Site Specific Environmental Management Plan

– Peka to Ōtaki Project

SE1: Mary Crest to Te Kowhai Road

FCCL-EV-MPN-0032

May 2019 – Revision C.2

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | New Zealand Government

Contents

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
C.1	Updated	Alice Naylor	18/01/19	Including Settlement Monitoring Proposal and Additional Stockpile
C.2	Updated	Alice Naylor	01/05/19	Includes Awatea Preload Stage 2

Certification Record

Revision	Action	Name	Position	Date	Signature
	Approved by:	RICHARD PERCY	PROJECT LEADER	9/5/19	
	On behalf of GWRC:				

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

CERTIFIED
VIJAY SOMA
Resource ConsentS & Compliance Manager
Kapiti Coast District Council
DATE: 9/5/2019

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 and Two) including removal of preload following required settlement period
- Mary Crest Basin Preload
- 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:

- 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
- Final main alignment surfacing and landscaping (except for the Cavallo Stream Diversion mentioned above)[1]

[1] 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	• Ensures there is a system in place so that construction works do not proceed until required environmental sign-offs are completed. • Overviews systems and processes to ensure consent requirements are captured for construction works. • Ensures adequate resources are provided to ensure environmental issues are appropriately managed. • Reviews environmental incidents and complaints with the Environmental Manager and acts to address issues where needed. • Reviews and monitors construction work methods to ensure compliance with RMA conditions
Environmental Manager	Alice Naylor	A.Naylor@Higgins.co.nz	• Develops, implements and reviews environmental management systems and environmental management plans. • Coordinates all environmental auditing functions and ensures relevant records are maintained. • Responds to and investigates all environmental complaints, issues or incidents. • Coordinates the SSEMP implementation process and pre-works requirements to ensure that environmental requirements are adhered to. • Provides training and briefings to site staff to ensure that there is sufficient

			knowledge of environmental requirements in the field. • Acts as the primary point of communication between regulatory bodies and the project. • Coordinates a team of experts in specialist disciplines such as contaminated land, ecology, groundwater, noise and vibration. • Communicates environmentally sensitive areas to the construction team.
Environmental Coordinator	Sevasti Hartley	sevastih@fcc.co.nz	• Supports the Environmental Manager and provides leadership to ensure all staff comply with environmental management systems. • Provides support in the formation of SSEMPs. • Undertakes as-builting of environmental controls. • Undertakes regular site inspections and audits. • Coordinates all site monitoring including but not limited to groundwater, water quality, ecological, dust, noise, and vibration monitoring. • Manages maintenance and monitoring of Chemical Treatment Systems (if used). • Ensures spill kits are available and stocked and provides training on equipment use. • Conducts regular site inspections of erosion and sediment control devices and co-ordinates maintenance where necessary. • Monitors site controls during rain storms. • Trains staff in site specific environmental procedures.
Stakeholder & Communications Manager	Ed Breese	ebreese@tonkintaylor.co.nz	• Organises, co-ordinates and facilitates engagement with affected property holders and community prior to and during construction.

			• Works in partnership with Environmental Manager on engagement and construction activities in accordance with RMA conditions
Site Superintendent / Supervisors / Foreman	Simon Fifield	SimonF@fcc.co.nz	• Provides leadership to the site construction team. • Ensures environmental controls including erosion and sediment control works are protected and maintained on a day to day basis. • Ensures that the SSEMPs and Archaeological Authority requirements are implemented appropriately by the construction team. • Maintains contactability 24/7 during construction and has authority to initiate immediate response actions. • Reports all environmental incidents, compliance issues and complaints to the Environmental Manager. • Reviews the need to use a water cart or sprinklers to control dust.
Project Engineers	Richard Rakovics (Civil) Craig Service (Structural)	RichardR@fcc.co.nz CraigS@fcc.co.nz	• Responsible for ensuring environmental controls and erosion and sediment control works are installed and modified as appropriate for each stage of construction. • Develop, implements and monitors construction methods and environmental protection measures to ensure compliance with the SSEMPs. • Demonstrate understanding of major environmental and community issues and environmentally sensitive areas. • Coordinate environmental interfaces with subcontractors and suppliers. • Reports all environmental incidents, compliance issues and complaints to the Environmental Manager.

Specialist support (contaminated land, ecology, noise and vibration)	Dean Miller (Principal Ecologist) Genevieve Smith – Contaminated land Brendon Shanks – Noise and Vibration	DCMiller@tonkintaylor.co.nz Genevieve.Smith@beca.co.nz Brendon.Shanks@marshallday.co.nz	• Provide expert advice to the Environmental Manager and Environmental Coordinator regarding specific site requirements. • Submits reports to the Environmental Manager to fulfil requirements of consents relevant to their field. • Briefs the construction team of site specific requirements for environmentally 'sensitive areas'.
Iwi	Te Waari Carkeek (Ngā Hapū o Ōtaki Kaiarahi)	TeWaariC@fcc.co.nz	• Provide input into project documentation such as management plans, design processes, planning documents. • Reviews permits to work and coordinates the level of involvement of kaitiaki in site activities • Coordinates all aspects of iwi monitoring. • Key point of contact for Ngā Hapū o Ōtaki.
	Caleb Royal (Ngā Hapū o Ōtaki Consents Processing Officer)		• Reviews consent applications and coordinates cultural monitoring activities. • Provides specialist advice to Ngā Hapū o Ōtaki
Iwi	Muaupoko Tribal Authority		• Point of contact for any archaeological discoveries in accordance with the agreed accidental discovery protocols and MTA agreement.

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 changes that are considered minor in accordance with SSEMP 'Project Minor Changes' FCCL-EV-MPN-

0037 will be submitted for information to the respective Manager 2 working days prior to implementation of that change. Any change that is not covered by the Project Minor Changes SSEMP must be submitted to the respective Manager for certification prior to implementation of that change.

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 Ōtaki 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 ~ 2.3m3/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 Mary Crest Preload and Te Hapua Undercut (Ch. 10600 – 11250)

- Topsoil will be stripped and used to form erosion and sediment controls (refer to section 5.2 below).
- Sand will be sourced from the main dunes to be used as preload surcharge material between Ch. 10600 – 10800). This will be left for the required settlement period prior to removal and use elsewhere across the site.
- 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 60,000m³ 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.

4.3.3.2 Stage 2 – Main Expressway Alignment Preload

- Drainage metal will be placed in the location of the Stage 2 preload.
- Additional traffic safety measures will be implemented along existing SH1.
- Sand will then be stripped from Stage 1 to be placed directly into Stage 2 Preload alongside existing SH1 (extending onto the road shoulder).
- A gap in the preload will remain in the location of the Awatea Stream until the actual settlement effects of the Stage 2 preload can be assessed. The open section of Awatea Stream between SH1 and the temporary culvert inlet beneath the Stage 1 preload will therefore continue to be protected by the existing dirty water diversion bunds.
- As the preload progresses, a polymer / mulch mix will be applied to reduce the risk of dust discharge and erosion.
- Due to the levels of the existing SH1, it is anticipated that any potential sediment runoff from the preload will fall back into the site (albeit potentially via the road shoulder for a short distance first).
- If it is noted in any areas that additional erosion and sediment control measures are required then a dirty water diversion channel or bund >400mm will be installed at the toe of the batter to prevent any discharge across SH1. If space restrictions prove problematic then the 1m concrete barriers currently placed along SH1 will be used as an alternative measure, provided that they are sealed using appropriate materials to ensure they are watertight.

- Following the required settlement period of approximately 3 – 4 months, surplus material will be removed and main alignment earthworks can 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).

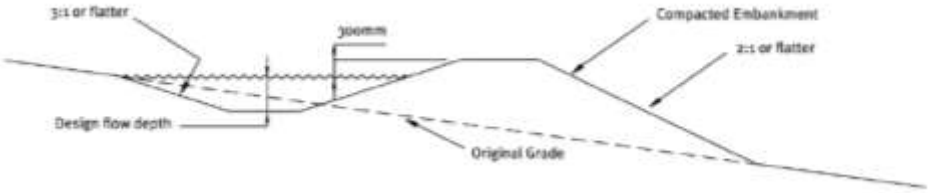


Figure 2: Typical cross section of dirty water diversion bund in accordance with the project ESCP.

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 Ōtaki 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 koiwi 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. settlement monitoring associated with Preload activities in the vicinity of existing SH1 for Awatea Preload and the Mary Crest Preload will be undertaken as follows:

5.9.1 Awatea Preload

Settlement will be monitored along SH1 prior to Stage 1 preload as the preload is approximately 5m from the road. Settlement Stations at every 20m intervals along the verge of SH1 are proposed. Settlement of the NIMT will also be monitored prior to Stage 2 preload. Rail settlement pins at every 20m interval are proposed. Refer to Appendix F for location details. Monitoring is to commence at least 4 weeks prior to preload activities in accordance with condition DC.45.

In the event that the alert, action or alarm levels outlined in the attached memo are reached, the owner and occupier of the site and the Manager (Kapiti Coast District Council Resource Consents and Compliance) must be notified within 72 hours. This notification will outline which trigger levels have been reached and any remedial or preventative action undertaken.

5.9.2 Mary Crest Basin Preload

The attached memo in Appendix F summarises required monitoring associated with the Mary Crest Basin Preload which is located further from SH1 and therefore poses low risk of settlement along SH1.

In the event that the alert, action or alarm levels outlined in the attached memo are reached, the owner and occupier of the site and the Manager (Kapiti Coast District Council Resource Consents and Compliance) must be notified within 72 hours. This notification will outline which trigger levels have been reached and any remedial or preventative action undertaken.

6 TRAFFIC

Existing site access points will be utilised for these works from Te Kowhai Road (SAP-1) and Te Hapua Road (SAP-2). Temporary traffic management will be set up at Te Hapua Road to allow for safe passage of dumpers crossing between the north and south, as well as temporary traffic management and reduced speed limits associated with the Awatea Stage Two Preload which interfaces with existing SH1. 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

N

Northern tie-in of new arterial road to existing SH1

Dirty water diversion bund >550mm

SAP 4

Area east of existing SH1 are not covered under this plan

Currently a no-go zone until soil investigation works are complete

Temporary stockpile

Dirty water diversion bund (550mm high) or silt fence to be installed for initial topsoil stripping until final cut levels are achieved

Localised controls may be required at bottom of cut batter in final stages of driveway construction

Edwin Stream

Jewell Stream

Sign-in area / worker conveniences

Potential peat disposal area

Dirty water diversion bund >550mm

Temporary water storage pond

SAP 3

Legend:

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

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 Diverison 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 decomissioning.
5. Construct and liven 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 decomissioning.
7. Continue earthworks

Dirty water diversion bund >550mm

SAP 3

Sign-in area / worker conveniences (SAP 3)

N

Sediment control configuration following culvert construction / livening

Approximate extent of Mary Crest Preload

Dirty water diversion bund >650mm with stabilised spillway

Additional stockpile outside of the Designation (refer to Retrospective Consent

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

Partial Online Temporary Culvert Placement (Dam and Divert)

1. Lay majority of the temporary culvert offline of the existing stream channel.
2. Set up 6 inch pump with fish exclusion at inlet.
3. Plug the existing stream immediately upstream of the temporary culvert location,
4. Pump stream water to downstream of the temporary culvert location.
5. Allow Ecologists and iwi to carry out fish relocation if required.
6. Plug immediately downstream of the temporary culvert location to isolate the works.
7. Pump remaining water from the temporary culvert location in accordance with a Permit to Pump.
8. Lay the remaining section of pipe and backfill.
9. Remove the downstream plug to allow water to backflow up the new temporary culvert.
10. Remove the upstream plug to fully liven the temporary culvert.
11. Progress Stage One Preload across the temporary culvert
12. Progress Stage Two Preload either side of the open channel between existing SH1 and the temporary culvert.

Dirty water diversion bunds >600mm with stabilised spillways

SAP 2 (N&S)

Temporary stockpile

Temporary Culvert 1050 diameter Pipe (50% AEP)

Unnamed drain to be partially decommissioned within the Designation boundary following fish salvage and relocation

Awatea Stream

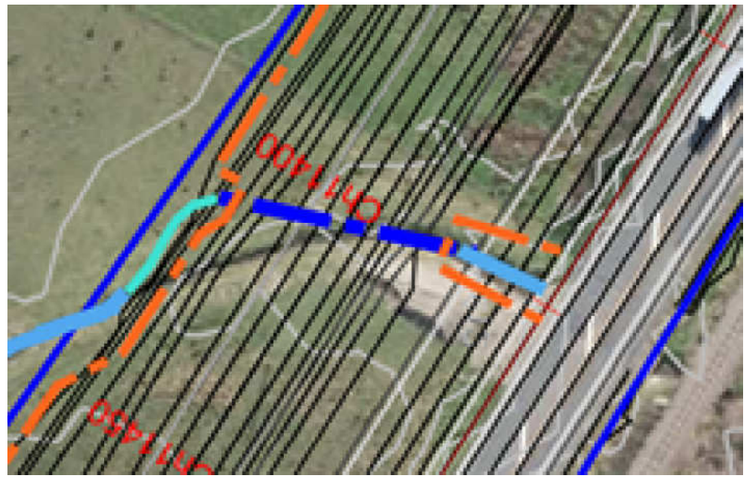
Preload Stage Two either side of the Awatea Stream

The need for dirty water diversion bunds along SH1 will be determined on site. To be constructed 400mm to contain a catchment of <0.5ha.

Kumototo Stream

Preload Stage One - Local Arterial Road footprint

Sediment control configuration following temporary culvert livening



Legend:

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

Sectio 4: Te Kowhai Undercut

N

Dig and replace for 'Te Kowhai Undercut'

Dirty water diversion bunds >700mm with stabilised spillways

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.

Tie into high point or carry along southern boundary

Temporary stockpile

SAP 1

Sign-in area / worker conveniences

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

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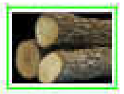
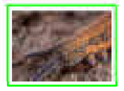
ECOLOGY LEGEND:

TERRESTRIAL ECOLOGY REQUIREMENTS:

LIZARD SURVEYS, SALVAGING AND MONITORING



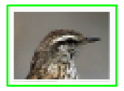
NATIVE TREE LOG SALVAGE



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

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A	SSEMP FOR INFORMATION	AK	GD	AN	20.07.17

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	Drawn	AK	13.07.17	
Scale (A3)	Dsg Verifier			
	Drg Check			Date
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Peka Peka to Ōtaki Expressway
Fletcher HIGGINS Beca Tonkin+Taylor

Subject: SSEMP PW2
Title: LEGENDS
Discipline: CIVIL
Drawing No. SSEMP PW2-00
Rev. B

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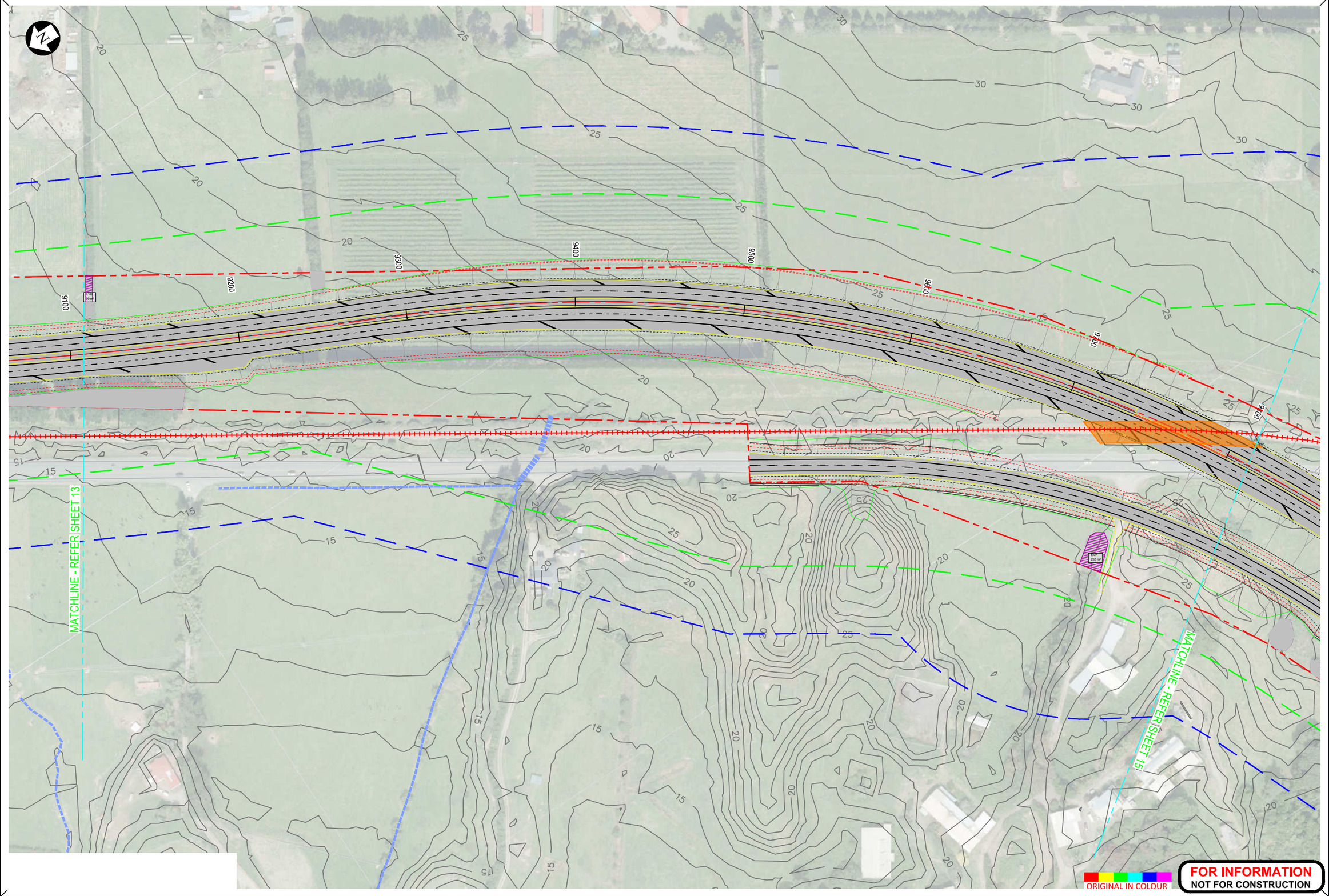

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Date

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Peka Peka to Ōtaki Expressway

HIGGINS

Beca

Tonkin+Taylor

Subject: ECOLOGY

Title: LAYOUT PLAN SHEET 14 OF 18

Discipline: CIVIL

Drawing No.: PP2O-DR-CE-0814

Rev.: B

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LEGEND:

- DESIGNATION
- RAILWAY DESIGNATION
- EXISTING STREAMS
- PROPOSED STREAMS DIVERSIONS
- EXISTING CULVERTS
- PROPOSED CULVERTS
- STORMWATER WETLAND/POND

ECOLOGICAL PLANTING:

- RIPARIAN PLANTING
- TERRESTRIAL MITIGATION PLANTING
- WETLAND BUFFER PLANTING
- SWAMP FOREST PLANTING
- LOW STATURE WETLAND PLANTING
- EXISTING VEGETATION RETAINED

EXISTING CULVERT No.48
SIZE: 0.91m x 0.9 (WxD)

EXISTING CULVERT No.49
SIZE: 0.9m DIA

EXISTING CULVERT No.51
SIZE: 1.2m x 1.3m (WxD)

EXISTING CULVERT No.52
SIZE: 1.2m DIA

CULVERT No.53
SIZE: TWIN 2.5m x 2m

EDWIN CULVERT

PROPOSED VALENTINE WETLAND
(TREATMENT & ATTENUATION)

T No.50
DIA
IL DS = 22.
IL DS = 20.2m

EDWIN STREAM
DIVERSION

SWALE CROSSES
OVER CULVERT

EXISTING STREAM
TO BE REMOVED

JEWEL STREAM
DIVERSION

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Subject: ECOLOGY

Title: LAYOUT PLAN
SHEET 15 OF 18

Discipline: CIVIL

Drawing No.: PP2O-DR-CE-0815

Rev.: B

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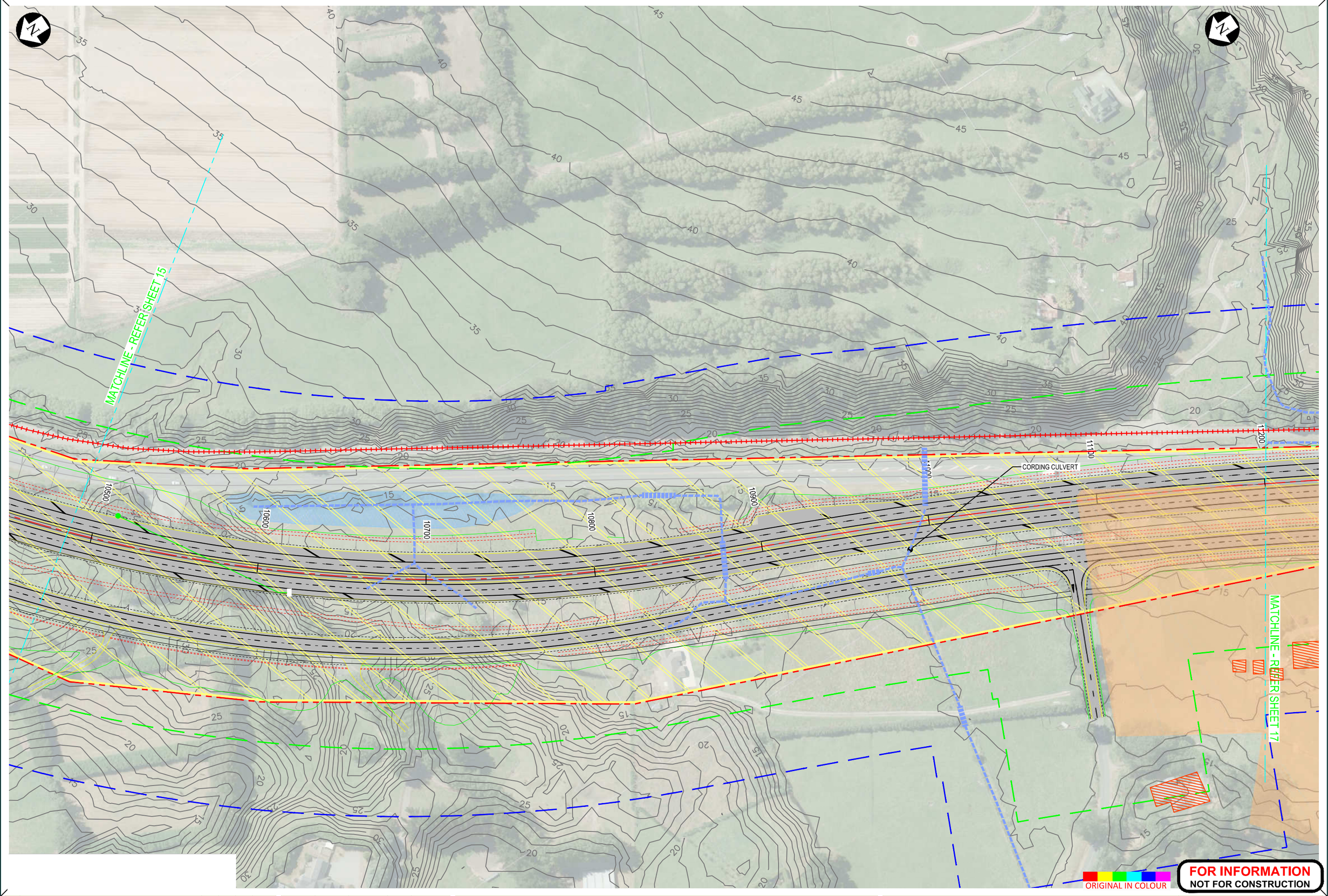

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SHEET 16 OF 18

Discipline: CIVIL
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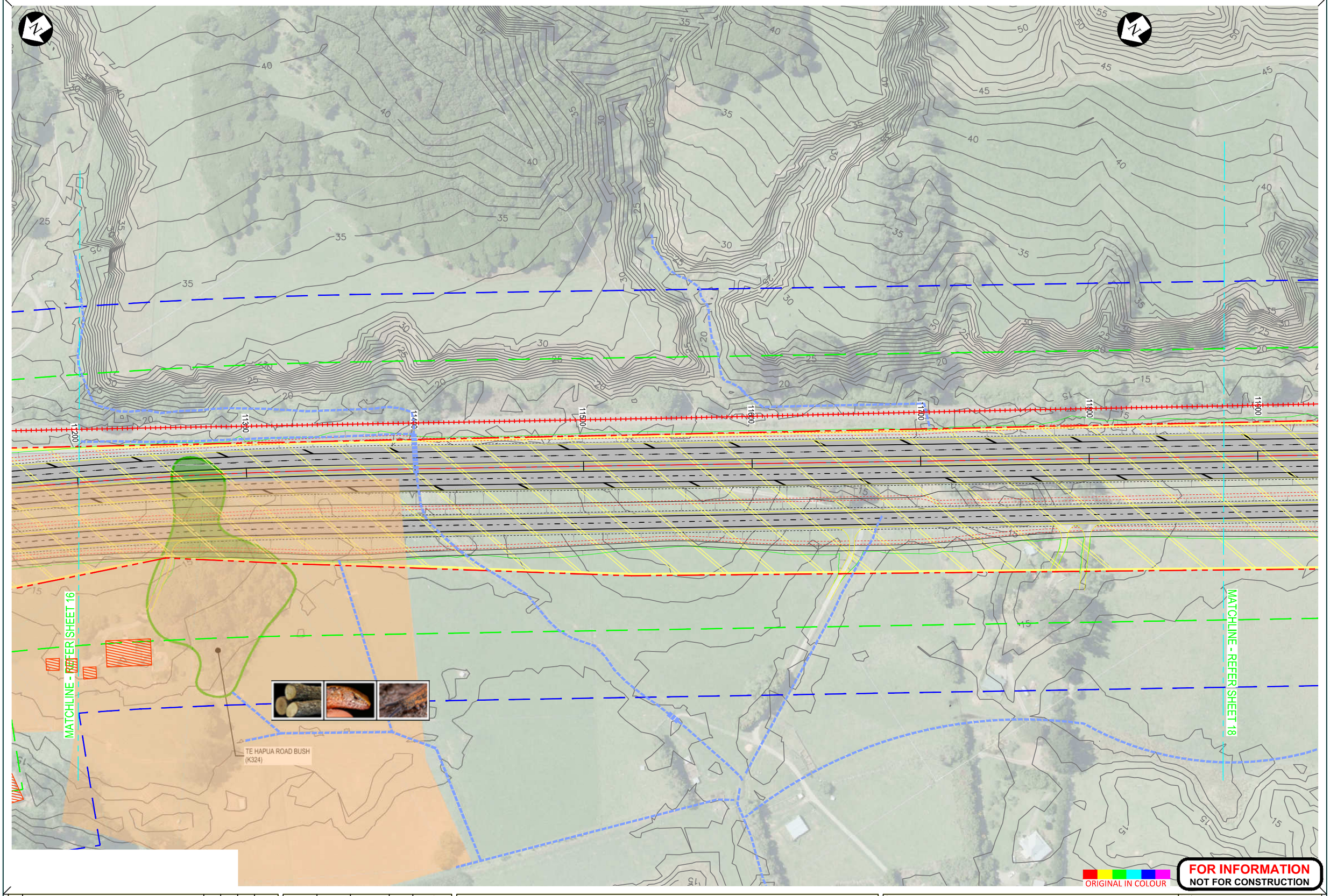

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Discipline: CIVIL

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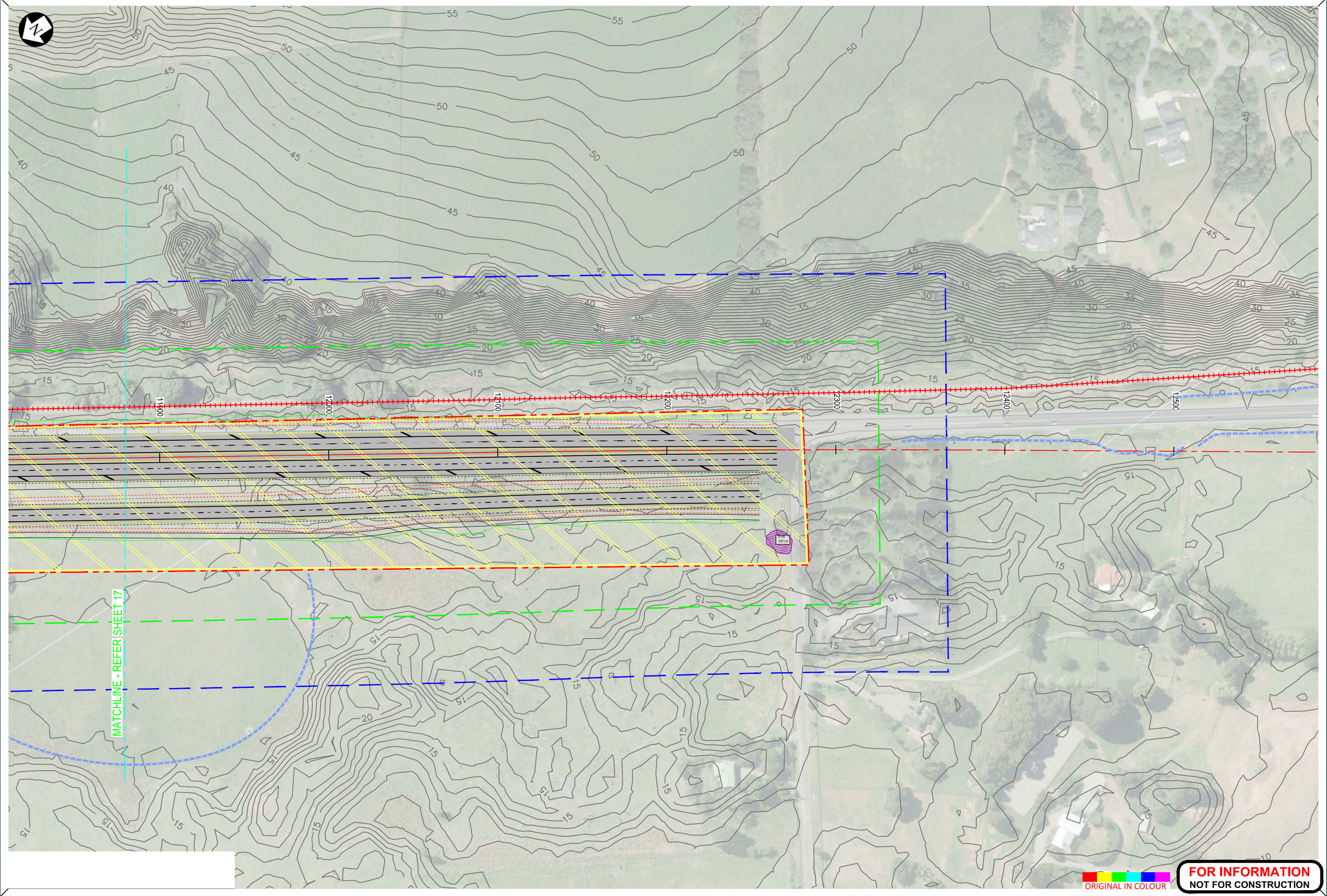

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HIGGINS

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SHEET 18 OF 18

Discipline: CIVIL

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Rev.: B

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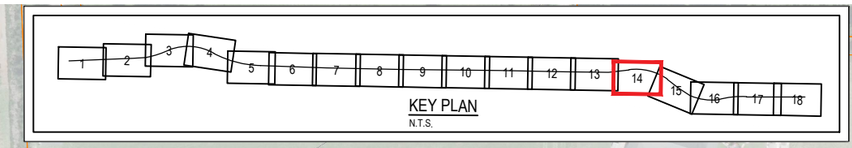
Construction Drawings

Save Date: 02 Mar 2018 1:30 p.m.

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.



KEY PLAN
N.T.S.

CULVERT No.45

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.

MARY CREST RAIL OVERPASS

UNSUITABLE DISPOSAL AREA

UNSUITABLE DISPOSAL AREA

NORTH ISLAND MAIN TRUNK RAILWAY

EXISTING STATE HIGHWAY 1

NEW LOCAL ARTERIAL ROAD

MATCHLINE - REFER SHEET 13

MATCHLINE - REFER SHEET 15

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

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
- TL4 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
- BH8XX GROUNDWATER MONITORING STANDPIPES

A1 SCALE 1:1000
A3 SCALE 1:2000
0 10 20 30 40 60 80 100 (m)

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

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

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject: EARTHWORKS
Title: GENERAL ARRANGEMENT PLAN SHEET 14 OF 18

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0014
Rev.: 1

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

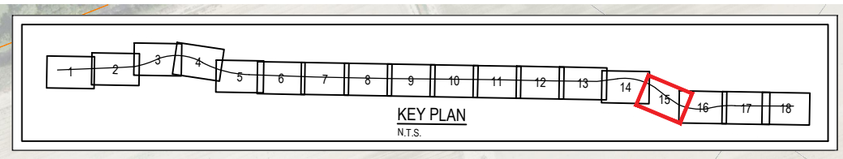
Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEUPDATES\PP2O-DR-GE-0001-0018.DWG

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
- TL4 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
- BH8XX 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.



KEY PLAN
N.T.S.

NORTH ISLAND MAIN TRUNK RAILWAY
CULVERT No.50A
EXISTING STATE HIGHWAY 1
VALENTINE BASIN
MARY CREST APPROACH EMBANKMENT UNDERCUT
VALENTINE BASIN UNDERCUT
PEAT UNDERCUT (DEPTH AND EXTENT OF UNDERCUT TO BE CONFIRMED BY GEOTECH DESIGNER)
MARY CREST BASIN UNDERCUT
VERIFICATION TEST PITTING TO BE UNDERTAKEN TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT
CULVERT No.50
CULVERT No.53
NEW LOCAL ARTERIAL ROAD
MATCHLINE - REFER SHEET 14
MATCHLINE - REFER SHEET 16
VERIFICATION TEST PITTING TO BE UNDERTAKEN TO CONFIRM THE EXTENT OF SOFT GROUND/PEAT

A1 SCALE 1:1000
A3 SCALE 1:2000
0 10 20 30 40 60 80 100 (m)

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

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

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS
Beca Tonkin+Taylor

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

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0015
Rev.: 1

Document No. R:\30\DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\SIG\EU\PDATE\SIP\PP2O-DR-GE-0001-0018.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

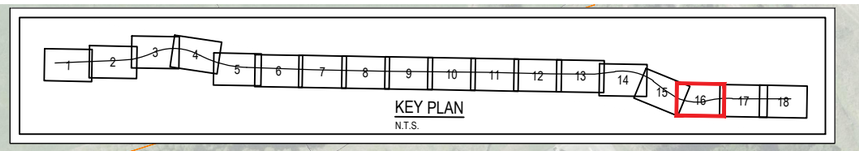
Save Date: 18 Apr 2018 4:43 p.m.

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
- WETLAND
- FILL SLOPE
- CUT SLOPE
- CUT AND FILL SLOPE
- TEMPORARY RETAINING WALL
- TL4 — BARRIER RETAINING WALL
- EXTENT OF PEAT
- RAIL EXISTING
- RAIL PROPOSED
- DESIGNATION BOUNDARY
- RAIL DESIGNATION
- PROPERTY BOUNDARY
- EXISTING STREAM
- PROPOSED CULVERTS
- EXISTING CULVERTS
- BH8XX — GROUNDWATER MONITORING STANDPIPES
- PROPOSED STREAM DIVERSION
- TIMBER RETAINING WALL
- L-SHAPED RETAINING WALL
- GABION RETAINING WALL

NOTE:

1. 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.



KEY PLAN
N.T.S.

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.

MATCHLINE - REFER SHEET 15

MARY CREST BASIN

CULVERT No.59

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

EXISTING STATE HIGHWAY 1

MARY CREST BASIN PRELOAD

TE HAPUA ROAD UNDERCUT

NEW LOCAL ARTERIAL ROAD

CULVERT No.61

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

LOCAL ARTERIAL ROAD RETAINING WALL 1

LOCAL ARTERIAL ROAD RETAINING WALL 2

TE HAPUA ROAD

MATCHLINE - REFER SHEET 17

A1 SCALE 1:1000
A3 SCALE 1:2000
0 10 20 30 40 60 80 100 (m)

NOTE:
DATUM: NZVD 2009

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Design	R.Ramilo	22.08.17	Approved For Construction
Drawn	A.Kochar	22.08.17	B.Symmans
Dsg Verifier	R.Hillier	1.03.18	
Drg 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 WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS
Beca Tonkin+Taylor

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

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0016
Rev.: 2

Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEU\PDATES\PP2O-DR-GE-0001-0018.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

Save Date: 02 Mar 2018 1:31 p.m.

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
- TL4 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
- BH8XX GROUNDWATER MONITORING STANDPIPES

NOTE:

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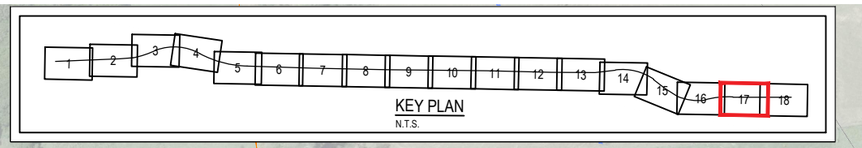


KEY PLAN
N.T.S.

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

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

NORTH ISLAND MAIN TRUNK RAILWAY

AWATEA STREAM PRELOAD

KUMOTOTO STREAM UNDERCUT

NEW LOCAL ARTERIAL ROAD

CULVERT No.64

CULVERT No.66

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

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

MATCHLINE - REFER SHEET 16

MATCHLINE - REFER SHEET 18

A1 SCALE 1:1000
A3 SCALE 1:2000
0 10 20 30 40 60 80 100 (m)

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

Scale (A1) 1:1000
Scale (A3) 1:2000

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

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS
Beca Tonkin+Taylor

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

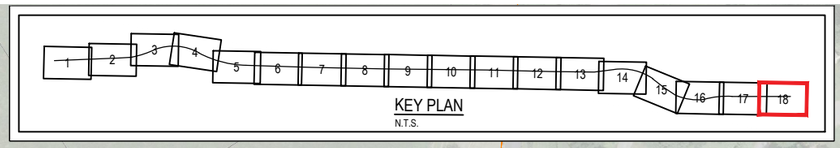
Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0017
Rev.: 1

Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEI\UPDATES\PP2O-DR-GE-0001-0018.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

Save Date: 02 Mar 2018 1:31 p.m.



KEY PLAN
N.T.S.

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

TE KOWHAI ROAD UNDERCUT

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

MATCHLINE - REFER SHEET 17

TE KOWHAI ROAD

11900 12000 12100 12200 12300 12400 12500

2400 2500 2600 2700 2800 2900

A1 SCALE 1:1000
A3 SCALE 1:2000
0 10 20 30 40 60 80 100 (m)

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
- 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
- TL4 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
- BH8XX GROUNDWATER MONITORING STANDPIPES

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

Scale (A1) 1:1000	Design	R.Ramilo	22.08.17	Approved For Construction B.Symmans
Scale (A3) 1:2000	Drawn	A.Kochar	22.08.17	
	Dsg Verifier	R.Hillier	1.03.18	
	Drg Check	G.Down	1.03.18	Date 1.03.18
	* Refer to Original Hardcopy for Signature			

NZ TRANSPORT AGENCY WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS
Beca Tonkin+Taylor

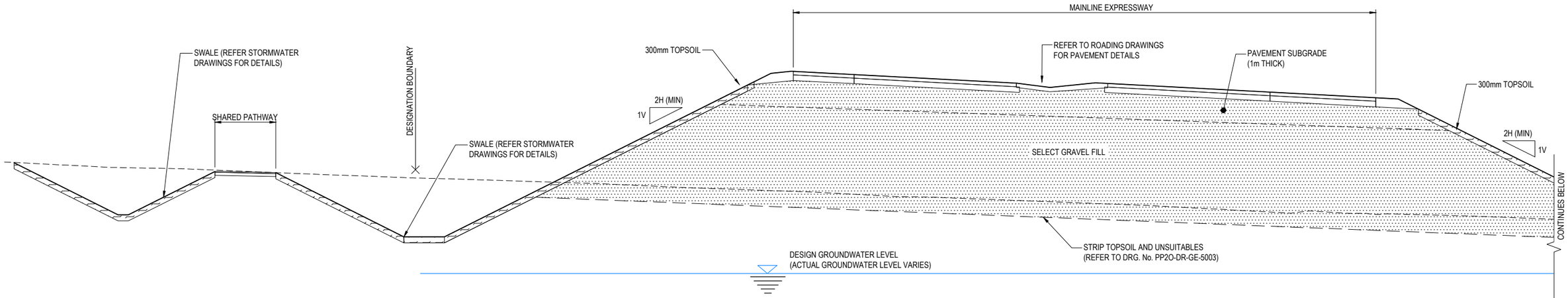
Subject: EARTHWORKS
Title: GENERAL ARRANGEMENT PLAN SHEET 18 OF 18

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0018
Rev.: 1

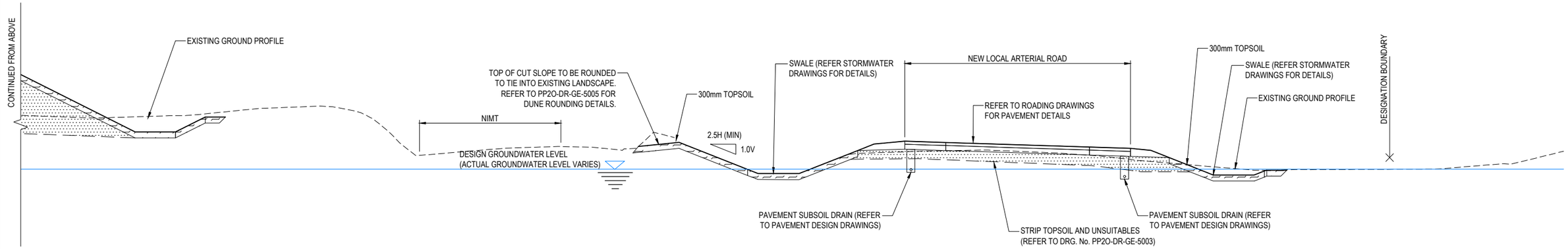
Document No. R:\30OD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEUPDATES\PP2O-DR-GE-0001-0018.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK



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



SECTION 41 / 0034 CHAINAGE 9520-9780 (NORTH OF MARY CREST RAIL OVERPASS) TYPICAL CROSS SECTION CONTINUED
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.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100 / Scale (A3) 1:200	Design	R. Ramilo	31.05.17	Approved For Construction B.Symmans
	Drawn	J. Libeau	13.09.17	
	Dsg Verifier	R.Hillier	1.03.18	
	Drg Check	G.Down	1.03.18	Date 1.03.18
	* Refer to Original Hardcopy for Signature			

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

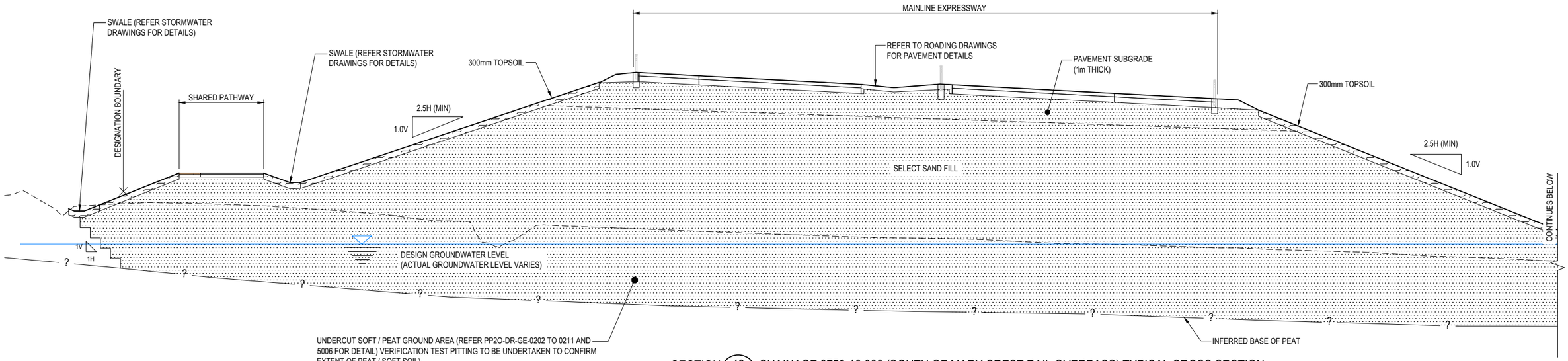
Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 41

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0169
Rev.: 1

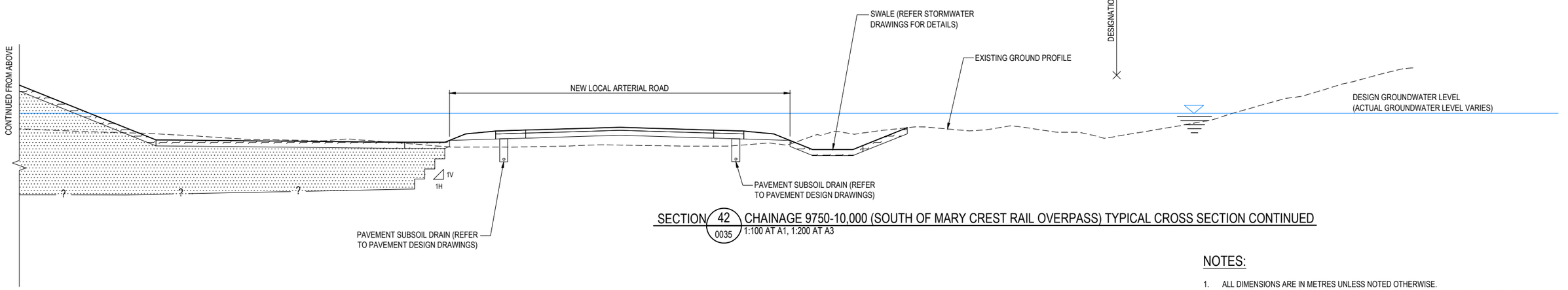
ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GE\UPDATES\PP2O-DR-GE-0164-0171 UPDATED.DWG



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



SECTION 42 (0035) CHAINAGE 9750-10,000 (SOUTH OF MARY CREST RAIL OVERPASS) TYPICAL CROSS SECTION CONTINUED
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.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100	Design	R. Ramilo	31.05.17
Scale (A3) 1:200	Drawn	J. Libeau	13.09.2017
	Dsg Verifier	R.Hillier	1.03.18
	Drg Check	G.Down	1.03.18

Approved For Construction B.Symmans Date 1.03.18

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

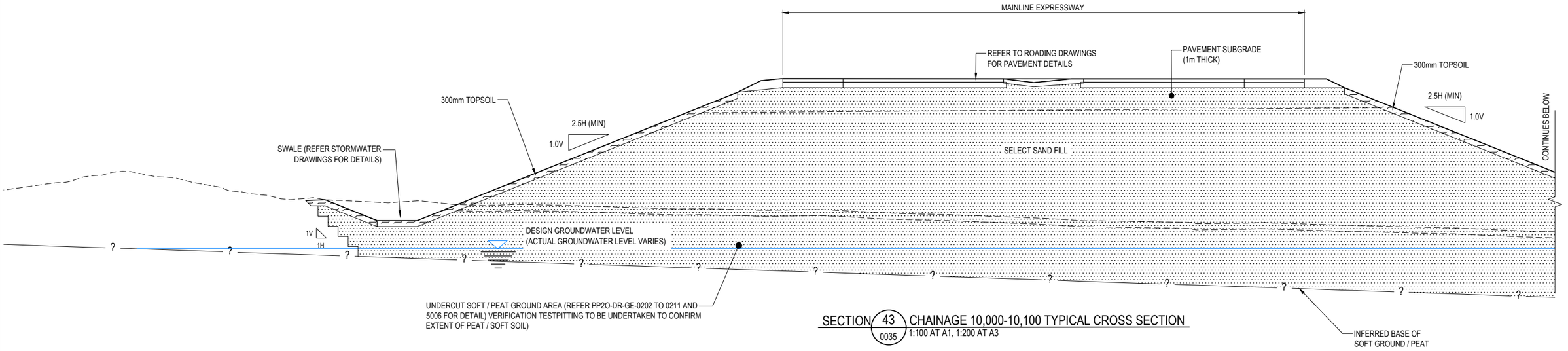
Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 42

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0170
Rev.: 1

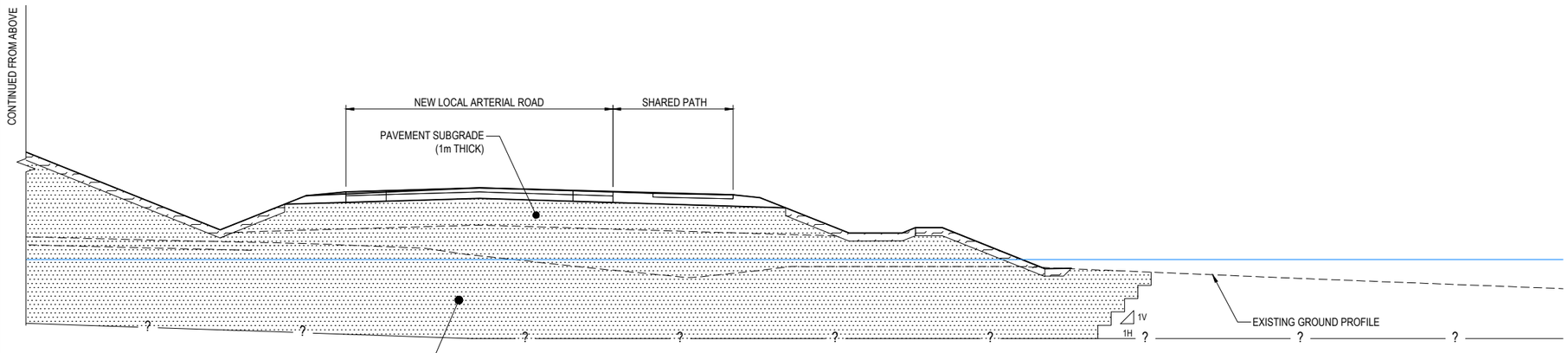
ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

Document No. R:\30\DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEI\UPDATES\PP2O-DR-GE-0164-0171 UPDATED.DWG



SECTION 43 / 0035 CHAINAGE 10,000-10,100 TYPICAL CROSS SECTION
1:100 AT A1, 1:200 AT A3



SECTION 43 / 0035 CHAINAGE 10,000-10,100 TYPICAL CROSS SECTION CONTINUED
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.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100 / Scale (A3) 1:200	Design	R. Ramilo	31.05.17
	Drawn	J. Libeau	13.09.2017
	Dsg Verifier	R.Hillier	1.03.18
	Drg Check	G.Down	1.03.18
	* Refer to Original Hardcopy for Signature		

Approved For Construction: B.Symmans
Date 1.03.18

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

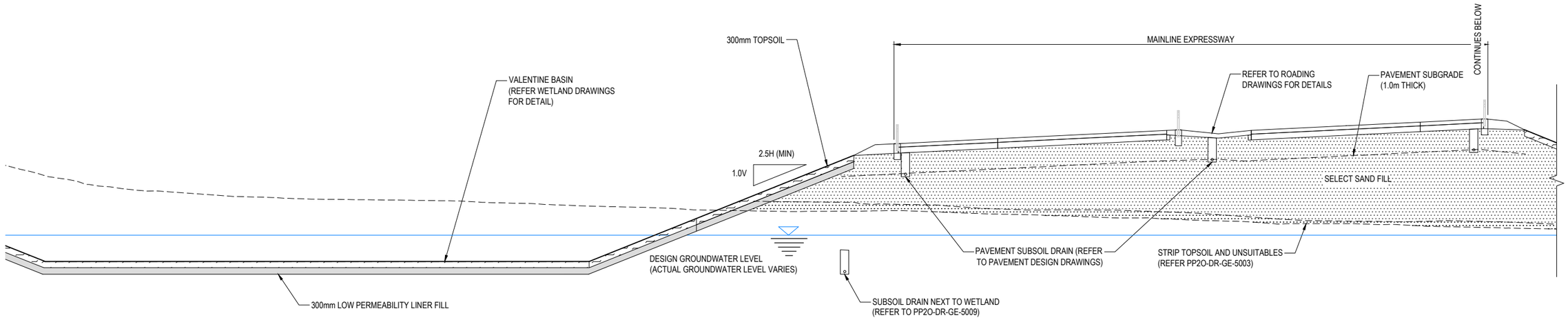
Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 43

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0171
Rev.: 1

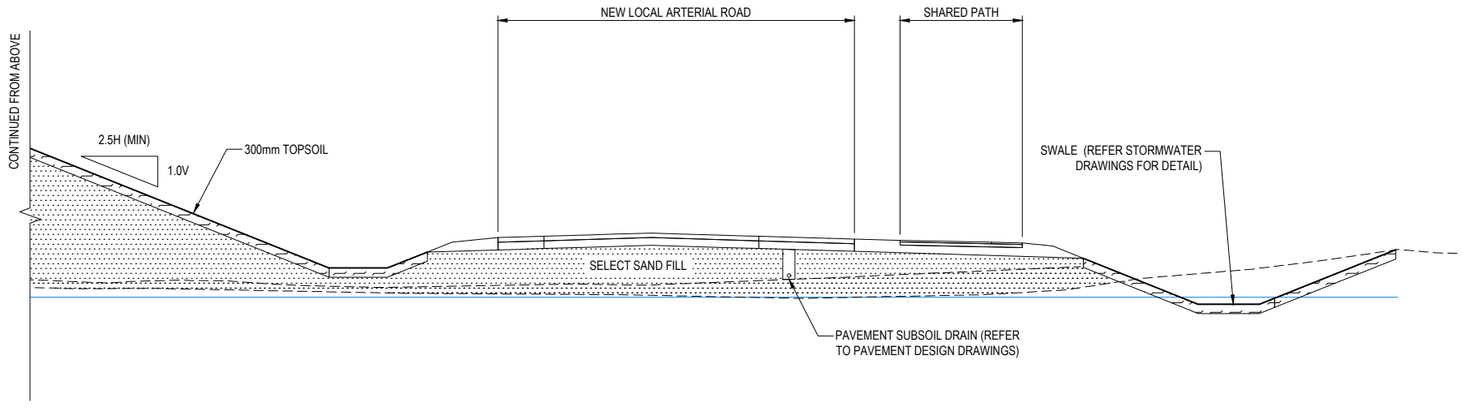
Document No. R/30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEU\PDATES\PP2O-DR-GE-0164-0171 UPDATED.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK



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



SECTION 44 0035 CHAINAGE 10100 - 10225 TYPICAL CROSS SECTION
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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6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100
Scale (A3) 1:200

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

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

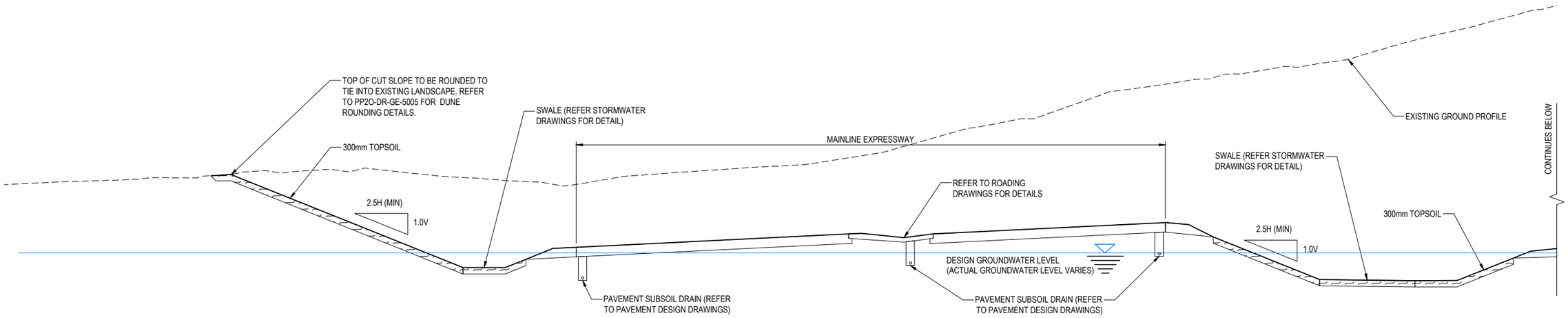
Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 44

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0172
Rev.: 1

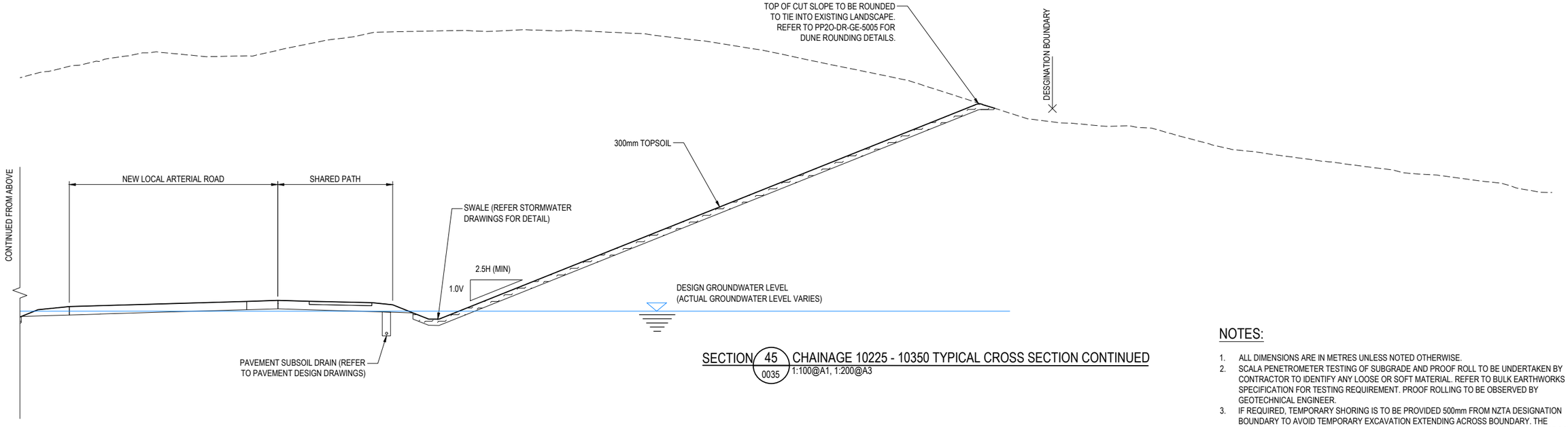
Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEI\UPDATES\PP2O-DR-GE-0172-0177 UPDATED.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK



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



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

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

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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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) 1:100
Scale (A3) 1:200

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

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

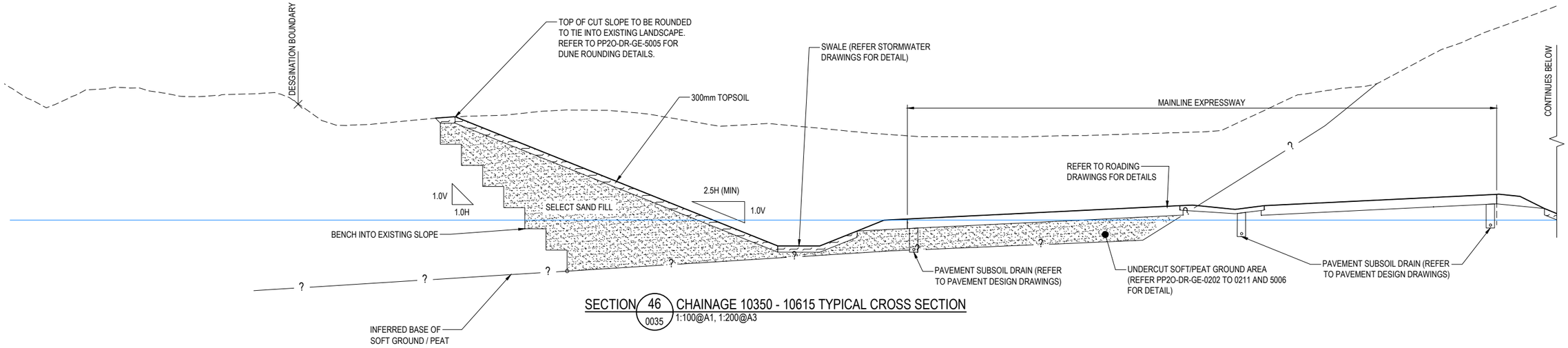
Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 45

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0173
Rev.: 1

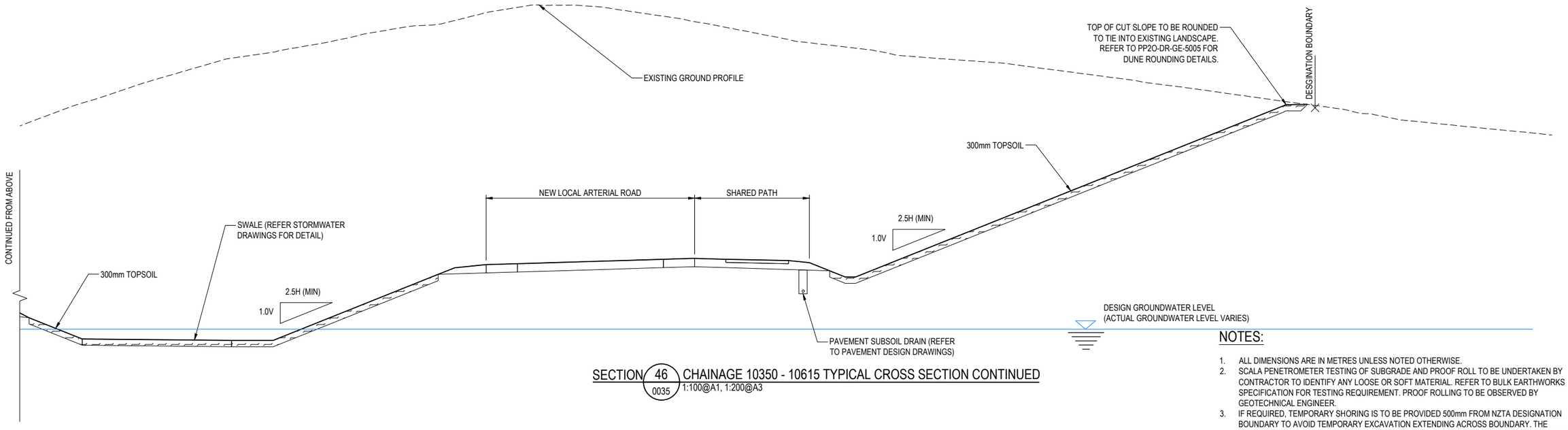
Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEIUPDATES\PP2O-DR-GE-0172-0177 UPDATED.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK



SECTION 46 / 0035 CHAINAGE 10350 - 10615 TYPICAL CROSS SECTION
1:100@A1, 1:200@A3



SECTION 46 / 0035 CHAINAGE 10350 - 10615 TYPICAL CROSS SECTION CONTINUED
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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6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100 / Scale (A3) 1:200	Design	R. Ramilo	31.05.17	Approved For Construction B.Symmans
	Drawn	A. Kochar	18.08.17	
	Dsg Verifier			
	Drg Check			Date 1.03.18
	* Refer to Original Hardcopy for Signature			

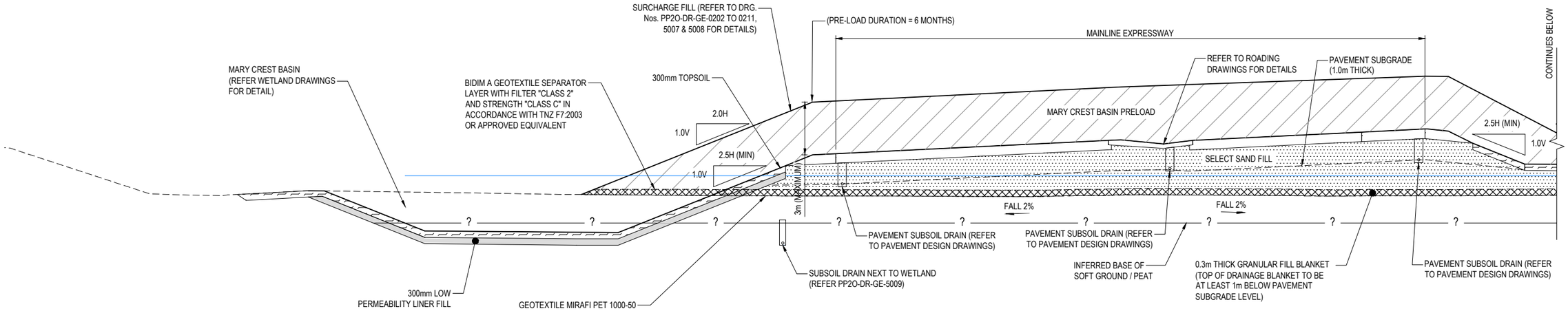
NZ TRANSPORT AGENCY WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS
Beca Tonkin+Taylor

Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 46
Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0174
Rev.: 1

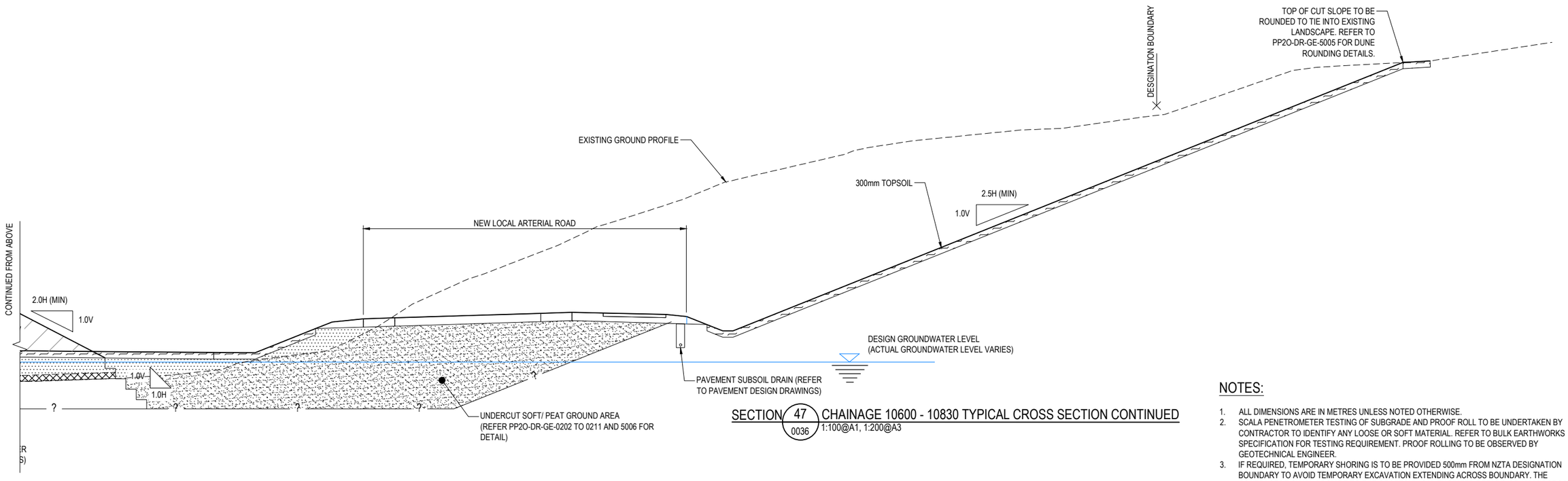
Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEU\PDATES\PP2O-DR-GE-0172-0177 UPDATED.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK



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



SECTION 47 / 0036 CHAINAGE 10600 - 10830 TYPICAL CROSS SECTION CONTINUED
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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6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

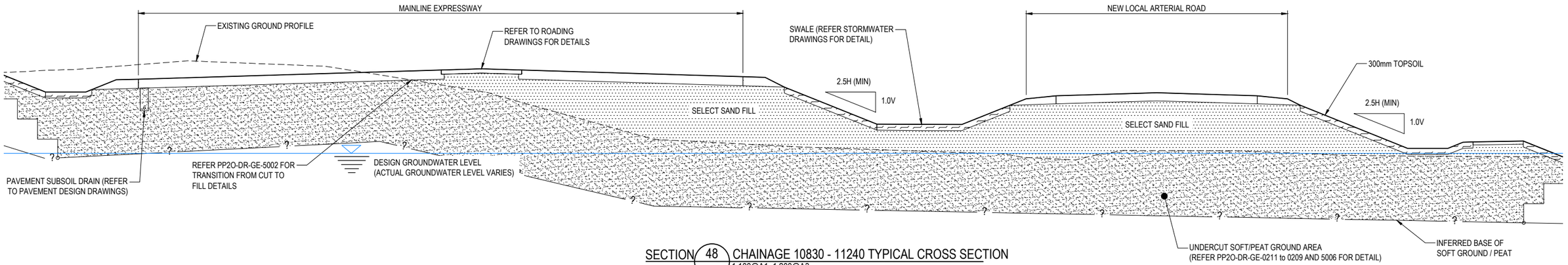
Scale (A1) 1:100 / Scale (A3) 1:200	Design	R. Ramilo	31.05.17
	Drawn	A. Kochar	18.08.17
	Dsg Verifier	R.Hillier	1.03.18
	Drg Check	G.Down	1.03.18

Approved For Construction: B.Symmans
Date 1.03.18
* Refer to Original Hardcopy for Signature

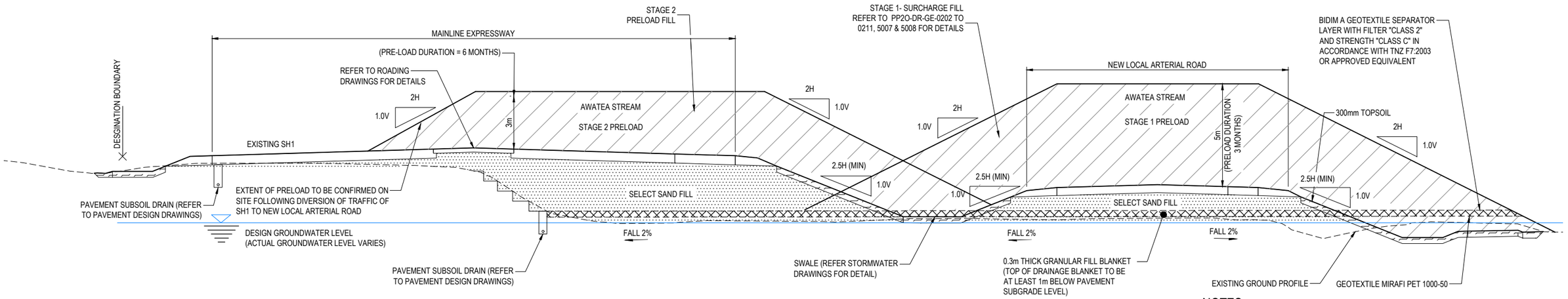
NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 47
Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0175
Rev.: 1

Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEU\PDATES\PP2O-DR-GE-0172-0177 UPDATED.DWG



SECTION 48 (0036) CHAINAGE 10830 - 11240 TYPICAL CROSS SECTION
1:100@A1, 1:200@A3



SECTION 49 (0037) CHAINAGE 11240 - 11670 TYPICAL CROSS SECTION
1:100@A1, 1:200@A3

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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6. REFER TO BULK EARTHWORKS SPECIFICATION FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT SUBGRADE AND RAIL FORMATION TESTING.

A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100
Scale (A3) 1:200

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

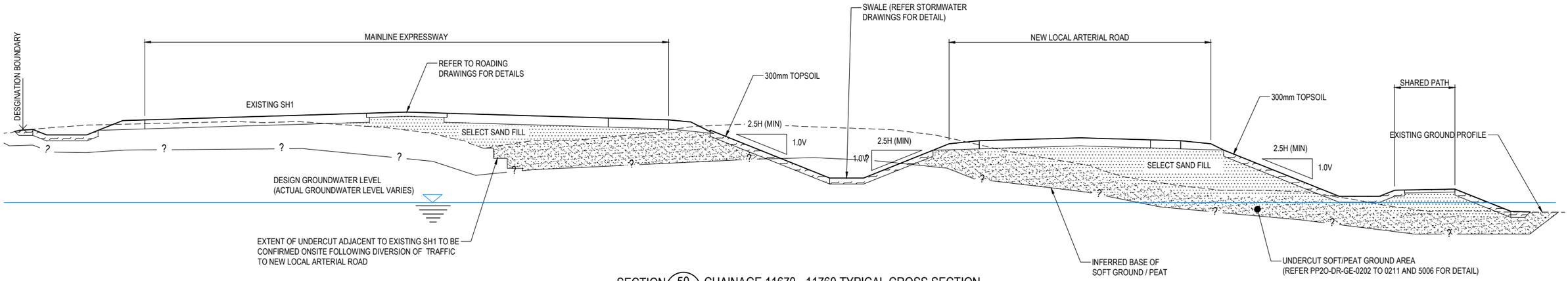
* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

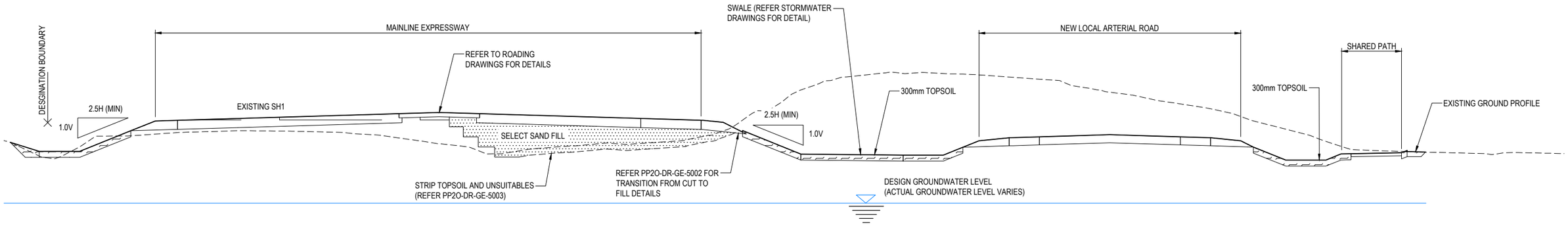
Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTION 48 AND 49

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0176
Rev.: 1

Document No. R130DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEIUPDATES\PP2O-DR-GE-0172-0177 UPDATED.DWG



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



SECTION 51 / 0037 CHAINAGE 11760 - 11850 TYPICAL CROSS SECTION
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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A1 SCALE 1:100
A3 SCALE 1:200
0 1 2 3 4 6 8 10 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

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

Scale (A1) 1:100
Scale (A3) 1:200

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

* Refer to Original Hardcopy for Signature

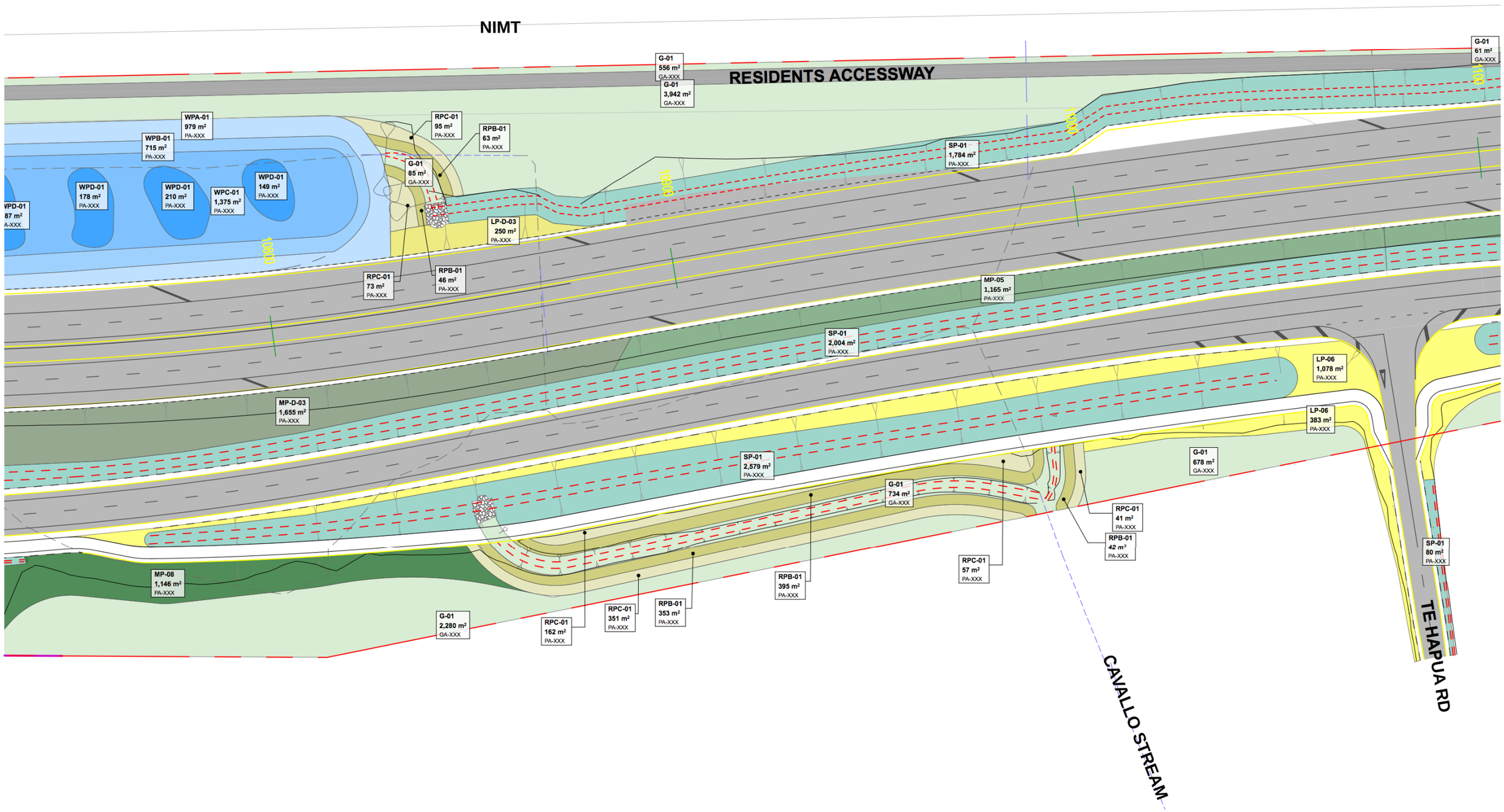
NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject: EARTHWORKS
Title: GEOTECHNICAL CROSS SECTIONS SECTIONS 50 AND 51

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0177
Rev.: 1

Document No. R:\30OD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEU\PDATES\PP2O-DR-GE-0172-0177 UPDATED.DWG

Landscape Plans



1
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Stream Diversion Treatment - Cavallo
Scale 1:1000

CONCEPT DESIGN
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	For Information	MB	SD/SH		28/08/18

Scale (A1) DOUBLE SHOWN
Scale (A3) AS SHOWN

			Approved For Construction
Design			
Drawn			
Dsg Verifier			
Drg Check			Date

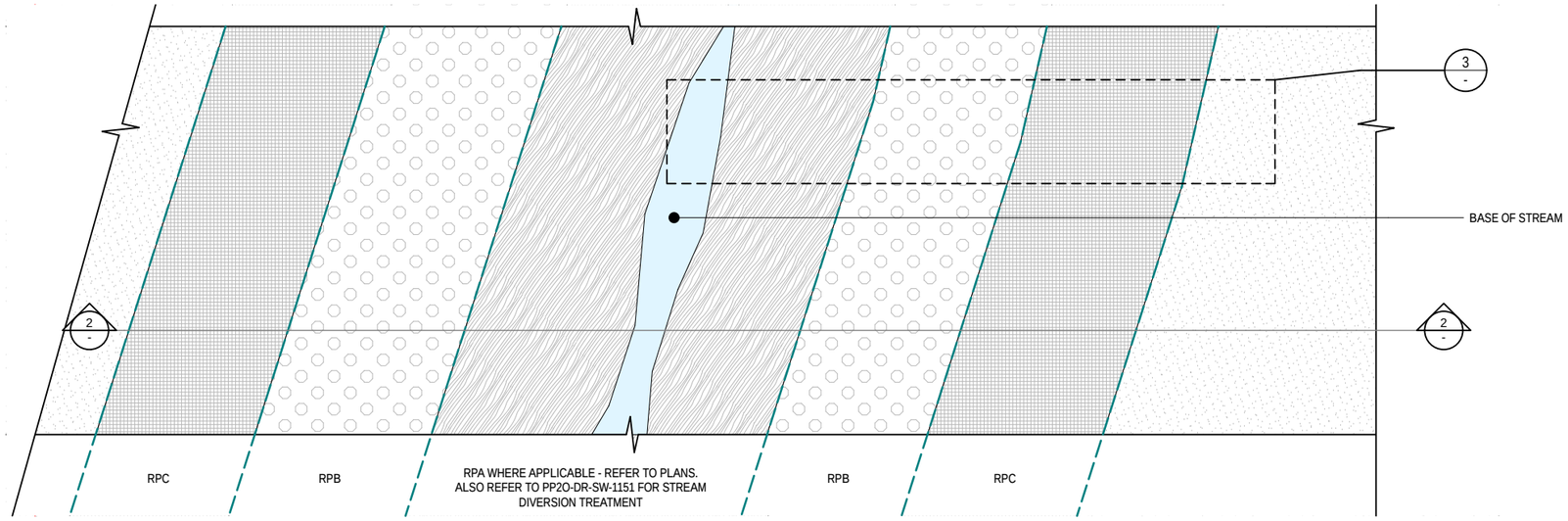
* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject:	STREAM DIVERSION TREATMENTS	Discipline	GENERAL
Title:	CAVAOLLO STREAM	Drawing No.	PP2O-SK-GN-0283
		Rev.	A

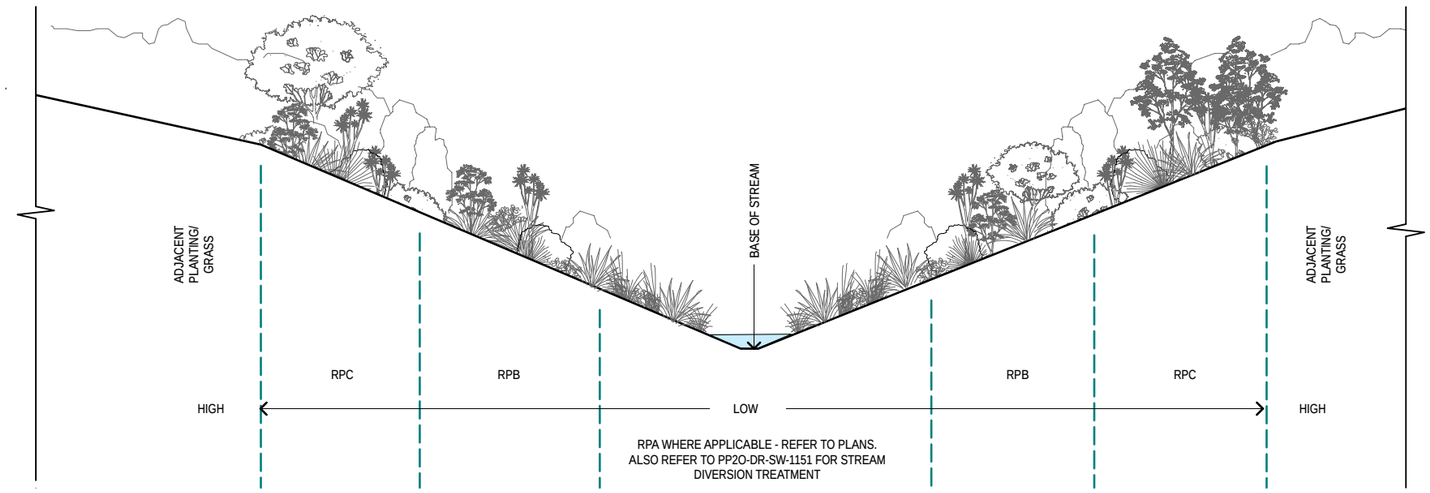
ORIGINAL SIZE A3 : DO NOT SCALE

IF IN DOUBT ASK



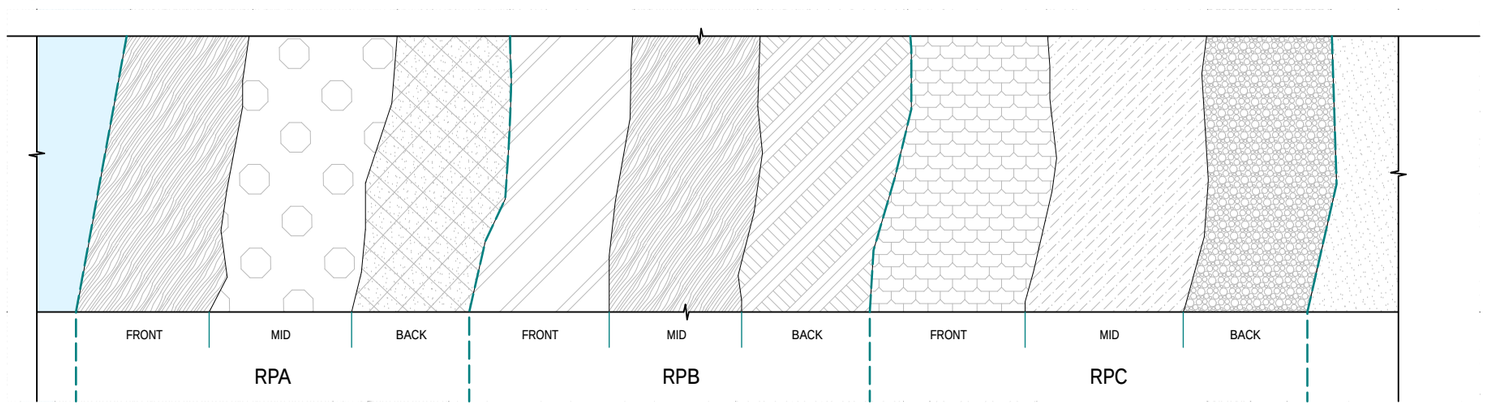
1 - TYPICAL PLANTING PLAN - RIPARIAN PLANTING

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 PP2O-DR-SW-1151 FOR STREAM DIVERSION TREATMENT

CONCEPT DESIGN
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
A	For Information	MB	SD/SH		28/08/18

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Design			Approved For Construction
Drawn			
Dsg Verifier			
Drg Check			Date

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject: STREAM DIVERSION TREATMENTS
Title: TYPICAL PLANTING SETOUT RIPARIAN PLANTING

Discipline: GENERAL
Drawing No.: PP2O-SK-GN-0284
Rev.: A

ORIGINAL SIZE A3 : DO NOT SCALE

IF IN DOUBT ASK

Riparian Planting - C (RPC-01): Upper Bank

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
Carex dipsacea	Autumn Sedge	5%	PB2	1.8	Front
Carex geminata	Rautahi	5%	0.5L	1.8	Mid
Coprosma propinqua	Mingimingi	5%	PB2	1	Mid
Cordyline australis	Cabbage Tree	3%	PB2	1	Mid
Cortaderia fulvida	Toetoe	10%	PB2	1	Front/mid
Hebe stricta	Koromiko	10%	PB2	1	Mid
Olearia paniculata	Akiraho	12%	PB2	1	Mid
Phormium tenax	NZ Swamp Flax	15%	PB2	1	Mid
Pittosporum eugenioides	Lemonwood	10%	PB2	1	Mid/Back
Pittosporum tenuifolium	Kohuhu	15%	PB2	1	Mid/Back
Plagianthus regius	Ribbonwood	10%	PB2	1	Back
Pseudopanax crassifolius	Lancewood	5%	PB2	1	Back
Sophora macrophylla	Kowhai	5%	PB2	1	Back

Riparian Planting - C (RPC-01): Tree Enrichment Species

Alectryon excelsus	Titoki	20%	5L	0.1	Enrich
Knightia excelsa	Rewa Rewa	20%	5L	0.1	Enrich
Podocarpus totara	Totara	20%	5L	0.1	Enrich
Prumnopitys taxifolia	Matai	20%	5L	0.1	Enrich
Syzygium maire	Swamp Maire	20%	5L	0.1	Enrich

Riparian Mitiation Planting - C (RMPC-01): Upper Bank

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
Carex dipsacea	Autumn Sedge	5%	PB2	1.8	Front
Carex geminata	Rautahi	5%	0.5L	1.8	Mid
Coprosma propinqua	Mingimingi	5%	PB2	1	Mid
Cordyline australis	Cabbage Tree	3%	PB2	1	Mid
Cortaderia fulvida	Toetoe	10%	PB2	1	Front/mid
Hebe stricta	Koromiko	10%	PB2	1	Mid
Olearia paniculata	Akiraho	12%	PB2	1	Mid
Phormium tenax	NZ Swamp Flax	15%	PB2	1	Mid
Pittosporum eugenioides	Lemonwood	10%	PB2	1	Mid/Back
Pittosporum tenuifolium	Kohuhu	15%	PB2	1	Mid/Back
Plagianthus regius	Ribbonwood	10%	PB2	1	Back
Pseudopanax crassifolius	Lancewood	5%	PB2	1	Back
Sophora macrophylla	Kowhai	5%	PB2	1	Back

Riparian Planting - C (RPC-01): Tree Enrichment Species

Alectryon excelsus	Titoki	20%	5L	0.1	Enrich
Knightia excelsa	Rewa Rewa	20%	5L	0.1	Enrich
Podocarpus totara	Totara	20%	5L	0.1	Enrich
Prumnopitys taxifolia	Matai	20%	5L	0.1	Enrich
Syzygium maire	Swamp Maire	20%	5L	0.1	Enrich

No.	Revision	By	Chk	Appd	Date
		AN			05/04/19
B	For Information - Updated RPC mix	MB	SD/SH		18/02/19
A	For Information	MB	SD/SH		28/08/18

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Design | Drawn | Dsg Verifier | Drg Check
Approved For Construction
Date
* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS
beca
Tonkin+Taylor

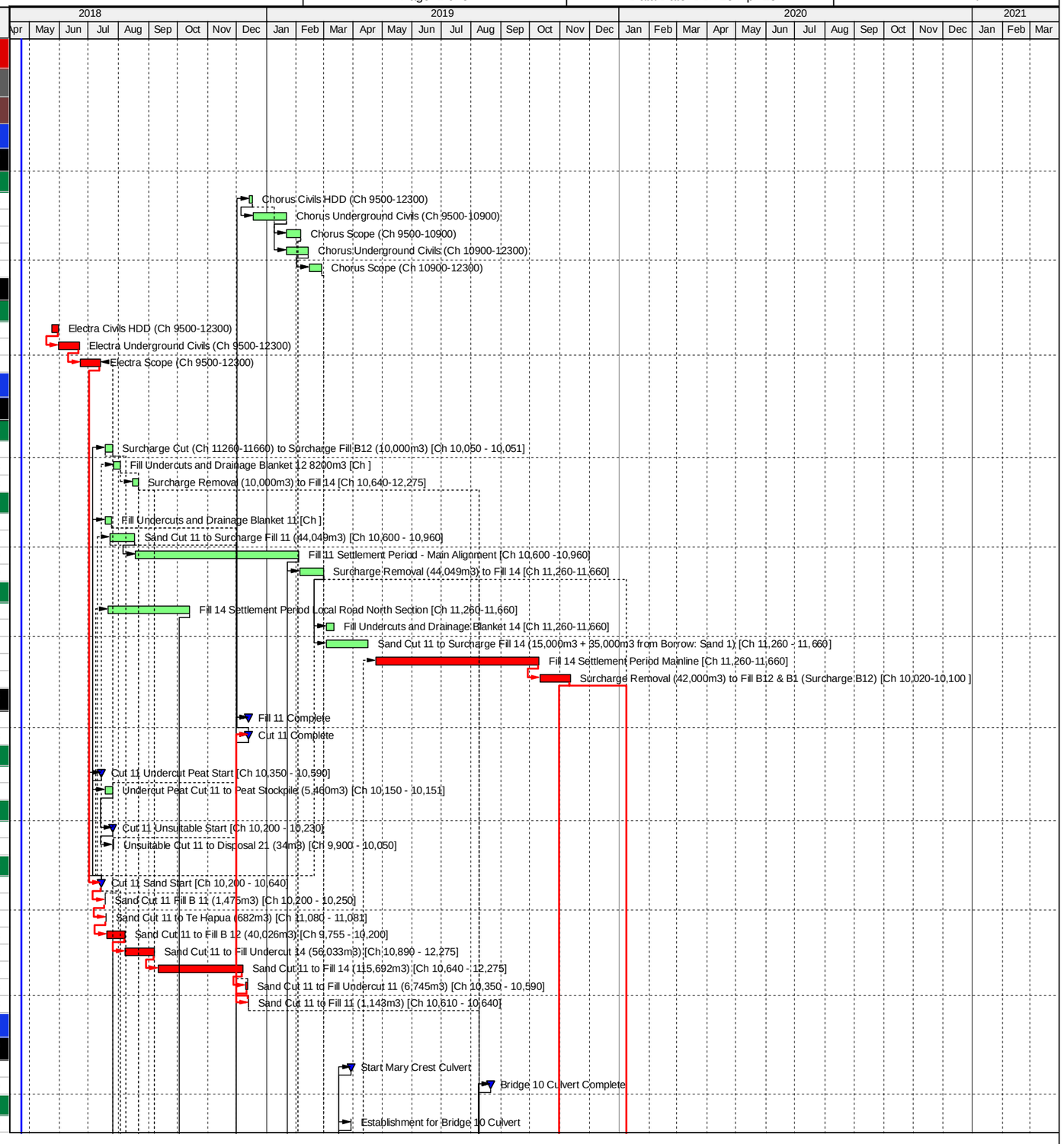
Subject: STREAM DIVERSION TREATMENTS
Title: RIPARIAN PLANT MIXES
Discipline: GENERAL
Drawing No.: PP2O-SK-GN-0285
Rev.: B

ORIGINAL SIZE A3 : DO NOT SCALE

IF IN DOUBT ASK

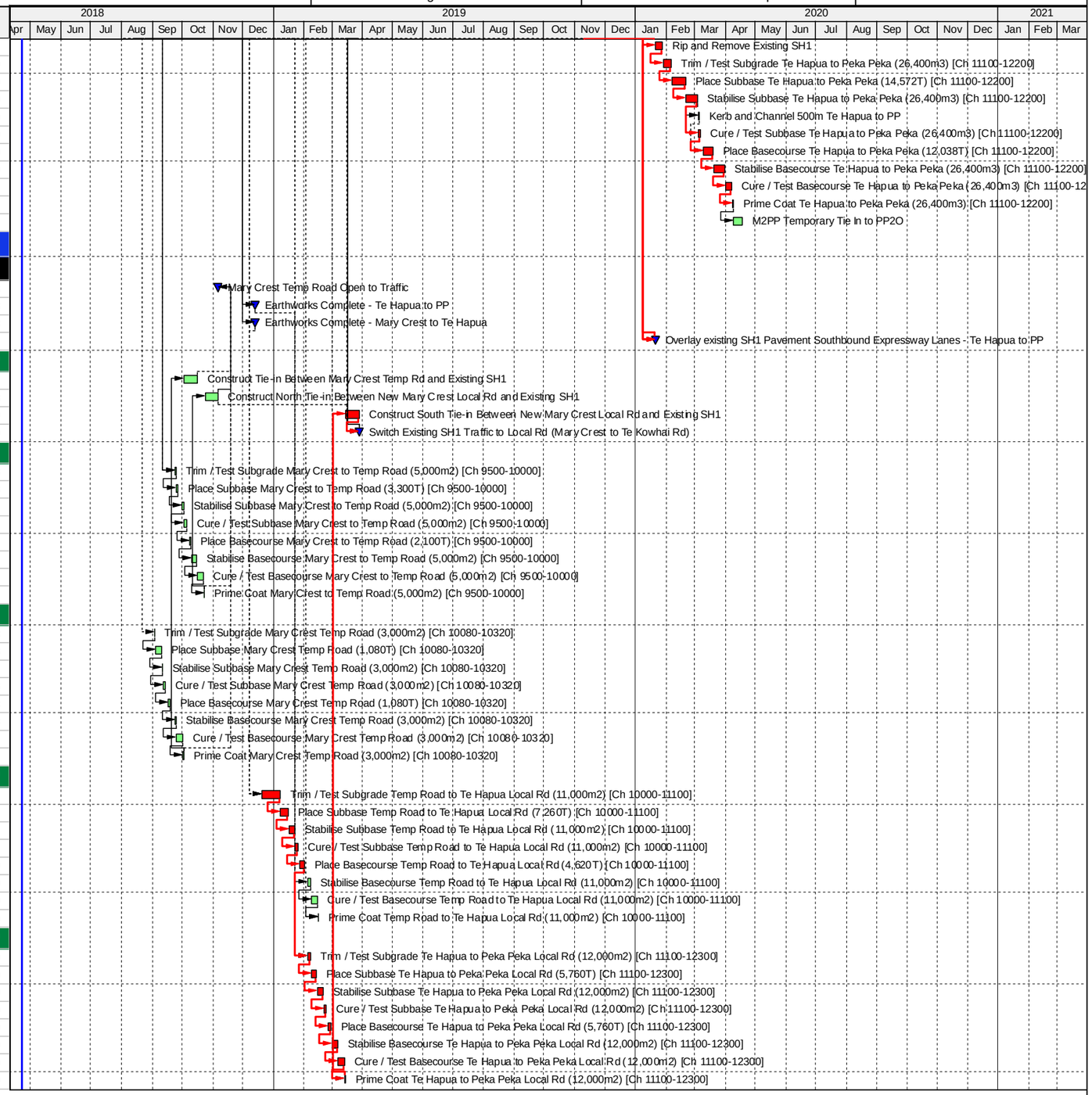
APPENDIX D – PROGRAMME

Activity Name	Orig Dur	Rem Dur	Start	Finish
Peka Peka to Otaki Expressway - Master Target	486d	486d	23-Apr-18	17-Apr-20
Construction	486d	486d	23-Apr-18	17-Apr-20
Zone 2 (South): 3800 - 12200	486d	486d	23-Apr-18	17-Apr-20
Utilities & Services	186d	186d	24-May-18	27-Feb-19
Chorus	42d	42d	14-Dec-18	27-Feb-19
Chorus 8 (9500-12300)	42d	42d	14-Dec-18	27-Feb-19
Chorus Civils HDD (Ch 9500-12300)	2d	2d	14-Dec-18	17-Dec-18
Chorus Underground Civils (Ch 9500-10900)	15d	15d	18-Dec-18	21-Jan-19
Chorus Scope (Ch 9500-10900)	10d	10d	22-Jan-19	05-Feb-19
Chorus Underground Civils (Ch 10900-12300)	15d	15d	22-Jan-19	13-Feb-19
Chorus Scope (Ch 10900-12300)	10d	10d	14-Feb-19	27-Feb-19
Electra	36d	36d	24-May-18	13-Jul-18
Electra 10 (9500-12300)	36d	36d	24-May-18	13-Jul-18
Electra Civils HDD (Ch 9500-12300)	5d	5d	24-May-18	30-May-18
Electra Underground Civils (Ch 9500-12300)	15d	15d	31-May-18	21-Jun-18
Electra Scope (Ch 9500-12300)	16d	16d	22-Jun-18	13-Jul-18
Earthworks	328d	328d	14-Jul-18	11-Nov-19
Ground Improvement	326d	326d	18-Jul-18	11-Nov-19
Surcharge Fill 12 (Ch 10020 - 10100) Valentine Basin - Undercut	23d	23d	18-Jul-18	21-Aug-18
Surcharge Cut (Ch 11260-11660) to Surcharge Fill B12 (10,000m3) [Ch 10,050 - 10,051]	6d	6d	18-Jul-18	25-Jul-18
Fill Undercuts and Drainage Blanket 12 8200m3 [Ch]	5d	5d	27-Jul-18	02-Aug-18
Surcharge Removal (10,000m3) to Fill 14 [Ch 10,640-12,275]	4d	4d	15-Aug-18	21-Aug-18
Surcharge Fill 11 (Ch 10600 - 10920) Mary Crest Basin	150d	150d	18-Jul-18	01-Mar-19
Fill Undercuts and Drainage Blanket 11 [Ch]	5d	5d	18-Jul-18	24-Jul-18
Sand Cut 11 to Surcharge Fill 11 (44,049m3) [Ch 10,600 - 10,960]	18d	18d	23-Jul-18	17-Aug-18
Fill 11 Settlement Period - Main Alignment [Ch 10,600 -10,960]	170d	170d	18-Aug-18	03-Feb-19
Surcharge Removal (44,049m3) to Fill 14 [Ch 11,260-11,660]	17d	17d	04-Feb-19	01-Mar-19
Surcharge Fill 14 (Ch 11260 - 11660) Awatea Area	323d	323d	21-Jul-18	11-Nov-19
Fill 14 Settlement Period Local Road North Section [Ch 11,260-11,660]	85d	85d	21-Jul-18	13-Oct-18
Fill Undercuts and Drainage Blanket 14 [Ch 11,260-11,660]	5d	5d	04-Mar-19	11-Mar-19
Sand Cut 11 to Surcharge Fill 14 (15,000m3 + 35,000m3 from Borrow: Sand 1) [Ch 11,260 - 11	27d	27d	04-Mar-19	16-Apr-19
Fill 14 Settlement Period Mainline [Ch 11,260-11,660]	170d	170d	24-Apr-19	10-Oct-19
Surcharge Removal (42,000m3) to Fill B12 & B1 (Surcharge B12) [Ch 10,020-10,100]	17d	17d	11-Oct-19	11-Nov-19
Cut 11 (Ch 10,160 - 10,700)	108d	108d	14-Jul-18	13-Dec-18
Fill 11 Complete	0d	0d		13-Dec-18
Cut 11 Complete	0d	0d		13-Dec-18
Cut 11 - Undercut Peat (5,460m3)	8d	8d	14-Jul-18	25-Jul-18
Cut 11 Undercut Peat Start [Ch 10,350 - 10,590]	0d	0d	14-Jul-18	
Undercut Peat Cut 11 to Peat Stockpile (5,460m3) [Ch 10,150 - 10,151]	6d	6d	18-Jul-18	25-Jul-18
Cut 11 - Unsuitable (34m3)	1d	1d	26-Jul-18	26-Jul-18
Cut 11 Unsuitable Start [Ch 10,200 - 10,230]	0d	0d	26-Jul-18	
Unsuitable Cut 11 to Disposal 21 (34m3) [Ch 9,900 - 10,050]	1d	1d	26-Jul-18	26-Jul-18
Cut 11 - Sand (280,198m3)	108d	108d	14-Jul-18	13-Dec-18
Cut 11 Sand Start [Ch 10,200 - 10,640]	0d	0d	14-Jul-18	
Sand Cut 11 Fill B 11 (1,475m3) [Ch 10,200 - 10,250]	1d	1d	18-Jul-18	18-Jul-18
Sand Cut 11 to Te Hapua (682m3) [Ch 11,080 - 11,081]	1d	1d	19-Jul-18	19-Jul-18
Sand Cut 11 to Fill B 12 (40,026m3) [Ch 9,755 - 10,200]	13d	13d	20-Jul-18	07-Aug-18
Sand Cut 11 to Fill Undercut 14 (56,033m3) [Ch 10,890 - 12,275]	19d	19d	08-Aug-18	07-Sep-18
Sand Cut 11 to Fill 14 (115,692m3) [Ch 10,640 - 12,275]	50d	50d	11-Sep-18	07-Dec-18
Sand Cut 11 to Fill Undercut 11 (6,745m3) [Ch 10,350 - 10,590]	3d	3d	10-Dec-18	12-Dec-18
Sand Cut 11 to Fill 11 (1,143m3) [Ch 10,610 - 10,640]	1d	1d	13-Dec-18	13-Dec-18
Structures	329d	329d	23-Apr-18	21-Aug-19
Mary Crest Access Culvert (Ch 9500)	100d	100d	29-Mar-19	21-Aug-19
Start Mary Crest Culvert	0d	0d	29-Mar-19	
Bridge 10 Culvert Complete	0d	0d		21-Aug-19
Enabling Works	3d	3d	29-Mar-19	02-Apr-19
Establishment for Bridge 10 Culvert	1d	1d	29-Mar-19	29-Mar-19



Activity Name	Orig Dur	Rem Dur	Start	Finish
Construction pads for Bridge 10 Culvert	3d	3d	29-Mar-19	02-Apr-19
Superstructure	97d	97d	03-Apr-19	21-Aug-19
Base Slab	23d	23d	03-Apr-19	08-May-19
Prep and Blind Base Slab Bridge 10 Culvert	3d	3d	03-Apr-19	05-Apr-19
Tie Reinforcing for Base Slab Bridge 10 Culvert	10d	10d	08-Apr-19	23-Apr-19
Form Base Slab Bridge 10 Culvert	3d	3d	24-Apr-19	29-Apr-19
Pour Base Slab Bridge 10 Culvert	1d	1d	30-Apr-19	30-Apr-19
Cure Base Slab Bridge 10 Culvert	7d	7d	01-May-19	07-May-19
Strip Base Slab Bridge 10 Culvert	1d	1d	08-May-19	08-May-19
Wall Units & Headwalls	35d	35d	09-May-19	27-Jun-19
Tie Reinforcing for Wall Units & Headwalls Bridge 10 Culvert	15d	15d	09-May-19	29-May-19
Form Wall Units & Headwalls Bridge 10 Culvert	8d	8d	30-May-19	11-Jun-19
Pour Wall Units & Headwalls Bridge 10 Culvert	4d	4d	12-Jun-19	17-Jun-19
Cure Wall Units & Headwalls Bridge 10 Culvert	5d	5d	18-Jun-19	24-Jun-19
Strip Wall Units & Headwalls Bridge 10 Culvert	3d	3d	25-Jun-19	27-Jun-19
Topping Slab	39d	39d	28-Jun-19	21-Aug-19
Form Soffit Topping Slab Bridge 10 Culvert	8d	8d	28-Jun-19	09-Jul-19
Tie Reinforcing for Topping Slab Bridge 10 Culvert	10d	10d	10-Jul-19	23-Jul-19
Form Topping Slab Bridge 10 Culvert	3d	3d	24-Jul-19	26-Jul-19
Pour Topping Slab Bridge 10 Culvert	1d	1d	29-Jul-19	29-Jul-19
Cure Topping Slab Bridge 10 Culvert	7d	7d	30-Jul-19	07-Aug-19
Topping Slab Bridge 10 Culvert	5d	5d	08-Aug-19	14-Aug-19
Patching Bridge 10 Culvert	5d	5d	15-Aug-19	21-Aug-19
Mary Crest Retaining Walls	35d	35d	23-Apr-18	12-Jun-18
Mary Crest Retaining Wall 1 [Ch 10650]	15d	15d	23-Apr-18	14-May-18
Mary Crest Retaining Wall 2 [Ch 10750]	10d	10d	15-May-18	28-May-18
Retaining Wall Earthworks for Electra Reolocation (10,000m3)	10d	10d	29-May-18	12-Jun-18
Drainage	351d	351d	08-Aug-18	20-Jan-20
CSP Culverts	198d	198d	14-Aug-18	10-Jun-19
Culvert 35 - 26.36m (21PA5-14) Gear Rd [Ch 8600] -CSP	18d	18d	14-Aug-18	06-Sep-18
Culvert 53 - 30m (18PA5-7) Local Rd Section (MC and TH) [Ch 10,050] - CSP	22d	22d	21-Aug-18	19-Sep-18
Culvert 28 - 53.5m (CM Supercor box 10m2) [Ch 7500] - CSP	32d	32d	07-Sep-18	23-Oct-18
Culvert 53 - 58m (18PA5-7) Main Alignment Section (MC and TH) [Ch 10,050] -CSP	45d	45d	20-Sep-18	22-Nov-18
Culvert 27 - 29.8m (CM supercor arch 12m2) [Ch 7520] - CSP	26d	26d	11-Mar-19	15-Apr-19
Culvert 23a - 43.7m (CM Arch 39AB) Te Horo Bridge Approach East Side [Ch 7200] - CSP	36d	36d	16-Apr-19	10-Jun-19
Circular Culverts	351d	351d	08-Aug-18	20-Jan-20
Culvert 50 - 20 m (1.2m Dia.) Local Rd Section (MC and TH) [Ch 9950]	5d	5d	08-Aug-18	14-Aug-18
Culvert 59 - 25m (1.6m Dia.) Local Rd Section (MC and TH) [Ch 10,800]	5d	5d	15-Aug-18	21-Aug-18
Culvert 61 - 30m (0.75m Dia.) Local Rd Section (MC and TH) [Ch 10,970]	4d	4d	22-Aug-18	27-Aug-18
Culvert 64 - 30m (5 Barrel 1.5m Dia.) Local Rd Section (TH and PP) [Ch 11,380] - PC Pipe	10d	10d	15-Oct-18	29-Oct-18
Culvert 45 - 46.5m (1.5m Dia.) [Ch 9400]	5d	5d	09-Nov-18	15-Nov-18
Culvert 42 - 37.2m (1.35m Dia.) [Ch 9020]	5d	5d	16-Nov-18	22-Nov-18
Culvert 66 - 23.55m (Twin 1.6m Dia.) Local Rd Section (TH and PP) [Ch 11,660]	10d	10d	23-Nov-18	06-Dec-18
Culvert 59 - 45m (1.6m Dia.) Main Alignment Section (MC and TH) [Ch 10,800]	10d	10d	04-Feb-19	18-Feb-19
Culvert 61 - 34.5m (0.75m Dia.) Main Alignment Section (MC and TH) [Ch 10,970]	5d	5d	19-Feb-19	25-Feb-19
Culvert 50 - 82.5m (1.2m Dia.) Main Alignment Section (MC and TH) [Ch 9950]	5d	5d	29-Mar-19	04-Apr-19
Culvert 50a - 17.5m (1.2m Dia.) Mary Crest Culvert Underpass [Ch 9950]	5d	5d	05-Apr-19	11-Apr-19
Culvert 64 - 40m (5 Barrel 1.5m Dia.) Main Alignment Section (TH and PP) [Ch 11,380] - PC Pipe	20d	20d	12-Nov-19	09-Dec-19
Culvert 66 - 40m (Twin 1.6m Dia.) Main Alignment Section (MC and TH) [Ch 11,660]	20d	20d	10-Dec-19	20-Jan-20
Pavements	157d	157d	22-Aug-19	17-Apr-20
Mary Crest to Te Hapua (Ch 10100-11100)	57d	57d	22-Aug-19	11-Nov-19
Trim / Test Subgrade Mary Crest to Te Hapua (24,000m3) [Ch 10100-11100]	5d	5d	22-Aug-19	30-Aug-19
Place Subbase Mary Crest to Te Hapua (13,248T) [Ch 10100-11100]	7d	7d	03-Sep-19	13-Sep-19
Stabilise Subbase Mary Crest to Te Hapua (24,000m3) [Ch 10100-11100]	6d	6d	19-Sep-19	02-Oct-19
Kerb and Channel 500m Mary Crest to Te Hapua	2d	2d	03-Oct-19	04-Oct-19
Cure / Test Subbase Mary Crest to Te Hapua (24,000m3) [Ch 10100-11100]	3d	3d	03-Oct-19	05-Oct-19
Place Basecourse Mary Crest to Te Hapua (10,944T) [Ch 10100-11100]	7d	7d	08-Oct-19	22-Oct-19
Stabilise Basecourse Mary Crest to Te Hapua (24,000m3) [Ch 10100-11100]	6d	6d	24-Oct-19	01-Nov-19
Cure / Test Basecourse Mary Crest to Te Hapua (24,000m3) [Ch 10100-11100]	7d	7d	02-Nov-19	08-Nov-19
Prime Coat Mary Crest to Te Hapua (24,000m3) [Ch 10100-11100]	1d	1d	11-Nov-19	11-Nov-19
Te Hapua to Peka Peka (Ch 11100-12200)	60d	60d	21-Jan-20	17-Apr-20

Activity Name	Orig Dur	Rem Dur	Start	Finish
Rip and Remove Existing SH1	5d	5d	21-Jan-20	28-Jan-20
Trim / Test Subgrade Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	6d	6d	29-Jan-20	06-Feb-20
Place Subbase Te Hapua to Peka Peka (14,572T) [Ch 11100-12200]	8d	8d	07-Feb-20	20-Feb-20
Stabilise Subbase Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	7d	7d	21-Feb-20	03-Mar-20
Kerb and Channel 500m Te Hapua to PP	2d	2d	04-Mar-20	05-Mar-20
Cure / Test Subbase Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	3d	3d	04-Mar-20	06-Mar-20
Place Basecourse Te Hapua to Peka Peka (12,038T) [Ch 11100-12200]	8d	8d	09-Mar-20	19-Mar-20
Stabilise Basecourse Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	7d	7d	20-Mar-20	31-Mar-20
Cure / Test Basecourse Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	7d	7d	01-Apr-20	07-Apr-20
Prime Coat Te Hapua to Peka Peka (26,400m3) [Ch 11100-12200]	1d	1d	08-Apr-20	08-Apr-20
M2PP Temporary Tie In to PP2O	5d	5d	09-Apr-20	17-Apr-20
Local Roads	333d	333d	03-Sep-18	21-Jan-20
Mary Crest to Peka Peka (Ch 9500-12250)	333d	333d	03-Sep-18	21-Jan-20
Mary Crest Temp Road Open to Traffic	0d	0d		06-Nov-18
Earthworks Complete - Te Hapua to PP	0d	0d		13-Dec-18
Earthworks Complete - Mary Crest to Te Hapua	0d	0d		13-Dec-18
Overlay existing SH1 Pavement Southbound Expressway Lanes - Te Hapua to PP	0d	0d	21-Jan-20	
Mary Crest Tie-ins to SH1	114d	114d	03-Oct-18	28-Mar-19
Construct Tie-in Between Mary Crest Temp Rd and Existing SH1	10d	10d	03-Oct-18	16-Oct-18
Construct North Tie-in Between New Mary Crest Local Rd and Existing SH1	10d	10d	24-Oct-18	06-Nov-18
Construct South Tie-in Between New Mary Crest Local Rd and Existing SH1	10d	10d	15-Mar-19	28-Mar-19
Switch Existing SH1 Traffic to Local Rd (Mary Crest to Te Kowhai Rd)	0d	0d		28-Mar-19
Mary Crest North of Temp Rd	21d	21d	24-Sep-18	23-Oct-18
Trim / Test Subgrade Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	1d	1d	24-Sep-18	24-Sep-18
Place Subbase Mary Crest to Temp Road (3,300T) [Ch 9500-10000]	2d	2d	25-Sep-18	26-Sep-18
Stabilise Subbase Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	2d	2d	01-Oct-18	02-Oct-18
Cure / Test Subbase Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	3d	3d	03-Oct-18	05-Oct-18
Place Basecourse Mary Crest to Temp Road (2,100T) [Ch 9500-10000]	2d	2d	08-Oct-18	09-Oct-18
Stabilise Basecourse Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	2d	2d	10-Oct-18	15-Oct-18
Cure / Test Basecourse Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	7d	7d	16-Oct-18	22-Oct-18
Prime Coat Mary Crest to Temp Road (5,000m2) [Ch 9500-10000]	1d	1d	23-Oct-18	23-Oct-18
Mary Crest Temp Road	22d	22d	03-Sep-18	02-Oct-18
Trim / Test Subgrade Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	03-Sep-18	03-Sep-18
Place Subbase Mary Crest Temp Road (1,080T) [Ch 10080-10320]	2d	2d	04-Sep-18	10-Sep-18
Stabilise Subbase Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	11-Sep-18	11-Sep-18
Cure / Test Subbase Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	3d	3d	12-Sep-18	14-Sep-18
Place Basecourse Mary Crest Temp Road (1,080T) [Ch 10080-10320]	2d	2d	17-Sep-18	18-Sep-18
Stabilise Basecourse Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	24-Sep-18	24-Sep-18
Cure / Test Basecourse Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	7d	7d	25-Sep-18	01-Oct-18
Prime Coat Mary Crest Temp Road (3,000m2) [Ch 10080-10320]	1d	1d	02-Oct-18	02-Oct-18
Mary Crest Temp Road to Te Hapua	30d	30d	20-Dec-18	15-Feb-19
Trim / Test Subgrade Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	20-Dec-18	07-Jan-19
Place Subbase Temp Road to Te Hapua Local Rd (7,260T) [Ch 10000-11100]	5d	5d	08-Jan-19	15-Jan-19
Stabilise Subbase Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	17-Jan-19	22-Jan-19
Cure / Test Subbase Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	23-Jan-19	25-Jan-19
Place Basecourse Temp Road to Te Hapua Local Rd (4,620T) [Ch 10000-11100]	5d	5d	28-Jan-19	01-Feb-19
Stabilise Basecourse Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	3d	3d	04-Feb-19	07-Feb-19
Cure / Test Basecourse Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	7d	7d	08-Feb-19	14-Feb-19
Prime Coat Temp Road to Te Hapua Local Rd (11,000m2) [Ch 10000-11100]	1d	1d	15-Feb-19	15-Feb-19
Te Hapua to Peka Peka	28d	28d	04-Feb-19	14-Mar-19
Trim / Test Subgrade Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	04-Feb-19	07-Feb-19
Place Subbase Te Hapua to Peka Peka Local Rd (5,760T) [Ch 11100-12300]	4d	4d	08-Feb-19	13-Feb-19
Stabilise Subbase Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	14-Feb-19	20-Feb-19
Cure / Test Subbase Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	21-Feb-19	23-Feb-19
Place Basecourse Te Hapua to Peka Peka Local Rd (5,760T) [Ch 11100-12300]	4d	4d	25-Feb-19	28-Feb-19
Stabilise Basecourse Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	3d	3d	01-Mar-19	06-Mar-19
Cure / Test Basecourse Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	7d	7d	07-Mar-19	13-Mar-19
Prime Coat Te Hapua to Peka Peka Local Rd (12,000m2) [Ch 11100-12300]	1d	1d	14-Mar-19	14-Mar-19



NZ TRANSPORT AGENCY WAKA KOTAHI

Peka Peka to Otaki
Mary Crest Area Programme

Actual Work | Critical Remaining ... | Remaining Work | Milestone | Milestones

Fletcher HIGGINS | Beca | Tonkin+Taylor

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

Tonkin+Taylor

Memo

To:	**Richard Rakovics, Alice Naylor**	**Job No:**	**85985.007**
From:	**Razel Ramilo**	**Date:**	**27 September 2018**
cc:	**Richard Cole, Stuart Waters, Andrew Goldie, Emma Boon**		
Subject:	**Peka Peka to Otaki Expressway - Mary Crest Basin Preload Geotechnical Instrumentation and Monitoring**		

1 Introduction

This memo relates to the proposed geotechnical instrumentation and monitoring at Mary Crest Basin preload. The Mary Crest Basin preload is approximately 25m from SH1.

Details of the proposed preload is summarised in Table 1.

Table 1: Details of Mary Crest Basin preload

Maximum Fill height (m)	Depth to top of peat (m bgl)	Peat thickness (m)	Preload height (m)	Expected Preload duration (months)	Proposed solution
3	0	4.5	2.5	6	Use high strength geotextile basal reinforcement and preload peat

2 Ground conditions

The preload footprint is underlain by Inter-dune deposits and Holocene dune sand. Inter-dune deposits typically consists of saturated woody, silty / sandy PEAT (3 to 4.5m thick in this area). Dune deposits can be described as fine to medium size SAND.

3 Groundwater monitoring

A water standpipe has been installed in borehole BH219 near SH1 during the previous stages of investigations completed by Opus[1]. Groundwater level within this standpipe will be monitored during preload activity.

Summary of measured groundwater levels are presented in Table 2.

[1] OPUS (2016) "PP2O Specimen Design Stage - Geotechnical Investigation (Factual Report)".

Table 2: Water standpipe results

Borehole ID	Groundwater (metres below ground level)	Groundwater RL (NZVD2009)
BH219	0 - 1	10.8 - 11.9

4 Ground instrumentation and monitoring

The preload will be monitored during construction to monitor temporary stability of the embankment fill, the magnitudes of settlement and the degree of consolidation settlement that has been completed. The proposed instrumentation and monitoring during preload includes:

- Site inspections by geotechnical designer or engineering geologist;
- Settlement monitoring using 2 profilometers, 10 settlement plates, and 10 settlement stations. These will be installed within the preload embankment.
- Groundwater and pore pressure monitoring using 2 vibrating wire piezometers. The piezometer will be installed at the centre of the preload embankment.
- Lateral ground displacement monitoring using 4 inclinometers and 2 shear probes. The inclinometers and shear probes will be installed within 1.5m from toe of preload embankment.

Refer to Table 1 for the instrumentation monitoring frequency. The frequency of monitoring will be regularly reviewed (at least monthly) to ensure the data gathered is appropriate and reflects the level of potential risk throughout various stages of preload. Alert, action and alarm trigger levels have also been prepared.

- Alert levels shall require an increase in monitoring frequency, design review and change in construction method and/or programme as necessary.
- Action level requires normal work in the area affected will cease immediately and not resume until successful implementation of corrective works.
- Alarm level requires all normal and corrective work in the area affected shall cease and emergency works undertaken to bring the situation under control to an Alert status.

In the event that the alert, action or alarm levels are reached, the owner and occupier of the site and the Manager (Kapiti Coast District Council Resource Consents and Compliance) must be notified within 72 hours. This notification will outline which of the trigger levels have been reached and any remedial or preventative action undertaken.

Table 3: Mary Crest Basin preload geotechnical instrumentation schedule

Construction Stage	Instrumentation Type	
	Settlement plates, settlement stations	**Profilometers, vibrating wire piezometers, stand pipe piezometers, inclinometers, shear probes**
Base line readings (1 month before start)	3 sets of consistent readings (at least 24 hrs apart)	3 sets of consistent readings (at least 24 hrs apart)
4 weeks prior to preload	Weekly	Weekly
During preload	Twice weekly	Twice weekly

Removal of preload	1 reading 24 hours prior 1 reading 24 hours following	1 reading 24 hours prior 1 reading 24 hours following
	Weekly for 1 month then monthly	Monthly

5 Temporary Drainage

A 300mm thick subsoil gravel fill blanket will be placed on the existing ground before the preload material is applied, water discharged from the peat during preload will be collected by the subsoil gravel fill blanket and the temporary drainage around the perimeter of the preload will collect displaced water and drain to the nearby stream.

6 Risk to existing SH1

The distance of preload from SH1 is approximately 25m. We have completed a slope stability and settlement analysis. This indicates that the influence zone of preload will be less than 10m. Based on this assessment, we do not expect that the preload will have an adverse effect to SH1. We consider the risk of settlement of SH1 due to the preload activity to be low. We consider that survey monitoring of SH1 is not necessary. However, regular inspections of SH1 during preloading will be undertaken. If the instrumentation at the preload (Refer Table 1 above) indicates that large or unexpected deformations have occurred during preloading or the regular inspections identify any damage or movement of SH1 the designer will investigate further and may propose to undertake instrument monitoring on SH1.

7 Applicability

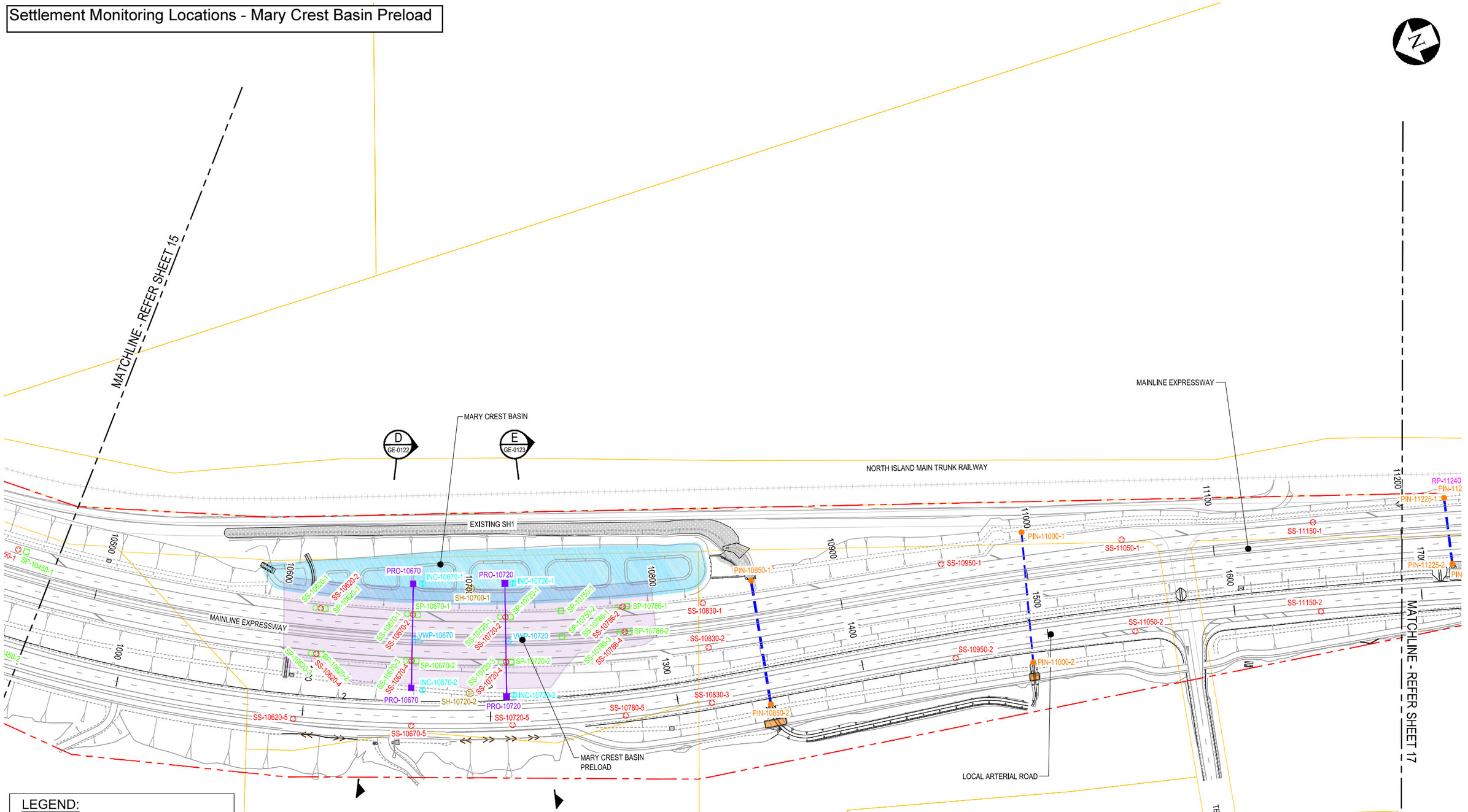
This report has been prepared for the exclusive use of Fletcher Construction, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Prepared by:	Reviewed by:
	
…….	…….
Razel Ramilo	Richard Cole
Senior Geotechnical Engineer	Geotechnical Design Lead

Save Date: 29 Mar 2019 1:20 p.m.

Settlement Monitoring Locations - Mary Crest Basin Preload



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

A1 SCALE 1:1000
A3 SCALE 1:2000

0 10 20 30 40 60 80 100 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
3	HOLDS REMOVED FROM CULVERTS	RMT	RR	BS	29.03.19
2	SOME INSTRUMENTS RENAMED AND ONE RELOCATED, PRELOAD MODIFIED	RMT	RC	BS	18.04.18
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Scale (A1) 1:1000
Scale (A3) 1:2000

Design	R. RAMILO	31.01.17	Approved For Construction: B. SYMMANS
Drawn	G. DOWN	31.01.17	
Dsg Verifier	R. HILLIER	09.03.18	
Drg Check	G. DOWN	09.03.18	Date 12.03.18

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject: EARTHWORKS
Title: GEOTECHNICAL INSTRUMENTATION PLAN SHEET 16

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0116
Rev.: 3

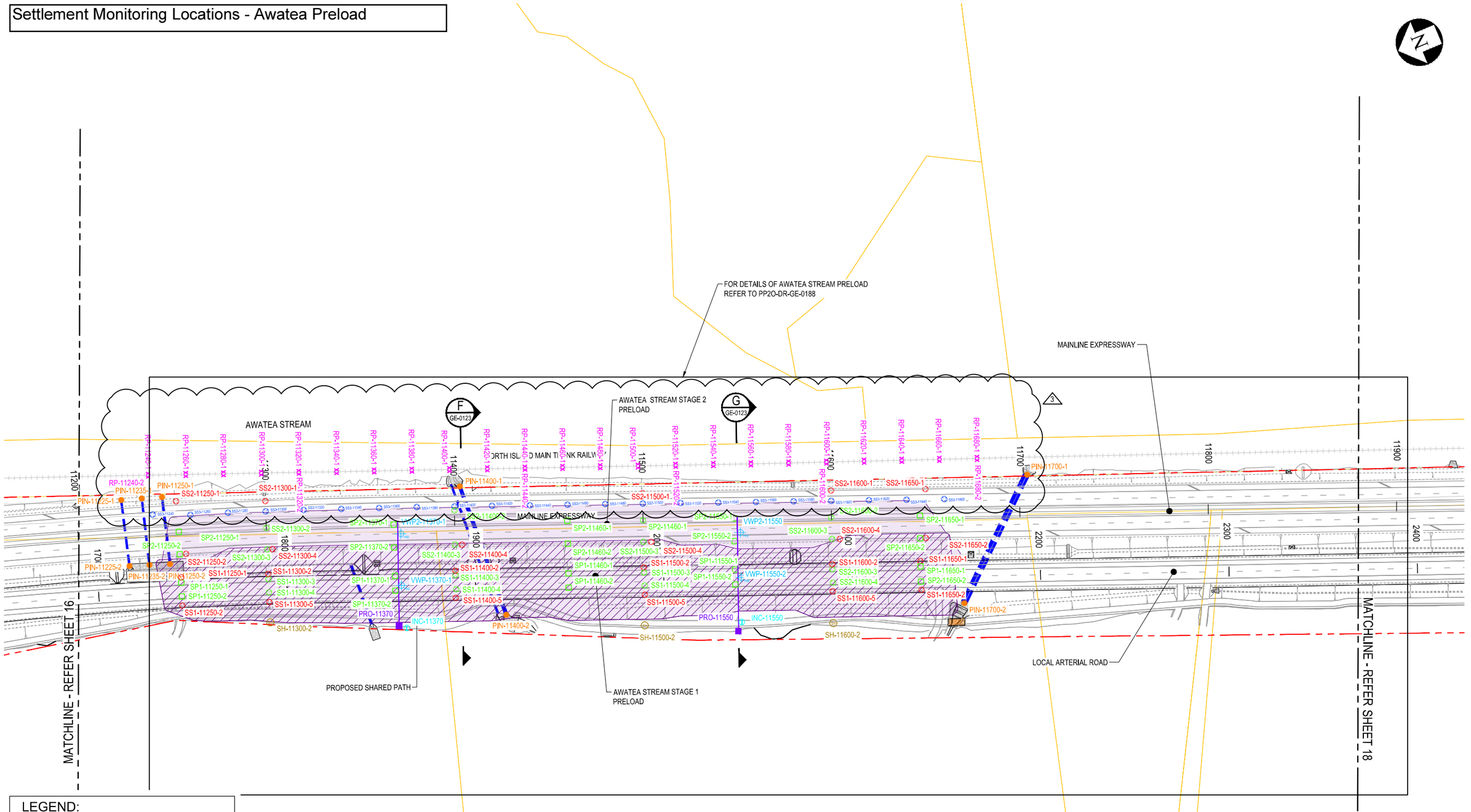
ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

Document No.: R130DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GEU\PDATES\PP2O-DR-GE-0101-0116.DWG

Save Date: 29 Mar 2019 1:22 p.m.

Settlement Monitoring Locations - Awatea Preload



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

A1 SCALE 1:1000
A3 SCALE 1:2000

0 10 20 30 40 60 80 100 (m)

ORIGINAL IN COLOUR

FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
3	RAIL SETTLEMENT PINS ADDED TO THE EAST OF THE PRELOAD AREA AND HOLDS REMOVED FROM CULVERTS	RMT	RR	BS	29.03.19
2	SOME INSTRUMENTS RENAMED AND OTHERS RELOCATED, PRELOAD MODIFIED	GD	RC	BS	13.04.18
1	FOR CONSTRUCTION	JL	TH	BS	09.03.18

Scale (A1) 1:1000	Design	R. RAMILO	31.01.17
Scale (A3) 1:2000	Drawn	G. DOWN	31.01.17
	Dsg Verifier	R. HILLIER	09.03.18
	Drg Check	G. DOWN	09.03.18

Approved For Construction: B. SYMMANS
Date: 12.03.18

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI | Peka Peka to Ōtaki Expressway | Fletcher HIGGINS | Beca | Tonkin+Taylor

Subject: EARTHWORKS
Title: GEOTECHNICAL INSTRUMENTATION PLAN SHEET 17

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0117
Rev.: 3

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

Document No.: R130DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GE\UPDATES\PP2O-DR-GE-0101-0118.DWG

APPENDIX G: STORMWATER REQUIREMENTS

Save Date: 20 Dec 2017 6:35 p.m.

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
- TL4 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

KEY PLAN
N.T.S.

REVISED CULVERT LOCATIONS

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.

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

EXISTING CULVERT

Temporary PE Culvert @ Awatea Stream
1 x 1050 diameter PE - to take 2 y ARI flow ~ 2.3m3/s.

NORTH ISLAND MAIN TRUNK RAILWAY

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

Stage 1 Preload
5m surcharge.
3 months

NEW LOCAL ARTERIAL ROAD

11200 11300 11600 11700 11800 11900

MATCHLINE - REFER SHEET 16

MATCHLINE - REFER SHEET 18

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

A1 SCALE 1:1000
A3 SCALE 1:2000
0 10 20 30 40 60 80 100 (m)

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) 1:1000
Scale (A3)

Design	R.RAMILO	22.08.17	Approved For Construction
Drawn	A.KOCHAR	22.08.17	
Dsg Verifier			
Drg Check			Date

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAKA KOTAHI
Peka Peka to Ōtaki Expressway
Fletcher HIGGINS Beca Tonkin+Taylor

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

Discipline: GEOTECHNICAL
Drawing No.: PP2O-DR-GE-0017
Rev.: B

Document No. R:\30DD - DESIGN DEVELOPMENT GENERAL\09 CAD\DRAWINGS\GE\PP2O-DR-GE-0001-0018.DWG

ORIGINAL SIZE A1 : DO NOT SCALE

IF IN DOUBT ASK

APPENDIX H: SITE SPECIFIC TRAFFIC MANAGEMENT PLAN

Site Specific Traffic Management Plan – Peka to Ōtaki Project

Mary Crest to Te Kowhai Road

June 2018

NZ TRANSPORT AGENCY WAKA KOTAHI

Peka Peka to Ōtaki Expressway

New Zealand Government

Contents

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 SSEMP.

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.

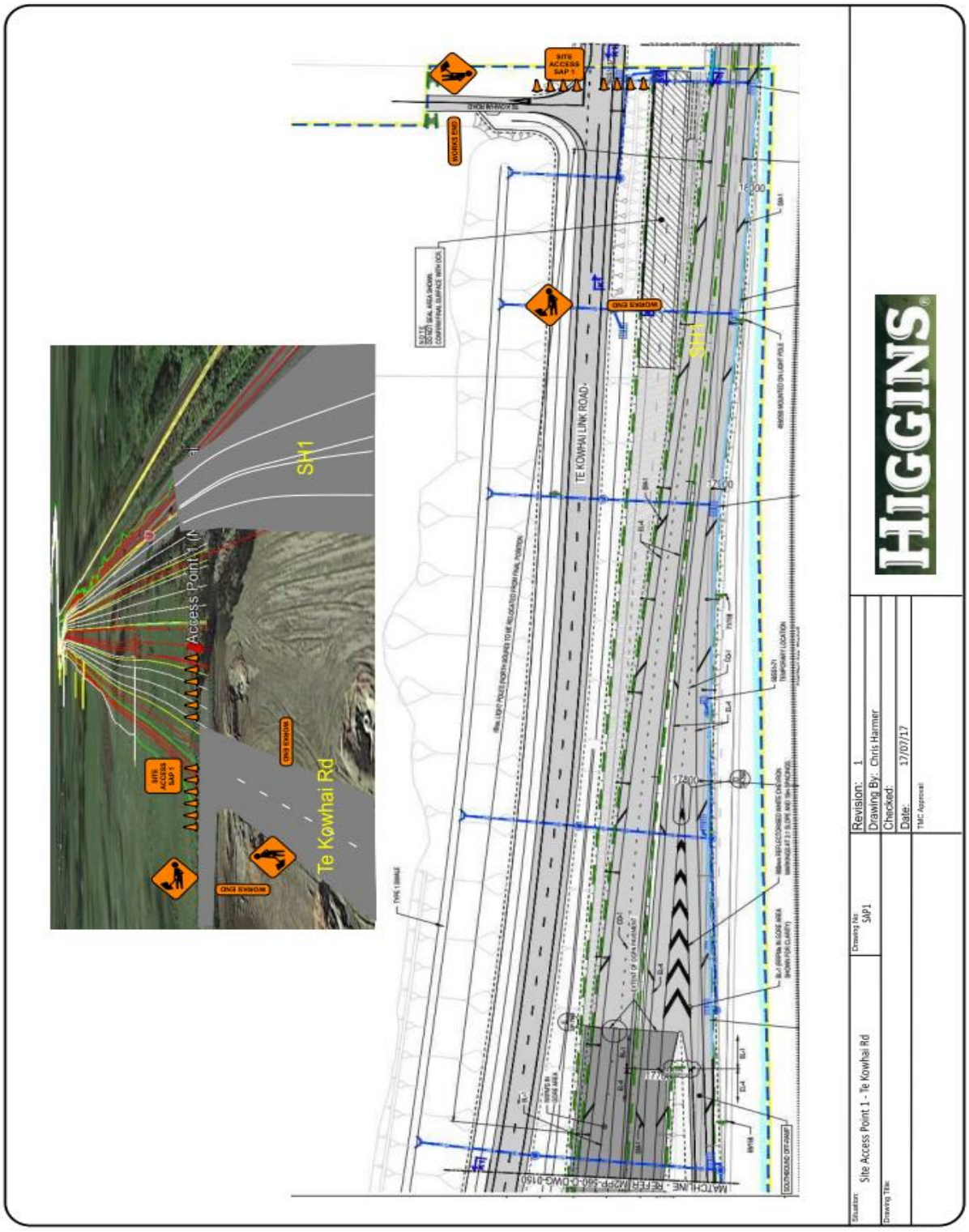
3.4 Monitoring, Auditing & Reporting – CTMP sections 3.3 & 3.4

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

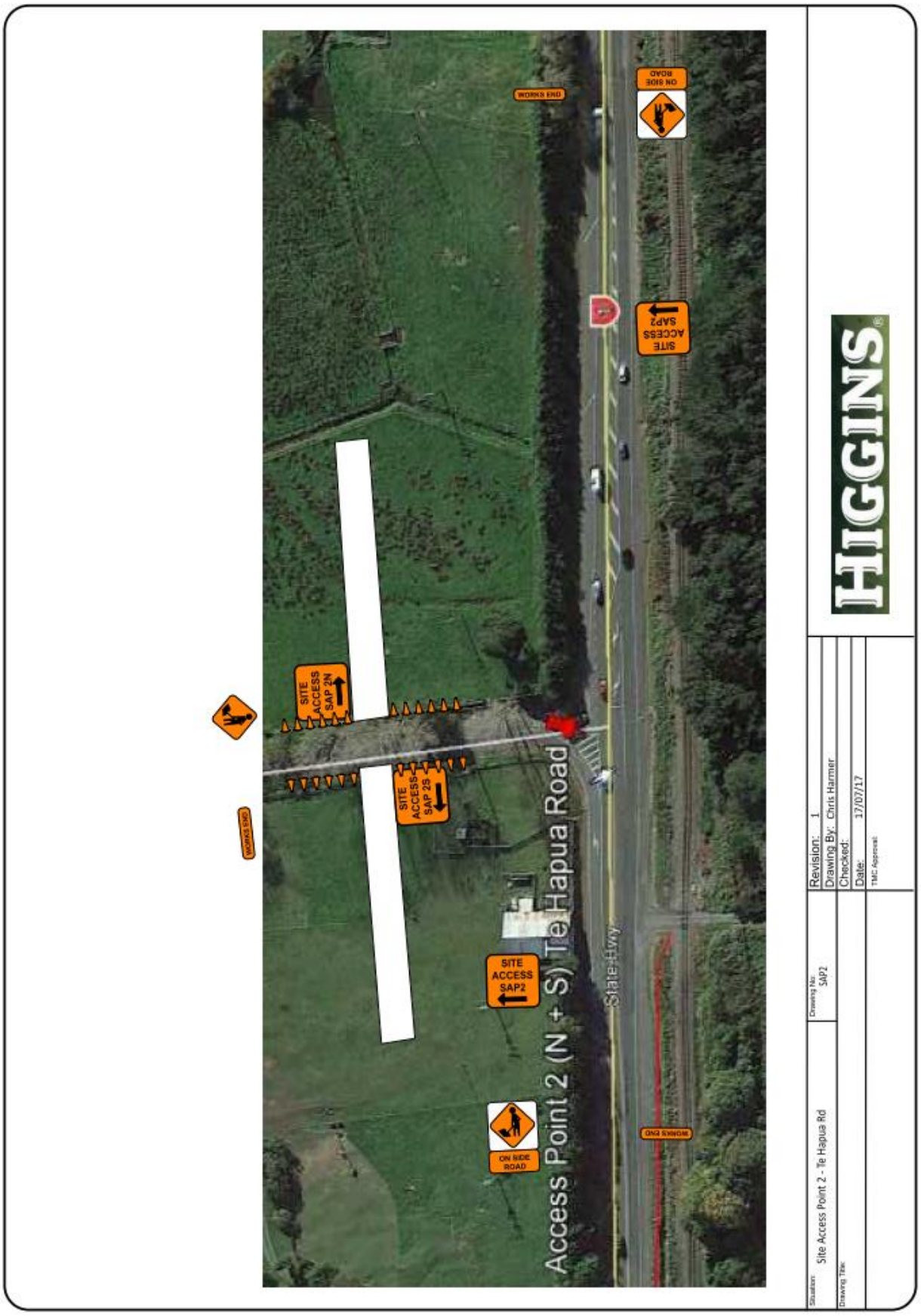
3.5 Complaints – CTMP sections 3.5

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.

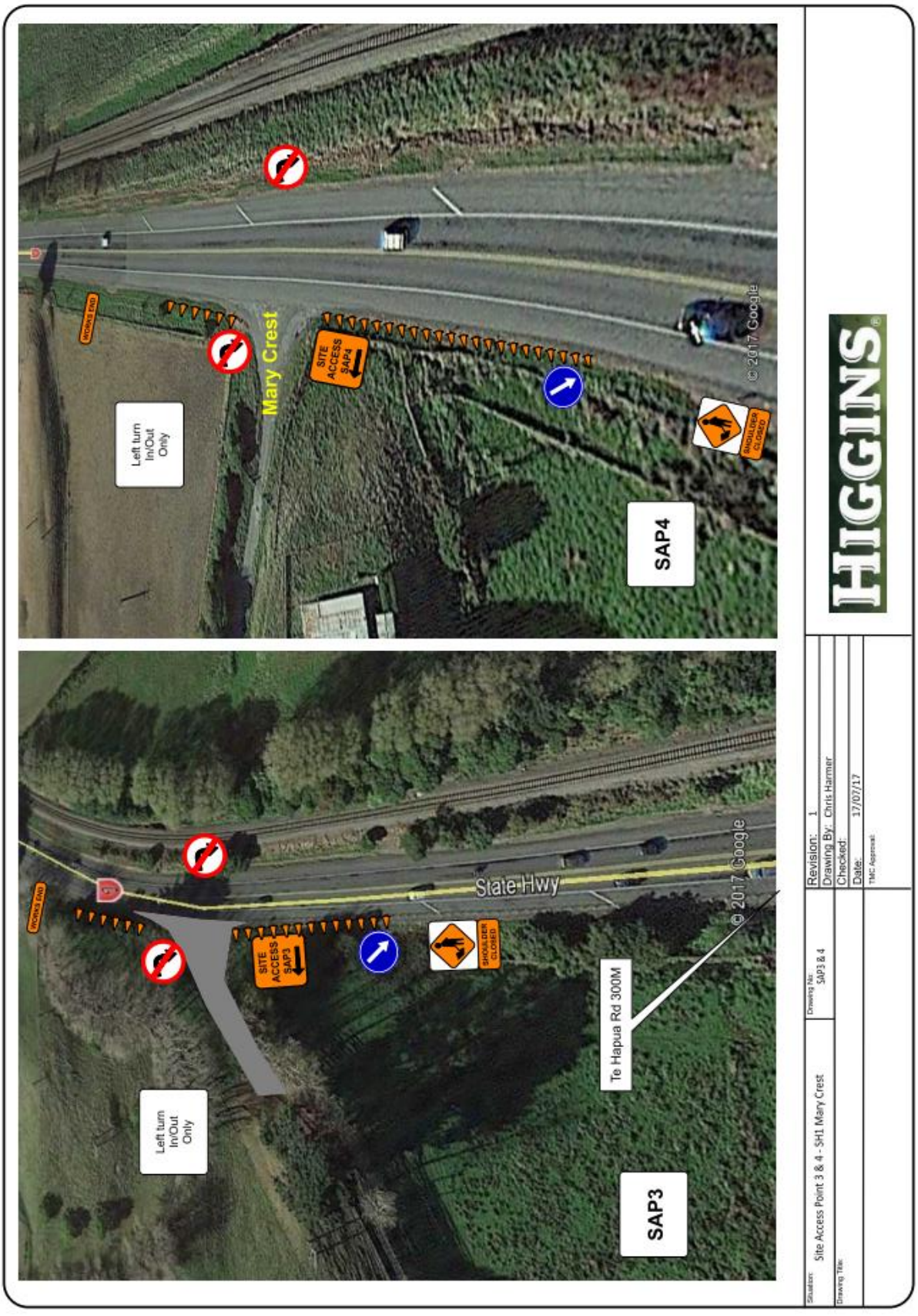
SAP 1


SH1
Access Point 1
Te Kowhai Rd
SITE ACCESS SAP 1
WORKS END
TE KOWHAI LINK ROAD
SH1
HIGGINS
Situation: Site Access Point 1 - Te Kowhai Rd
Drawing No: SAP1
Drawing Title:
Revision: 1
Drawing By: Chris Harmer
Checked:
Date: 17/07/17
TMC Approval:

SAP 2


Access Point 2 (N + S) Te Hapua Road
State Hwy
SITE ACCESS SAP 2N
SITE ACCESS SAP 2S
SITE ACCESS SAP2
SITE ACCESS SAP2
ON SIDE ROAD
ON SIDE ROAD
WORKS END
WORKS END
WORKS END
Site Access Point 2 - Te Hapua Rd
SAP2
Revision: 1
Drawing By: Chris Harmer
Checked:
Date: 17/07/17
TMC Approval:
HIGGINS

SAP 3 & SAP 4


Mary Crest
SITE ACCESS SAP4
WORKS END
Left turn In/Out Only
SHOULDER CLOSED
SAP4
© 2017 Google
State Hwy
SITE ACCESS SAP3
Te Hapua Rd 300M
SAP3
Site Access Point 3 & 4 - SH1 Mary Crest
SAP3 & 4
Revision: 1
Drawing By: Chris Harmer
Checked:
Date: 17/07/17
TMC Approval:
HIGGINS

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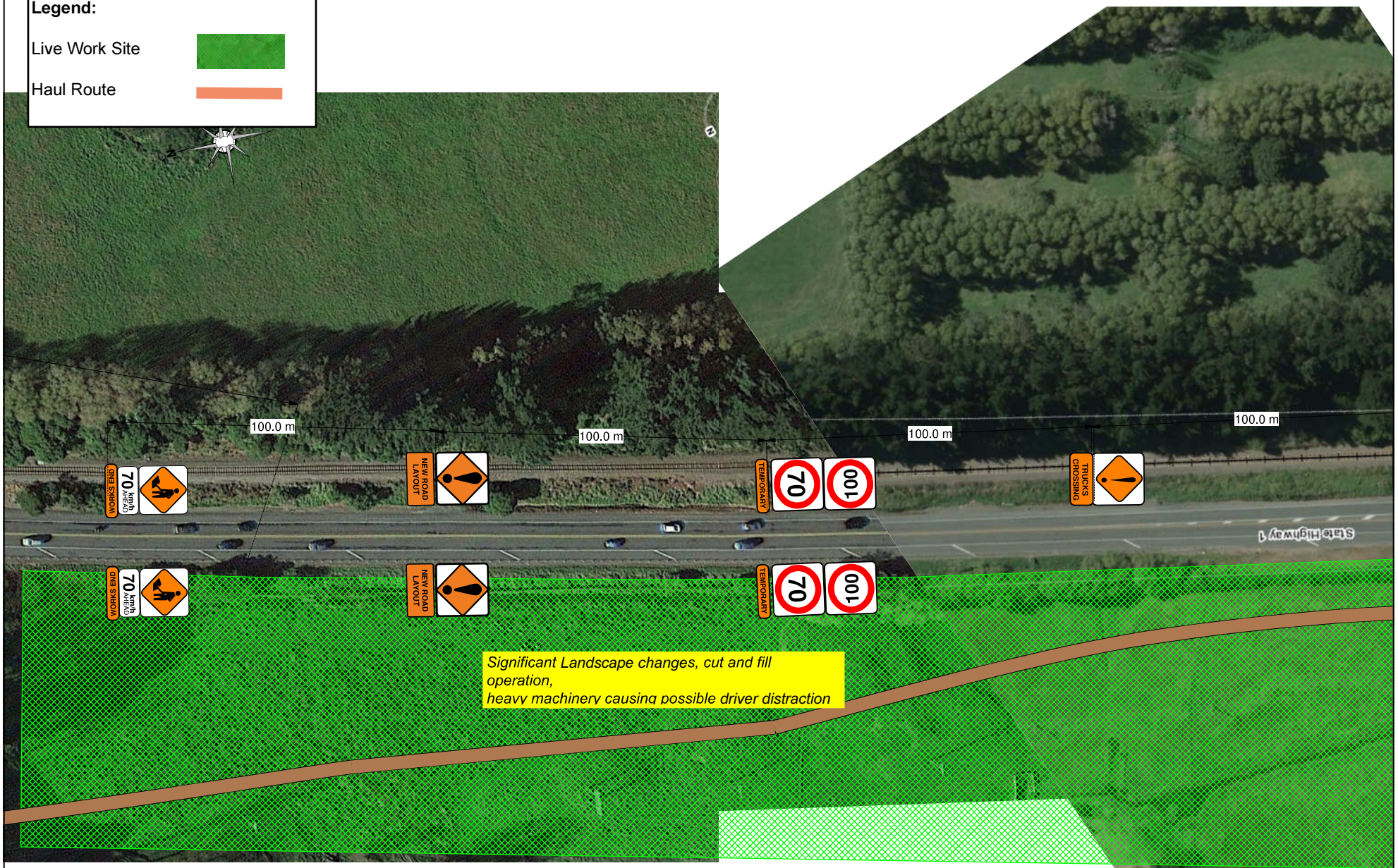

SITUATION : Pre Load Stage 2 Works	REVISION : 1.0
DRAWING TITLE : New Road Layout Contraflow Site Access Point 2	DRAWING BY : Travis Medhurst
DRAWING No : P2O - 049SAP2 Sheet 1	CHECKED :
	DATE : 19.02.2019
	TMC APPROVAL :

Peka Peka to Ōtaki Expressway

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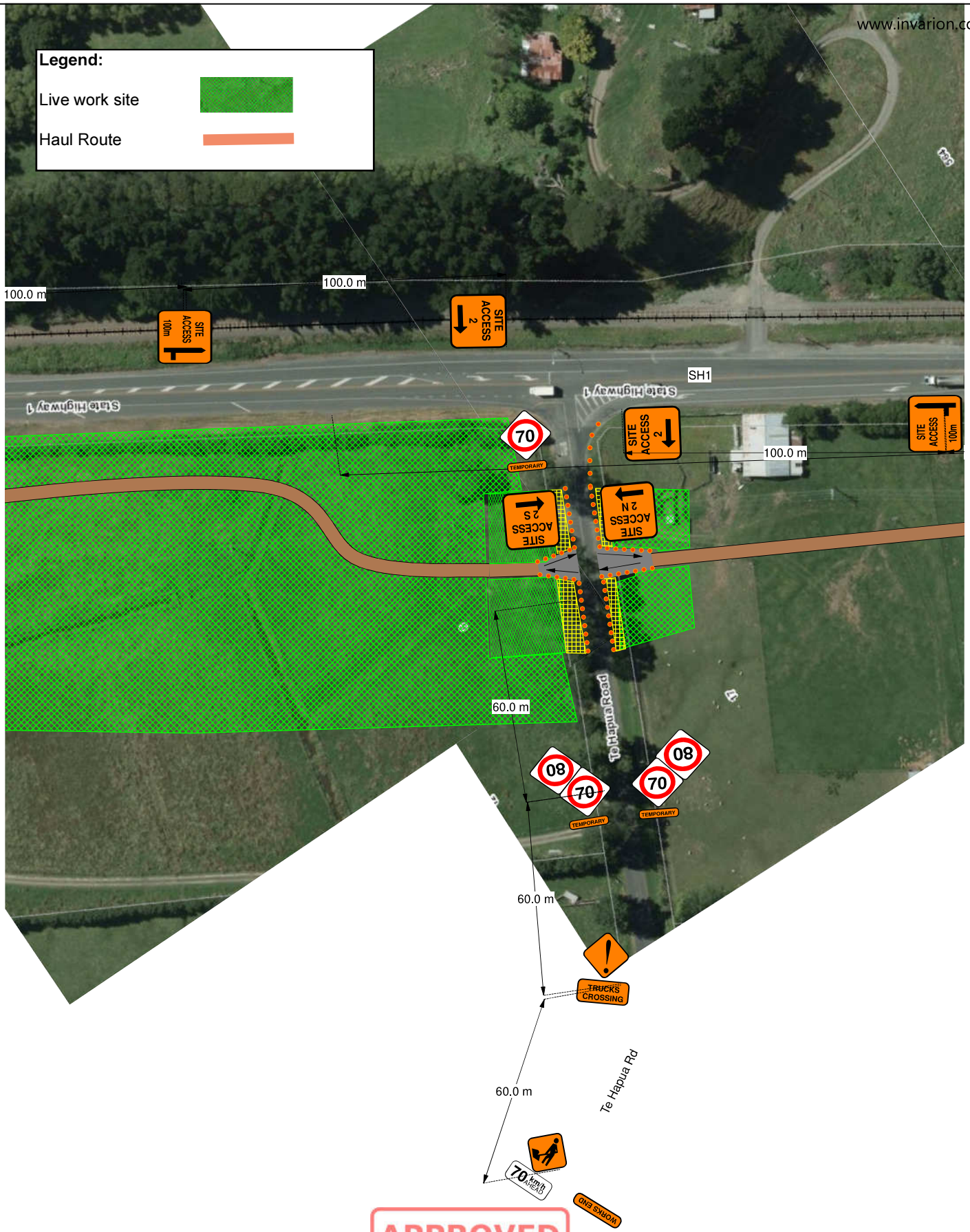

SITUATION : Pre Load Stage 2 Works	REVISION :
DRAWING TITLE : New Road Layout Contraflow SAP 2	DRAWING BY : Travis Medhurst
DRAWING No : P2O - 049SAP2 Sheet 2	CHECKED :
	DATE : 19.02.2019
	TMC APPROVAL :

APPROVED
CAR E569054
Kerry Smith
STMS Number 62238
NZTA - Wellington
22 February 2019

Peka Peka to Ōtaki Expressway

NZ TRANSPORT AGENCY WAKA KOTAHI
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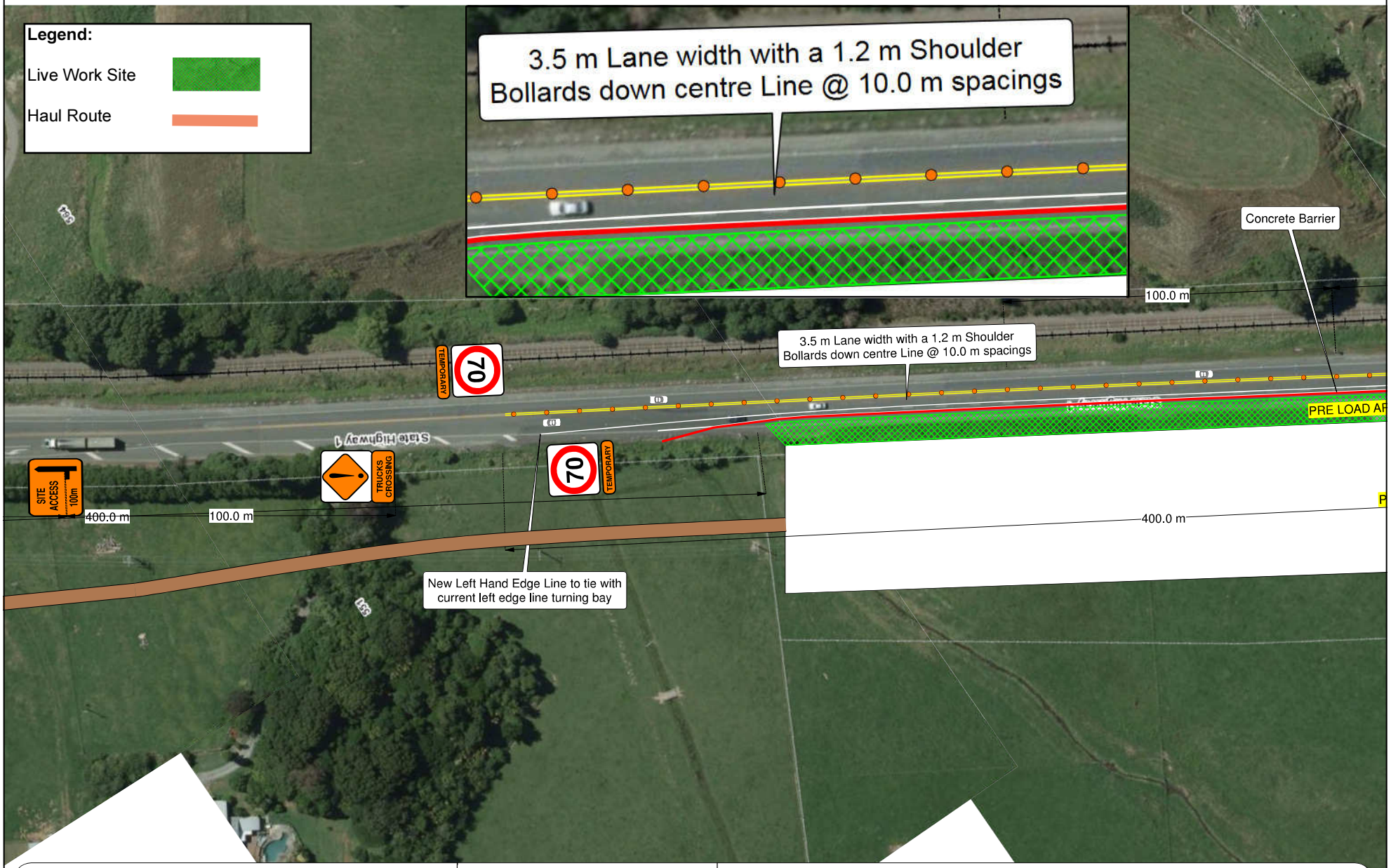

SITUATION : Pre Load Stage 2 Works	REVISION : 1.0
DRAWING TITLE : New Road Layout Contraflow Site Access Point 2	DRAWING BY : Travis Medhurst
DRAWING No : P2O - 049SAP2 Sheet 3	CHECKED :
	DATE : 19.02.2019
	TMC APPROVAL :

Peka Peka to Ōtaki Expressw

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SITUATION :	Pre Load
DRAWING TITLE :	New
DRAWING No :	P2O -

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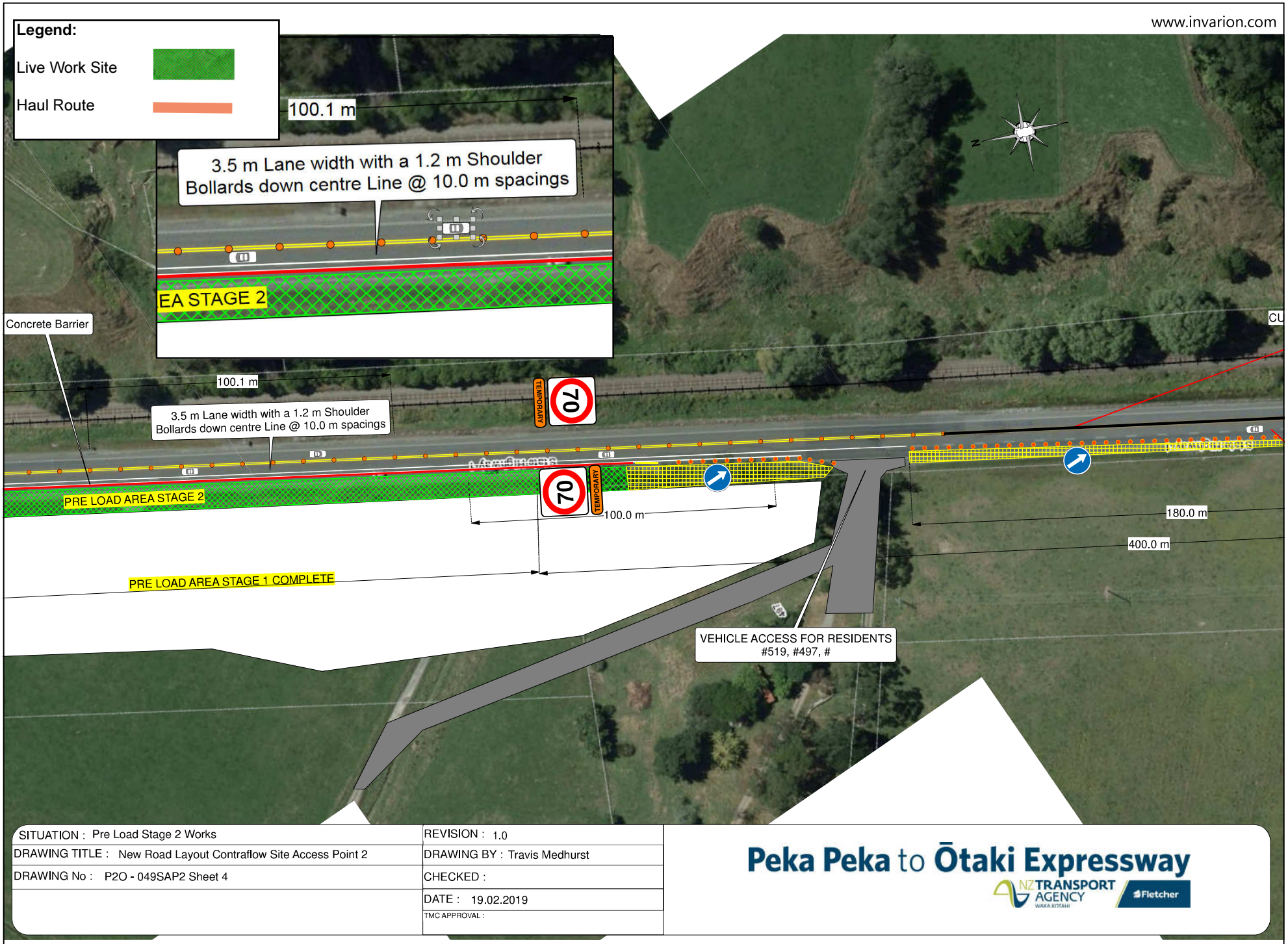

SITUATION : Pre Load Stage 2 Works	REVISION : 1.0
DRAWING TITLE : New Road Layout Contraflow Site Access Point 2	DRAWING BY : Travis Medhurst
DRAWING No : P2O - 049SAP2 Sheet 4	CHECKED :
	DATE : 19.02.2019
	TMC APPROVAL :

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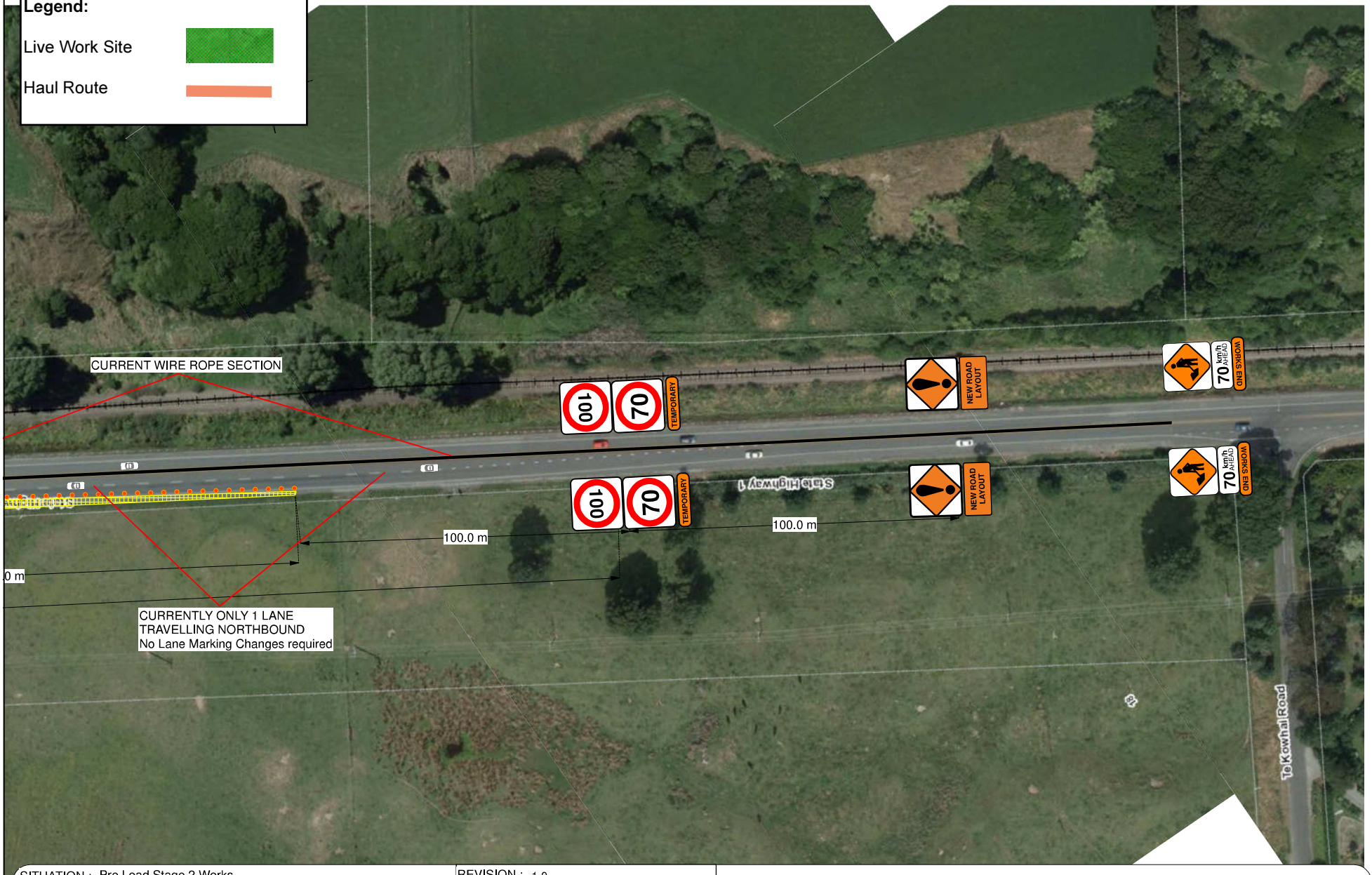

SITUATION : Pre Load Stage 2 Works	REVISION : 1.0
DRAWING TITLE : New Road Layout Contraflow Site Access Point 2	DRAWING BY : Travis Medhurst
DRAWING No : P2O - 049SAP2 Sheet 5	CHECKED :
	DATE : 19.02.2019
	TMC APPROVAL :

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