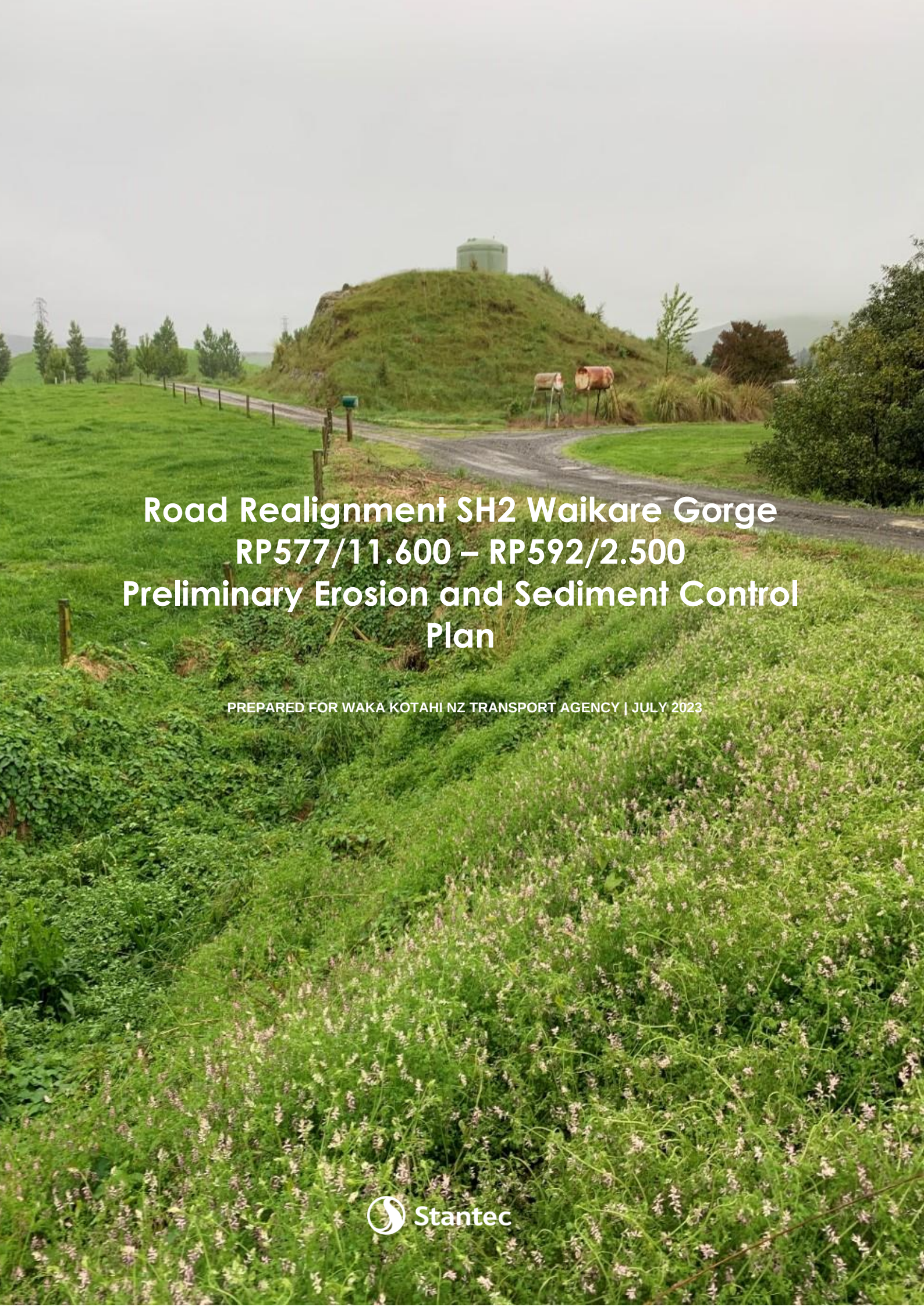

Road Realignment SH2 Waikare Gorge RP577/11.600 – RP592/2.500 Preliminary Erosion and Sediment Control Plan

PREPARED FOR WAKA KOTAHI NZ TRANSPORT AGENCY | JULY 2023

Stantec

Revision schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	**Checked by**	**Reviewed by**	**Approved by**
01	15/07/2023	Preliminary For Consent	N Keenan	J Van Dael	N Keenan	S Lloyd
02	18/07/2023	Final for Consent	N Keenan	J Van Dael	N Keenan	S Lloyd

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Quality statement

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Abbreviations

Abbreviation	Name
AEE	Assessment of Effects on the Environment
CEMP	Construction and Environmental Management Plan
Consent Authority	Hawke's Bay Regional Council
Consent Holder	Waka Kotahi NZ Transport Agency
Construction Works	Activities undertaken to construct the Project
CTMP	Construction Traffic Management Plan
ESC	Erosion and Sediment Control
ESCP	Erosion Sediment Control Plan
GRPA	Government Roading Powers Act 1989
HDC	Hastings District Council
HBRC	Hawke's Bay Regional Council
LMTA	Land Management Transport Act 2003
LTA	Land Transport Act 1998
Manager Compliance	Hawke's Bay Regional Council Manager Compliance
NOR	Notice of Requirement
NES-CS	Resource Management (National Environmental Standards for Assessing and Managing Contaminants In Soil To Protect Human Health) Regulations 2011
NES-F	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
NPS-FM	National Policy Statement for Freshwater Management 2020
Project	The construction, operation, maintenance and improvement of the state highway and associated infrastructure of State Highway 2
Requiring Authority	Waka Kotahi NZ Transport Agency
RMA	Resource Management Act 1991
Territorial Authorities	Hastings District Council and Wairoa District Council
SH2	State Highway 2
SMP	Stormwater Management Plan
SQP	Suitably qualified person
Waka Kotahi	Waka Kotahi NZ Transport Agency
WDC	Wairoa District Council

1 Introduction

1.1 Project Background

This preliminary Erosion and Sediment Control Plan (ESCP) has been prepared as part of the resource consent application for the SH2 Waikare Gorge Realignment Project, located midway between Napier and Wairoa, Hawke's Bay.

The proposed two-lane new state highway ("realignment") extends over a distance of approximately 3.8km and will sit west of the existing 6km section of SH2. It diverges from the existing SH2 south of Putorino Station Road, briefly runs parallel to the rail corridor (and on the existing Putorino Station Road alignment) and crosses Kings Creek (also known as Pohatanui Stream). It then heads across moderately undulating farm and pastureland to traverse the Waikare Gorge at a new proposed bridge. From the northern side of the Waikare Gorge, it veers westwards towards and crosses over the KiwiRail corridor to reconnect and tie into the existing SH2 after the McKenzie's Rail Overbridge.

The general site location is shown in Figure 1. The realignment is shown by the dashed red line.

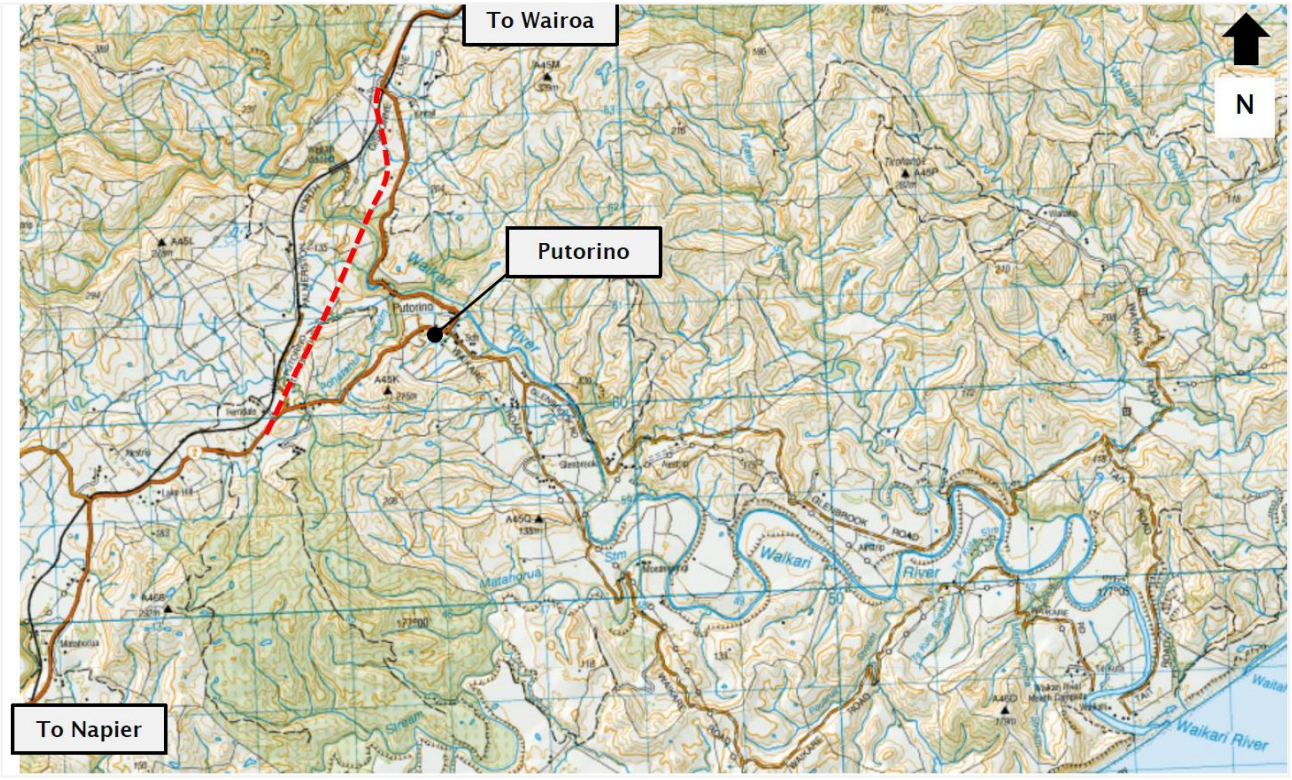


Figure 1: Location of proposed highway upgrades

1.2 Proposed Project Components

The Project comprises the following key features and activities:

- A 3.8km long, two-lane greenfield road alignment
- Waikare Gorge Bridge
- A new railway overpass bridge
- Kings Creek road bridge and stock bridge
- Stock underpasses
- Passing lane and slow vehicle bay
- Tie-ins to the existing SH2 and local roads
- A new safe stopping place
- Installation of a wire rope median barrier and edge barriers
- Culvert extensions and new culverts with associated headwalls and rock rip rap aprons

- Installation of stormwater treatment facilities including forebay, wetland and pond installations
- Earthworks – cut and fill
- Installation of retaining walls
- Planting and landscaping
- Land disturbance and vegetation clearance
- Stream bed disturbance and temporary stream diversion (including dewatering) during construction
- Temporary installation of erosion and sediment control devices during construction.

This project will involve disturbance of land, involving removal of vegetation and/or earth. The project has adopted guiding principles that will enable the constructor to minimise the impact of land disturbance and restrict sediments entering the receiving environment.

This report has been prepared to support the resource consent application prepared by Stantec.

1.3 Purpose

This preliminary ESCP has been prepared to meet the requirements of the HBRC Waterway Guidelines "Erosion and Sediment Control," 2009[1]. It sets out the procedures and methodologies that will be undertaken during the proposed earthworks. It will be the responsibility of the appointed contractor to finalise the document in consultation with HBRC. It is expected to be a living document that will require updating as the construction methodology is developed and programmed.

The principal objective of erosion and sediment control is to avoid causing or accelerating the erosion of soils and limiting the extent and duration of any erosion or sediment generation. Where not achievable, the secondary objective is the effective and efficient treatment of sediment discharges into the recovering environment.

The structure of this ESCP aligns with HBRC's guidelines for erosion and sediment control (ESC). In summary, the HBRC guideline document covers the following matters:

Table 1: General Layout of this ESCP in Sections

Section (in HBRC document)	Content
1	Introduction and project overview (section 1 of This ESCP report)
2	Basic erosion facts, principles to follow (section 1 of This ESCP report)
	Earthworks volumes (section 2 of This ESCP report)
3	Erosion control practices (sections 3 and 4 of This ESCP report)
4	Sediment Control Practices - Site stabilisation (sections 3 and 4 of This ESCP report)
5	Maintenance, monitoring, and reporting (section 5 of This ESCP report)

1.4 Principles to minimise effects

Referring to Section 3 of HBRC erosion and sediment control guidelines, the principles for minimising sediment discharges are as follows:

- Minimising areas of disturbance by staging earthworks, using cut and cover construction techniques for works along a highway
- Only undertaking earthworks within agreed footprint (any areas beyond extent will have temporary ESC in place prior to commencing)
- Prompt stabilisation of disturbed areas by using temporary erosion protection (e.g. coconut matting), or permanent protection such as hydroseeding, compacted hardfill or road pavement

[1] https://www.hbrc.govt.nz/services/policy-and-planning/

- Use of best practise ESC techniques, constructed in accordance with HBRC guidelines
- Piping and channelling runoff away from areas of open earthworks to minimise sediment generation
- Diversion of clean water away from disturbed areas by installing bunding upstream of areas of open earthworks
- Ensuring regular inspections and audits of ESC measures
- Regular planning meetings and updating plans to suit changing site conditions (frequency to be determined by consent holder and contractor).

1.5 Receiving environment

Stormwater from the proposed highway works will largely drain to existing waterways, farmland drainage and natural swale areas. The land is mainly grassland and rolling countryside. These small waterways lead into the Waikari River and then to the ocean some 10km downstream.

2 Earthworks Overview

2.1 General

The ESCP provides a 'tool-box approach' to ESC measures which are appropriate to mitigate erosion risks and management of sediment runoff during earthworks. This document has been prepared as a preliminary ESCP, and it will be the responsibility of the appointed contractor to provide a finalised ESCP for approval by HBRC prior to earthworks commencing.

2.2 Earthworks

Earthworks are expected to take several earthworks seasons. Works may need to continue through the winter works shut down period, and as such an application to continue works through this period will be submitted to HBRC if required.

The following Table 2 provides a summary of the earthwork volumes associated with this project. Vegetation clearance and land disturbance required to undertake the realignment works, will result in an estimated 400,000m3 of earthworks associated with cut to fill, cut to waste and imported fill (if any) taking place throughout the Project. These volumes are derived from the design model for the Project and are approximate/conservative volumes. They will be further refined during the final detailed design stage of the Project.

Table 2: Preliminary earthwork volumes

Type of Earthworks	Volume (m^3)
Cut to fill	280,000
Cut to waste	120,000
Imported Fill	None at this stage

Progressive stabilisation shall be adopted throughout the project to ensure that the extent of unsecured area is kept to a minimum and does not exceed the catchment areas of the ESC treatment devices, e.g. decanting earth bunds and sediment ponds.

Surface area affected by the earthworks associated with the proposed road cuts and fills is estimated to be a linear swathe across the land of a width between 50m and 100m over the Project length of 3.8km. This gives an area of disturbance of between 190,000m^2 and 380,000m^2 (19ha to 38ha). This includes 75,000m^2 (7.5ha) of impermeable road surface.

The staging plan may be modified and improved in response to detailed design or as works proceed, along with contractor input.

It is anticipated that specific measures will be discussed at weekly site meetings and daily checks undertaken by the appointed contractor based on weather conditions. This shall be confirmed by the Contractor in the final ESCP.

2.3 Commencement

Prior to commencement, a pre-construction meeting will be requested with the appointed contractor, client and HBRC to discuss the ESCP and other conditions of consent.

3 Works Areas

Specific works areas are to be determined by Contractor and outlined in the final ESCP, to be supplied to HBRC. This final ESCP will take into account construction methodology and construction programme.

The Project will seek to achieve a balance of on-site cut and fill over the entire project. Cut materials will be transported to fill locations and developed concurrently according to the earthworks plan. Several locations could be developed at once.

Appendix A includes a preliminary ESCP for this area. The contractor may divide this area into smaller work areas, it will be their responsibility to provide a finalised ESCP for approval by HBRC.

3.1 Work Areas – cut locations

ESC practices are expected to include:

- Clean water diversion bunds at the top of cuts leading to the flanks of the cuts to prevent excess sheet flows down cut faces
- Silt fences at the base of cut slopes and at locations where a developing cut footprint is concentrated by topography
- Re-vegetation of slopes with hydroseed.
- Dirty water diversion bunds from silt fence locations to settlement ponds
- Decanting earth bunds and sediment ponds as required.

3.2 Work Areas – fill locations

ESC Measures are expected to include:

- Clean water diversion bunds at the base of fill slopes to minimise mixing of waters
- Silt fences and super-silt fences at the base of fill slopes
- Re-vegetation of slopes with hydroseed
- Dirty water diversion bunds from silt fence locations to settlement ponds
- Decanting earth bunds and sediment ponds as required.

4 Erosion and Sediment Controls

4.1 General

The ESC measures below have been selected from HBRC guidelines. Specific management practices and detailed design of ESC measures shall be completed prior to commencing the earthworks. The exact location and size of sediment and erosion control measures will be confirmed and updated by the physical works contractor prior to construction. Additional or alternative measures may need to be considered in order to ensure that the objective of the ESCP is achieved. All control measures will require on-going maintenance throughout the construction period and should be monitored and inspected during and after significant rainfall events. A summary of minimum maintenance, monitoring and reporting requirements that are to be adopted and implemented on site are included in this document.

4.2 Silt fencing

Refer to Section 6.3 and 6.4 of the HBRC guidelines. Silt fences or super silt fences will be erected in appropriate locations to capture sheet flow runoff before it leaves the works site.

The geotextile on the silt fences shall be approximately 400 mm high above ground and a minimum of 200 mm below the surface with posts at maximum 2 m intervals, as shown in Figure 2 below (Figure 6-9 in The Guidelines).

The super silt fences will adhere to approximately 800 mm high above ground and a minimum of 200 mm below the surface with posts at maximum 3 m intervals, as shown in Figure 3 below (Figure 6-10 in The Guidelines).

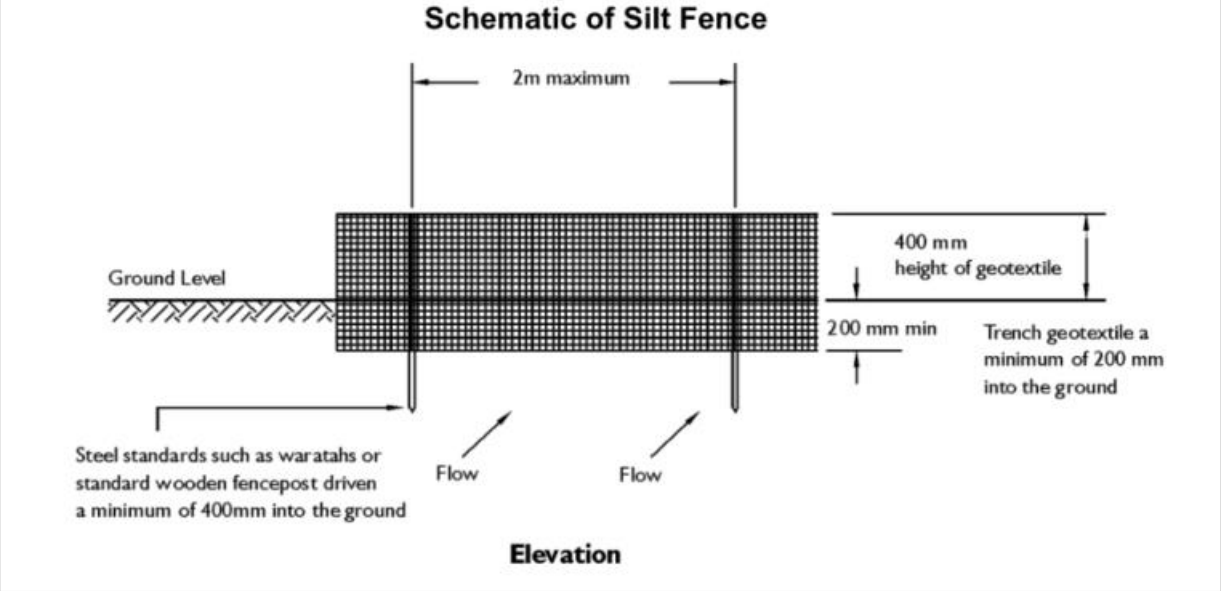


Figure 2: Silt Fence standard detail

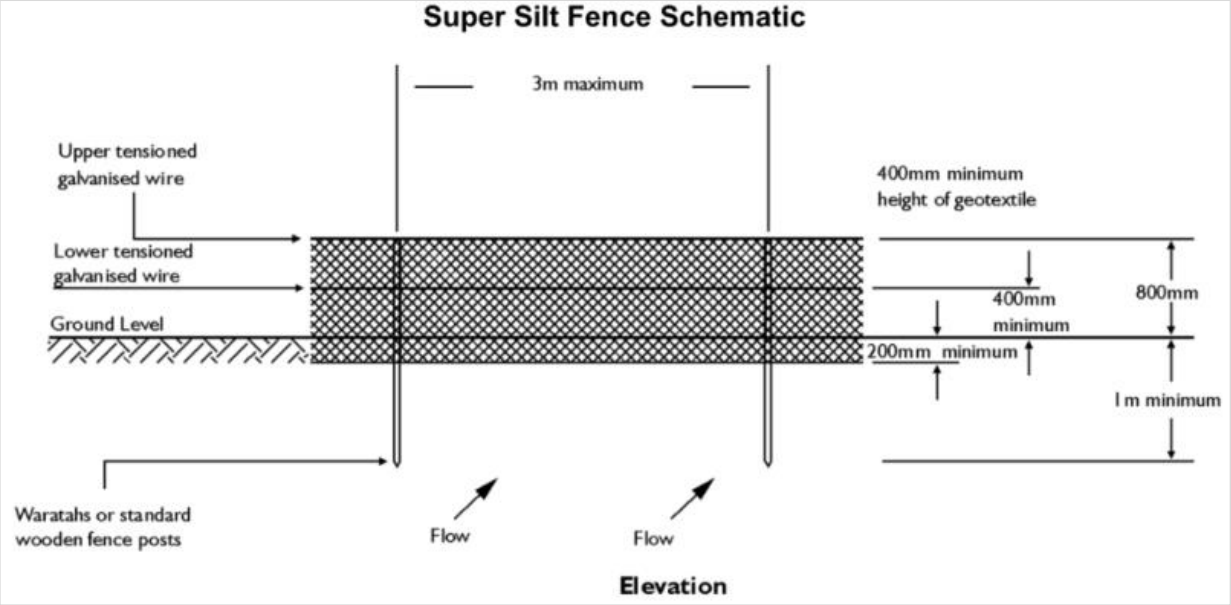


Figure 3: Super Silt Fence standard detail

4.3 Dust Control

Effective dust control requires forward planning alongside monitoring site conditions, tracking exposed soil moisture levels to avoid the dry site. Water carts or sprinklers should be used to mitigate effects where necessary.

If water is used to stabilise dust, a water and dust management plan is required.

4.4 Clean Water Diversions

Refer to Section 5.1 of the HBRC guidelines. The clean water catchments above the Project will be intercepted by runoff diversion bunds and channels to direct runoff to natural flow paths along the road. Flows would then be directed into the existing or upgraded culverts, or to existing streams and channels.

Diversion channels will be sized to convey the 5% AEP event, and present approximately 300mm of freeboard, refer to Figure 4.

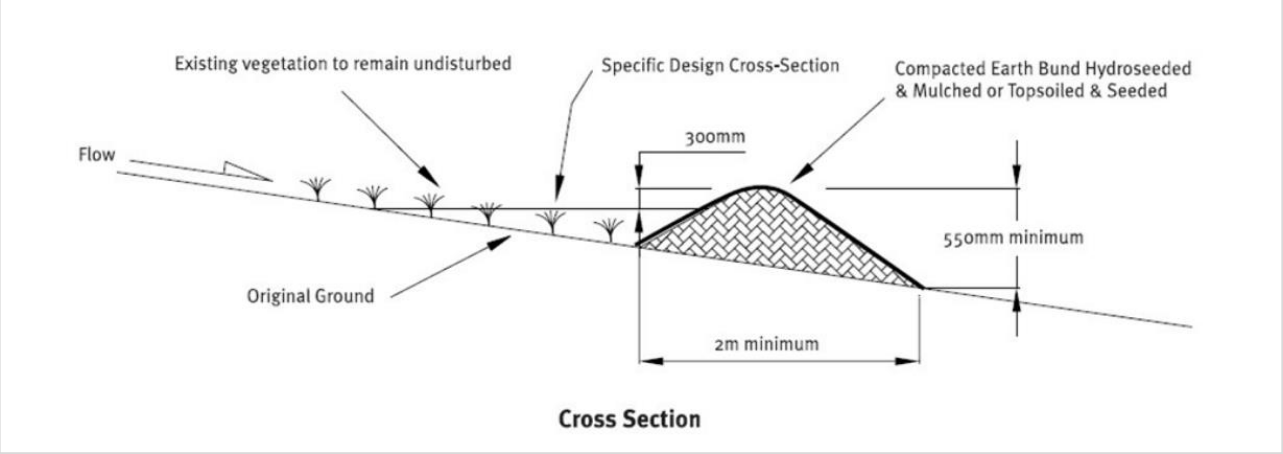


Figure 4: Clean water diversion channel and bund typical detail

4.5 Dirty Water Diversions

Dirty water diversions are similar to clean water diversions therefore the design is to adhere to the clean water diversion specifications (Section 5.1 HBRC guidelines). Sediment-laden water will be conveyed via dirty water diversion bunds from within the disturbed area and directed to sediment retention devices such as decanting earth bunds (DEB) for treatment. Dirty water diversions are typically located within or at the lowest extent of the disturbed area. They will be designed to convey the 5% AEP event and similar to clean water diversion channel specifications.

The diversion bunds are expected to have an indicative target depth of 500mm (with a minimum freeboard of 300mm) for conveying or diverting the flows from the catchment. The depth and width will vary as shown in Figure 5, and this will depend on the contours and the catchment for which the bund is designed.

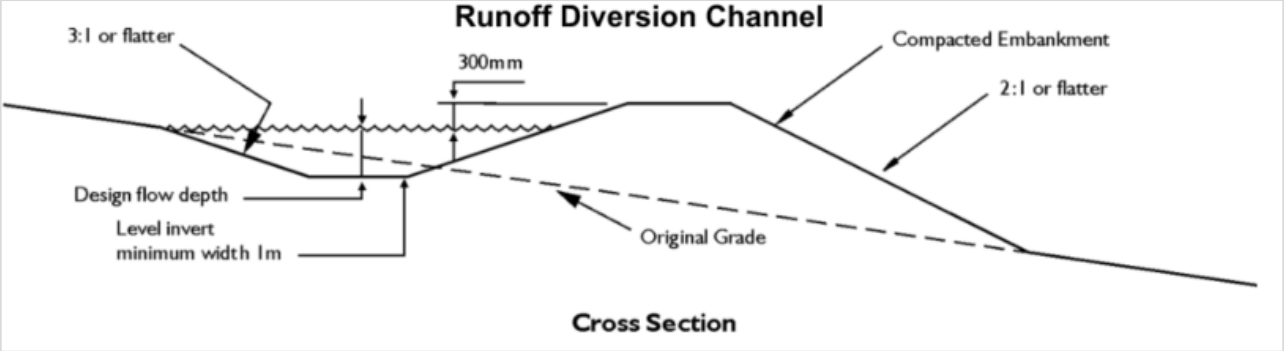


Figure 5: Dirty water diversion channel and bund typical detail

4.6 Level Spreader

Level spreader practices are required in several locations where clean water diversion bunds are installed to disperse concentrated flows across a vegetated slope. These are to be designed in accordance with Section 5.13 of HBRC Guidelines. A typical cross section shown in Figure 6 is taken from Figure 5-9 HBRC Guidelines.

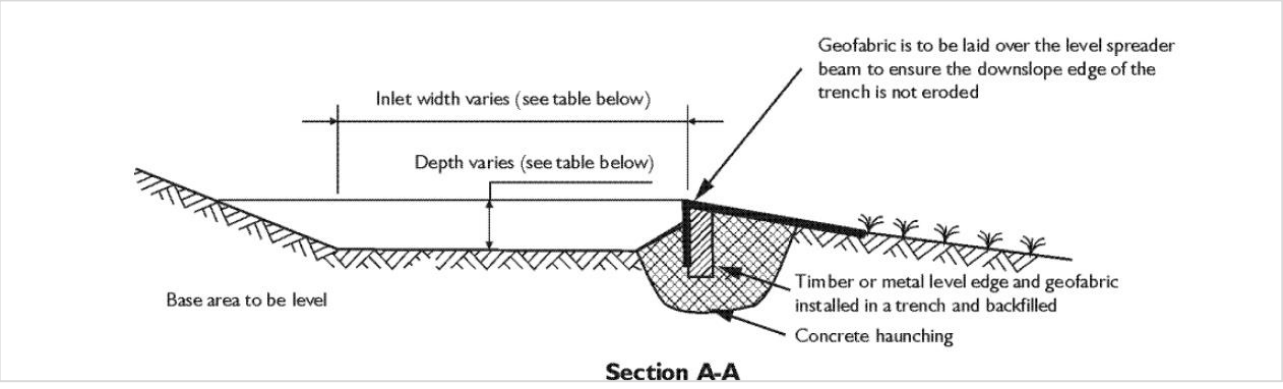


Figure 6: Level spreader cross section

4.7 Decanting Earth Bunds

Decanting earth bunds are to be designed in accordance with Section 6.7 of the HBRC guidelines. These bunds will be placed at the points of discharge from the excavation area and downstream of dirty water diversions. Contributing catchments shall be limited to 3000 m^2. A sediment retention pond shall be used if the catchment area is larger. The location and use of decanting earth bunds are to be confirmed in the Contractor's agreed construction methodology. The floating decant and bund is shown in Figure 7 taken from Section 6.7.4 HBRC Guidelines.

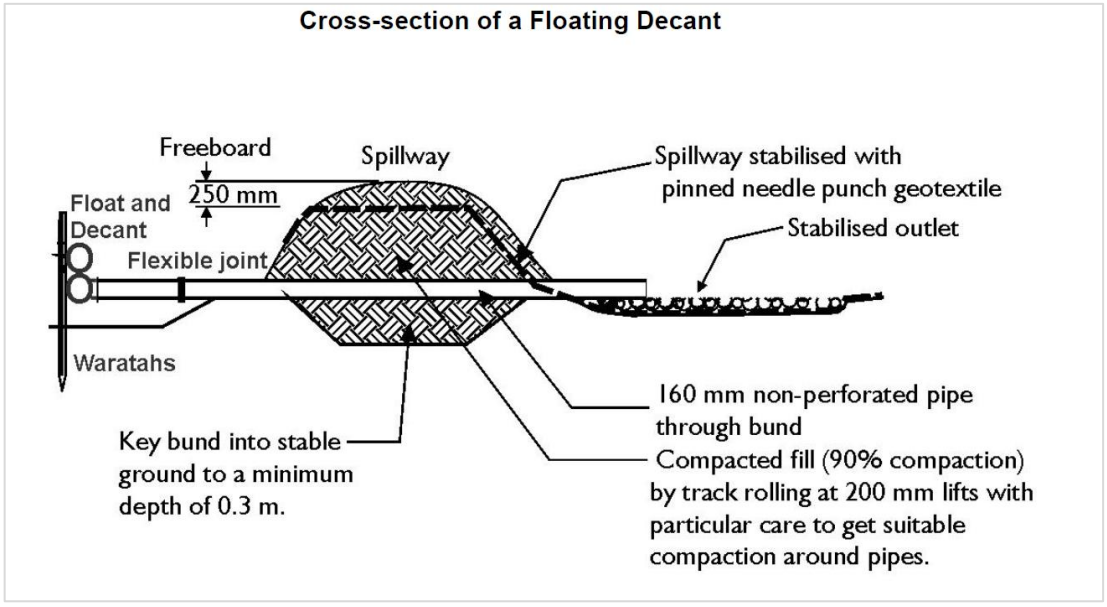


Figure 7: Decanting earth bund

4.8 Sediment Retention Pond

Sediment retention ponds are to be designed in accordance with Section 6.1 of the HBRC guidelines for use in supporting exposed working areas >0.3 hectares. The general schematic is shown in Figure 8 below.

The location and use of decanting earth bunds are to be confirmed in the Contractor's agreed construction methodology.

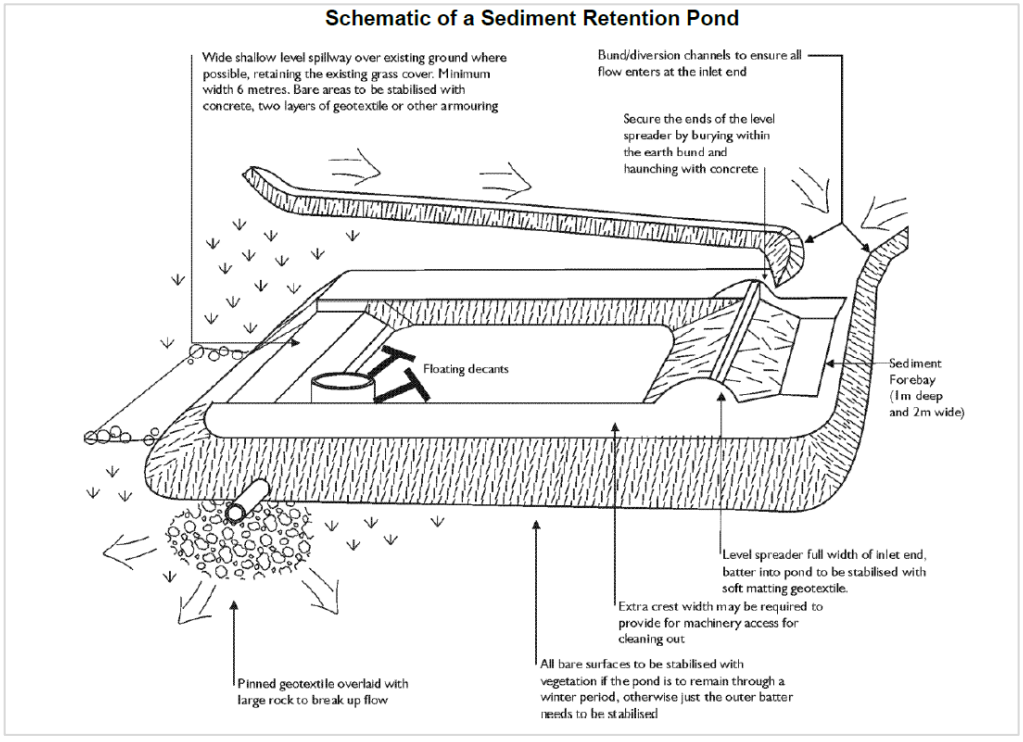


Figure 8: Sediment Retention Pond Schematic (refer to HBRC guidelines Figure 6-1)

4.9 Flocculation

Large projects often benefit from inclusion of flocculants to increase the effectiveness of sedimentation practices. Flocculation in ponds is to be designed in accordance with Section 6.2 of the HBRC guidelines for use in supporting exposed working areas >0.3 hectares and in DEB practices as required.

The use and application of flocculants should be summarised by a suitably qualified person (SQP) who can prepare a site-specific Flocculation Plan for the SH2 Waikare Gorge in combination with the Contractor's construction and environmental management plan (CEMP). The design of a flocculant system is described in Section 6.2, and specifically Section 6.2.3 and following, of the HBRC Guidelines.

4.10 Stabilisation

As construction will progress in a staged manner, staged decommissioning of any installed sediment control devices will be required. The appointed contractor shall dispose of any accumulated sediment at an approved landfill, with prior approval from HBRC.

Upon completion of a construction stage, any remaining excavations will be backfilled to stabilise the works area. All remaining exposed soils shall be stabilised in accordance with Section 5 of the HBRC Guidelines including topsoiling, revegetation, hydroseeding, mulching, turfing and matting. The contractor's construction methodology will define the timings for stabilisation of the works areas. Temporary construction areas will be reinstated to the correct standard following the completion of the project works. Measures to maintain the stability of the construction areas include:

- Programming stripping of upper layers and clearing of vegetation to be carried out immediately prior to the work to be carried out in that area
- Not leaving areas exposed for unreasonably long times
- Top soiling planting, grassing and /or mulching immediately after an area is complete and prior to rain events
- Consider hydroseeding to establish vegetation quickly while providing a degree of instant protection from rain drop impact to slopes of 1.5H:1.0V, and other measures for steeper slopes such as organic and synthetic erosion control blankets (up to 1:1 slopes).

5 Maintenance, Monitoring and Reporting

5.1 Maintenance

Table 3 identifies the maintenance requirements for all ESCs. Maintenance will be based on daily inspections by the contractor as well as regular site walkovers with HBRC. Checks will also be conducted prior to heavy rain events to ensure devices have been maintained, with additional checks following the rain event.

In the event of ESC failure, the contractor will be responsible for diverting any runoff away from the area of the failure so that it can be rapidly repaired. This may include implementation of sandbags or hay bales.

Table 3: Maintenance Frequency for proposed ESCP devices

Device	Maintenance Activity	Frequency
Silt Fences	Inspect regularly	• Before and after storms for all types of fences. • Once a week for silt fences
	Remove silt build up	When sediment deposition reaches 50% of the silt fence height
	Maintenance – repair holes, bulges etc.	• Immediately, as and when required • Implement temporary measures during remediation process
Runoff Diversion Channels	Inspect for scour	After every rainfall event and during periods of prolonged rain
	Remove accumulated sediment in the runoff diversion channel	As and when required.
	Carry out maintenance and repairs to ensure design capacity is maintained	• Immediately, as and when required • Implement temporary measures during remediation process

Device	Maintenance Activity	Frequency
	Check outlets to ensure that they remain free from scour and erosion	Daily
Decanting Earth Bunds	Increased accumulation of sediment, risking overtopping	• Regularly • After rainfall events or during prolonged periods of rainfall
	Scouring at discharge points	Daily, install additional armouring or other stabilisation methods if scour is evident
Sediment Retention Ponds	Desludging accumulation of sediment (this should not exceed 20% of total volume), blockage of skimmers (decant pipes) risking overtopping	• Regularly • After rainfall events or during prolonged periods of rainfall • End of bulk earthworks season • Immediate repair of any damage due to erosion or equipment
	Repair to scouring at discharge points, emergency overflow weir	Daily, install additional armouring or other stabilisation methods if scour is evident
Flocculation System	Dosing application rates, reservoirs, security of system, security of storage of supplies, functioning of rainfall gauging, functioning of dosing system, effectiveness of downstream discharge quality. Monitoring of performance will be reason to initiate adjustments to the flocculant treatment system.	• Before and after storms • During long duration events • Daily - visual • Weekly - testing
	Servicing of flocculation unit	• Completed before staff leave site unattended for prolonged periods of time (i.e. weekends) • Refer Section 6.2.9 HBRC Guidelines

5.2 Monitoring and reporting

Once the ESCP has been implemented, regular inspections will be undertaken with the contractor and HBRC.

It will be the responsibility of the contractor to hold weekly toolbox meetings to discuss ESC measures with all staff on site. ESC will be an agenda items at this meeting, and a record of minutes will be available from the contractor upon request.

5.3 Roles and Responsibilities

The contractor is responsible for appointing roles to undertake the following:

- Implementation and management of ESCP
- Maintenance and monitoring of ESCs
- Reporting on checks/inspections and communications with HBRC
- Updates to the ESCP if required.

5.4 Contingencies

5.4.1 Heavy rain events

The contractor is required to monitor the weather forecast and prepare in advance of predicted rainfall events of greater than 15 mm in 24 hours. It is the responsibility of the contractor to prepare a checklist of actions for use prior to heavy rain events. The checklist will include, at a minimum:

- Checking all ESCs are operational including silt fencing
- Stabilising earthworks
- Clean diversion channels to treatment devices
- Empty earth decanting bunds of sediment
- ESCs are appropriate for predicted weather event, e.g. bunds with adequate height.

5.4.2 Uncontrollable events (e.g. COVID-19)

In the case of an uncontrollable event which requires the cessation of operations (such as Lockdown due to COVID-19), the contractor shall check and prepare the site for a heavy rain event as above, with the assumption that a heavy rain event may occur during the uncontrollable event.

5.5 Review of ESCP

This preliminary ESCP is intended to be a living document that requires reviews and updates as earthworks progress. This document has been provided in support of a resource consent, and it is expected that the appointed contractor shall provide a final ESCP to suit their construction programme and methodology. The final ESCP shall be issued to HBRC for approval prior to construction commencing.

Any changes should be made in consultation with Horizons, and a record of this shall be kept.

5.6 Key Contact Details

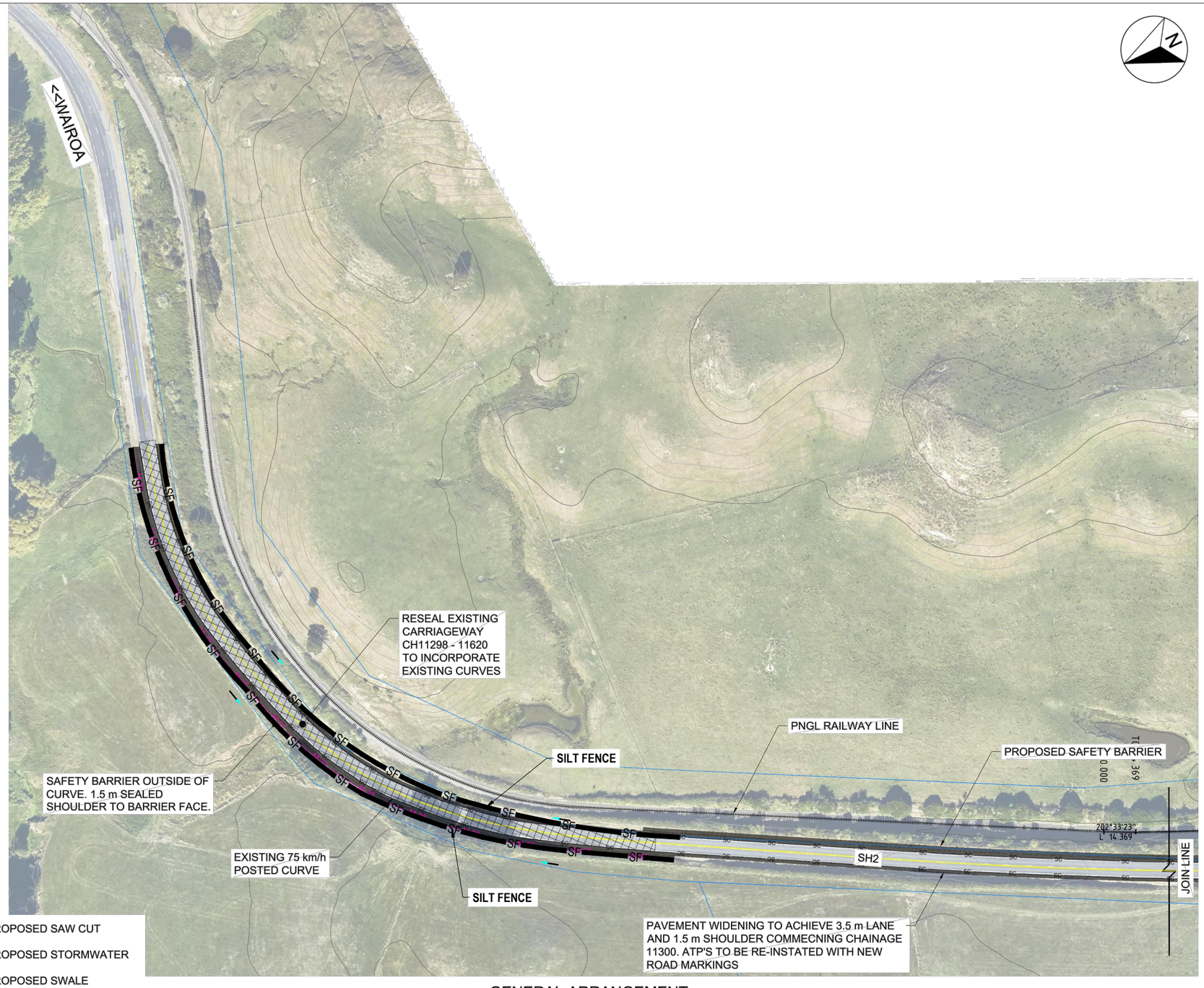
Key Contact details will be provided by the Contractor in the final ESCP. The details will be provided to HBRC.

Appendices

Appendix A Preliminary Erosion and Sediment Control Drawings – SH2 Waikare Gorge

LEGEND

- SF — SILT FENCE
- DIVERSION CHANNEL/BUND
- DEB — DECANTING EARTH BUND
- LEVEL SPREADER
- SED — SEDIMENTATION POND
- HIGH POINT
- LOW POINT



300 mm
200
100
50
0 10 mm

LEGEND

	PROPOSED EDGE OF SEAL	SC — SC	PROPOSED SAW CUT
	PROPOSED FILL BATTER	SW — SW	PROPOSED STORMWATER
	PROPOSED CUT BATTER		PROPOSED SWALE
	PROPOSED PAVEMENT CONSTRUCTION		PROPOSED WIRE ROPE MEDIAN BARRIER
	EXISTING BOUNDARY LINE	M-23 — M-23	PROPOSED M23 COMPLIANT SAFETY BARRIER
	PROPOSED BOUNDARY		
// // // //	EXISTING FENCE LINE		

GENERAL ARRANGEMENT
SCALE 1:1000 @ A1

EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 1 OF 8

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
A	DRAFT CONCEPT DESIGN ISSUE			J.T.	29/07/2021
B	CONCEPT DESIGN ISSUE FOR ROAD SAFETY AUDIT (DRAFT)			J.T.	18/08/2021
C	CONCEPT DESIGN ISSUE FOR ROAD SAFETY AUDIT (FINAL)			J.T.	02/09/2021
D	PRELIMINARY DESIGN ISSUE			J.T.	15/12/2021
E	LONGSECTIONS UPDATED TO CORRECT CHAINAGES			J.T.	16/12/2021
F	GEOMETRIC DESIGN CHANGES POST CONCEPT REVIEW			J.T.	04/02/2022

WAKA KOTAHI NZ TRANSPORT AGENCY

wsp Stantec GHD

SCALES		ORIGINAL SIZE
AS SHOWN		A1
DRAWN	DESIGNED	APPROVED
P. BIRSE	A. LEWIS	-
DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
J. TAYLOR	J. TAYLOR	-

FOR CONSENT

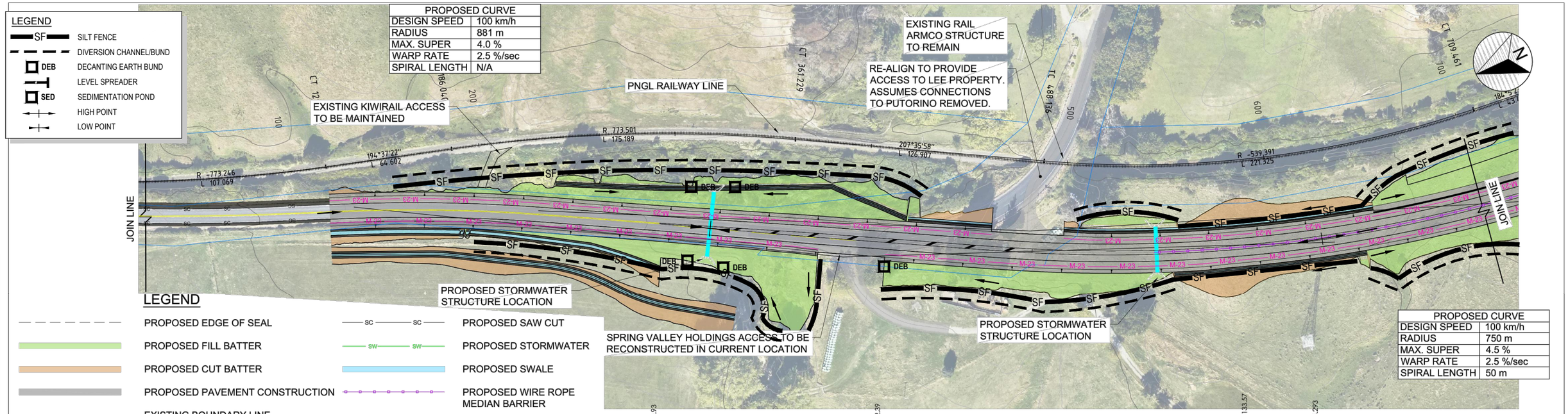
PROJECT
WAKA KOTAHI NZ TRANSPORT AGENCY
SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE
GENERAL ARRANGEMENT
PLAN AND LONGSECTION SHEET 1 OF 8

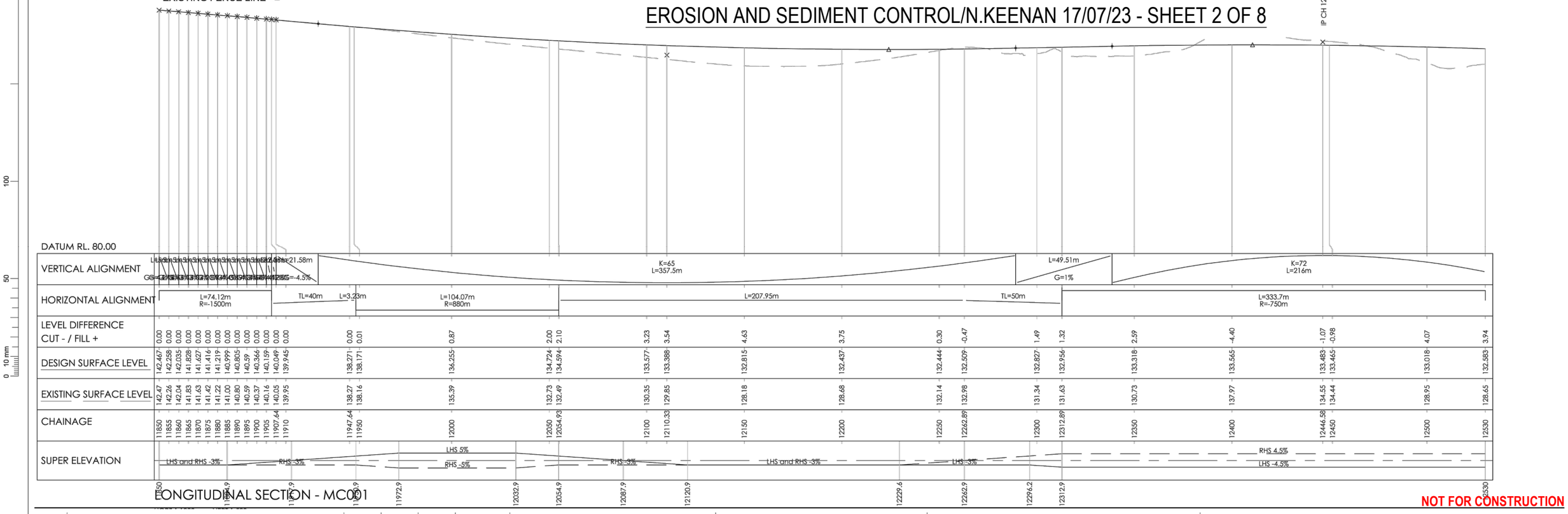
DOCUMENT NO.	SHEET NO.	REVISION
WGR - DES - GEM - 00 - DRG	0002	F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0002A

ORGANISATION JOB CODE: 2-S5416.01 ORIGINATING ORGANISATION: WSP



EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 2 OF 8



LONGITUDINAL SECTION - MC001

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
A	DRAFT CONCEPT DESIGN ISSUE			J.T.	29/07/2021
B	CONCEPT DESIGN ISSUE FOR ROAD SAFETY AUDIT (DRAFT)			J.T.	18/08/2021
C	CONCEPT DESIGN ISSUE FOR ROAD SAFETY AUDIT (FINAL)			J.T.	02/09/2021
D	PRELIMINARY DESIGN ISSUE			J.T.	15/12/2021
E	LONGSECTIONS UPDATED TO CORRECT CHAINAGES			J.T.	16/12/2021
F	GEOMETRIC DESIGN CHANGES POST CONCEPT REVIEW			J.T.	04/02/2022

WAKA KOTAHI NZ TRANSPORT AGENCY

WSP Stantec GHD

SCALES: AS SHOWN
ORIGINAL SIZE: A1
DRAWN: P. BIRSE
DESIGNED: A. LEWIS
APPROVED: -
DRAWING VERIFIED: J. TAYLOR
DESIGN VERIFIED: J. TAYLOR
APPROVED DATE: -

FOR CONSENT

PROJECT: WAKA KOTAHI NZ TRANSPORT AGENCY SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE: GENERAL ARRANGEMENT PLAN AND LONGSECTION SHEET 2 OF 8

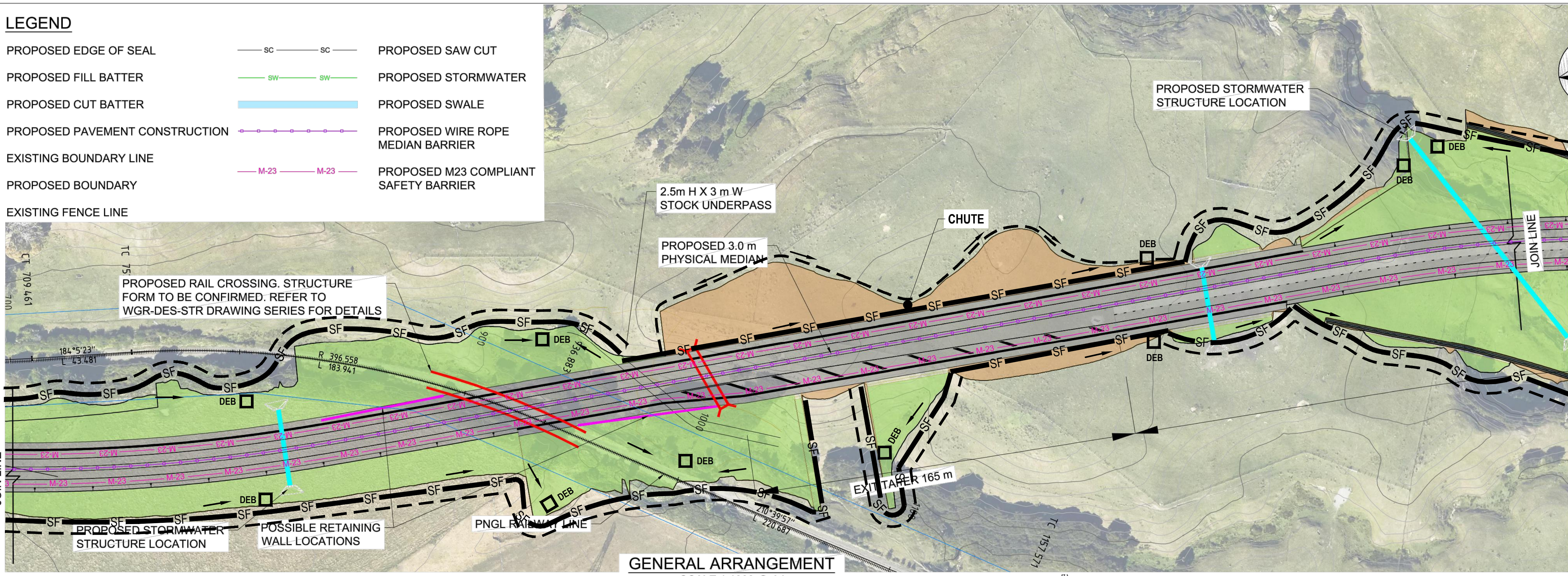
DOCUMENT NO.: WGR - DES - GEM - 00 - DRG
SHEET NO.: 0003
REVISION: F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0003A

ORGANISATION JOB CODE: 2-S5416.01 ORIGINATING ORGANISATION: WSP

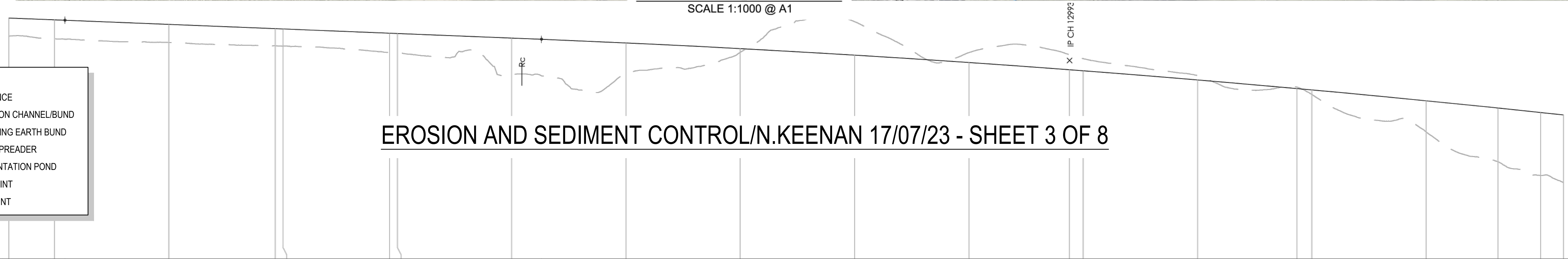
LEGEND

(dashed line)	PROPOSED EDGE OF SEAL	— SC — SC —	PROPOSED SAW CUT
(light green)	PROPOSED FILL BATTER	— SW — SW —	PROPOSED STORMWATER
(tan)	PROPOSED CUT BATTER	(light blue)	PROPOSED SWALE
(grey)	PROPOSED PAVEMENT CONSTRUCTION	(purple line)	PROPOSED WIRE ROPE MEDIAN BARRIER
(thin blue line)	EXISTING BOUNDARY LINE	— M-23 — M-23 —	PROPOSED M23 COMPLIANT SAFETY BARRIER
(red line)	PROPOSED BOUNDARY		
(blue line with //)	EXISTING FENCE LINE		



GENERAL ARRANGEMENT

SCALE 1:1000 @ A1



LEGEND

SF	SILT FENCE
(dashed line)	DIVERSION CHANNEL/BUND
DEB	DECANTING EARTH BUND
(symbol)	LEVEL SPREADER
SED	SEDIMENTATION POND
(symbol)	HIGH POINT
(symbol)	LOW POINT

EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 3 OF 8

DATUM RL. 80.00

VERTICAL ALIGNMENT: K=72 L=216m; L=208.4m G=-2%; K=132 L=462m

HORIZONTAL ALIGNMENT: L=333.7m R=-750m; TL=50m; L=396.84m; TL=88m; L=212.5m R=550m

CHAINAGE	LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
12530	3.94	132.583	128.65
12550	4.17	132.223	128.05
12600	3.96	131.224	127.26
12646.59	3.74	130.293	126.55
12650	3.75	130.224	126.48
12696.59	4.21	129.293	125.08
12700	4.31	129.224	124.91
12750	7.97	128.224	120.25
12800	6.77	127.173	120.40
12850	0.79	125.938	125.15
12900	-7.30	124.513	131.81
12950	-2.17	122.9	125.07
12993.99	-3.27	121.324	124.59
13000	-2.66	121.097	123.76
13050	-0.96	119.104	120.06
13093.43	-0.31	117.22	117.53
13100	0.98	116.922	115.94
13150	6.78	114.551	107.77
13181.43	11.72	112.963	101.25
13200	13.71	111.99	98.28
13210	14.72	111.455	96.74

SUPER ELEVATION: RHS 4.5%; LHS -4.5%; LHS -3%; LHS and RHS -3%; RHS -3%; LHS 7.9%; RHS -7.9%

Super elevation chainages: 12530, 12646.6, 12663.3, 12696.6, 12729.9, 13060, 13093.4, 13126.9, 13181.4, 13210

LONGITUDINAL SECTION - MC001

HORZ 1:1000 VERT 1:500

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
A	DRAFT CONCEPT DESIGN ISSUE			J.T.	29/07/2021
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F	GEOMETRIC DESIGN CHANGES POST CONCEPT REVIEW			J.T.	04/02/2022

WAKA KOTAHI NZ TRANSPORT AGENCY | wsp | Stantec | GHD

SCALES: AS SHOWN | ORIGINAL SIZE: A1

DRAWN: P. BIRSE | DESIGNED: A. LEWIS | APPROVED: -

DRAWING VERIFIED: J. TAYLOR | DESIGN VERIFIED: J. TAYLOR | APPROVED DATE: -

FOR CONSENT

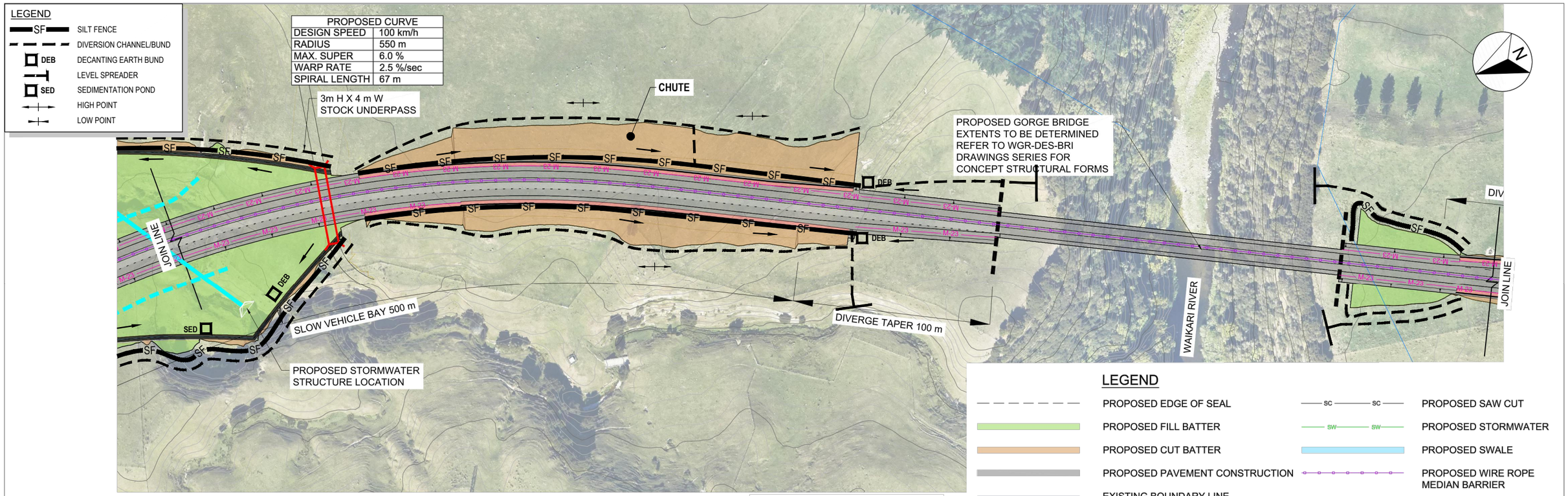
PROJECT: WAKA KOTAHI NZ TRANSPORT AGENCY SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE: GENERAL ARRANGEMENT PLAN AND LONGSECTION SHEET 3 OF 8

DOCUMENT NO.: WGR - DES - GEM - 00 - DRG | SHEET NO.: 0004 | REVISION: F

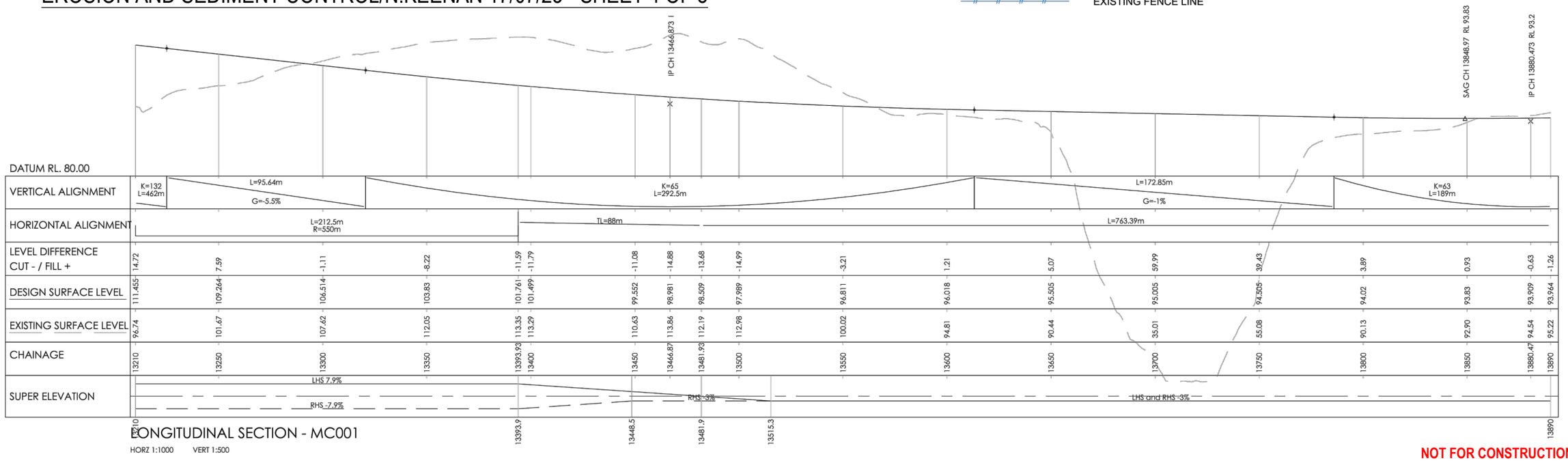
Original sheet size A1 (841x594)   C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0004A

ORGANISATION JOB CODE: 2-S5416.01   ORIGINATING ORGANISATION: WSP



GENERAL ARRANGEMENT
SCALE 1:1000 @ A1

EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 4 OF 8



LONGITUDINAL SECTION - MC001
HORZ 1:1000 VERT 1:500

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
A	DRAFT CONCEPT DESIGN ISSUE			J.T.	29/07/2021
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E	LONGSECTIONS UPDATED TO CORRECT CHAINAGES			J.T.	16/12/2021
F	GEOMETRIC DESIGN CHANGES POST CONCEPT REVIEW			J.T.	04/02/2022

WAKA KOTAHI NZ TRANSPORT AGENCY
wsp Stantec GHD

SCALES: AS SHOWN
ORIGINAL SIZE: A1
DRAWN: P. BIRSE
DESIGNED: A. LEWIS
APPROVED: -
DRAWING VERIFIED: J. TAYLOR
DESIGN VERIFIED: J. TAYLOR
APPROVED DATE: -

FOR CONSENT

PROJECT
WAKA KOTAHI NZ TRANSPORT AGENCY
SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE
GENERAL ARRANGEMENT
PLAN AND LONGSECTION SHEET 4 OF 8

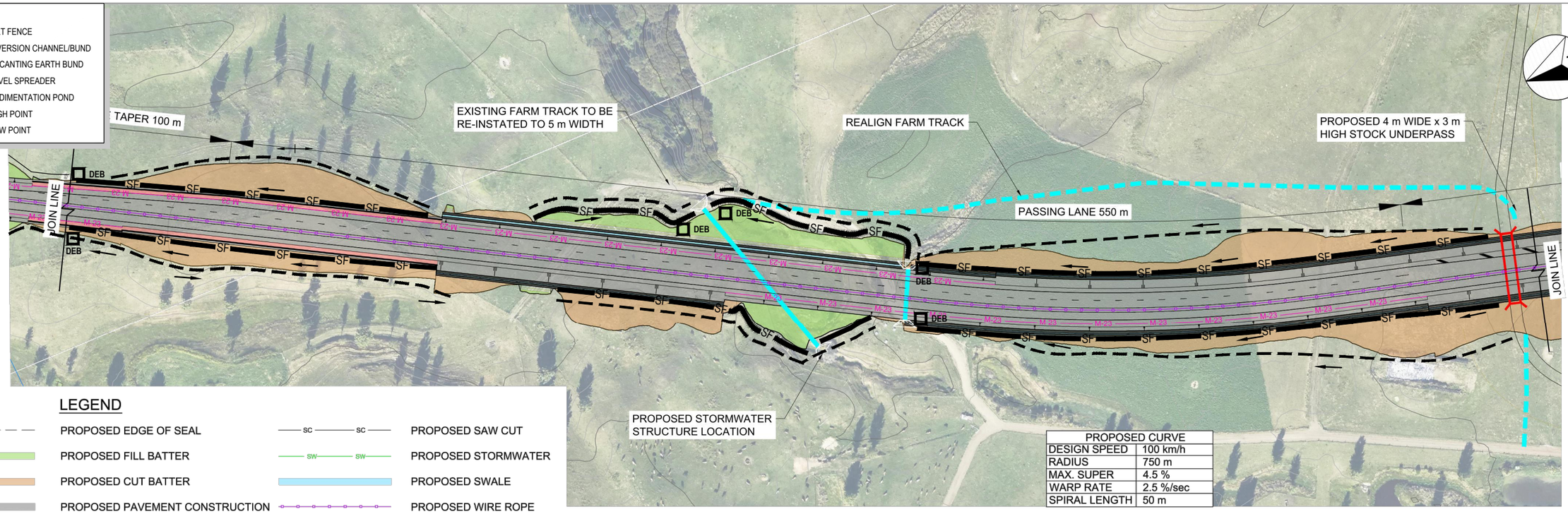
DOCUMENT NO. WGR - DES - GEM - 00 - DRG
SHEET NO. 0005
REVISION F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0005A

ORGANISATION JOB CODE: 2-S5416.01
ORIGINATING ORGANISATION: WSP

LEGEND

- SF — SILT FENCE
- DIVERSION CHANNEL/BUND
- DEB — DECANTING EARTH BUND
- LEVEL SPREADER
- SED — SEDIMENTATION POND
- HIGH POINT
- LOW POINT



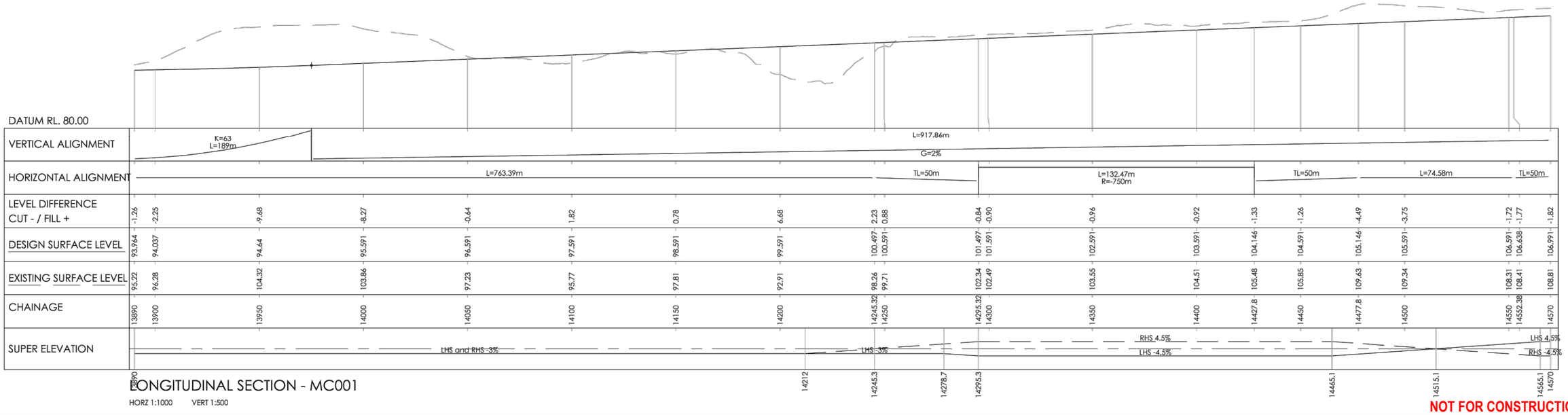
PROPOSED CURVE	
DESIGN SPEED	100 km/h
RADIUS	750 m
MAX. SUPER	4.5 %
WARP RATE	2.5 %/sec
SPIRAL LENGTH	50 m

LEGEND

- PROPOSED EDGE OF SEAL
- PROPOSED FILL BATTER
- PROPOSED CUT BATTER
- PROPOSED PAVEMENT CONSTRUCTION
- EXISTING BOUNDARY LINE
- PROPOSED BOUNDARY
- EXISTING FENCE LINE
- SC — PROPOSED SAW CUT
- SW — PROPOSED STORMWATER
- PROPOSED SWALE
- PROPOSED WIRE ROPE MEDIAN BARRIER
- M-23 — PROPOSED M23 COMPLIANT SAFETY BARRIER

GENERAL ARRANGEMENT
SCALE 1:1000 @ A1

EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 5 OF 8



LONGITUDINAL SECTION - MC001
HORZ 1:1000 VERT 1:500

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
A	DRAFT CONCEPT DESIGN ISSUE			J.T.	29/07/2021
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E	LONGSECTIONS UPDATED TO CORRECT CHAINAGES			J.T.	16/12/2021
F	GEOMETRIC DESIGN CHANGES POST CONCEPT REVIEW			J.T.	04/02/2022

WAKA KOTAHI NZ TRANSPORT AGENCY

Stantec

GHD

SCALES		ORIGINAL SIZE
AS SHOWN		A1
DRAWN	DESIGNED	APPROVED
P. BIRSE	A. LEWIS	-
DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
J. TAYLOR	J. TAYLOR	-

FOR CONSENT

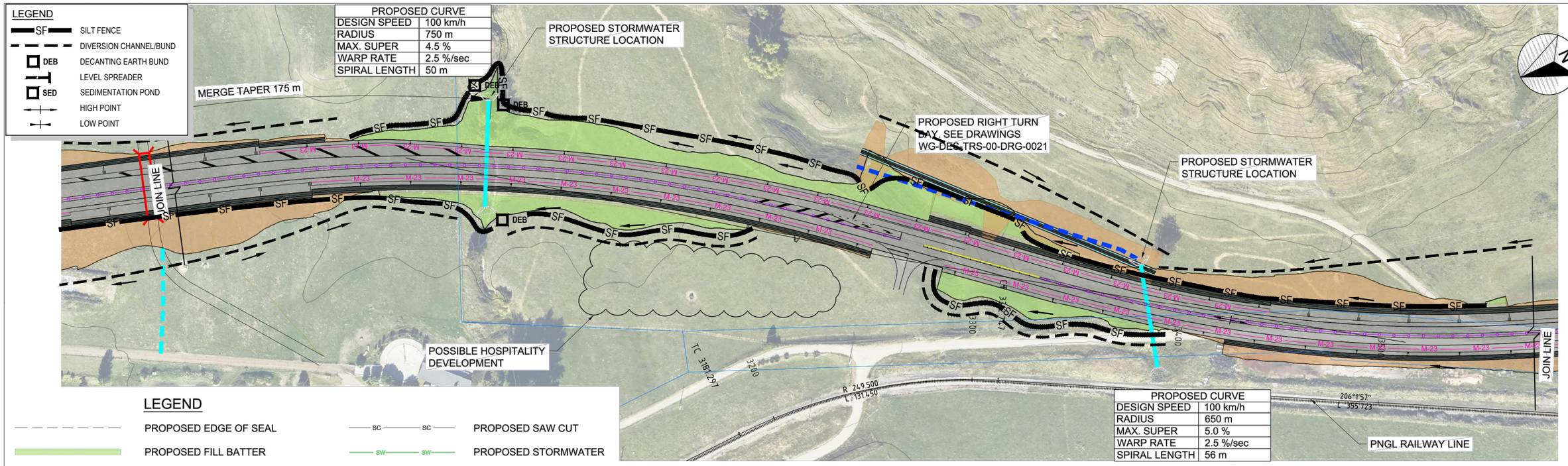
PROJECT
WAKA KOTAHI NZ TRANSPORT AGENCY
SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE
GENERAL ARRANGEMENT
PLAN AND LONGSECTION SHEET 5 OF 8

DOCUMENT NO. WGR - DES - GEM - 00 - DRG
SHEET NO. 0006
REVISION F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0006A

ORGANISATION JOB CODE: 2-S5416.01 ORIGINATING ORGANISATION: WSP



LEGEND

- PROPOSED EDGE OF SEAL
- PROPOSED FILL BATTER
- PROPOSED CUT BATTER
- PROPOSED PAVEMENT CONSTRUCTION
- EXISTING BOUNDARY LINE
- PROPOSED BOUNDARY
- EXISTING FENCE LINE
- PROPOSED SAW CUT (SC)
- PROPOSED STORMWATER (SW)
- PROPOSED SWALE
- PROPOSED WIRE ROPE MEDIAN BARRIER
- PROPOSED M23 COMPLIANT SAFETY BARRIER (M-23)

GENERAL ARRANGEMENT

SCALE 1:1000 @ A1

5082.83 RL 115.35

2.328 RL 117.437

EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 6 OF 8

LONGITUDINAL SECTION - MC001

HORZ 1:1000 VERT 1:500

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
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WAKA KOTAHI NZ TRANSPORT AGENCY

WSP Stantec GHD

SCALES		ORIGINAL SIZE
AS SHOWN		A1
DRAWN	DESIGNED	APPROVED
P. BIRSE	A. LEWIS	-
DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
J. TAYLOR	J. TAYLOR	-

FOR CONSENT

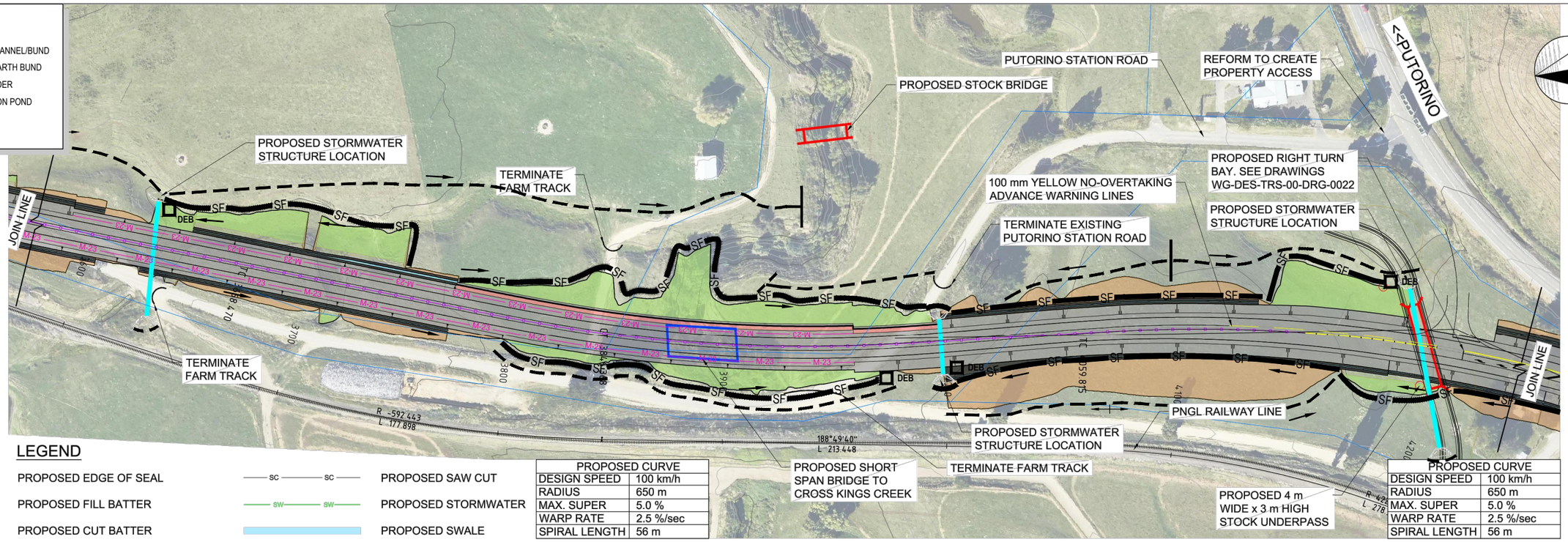
PROJECT
WAKA KOTAHI NZ TRANSPORT AGENCY
SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE
GENERAL ARRANGEMENT
PLAN AND LONGSECTION SHEET 6 OF 8

DOCUMENT NO.	SHEET NO.	REVISION
WGR - DES - GEM - 00 - DRG	0007	F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0007A

ORGANISATION JOB CODE: 2-S5416.01 ORIGINATING ORGANISATION: WSP



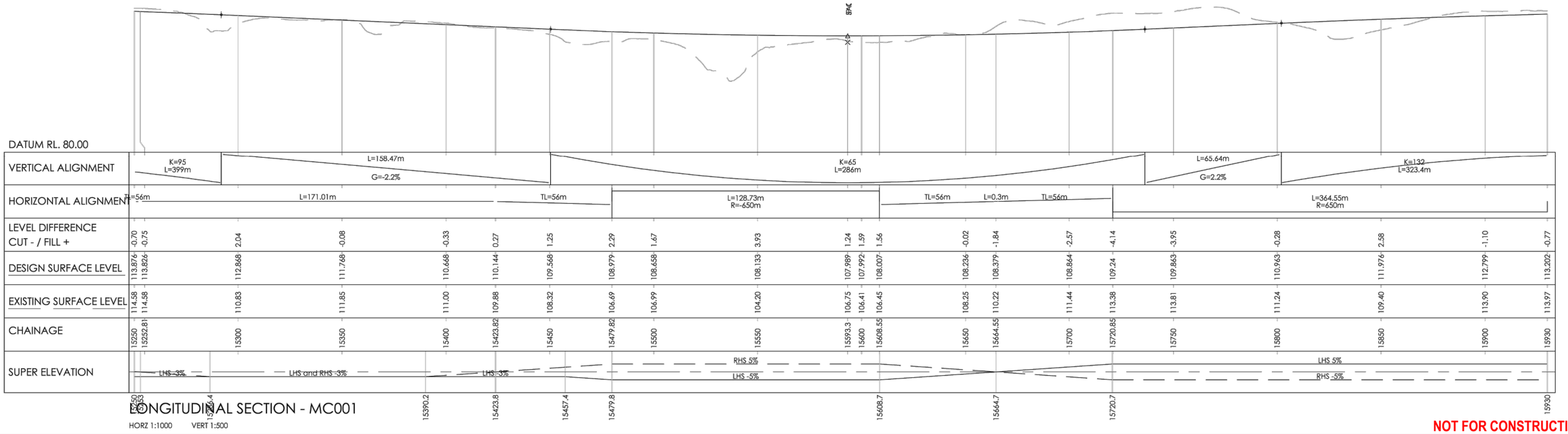
LEGEND

- PROPOSED EDGE OF SEAL
- PROPOSED FILL BATTER
- PROPOSED CUT BATTER
- PROPOSED PAVEMENT CONSTRUCTION
- EXISTING BOUNDARY LINE
- PROPOSED BOUNDARY
- EXISTING FENCE LINE
- PROPOSED SAW CUT
- PROPOSED STORMWATER
- PROPOSED SWALE
- PROPOSED WIRE ROPE MEDIAN BARRIER
- PROPOSED M23 COMPLIANT SAFETY BARRIER

GENERAL ARRANGEMENT

SCALE 1:1000 @ A1

EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 7 OF 8



LONGITUDINAL SECTION - MC001

HORZ 1:1000 VERT 1:500

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
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F	GEOMETRIC DESIGN CHANGES POST CONCEPT REVIEW			J.T.	04/02/2022

WAKA KOTAHI NZ TRANSPORT AGENCY

WSP Stantec GHD

SCALES: AS SHOWN		ORIGINAL SIZE: A1
DRAWN: P. BIRSE	DESIGNED: A. LEWIS	APPROVED: -
DRAWING VERIFIED: J. TAYLOR	DESIGN VERIFIED: J. TAYLOR	APPROVED DATE: -

FOR CONSENT

PROJECT: WAKA KOTAHI NZ TRANSPORT AGENCY
SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE: GENERAL ARRANGEMENT
PLAN AND LONGSECTION SHEET 7 OF 8

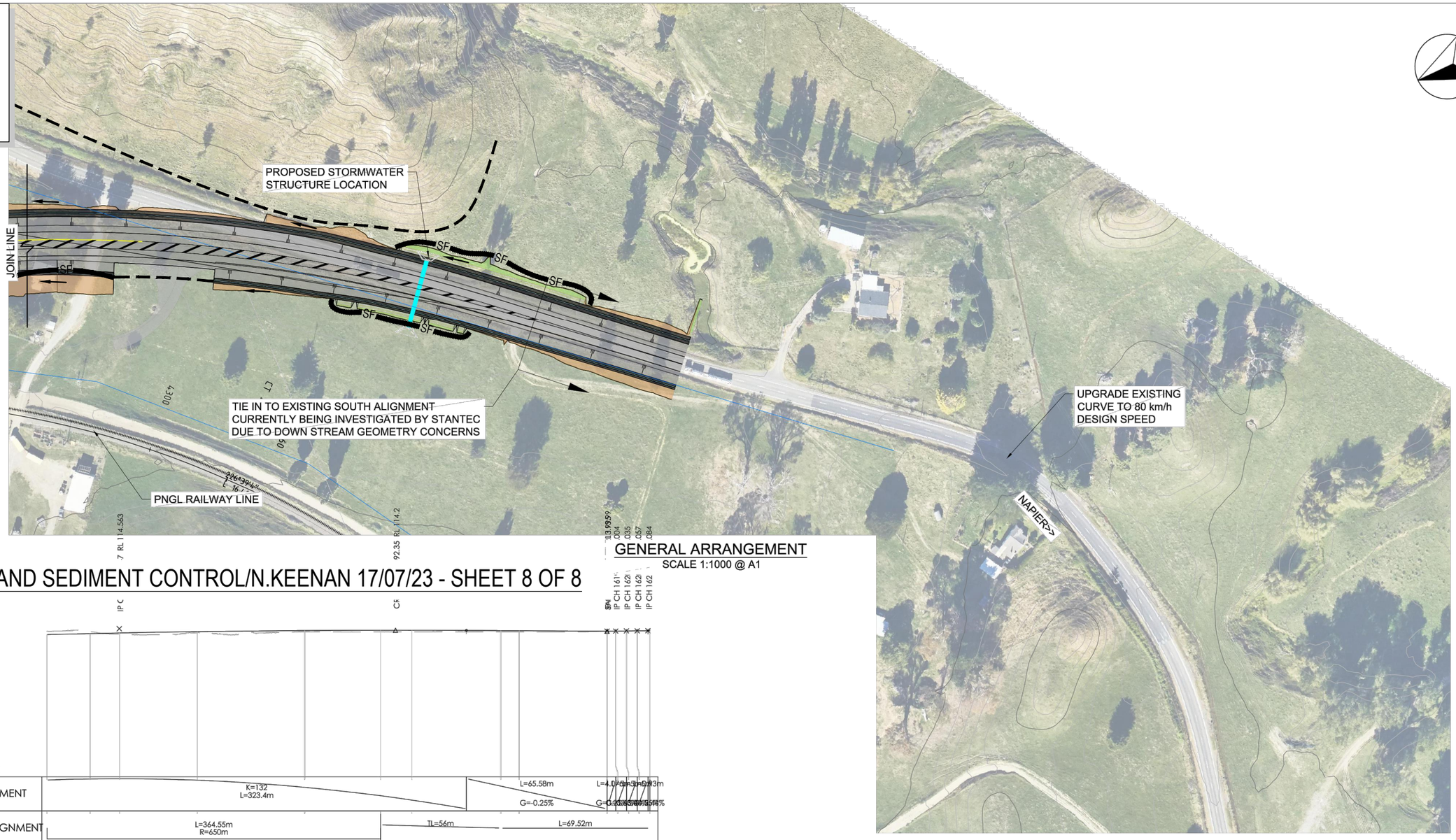
DOCUMENT NO.: WGR - DES - GEM - 00 - DRG
SHEET NO.: 0008
REVISION: F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0008A

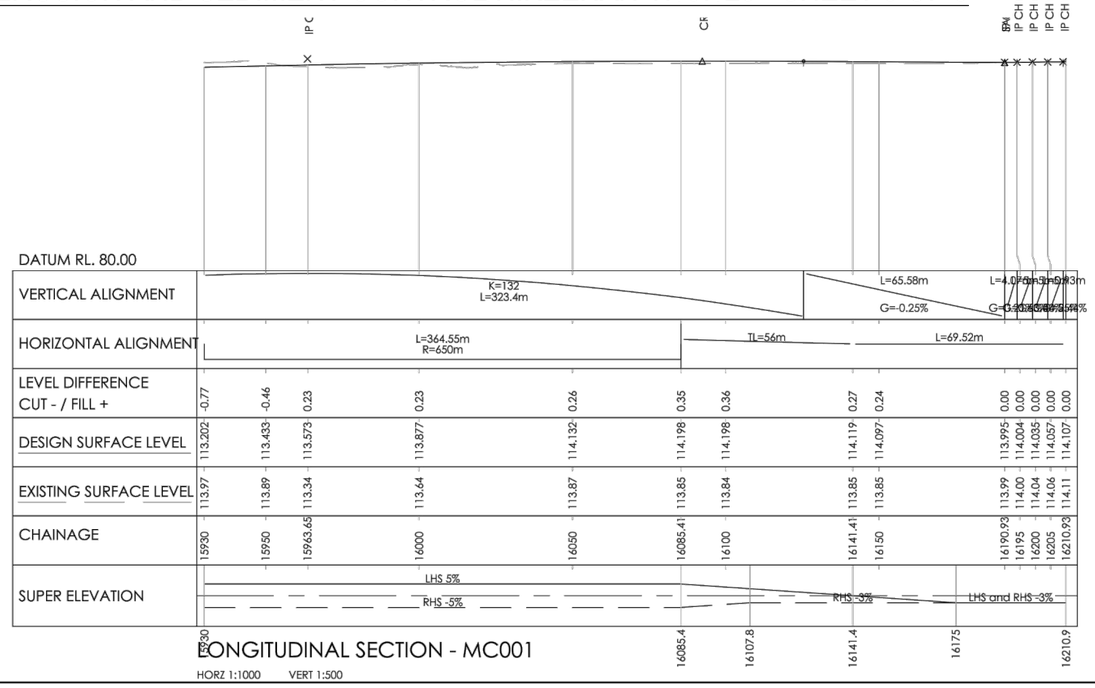
ORGANISATION JOB CODE: 2-S5416.01 ORIGINATING ORGANISATION: WSP

LEGEND

- SF — SILT FENCE
- DIVERSION CHANNEL/BUND
- DEB — DECANTING EARTH BUND
- LEVEL SPREADER
- SED — SEDIMENTATION POND
- HIGH POINT
- LOW POINT



EROSION AND SEDIMENT CONTROL/N.KEENAN 17/07/23 - SHEET 8 OF 8



LONGITUDINAL SECTION - MC001

HORZ 1:1000 VERT 1:500

GENERAL ARRANGEMENT

SCALE 1:1000 @ A1

LEGEND

- PROPOSED EDGE OF SEAL
- PROPOSED FILL BATTER
- PROPOSED CUT BATTER
- PROPOSED PAVEMENT CONSTRUCTION
- EXISTING BOUNDARY LINE
- PROPOSED BOUNDARY
- EXISTING FENCE LINE
- SC — SC — PROPOSED SAW CUT
- SW — SW — PROPOSED STORMWATER
- PROPOSED SWALE
- PROPOSED WIRE ROPE MEDIAN BARRIER
- M-23 — M-23 — PROPOSED M23 COMPLIANT SAFETY BARRIER

NOT FOR CONSTRUCTION

REVISION	AMENDMENT	DRAWN	CHECKED	APPROVED	DATE
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WAKA KOTAHI NZ TRANSPORT AGENCY

WSP Stantec GHD

SCALES		ORIGINAL SIZE
AS SHOWN		A1
DRAWN	DESIGNED	APPROVED
P. BIRSE	A. LEWIS	-
DRAWING VERIFIED	DESIGN VERIFIED	APPROVED DATE
J. TAYLOR	J. TAYLOR	-

FOR CONSENT

PROJECT
WAKA KOTAHI NZ TRANSPORT AGENCY
SH2 R.P. 577/11.600-592/2.500 WAIKARE GORGE REALIGNMENT

TITLE
GENERAL ARRANGEMENT
PLAN AND LONGSECTION SHEET 8 OF 8

DOCUMENT NO. WGR - DES - GEM - 00 - DRG
SHEET NO. 0009
REVISION F

Original sheet size A1 (841x594) C:\12dS\data\WSPSYN\WGR - SH2 Waikare Gorge_26\04_Documentation\01_Drafting\02_Drawings\WGR-DES-GEM-00-DRG-0001_0009.dwg 0009A

ORGANISATION JOB CODE: 2-S5416.01 ORIGINATING ORGANISATION: WSP

DESIGN WITH COMMUNITY IN MIND

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That is why at Stantec, we always design with community in mind.

We care about the communities we serve—because they are our communities too. This allows us to assess what is needed and connect our expertise, to appreciate nuances and envision what has never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We are designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN.
Visit us at stantec.com or find us on social media.

Stantec New Zealand
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PO Box 13052, Armagh, Christchurch, 8141
Tel +64 6 873 8900 | www.stantec.com