - REFER SHEET 14

MATCHLINE - REFER SHEET 16



VERIFICATION TEST PITTING TO BE UNDERTAKEN TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT

VERIFICATION TEST PITTING TO BE UNDERTAKEN TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT

PEAT UNDERCUT (DEPTH AND EXTENT OF UNDERCUT TO BE CONFIRMED BY GEOTECH DESIGNER)

**NOTE:**  
 DATUM: NZVD 2009

**FOR CONSTRUCTION**  
 ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	AK	RC	BS	1.03.18







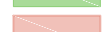
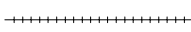
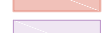









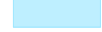








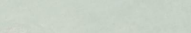
Scale	Design	Drawn	Dwg Verifier	Dwg Check	Date
A1 1:1000	R. Ramilo	A. Kochar	R. Hillier	G. Down	22.08.17
A3 1:2000	R. Ramilo	A. Kochar	R. Hillier	G. Down	1.03.18

**NZ TRANSPORT AGENCY** | **Peka Peka to Otaki Expressway** | **Fletcher HIGGINS** | **BECA** | **Tonkin+Taylor**

Subject:	EARTHWORKS
Title:	GENERAL ARRANGEMENT PLAN SHEET 15 OF 18

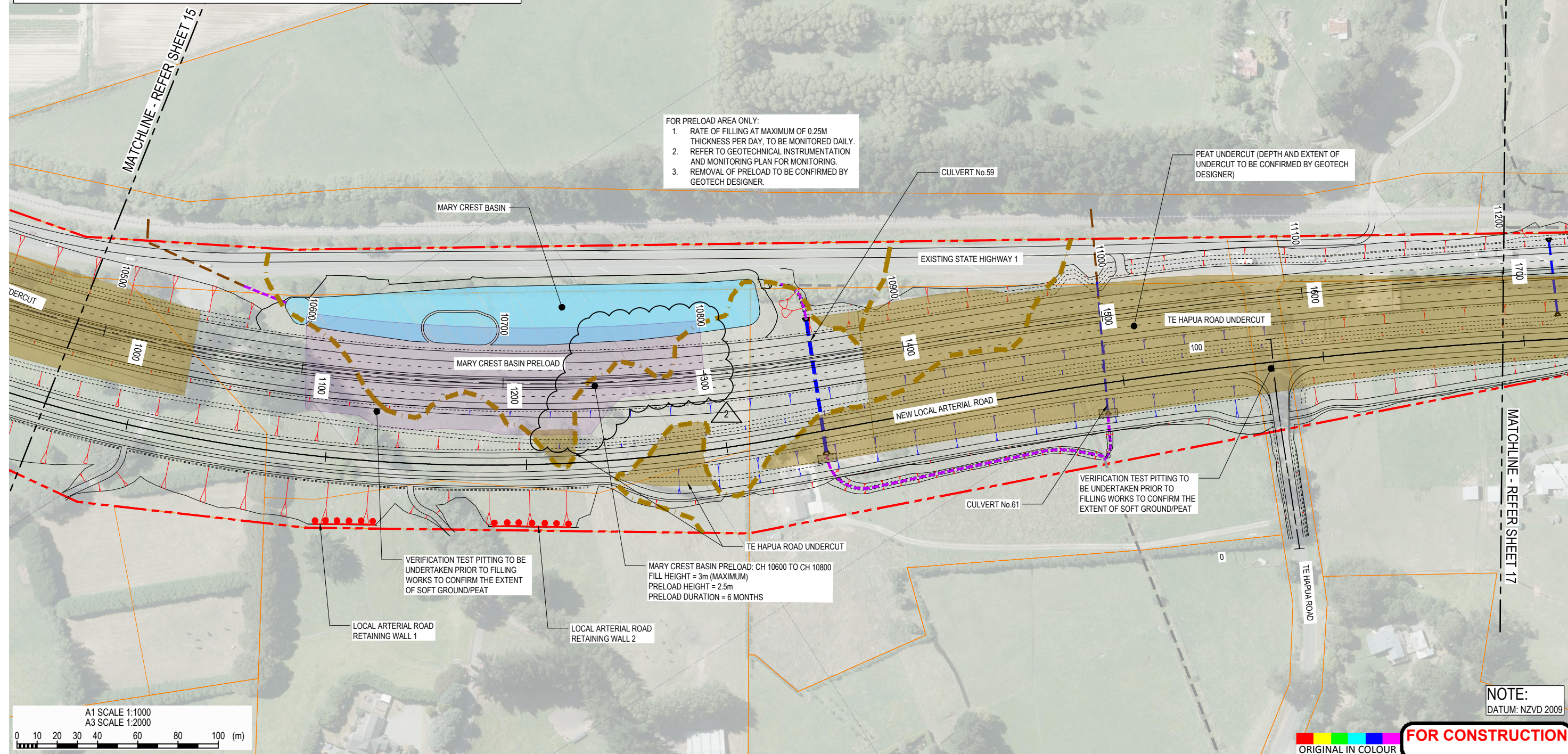
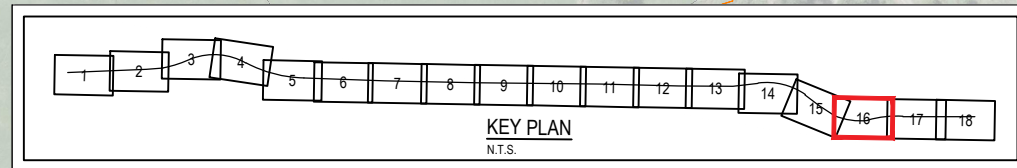
Discipline:	GEOTECHNICAL
Drawing No.:	PP20-DR-GE-0015
Rev.:	1

LEGEND:

- |   |  |   |                                   |
|---|--|---|-----------------------------------|
|  | STRUCTURE                                      |  | TEMPORARY RETAINING WALL          |
|  | UNDERCUT PEAT AND REPLACE WITH STRUCTURAL FILL |  | BARRIER RETAINING WALL            |
|  | UNDERCUT BENEATH MSE BRIDGE ABUTMENTS          |  | EXTENT OF PEAT                    |
|  | GEOGRID REINFORCED SLOPE                       |  | RAIL EXISTING                     |
|  | PRELOAD AREA                                   |  | RAIL PROPOSED                     |
|  | RAIL TIE-IN                                    |  | DESIGNATION BOUNDARY              |
|  | ROCKFILL TERRAMESH SYSTEM                      |  | RAIL DESIGNATION                  |
|  | DISPOSAL AREA / BORROW AREA                    |  | PROPERTY BOUNDARY                 |
|  | WETLAND  |  | EXISTING STREAM                   |
|  | FILL SLOPE                                     |  | PROPOSED CULVERTS                 |
|  | CUT SLOPE                                      |  | EXISTING CULVERTS                 |
|  | CUT AND FILL SLOPE                             |  | GROUNDWATER MONITORING STANDPIPES |
|   |  |  | PROPOSED STREAM DIVERSION         |
|   |  |  | TIMBER RETAINING WALL             |
|   |  |  | L-SHAPED RETAINING WALL           |
|   |  |  | GABION RETAINING WALL             |

NOTE:

- STORMWATER FEATURES ARE SHOWN FOR CLARITY AND ARE NOT ISSUED FOR CONSTRUCTION. THESE DRAWINGS SHOULD NOT BE RELIED ON FOR CONSTRUCTING STORMWATER FEATURES AND SUBSOIL DRAIN. REFER TO STORMWATER AND SUBSOIL DRAINAGE DRAWINGS FOR DETAILS.



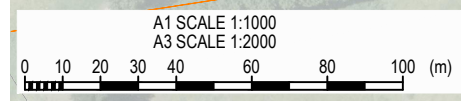
FOR PRELOAD AREA ONLY:  
 1. RATE OF FILLING AT MAXIMUM OF 0.25M THICKNESS PER DAY, TO BE MONITORED DAILY.  
 2. REFER TO GEOTECHNICAL INSTRUMENTATION AND MONITORING PLAN FOR MONITORING.  
 3. REMOVAL OF PRELOAD TO BE CONFIRMED BY GEOTECH DESIGNER.

PEAT UNDERCUT (DEPTH AND EXTENT OF UNDERCUT TO BE CONFIRMED BY GEOTECH DESIGNER)

VERIFICATION TEST PITTING TO BE UNDERTAKEN PRIOR TO FILLING WORKS TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT

VERIFICATION TEST PITTING TO BE UNDERTAKEN PRIOR TO FILLING WORKS TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT

MARY CREST BASIN PRELOAD: CH 10600 TO CH 10800  
 FILL HEIGHT = 3m (MAXIMUM)  
 PRELOAD HEIGHT = 2.5m  
 PRELOAD DURATION = 6 MONTHS



NOTE:  
 DATUM: NZVD 2009

**FOR CONSTRUCTION**  
 ORIGINAL IN COLOUR

No.	Revision	By	Chk.	Appd.	Date
2	AREA OF PRELOAD MODIFIED	GD	RC	BS	13.04.18
1	ISSUED FOR CONSTRUCTION	AK	RC	BS	01.03.18

Scale	Design	Drawn	Dwg Verifier	Dwg Check	Date	Approved For Construction
Scale (A1) 1:1000	R.Ramilo	A.Kochar	R.Hillier	G.Down	22.08.17	B.Symmans
Scale (A3) 1:2000					1.03.18	

\* Refer to Original Hardcopy for Signature







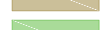


























Subject:	EARTHWORKS
Title:	GENERAL ARRANGEMENT PLAN SHEET 16 OF 18

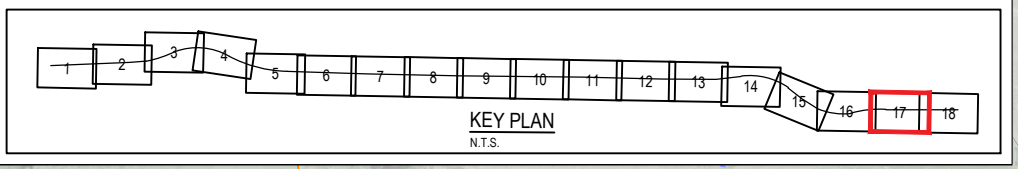
Discipline:	GEOTECHNICAL
Drawing No.:	PP20-DR-GE-0016
Rev.:	2

LEGEND:

- |   |  |   |                                   |
|---|--|---|-----------------------------------|
|  | STRUCTURE                                      |  | TEMPORARY RETAINING WALL          |
|  | UNDERCUT PEAT AND REPLACE WITH STRUCTURAL FILL |  | BARRIER RETAINING WALL            |
|  | UNDERCUT BENEATH MSE BRIDGE ABUTMENTS          |  | EXTENT OF PEAT                    |
|  | GEOGRID REINFORCED SLOPE                       |  | RAIL EXISTING                     |
|  | PRELOAD AREA                                   |  | RAIL PROPOSED                     |
|  | RAIL TIE-IN                                    |  | DESIGNATION BOUNDARY              |
|  | ROCKFILL TERRAMESH SYSTEM                      |  | RAIL DESIGNATION                  |
|  | DISPOSAL AREA / BORROW AREA                    |  | PROPERTY BOUNDARY                 |
|  | RETAINING WALL                                 |  | EXISTING STREAM                   |
|  | FILL SLOPE                                     |  | PROPOSED CULVERTS                 |
|  | CUT SLOPE                                      |  | EXISTING CULVERTS                 |
|  | CUT AND FILL SLOPE                             |  | PAVEMENT SUB-SOIL DRAINS          |
|   |  |  | GEOTECHNICAL SUB-SOIL DRAINS      |
|   |  |  | SWALE SUB-SOIL DRAINS             |
|   |  |  | GROUNDWATER MONITORING STANDPIPES |

NOTE:

1. STORMWATER FEATURES AND SUBSOIL DRAINS ARE SHOWN FOR CLARITY AND ARE NOT ISSUED FOR CONSTRUCTION. THESE DRAWINGS SHOULD NOT BE RELIED ON FOR CONSTRUCTING STORMWATER FEATURES AND SUBSOIL DRAIN. REFER TO STORMWATER AND SUBSOIL DRAINAGE DRAWINGS FOR DETAILS.



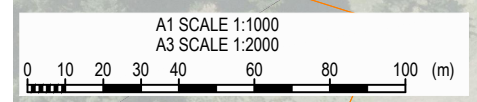
FOR PRELOAD AREA ONLY:  
 1. RATE OF FILLING AT MAXIMUM OF 0.25M THICKNESS PER DAY, TO BE MONITORED DAILY.  
 2. REFER TO GEOTECHNICAL INSTRUMENTATION AND MONITORING PLAN FOR MONITORING.  
 3. REMOVAL OF PRELOAD TO BE CONFIRMED BY GEOTECH DESIGNER.

STAGE 2 - AWATEA STREAM PRELOAD  
 MAINLINE CH 11240 TO CH 11670  
 FILL HEIGHT = 4m (MAXIMUM)  
 PRELOAD HEIGHT = 3m  
 PRELOAD DURATION = 6 MONTHS

STAGE 1 - AWATEA STREAM PRELOAD  
 LOCAL ARTERIAL ROAD CH 1730 TO CH 2145  
 FILL HEIGHT = 3m (MAXIMUM)  
 PRELOAD HEIGHT = 5m  
 PRELOAD DURATION = 3 TO 4 MONTHS

PEAT UNDERCUT (DEPTH AND EXTENT OF UNDERCUT TO BE CONFIRMED BY GEOTECH DESIGNER)

VERIFICATION TEST PITTING TO BE UNDERTAKEN PRIOR TO FILLING WORKS TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT



NOTE:  
 DATUM: NZVD 2009

ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	AK	RC	BS	1.03.18

Design	R.Ramilo	22.08.17	Approved For Construction
Drawn	A.Kochar	22.08.17	B.Symmans
Dwg Verifier	R.Hillier	1.03.18	
Dwg Check	G.Down	1.03.18	Date 1.03.18

\* Refer to Original Hardcopy for Signature

**NZ TRANSPORT AGENCY** WAIKATO REGION

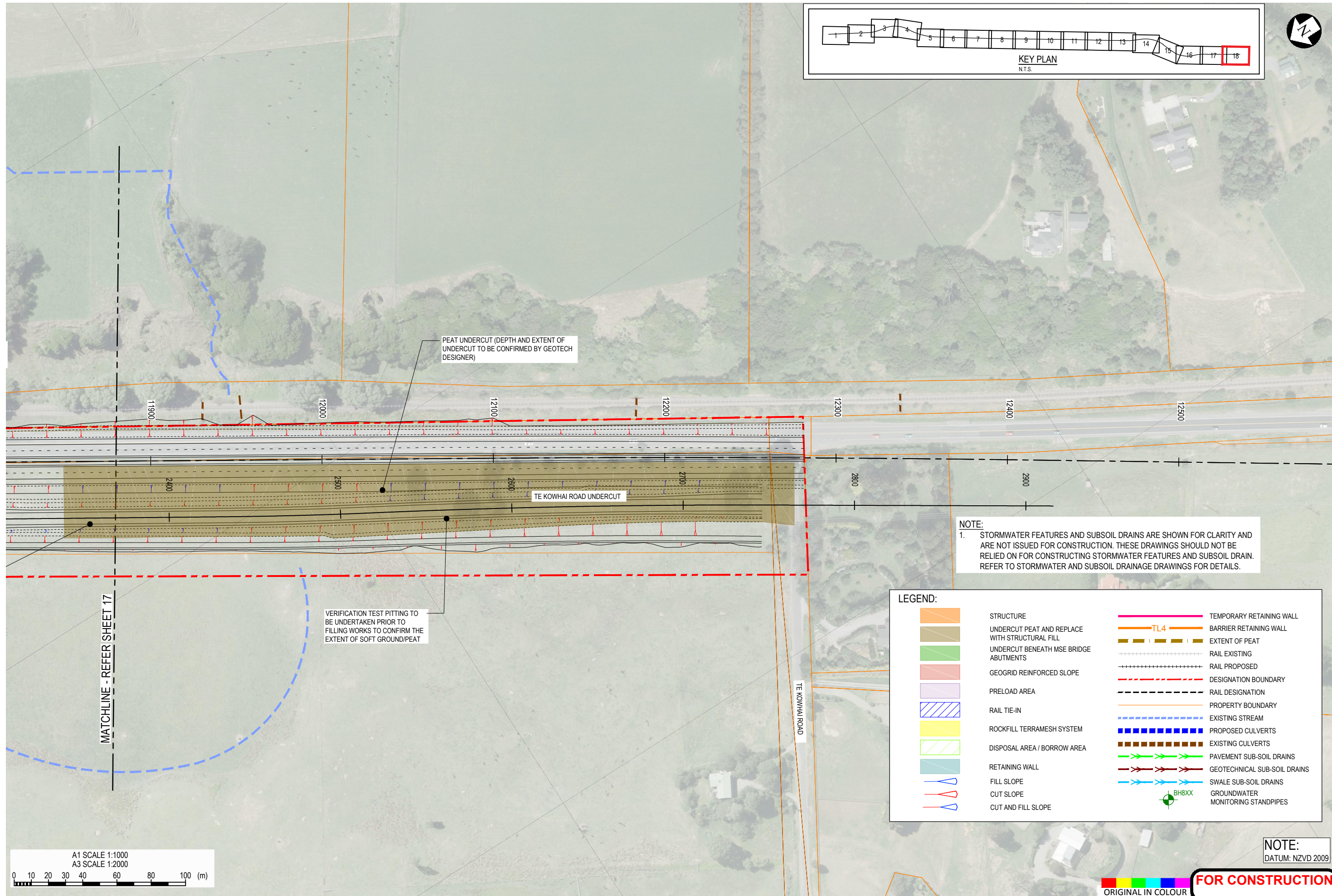
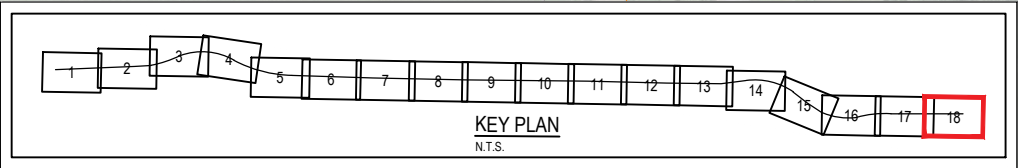
**Peka Peka to Ōtaki Expressway**

**Fletcher HIGGINS**

**BECA** **TFT** **Tonkin+Taylor**

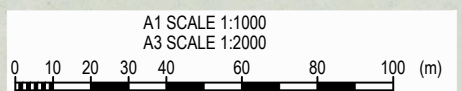
Subject:	EARTHWORKS
Title:	GENERAL ARRANGEMENT PLAN SHEET 17 OF 18

Discipline:	GEOTECHNICAL
Drawing No.:	PP20-DR-GE-0017
Rev.:	1



**NOTE:**  
 1. STORMWATER FEATURES AND SUBSOIL DRAINS ARE SHOWN FOR CLARITY AND ARE NOT ISSUED FOR CONSTRUCTION. THESE DRAWINGS SHOULD NOT BE RELIED ON FOR CONSTRUCTING STORMWATER FEATURES AND SUBSOIL DRAIN. REFER TO STORMWATER AND SUBSOIL DRAINAGE DRAWINGS FOR DETAILS.

LEGEND:			
	STRUCTURE		TEMPORARY RETAINING WALL
	UNDERCUT PEAT AND REPLACE WITH STRUCTURAL FILL		BARRIER RETAINING WALL
	UNDERCUT BENEATH MSE BRIDGE ABUTMENTS		EXTENT OF PEAT
	GEOGRID REINFORCED SLOPE		RAIL EXISTING
	PRELOAD AREA		RAIL PROPOSED
	RAIL TIE-IN		DESIGNATION BOUNDARY
	ROCKFILL TERRAMESH SYSTEM		RAIL DESIGNATION
	DISPOSAL AREA / BORROW AREA		PROPERTY BOUNDARY
	RETAINING WALL		EXISTING STREAM
	FILL SLOPE		PROPOSED CULVERTS
	CUT SLOPE		EXISTING CULVERTS
	CUT AND FILL SLOPE		PAVEMENT SUB-SOIL DRAINS
			GEOTECHNICAL SUB-SOIL DRAINS
			SWALE SUB-SOIL DRAINS
			GROUNDWATER MONITORING STANDPIPES



**NOTE:**  
 DATUM: NZVD 2009

**FOR CONSTRUCTION**  
 ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	AK	RC	BS	1.03.18

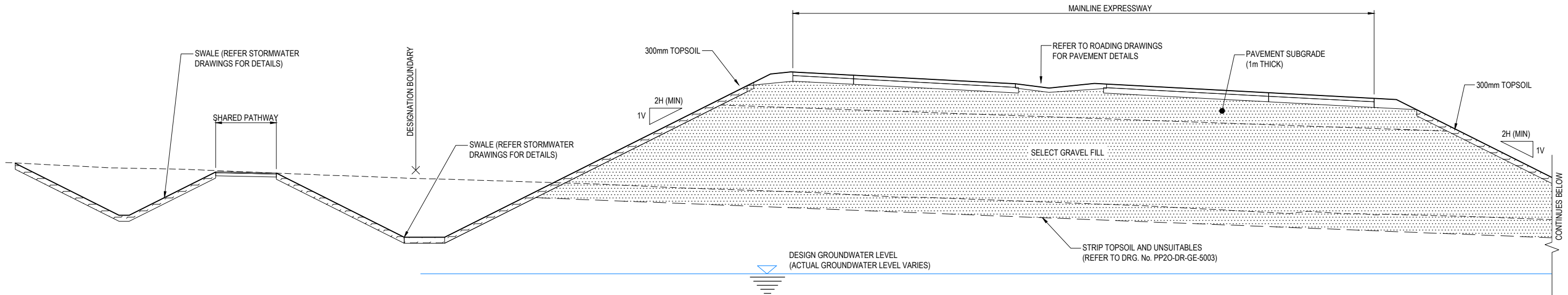
Scale (A1)	Design	Drawn	Checked	Approved For Construction
1:1000	R. Ramilo	A. Kochar	R. Hillier	B. Symmans
1:2000	G. Down			

**NZ TRANSPORT AGENCY** **Peka Peka to Ōtaki Expressway** **Fletcher HIGGINS** **BECA** **Tonkin+Taylor**

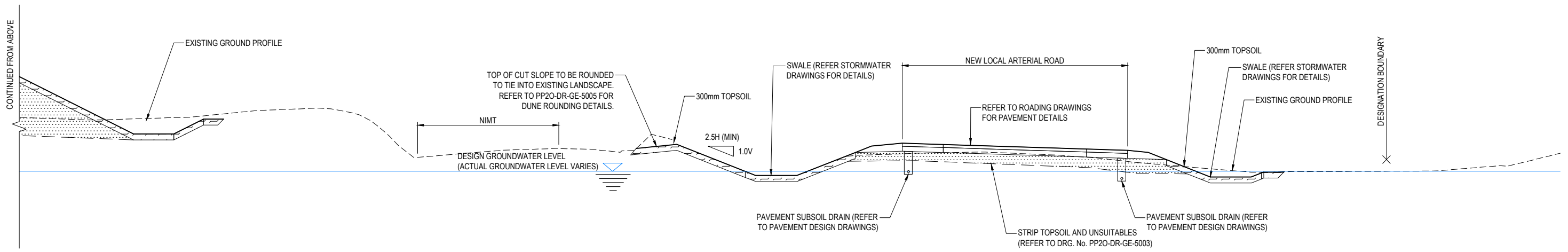
Subject:	EARTHWORKS
Title:	GENERAL ARRANGEMENT PLAN SHEET 18 OF 18

Discipline:	GEOTECHNICAL
Drawing No.:	PP20-DR-GE-0018
Rev.:	1





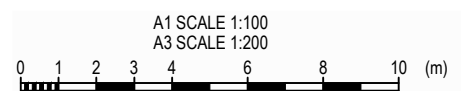
SECTION 41 CHAINAGE 9530-9780 (NORTH OF MARY CREST RAIL OVERPASS) TYPICAL CROSS SECTION  
0034 1:100 AT A1, 1:200 AT A3



SECTION 41 CHAINAGE 9520-9780 (NORTH OF MARY CREST RAIL OVERPASS) TYPICAL CROSS SECTION CONTINUED  
0034 1:100 AT A1, 1:200 AT A3

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
3. IF REQUIRED, TEMPORARY SHORING IS TO BE PROVIDED 500mm FROM NZTA DESIGNATION BOUNDARY TO AVOID TEMPORARY EXCAVATION EXTENDING ACROSS BOUNDARY. THE CONTRACTOR SHALL PROVIDE TO THE GEOTECHNICAL ENGINEER DETAILS OF ANY PROPOSED SHORING.
4. ON COMPLETION OF THE UNDERCUT THE SURFACE SHALL BE SHAPED, TRIMMED AND COMPACTED SO AS NOT TO POND WATER.
5. ADDITIONAL SUBSOIL DRAINAGE TO BE CONSTRUCTED IN ANY AREAS OF WET SUBGRADE AS DIRECTED BY THE GEOTECHNICAL ENGINEER. SUBSOIL DRAINS TO BE CONNECTED TO STORMWATER SYSTEM VIA SUMPS. IF SUBSOIL DRAINAGE CANNOT BE CONNECTED TO STORMWATER SYSTEM (I.E. LEVEL IS BELOW SUMP INVERT LEVEL) THEN CLEAN GRANULAR FILL TO BE PLACED AND COMPACTED IN BASE OF EXCAVATION.
6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

Design	R. Ramilo	31.05.17	Approved For Construction
Drawn	J. Libeau	13.09.17	B. Symmans
Dwg Verifier	R. Hillier	1.03.18	
Dwg Check	G. Down	1.03.18	Date 1.03.18

\* Refer to Original Hardcopy for Signature

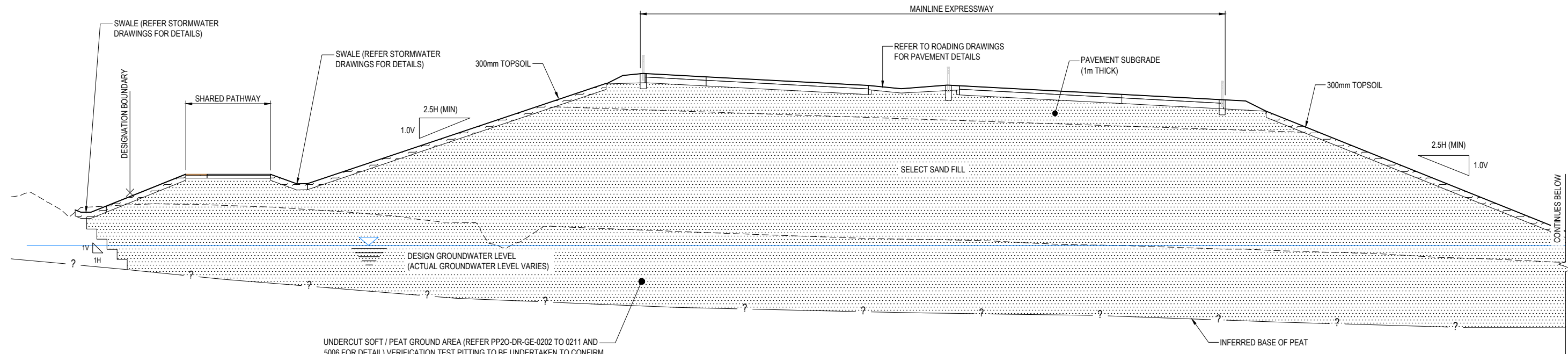
NZ TRANSPORT AGENCY WAIKA KOTAHU

**Peka Peka to Otaki Expressway**

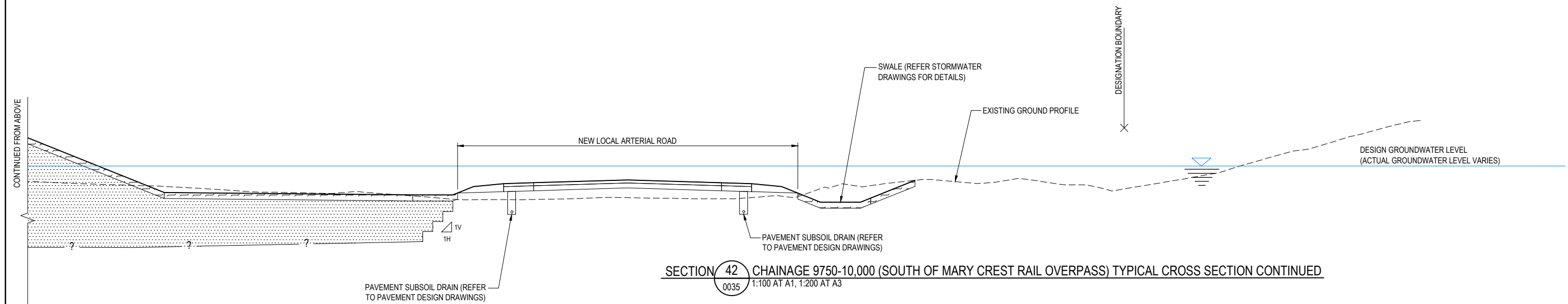
**Fletcher HIGGINS**

**BECA** **TFT** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 41	Drawing No.:	PP20-DR-GE-0169
		Rev.:	1



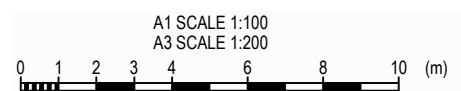
SECTION 42 CHAINAGE 9750-10,000 (SOUTH OF MARY CREST RAIL OVERPASS) TYPICAL CROSS SECTION  
 0035 1:100 AT A1, 1:200 AT A3



SECTION 42 CHAINAGE 9750-10,000 (SOUTH OF MARY CREST RAIL OVERPASS) TYPICAL CROSS SECTION CONTINUED  
 0035 1:100 AT A1, 1:200 AT A3

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
3. IF REQUIRED, TEMPORARY SHORING IS TO BE PROVIDED 500mm FROM NZTA DESIGNATION BOUNDARY TO AVOID TEMPORARY EXCAVATION EXTENDING ACROSS BOUNDARY. THE CONTRACTOR SHALL PROVIDE TO THE GEOTECHNICAL ENGINEER DETAILS OF ANY PROPOSED SHORING.
4. ON COMPLETION OF THE UNDERCUT THE SURFACE SHALL BE SHAPED, TRIMMED AND COMPACTED SO AS NOT TO POND WATER.
5. ADDITIONAL SUBSOIL DRAINAGE TO BE CONSTRUCTED IN ANY AREAS OF WET SUBGRADE AS DIRECTED BY THE GEOTECHNICAL ENGINEER. SUBSOIL DRAINS TO BE CONNECTED TO STORMWATER SYSTEM VIA SUMPS. IF SUBSOIL DRAINAGE CANNOT BE CONNECTED TO STORMWATER SYSTEM (I.E. LEVEL IS BELOW SUMP INVERT LEVEL) THEN CLEAN GRANULAR FILL TO BE PLACED AND COMPACTED IN BASE OF EXCAVATION.
6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

Scale (A1)	Design	Drawn	Checked	Date	Approved For Construction
1:100	R. Ramilo	J. Libeau	R. Hillier	31.05.17	B. Symmans
1:200	G. Down	G. Down	G. Down	13.09.2017	

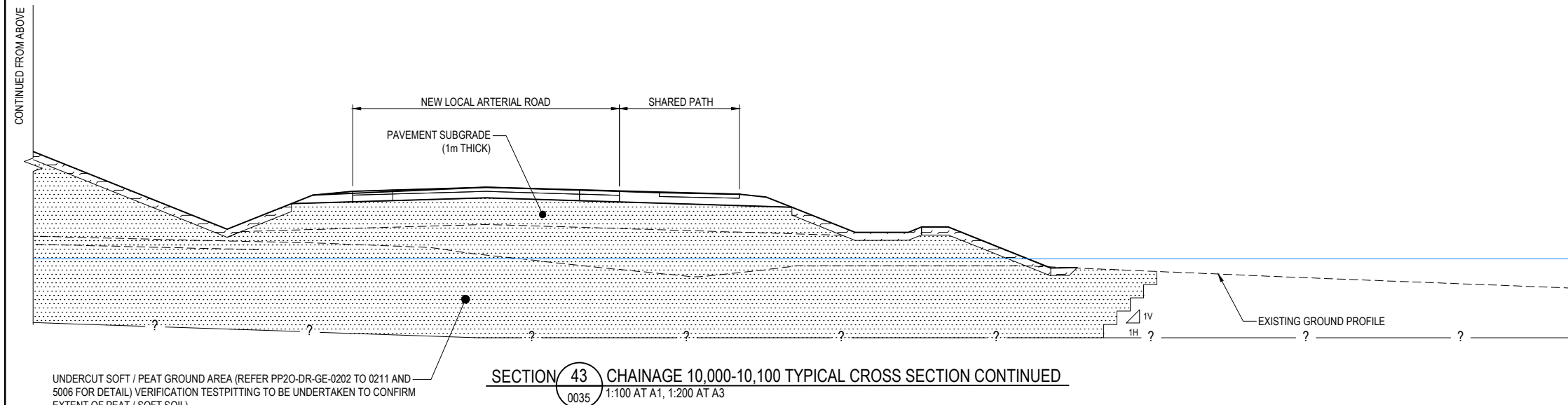
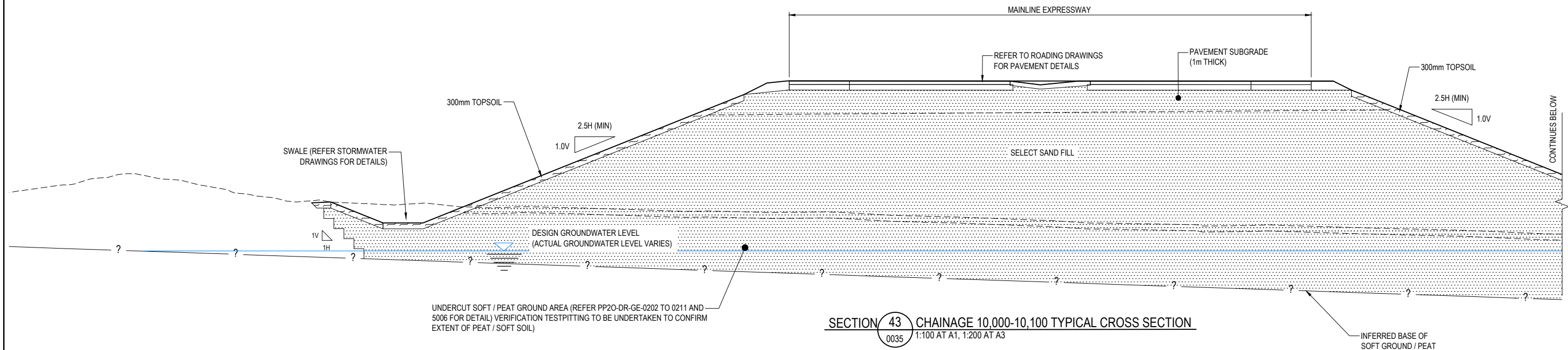
NZ TRANSPORT AGENCY WAIKA TĪKĪMA

**Peka Peka to Ōtaki Expressway**

Fletcher HIGGINS  
BECA  
Tonkin+Taylor

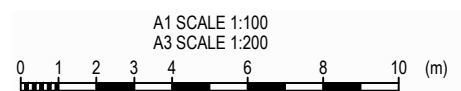
Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 42	Drawing No.:	PP20-DR-GE-0170
		Rev.:	1

Document No. R3000 - DESIGN DEVELOPMENT GENERAL/09 CAD/DRAWINGS/GEOTECHNICAL/PP20-DR-GE-0170-0171\_UPDATED.DWG



**NOTES:**

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
3. IF REQUIRED, TEMPORARY SHORING IS TO BE PROVIDED 500mm FROM NZTA DESIGNATION BOUNDARY TO AVOID TEMPORARY EXCAVATION EXTENDING ACROSS BOUNDARY. THE CONTRACTOR SHALL PROVIDE TO THE GEOTECHNICAL ENGINEER DETAILS OF ANY PROPOSED SHORING.
4. ON COMPLETION OF THE UNDERCUT THE SURFACE SHALL BE SHAPED, TRIMMED AND COMPACTED SO AS NOT TO POND WATER.
5. ADDITIONAL SUBSOIL DRAINAGE TO BE CONSTRUCTED IN ANY AREAS OF WET SUBGRADE AS DIRECTED BY THE GEOTECHNICAL ENGINEER. SUBSOIL DRAINS TO BE CONNECTED TO STORMWATER SYSTEM VIA SUMPS. IF SUBSOIL DRAINAGE CANNOT BE CONNECTED TO STORMWATER SYSTEM (I.E. LEVEL IS BELOW SUMP INVERT LEVEL) THEN CLEAN GRANULAR FILL TO BE PLACED AND COMPACTED IN BASE OF EXCAVATION.
6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

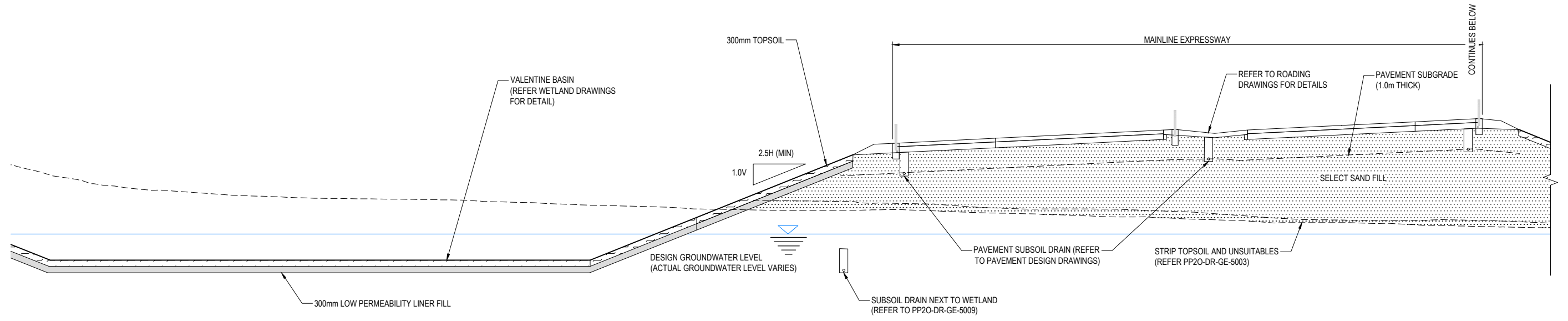
Design	R. Ramilo	31.05.17	Approved For Construction
Drawn	J. Libeau	13.09.2017	B. Symmans
Dwg Verifier	R. Hillier	1.03.18	
Dwg Check	G. Down	1.03.18	Date 1.03.18

\* Refer to Original Hardcopy for Signature

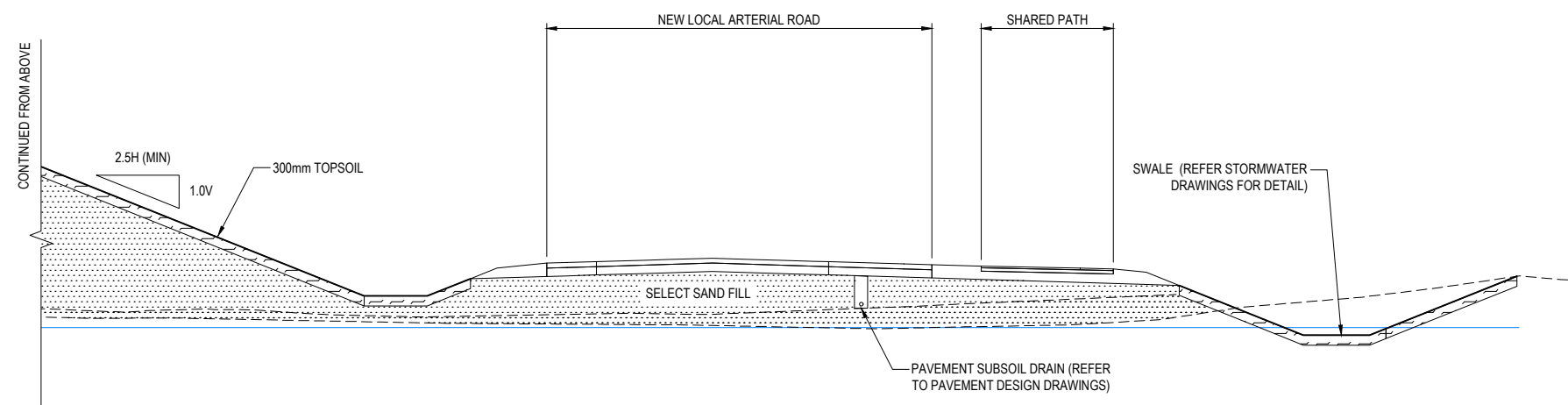
NZ TRANSPORT AGENCY WAIKAŪTĀKI  
**Peka Peka to Ōtaki Expressway**  
**Fletcher HIGGINS**  
**BECA** **TFT** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 43	Drawing No.:	PP20-DR-GE-0171
		Rev.:	1

Document No. R13000 - DESIGN DEVELOPMENT GENERAL09 CAD/DRAWINGS/UPDATE/PP20-DR-GE-0164-0171\_UPDATED.DWG



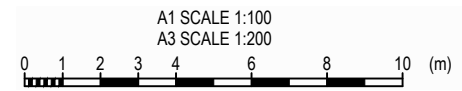
SECTION 44 CHAINAGE 10100 - 10225 TYPICAL CROSS SECTION  
0035 1:100@A1, 1:200@A3



SECTION 44 CHAINAGE 10100 - 10225 TYPICAL CROSS SECTION  
0035 1:100@A1, 1:200@A3

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
3. IF REQUIRED, TEMPORARY SHORING IS TO BE PROVIDED 500mm FROM NZTA DESIGNATION BOUNDARY TO AVOID TEMPORARY EXCAVATION EXTENDING ACROSS BOUNDARY. THE CONTRACTOR SHALL PROVIDE TO THE GEOTECHNICAL ENGINEER DETAILS OF ANY PROPOSED SHORING.
4. ON COMPLETION OF THE UNDERCUT THE SURFACE SHALL BE SHAPED, TRIMMED AND COMPACTED SO AS NOT TO POND WATER.
5. ADDITIONAL SUBSOIL DRAINAGE TO BE CONSTRUCTED IN ANY AREAS OF WET SUBGRADE AS DIRECTED BY THE GEOTECHNICAL ENGINEER. SUBSOIL DRAINS TO BE CONNECTED TO STORMWATER SYSTEM VIA SUMPS. IF SUBSOIL DRAINAGE CANNOT BE CONNECTED TO STORMWATER SYSTEM (I.E. LEVEL IS BELOW SUMP INVERT LEVEL) THEN CLEAN GRANULAR FILL TO BE PLACED AND COMPACTED IN BASE OF EXCAVATION.
6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

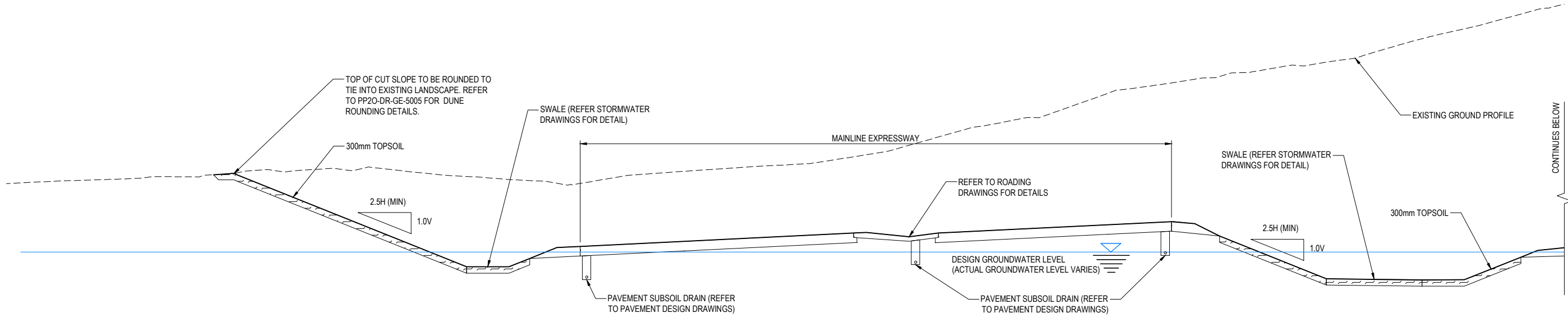
No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

Scale (A1)	Design	R. Ramilo	31.05.17	Approved For Construction
1:100	Drawn	A. Kochar	18.08.17	B. Symmans
Scale (A3)	Dwg Verifier	R. Hillier	1.03.18	
1:200	Dwg Check	G. Down	1.03.18	Date 1.03.18

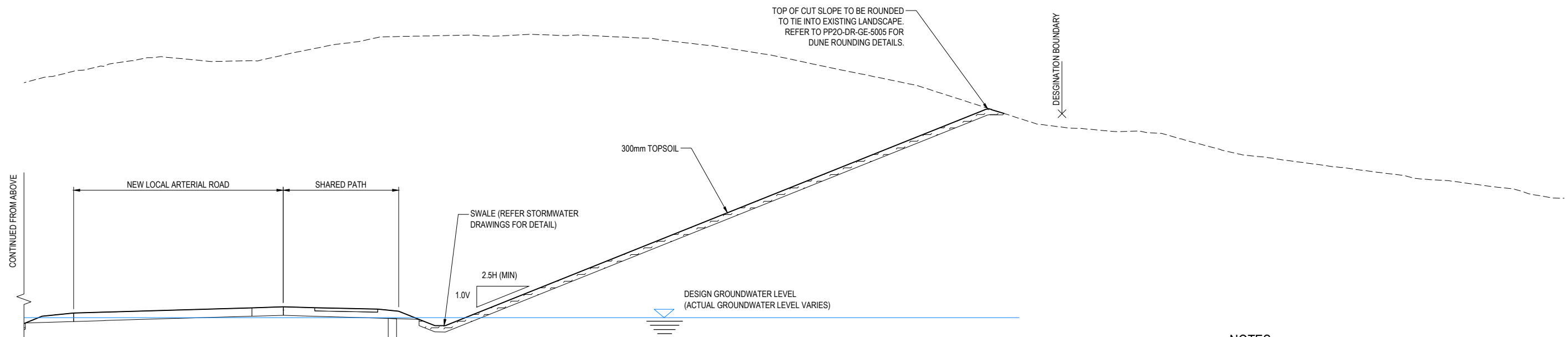
\* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAIKA TŌTĪMA  
Peka Peka to Ōtaki Expressway  
Fletcher HIGGINS  
BECA TTT Tonkin+Taylor

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 44	Drawing No.:	PP20-DR-GE-0172
		Rev.:	1



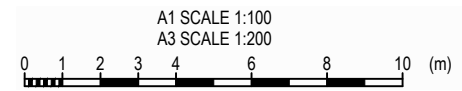
SECTION 45 CHAINAGE 10225 - 10350 TYPICAL CROSS SECTION  
 0035 1:100@A1, 1:200@A3



SECTION 45 CHAINAGE 10225 - 10350 TYPICAL CROSS SECTION CONTINUED  
 0035 1:100@A1, 1:200@A3

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
3. IF REQUIRED, TEMPORARY SHORING IS TO BE PROVIDED 500mm FROM NZTA DESIGNATION BOUNDARY TO AVOID TEMPORARY EXCAVATION EXTENDING ACROSS BOUNDARY. THE CONTRACTOR SHALL PROVIDE TO THE GEOTECHNICAL ENGINEER DETAILS OF ANY PROPOSED SHORING.
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6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

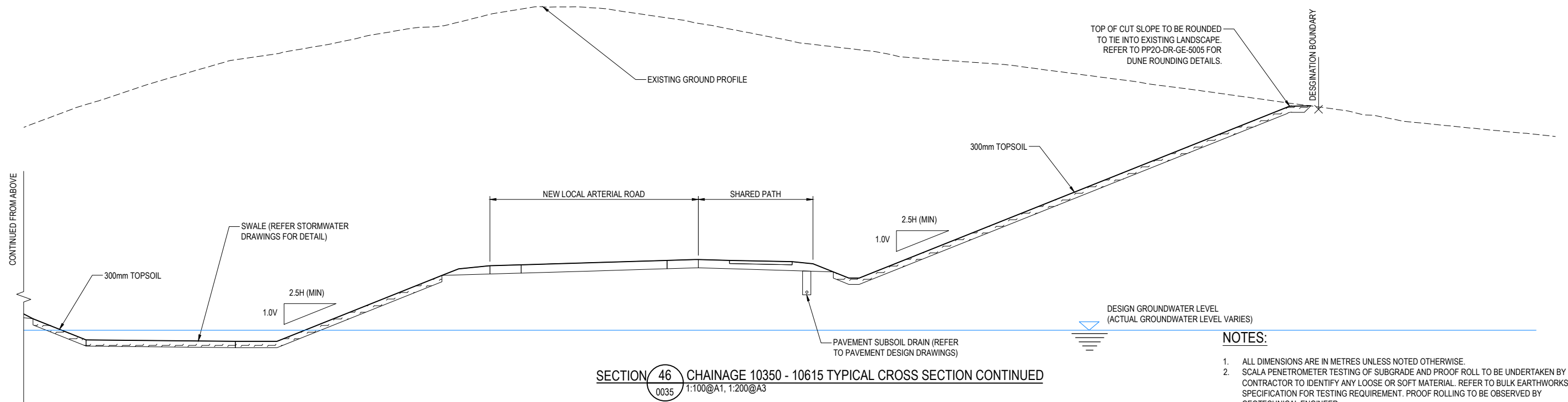
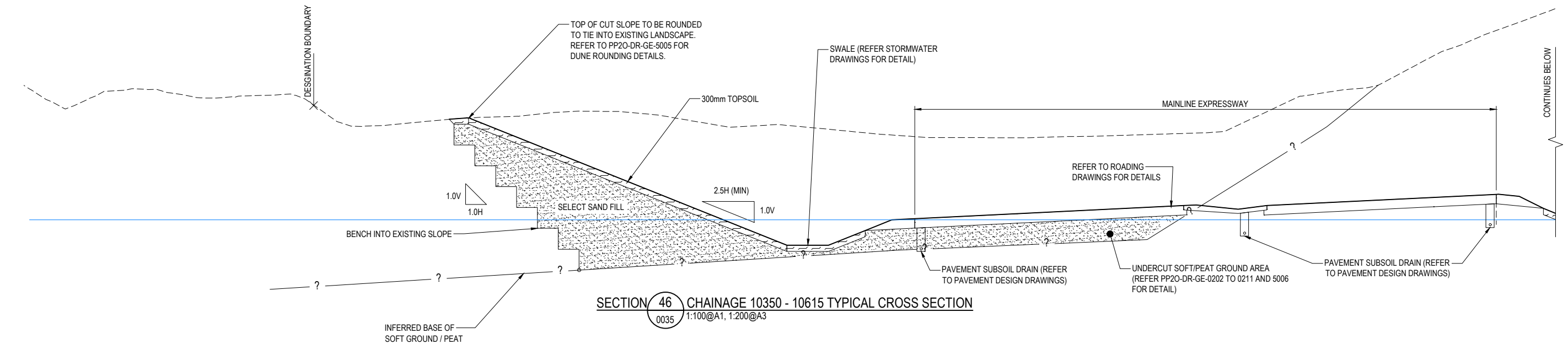
Design	R. Ramilo	31.05.17	Approved For Construction
Drawn	A. Kochar	18.08.17	B. Symmans
Dwg Verifier	R. Hillier	1.03.18	
Dwg Check	G. Down	1.03.18	Date 1.03.18

\* Refer to Original Hardcopy for Signature

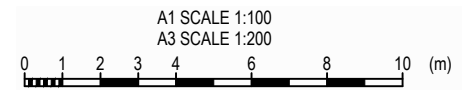
NZ TRANSPORT AGENCY WAIKATO  
**Peka Peka to Otaki Expressway**  
 Fletcher HIGGINS  
 BECA TTT Tonkin+Taylor

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 45	Drawing No.:	PP20-DR-GE-0173
		Rev.:	1

Document No. R3000 - DESIGN DEVELOPMENT GENERAL/09 CAD/DRAWINGS/GEOTECH/PP20-DR-GE-0173-0177 UPDATED.DWG



- NOTES:**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
  2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
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  4. ON COMPLETION OF THE UNDERCUT THE SURFACE SHALL BE SHAPED, TRIMMED AND COMPACTED SO AS NOT TO POND WATER.
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  6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.



**FOR CONSTRUCTION**  
ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

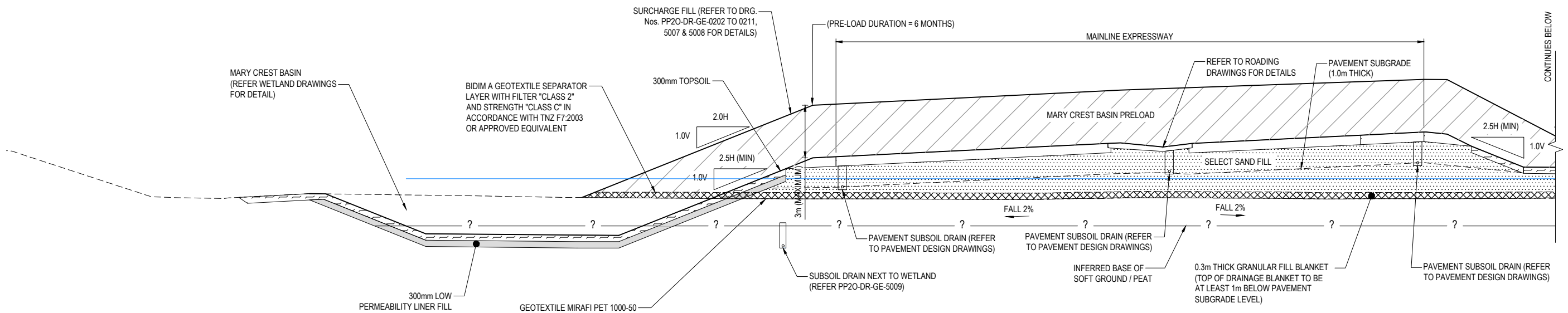
Design	R. Ramilo	31.05.17	Approved For Construction
Drawn	A. Kochar	18.08.17	B. Symmans
Dwg Verifier			
Dwg Check			
Date		1.03.18	

\* Refer to Original Hardcopy for Signature

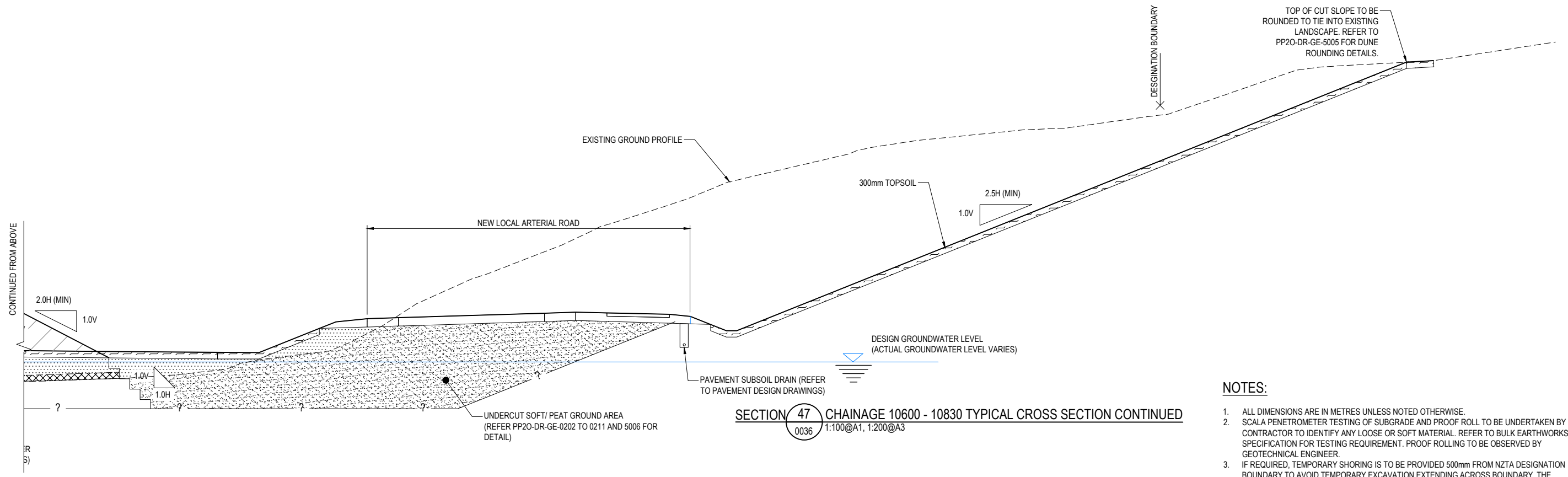
**NZ TRANSPORT AGENCY** WAIKATO REGION  
**Peka Peka to Ōtaki Expressway**  
**Fletcher HIGGINS**  
**BECA** **TFT** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 46	Drawing No.:	PP20-DR-GE-0174
		Rev.:	1

Document No. R3000 - DESIGN DEVELOPMENT GENERAL09 CAD/DRAWINGS/GEOTECH/PP20-DR-GE-0174-0177 UPDATED.DWG



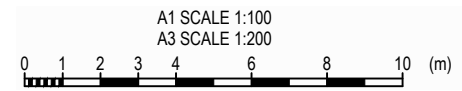
SECTION 47 CHAINAGE 10600 - 10830 TYPICAL CROSS SECTION  
0036 1:100@A1, 1:200@A3



SECTION 47 CHAINAGE 10600 - 10830 TYPICAL CROSS SECTION CONTINUED  
0036 1:100@A1, 1:200@A3

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
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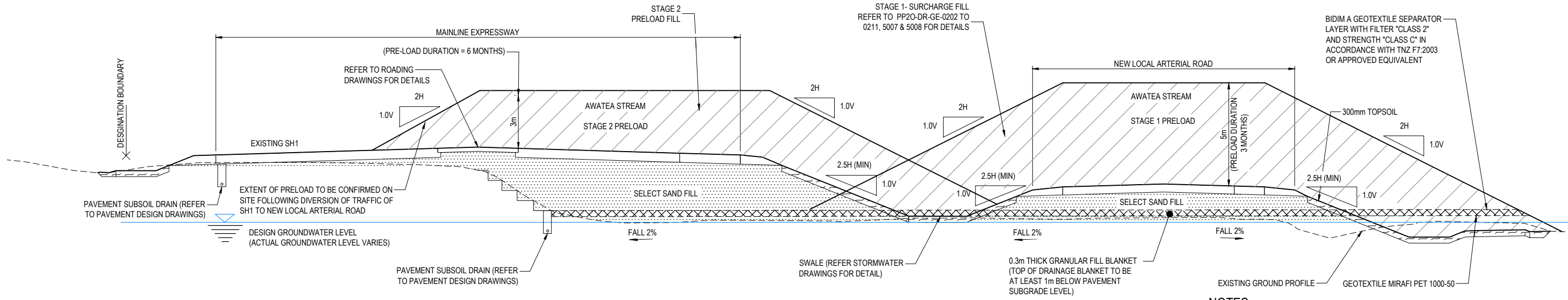
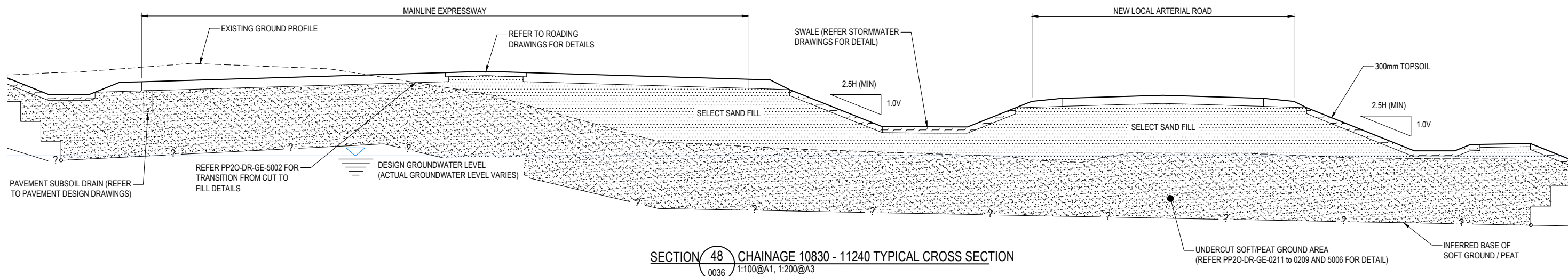
FOR CONSTRUCTION ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

Scale (A1)	Design	Drawn	Checked	Date	Approved For Construction
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1:200	G. Down	G. Down	G. Down	1.03.18	

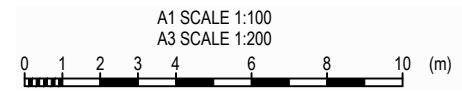
NZ TRANSPORT AGENCY  
Peka Peka to Ōtaki Expressway  
Fletcher HIGGINS  
BECA  
Tonkin+Taylor

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 47	Drawing No.:	PP20-DR-GE-0175
		Rev.:	1



- PROPOSED CONSTRUCTION SEQUENCE
1. INSTALL GEOTECHNICAL INSTRUMENTATION
  2. SW STAGE 1 DIVERSION
  3. CONSTRUCT STAGE 1 PRELOAD
  4. 3 MONTH SETTLEMENT PERIOD. MONITOR SETTLEMENT.
  5. REMOVE PRELOAD AND CONSTRUCT CULVERT BENEATH LOCAL ARTERIAL ROAD.
  6. CONSTRUCT LOCAL ARTERIAL ROAD AND DIVERT TRAFFIC
  7. SW STAGE 2 DIVERSION
  8. CONSTRUCT STAGE 2 PRELOAD
  9. 6 MONTH SETTLEMENT PERIOD. MONITOR SETTLEMENT.
  10. REMOVE PRELOAD AND EXTEND CULVERT UNDER EXPRESSWAY.
  11. CONSTRUCT EXPRESSWAY

- NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
  2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
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FOR CONSTRUCTION ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

Design	R. Ramilo	31.05.17	Approved For Construction
Drawn	A. Kochar	18.08.17	B. Symmans
Dwg Verifier	R. Hillier	1.03.18	
Dwg Check	G. Down	1.03.18	Date 1.03.18

\* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAIKA TĪKĪMA

Peka Peka to Ōtaki Expressway

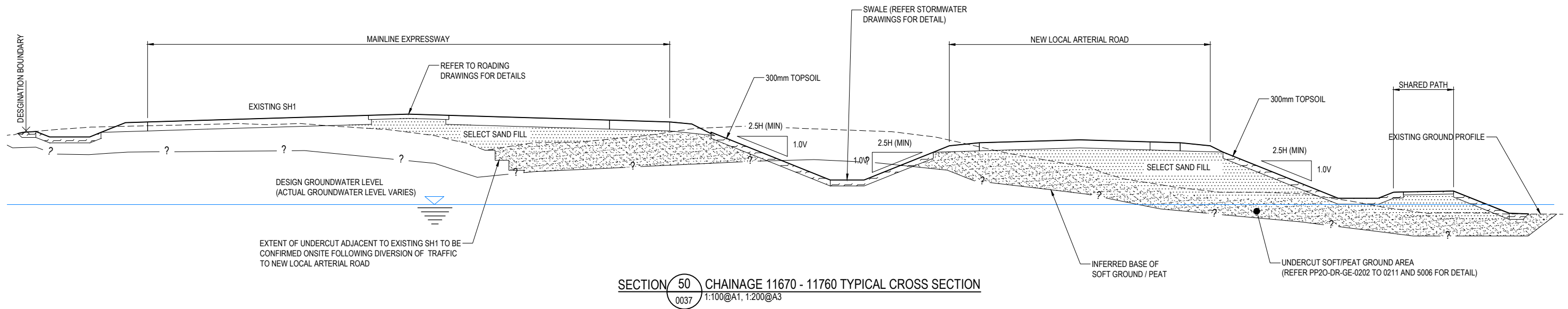
Fletcher HIGGINS

BECA TTT Tonkin+Taylor

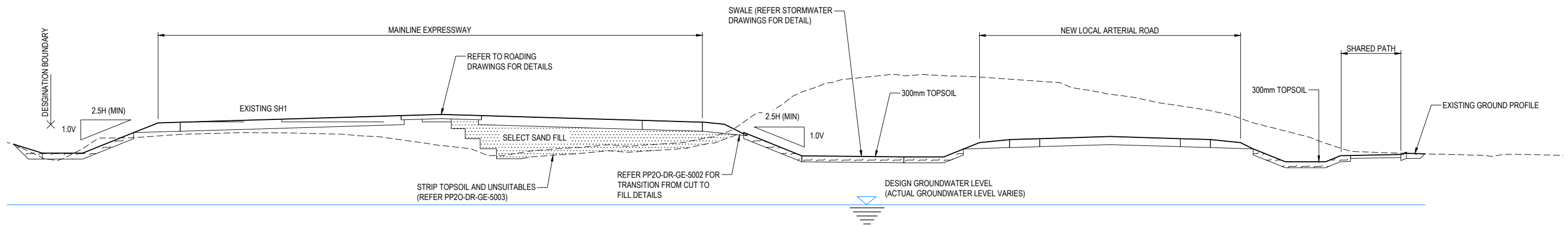
Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTION 48 AND 49	Drawing No.:	PP20-DR-GE-0176
		Rev.:	1

Document No. R3000 - DESIGN DEVELOPMENT GENERAL/09 CAD/DRAWINGS/UPDATE/PP20-DR-GE-0176-0177 UPDATED.DWG





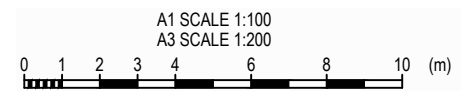
SECTION 50 CHAINAGE 11670 - 11760 TYPICAL CROSS SECTION  
0037 1:100@A1, 1:200@A3



SECTION 51 CHAINAGE 11760 - 11850 TYPICAL CROSS SECTION  
0037 1:100@A1, 1:200@A3

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. SCALA PENETROMETER TESTING OF SUBGRADE AND PROOF ROLL TO BE UNDERTAKEN BY CONTRACTOR TO IDENTIFY ANY LOOSE OR SOFT MATERIAL. REFER TO BULK EARTHWORKS SPECIFICATION FOR TESTING REQUIREMENT. PROOF ROLLING TO BE OBSERVED BY GEOTECHNICAL ENGINEER.
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FOR CONSTRUCTION ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	ISSUED FOR CONSTRUCTION	RMT	RC	BS	1.03.18

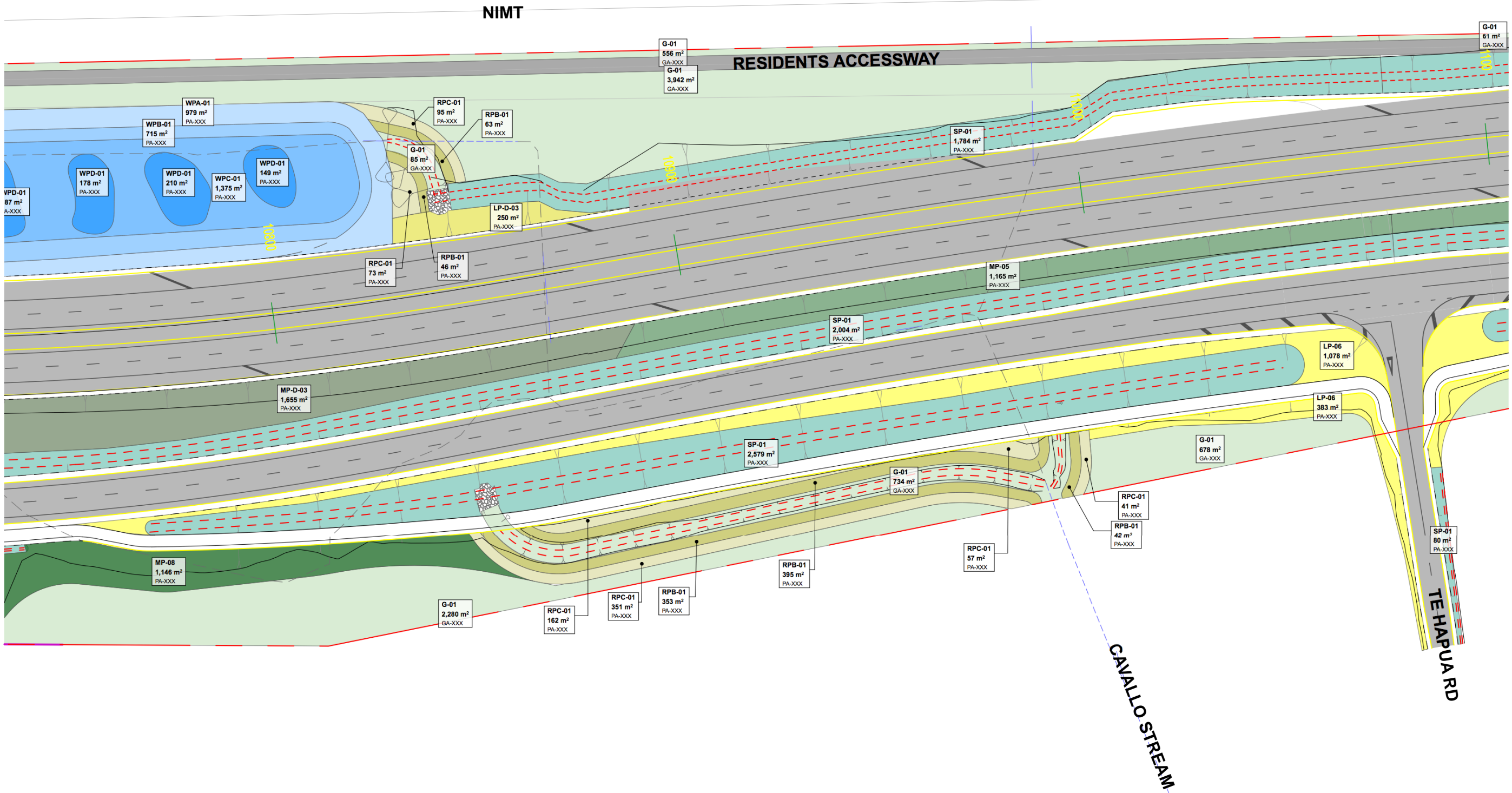
Scale (A1)	Design	Drawn	Dwg Check	Date	Approved For Construction
1:100	R. Ramilo	A. Kochar	R. Hillier	18.08.17	B. Symmans
1:200			G. Down	1.03.18	

\* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAIKAŪTĀKI  
Peka Peka to Ōtaki Expressway  
Fletcher HIGGINS  
BECA TTT Tonkin+Taylor

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL CROSS SECTIONS SECTIONS 50 AND 51	Drawing No.:	PP20-DR-GE-0177
		Rev.:	1

## Landscape Plans



1 Stream Diversion Treatment - Cavallo  
Scale 1:1000

No.	Revision	By	Chk	Appd	Date
A	For Information	MB	SD/SH		28/06/18

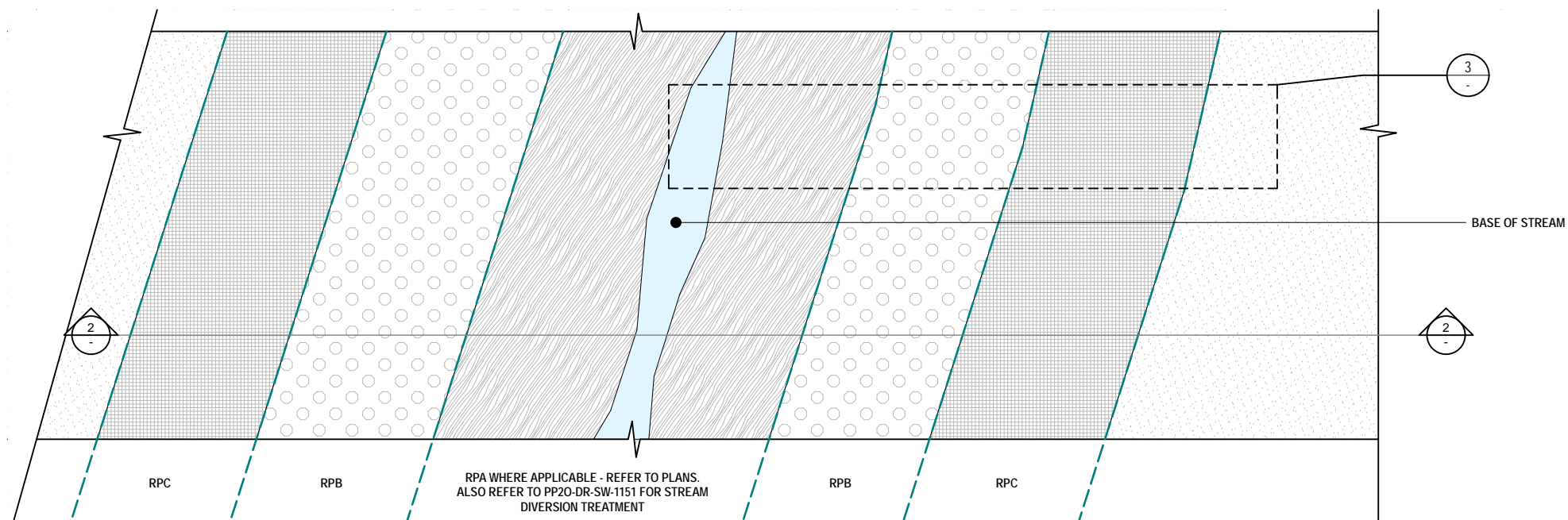
Scale (A1) DOUBLE SHOWN	Design	Approved For Construction
Scale (A3) AS SHOWN	Drawn	Date
	Design Verifier	
	Dwg Check	

\* Refer to Original Hardcopy for Signature

Subject:	STREAM DIVERSION TREATMENTS
Title:	CAVALLO STREAM

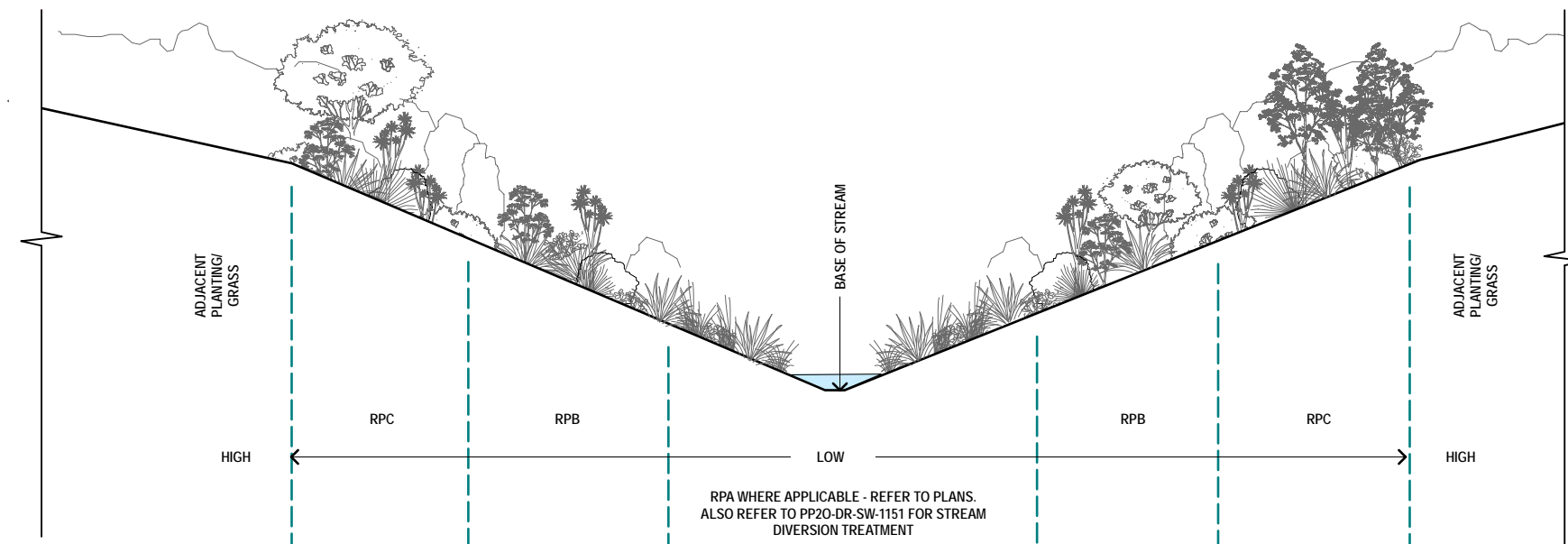
**CONCEPT DESIGN**  
NOT FOR CONSTRUCTION

Discipline:	GENERAL
Drawing No.:	PP20-SK-GN-0283
Rev.:	A



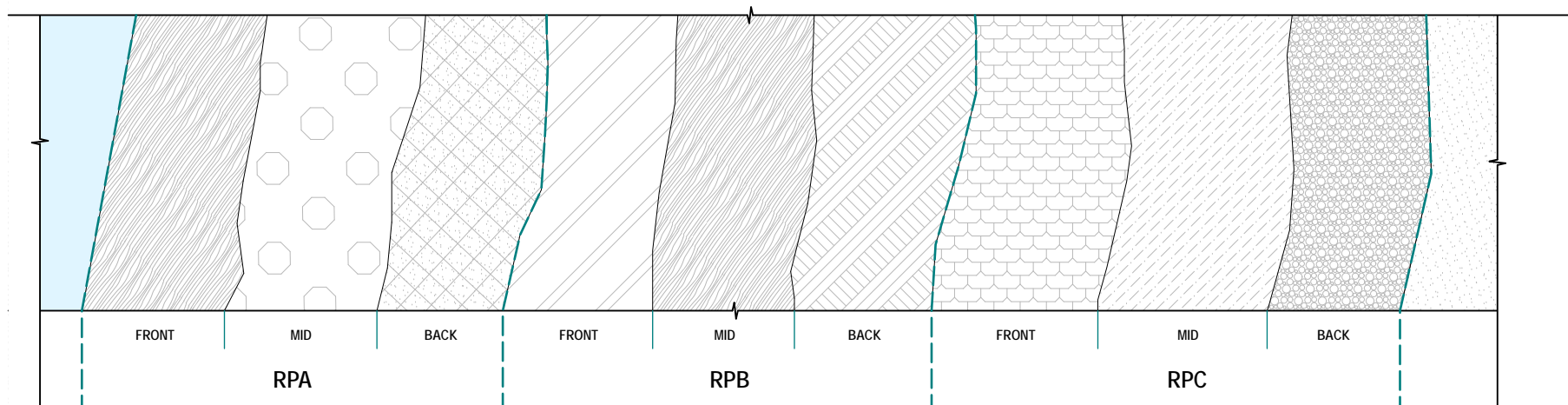
**1 TYPICAL PLANTING PLAN - RIPARIAN PLANTING**

Scale 1:250



**2 TYPICAL PLANTING SECTION - RIPARIAN PLANTING**

Scale 1:250



**3 TYPICAL PLANTING DETAIL PLAN - RIPARIAN PLANTING**

Scale 1:100

**KEY:**  
 RPA - RIPARIAN PLANTING STANDING WATER/WATERS EDGE MIX  
 RPB - RIPARIAN PLANTING LOWER BANK MIX  
 RPC - RIPARIAN PLANTING UPPER BANK MIX

**NOTES:**  
 1. DRAWINGS TO BE READ IN CONJUNCTION WITH PLANTING PLANS, PLANTING SCHEDULES, TYPICAL PLANTING DETAILS AND LANDSCAPE SPECIFICATIONS

2. CONFIRM SETOUT WITH LANDSCAPE ARCHITECT PRIOR TO PLANTING

3. PLANT IN NATURAL CLUSTERS OF ODD NUMBERS (3-11) OF A SINGLE SPECIES UNLESS SPECIFIED WITHIN PLANTING SCHEDULES OR ON PLANTING PLANS

4. GENERALLY PLANT LOWER GROWING SPECIES TOWARD THE FRONT

5. AVOID STRAIGHT LINES

6. SETOUT FROM FRONT TO BACK

7. REFER TO PP20-DR-SW-1151 FOR STREAM DIVERSION TREATMENT

No.	Revision	By	Chk	Appd	Date
A	For Information	MB	SD/SH		28/06/18

Design		Approved For Construction
Scale (A1) SHOWN		Date
Scale (A3) AS SHOWN		
Drawn		
Design Verifier		
Dwg Check		
* Refer to Original Hardcopy for Signature		

Subject:	STREAM DIVERSION TREATMENTS	Discipline:	GENERAL
Title:	TYPICAL PLANTING SETOUT RIPARIAN PLANTING	Drawing No.:	PP20-SK-GN-0284
		Rev.:	A

**CONCEPT DESIGN  
NOT FOR CONSTRUCTION**

Riparian Planting - A (RPA-01): Standing Water/Waters Edge					
Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	10%	0.5L	1.8	Front/Mid
<i>Carex secta</i>	Pukio	10%	0.5L	1.8	Front
<i>Carex virgata</i>	Pukio	10%	0.5L	1.8	Front
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	10%	PB2	1	Back
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	20%	0.5L	1	Front/Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	10%	0.5L	1.8	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	30%	PB2	1	Mid

Riparian Planting - B (RPB-01): Lower Bank					
Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	3%	0.5L	1.8	Front/Mid
<i>Carex dipsacea</i>	Autumn Sedge	4%	PB2	1.8	Front
<i>Carex secta</i>	Pukio	4%	0.5L	1.8	Front
<i>Carex virgata</i>	Pukio	4%	0.5L	1.8	Front
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	8%	PB2	1	Mid
<i>Cordyline australis</i>	Cabbage Tree	6%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	20%	PB2	1	Front/mid
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	8%	0.5L	1	Front/Mid
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	3%	0.5L	1.8	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	30%	PB2	1	Mid

Riparian Planting - C (RPC-01): Upper Bank					
Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	5%	PB2	1.8	Front
<i>Carex geminata</i>	Rautahi	5%	0.5L	1.8	Mid
<i>Coprosma propinqua</i>	Mingimingi	5%	PB2	1	Mid
<i>Cordyline australis</i>	Cabbage Tree	3%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Front/mid
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Olearia paniculata</i>	Akiraho	12%	PB2	1	Mid
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	15%	PB2	1	Mid/Back
<i>Plagianthus regius</i>	Ribbonwood	5%	PB2	1	Back

No.	Revision	By	Chk	Appd	Date
A	For Information	MB	SD/SH		28/06/18

Scale (A1) SHOWN	Design	Drawn	Approved For Construction
Scale (A3) AS SHOWN <td>Design</td> <td></td> <td>Date</td>	Design		Date
	Dwg Verifier		
	Dwg Check		

\* Refer to Original Hardcopy for Signature

**NZ TRANSPORT AGENCY** Peka Peka to Ōtaki Expressway

**Fletcher HIGGINS**

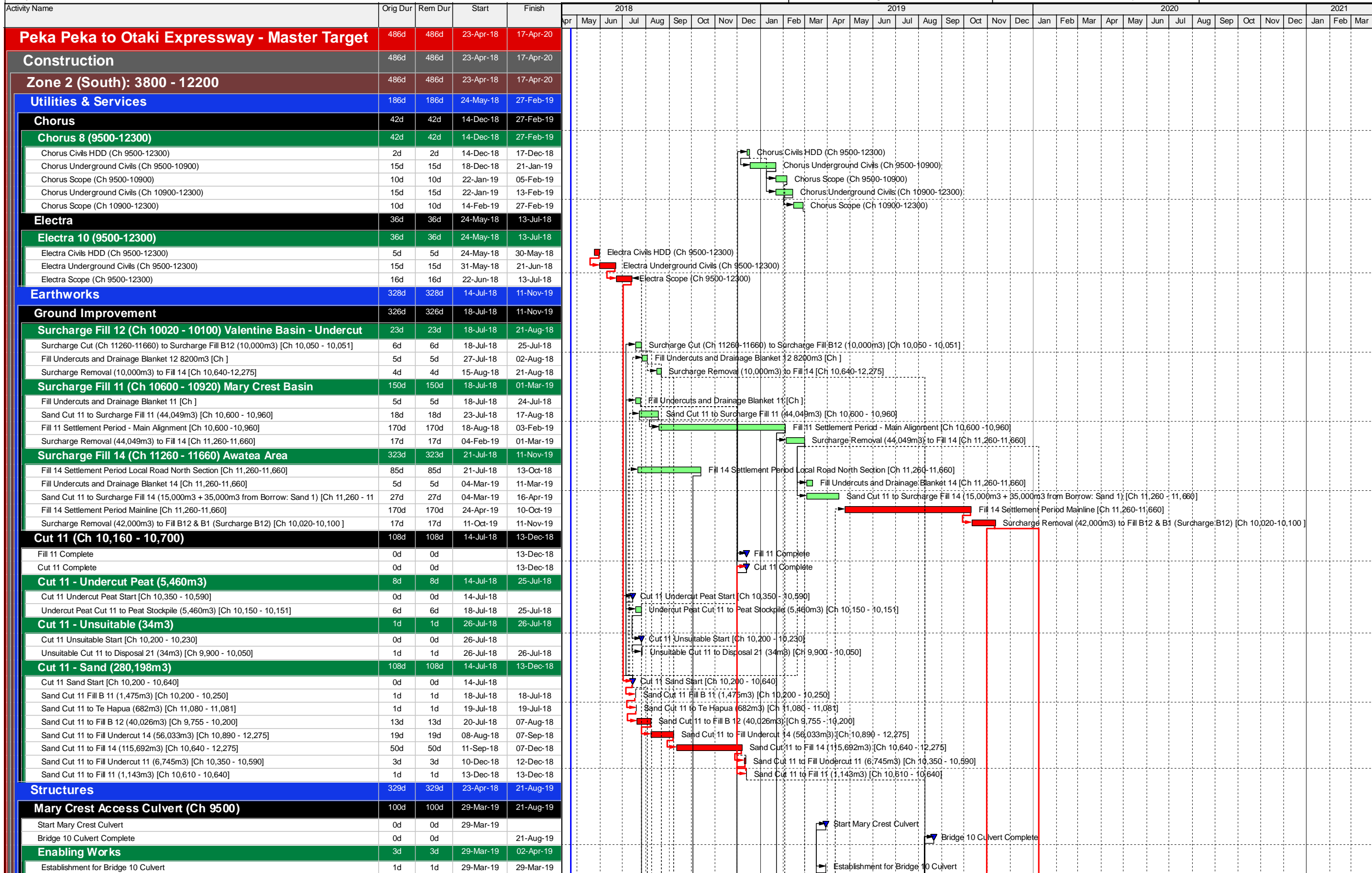
**BECA** **Tonkin+Taylor**

Subject:	STREAM DIVERSION TREATMENTS
Title:	RIPIARIAN PLANT MIXES

**CONCEPT DESIGN**  
NOT FOR CONSTRUCTION

Discipline:	GENERAL
Drawing No.:	PP20-SK-GN-0285
Rev.:	A

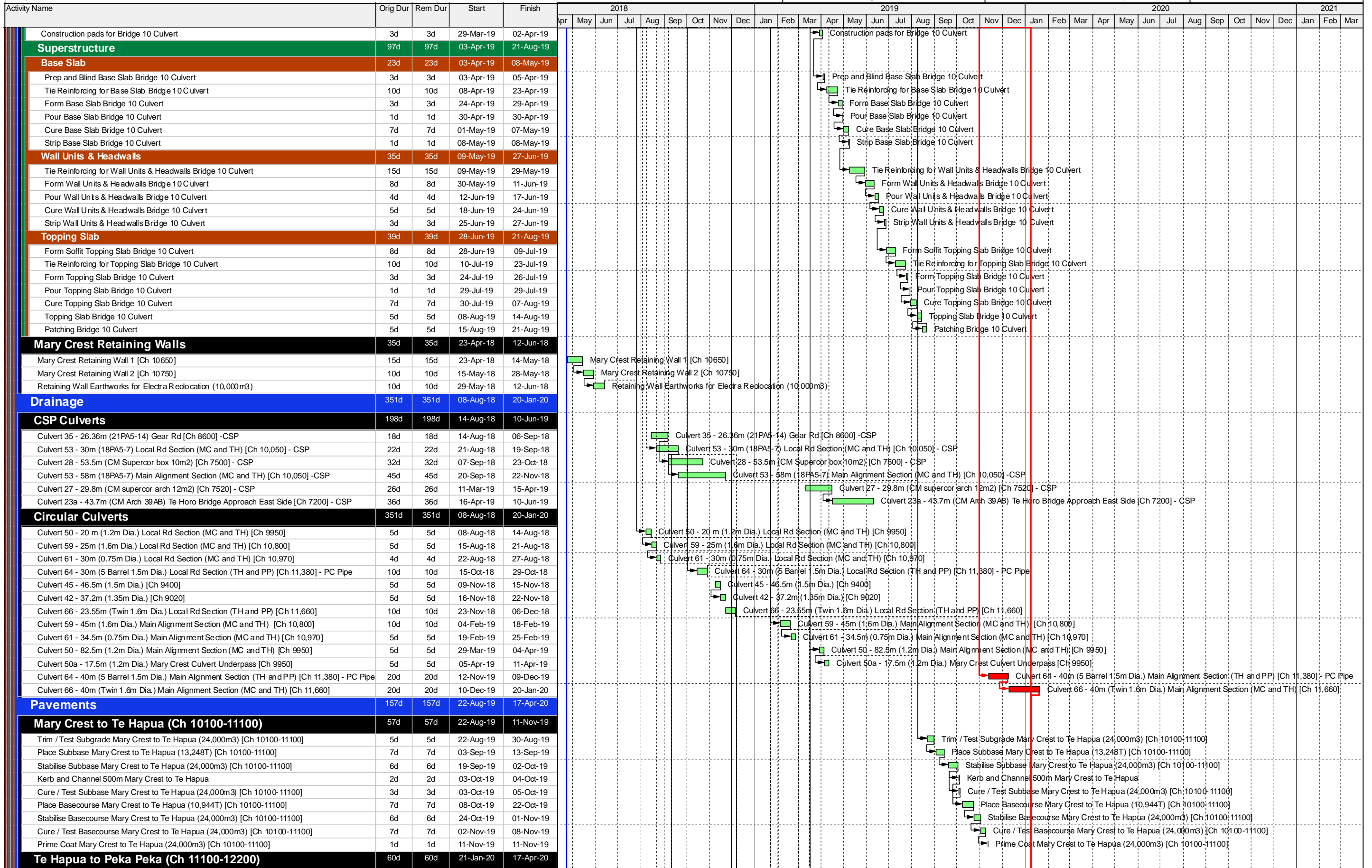
# APPENDIX D – PROGRAMME



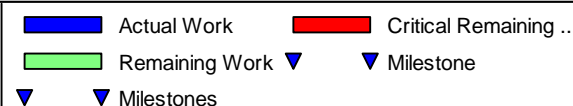
**Peka Peka to Otaki  
Mary Crest Area Programme**

- Actual Work
- Remaining Work
- Critical Remaining ...
- ▼ Milestones
- ▼ Milestone



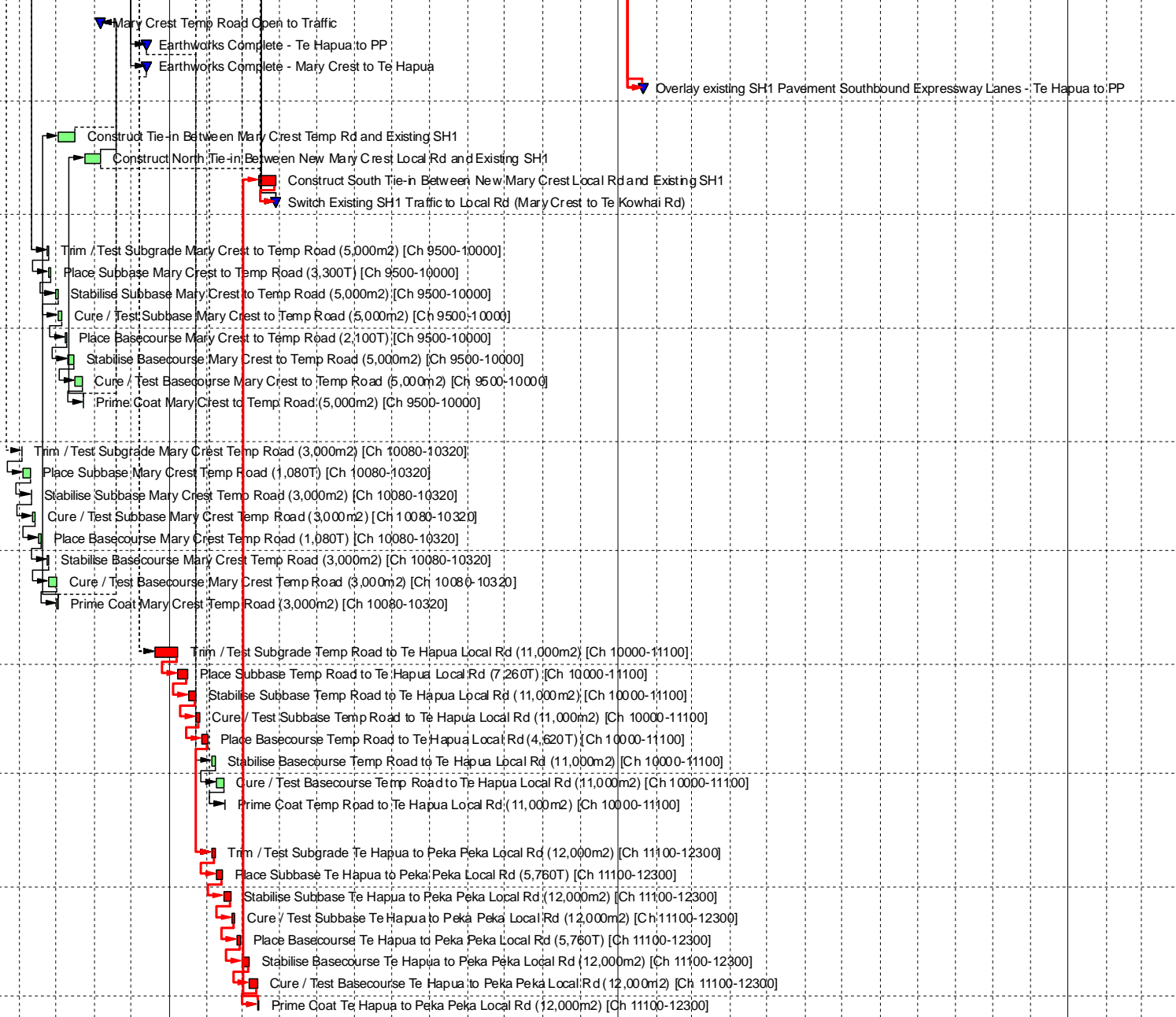


**Peka Peka to Otaki  
Mary Crest Area Programme**





Activity Name	Orig Dur	Rem Dur	Start	Finish	2018												2019												2020												2021												
					Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar													
Rip and Remove Existing SH1	5d	5d	21-Jan-20	28-Jan-20																																																	Rip and Remove Existing SH1
Trim / Test Subgrade Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	6d	6d	29-Jan-20	06-Feb-20																																																	Trim / Test Subgrade Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]
Place Subbase Te Hapua to Peka Peka (14,572T) [Ch 11100-12200]	8d	8d	07-Feb-20	20-Feb-20																																																	Place Subbase Te Hapua to Peka Peka (14,572T) [Ch 11100-12200]
Stabilise Subbase Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	7d	7d	21-Feb-20	03-Mar-20																																																	Stabilise Subbase Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]
Kerb and Channel 500m Te Hapua to PP	2d	2d	04-Mar-20	05-Mar-20																																																	Kerb and Channel 500m Te Hapua to PP
Cure / Test Subbase Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	3d	3d	04-Mar-20	06-Mar-20																																																	Cure / Test Subbase Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]
Place Basecourse Te Hapua to Peka Peka (12,038T) [Ch 11100-12200]	8d	8d	09-Mar-20	19-Mar-20																																																	Place Basecourse Te Hapua to Peka Peka (12,038T) [Ch 11100-12200]
Stabilise Basecourse Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	7d	7d	20-Mar-20	31-Mar-20																																																	Stabilise Basecourse Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]
Cure / Test Basecourse Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	7d	7d	01-Apr-20	07-Apr-20																																																	Cure / Test Basecourse Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]
Prime Coat Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	1d	1d	08-Apr-20	08-Apr-20																																																	Prime Coat Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]
M2PP Temporary Tie In to PP20	5d	5d	09-Apr-20	17-Apr-20																																																	M2PP Temporary Tie In to PP20
<b>Local Roads</b>	<b>333d</b>	<b>333d</b>	<b>03-Sep-18</b>	<b>21-Jan-20</b>																																																	
<b>Mary Crest to Peka Peka (Ch 9500-12250)</b>	<b>333d</b>	<b>333d</b>	<b>03-Sep-18</b>	<b>21-Jan-20</b>																																																	
Mary Crest Temp Road Open to Traffic	0d	0d		06-Nov-18																																																	Mary Crest Temp Road Open to Traffic
Earthworks Complete - Te Hapua to PP	0d	0d		13-Dec-18																																																	Earthworks Complete - Te Hapua to PP
Earthworks Complete - Mary Crest to Te Hapua	0d	0d		13-Dec-18																																																	Earthworks Complete - Mary Crest to Te Hapua
Overlay existing SH1 Pavement Southbound Expressway Lanes - Te Hapua to PP	0d	0d	21-Jan-20																																																		Overlay existing SH1 Pavement Southbound Expressway Lanes - Te Hapua to PP
<b>Mary Crest Tie-ins to SH1</b>	<b>114d</b>	<b>114d</b>	<b>03-Oct-18</b>	<b>28-Mar-19</b>																																																	
Construct Tie-in Between Mary Crest Temp Rd and Existing SH1	10d	10d	03-Oct-18	16-Oct-18																																																	Construct Tie-in Between Mary Crest Temp Rd and Existing SH1
Construct North Tie-in Between New Mary Crest Local Rd and Existing SH1	10d	10d	24-Oct-18	06-Nov-18																																																	Construct North Tie-in Between New Mary Crest Local Rd and Existing SH1
Construct South Tie-in Between New Mary Crest Local Rd and Existing SH1	10d	10d	15-Mar-19	28-Mar-19																																																	Construct South Tie-in Between New Mary Crest Local Rd and Existing SH1
Switch Existing SH1 Traffic to Local Rd (Mary Crest to Te Kowhai Rd)	0d	0d		28-Mar-19																																																	Switch Existing SH1 Traffic to Local Rd (Mary Crest to Te Kowhai Rd)
<b>Mary Crest North of Temp Rd</b>	<b>21d</b>	<b>21d</b>	<b>24-Sep-18</b>	<b>23-Oct-18</b>																																																	
Trim / Test Subgrade Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	1d	1d	24-Sep-18	24-Sep-18																																																	Trim / Test Subgrade Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]
Place Subbase Mary Crest to Temp Road (3,300T) [Ch 9500-10000]	2d	2d	25-Sep-18	26-Sep-18																																																	Place Subbase Mary Crest to Temp Road (3,300T) [Ch 9500-10000]
Stabilise Subbase Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	2d	2d	01-Oct-18	02-Oct-18																																																	Stabilise Subbase Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]
Cure / Test Subbase Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	3d	3d	03-Oct-18	05-Oct-18																																																	Cure / Test Subbase Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]
Place Basecourse Mary Crest to Temp Road (2,100T) [Ch 9500-10000]	2d	2d	08-Oct-18	09-Oct-18																																																	Place Basecourse Mary Crest to Temp Road (2,100T) [Ch 9500-10000]
Stabilise Basecourse Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	2d	2d	10-Oct-18	15-Oct-18																																																	Stabilise Basecourse Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]
Cure / Test Basecourse Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	7d	7d	16-Oct-18	22-Oct-18																																																	Cure / Test Basecourse Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]
Prime Coat Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	1d	1d	23-Oct-18	23-Oct-18																																																	Prime Coat Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]
<b>Mary Crest Temp Road</b>	<b>22d</b>	<b>22d</b>	<b>03-Sep-18</b>	<b>02-Oct-18</b>																																																	
Trim / Test Subgrade Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	03-Sep-18	03-Sep-18																																																	Trim / Test Subgrade Mary Crest Temp Road (3,000m2) [Ch 10080-10320]
Place Subbase Mary Crest Temp Road (1,080T) [Ch 10080-10320]	2d	2d	04-Sep-18	10-Sep-18																																																	Place Subbase Mary Crest Temp Road (1,080T) [Ch 10080-10320]
Stabilise Subbase Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	11-Sep-18	11-Sep-18																																																	Stabilise Subbase Mary Crest Temp Road (3,000m2) [Ch 10080-10320]
Cure / Test Subbase Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	3d	3d	12-Sep-18	14-Sep-18																																																	Cure / Test Subbase Mary Crest Temp Road (3,000m2) [Ch 10080-10320]
Place Basecourse Mary Crest Temp Road (1,080T) [Ch 10080-10320]	2d	2d	17-Sep-18	18-Sep-18																																																	Place Basecourse Mary Crest Temp Road (1,080T) [Ch 10080-10320]
Stabilise Basecourse Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	24-Sep-18	24-Sep-18																																																	Stabilise Basecourse Mary Crest Temp Road (3,000m2) [Ch 10080-10320]
Cure / Test Basecourse Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	7d	7d	25-Sep-18	01-Oct-18																																																	Cure / Test Basecourse Mary Crest Temp Road (3,000m2) [Ch 10080-10320]
Prime Coat Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	02-Oct-18	02-Oct-18																																																	Prime Coat Mary Crest Temp Road (3,000m2) [Ch 10080-10320]
<b>Mary Crest Temp Road to Te Hapua</b>	<b>30d</b>	<b>30d</b>	<b>20-Dec-18</b>	<b>15-Feb-19</b>																																																	
Trim / Test Subgrade Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	20-Dec-18	07-Jan-19																																																	Trim / Test Subgrade Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]
Place Subbase Temp Road to Te Hapua Local Rd (7,260T) [Ch 10000-11100]	5d	5d	08-Jan-19	15-Jan-19																																																	Place Subbase Temp Road to Te Hapua Local Rd (7,260T) [Ch 10000-11100]
Stabilise Subbase Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	17-Jan-19	22-Jan-19																																																	Stabilise Subbase Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]
Cure / Test Subbase Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	23-Jan-19	25-Jan-19																																																	Cure / Test Subbase Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]
Place Basecourse Temp Road to Te Hapua Local Rd (4,620T) [Ch 10000-11100]	5d	5d	28-Jan-19	01-Feb-19																																																	Place Basecourse Temp Road to Te Hapua Local Rd (4,620T) [Ch 10000-11100]
Stabilise Basecourse Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	04-Feb-19	07-Feb-19																																																	Stabilise Basecourse Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]
Cure / Test Basecourse Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	7d	7d	08-Feb-19	14-Feb-19																																																	Cure / Test Basecourse Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]
Prime Coat Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	1d	1d	15-Feb-19	15-Feb-19																																																	Prime Coat Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]
<b>Te Hapua to Peka Peka</b>	<b>28d</b>	<b>28d</b>	<b>04-Feb-19</b>	<b>14-Mar-19</b>																																																	
Trim / Test Subgrade Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	04-Feb-19	07-Feb-19																																																	Trim / Test Subgrade Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]
Place Subbase Te Hapua to Peka Peka Local Rd (5,760T) [Ch 11100-12300]	4d	4d	08-Feb-19	13-Feb-19																																																	Place Subbase Te Hapua to Peka Peka Local Rd (5,760T) [Ch 11100-12300]
Stabilise Subbase Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	14-Feb-19	20-Feb-19																																																	Stabilise Subbase Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]
Cure / Test Subbase Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	21-Feb-19	23-Feb-19																																																	Cure / Test Subbase Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]
Place Basecourse Te Hapua to Peka Peka Local Rd (5,760T) [Ch 11100-12300]	4d	4d	25-Feb-19	28-Feb-19																																																	Place Basecourse Te Hapua to Peka Peka Local Rd (5,760T) [Ch 11100-12300]
Stabilise Basecourse Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	01-Mar-19	06-Mar-19																																																	Stabilise Basecourse Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]
Cure / Test Basecourse Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	7d	7d	07-Mar-19	13-Mar-19																																																	Cure / Test Basecourse Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]
Prime Coat Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	1d	1d	14-Mar-19	14-Mar-19																																																	Prime Coat Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]



**Peka Peka to Otaki  
Mary Crest Area Programme**

■ Actual Work     ■ Critical Remaining ...  
■ Remaining Work     ▼ Milestone  
▼ Milestones



## APPENDIX E: ARCHAEOLOGICAL MAPS

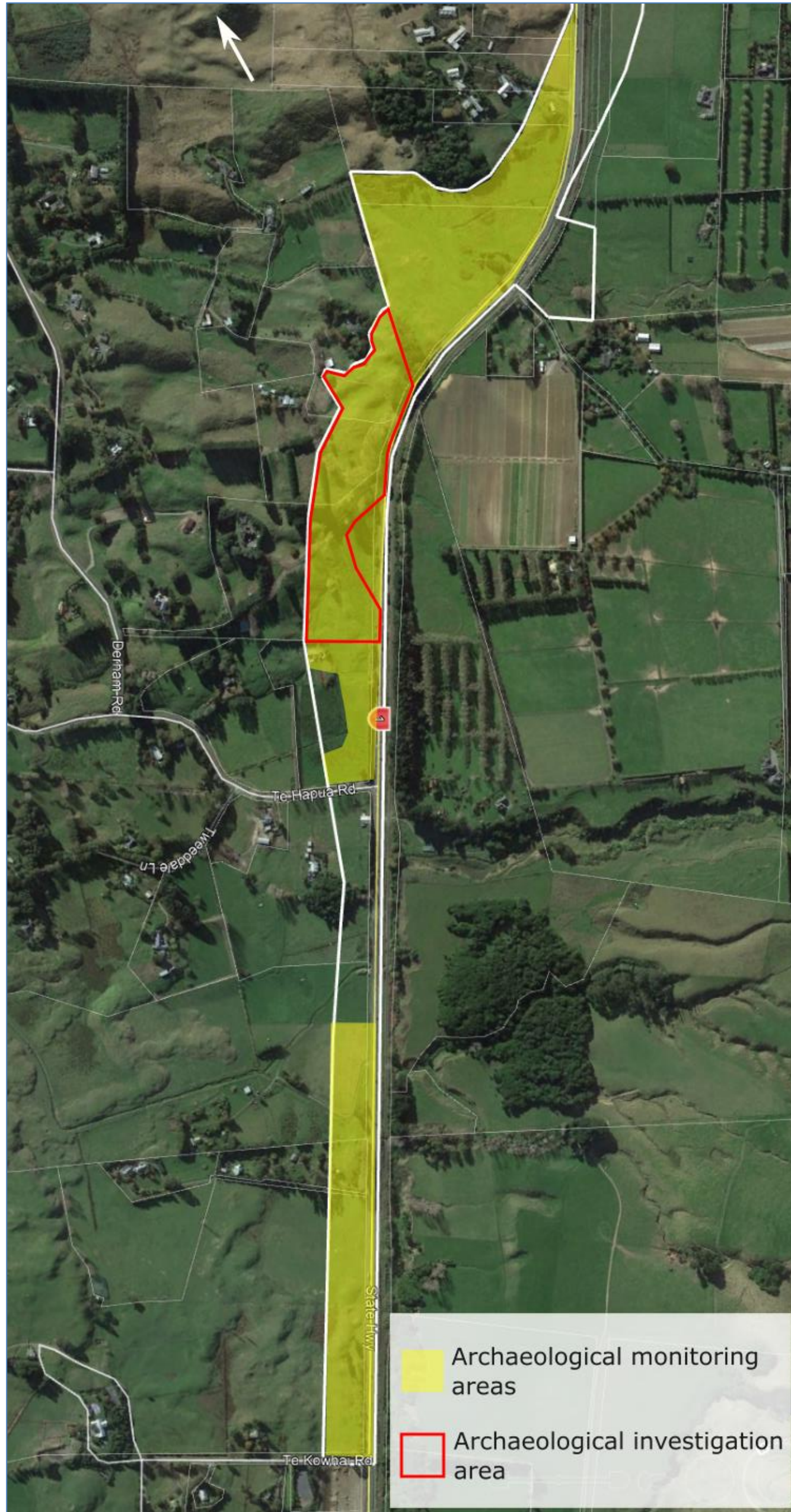


Figure 9: Areas of pre-investigation and monitoring based on underlying geological deposits in the section between Te Kowhai Road and Mary Crest.

## APPENDIX F: SETTLEMENT MONITORING

*Note that the 'Mary Crest Basin Preload' works are on hold until a later date once approval of the settlement monitoring proposal has been approved by Kapiti Coast District Council.*

# Memo

To: Richard Rakovics Job No: 85985.007

From: Razel Ramilo Date: 10 August 2018

cc: Emma Boon, Stuart Waters, Richard Cole

Subject: Settlement monitoring along SH1 and North Island Main Trunk (NIMT) at Mary Crest Basin and Awatea Stream Preload

## 1 Introduction

This memo relates to the proposed settlement monitoring along State Highway (SH1) and North Island Main Trunk (NIMT) at Mary Crest Basin and Awatea Stream preload.

## 2 Preloading

Areas identified where preloading will be carried out are summarised below and shown in drawings PP20-DR-GE-0204, 206, 207, 208 and 209.

Table 1: Proposed preloading for embankment over soft ground

	Chainage	Maximum Fill height (m)	Depth to top of peat (m bgl)	Peat thickness (m)	Preload height (m)	Expected Preload duration (months)	Proposed solution
Mary Crest Basin Preload	10,600 to 10,830	3	0	4.5	2.5	3-6	Preload peat and use high strength geotextile basal reinforcement. Drainage blanket where required.
Awatea Stream Preload – Stage 1 (Local Arterial Road)	1730 to 2145	3	2 – 3	5-7	5	3-4	Preload peat and use high strength geotextile basal reinforcement.
Awatea Stream Preload – Stage 2	11,240 to 11,670	4	2 – 3	5-7	3	3-6	Preload peat and use high strength geotextile basal reinforcement.

## 3 Consent Requirements

### 3.1 Settlement Management Condition 43.b

Ground settlement will be closely monitored by settlement plates / stations during and after the preloading period to assess the settlement of the adjacent ground, especially at the existing State Highway 1 and the North Island Main Trunk Railway.

### 3.2 Settlement Management Condition 44

The Requiring Authority shall establish a series of ground settlement monitoring marks to monitor potential settlement that might occur as a result of construction of embankments and drawdown of the groundwater table as part of the work. The exact locations of each type of settlement monitoring marks shall be confirmed in the relevant SSEMP and will be generally located as follows:

- a) At 20 m intervals along sections identified as prone to settlement due to construction of compressible ground / and preloading (namely south of Mary Crest and north of Rahui Road); and
- b) Adjacent to stormwater features where settlement of more than 0.1 m due to groundwater drawdown has been predicted.

### 3.3 Settlement Management Condition 45

The Requiring Authority shall survey the settlement monitoring marks at the following frequency:

- a) Pre-construction – settlement at monthly intervals starting at least 1 month prior to construction commencing within 500 metres of the monitoring mark;
- b) During construction:
  - i. At weekly intervals during construction earthworks in the area;
  - ii. At monthly intervals after construction earthworks in the area until settlement is less than 5 mm per month; and
  - iii. At 3 monthly intervals during the balance of the construction of the Project;
- c) Post-construction:
  - i. At 3 monthly intervals for 12 months.

### 3.4 Settlement Management Condition 46

Immediately following each monitoring round, the Requiring Authority shall use the settlement monitoring results (together with the results of visual observation and groundwater monitoring where they may provide additional information) to reassess whether any damage has occurred or is likely to occur as a result of settlement arising from the works. If the reassessment indicates that any damage has occurred or is likely to occur:

- a) The owner and occupier of the site shall be notified within 72 hours;
- b) The requiring Authority shall undertake appropriate remedial or preventative action; and
- c) The requiring Authority shall advise the owner and occupier of the site and the Manager of any remedial or preventative action undertaken.

### 3.5 Settlement Management Condition 47

The Requiring Authority may reduce the frequency of settlement monitoring required by Condition 45 when:

- a) The construction of a Stage has been completed;
- b) 3 monthly monitoring has been carried out for a minimum of 6 months; and
- c) The monitoring indicates that no damage has occurred or is likely to occur.

### 3.6 Settlement Management Condition 48

The Requiring Authority shall collate the results of the settlement monitoring (undertaken pursuant to Condition 45) and prepare a report that shall be made available to the Manager at the completion of the Works.

## 4 Settlement Monitoring along SH1 and NIMT Rail Track at Mary Crest Basin and Awatea Stream Preload

The Geotechnical Instrumentation and Monitoring Plan for the Mary Crest Basin and Awatea Stream preloads has been prepared to support the consent requirements. Refer to the Geotechnical Instrumentation and Monitoring Plan (Ref. T&T-EW-RPT-0105) for details on roles and responsibilities, instrument types and locations, monitoring frequency and alert, action and alarm levels.

Proposed geotechnical instrumentation to be installed during preload include:

- Settlement plates
- Settlement stations
- Vibrating wire piezometers
- Inclinerometers
- Shear probes
- Profilometers
- Rail settlement pins

We understand that due to health and safety concerns, Fletcher Construction would like to limit the settlement monitoring on SH1 and the NIMT.

At Mary Crest Basin preload, due to distance of preload from SH1 (approximately 20m), we do not expect that the preload will have an adverse effect to SH1 and do not consider instrumented (survey) monitoring is necessary. However, regular inspections of SH1 during preloading will be undertaken. If the instrumentation above indicates that large or unexpected deformations have occurred during preloading or the regular inspections identify movement the designer will investigate further and may propose to undertake instrument monitoring on SH1.

At Awatea Stream preload, settlement will be monitored along SH1 prior to Stage 1 preload as the SH1 is approximately 5m from the preload. Settlement stations at every 20m interval along the verge of SH1 are proposed. Settlement of the NIMT rail track will also be monitored prior to Stage 2 preload and following traffic diversion. Rail settlement pins at every 20m interval are proposed.

## 5 Applicability

This report has been prepared for the exclusive use of Fletcher Construction, 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

Prepared by:



.....  
Razel Ramilo

Senior Geotechnical Engineer

Reviewed by:



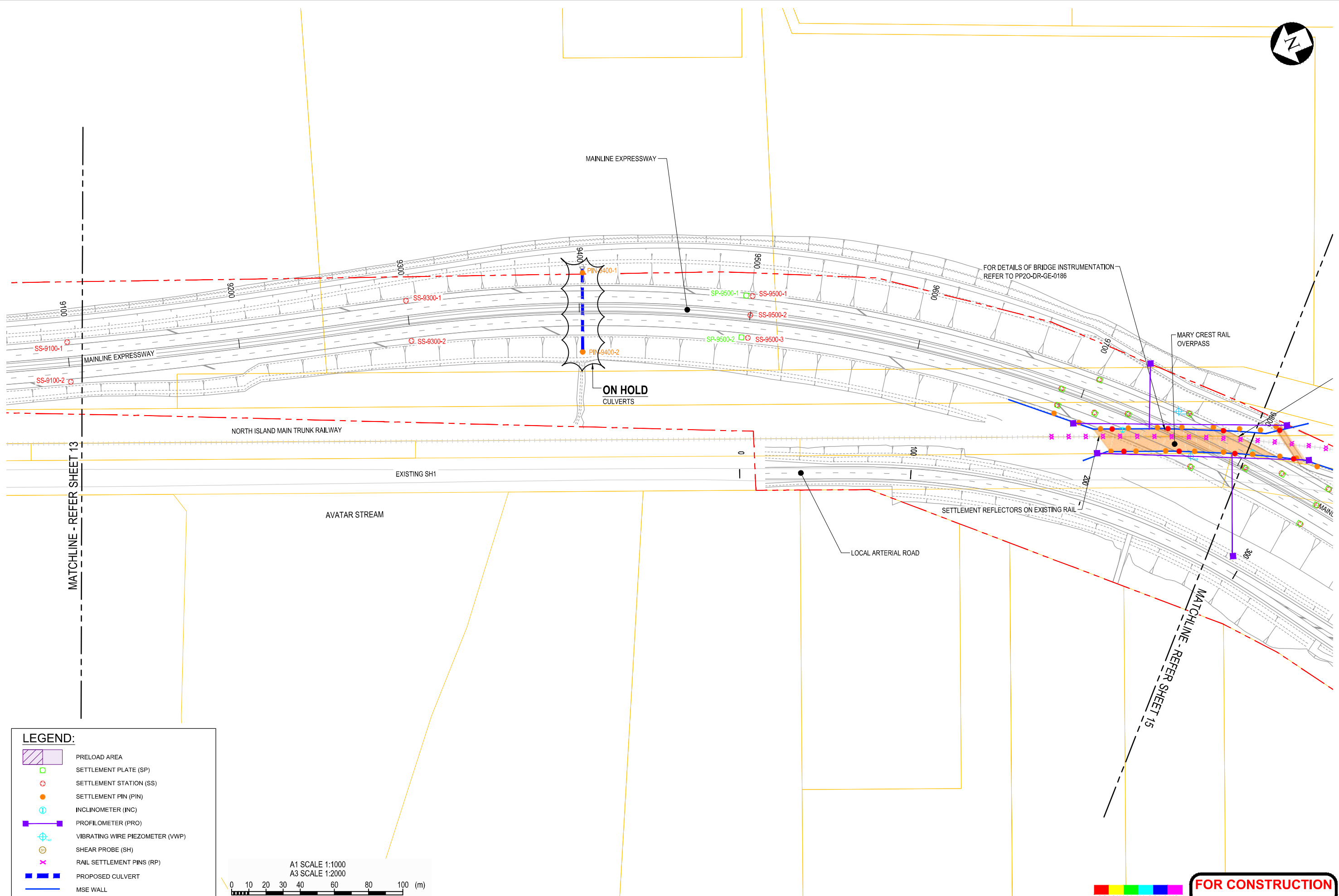
.....  
Richard Cole

Geotechnical Design Lead

10-Aug-18

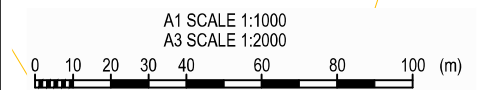
\\weldc1.ttgroup.local\data\rep\live\tt\projects\85985\85985.0070\4000 geotechnical\2 north\workingmaterial\13 instrumentation\memo\settlement monitoring along sh1 and nimt rail track at mary crest basin and awatea stream preload.docx





**LEGEND:**

- PRELOAD AREA
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- INCLINOMETER (INC)
- PROFILOMETER (PRO)
- VIBRATING WIRE PIEZOMETER (VWP)
- SHEAR PROBE (SH)
- RAIL SETTLEMENT PINS (RP)
- PROPOSED CULVERT
- MSE WALL



**FOR CONSTRUCTION**  
ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Scale	Design	Drawn	Checked	Date	Approved For Construction
Scale (A1) 1:1000	R. RAMLO	G. DOWN	R. HILLIER	31.01.17	B. SYMMANS
Scale (A3) 1:2000	R. RAMLO	G. DOWN	R. HILLIER	09.03.18	B. SYMMANS

\* Refer to Original Handcopy for Signature

**NZ TRANSPORT AGENCY**  
MAKKA KOTAHU

**Peka Peka to Otaki Expressway**

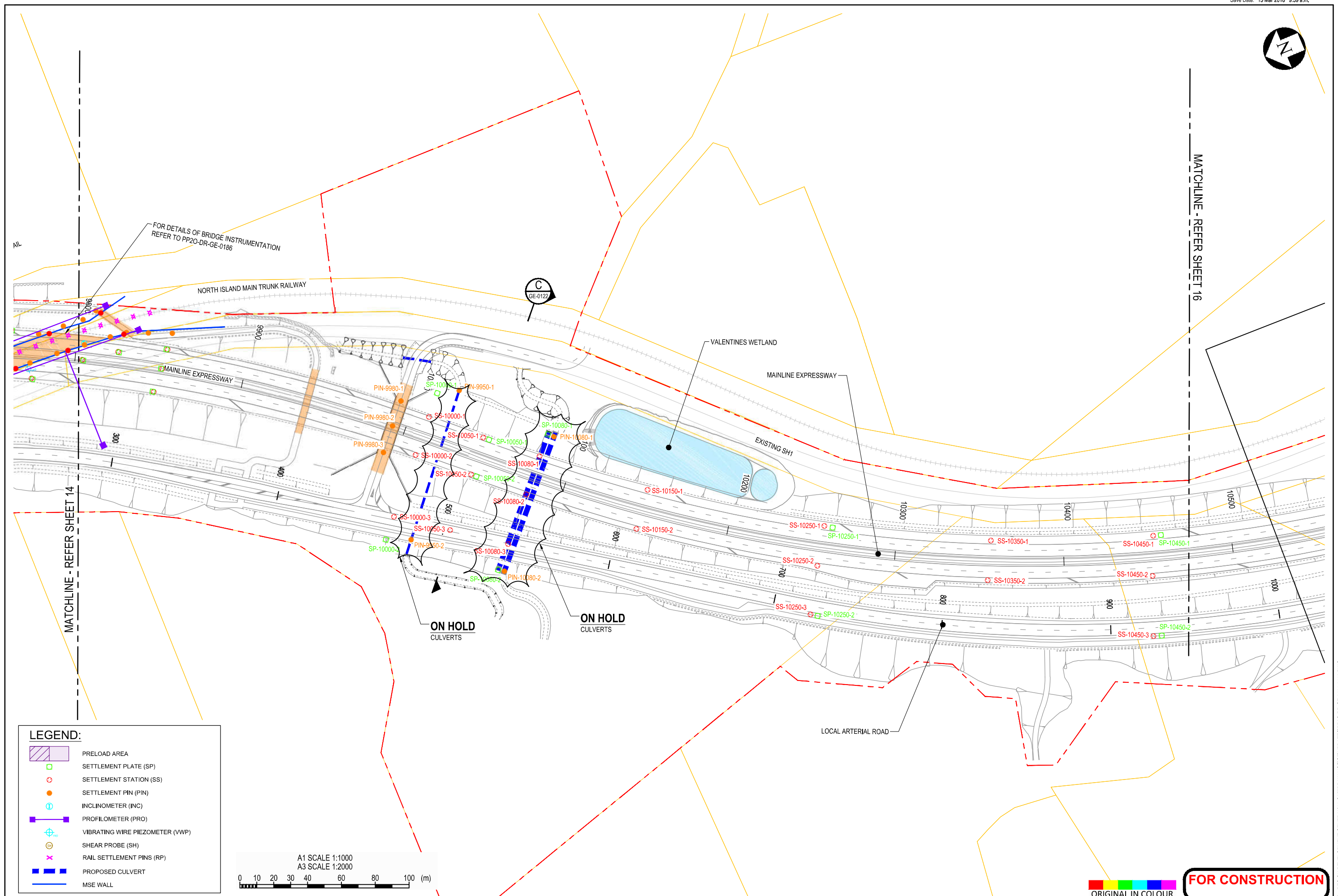
**Fletcher HIGGINS**

**BECA**

**Tonkin+Taylor**

Subject: EARTHWORKS	Discipline: GEOTECHNICAL
Title: GEOTECHNICAL INSTRUMENTATION PLAN SHEET 14	Drawing No. PP20-DR-GE-0114

Rev. 1	Date
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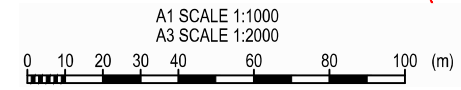
FOR DETAILS OF BRIDGE INSTRUMENTATION REFER TO PP20-DR-GE-0186

MATCHLINE - REFER SHEET 14

MATCHLINE - REFER SHEET 16

**LEGEND:**

- PRELOAD AREA
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- INCLINOMETER (INC)
- PROFILOMETER (PRO)
- VIBRATING WIRE PIEZOMETER (VWP)
- SHEAR PROBE (SH)
- RAIL SETTLEMENT PINS (RP)
- PROPOSED CULVERT
- MSE WALL



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Design	R. RAMLO	31.01.17	Approved For Construction
Drawn	G. DOWN	31.01.17	B. SYMMANS
Dwg Verifier	R. HILLIER	09.03.18	
Dwg Check	G. DOWN	09.03.18	Date 12.03.18

\* Refer to Original Handcopy for Signature



**Peka Peka to Otaki Expressway**



Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL INSTRUMENTATION PLAN	Drawing No.:	PP20-DR-GE-0115
	SHEET 15	Rev.:	1

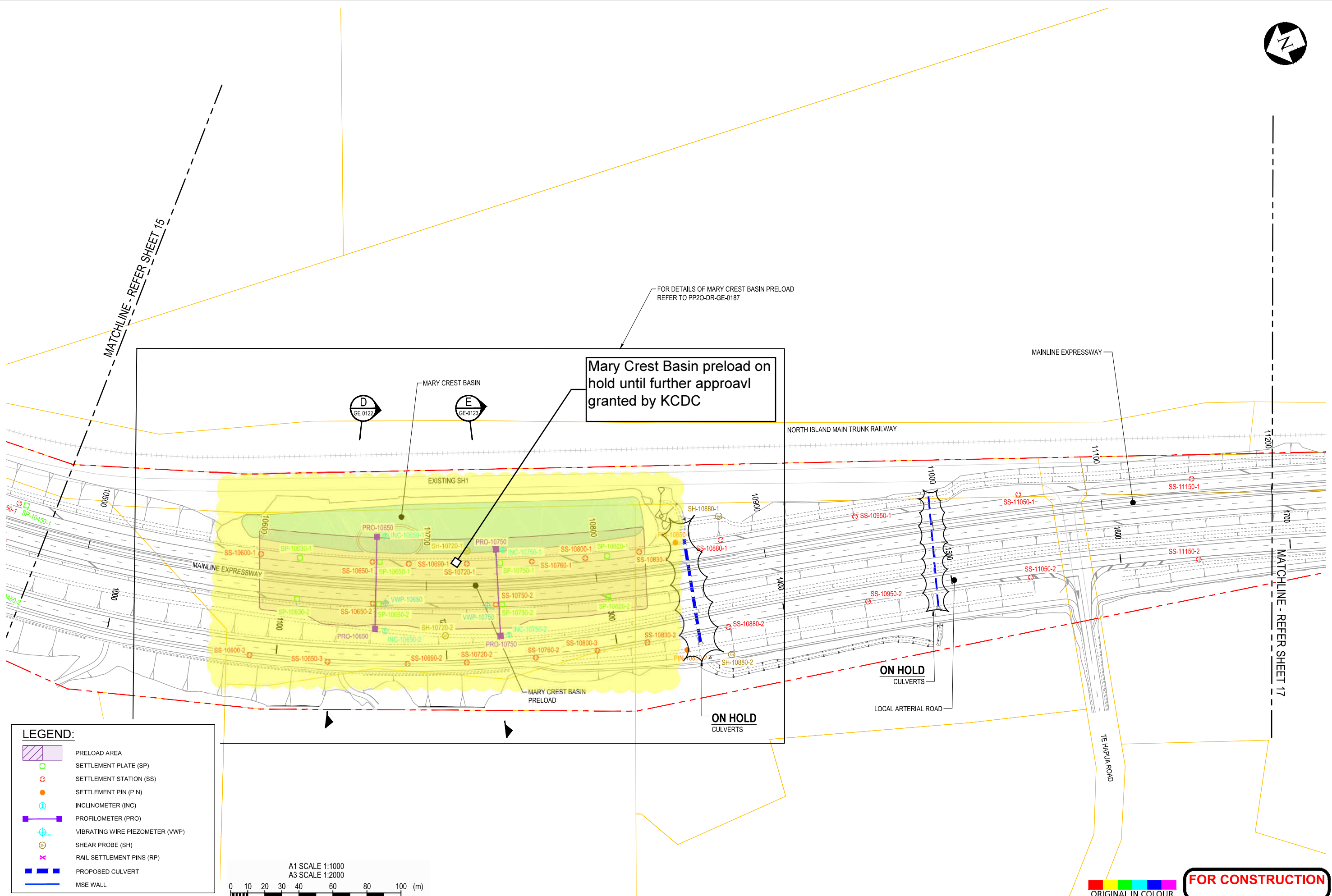


MATCHLINE - REFER SHEET 15

MATCHLINE - REFER SHEET 17

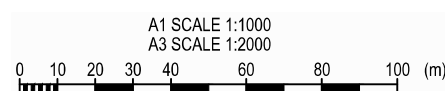
Mary Crest Basin preload on hold until further approval granted by KCDC

FOR DETAILS OF MARY CREST BASIN PRELOAD REFER TO PP20-DR-GE-0187



**LEGEND:**

- PRELOAD AREA
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- INCLINOMETER (INC)
- PROFILOMETER (PRO)
- VIBRATING WIRE PIEZOMETER (VWP)
- SHEAR PROBE (SH)
- RAIL SETTLEMENT PINS (RP)
- PROPOSED CULVERT
- MSE WALL



FOR CONSTRUCTION  
ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

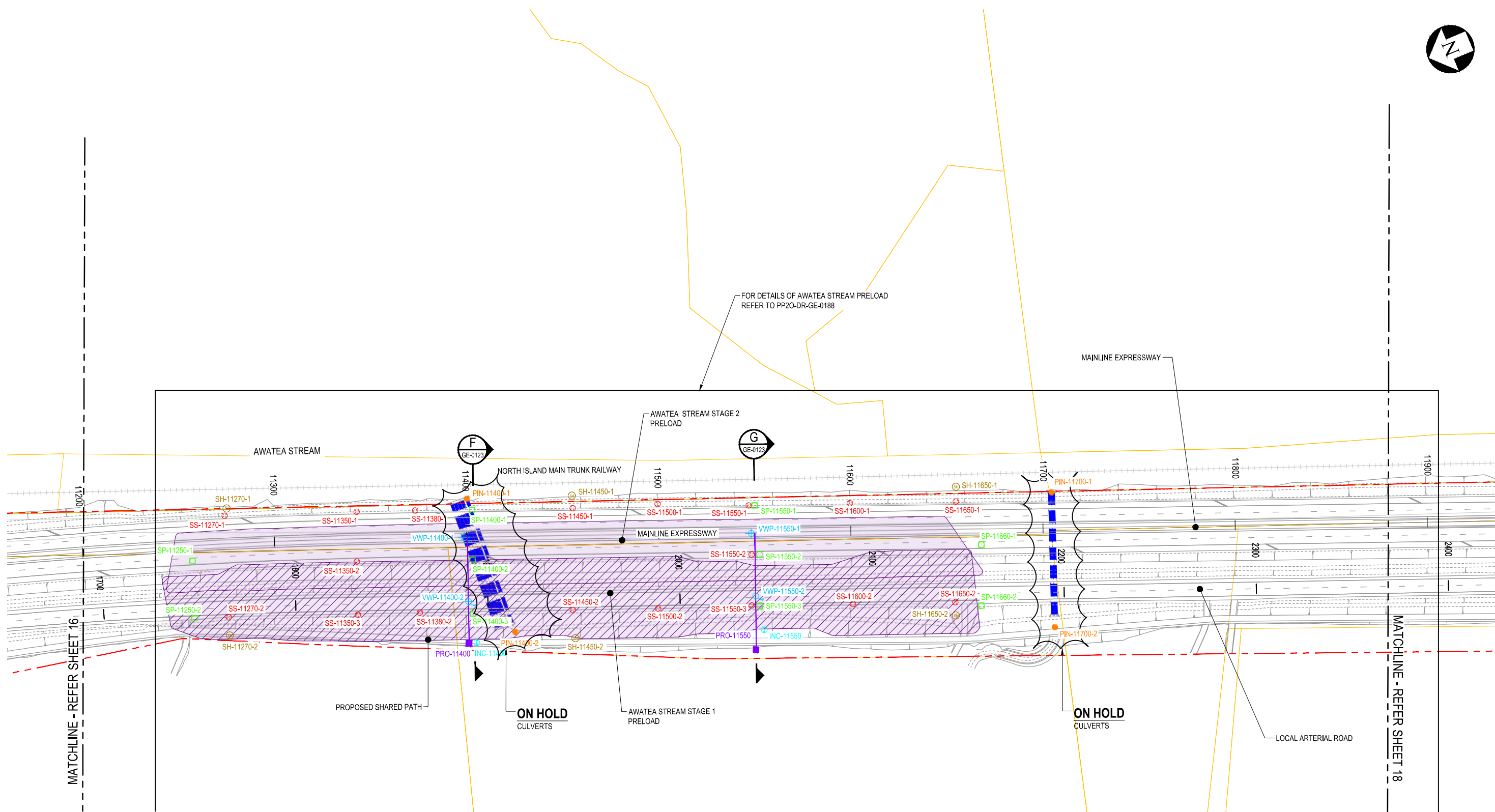
Design	R. RAMLO	31.01.17	Approved For Construction
Drawn	G. DOWN	31.01.17	B. SYMMANS
Dwg Verifier	R. HILLIER	09.03.18	
Dwg Check	G. DOWN	09.03.18	Date 12.03.18

\* Refer to Original Handcopy for Signature

NZ TRANSPORT AGENCY  
Peka Peka to Otaki Expressway

Fletcher HIGGINS  
BECA  
Tonkin+Taylor

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL INSTRUMENTATION PLAN	Drawing No.:	PP20-DR-GE-0116
	SHEET 16	Rev.:	1



FOR DETAILS OF AWATEA STREAM PRELOAD REFER TO PP20-DR-GE-0188

MAINLINE EXPRESSWAY

AWATEA STREAM

NORTH ISLAND MAIN TRUNK RAILWAY

AWATEA STREAM STAGE 2 PRELOAD

MAINLINE EXPRESSWAY

AWATEA STREAM STAGE 1 PRELOAD

ON HOLD CULVERTS

LOCAL ARTERIAL ROAD

PROPOSED SHARED PATH

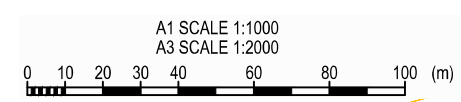
ON HOLD CULVERTS

MATCHLINE - REFER SHEET 16

MATCHLINE - REFER SHEET 18

LEGEND:

- PRELOAD AREA
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- INCLINOMETER (INC)
- PROFILOMETER (PRO)
- VIBRATING WIRE PIEZOMETER (VWP)
- SHEAR PROBE (SH)
- RAIL SETTLEMENT PINS (RP)
- PROPOSED CULVERT
- MSE WALL



ORIGINAL IN COLOUR

**FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Design	R. RAMLO	31.01.17	Approved For Construction
Drawn	G. DOWN	31.01.17	B. SYMMANS
Dwg Verifier	R. HILLIER	09.03.18	
Dwg Check	G. DOWN	09.03.18	Date 12.03.18

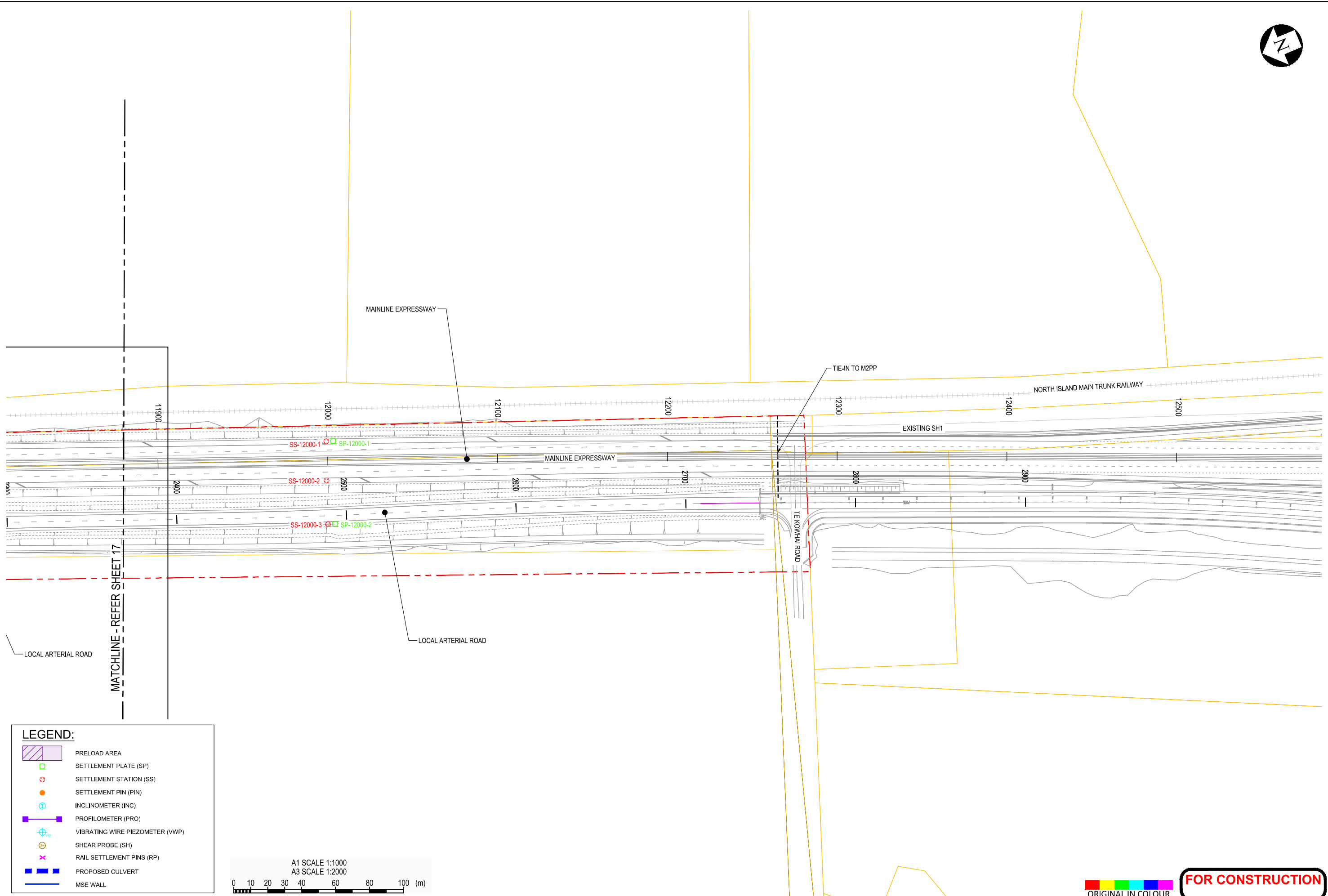
\* Refer to Original Handcopy for Signature



Peka Peka to Otaki Expressway

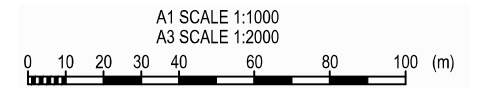


Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL INSTRUMENTATION PLAN	Drawing No.:	PP20-DR-GE-0117
	SHEET 17	Rev.:	1



**LEGEND:**

- PRELOAD AREA
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- INCLINOMETER (INC)
- PROFILOMETER (PRO)
- VIBRATING WIRE PIEZOMETER (VWP)
- SHEAR PROBE (SH)
- RAIL SETTLEMENT PINS (RP)
- PROPOSED CULVERT
- MSE WALL



**FOR CONSTRUCTION**  
ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Design	R. RAMLO	31.01.17	Approved For Construction
Drawn	G. DOWN	31.01.17	B. SYMMANS
Dwg Verifier	R. HILLIER	09.03.18	
Dwg Check	G. DOWN	09.03.18	Date 12.03.18

\* Refer to Original Handcopy for Signature

**NZ TRANSPORT AGENCY**  
WAIKATO

**Peka Peka to Ōtaki Expressway**

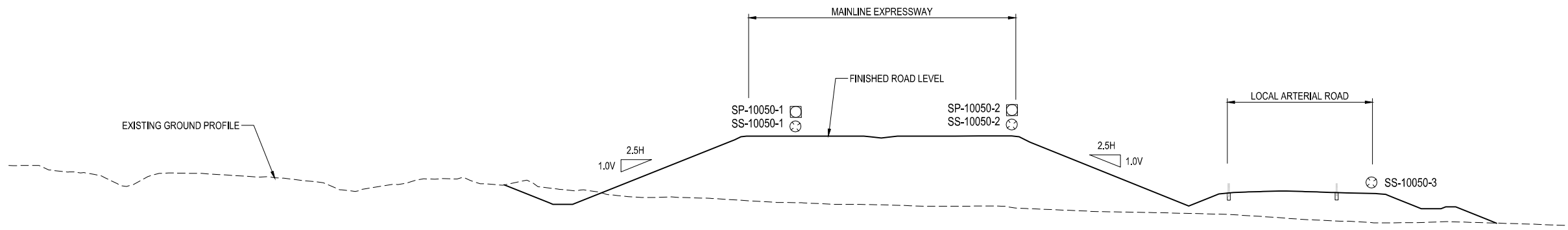
**Fletcher HIGGINS**

**BECA**

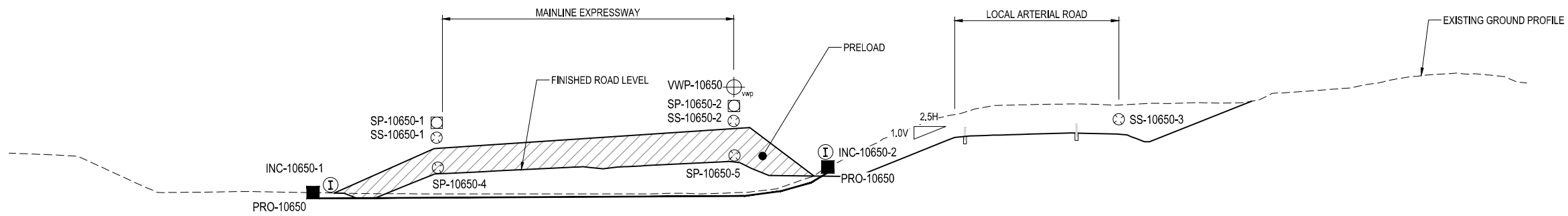
**Tonkin+Taylor**

Subject: EARTHWORKS	Discipline: GEOTECHNICAL
Title: GEOTECHNICAL INSTRUMENTATION PLAN SHEET 18	Drawing No. PP20-DR-GE-0118

Rev. 1	
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**C** INSTRUMENTATION CROSS SECTION - CHAINAGE 10050  
0115  
1:250 AT A1, 1:500 AT A3

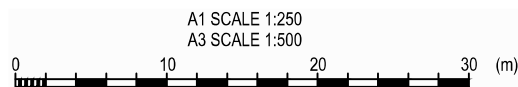


**D** INSTRUMENTATION CROSS SECTION - CHAINAGE 10650  
0116  
1:250 AT A1, 1:500 AT A3

**LEGEND:**

- SETTLEMENT PLATE (SP)
- ⊕ SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- Ⓢ INCLINOMETER (INC)
- PROFILOMETER (PRO)
- ⊕<sub>vwp</sub> VIBRATING WIRE PIEZOMETER (VWP)
- ⊕<sub>sp</sub> SHEAR PROBE (SH)
- ▨ PRELOAD AREA

- NOTES:**
- FOR INSTRUMENTATION LOCATION PLAN REFER DRAWING PP20-DR-GE-0101-0118
  - FOR TYPICAL DETAIL OF THE VARIOUS INSTRUMENTS REFER DRAWING PP20-DR-GE-0131 & 0132
  - SS-10650-1 AND SS-10650-2 TO BE REPLACED WITH SS-10650-4 AND SS-10650-5 FOLLOWING REMOVAL OF PRELOAD



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

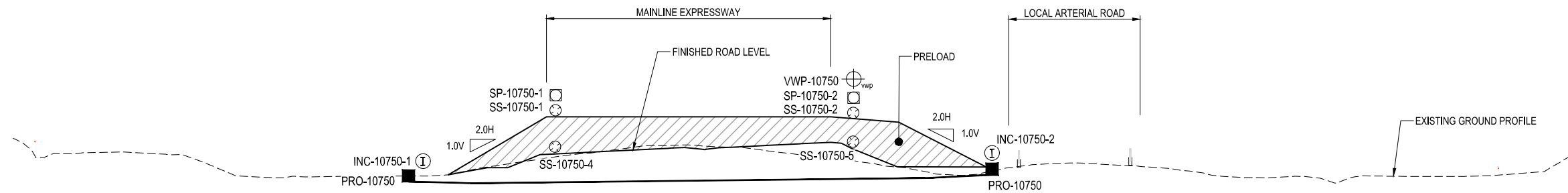
No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Scale (A1)	Design	T.HAXELL	16.08.17	Approved For Construction
1:250	Drawn	G.DOWN	16.08.17	B. SYMMANS
Scale (A3)	Dwg Verifier	R. HILLIER	09.03.18	
1:500	Dwg Check	G. DOWN	09.03.18	Date 12.03.18

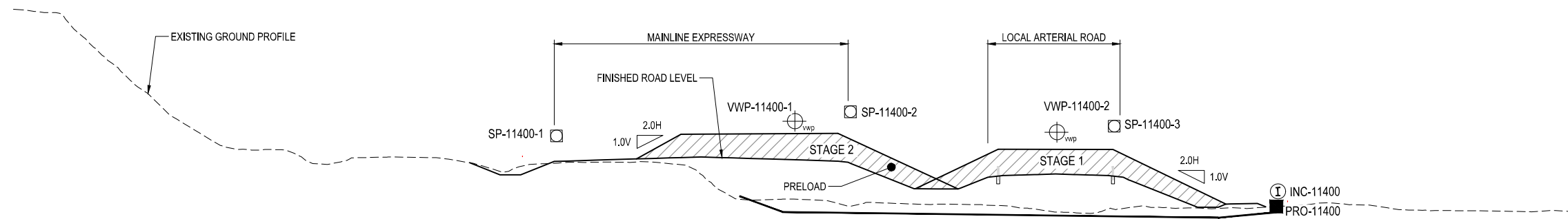
\* Refer to Original Handcopy for Signature

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	INSTRUMENTATION SECTIONS SHEET 2	Drawing No.:	PP20-DR-GE-0122

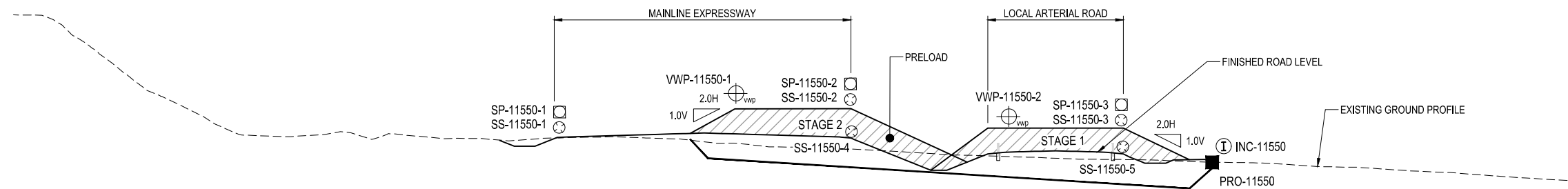
Rev.:	1
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**E** INSTRUMENTATION CROSS SECTION - CHAINAGE 10750  
0116 1:250 AT A1, 1:500 AT A3



**F** INSTRUMENTATION CROSS SECTION - CHAINAGE 11400  
0117 NTS

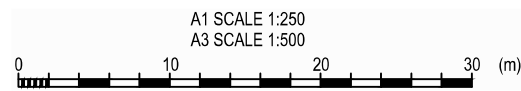


**G** INSTRUMENTATION CROSS SECTION - CHAINAGE 11550  
0117 NTS

**LEGEND:**

	SETTLEMENT PLATE (SP)
	SETTLEMENT STATION (SS)
	SETTLEMENT PIN (PIN)
	INCLINOMETER (INC)
	PROFILOMETER (PRO)
	VIBRATING WIRE PIEZOMETER (VWP)
	SHEAR PROBE (SH)
	PRELOAD AREA

- NOTES:**
1. FOR INSTRUMENTATION LOCATION PLAN REFER DRAWING PP20-DR-GE-0101-0118
  2. FOR TYPICAL DETAIL OF THE VARIOUS INSTRUMENTS REFER DRAWING PP20-DR-GE-0131 & 0132
  3. SS-10750-1 AND SS-10750-2 TO BE REPLACED WITH SS-10750-4 AND SS-10750-5 FOLLOWING REMOVAL OF PRELOAD
  4. SS-11550-2 AND SS-11550-3 TO BE REPLACED WITH SS-1550-4 AND SS-11550-5 FOLLOWING REMOVAL OF SURCHARGE



No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	GD	TH	BS	09.03.18

Design	T.HAXELL	16.08.17	Approved For Construction
Drawn	G.DOWN	16.08.17	B. SYMMANS
Dwg Verifier	R. HILLIER	09.03.18	
Dwg Check	G. DOWN	09.03.18	Date 12.03.18

\* Refer to Original Handcopy for Signature

**NZ TRANSPORT AGENCY** **Peka Peka to Ōtaki Expressway** **Fletcher HIGGINS** **BECA** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	INSTRUMENTATION SECTIONS	Drawing No.:	PP20-DR-GE-0123
	SHEET 3	Rev.:	1

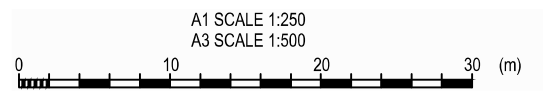
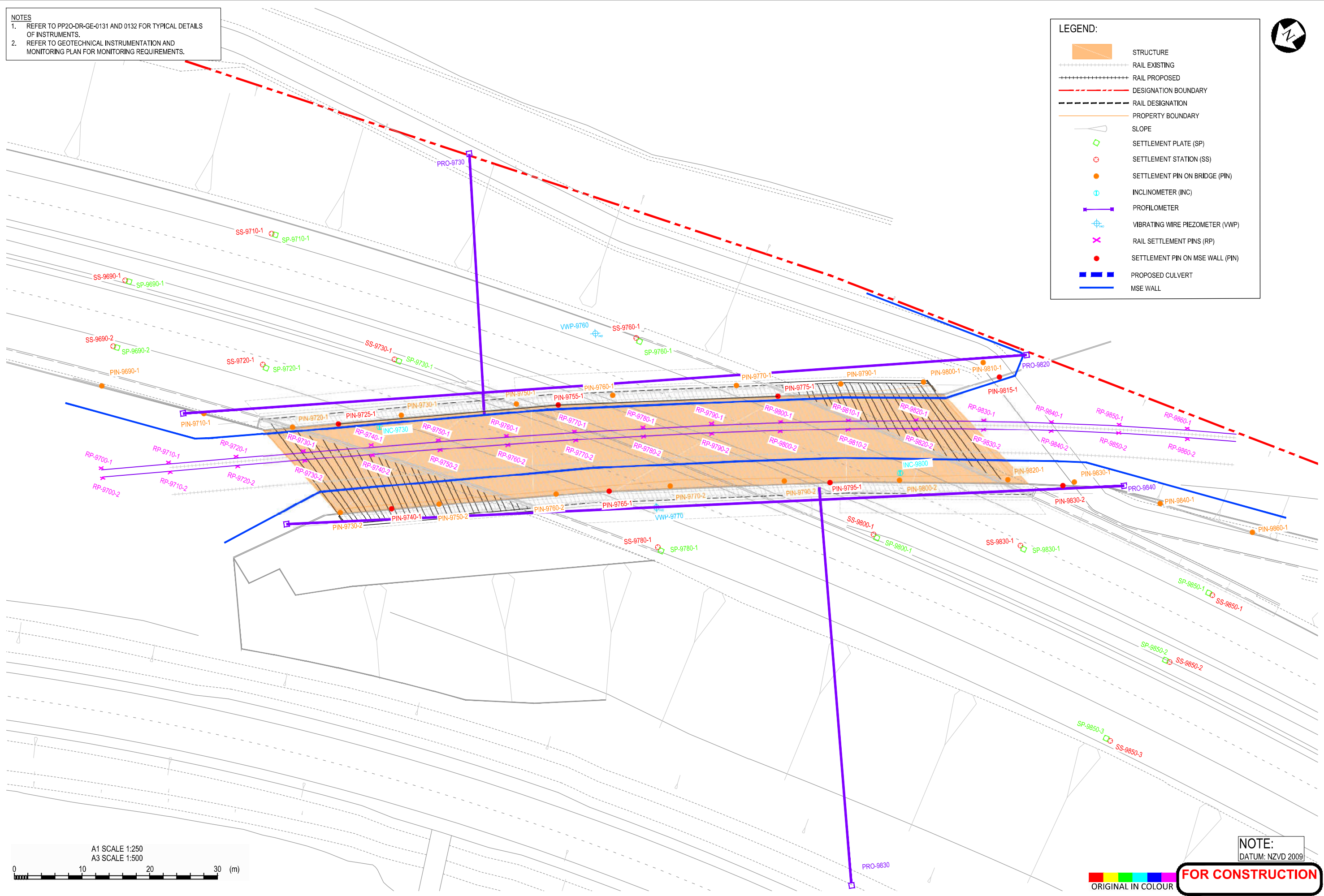
**FOR CONSTRUCTION**  
ORIGINAL IN COLOUR

Document No. R19300 - DESIGN DEVELOPMENT GENERAL09 CAD/DRAWINGS/GE/UPDA/PP20-DR-GE-0121-0123.DWG

**NOTES**  
 1. REFER TO PP20-DR-GE-0131 AND 0132 FOR TYPICAL DETAILS OF INSTRUMENTS.  
 2. REFER TO GEOTECHNICAL INSTRUMENTATION AND MONITORING PLAN FOR MONITORING REQUIREMENTS.

**LEGEND:**

- STRUCTURE
- RAIL EXISTING
- RAIL PROPOSED
- DESIGNATION BOUNDARY
- RAIL DESIGNATION
- PROPERTY BOUNDARY
- SLOPE
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN ON BRIDGE (PIN)
- INCLINOMETER (INC)
- PROFILOMETER
- VIBRATING WIRE PIEZOMETER (VWP)
- RAIL SETTLEMENT PINS (RP)
- SETTLEMENT PIN ON MSE WALL (PIN)
- PROPOSED CULVERT
- MSE WALL



**NOTE:**  
 DATUM: NZVD 2009

**FOR CONSTRUCTION**  
 ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	RC	BS	09.03.18

Scale (A1)	Design	Date	Approved For Construction
1:250	B. RAMA	22.08.17	B. SYMMANS
Scale (A3)	Drawn	Date	Checked
	J. LIBEAU	22.08.17	B. SYMMANS
	R. HILLIER	09.03.18	
	G. DOWN	09.03.18	

\* Refer to Original Handcopy for Signature

**NZ TRANSPORT AGENCY** **Peka Peka to Ōtaki Expressway** **Fletcher HIGGINS** **BECA** **Tonkin+Taylor**

Subject:	EARTHWORKS
Title:	GEOTECHNICAL INSTRUMENTATION PLAN BRIDGE 9 MARY CREST OVERPASS

Discipline:	GEOTECHNICAL
Drawing No.:	PP20-DR-GE-0186
Rev.:	1

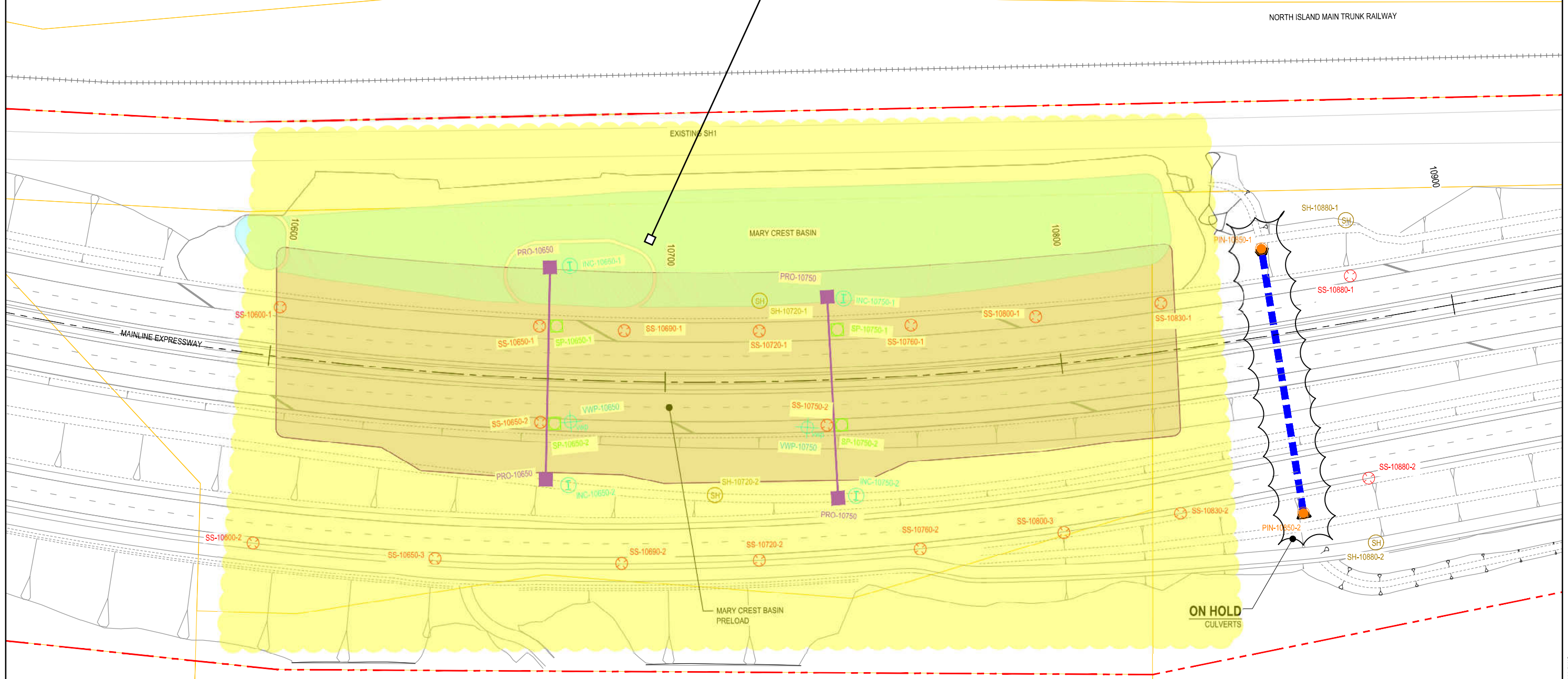
Document No. R19000 - DESIGN DEVELOPMENT GENERAL09 CAD/DRAWINGS/GEUPDA/TESS/PP20-DR-GE-0186.DWG















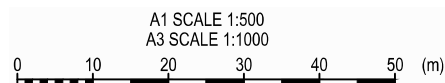
MARY CREST BASIN  
PRELOAD ON HOLD

NORTH ISLAND MAIN TRUNK RAILWAY



**LEGEND:**

-  PRELOAD AREA
-  SETTLEMENT PLATE (SP)
-  SETTLEMENT STATION (SS)
-  SETTLEMENT PIN (PIN)
-  INCLINOMETER (INC)
-  PROFILOMETER (PRO)
-  VIBRATING WIRE PIEZOMETER (VWP)
-  SHEAR PROBE (SH)
-  PROPOSED CULVERT
-  MSE WALL



ORIGINAL IN COLOUR **FOR CONSTRUCTION**

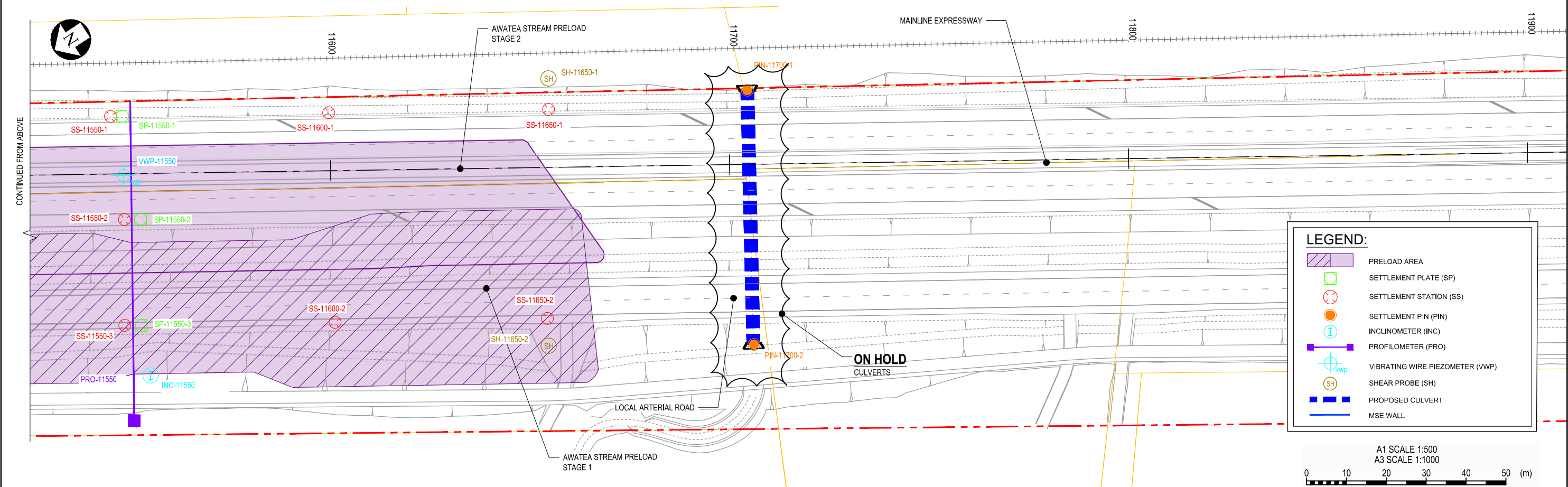
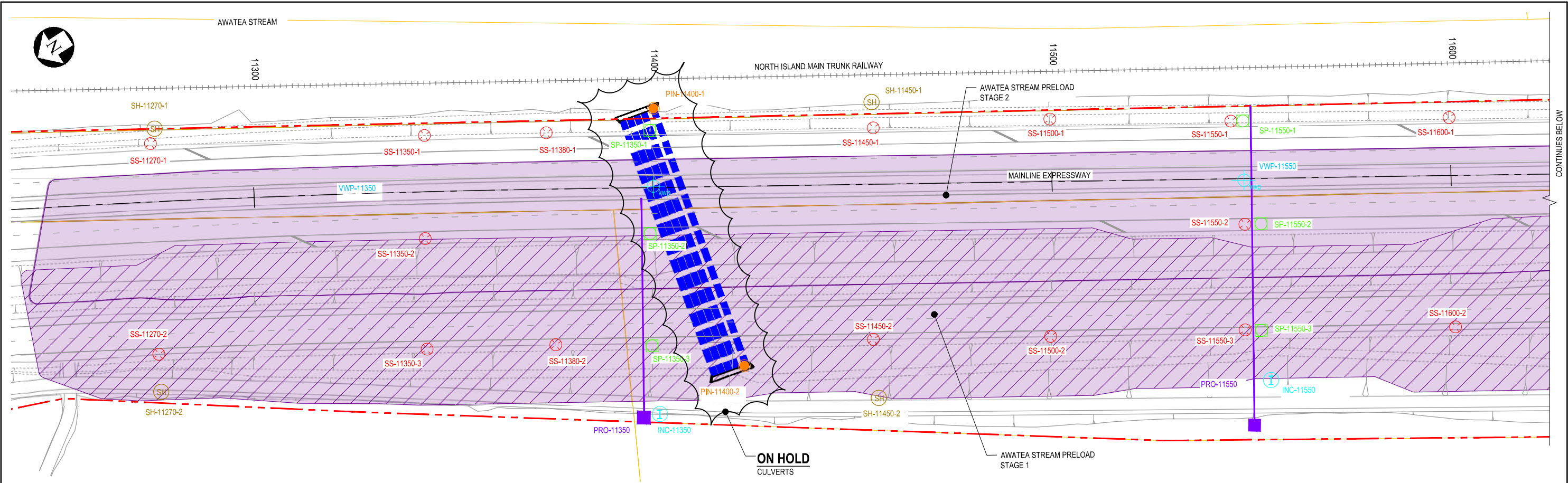
No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	RR	BS	09.03.18

Scale (A1)	Design	Drawn	Checked	Approved For Construction
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1:1000	G. DOWN	09.03.18	R. HILLIER	09.03.18



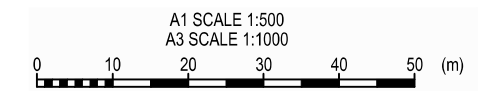
**Peka Peka to Ōtaki Expressway**  
**Fletcher HIGGINS**  
**BECA** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL INSTRUMENTATION PLAN MARY CREST BASIN PRELOAD		Rev.:
		Drawing No.:	PP20-DR-GE-0187
			1



**LEGEND:**

- PRELOAD AREA
- SETTLEMENT PLATE (SP)
- SETTLEMENT STATION (SS)
- SETTLEMENT PIN (PIN)
- INCLINOMETER (INC)
- PROFILOMETER (PRO)
- VIBRATING WIRE PIEZOMETER (VWP)
- SHEAR PROBE (SH)
- PROPOSED CULVERT
- MSE WALL



**CONSTRUCTION**  
ORIGINAL IN COLOUR

No.	Revision	By	Chk	Appd	Date
1	FOR CONSTRUCTION	JL	RR	BS	09.03.18

Scale (A1)	Design	Date	Approved For Construction
1:500	R. RAMLO	07.11.17	B. SYMMANS
Scale (A3)	Drawn	Date	Checked
1:1000	J. LIBEAU	07.11.17	R. HILLIER
	G. DOWN	09.03.18	G. DOWN

\* Refer to Original Handcopy for Signature

**NZ TRANSPORT AGENCY** **Peka Peka to Otaki Expressway** **Fletcher HIGGINS** **BECA** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GEOTECHNICAL INSTRUMENTATION PLAN AWATEA STREAM PRELOAD	Drawing No.:	PP20-DR-GE-0188
		Rev.:	1

Document No. R19000 - DESIGN DEVELOPMENT GENERAL/09 CAD/DRAWINGS/GEOTECHNICAL/PP20-DR-GE-0188.DWG

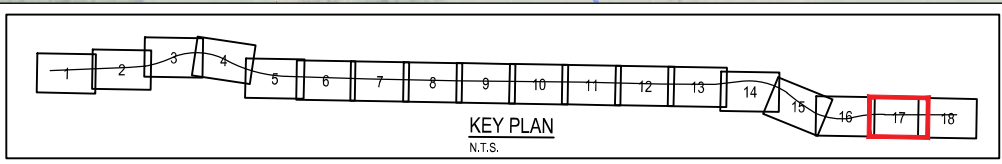
# APPENDIX REQUIREMENTS

## G:

# STORMWATER

**LEGEND:**

- STRUCTURE
- UNDERCUT PEAT AND REPLACE WITH STRUCTURAL FILL
- UNDERCUT BENEATH MSE BRIDGE ABUTMENTS
- GEOGRID REINFORCED SLOPE
- PRELOAD AREA
- RAIL TIE-IN
- ROCKFILL TERRAMESH SYSTEM
- DISPOSAL AREA / BORROW AREA
- TEMPORARY RETAINING WALL
- PAVEMENT SUBSOIL DRAIN
- BARRIER RETAINING WALL
- EXTENT OF PEAT
- RAIL EXISTING
- RAIL PROPOSED
- DESIGNATION BOUNDARY
- RAIL DESIGNATION
- PROPERTY BOUNDARY
- EXISTING STREAM
- FILL SLOPE
- CUT SLOPE
- CUT AND FILL SLOPE
- PROPOSED CULVERTS
- EXISTING CULVERTS



FOR PRELOAD AREA ONLY:  
 1. RATE OF FILLING AT 0.25M/DAY. TO BE MONITORED DAILY.  
 2. REFER TO GEOTECHNICAL INSTRUMENTATION AND MONITORING PLAN FOR MONITORING.  
 3. REMOVAL OF PRELOAD TO BE CONFIRMED BY GEOTECH DESIGNER.

EXISTING CULVERT

PRELOAD AREA 3: CH 11260 TO CH 11520  
 FILL HEIGHT = 3m (MAXIMUM)  
 PRELOAD HEIGHT  
 PRELOAD DURATION

Temporary PE Culvert @ Awatea Stream  
 1 x 1050 diameter PE - to take 2 y ARI flow ~ 2.3m<sup>3</sup>/s.

Stage 1 Preload  
 5m surcharge.  
 3 months

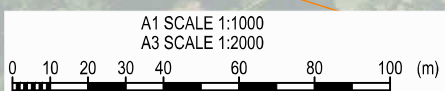
REVISED CULVERT LOCATIONS

PEAT UNDERCUT (DEPTH AND EXTENT OF UNDERCUT TO BE CONFIRMED BY GEOTECH DESIGNER)

**Assumed construction sequence**  
 2. SW Stage 1 Diversion  
 3. Construct Stage 1 Preload  
 4. 3 month settlement period. Monitor settlement.

MATCHLINE - REFER SHEET 16

MATCHLINE - REFER SHEET 18



NOTE:  
 DATUM: NZVD 2009

ORIGINAL IN COLOUR **FOR INFORMATION NOT FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
B	100% DESIGN SOUTH	GD	RC	BS	15.12.17
A	80% DESIGN	AK	RC	BS	22.08.17

Scale (A1)	Design	Date	Approved For Construction
1:1000	R.RAMLO	22.08.17	
Scale (A3)	Drawn	Date	Date
	A.KOCHAR	22.08.17	
	Dwg Verifier		
	Dwg Check		

\* Refer to Original Hardcopy for Signature

**NZ TRANSPORT AGENCY** WAIKANA KAITIHI

**Peka Peka to Ōtaki Expressway**

**Fletcher HIGGINS**

**BECA** **Tonkin+Taylor**

Subject:	EARTHWORKS	Discipline:	GEOTECHNICAL
Title:	GENERAL ARRANGEMENT PLAN	Drawing No.:	PP20-DR-GE-0017
	SHEET 17 OF 18	Rev.:	B

# APPENDIX H: SITE SPECIFIC TRAFFIC MANAGEMENT PLAN

---

# Site Specific Traffic Management Plan – Peka to Ōtaki Project

Mary Crest to Te Kowhai Road

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June 2018

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# 1 INTRODUCTION

This Site Specific Traffic Management Plan (SSTMP) provides the necessary information to demonstrate how the project team plan to avoid or mitigate potential construction traffic effects from activities associated with works due to take place between Mary Crest and Te Kowhai Road.

This SSTMP reflects the requirements of the Construction Traffic Management Plan (CTMP) including sections 1.3 (Performance Standards) and section 3.2.1 - specifically the need to interface with TTM on other networks. This plan is also consistent with the requirements set out in the over-arching Construction Environmental Management Plan (CEMP).

This document is intended to be utilised by the construction team to clearly identify any site specific traffic management requirements that must be adhered to prior to, and during works in any given area.

The temporary traffic management required to carry out these works across the site will consist of various types of Temporary Closures including, but not limited to, Site Access, Shoulder, Footpath, Stop/Go, Contra Flow and Temporary Concrete Barrier installations with works undertaken on Local Roads as covered by this SEMP.

Specific Traffic Management methodologies will be finalised and submitted to the relevant Road Controlling Authority as the construction programme is finalised and becomes more detailed. These more specific Traffic Management Plans (TMPs) will cover specific mitigation for each individual temporary traffic management requirement. This document will be a living document that will have multiple stages and traffic layouts that will be amended as and when required to suit varying construction stages and required traffic management.



## 1.1 The SSTMP and TMP Process

This SSTMP provides the necessary information from a project level on how the effects of construction traffic related to the site activities will be avoided or mitigated across the two roading networks in the location of the expressway works i.e. the State Highway Network (NZTA) and the local road network (KCDC)

Each of the two Road Controlling Authorities (RCA's) has its own processes and procedures for the approvals (TMP's) and implementation of temporary Traffic management within their respective networks which is separate to the SSTMP process.

It is recognised that approval / implementation of TMPs associated with this SSTMP will be staged and implemented at differing times over the course of the works. In addition, it is recognised that the TMP's themselves may alter due to both project and surrounding community requirements.

The purpose of this SSTMP is to provide the base (minimum) standard of service / maximum practical level of mitigation to be incorporated into the development of the respective TMP's all the while ensuring that the BOI consent conditions and subsequent CTMP requirements are met during the construction process.

## 2 SSTMP CONSENT CONSIDERATIONS

Reference should also be made to section 3.2 of the CTMP.

### 2.1 Proposed Temporary Traffic Management Measures - BOI condition 34 b (i)

Each of the work areas will have the required (CoPTTM) signage and early warning delineation provided by a combination of cones and line marking – all in accordance with the respective RCA TMP requirements. Each Traffic Management Plan will be submitted to the relevant RCA and Approved prior to implementation. Until site specific construction plans are finalised a location specific Traffic Management Plan cannot be prepared. Once methodologies are finalised location specific Traffic Management plans will be prepared and submitted to KCDC for approval.

### 2.2 Assessment of delays - BOI condition 34 b (ii)

Each Traffic Management plan will incorporate an assessment of expected delays and will also provide delay calculations where any are expected to occur. It is not envisaged that any significant delays will occur at any time.

Any oversized loads will be escorted with Pilot Vehicles again with no anticipated delays with their operations covered by Oversized Vehicle Permits. These oversized movements will be of an occasional nature only to move large plant in and off site.

### 2.3 Detour Routes - BOI condition 34 b (iii)

As the works progress, the necessary TMPs will be submitted to KCDC for approval.

### 2.4 Existing Accesses - BOI condition 34 b (iv)

The proposed Temporary Traffic Management measures do not knowingly affect existing accesses to private or commercial properties. Should this occur consultation will be undertaken with affected parties to ensure they retain access at all times.

### 2.5 Pedestrian and Cyclist Access - BOI condition 34 b (v)

Detours may be required during various phases of works in this area. As the works progress, the necessary TMPs will be submitted to the relevant RCA for approval.

### 2.6 Maintaining Existing Transport Services - BOI condition 34 b (vi)

The proposed Temporary Traffic Management measures for implementation of the work areas will not affect any existing public transport services and facilities such as bus stops.

## 2.7 Temporary Speed Limits (TSL) - BOI condition 34 b (vii)

The use of TSL's will be kept to a minimum and will be identified as and when required in Site Specific Traffic Management Plans submitted to and approved by the relevant RCA. It is expected that a Temporary Speed Limit of 30km/h will only be used during Stop Go operations or should an unsealed surface be required to be left trafficked.

## 2.8 Access to & From the Construction Site - BOI condition 34 b (viii)

The primary objective of this SSTMP is the planning (TMP's), approvals (RCA's) and incorporation of Site Access Points (SAP's) as outlined in this SSTMP appended to **SSEMP SLR1** to ensure the safe and efficient access to and from site of construction related traffic.

The operating hours of the SAP's will be in accordance with the proposed hours of work included within the **CNVMP** i.e.

- Monday to Friday 6.30am to 8pm
- Saturday 7.30am to 6pm

Operation outside those hours will be at the approval of the Engineer and in accordance with the provisions of the **CNVMP**.

## 2.9 Communications and Stakeholders - BOI condition 34 b (ix)

As the effects of the proposed measures are as yet unknown, implementation and operation of the SSTMP's will be communicated to stakeholders, road users and the community via the methods and processes as included within the project Stake Holder and Communications Management Plan, with particular emphasis on the key groups identified in Section 3.1 of the CTMP as required.

# 3 ADDITIONAL CTMP CONSIDERATIONS

## 3.1 Kiwirail NIMTR - CTMP section 2.1.2

The implementation and operation of some SSTMP's may involve the need to collaborate with Kiwirail as sites may cross the NIMT Railway or existing at grade carriageway crossings. Traffic Management strategies will include having no delays created for Kiwirail and the NIMT.

## 3.2 Emergency Action Plan(s) – CTMP section 3.2.3.8

All emergency services shall have unimpeded access along all State Highway and local roads 24 hrs. per day. Should any roads be affected by temporary traffic management any likely delays will be communicated prior to works to all Emergency Service Providers by way of weekly Road Works Reporting procedures as required by both RCA's. All major works that impact the roading network will have SSTMP's developed with consultation of Emergency Services.

### **3.3 Access to KCDC Owned and Operated Water and Waste Water Assets – CTMP section 3.2.1.1.7**

Access to existing KCDC water and waste water assets will not be impeded by any SSTMP's.

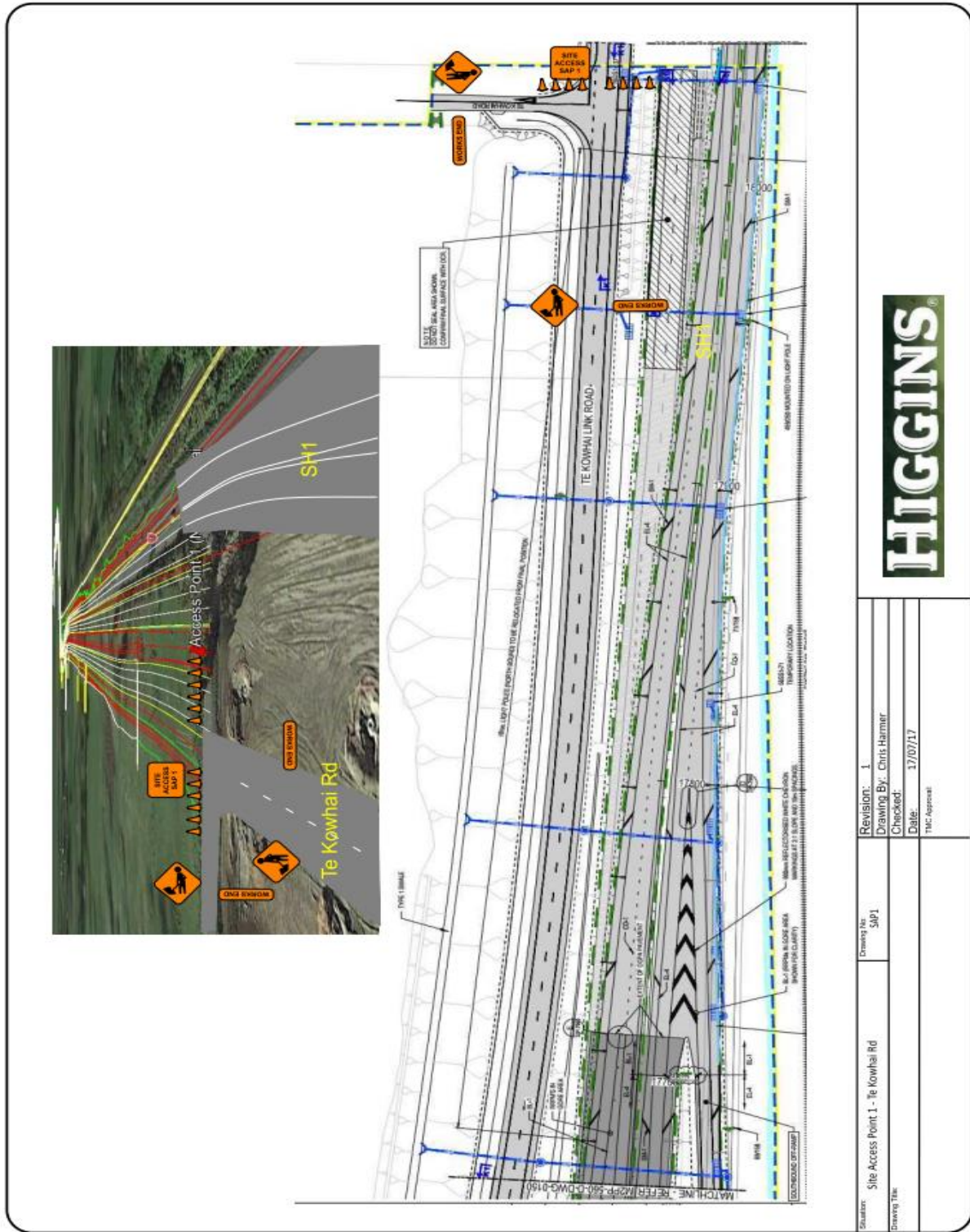
### **3.4 Monitoring, Auditing & Reporting – CTMP sections 3.3 & 3.4**

Monitoring, Auditing and Reporting of the Traffic Management Measure (once implemented) shall be in accordance with the CTMP and CoPTTM guidelines.

### **3.5 Complaints – CTMP sections 3.5**

Feedback including complaints received related to the implementation of Temporary Traffic Management measures covered within this SSTMP shall be recorded and processed in line with the CTMP.

SAP 1



Revision: 1 Drawing By: Chris Hammar Checked: Date: 17/07/17 TMC Approval:	Drawing No: SAP1	Site Access Point 1 - Te Kowhai Rd Drawing Title:
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SAP 2

Signature: Site Access Point 2 - Te Hapua Rd Drawing Title:	Revision: 1 Drawing No: SAP2 Drawing By: Chris Harmer Checked: TMC Approval Date: 17/07/17
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SAP 3 & SAP 4

Situation: Site Access Point 3 & 4 - SH1 Mary Crest Drawing Title:	Drawing No: SAP3 & 4 Revision: 1 Drawing By: Chris Hamner Checked: TMC Approval Date: 17/07/17	
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