

TE KOWHAI EAST LIMITED PARTNERSHIP

Stream Works Management Plan (Draft)

Te Kowhai East Industrial Development
270 Te Kowhai Road and 28 Mathers Road, Horotiu, Hamilton
TKE-STMP-001

Prepared for Fast-track Approvals Act 2024 Consent Application

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TKE-STMP-001

STREAM WORKS MANAGEMENT PLAN (DRAFT)

Mangaheka modification · Drain network · Sediment control · Iwi and hapū



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1. Introduction

This draft Stream Works Management Plan (STMP) sets out the framework for managing all in-channel and near-channel construction works at the Te Kowhai East development. It covers modification of the Mangaheka Stream, culverting of the Te Otamanui Stream, closure and diversion of the farm drain network, culvert installation, and sediment control during instream works. This document is intended to be read alongside the management plans itemised in section 1.1, which overlap with the requirements and works covered by this management plan.

The report has been prepared to support Te Kowhai East Limited Partnership’s substantive application for approvals under the Fast-track Approvals Act 2024 (FTAA).

The Project is a large-scale industrial development located on the north-western edge of Hamilton, adjacent to the established Te Rapa industrial area. The application provides for the creation of an integrated industrial precinct, including approximately 210 industrial lots, land for neighbourhood centre activities, reserves for recreation, stormwater management and ecological mitigation, and associated roading and infrastructure services. The application also seeks approval for the ultimate land use outcomes anticipated across the site, being predominantly industrial activities, along with a limited range of compatible non-industrial activities suited to an industrial environment.

A comprehensive description of the Project is provided in the Substantive Application Report (SAR).

1.1 Related management plans

This STMP must be read alongside the following related management plans, each of which addresses a specific environmental or operational workstream. The table below sets out the interface between this STMP and each related plan.

Plan name	Interface with this STMP
Fish Management Plan (FMP)	Governs fish capture, handling and relocation protocols for all in-channel and drain works covered by this STMP.
Construction Management Plan (CMP)	Site-wide management framework, establishing operational, environmental, health and safety, and compliance controls. Assignment of regulatory hold points, roles and responsibilities across all construction stages.
Earthworks Management Plan (EWMP)	Defines the integration of the bulk earthworks programme with the staged stream works phasing (Section 4), and specifies the site-wide erosion and sediment control measures, phase sequencing and earthworks methodology.
Mangaheka Stream Enhancement Plan (MSEP)	Riparian planting specifications for post-works reinstatement (Section 7) and Mangaheka enhancement (Section 4.1).
Black Mudfish Habitat Creation Plan (BMHCP)	Created habitat for relocated black mudfish (Section 4.4, Section 7). Released fish destinations confirmed in the FMP.
Bat Management Plan (BMP)	Tree felling and vegetation clearance in stream corridors and riparian margins interfaces with bat foraging habitat. Coordinated timing and tree assessment protocols.
Lizard Management Plan (LMP)	Vegetation clearance in stream and drain margins interfaces with potential lizard habitat. Pre-clearance survey and salvage capture required where moderate or high habitat suitability is identified.

3. Legislative and Policy Context

Instrument	Relevant provision	
National Environmental Standards for Freshwater (NES-F) 2020	Permitted and restricted discretionary activity standards for instream works; fish passage at culverts; setbacks	
Waikato Regional Plan (WRP)	Watercourse classifications; resource consent requirements for instream works	
National Policy Statement for Freshwater Management (NPS-FM) 2020	Te Mana o te Wai hierarchy; freshwater ecosystem health; sediment and contaminants	
Waikato Regional Council (WRC) TR2009/02	Erosion and sediment control design standards; controls within 50 m of Mangaheka Stream	
Fast-track Approvals Act 2024 (FTAA)	Expert Panel assessment and consent conditions framework	
Te Ture Whaimana o Te Awa o Waikato	Vision and Strategy for the Waikato and Waipā Rivers (Treaty settlement); prevails over any inconsistency with the NPS-FM in the Waikato/Waipā catchments	
Ngāti Reko, Ngāti Māhanga (primary mana whenua)	Mātauranga input into stream works methodology and cultural values. Coordination of cultural ceremonies and protocols as advised by mana whenua. Engagement with the relevant iwi and hapū directly and via relevant governance entities as appropriate. Further coordination and consultation with the relevant iwi and hapū will be undertaken to confirm notification and engagement requirements for in-channel Mangaheka Stream works (HP-EW-08).	Ongoing via iwi and hapū engagement
Ngāti Wairere, Ngāti Hauā, Ngāti Tamainupō, Te Uri o Māhanga (enduring interests)	Mātauranga input and engagement with the relevant iwi and hapū as appropriate. Draft Plan provided for review.	Ongoing via iwi and hapū engagement

Te Kowhai East Limited Partnership is responsible for engaging with iwi/hapū and providing a final copy of this STMP to all relevant parties. Mātauranga Māori input received through consultation will be considered and incorporated into this plan where appropriate.

4. Stream Modification & Culvert Works Summary

Works will be undertaken throughout the proposed development across the nine development stages within four earthworks phases, as set out in the EWMP. Each phase includes sub-phases (S1 – S3) which designate the earthworks scope areas where the stream modification is located. The timings and staging of the following works are to be aligned with the intention set out in the EWMP.

4.1 Mangaheka Stream — Modification works

The Mangaheka Stream which bisects the site, requires modification to provide for increased stormwater flow capacity generated from the development. The modification design includes:

- Lowering of the existing Mangaheka stream and creation of a meandering baseflow channel with similar dimensions to the existing channel, maintaining the longitudinal gradient and sinuosity of the existing stream.
- Creation of approximately 17 m wide flood conveyance in line with Mangaheka stream (within the site) to accommodate for flooding, targeted at the 2-, 10-, 100-year ARI events which operate in conjunction

with the attenuation provided by the wetlands. These are additional in-stream structures beyond the channel reconstruction itself.

- Downstream transition works from the lowering of the Mangaheka channel are anticipated to extend approximately 400 m downstream of the site into 302 and 360 Te Kowhai Road and 196 Onion Road.
- Stormwater conveyance channels beyond the outer edge of the Mangaheka flood conveyance channel to carry stormwater from the development catchment to the stream.
- Creating a meandering formation of the stream within the site, to lengthen the modified stream by approximately 370m.
- Instream and riparian habitat enhancement per the MSRP: woody debris, native plantings, gravel riffles.

For further information on the formation of the proposed modifications works, refer to the Engineering Plans in Appendix A. Ecological requirements for these works — pre-works habitat assessment and fish capture with ESL clearance, continuity of flow and fish passage, and riparian planting — are set out in Sections 5.1 and 6 and undertaken in accordance with the FMP.

4.2 Mangaheka Stream — Culvert – Bridge Crossings

Alongside the stream modification works, two road crossings are required to provide crossing points for the main collector roads proposed in the development. The current concept design provides for box culverts under each crossing, sized 3000 mm × 1500 mm for the western crossing and 2000 mm × 1500 mm for the eastern crossing (indicative sizes, to be confirmed at detailed design).

The crossings form part of an integrated attenuation and conveyance arrangement, comprising the box culverts through the attenuation embankment together with an approximately 20 m bridge span above. The box culverts convey flow and provide fish passage through an attenuation embankment whose crest corresponds to the 100-Year ARI level. The bridge will be constructed with additional freeboard above the top of embankment so that the embankment can act as an emergency spillway during a culvert blockage scenario.

The detailed design of the crossing structures, including their relationship with the baseflow channel, flood conveyance area and attenuation embankment, will be confirmed prior to construction of the relevant stream works. The culvert crossings will be designed and installed to maintain fish passage in accordance with the NES-F and the FMP; installation standards are set out in Section 6.5. For specific details on the envisaged works, refer to the Engineering Plans Appendix A.

4.3 Te Otamanui Stream — Culvert Crossing

The development gains access via Te Kowhai Road, which crosses Te Otamanui Stream. A box culvert (approximately 1500 mm × 1000 mm) is proposed at the Te Kowhai Road crossing. The works affect approximately 65 m of the Te Otamanui Stream and comprise the culvert crossing and associated stream/daylighting and riparian works required to integrate the crossing with the new road formation. No other modification of the Te Otamanui Stream is proposed. Fish passage through the culvert will be provided for with the FMP. For specific details on the envisaged works, refer to the Engineering Plans Appendix A.

4.4 Farm drain network — closure and diversion

A series of existing farm drains within the site currently discharge into the Mangaheka Stream. These drains shall be replaced by the criteria summarised in the table below, as means to conveying overland flow paths into the designed devices and conveyance channels.

Treatment	Description
Piping	Drains under roading and platforms piped with suitable culverts to maintain catchment connectivity
Infilling	Drains within earthworks platforms progressively infilled as earthworks advance. Ensure existing drains not being earthworked are adequately diverted if required.
Diversion / Modification	Drains redirected to stormwater network or Mangaheka floodplain channel. Drains retained as part of stormwater conveyance or wetland habitat

All drain works will be subject to fish capture requirements per the FMP. Prior to any drain works, the ecologist (ESL) shall undertake relevant actions – fish capture / survey – and clearance issued. Drains identified as black mudfish habitat in the EclA are subject to black mudfish capture, salvage and habitat compensation in accordance with the BMHCP. Capture must be complete and ESL clearance issued before any infilling, piping or diversion of those drains commences. Refer to the EclA and the BMHCP for the farm drain classification and black mudfish habitat extent.

4.5 Outlet Structures – Stormwater Devices

A number of outlet structures serving the proposed wetlands and raingardens will be constructed within the main conveyance channel. Although most of these structures sit outside the main stream channel, some require energy dissipation — such as rip-rap lining — that will need to be coordinated with the stream works. As far as practical, any works associated with the outlet structures will be undertaken at the same time as the stream modification works, so that they fall within the isolated stream works rather than being carried out as separate, later disturbances.

5. Stream Works Design – Pre and Post Requirements

5.1 Stream Modification Pre-Requirements

This section sets out the design and performance requirements for the Mangaheka stream modification works. Construction management requirements — hold points, flow continuity, diversion and dewatering, in-channel working methods, sediment control and staging — are set out in Section 6, with post-works reinstatement and monitoring in Sections 7 and 8. The Mangaheka Stream modification works progress in discrete stages as set out in Section 6.6, aligned with the principal earthworks phasing defined in the EWMP.

Pre-works requirements

The following design and baseline requirements apply before construction commences in each stage:

- Reference reach identification. A representative natural or near-natural reach within the wider Mangaheka catchment is surveyed and used to inform design targets for channel geometry, substrate composition, and habitat features. The reference reach is the lower Mangaheka downstream of State Highway 39 where channel morphology, gradient, and riparian condition most closely approximate the pre-modification state of the on-site reach. A detailed reference reach survey is undertaken at detailed design stage and documented in the design memo per the MSRP.
- No stream modification works shall commence until ecological pre-requisites under the related management plans (sections 1.1) are met.

- Pre-works baseline survey of existing channel cross-sections, bed substrate, bank condition, and riparian vegetation.

Pre-commencement hold points and clearances — habitat assessment and fish capture per the FMP, temporary diversion design approval, erosion and sediment control verification, and iwi and hapū requirements — per Sections 6.1, 6.2 and 6.7.

Channel design and construction requirements

- The following requirements apply to the constructed channel in each Mangaheka Stream stage. The new channel corridor is formed alongside the existing drain, which remains operational as the bypass route until the new channel is ready to receive flow. Reach isolation, dewatering and discharge management are set out in Section 6.2.1, in-channel working methods in Section 6.3, and sediment control in Section 6.4.
- Two-stage channel form: meandering baseflow channel cut to design grade, with the flood conveyance bench shaped around it.
- Habitat features and bed substrate composition shall be designed and approved by Ecologists and Engineer prior to placement within the modified stream.
- Bank stabilisation: coir logs and brush layering at vulnerable points; rock toe protection only where hydraulic energy requires it; live planting per the MSRP carries the long-term stability load.
- Reach tie-ins: hydraulic transition matched to the upstream completed reach; no abrupt grade, width, or sinuosity changes.
- Old drain decommissioning: backfilling or repurposing shall be as per the approved stream works design
- Excavation channel material placed in designated holding areas and inspected by Ecologists/contractor for buried eels.

Post-works reinstatement and monitoring

- Reinstatement requirements for each stage (temporary works removal, bank regrading, riparian planting per the MSRP, and as-built survey) are set out in Section 7. Construction-phase and post-works monitoring, including bank stability monitoring, are set out in Section 8, with longer-term geomorphic and ecological condition assessment per the FMP Section 10 (Monitoring framework).

6. Construction Management Requirements

6.1 Hold points and pre-conditions

The following hold points apply to all stream and drain works under this plan:

Hold point	Pre-condition	Authority release	to	Reference
Fish capture clearance	ESL written confirmation that fish capture is complete in the working reach before any drain works or instream works commence. Completion criteria and reporting as determined by ESL, or as otherwise agreed. Detailed capture and relocation methodology per the FMP.	ESL		FMP
Iwi and hapū notification — Mangaheka in-channel works	Iwi and hapū notified before any in-channel works commence on Mangaheka Stream; notification timeframes to be confirmed through further coordination and consultation	Delivery Lead		Section 6.7 (Cultural Effects)

Spawning season clearance	No instream works on Mangaheka Stream between 1 August and 30 November without ESL written clearance confirming no active fish spawning	ESL	ESL written spawning season clearance
ESC measures operational	All ESC measures (silt fences, sediment retention, turbidity monitoring) confirmed operational before any instream works commence	ER	EWMP
Consent conditions incorporated	WRC resource consent conditions incorporated into contractor CEMP before any instream works commence	Delivery Lead / BBO	Consent conditions

6.2 Continuity of flow

Continuous flow through the Mangaheka Stream must be maintained at all times during construction. No full channel blockage is permitted without a functioning bypass in place – diversion stream or pumped method. The bypass must:

- Have sufficient capacity to pass the 5-yr ARI flow at the time of works without causing upstream flooding.
- Maintain fish passage continuity — bypass must not strand or entrap fish, unless a methodology is agreed with ESL on recovery methods during stream works.
- Be inspected daily during works and maintained in operational condition.
- Temporary diversion must be certified and approved by the Engineer in accordance with the stream works design. The preferred bypass approach is a gravity-fed temporary diversion channel cut parallel to the working reach, sized to convey the 5-yr ARI flow at the time of works with 300 mm of freeboard. Pumped bypass is held as contingency for high flow events. Pipe diversion is envisaged as a last resort where sections of stream cannot be gravity channelised.
- Bypass screened or designed to prevent passage of pest fish species into upstream reaches. Any pest fish captured during bypass operation are handled and disposed of as agreed with the ESL and in accordance with the FMP.

6.2.1 Diversion methodology

All in-channel works on the Mangaheka and Te Otamanui streams require the working reach to be isolated from the active waterway, the residual water within the stream section removed, and any discharges from the working area managed to prevent sediment release to the receiving environment. The following methodology applies to all stream works diversions and dewatering operations covered by this STMP.

Temporary Diversion Construction

- Temporary diversion to be marked out as per the approved temporary diversion design.
- Commence earthworks to form channel profile and leaving 5m short from upstream and downstream of working stream section. Progressively lining with geotextile to prevent silt and erosion.
- Gain certification by ecologist/engineer to integrity of diversion, prior to diverting flows.

Working reach isolation

- Working stream section isolated at upstream and downstream extents using earth bunding / sand bagging, or appropriate method of damming device.
- Earth bunds constructed using clean clay or imported clay. Geotextile membrane on the upstream face for sealing.
- Isolation bunds positioned at least 5 m clear of the active works edge to allow plant access and inspection.

- Fish recovery from the isolated reach completed by ESL before any dewatering commences, per the FMP Section 9 (Capture and Translocation).
- Isolation integrity inspected daily and after every rainfall event exceeding 25 mm in 24 hours.

Dewatering

- Pre-dewatering fish recovery completed by ESL after the isolation bunds are in place and before any pump-out commences. Completion criteria as determined by ESL, or as otherwise agreed.
- Dewatering timing to be agreed with ESL.
- Residual water in the isolated reach pumped to a sediment retention structure before any earthworks commence.
- Pump capacity sized to handle initial dewatering plus ongoing seepage rate. Pump capacity shall be confirmed prior to dewatering. Backup pump on standby for the duration of works in case of primary pump failure
- Ongoing seepage management throughout the works period. Pumping continues until reach is reinstated and re-watered.

Discharge management

- All dewatering discharge passes through a sediment retention structure (silt trap, sediment retention pond, or filter sock array) before entering any drain or watercourse.
- No direct discharge of dewatering water to the active downstream Mangaheka Stream without prior treatment.
- Flocculant treatment applied where turbidity at the discharge point exceeds 100 NTU. Approved flocculant types as per approved chemical treatment plan
- Turbidity monitored at the discharge point with daily records. Discharge ceases immediately if turbidity exceeds baseline requirements.

High flow event contingency

- Works suspended ahead of any forecast rainfall event exceeding 25 mm in 24 hours or 15 mm in 1 hour, per the most recent MetService forecast for the site.
- On suspension: bypass confirmed fully operational and at full capacity; dewatering pumps removed from the working reach to higher ground; isolation bunds inspected for integrity; loose material in or adjacent to the channel stabilised.
- Where flow exceeds bypass capacity during works, in-channel works cease immediately. Notification of overflow to be reported to Engineer & Council and treated as an incident.
- Works resume only after the bypass and isolation have been reassessed and additional mitigation are in place as agreed with the Environmental Representative, and any damage repaired.

6.3 In-stream work methods

The following working method requirements apply to all in-channel works on Mangaheka Stream:

- Works proceed in discrete, staged reaches of a length that can be effectively isolated, dewatered and fish salvaged in a single operation, with the upstream reach reinstated and stable before the next reach commences.
- Excavation plant working within the channel must operate from the bank where practicable. Plant access to the channel bed requires specific approval.
- No refuelling, maintenance, or fluid changes within 20 m of the active channel edge.
- Concrete and grout works adjacent to the channel: no pour within 10 m of the active channel without a temporary bund or equivalent isolation in place.
- Disturbed bed and bank material must be shaped and stabilised at the end of each working day — no unsecured loose material left in or adjacent to the channel overnight.

- Working hours and timings on season must be agreed with ESL, Engineer and Council authority prior to works.
- All plant and equipment Check Clean Dry (CCD) compliant before first entry to site and before transfer between Mangaheka Stream and farm drain works. Inspection by the Environmental Representative or delegate before site entry.
- Inspection record kept of CCD compliance for each plant item. Records maintained on site for the duration of works.
- Equipment arriving from outside the Waikato region or from any site with confirmed didymo, alligator weed, or other freshwater pest organisms requires additional decontamination per Ministry for Primary Industries (MPI) biosecurity protocols before site entry.

6.4 Sediment control during instream works

Sediment control during instream works is governed by the CMP and the EWMP. The following requirements apply specifically to stream and drain works:

- Background turbidity is established by pre-works continuous monitoring at a fixed upstream reference station. Compliance triggers, background calculation methodology, monitoring duration, and equipment standards are confirmed at detailed design in accordance with WRC consent conditions and any required National Environmental Monitoring Standards (NEMS) Water Quality Monitoring protocols.
- Silt curtains deployed downstream of all active instream works before works commence. Curtains must extend to the channel bed and be anchored.
- Continuous turbidity monitoring at the downstream compliance point during all Mangaheka in-channel works. Monitoring using calibrated turbidity logger set to record at 15-minute intervals.
- Compliance threshold: turbidity must not exceed 100 NTU above background at the downstream compliance point for more than 15 consecutive minutes.
- Where threshold is exceeded: works stop; cause identified and addressed; ESL notified within 1 hour; works resume only after turbidity returns to background.
- Flocculation may be used to manage turbidity during dewatering of isolated sections: approved flocculant types and application rates is subject to a site-specific chemical treatment management plan.

6.5 Culvert installation standards

All culverts crossing any watercourse within the site must be designed and installed to comply with fish passage requirements. Detailed fish passage design is addressed in the FMP and confirmed with the ESL. In addition, refer to the engineering design details for the relevant culvert crossing the Mangaheka and Te Otamanui streams. The following are the scope of works to be undertaken within stream line.

- Culvert installation is preceded by isolation of the upstream flow using temporary bunds or stop logs and dewatering of the installation footprint.
- Dewatering discharge must pass through a sediment retention structure before entering any drain or watercourse.
- Culvert alignment must be integrated with the approved stream alignment. Survey set out onsite and approval required by the Engineer and ESL prior to installation.
- Outlet energy dissipation: scour protection (rip-rap or equivalent) shall be provided, where required.
- Post-installation: culvert invert levels must be surveyed and confirmed to be at or below the channel bed level before backfilling commences.
- Culvert installation is carried out during periods of low or no flow. Where flow is present, the work area is isolated and the flow diverted before installation begins.
- All materials and plant are on site before in-channel work starts, to keep the time spent working in the watercourse to a minimum.

- Fish are captured and relocated from the isolated reach before excavation begins.
- Culverts are installed to the design levels with no drop at the outlet, so that fish passage is maintained.
- Once the culvert is in place, flows are returned to it, and the disturbed bed and banks are stabilised and reinstated.

6.6 Staged sequencing

Stream and drain works are staged to align with the overall earthworks programme. Within each stage, drain works proceed ahead of bulk earthworks to allow drainage of the platform. The following sequencing principles apply:

- Fish capture clearance for the stage must precede any drain works in that stage.
- Mangaheka in-channel works are sequenced to avoid the spawning season restriction where practicable. Where the programme requires works within this period, ESL clearance must be obtained in advance, within the timeframe agreed with the ESL.
- No drain infilling commences until the downstream stormwater outlet for that drainage catchment is operational and confirmed by ESL.
- Retained drain sections must be protected from sediment ingress during works in adjacent areas.

Each phase contains multiple working reaches. Reaches within a stage are constructed in upstream-to-downstream order, with each reach reinstated and stable before the next reach commences.

The following table sets out the indicative staging for Mangaheka Stream modification works, stream reach boundaries and lengths. Drain works within each stage proceed ahead of bulk earthworks in accordance with the earthworks programme.

Phase	Stream description	Approx. length (m)	Works description
S1	CH400 to CH1500 (400m of in-stream lowering external of the development)	~1100m	• Mangaheka Stream widening/lowering – Downstream - mid stream section; general alignment of existing stream maintained. Bulk cut earthworks. • Road crossing and culvert installation.
S2	CH1500 to CH 2250 (Stream lowering and secondary conveyance construction)	~750m	• Mangaheka Stream widening/lowering – mid stream section; general alignment of existing stream maintained. Bulk cut earthworks. • Adjacent secondary conveyance channel to be constructed
S3	CH2250 – CH2660 (Stream lowering and secondary conveyance construction)	~410m	• Mangaheka Stream – mid to upstream section, widening, lowering and minor re-alignment. • Mangaheka floodplain channel and baseflow channel formation. • culvert installation/Road crossing

1A (Te Otamanui Stream)	In stream works Culvert installation	~65m	Te Otamanui stream culvert installations and construction of new collector road connection.
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6.7 Cultural Effects

Cultural effects are addressed in the Cultural Impact Assessment prepared by the relevant iwi and hapū. All stream works shall be undertaken in accordance with its recommendations, including:

- engagement/notification before Mangaheka works;
- opportunity for cultural protocols/ceremonies;
- relevant mātauranga input into detailed stream design; and
- incident notification where required.

7. Post-Works Reinstatement

Following completion of stream modification and drain works in each stage, the following reinstatement requirements apply:

- All temporary bunds and bypass structures removed within 5 working days of works completion in each reach.
- Disturbed bank material regraded to design profile and seeded with appropriate planting species.
- Riparian planting undertaken in accordance with the MSRP or equivalent enhancement/landscape package.
- Silt fences and temporary sediment control removed after turbidity returns to background for 48 consecutive hours post-works.
- As-built survey of all modified channel reaches shall be undertaken, and verified by the Engineer within 30 days of works completion per stage.

8. Monitoring

This STMP defines construction-phase monitoring of stream works compliance. Ecological monitoring (macroinvertebrate community condition, fish community, riparian planting establishment) is addressed in the FMP.

Parameter	Method	Frequency	Responsibility	Trigger for adaptive management
Turbidity during instream works	Continuous logger at downstream compliance point; 15-minute recording interval	During all Mangaheka in-channel works	Contractor / ER	Exceedance of 100 NTU above background for >15 minutes — works stop
Visual water quality	Daily visual inspection of compliance point during active works (clarity, sheen, floating material)	Daily during active works	Contractor / ER	Visible plume beyond silt curtain or sheen observed — works stop, ER notified
Sediment & erosion control devices	Visual inspections and maintenance checks as set out in TR2009 / 02	Daily during active works; before and after rainfall >25 mm/24 hr	Contractor / ER	Damage, undermining, or bypass observed — repair or replace before works resume

Bypass operation	Visual inspection of bypass capacity, fish passage, and integrity	Daily during bypass operation; after each rainfall event	Contractor / Engineer	Capacity exceedance, fish strand or entrapment — works suspended,
Channel geometry as-built	Survey of modified channel reach (bed level, cross-sections, gradient)	Within 30 days of works completion per stage	Engineer	Deviation exceeding design tolerance. Engineer to review and remediation to be undertaken
Bank stability	Visual inspection of modified bank reaches	Weekly during active works; monthly for 6 months post-works	ER / Maven	Active erosion or slumping observed — emergency stabilisation as per Section 9

Post-works ecological monitoring (macroinvertebrate community condition, fish community, riparian planting establishment, and Mangaheka Stream condition assessment) is addressed in the FMP Section 10 (Monitoring). Adaptive management triggers from this monitoring framework are set out in Section 9 of this STMP.

9. Adaptive Management

All adaptive management actions triggered under this STMP must be reported in the relevant stage completion report and the monthly environmental summary to the consent authority. The following table sets out the trigger, action, timeframe, and responsible party for each foreseeable non-compliance scenario.

Trigger	Immediate action	Timeframe	Responsible party	Reporting
Turbidity exceeds 100 NTU above background for more than 15 consecutive minutes at downstream compliance point	Works stop immediately; cause identified and addressed; silt curtain inspected and repaired or replaced; ER notified	Works stop immediately; ESL notified within 1 hour; works resume only after turbidity returns to background	Contractor / Environmental Representative (ER)	Incident recorded in daily log; reported in monthly environmental summary to WRC and Delivery Lead
Fish kill or stranding observed during or after instream works	Works stop immediately; ESL notified; fish recovered and recorded; reach assessed for additional hazards before works resume	ESL notified within 1 hour; written incident report to WRC and the relevant iwi and hapū within 24 hours	ER / ESL	Incident report to WRC and the relevant iwi and hapū within 24 hours; included in stage completion report
Channel geometry post-modification deviates from design specification	Engineer notified; joint inspection arranged; remediation design prepared	Inspection within 14 days of identification; remediation design within 30 days; works completed within 60 days	Engineer	Remediation plan submitted to WRC; as-built resurvey after completion
Bank instability or active erosion identified on modified Mangaheka reach	Erosion protection installed immediately; Engineer and ESL conduct joint inspection; stabilisation approach confirmed	Emergency stabilisation within 24 hours; joint inspection within 14 days; permanent	Contractor / Engineer	Incident recorded in daily log; monthly environmental summary; reported to

		repair within 60 days		WRC if affecting water quality
Bypass capacity exceeded during high flow event	Upstream flows diverted to temporary retention; in-channel works ceased; bypass capacity reassessed by Engineer	Works suspended during event; capacity review within 5 working days of event; works only resume after Maven sign-off	Contractor / Engineer	Incident recorded in daily log; the relevant iwi and hapū notified within 24 hours if affecting Mangaheka mainstem
Significant channel event (spill, material release, or other environmental incident)	Incident isolated; ER and Delivery Lead notified; source controlled	ER notified within 1 hour; WRC and the relevant iwi and hapū notified within 24 hours; written report within 5 working days	Contractor / Delivery Lead	Written report to WRC and the relevant iwi and hapū within 5 working days

10. Roles and Responsibilities

The following parties are responsible for the implementation of this STMP. All stream and drain works under this plan are conducted under the authority of the Delivery Lead.

Role	Party	Responsibilities
Delivery Lead	Te Kowhai East Ltd Partnership	Overall plan oversight and coordination of hold-point compliance. Iwi and hapū engagement. Liaison with WRC as consenting authority. Consent conditions compliance. Pre-commencement notification per the CMP Section A8.1 sign-off.
Civil Engineer	Maven Associates	Mangaheka Stream modification design. Bypass design and certification. Culvert installation design and fish passage compliance. As-built survey of all modified reaches. Channel geometry remediation design where triggered.
Freshwater Ecologist	Ecological Solutions Ltd	Fish capture and clearance for each works reach. Spawning season clearance. Turbidity trigger response. Fish kill or stranding response. Post-works ecological monitoring per the FMP.
Environmental Representative (ER)	[To be appointed: independent of contractor; role definition, qualifications, and authority per the CMP Section 3]	Daily monitoring during instream works. Turbidity exceedance management and incident reporting. Silt curtain and ESC inspection and maintenance authorisation. Plant access to channel bed authorisation. Stop-works authority.
Principal Contractor	[To be appointed]	Implementation of all works methods specified in this STMP. ESC measure installation and maintenance per the EWMP. Bypass operation. CEMP development incorporating STMP requirements. Working hours compliance. Daily inspection record-keeping.
Iwi and hapū	Iwi and hapū	Mātauranga input into stream modification methodology and cultural values of Mangaheka Stream. Receipt of Pre-commencement notification as per the CMP Section 6 advising on, and attendance at, pre-commencement cultural ceremonies and protocols. Receipt of instream incident notifications within 24 hours.

Waikato Regional Council (WRC)	Waikato Regional Council	Resource consent certifying authority. STMP certification at least 20 working days before commencement of stream works. Compliance monitoring of consent conditions. Receipt of incident reports for turbidity exceedances, fish kills, and water quality incidents.
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11. References

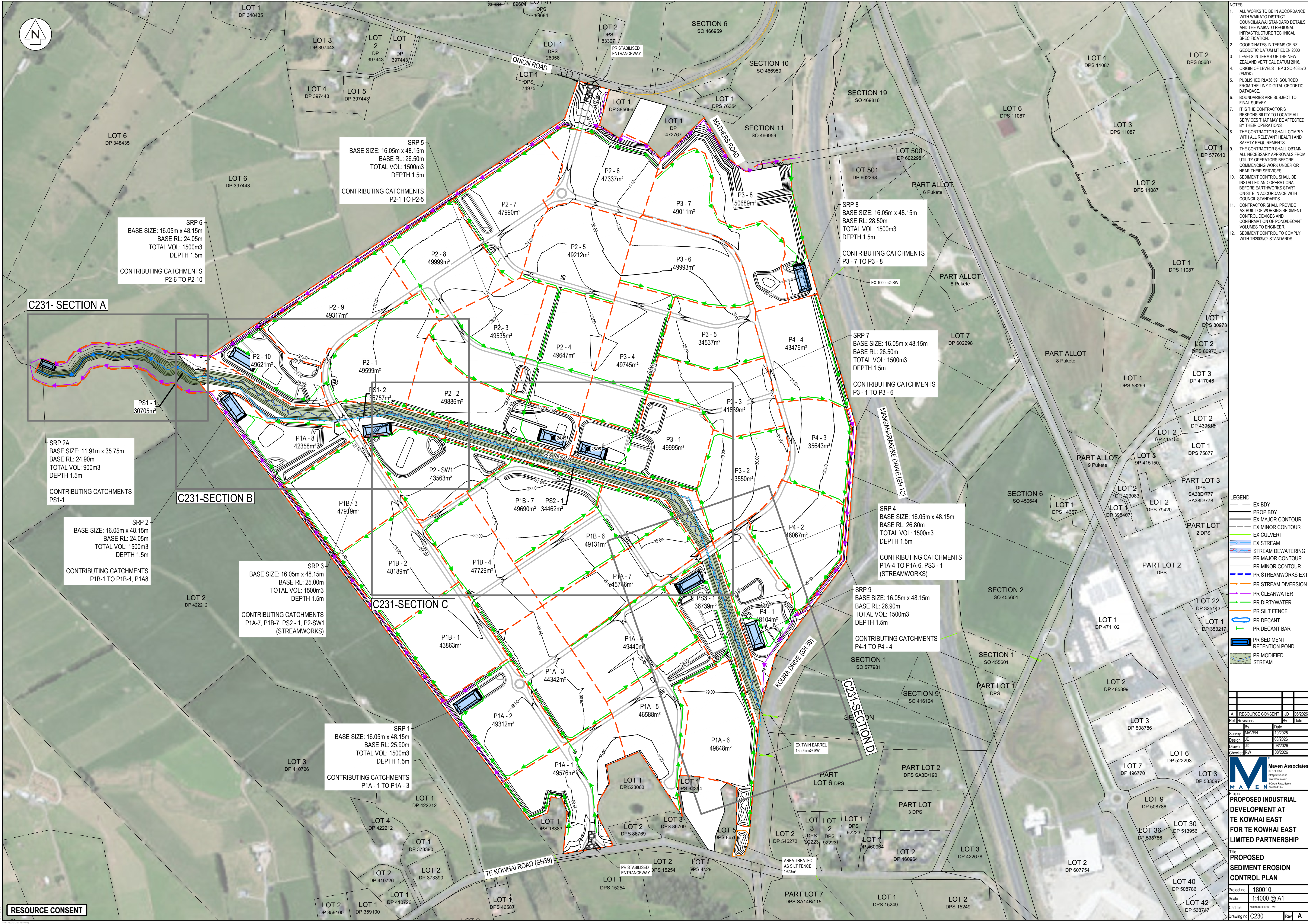
Reference	Author	Date	Relevance to this STMP
Ecological references			
Ecological Impact Assessment (EcIA) draft version v5	Ecological Solutions Ltd	28 August 2026	Baseline stream classification, ecological values and effects characterisation for the Mangaheka and Te Otamanui Streams, Watercourse M13 and the drain network. Informs Sections 4 and 6.
Fish Management Plan (FMP)	Ecological Solutions Ltd	28 August 2026	Capture, handling and relocation of native fish (excluding black mudfish) before and during dewatering and excavation. Sets the pre-works fish recovery requirement (Sections 5 and 6).
Black Mudfish Habitat Creation Plan (BMHCP)	Ecological Solutions Ltd	28 August 2026	Black mudfish capture and translocation, and design of the created wetland habitat. Governs drain closure and diversion (Section 4.4).
Bat Management Plan (BMP)	Ecological Solutions Ltd	August 2026	Tree felling and vegetation clearance protocols where riparian trees may provide bat roost habitat.
Mangaheka Stream Enhancement Plan (MSEP)	Ecological Solutions Ltd	29 August 2026	Restoration design for the Mangaheka reach, and riparian planting for reinstatement (Sections 4.1 and 7).
Lizard Management Plan (LMP)	Ecological Solutions Ltd	August 2026 (Draft)	Pre-clearance lizard habitat assessment, salvage and release for clearance in stream and drain margins.
Management Plans			
Earthworks Management Plan (EWMP)	Maven	August 2026	Earthworks phasing / sequencing: Sections 4, and staged sections 6.6
Cultural References			
Cultural Impact Assessment (CIA)	Tangata Whenua Working Group	13 August 2026	Pre-commencement and Cultural effects, notification management.
Standards and guidelines			
TR2009/02 Erosion and Sediment Control Guidelines.	Waikato Regional Council.	January 2009	Erosion and sediment control plan protocols

12. Appendices

Appendix A.1 – Engineering Plans – ESCP & Stream Diversion Plans

Appendix A.2 – Engineering Plan – Stream Modification & Culvert Design Plans

Appendix A.1



NOTES

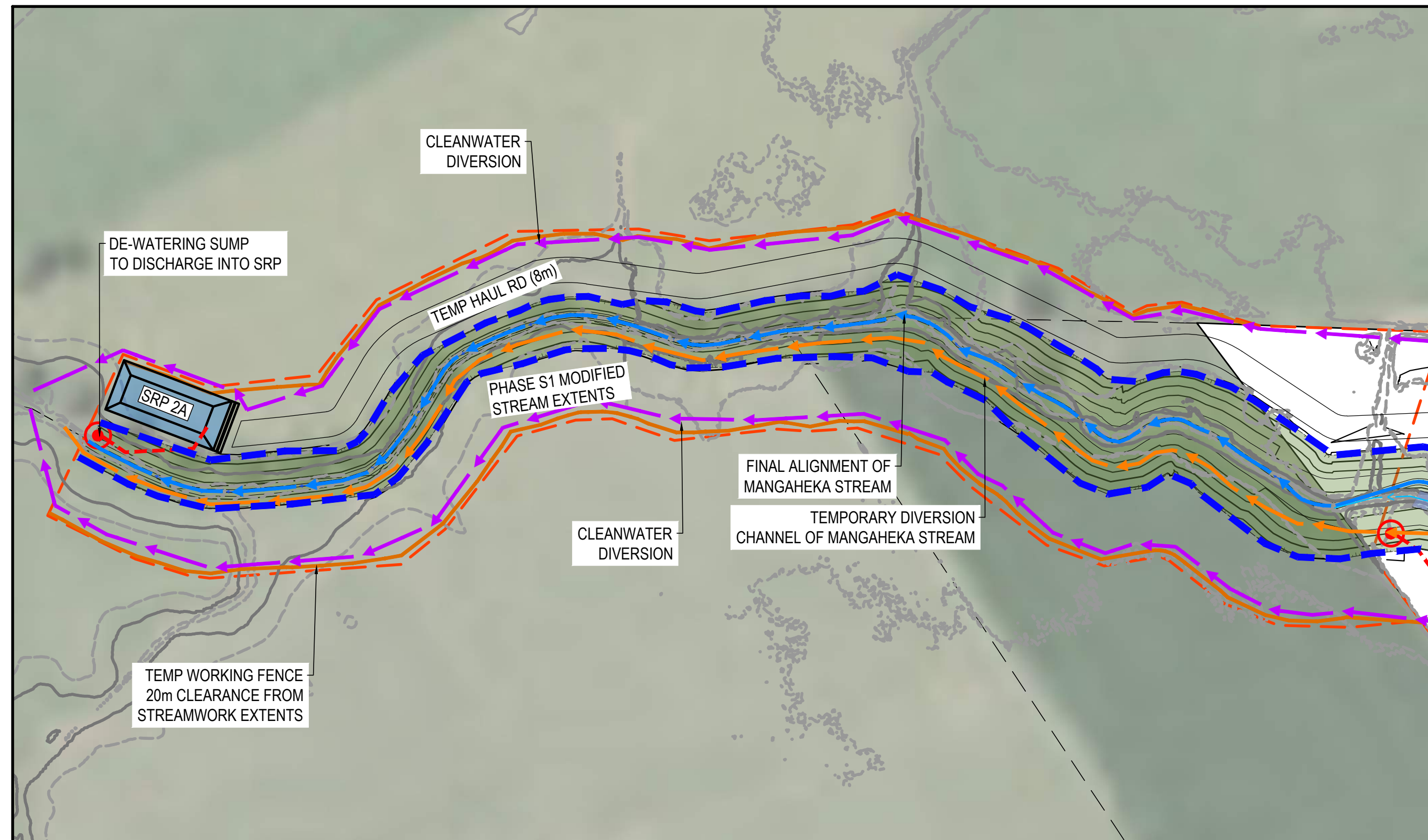
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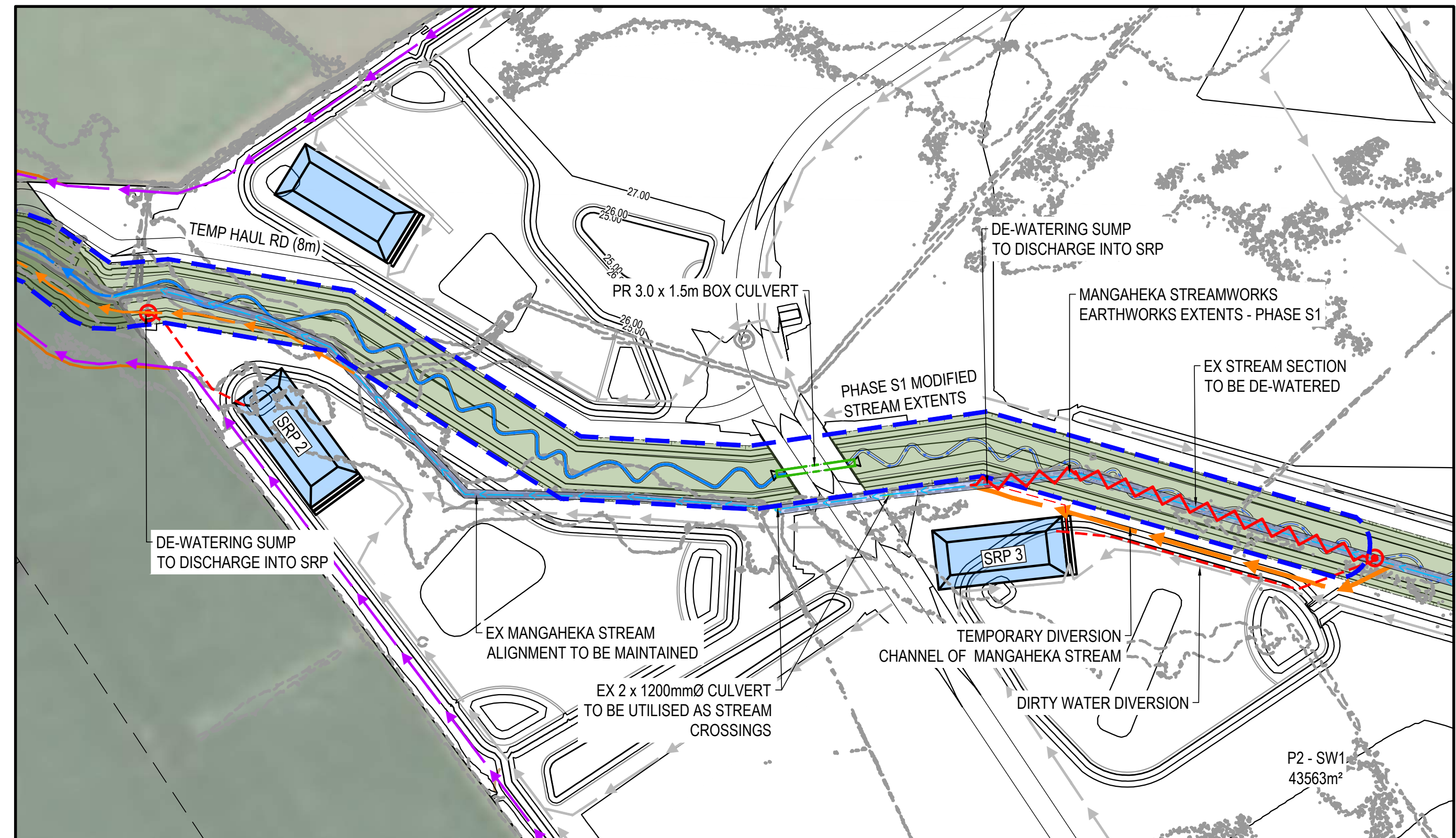
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- PR MINOR CONTOUR
- PR STREAMWORKS EXT
- PR STREAM DIVERSION
- PR CLEANWATER
- PR DIRTYWATER
- PR SILT FENCE
- PR DECANT
- PR DECANT BAR
- PR SEDIMENT RETENTION POND
- PR MODIFIED STREAM

Rev	Revisions	By	Date
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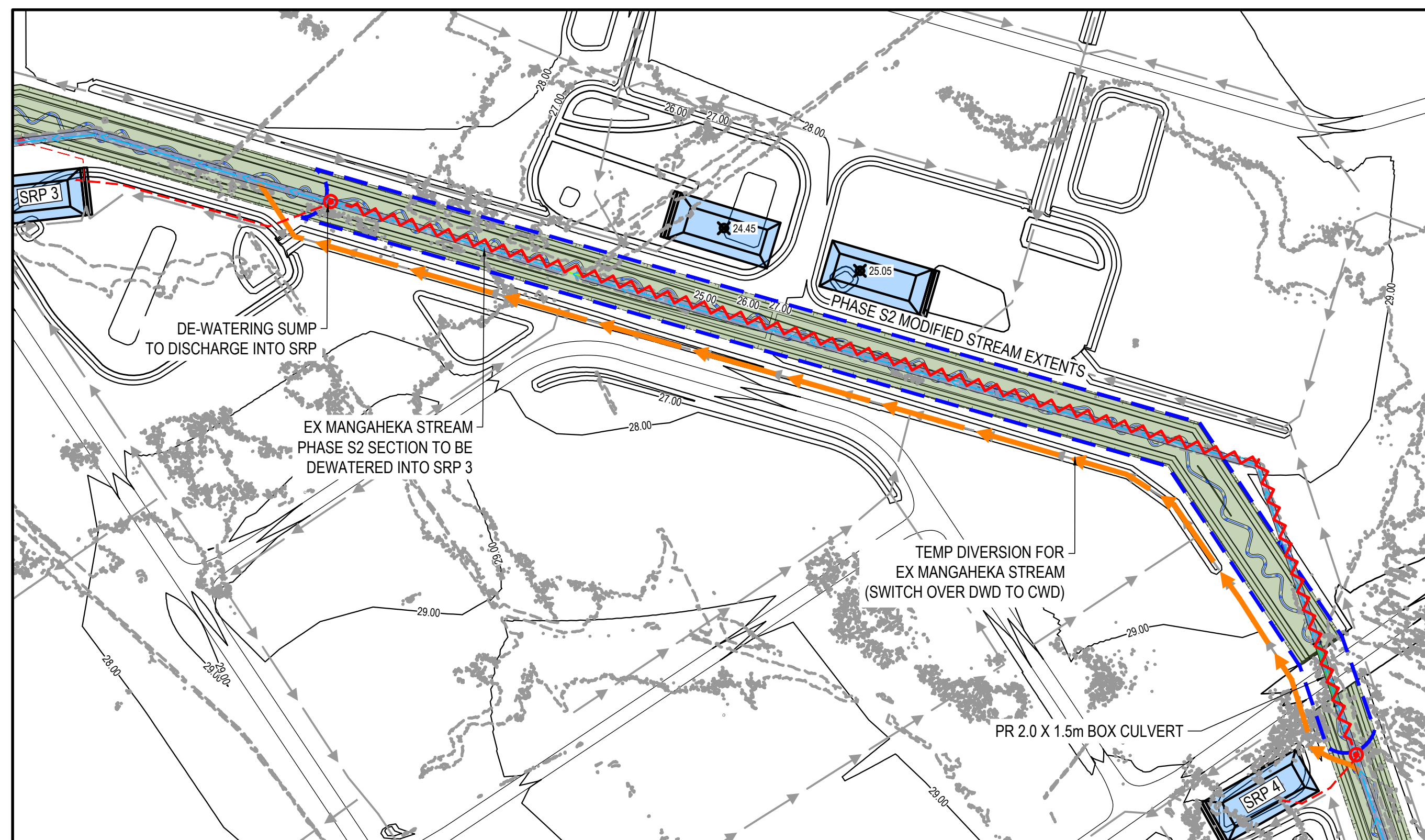
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Title: PROPOSED SEDIMENT EROSION CONTROL PLAN
Project no: 180010
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Drawing no: C230 Rev: A



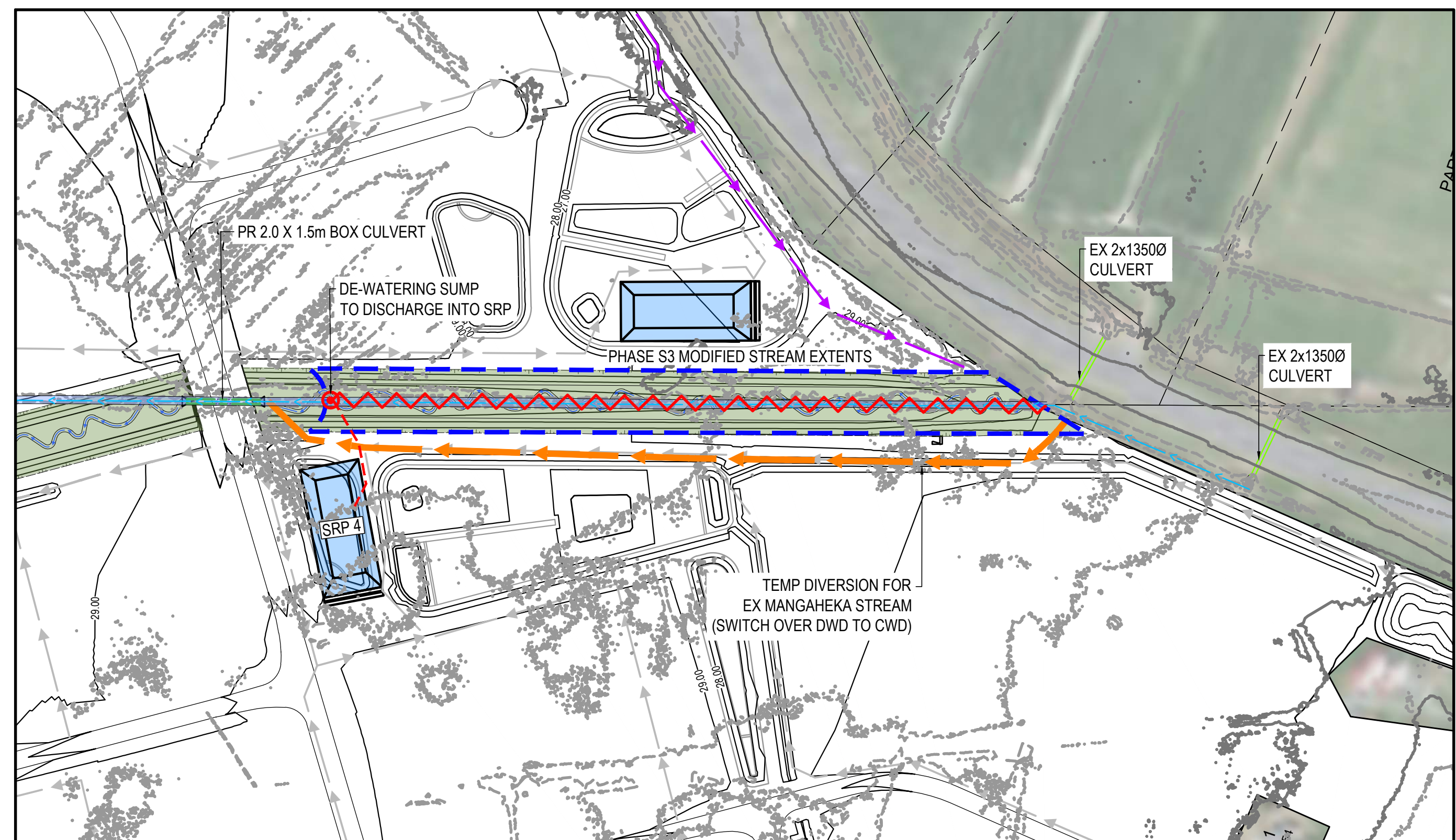
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C230 SCALE 1:1250 @ A1



B PHASE S1 - STREAM WORKS LOWERING/WIDENING (INTERNAL)
C230 SCALE 1:2000 @ A1



C PHASE S2 - STREAM WORKS LOWERING/WIDENING (INTERNAL)
C230 SCALE 1:2500 @ A1



D PHASE S3 - STREAM WORKS LOWERING/WIDENING (INTERNAL)
C230 SCALE 1:2000 @ A1

- NOTES
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 - PROP BDY
 - EX MAJOR CONTOUR
 - EX MINOR CONTOUR
 - EX CULVERT
 - EX STREAM
 - STREAM DEWATERING
 - PR MAJOR CONTOUR
 - PR MINOR CONTOUR
 - PR STREAMWORKS EXT
 - PR STREAM DIVERSION
 - PR CLEANWATER
 - PR DIRTY WATER
 - PR SILT FENCE
 - PR DECANT
 - PR DECANT BAR
 - PR SEDIMENT RETENTION POND
 - PR MODIFIED STREAM

Rev	Revisions	By	Date
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Survey	MAVEN	Date	10/2025
Design	ID	Date	08/2026
Drawn	ID	Date	08/2026
Checked	RW	Date	08/2026

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03 571 0502
maven@ma.co.nz
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5 Chelms Road, Epsom
Auckland 1052

Project
PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED STREAM DIVERSION EXTENTS PLAN

Project no
180010

Scale
AS SHOWN @ A1

Cad file
180010-C230-180010.DWG

Drawing no
C231

Rev
A

1.0- TEMPORARY DIVERSION CHANNEL

- UNDERTAKE ALL IN-STREAM WORKS, INCLUDING FLOW CUT-OVER, DURING LOW-FLOW PERIODS; MONITOR FORECASTS AND CEASE AND SECURE WORKS AHEAD OF SIGNIFICANT RAINFALL.
- EXCAVATE TEMPORARY DIVERSION CHANNEL WITHIN THE NEW MANGAHEKA STREAM EXTENTS, SIZED FOR THE 5-YEAR ARI EVENT (PRE-DEVELOPMENT).
- CUT SECTIONS OUTSIDE THE CHANNEL TO LEVEL AND PERMANENTLY STABILISE (RIPARIAN PLANTING AS REQUIRED).
- LINE TEMPORARY DIVERSION CHANNEL AS REQUIRED BY TR2009/02.
- CONFIRM ALL SEDIMENT RETENTION PONDS AND ESC DEVICES ARE CONSTRUCTED, OPERATIONAL AND AS-BUILT CERTIFIED, AND CLEAN WATER FROM THE UPSTREAM CATCHMENT IS DIVERTED AROUND THE WORKS, BEFORE DIVERTING STREAM FLOWS.
- DIVERT FLOWS FROM MANGAHEKA STREAM, STARTING FROM DOWNSTREAM TO UPSTREAM.

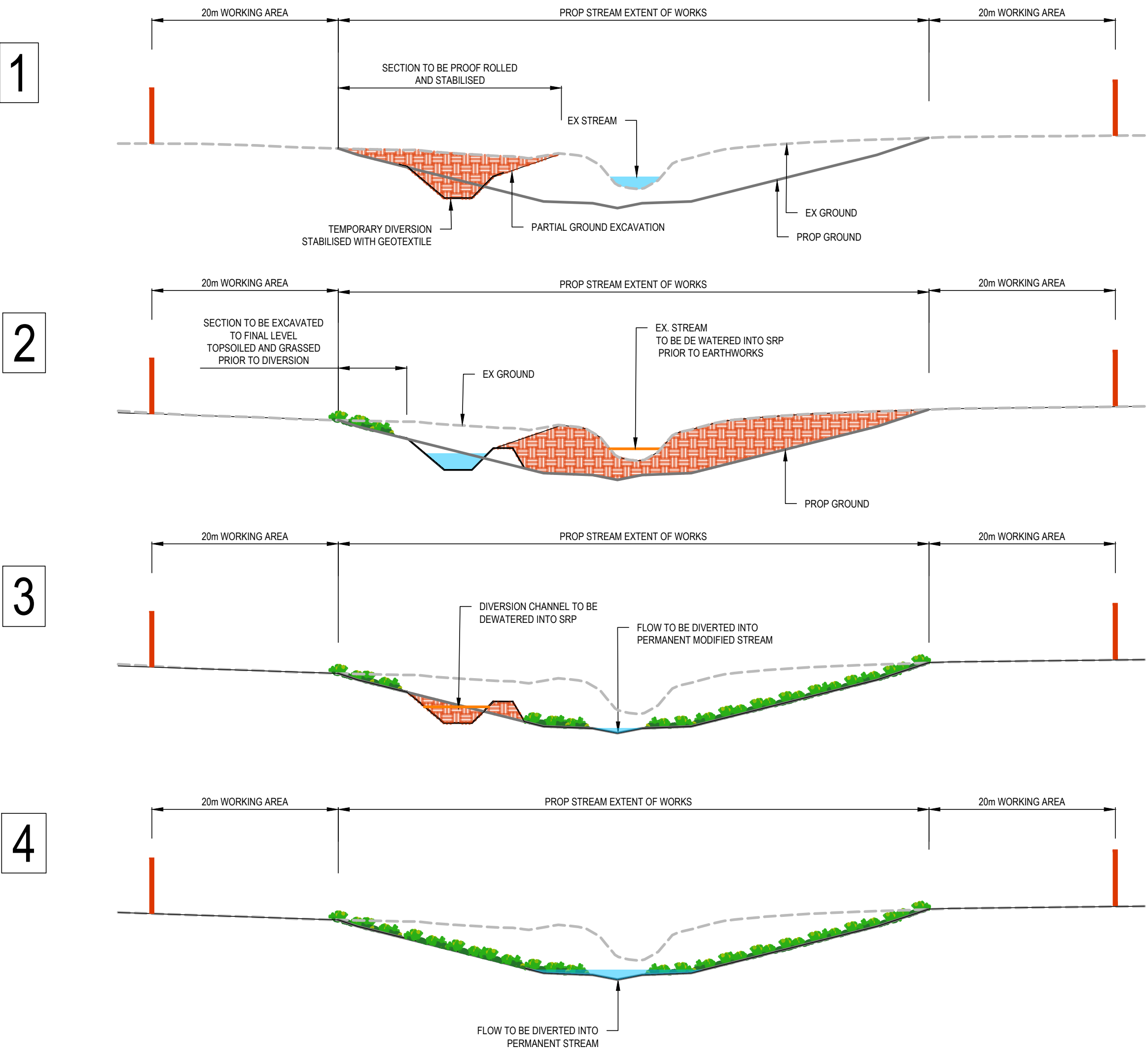
2.0- MANGAHEKA STREAM WORKS

- UNDERTAKE FISH AND NATIVE FAUNA SALVAGE FROM THE ISOLATED REACH BEFORE DEWATERING, IN ACCORDANCE WITH CONSENT CONDITIONS.
- DEWATER ISOLATED SECTION OF EXISTING MANGAHEKA STREAM TO NEAREST SEDIMENT RETENTION POND.
- PUMP DEWATERING TO THE SRP VIA A SCREENED INTAKE, TREAT WITH FLOCCULANT IF TURBID, AND DISCHARGE TO A STABILISED, NON-EROSIVE OUTLET.
- COMPLETE BULK EXCAVATION AND STABILISATION OF THE PROPOSED STREAM MODIFICATION; FORM TEMPORARY BUND ADJACENT TO DIVERSION CHANNEL.
- COMPLETE TOPSOILING AND LANDSCAPING
- PROGRESSIVELY STABILISE ALL EXPOSED AND DISTURBED AREAS AS SOON AS PRACTICABLE, IN ACCORDANCE WITH TR2009/02.

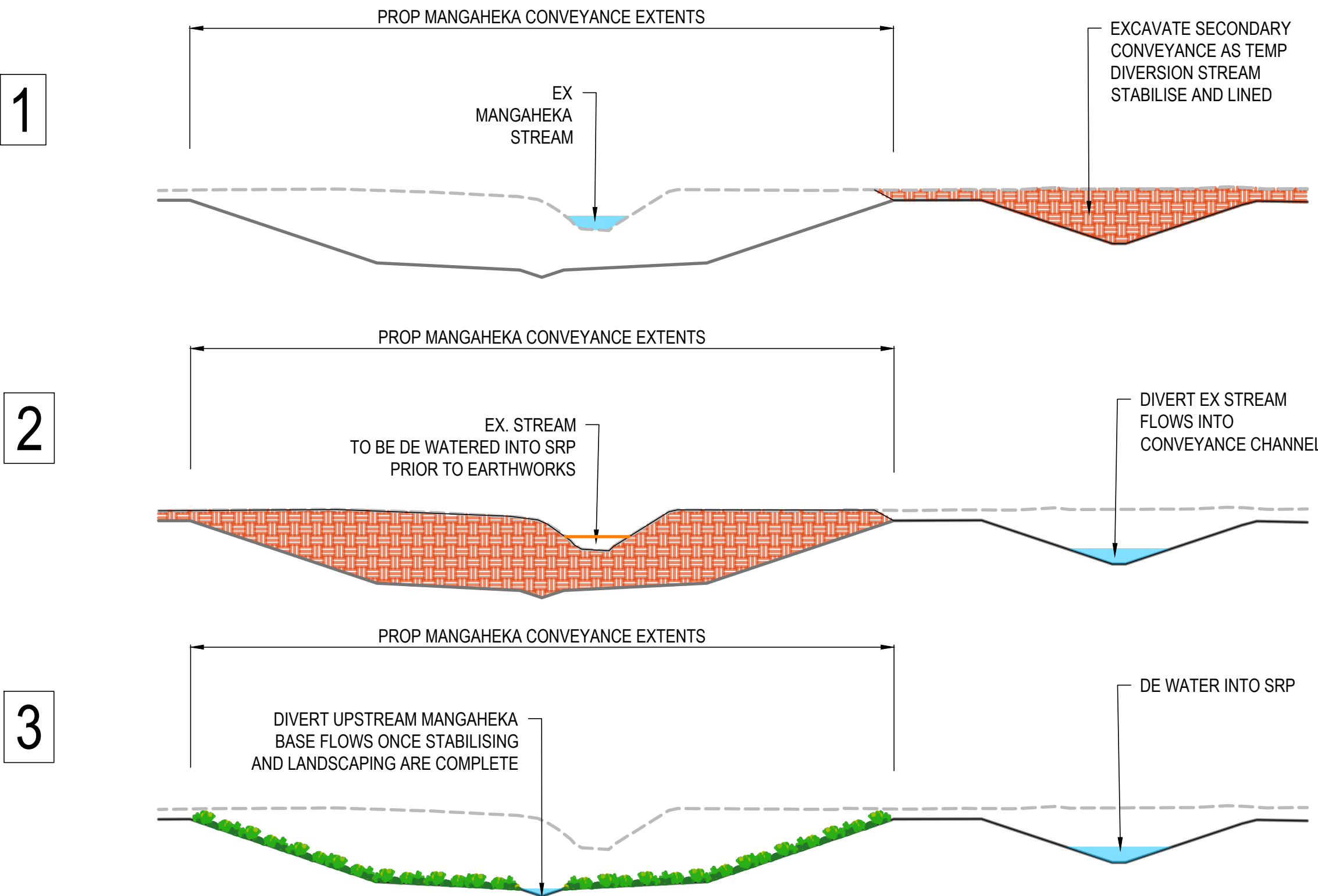
3.0- DIVERSION FLOW CUT OVER

- DEWATER DIVERSION FLOW INTO SEDIMENT RETENTION POND
- CHANGE OVER FLOWS INTO PERMANENT STREAM ALIGNMENT
- INSTALL ESC CONTROLS (SILT SOCKS) ALONG THE STABILISED SECTIONS.
- FILL DIVERSION CHANNEL WITH BUNDING MATERIAL
- STABILISE THE REINSTATED DIVERSION CHANNEL FOOTPRINT ON COMPLETION OF FILLING.
- COMPLETE FINAL TOPSOILING AND LANDSCAPING

PHASE S1 STREAM WORKS SEQUENCE (IN STREAM DIVERSION)
SCALE 1:150 @ A1



PHASE S2 - S3 STREAM WORKS SEQUENCE
SCALE 1:150 @ A1



- NOTES
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LEGEND

---	EX GROUND LEVEL
---	PR FINAL GROUND LEVEL
---	PARTIAL GROUND LEVEL
---	EXCAVATION AREA

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Rev	Revisions	By	Date
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Design	JD	08/2026	
Drawn	JD	08/2026	
Checked	RW	08/2026	

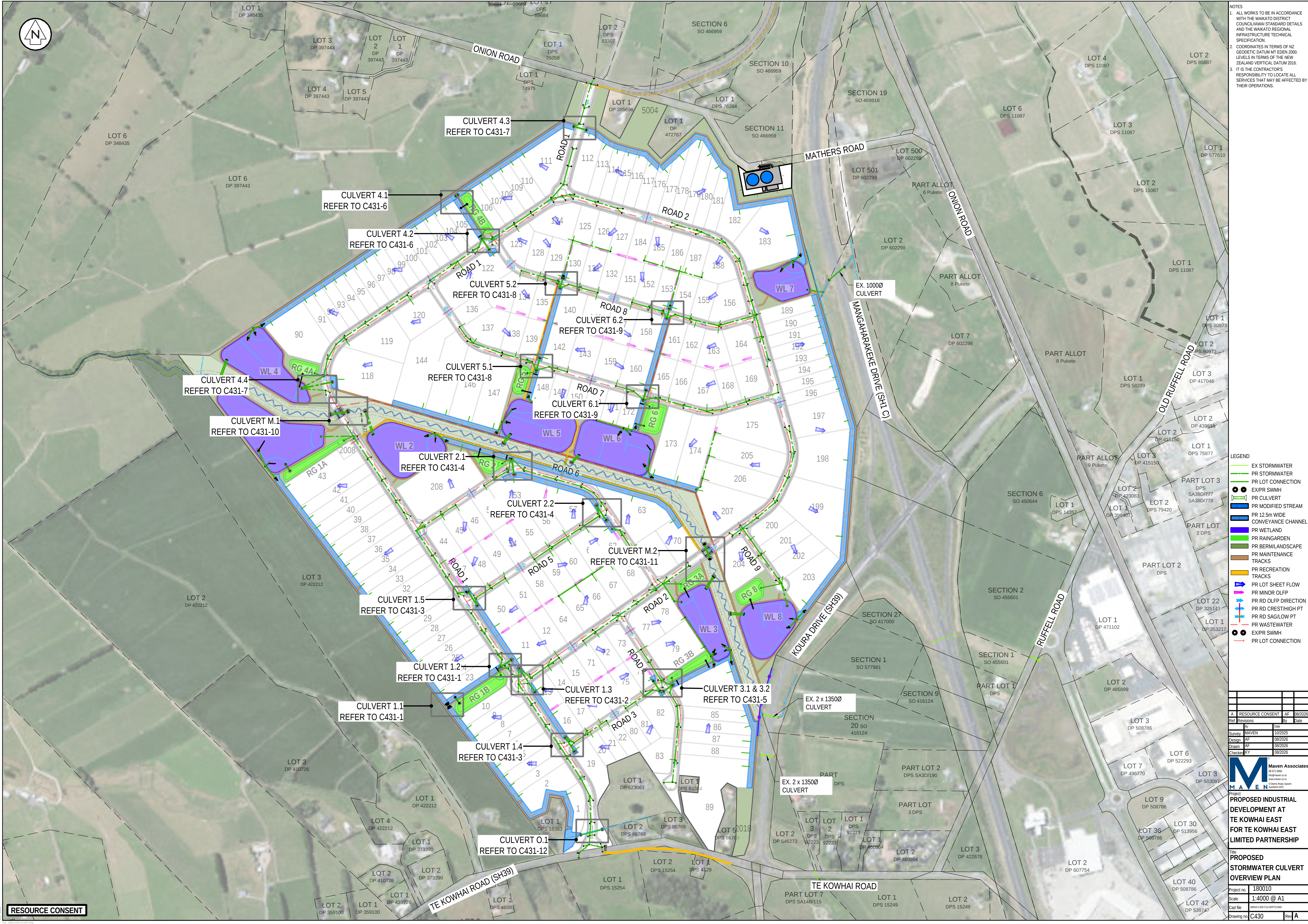


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PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED STREAM DIVERSION METHODOLOGY PLAN

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Scale	AS SHOWN @ A1
Cad file	180010-C232-1100P.DWG
Drawing no.	C232
Rev	A

Appendix A.2



NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH THE WAIKATO DISTRICT COUNCIL/AIAI STANDARD DETAILS AND THE WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION.
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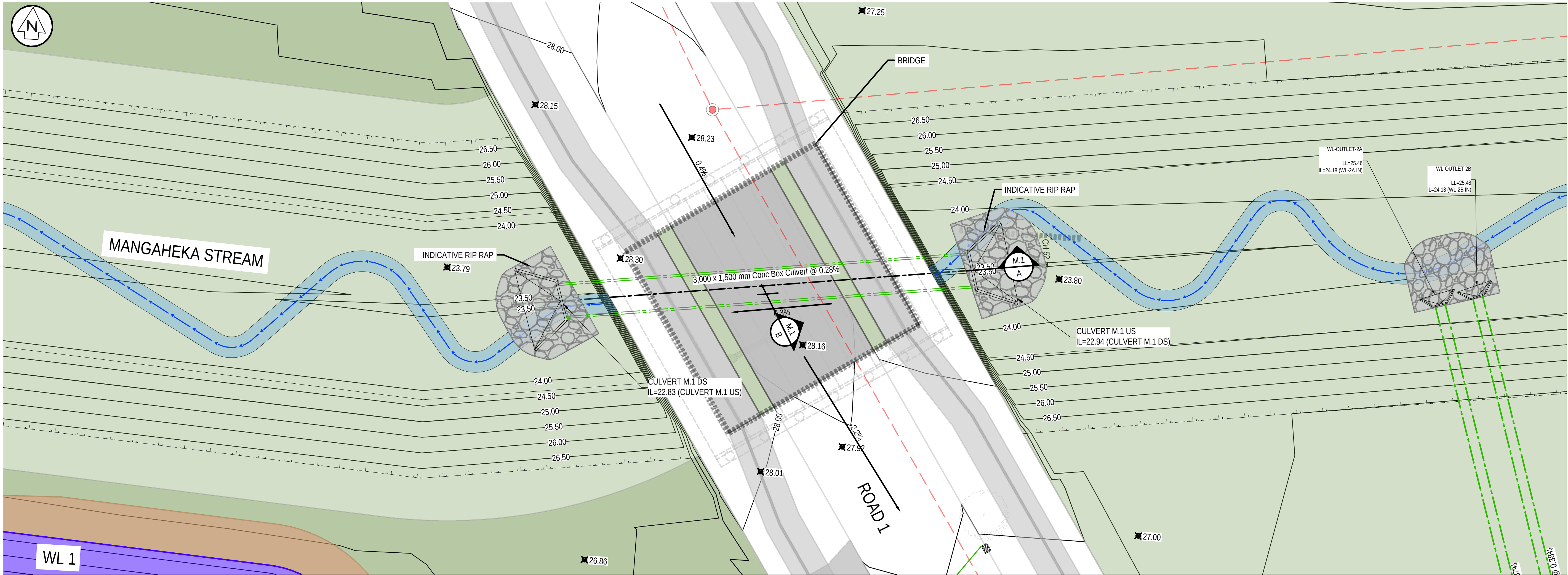
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 - PR STORMWATER
 - PR LOT CONNECTION
 - EX/PR SWM
 - PR CULVERT
 - PR MODIFIED STREAM
 - PR 12.5m WIDE CONVEYANCE CHANNEL
 - PR WETLAND
 - PR RAINGARDEN
 - PR BERM/LANDSCAPE
 - PR MAINTENANCE TRACKS
 - PR RECREATION TRACKS
 - PR LOT SHEET FLOW
 - PR MINOR OLFP
 - PR RD OLFP DIRECTION
 - PR RD CREST/HIGH PT
 - PR RD SAG/LOW PT
 - PR WASTEWATER
 - EX/PR SWM
 - PR LOT CONNECTION

Project	PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP
Title	PROPOSED STORMWATER CULVERT OVERVIEW PLAN
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Scale	1:4000 @ A1
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Drawing no.	C430
Rev	A

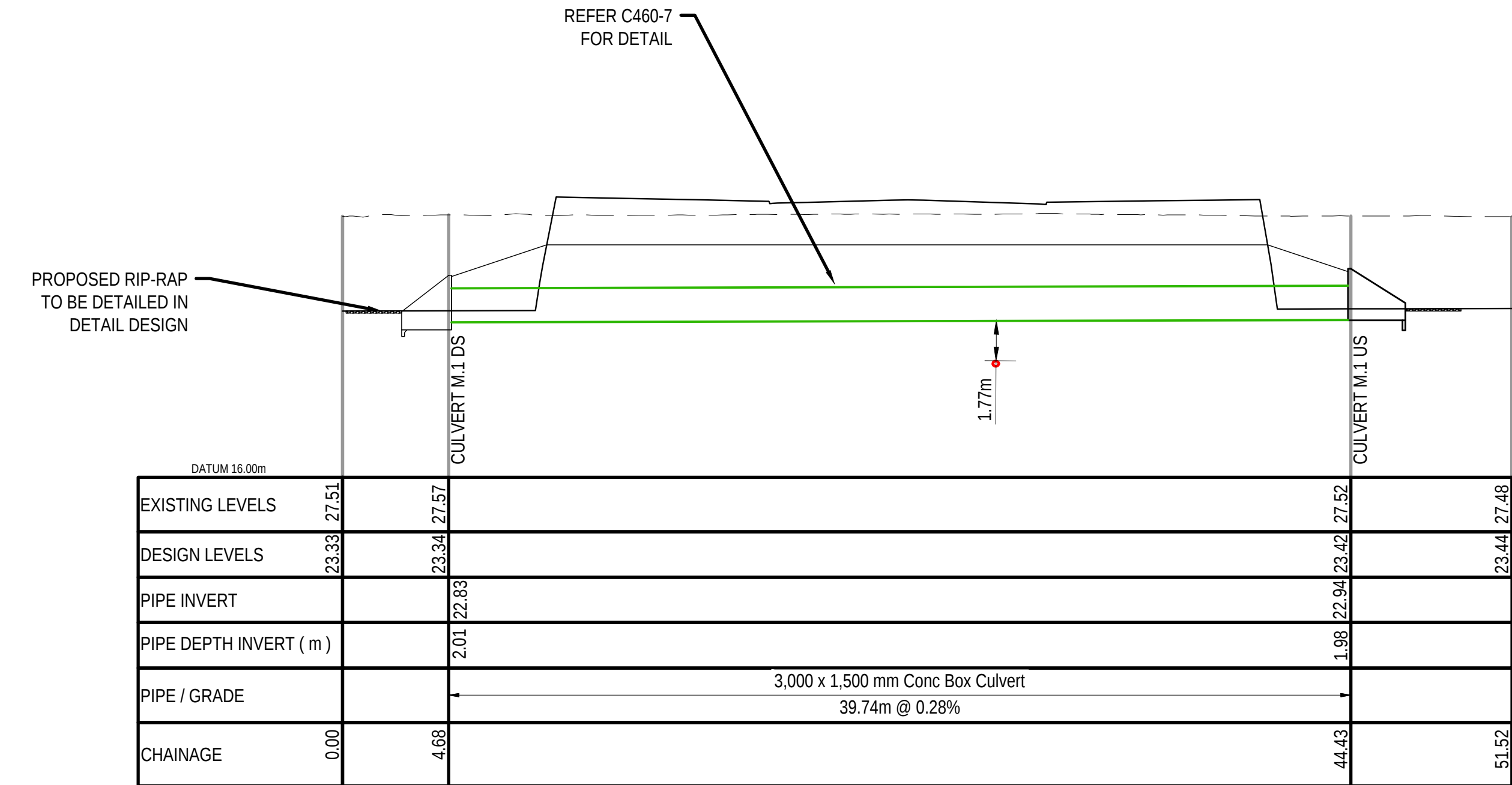
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Rev	Revisions	By	Date
Survey	MAVEN		10/2025
Design	AF		08/2026
Drawn	AF		08/2026
Checked	KY		08/2026

MAVEN Associates
02 521 0850
info@maven.co.nz
www.maven.co.nz
5 Chalmers Road, Epsom
Auckland 1052

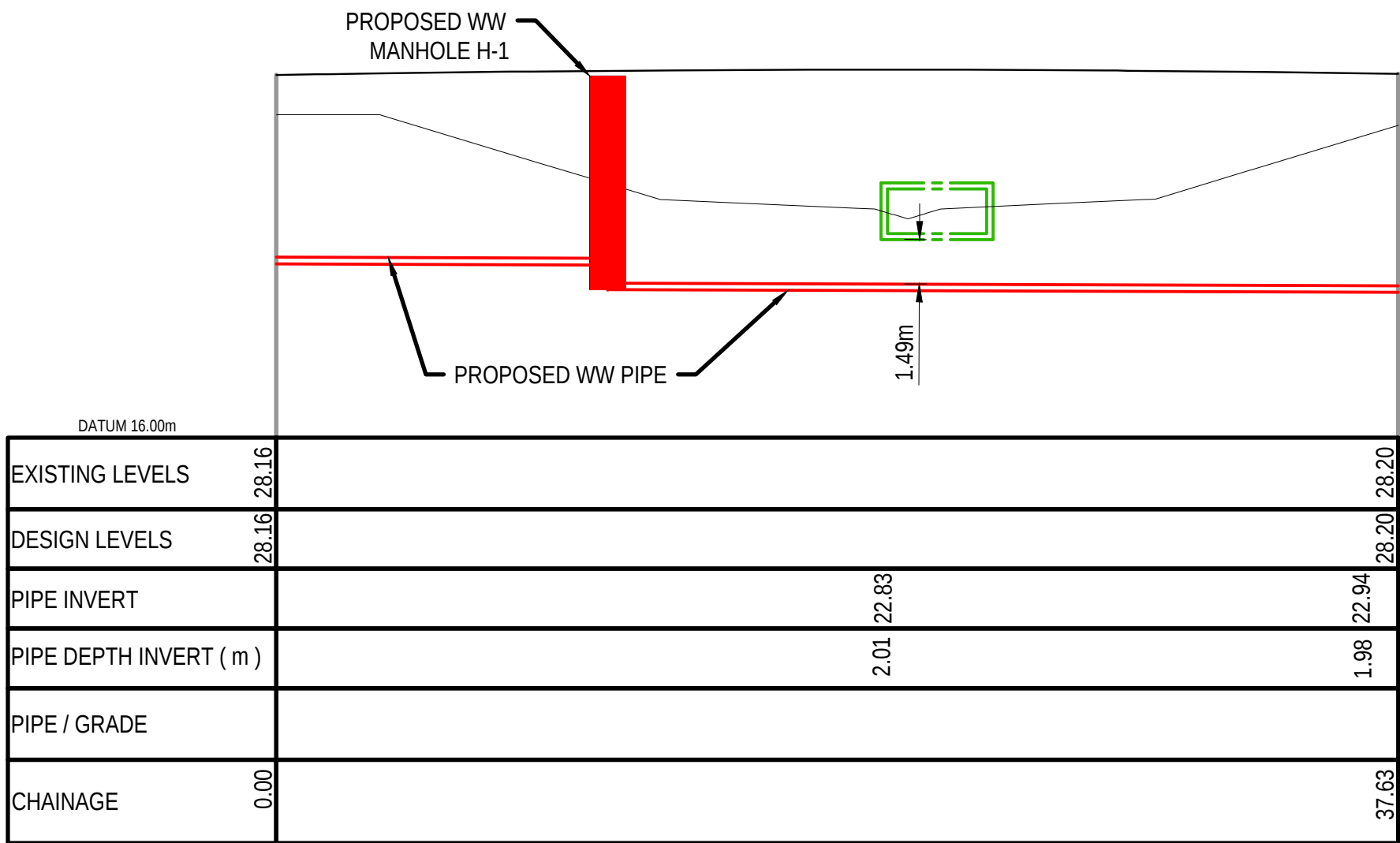
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SCALE: HORI 1:1000 VERT 1:1000



CULVERT M-1_SECTION B
SCALE: HORI 1:1000 VERT 1:1000

- LEGEND
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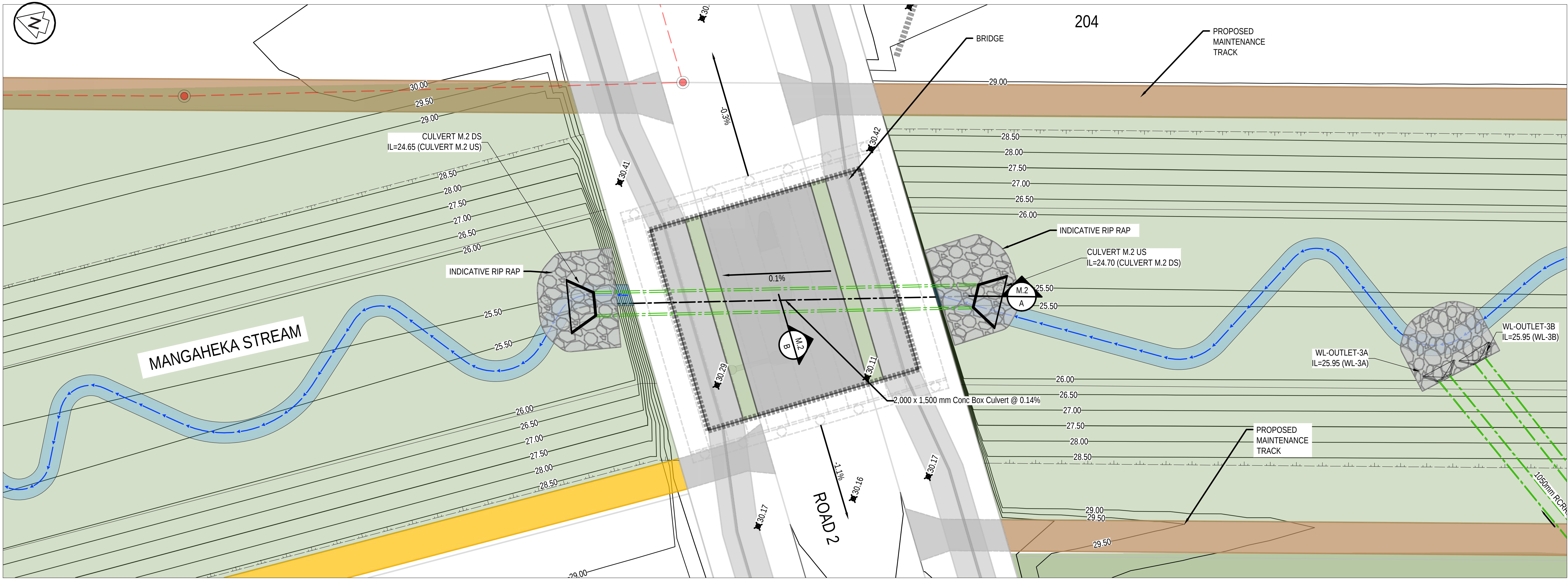
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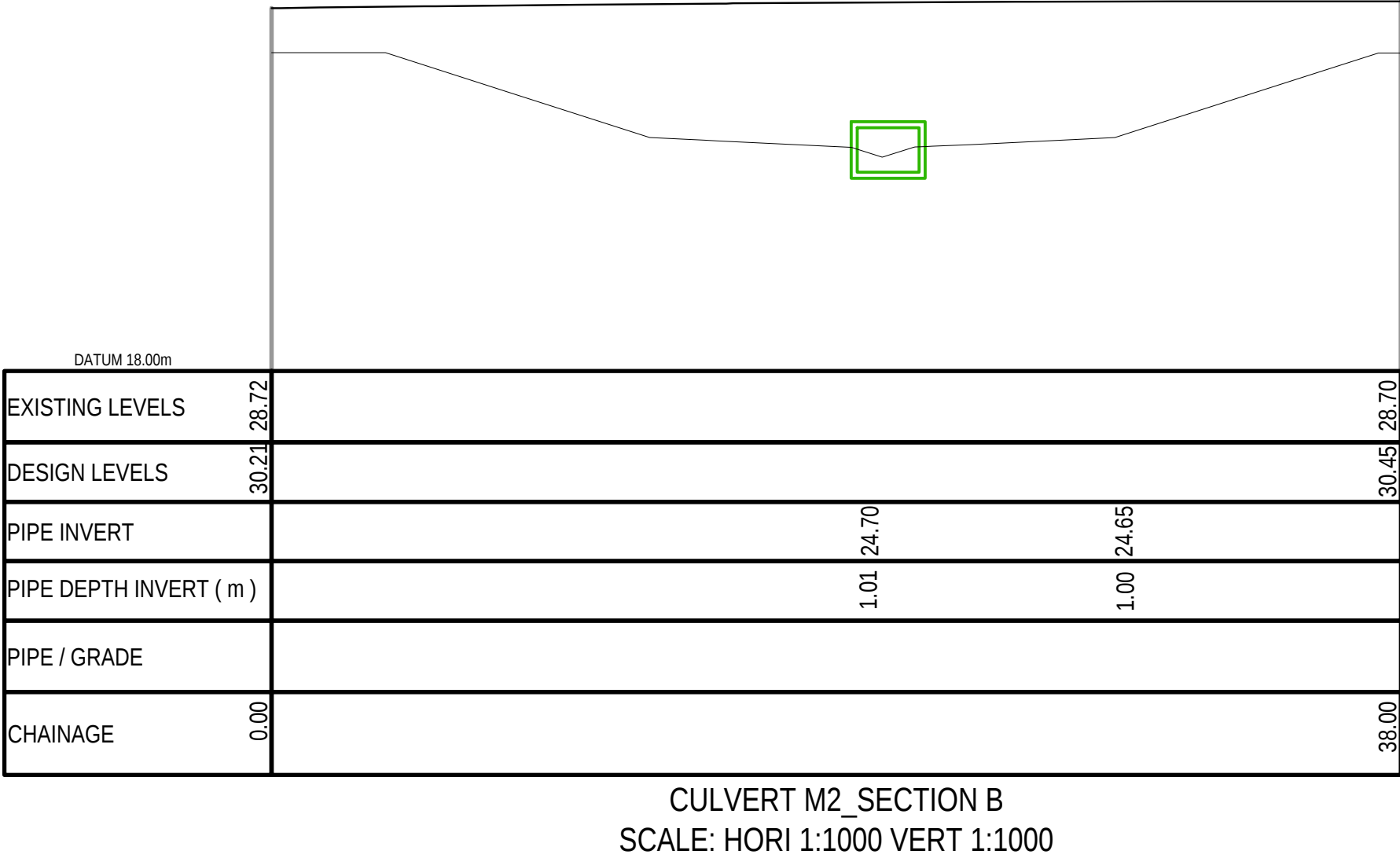
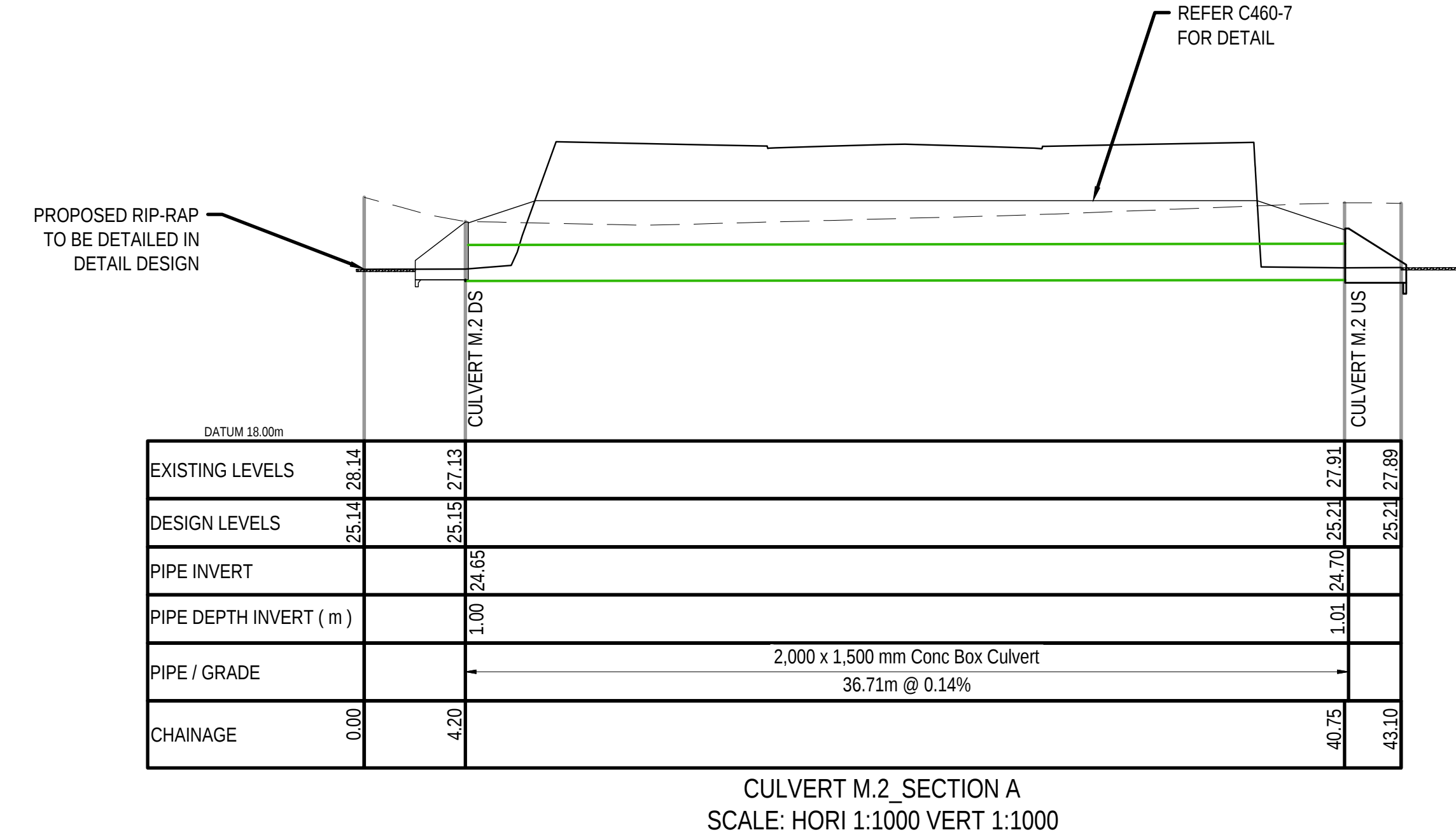
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PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED STORMWATER CULVERT PLAN

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Rev	A



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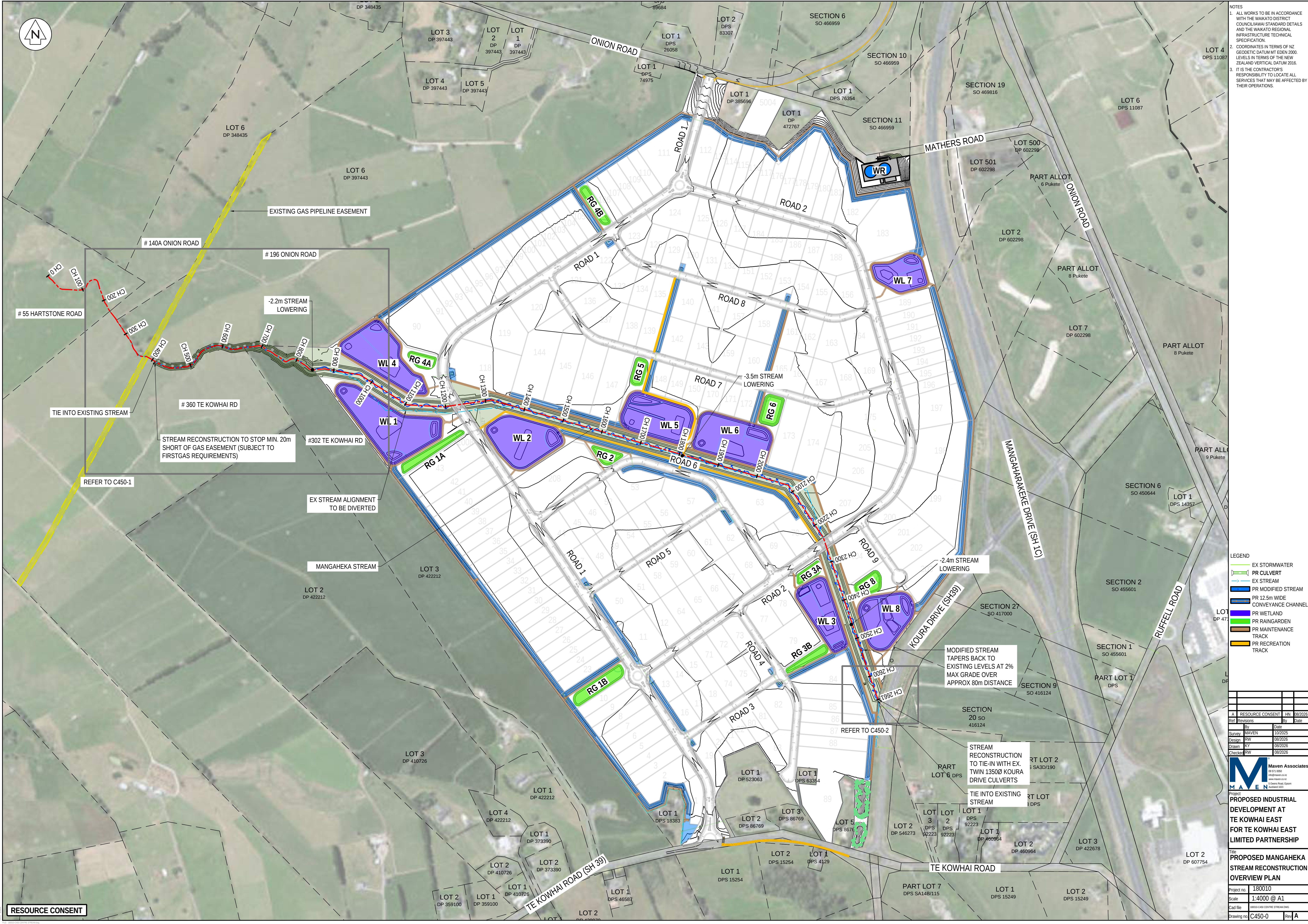
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RESOURCE CONSENT

Ref	Revisions	By	Date
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Checked: KY 08/2026

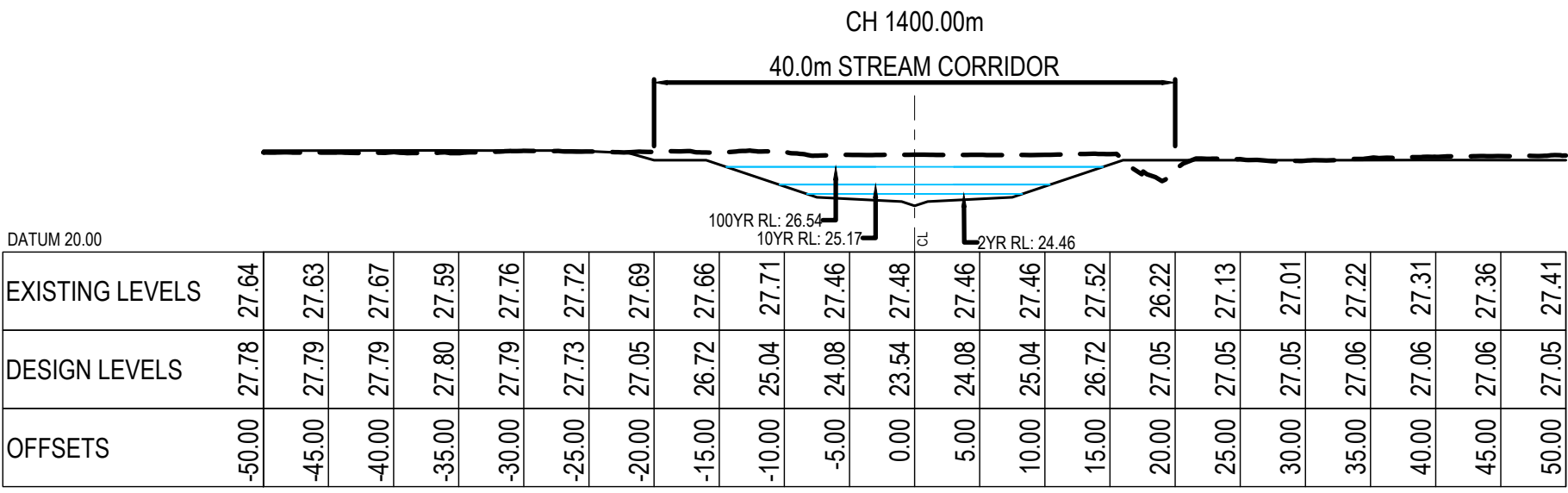
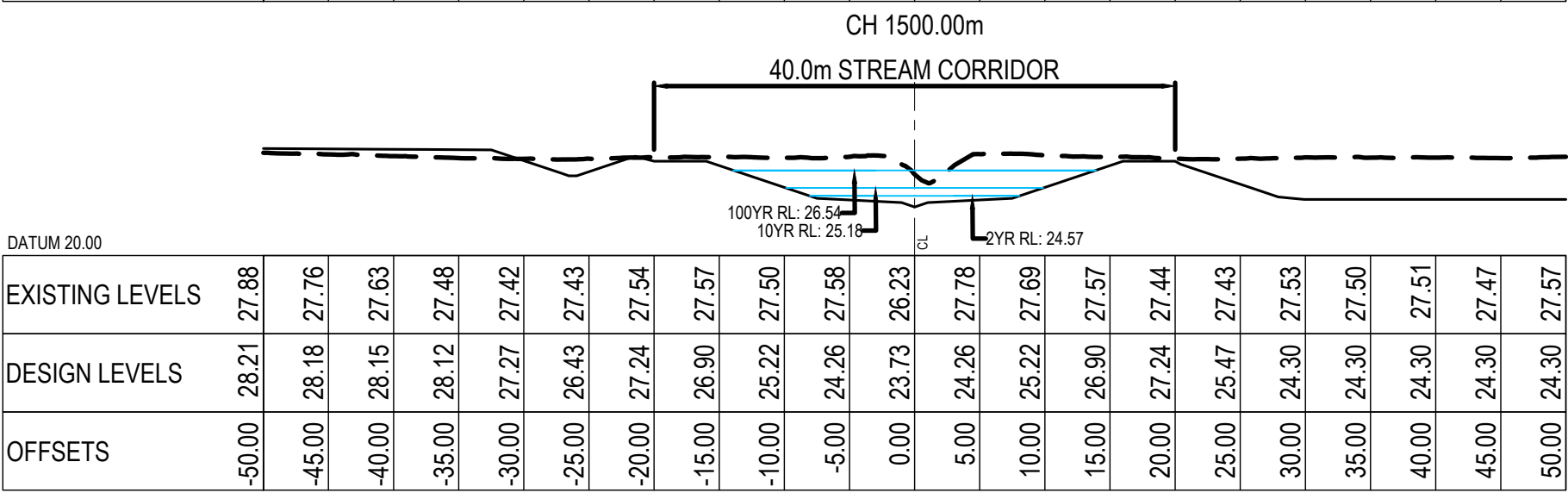
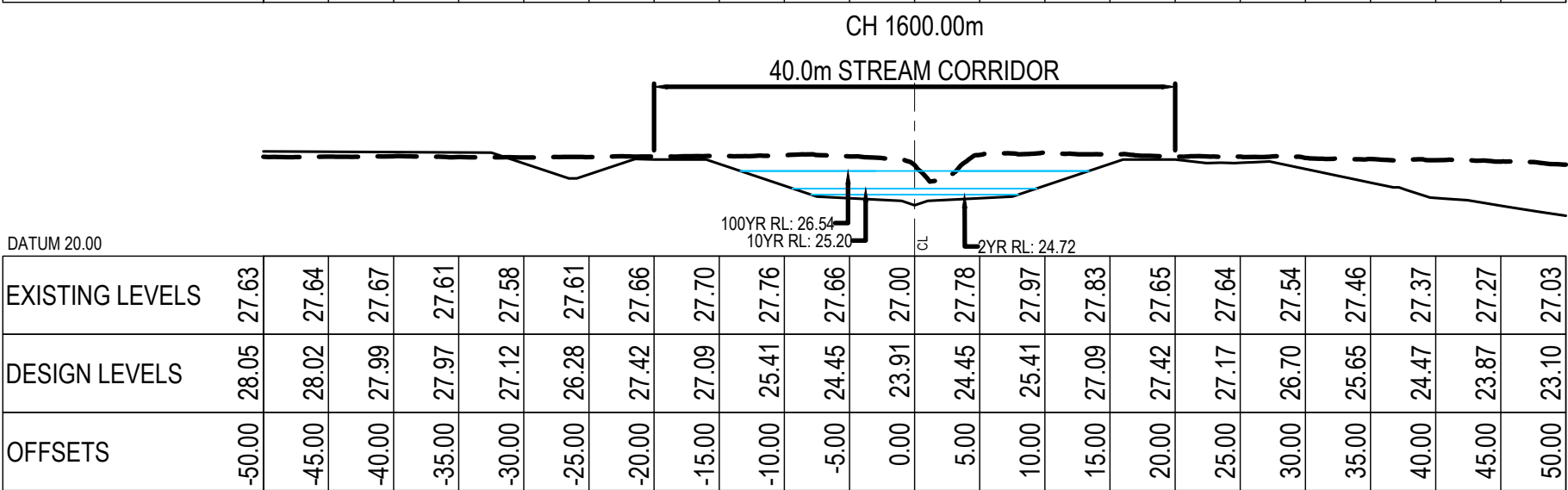
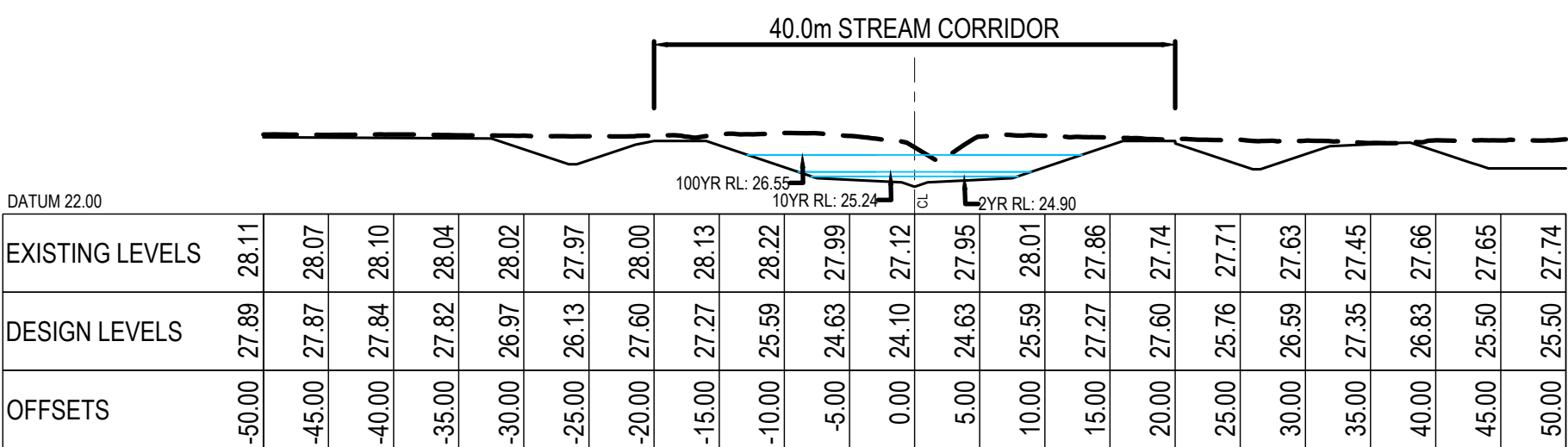
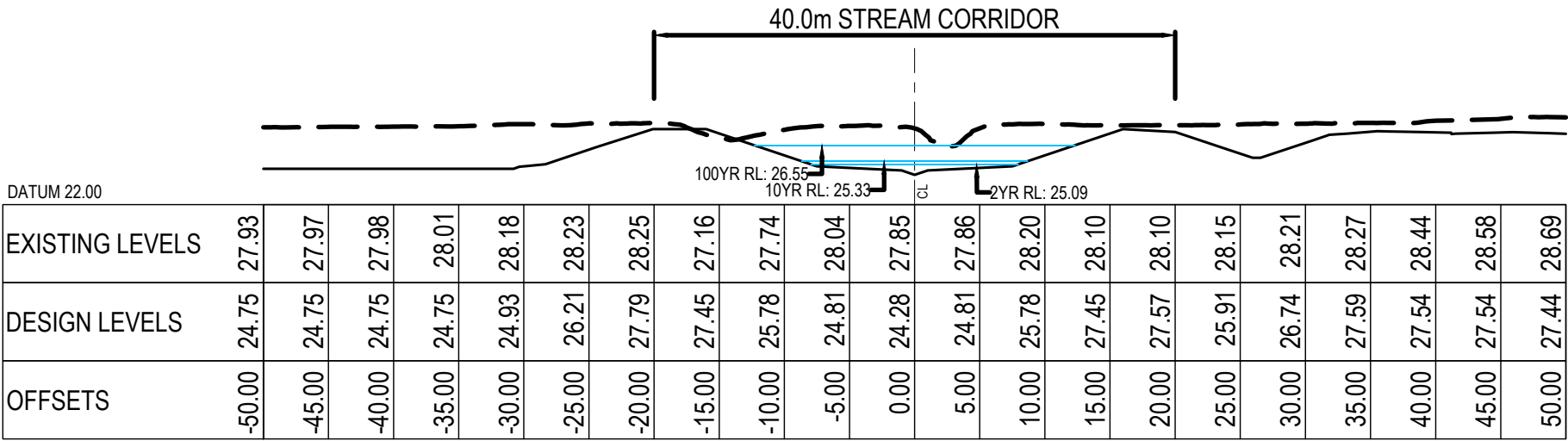
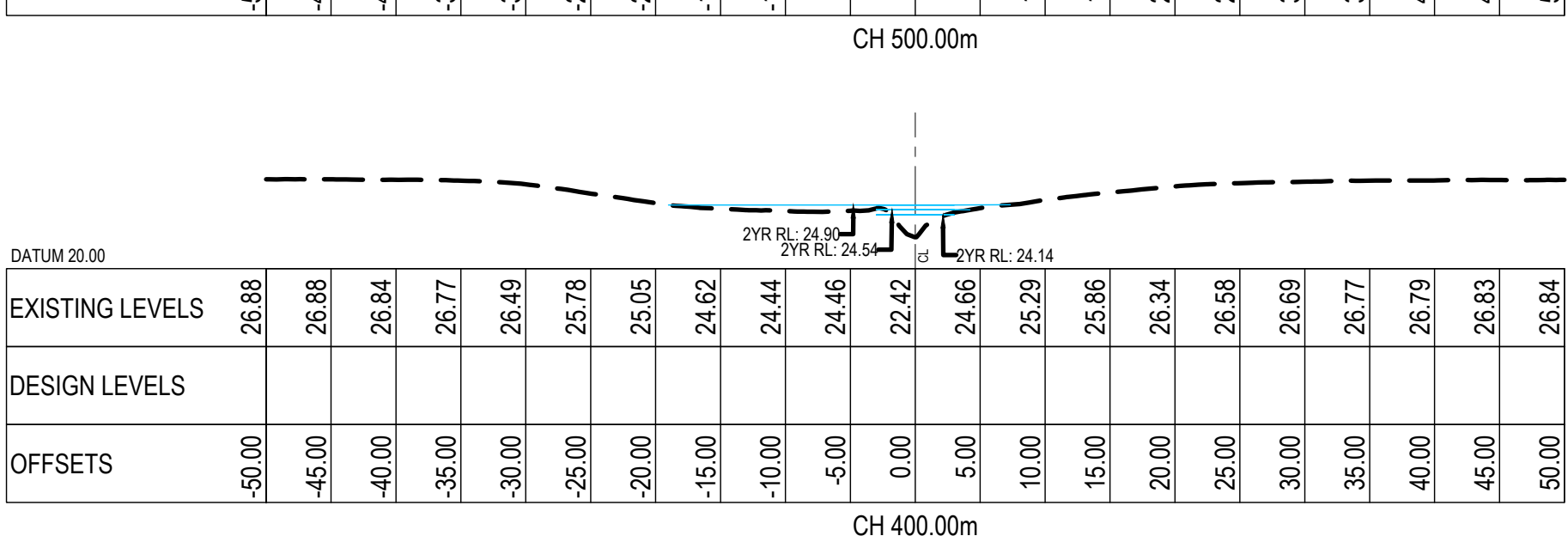
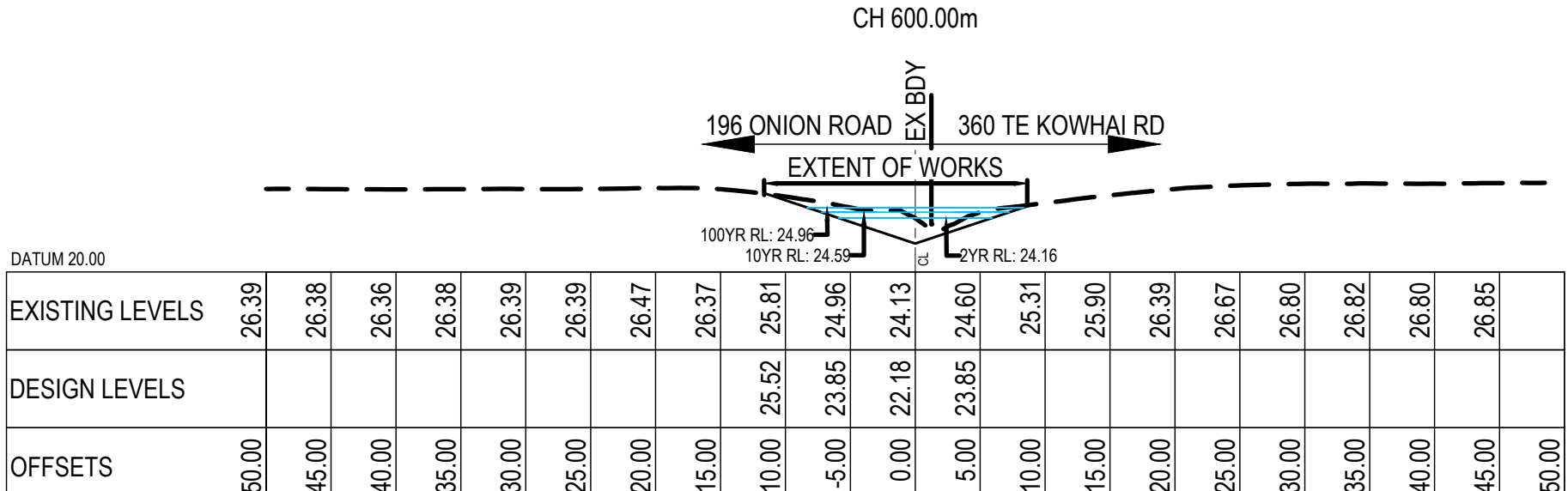
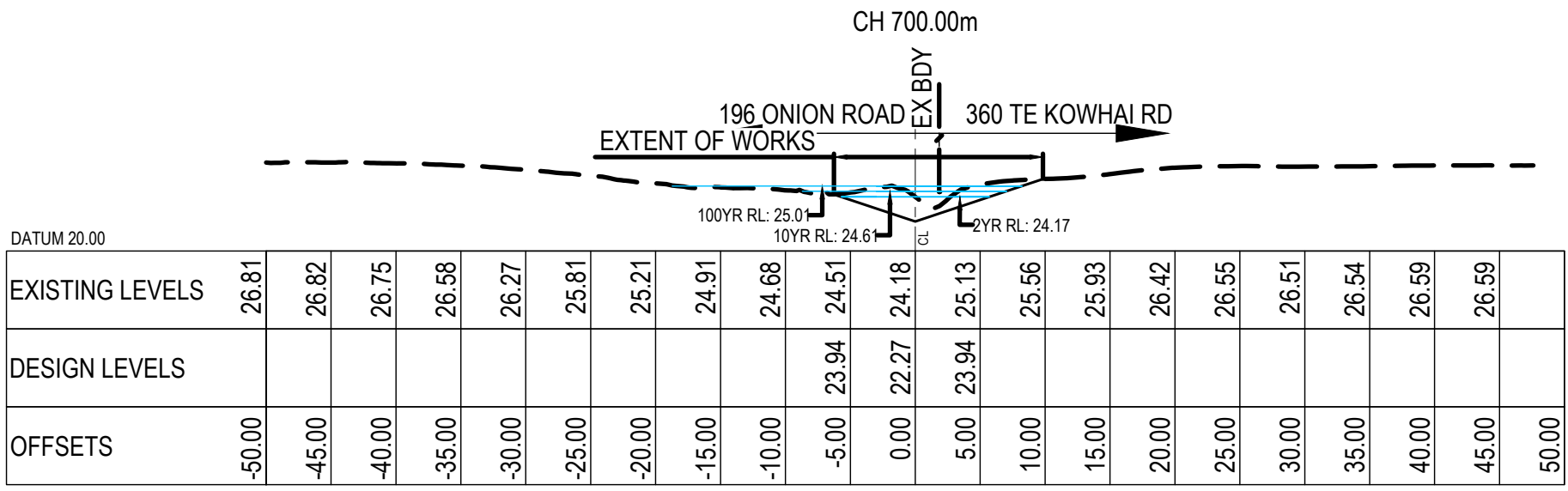
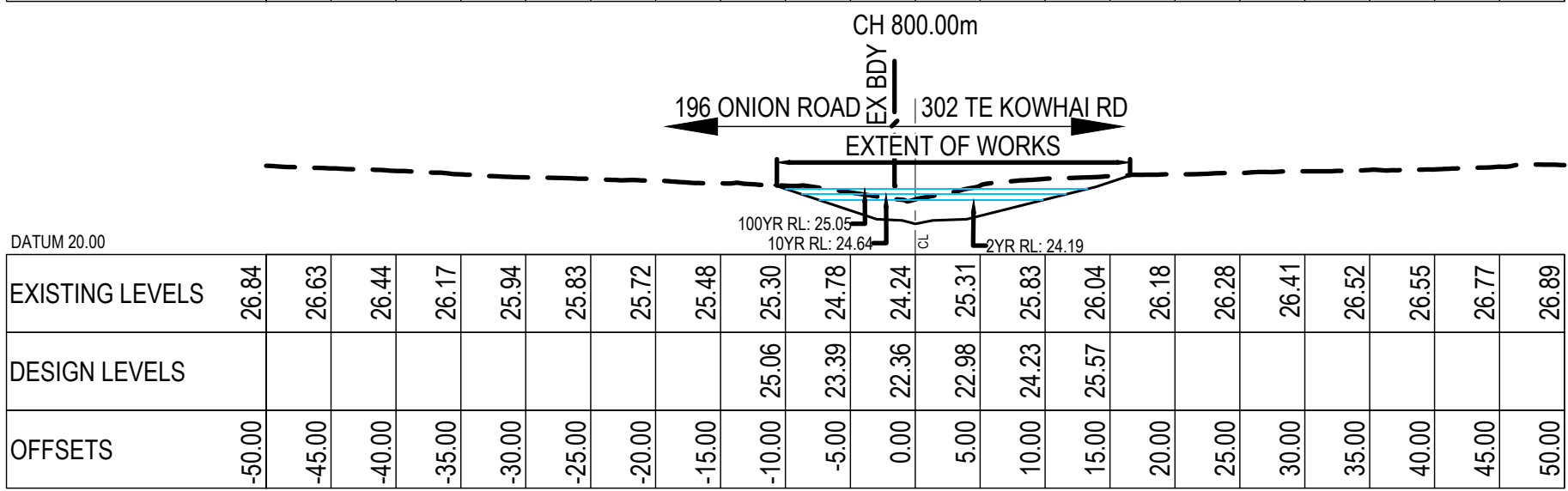
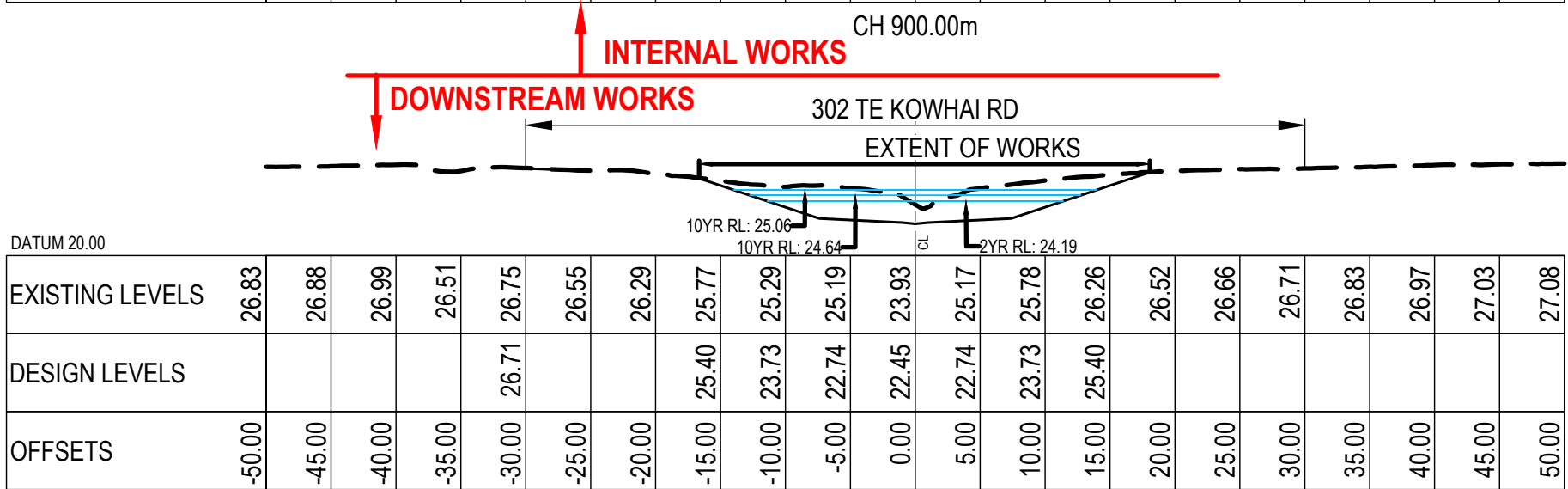
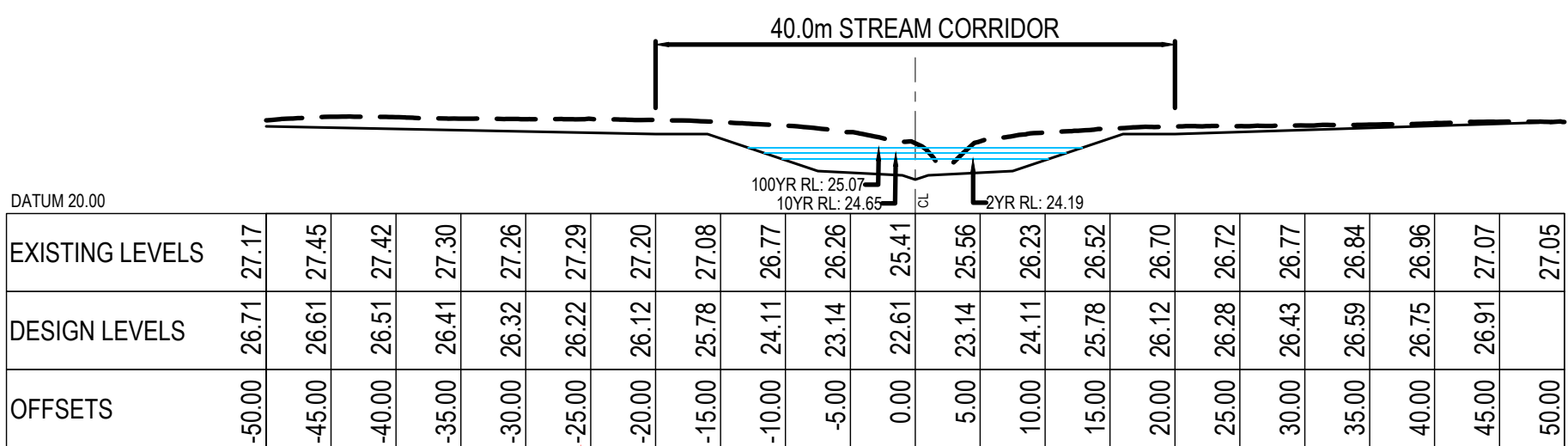
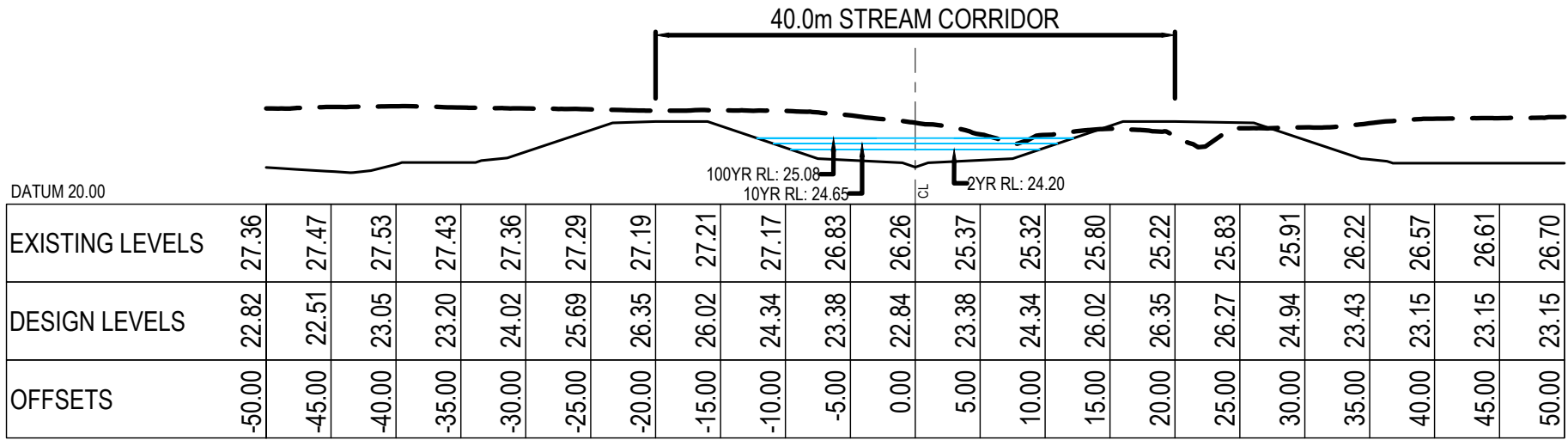
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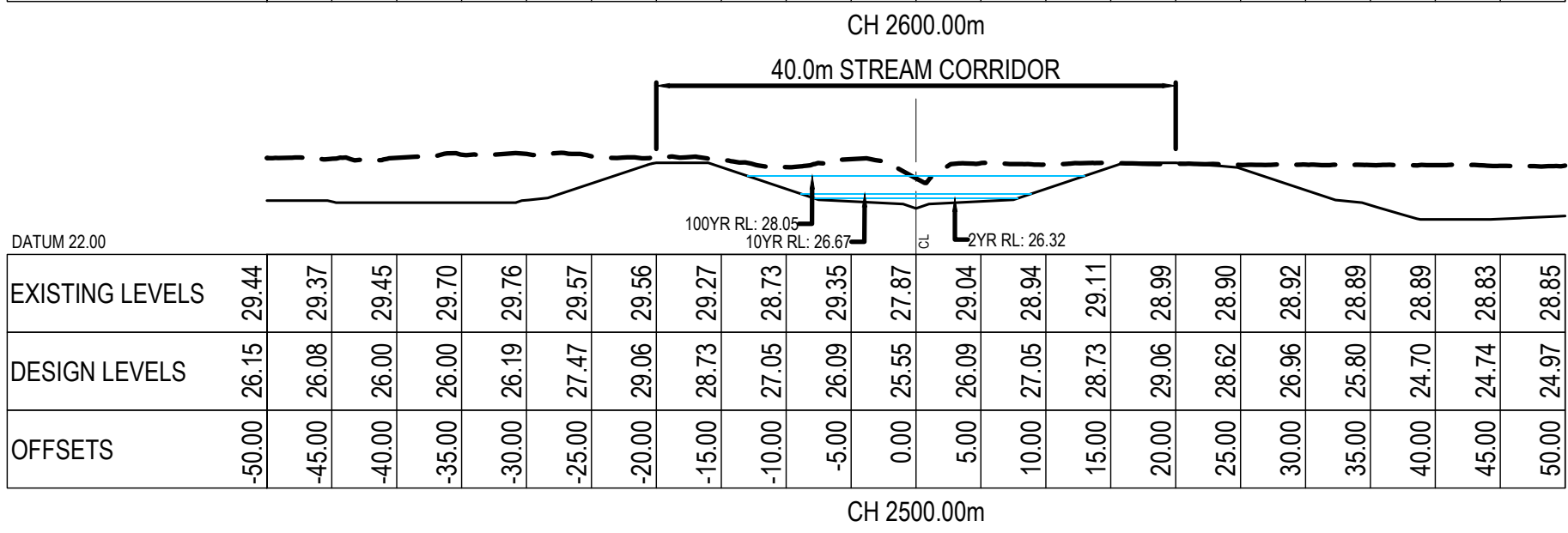
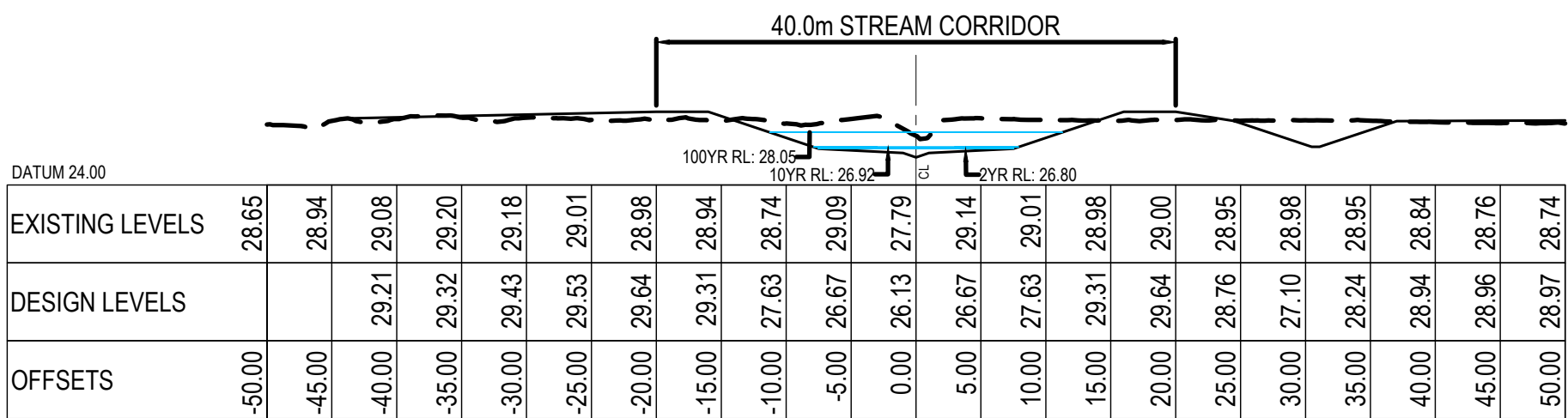


LEGEND

-  EX STORMWATER
-  PR CULVERT
-  EX STREAM
-  PR MODIFIED STREAM
-  PR 12.5m WIDE CONVEYANCE CHANNEL
-  PR WETLAND
-  PR RAINGARDEN
-  PR MAINTENANCE TRACK
-  PR RECREATION TRACK

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	Project PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP	
	Title PROPOSED MANGAHEKA STREAM RECONSTRUCTION OVERVIEW PLAN	
	Project no.	180010
Scale	1:4000 @ A1	
Cad file	18002-CARD CLIENT STREAM.DWG	
Drawing no	C450-0	Rev A





RESOURCE CONSENT

LEGEND
--- EX GROUND LEVEL
--- PR GROUND LEVEL
--- PR FLOOD LEVEL

A		RESOURCE CONSENT		HN	08/2026
Revised	By	Date			
Survey	MAVEN	10/2025			
Design	RW	08/2026			
Drawn	RW	08/2026			
Checked	RW	08/2026			

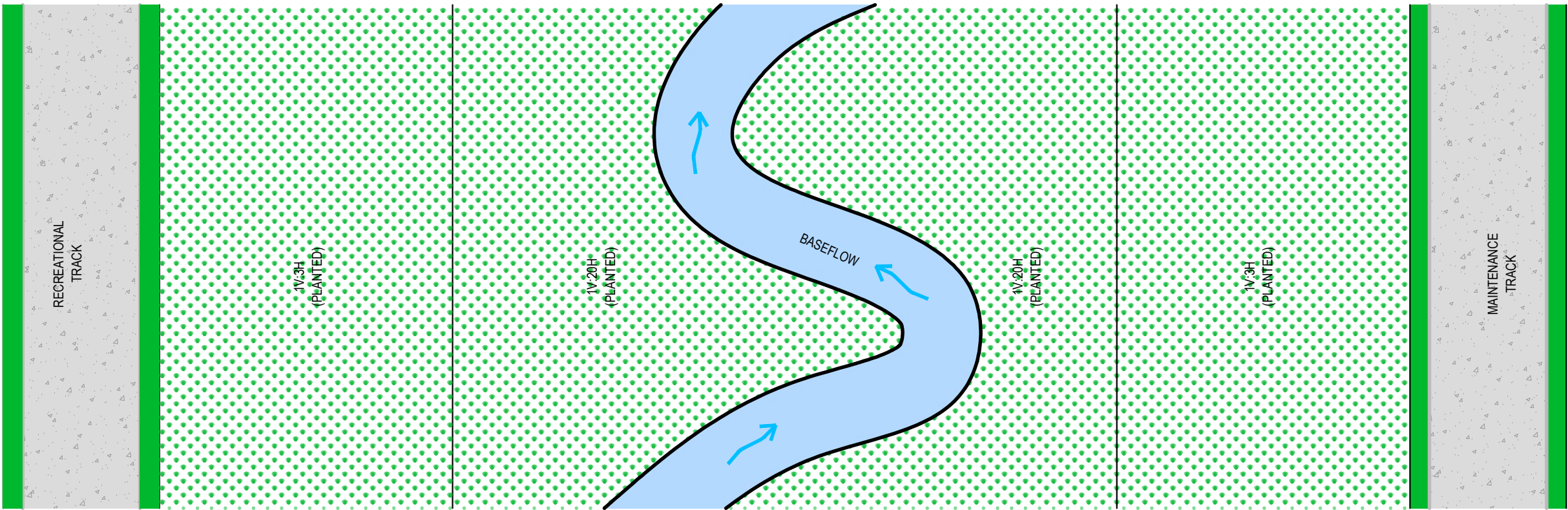


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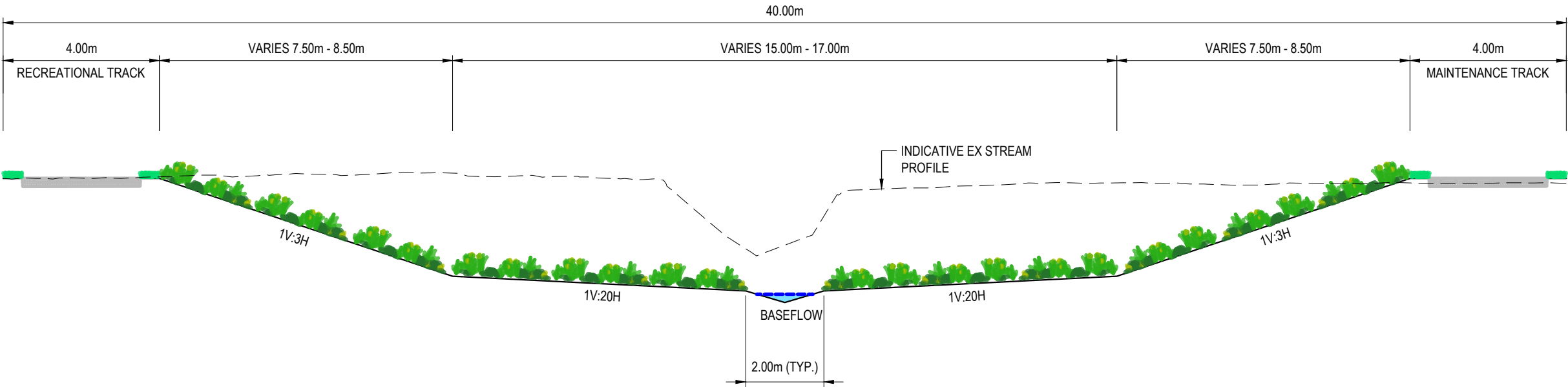
Project
PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED MANGAHEKA STREAM RECONSTRUCTION CROSS SECTIONS

Project no.	180010
Scale	1:500 @ A1
Cad file	180010-CROSS-SECTION-STREAM-RECON
Drawing no.	C454-3
Rev	A



TYPICAL MANGAHEKA STREAM RECONSTRUCTION PLAN
SCALE 1:125 @ A3



TYPICAL MANGAHEKA STREAM RECONSTRUCTION SECTION
SCALE 1:125 @ A3

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH THE WAIKATO DISTRICT COUNCIL/IAWAI STANDARD DETAILS AND THE WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.

A	RESOURCE CONSENT	SP	08/2026
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	SP		08/2026
Drawn	SP		08/2026
Checked	RW		08/2026

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Project
PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED MANGAHEKA STREAM RECONSTRUCTION DETAILS

Project no.	180010
Scale	1:125 @ A3
Cad file	180010-C460 TYP DETAIL.DWG
Drawing no.	C460-6
Rev	A

RESOURCE CONSENT