

TE KOWHAI EAST LIMITED PARTNERSHIP

Earthworks Management Plan (Draft)

Te Kowhai East Industrial Development
270 Te Kowhai Road and 28 Mathers Road, Horotiu, Hamilton
TKE-EWMP-001
Prepared for Fast-track Approvals Act 2024 Consent Application

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Appendices

A.1 – Erosion & Sediment Control Plans – Attached Separately

A.2 – Earthworks Plans - Attached Separately

1 Introduction

1.1 Purpose

This draft Earthworks Management Plan (EWMP) describes the proposed earthworks for the Te Kowhai East Industrial development. It sets out the earthworks scope, volumes, staging methodology, geotechnical basis, and environmental management framework governing those works, and describes how the effects of the earthworks on the environment are to be managed.

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.

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

1.2 Scope of earthworks

The earthworks scope covers the entire Te Kowhai East Industrial Subdivision development site of approximately 187.5 ha and includes:

- Bulk cut and fill to form industrial lot platforms and road subgrade across nine development stages within four earthworks phases. The phases include earthworks associated with stream works.
- Topsoil stripping, stockpiling, and reuse or disposal.
- Mangaheka Stream channel modification as per the Stream Works Management Plan (STMP).
- Stormwater management of the existing farm drain network within the development site.
- Excavation of eight stormwater wetlands, raingardens, and associated conveyance channels. The devices are as designed in the Maven Infrastructure Report and the Stormwater Management Plan (SWMP).
- Construction of the north-western access embankment via Onion Road (up to 4.0 m fill).
- Northern boundary retaining structures (up to 6 m height).
- Bulk fill to form water reservoir platforms
- Direct haulage of any surplus cut to fill areas.
- Export/Import of any soil surplus from the site.

2 Site Description and Existing Conditions

2.1 Location

The Project site comprises a large, contiguous landholding located on the north-western edge of Hamilton. It is generally bounded by Te Kowhai Road to the south, Koura Drive and Mangaharakeke Drive (State Highway 1C) to the east, and Onion Road to the north. The site is made up of multiple land titles, legal descriptions, and associated physical addresses.

For identification purposes, the site is commonly referred to by the primary addresses of 270 Te Kowhai Road and 28 Mathers Road. Full details of the landholdings are provided in the SAR. The site is identified in Figure 1 below.



Figure 1: Site Location Plan

The site comprises approximately 187.5 ha of land and is approximately 12 km northwest of Hamilton CBD. The site is currently operated as a dairy farm. The existing survey plan prepared by Maven Associates is shown in Figure 2 below.



Figure 2: Site location and topography (Source: Maven Associates Ltd)

Ground conditions comprise rolling terrain underlain by variable soils, including moisture-sensitive silts, as recorded in the CMW Geotechnical Investigation Report (GIR). The GIR confirms that suitable development platforms can be achieved subject to appropriate earthworks control, material selection and moisture conditioning; settlement beneath new fill areas, reuse of suitable site-won material as engineered fill, and localised groundwater management are the key geotechnical considerations. Groundwater and hydrogeological effects have been assessed separately by WGA, with any dewatering, lining or monitoring requirements to be confirmed through detailed design. Geotechnical and groundwater management is addressed further in Section 4.

2.2 Existing waterways and drainage

The site is crossed by the following waterways that are directly affected by the proposed earthworks:

Watercourse	Length on site	Character	Proposed treatment
Mangaheka Stream	~1,900 m	Highly modified; straightened and incised; principal catchment drain	Localised widening, lowering, meander introduction, and riparian enhancement per the STMP. Fish capture required before works per ESL FMP.
Te Otamanui Stream	~220 m	Southern boundary; highly modified headwaters; no native fish other than eel expected	Culverting for new road. ESL confirmation of habitat class before works.
Farm drain network	16.2 km total	Artificial farm drains; classified Moderate (7.9 km) and Low (8.3 km); of these the Moderate class is potential black mudfish habitat per the ESL FMP. The High-value ~1.9 km reach is the Mangaheka Stream (listed separately), not farm drain	Closure, piping, or diversion per stage programme. Fish capture before all High and Moderate class drains.

3 Proposed Earthworks

3.1 Earthworks scope

The proposed earthworks reshape approximately 185.9 ha of existing dairy farm from its current topography into a series of level industrial development platforms and internal roading, grading toward the stormwater management network. The earthworks are conceived as a balanced cut-to-fill operation: material excavated from one area is placed directly into fill areas elsewhere across the site, without permanent structural stockpiling. All cut material is managed on site unless identified through geotechnical or environmental inspection as unsuitable or contaminated, in which case it is removed to an appropriate facility.

The earthworks are structured in four phases, aligned to the release of the nine proposed subdivision stages across the site. This phasing has been optimised so that each stage achieves a cut/fill balance at the point of release, minimising the import and export of surplus material and avoiding the need for permanent structural stockpiles on site. Material excavated from one area is hauled directly to a fill area elsewhere in the same or an immediately following stage, as set out in Section 3.4.

Volumes will be reassessed and rebalanced at each stage and reflected in the final Construction Management Plan (CMP) and ESCP before commencement of that stage, ensuring the cut-to-fill balance is maintained as actual ground conditions are encountered. Any unsuitable or contaminated material identified through inspection during works will be removed from site. These volumes cannot be determined in advance and will be quantified as works proceed.

Works are generally intended to be carried out in the following steps for all earthwork phases:

- Pre-construction meeting to agree on final erosion and sediment control plan for the proposed works.
- Before any works are undertaken, the ecological reports and assessments shall be reviewed to ensure ecological requirements are followed and any fauna within the existing stream is removed prior to earthworks.
- Stabilised vehicle entrances to be constructed according to engineering drawings.
- Install specific silt control measures, construct sediment retention ponds, and form clean and dirty water diversion bunds.
- Construct haul roads to allow construction vehicles and prime movers to access the site.
- Bulk topsoil stripping and stockpiling within approved earthworks area.
- Carry out bulk structural cut to fill earthworks, and bulk excavation of stormwater devices (wetlands, raingardens, conveyance channels). Temporary earthworks (diversion channels) associated with modification of Mangaheka Stream, and the culvert installation within Te Otamanui Stream.
- Install drainage systems, stormwater outfalls, deep excavations for pump stations, and utilities.
- Prepare lot platforms where applicable, including subgrade preparation and placement of stabilised aggregate.
- Stabilise road corridors by placing the subgrade improvement layer and compacted subbase to provide all-weather access.
- Undertake ongoing maintenance of erosion and sediment controls until the site is deemed permanently stabilised and approved by regulatory authorities.

The Engineering Drawings C200 series in appendix A details the extent of earthworks and sediment control measures contained in the Infrastructure Report that forms part of the application documentation.

3.2 Flood Plain and Overland Flow Path (OLFP)

The site contains floodplain and overland flow path (OLFP) areas, fed by a network of existing farm drains that discharge into the Mangaheka Stream. A flood assessment carried out by Te Miro Water (TMW) identifies that flooding within the site results primarily from the Mangaheka Stream outspilling its banks, with the resulting overland flow following the low-lying land south of the stream.

To manage this risk under the proposed development, the Mangaheka Stream is to be modified by lowering and widening its channel to provide additional conveyance capacity for the increased flows generated as the site is developed.

This stream modification is staged in three parts contained within the four phases — S1, S2 and S3 — rather than carried out as a single operation, for two reasons. First, each stage of the stream works increases conveyance capacity ahead of the subdivision stage it serves, so that flood conveyance is progressively upgraded in step with the catchment area being developed rather than left short of capacity between stages. Second, staging limits the length of active, unlined channel exposed within the floodplain at any one time, reducing the risk of works being affected by a flood event during construction. The staged approach has been sequenced so that the stream works do not constrain or delay the proposed subdivision staging programme and are integrated with the earthworks phasing set out in Section 3.4. Further detail on the sequencing, methodology and controls for these works is provided in the STMP.

Prior to earthworks commencing, the existing farm drains contributing to secondary overland flow paths will be identified on site and diverted where necessary, to prevent upstream catchment flows from entering the live working zone. An indicative site-wide erosion and sediment control layout has been prepared, providing separate conveyance of clean and dirty water via new diversion channels.

The effect of these works has been assessed under a detailed Hydraulic Model Report and SWMP which forms part of the application documentation.

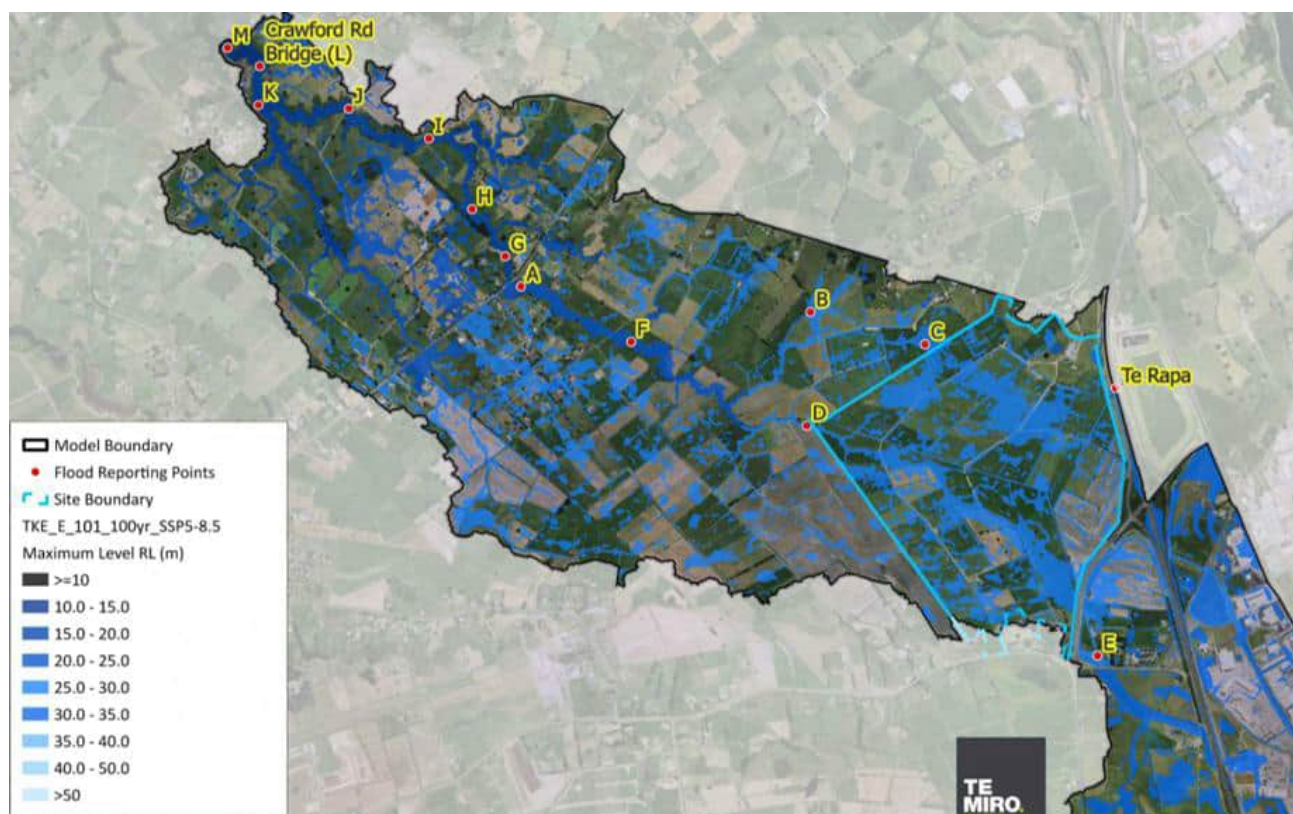


Figure 3: Pre Development 100yr CC flooding (Source: Te Miro Flood Model)

3.3 Earthworks Volumes

The following volumes are based on Maven Associates earthworks modelling. The earthworks volume comparison is described in the table below, including assumptions made and limitations. Topsoil volumes are calculated based on an assumed average depth (300mm) and applied site wide. Refer to Section 5.0 in this report for detailed topsoil management. All volumes will be confirmed against issued earthworks drawings at each earthworks phase, and progressively measured and recalibrated if required as described in Section 3.5.

Volume category	Basis	Volume (m ³)	Management approach
Structural earthworks: subgrade to subgrade, excl. topsoil			
Structural cut	Maven Associates Earthworks model: Existing subgrade to proposed subgrade	1,150,860 (cut factor 1.0)	Direct hauled to fill areas within site across the four earthworks phases. No permanent structural stockpile maintained.
Structural fill	<u>Existing subgrade</u> generated by lowering the topographical survey by 300mm (assumed topsoil depth average) <u>Proposed subgrade</u> generated by lowering the design ground as follows: Lots = 100mm Stormwater reserve = 200mm Roading = 1000mm	1,000,780 (fill factor 1.0; compaction factor and settlement allowance are excluded for this volume)	Received from cut phases via direct haul. Placed and compacted per NZS 4431:2022 and CMW specification.
Cross-phase earthworks balance	Cut to fill balanced across the four earthworks phases	Balanced on site 1,150,860 m ³ (cut factor 1.0) 1,150,320 m ³ (fill factor 1.15, equivalent to 0.870 shrinkage factor on cut volume)	Cut surplus placed directly into fill areas for final placement or spread over subsequent phase for conditions of cut volume. Refer to Proposed Earthwork Phasing Plan C221 and Section 3.4 within this report Compaction factor to be verified progressively at each phase.
Unsuitable or contaminated material	Identified through geotechnical and environmental inspection during works	Not determinable in advance	Removed from site to appropriate licensed facility as found. Volumes quantified progressively and reported monthly.

Volume category	Basis	Volume (m ³)	Management approach
Topsoil: managed separately from structural earthworks (Details in Section 5 of this report)			
Topsoil stripped	300mm average strip depth	557,869	Stripped ahead of structural earthworks. Stockpiled separately at CMW-approved locations. Not mixed with structural fill.

3.4 Earthworks Phasing

The earthworks are structured in four phases to reflect the site topography and maintain a direct cut-to-fill haul balance. Phase 1A covers the southern development areas: cut surplus is hauled directly north to Phase 1B as those areas open. Phases 2 and 3 cover the northern platforms, which are the primary fill-receiving areas for the net cut volume from the S1, S2 and S3 stream works phases. Phase 4 is the final fill placement area, receiving surplus cut material from Phase 3. No permanent structural stockpile is maintained.

EW Phase	Dev. stages	Est. area (ha)	Cut (m ³) Cut Factor 1.0	Fill (m ³) Fill Factor 1.15	Phase balance	Key ecological pre-condition	ESC pre-condition
Phase 1A	Stage 1	36.0	136,295	116,510	Surplus cut 19,785 m ³ ; direct hauled to Phase 1B	Fish capture. Bat clearance before any vegetation clearance. (same condition for all EW phases) Stream works methodology approved	SRP 1 operational. Stabilised entranceway at SH 39 access. Settlement monitoring instruments in place before fill.
Phase S1	Stage 1	7.4	159,615	5,050	Surplus cut 154,565 m ³ ; direct hauled to Phase 2	The same pre-condition applies. Stream works methodology approved	SRP 2 & 2A operational.
Phase 1B	Stage 2	30	101,345	121,300	Fill shortfall 19,785 m ³ ; receives fill from Phases 1A	The same pre-condition applies.	<u>Stage 2</u> SRP 2 operational. <u>Stage 3</u> SRP 3 operational. Settlement monitoring instruments in place before fill.

EW Phase	Dev. stages	Est. area (ha)	Cut (m ³) Cut Factor 1.0	Fill (m ³) Fill Factor 1.15	Phase balance	Key ecological pre-condition	ESC pre-condition
Phase S2	Stage 3	6.1	115,070	3,230	Surplus cut 111,840 m ³ ; direct hauled to Phase 3	The same pre-condition applies. Stream works methodology approved	SRP 3 operational.
Phase S3	Stage 4	3.7	64,400	2,940	Surplus cut 61,460 m ³ ; direct hauled to Phase 3	The same pre-condition applies.	SRP 4 operational.
Phase 2	Stage 5 & 6	49.8	207,440	360,455	Fill shortfall 154,565m ³ ; receives fill from Phase S1	The same pre-condition applies.	SRP 5 & 6, operational. Settlement monitoring instruments in place before fill.
Phase 3	Stage 7 & 8	35.8	294,000	352,140	<u>Stage 7 – 8 (partial)</u> Fill shortfall 173,300 m³; receives fill from Phases S2 & S3 <u>Stage 8</u> Cut surplus 115,160 m³ direct hauled to Phase 4. Blending operation	The same pre-condition applies.	<u>Stage 7</u> SRP 7 operational. <u>Stage 8</u> SRP 8 operational. Settlement monitoring instruments in place before fill.
Phase 4	Stage 9 & R	18.6	72,695	188,695	Fill shortfall 115,160 m³; receives fill from Phase 3 Blending operation	The same pre-condition applies.	SRP 9 operational. Settlement monitoring instruments in place before fill.
Total	All stages	~185	~1,150,860	~1,150,320	Balanced on site		

The assignment of Phase 1A (southern), stream works phases S1–S3, and Phases 2, 3 and 4 (northern) reflects the cut/fill balance of those areas: Phase 1A and S1–S3 are net cut-generating, and Phases 2, 3 and 4 are net fill-consuming.

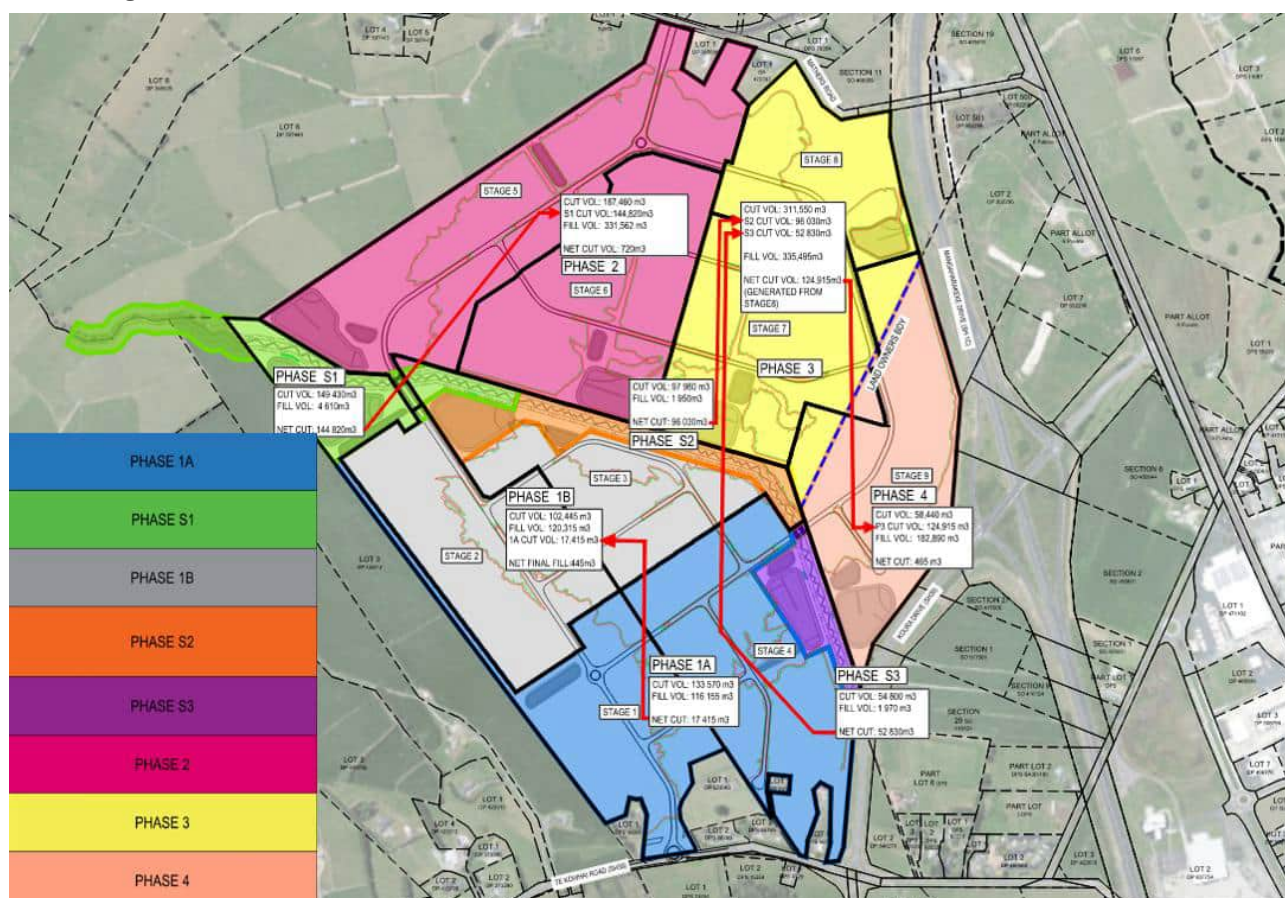


Figure 4: Earthworks phase plan – mark up (Maven Associates drawing C221)

3.5 Earthworks Programme

The earthworks programme is designed so that structural cut material moves directly from cut areas to fill areas, without intermediate stockpiling. The earthworks programme and sequencing are based on the intended staging release for this development, summarised as follows.

Stages 1 and 2 (Phase 1A, 1B, S1, 2 – Partial)

Estimated duration: 8 months (Earthworks Season 1)

The release of Stages 1 and 2 requires Phase 1A (Stage 1) works to commence first, with the 19,785 m³ structural surplus — generated mainly from the Stage 1 area — hauled directly to the designated Phase 1B fill area, which opens concurrently. Phase S1 stream works commence concurrently with Phase 1A, transporting a bulk surplus of 154,565 m³ to a designated area within Phase 2, for direct fill or moisture conditioning prior to placement.

Stage 3 (Phase 3, S2)

Estimated duration: 4 months, December–February (Earthworks Season 2)

The release of Stage 3 requires the S2 stream works to commence. Phase S2 generates the majority of its 111,840 m³ surplus through excavation of wetlands and conveyance channel works to service Stage 3. This surplus is to be hauled into the southern side of Phase 3, within the Stage 7 fill areas. The northern side of the S2 earthworks area is intended to daylight to existing ground level, optimising the cut volume generated to release Stage 3.

Stage 4 (Phase S3)

Estimated duration: 4 months, December–February (Earthworks Season 2)

Using a similar methodology to Stage 3, the release of Stage 4 requires the S3 stream works — generating 61,460 m³ of cut surplus — to be hauled directly into the Phase 3, Stage 7 fill areas. These earthworks comprise bulk excavation of wetlands and the modification works to the Mangaheka Stream required to complete the conveyance connectivity.

Stages 5 and 6 (Phase 2)

Estimated duration: 8 months (Earthworks Season 3)

Release of Stages 5 and 6 requires cut-to-fill operations to be completed within Phase 2. The remaining works comprise earthworks within the cut areas — including the wetlands and secondary conveyance channels in the southern portion of Stages 5 and 6 — required to fully complete the balance of the phase. These works are completed independently, on the assumption that the cut volume surplus from Phase S1 has already been received.

Stage 7 (Phase 3 – Partial)

Estimated duration: 4 months (Earthworks Season 4)

Release of Stage 7 is achieved through cut-to-fill operations within Stage 7 itself. The surplus cut carried over from the S2 stream works, combined with the cut volume generated within Stage 7 — approximately 111,840m³ in total — creates a near-balanced cut/fill operation, fully completing the earthworks within Stage 7.

Stages 8–9, R (Phase 3, 4)

Estimated duration: 12 months (Earthworks Seasons 4–5)

Release of Stages 8 and 9 entails undertaking the earthworks within these stages. The majority of the surplus cut from Stage 8 — approximately 115,160 m³ — is generated by excavation of the hill located at the northern end of the stage. In accordance with the CMW geotechnical report, the upper layer of the rolling hills (Hamilton & Kauroa Ash) is suitable for use as engineered fill within the Stage 8 fill areas. The lower layer of the northern hill (Puketoka Silts) is recommended to be blended at a ratio of 3:2 with a suitable geological formation. The Puketoka Silts shall be cut and blended with material from within Phase 4 and placed as fill once geotechnical conditions are satisfied. It is noted that re-conditioning of the existing material within the northern side of Stage 8 will be undertaken and certified by CMW prior to any major structural fill.

The phasing approach outlined above reduces the need for any large structural stockpiles on site at any stage of the programme. The only material stockpiled on site in significant volume is topsoil, which is managed separately in CMW-approved locations per Section 5.

Volume recalibration at each stage: actual ground conditions, material yields, and fill compaction factors vary from the modelled assumptions. Before each stage commences, a cut-to-fill volume recalibration is progressively reviewed on a monthly basis against the overall programme sequence, with adjustments made as required to maintain the principle of reduced material stockpiling. This adaptive recalibration ensures the cut-to-fill balance is maintained as the programme progresses. Where a stage generates more cut than anticipated, the programme will either: (a) expand the receiving fill area; or (b) advance the commencement of the next Phase 3 or 4 fill stage.

4 Earthworks Methodology and Geotechnical Management

The proposed earthworks involve cutting down the northern rolling hill topography by up to 10 m to generate fill for placement across the low-lying plains, creating near-level building platforms and industrial roading. The following controls, upon which the geotechnical suitability assessment (CMW Geosciences, ref. HAM2025-0116, Rev0, dated 14 August 2026) relies, will be implemented throughout earthworks construction.

General requirements.

All earthworks will be carried out in accordance with NZS 4431:2022 *Code of Practice for Earthworks for Residential and Commercial Developments* and under the supervision of a Chartered Professional Geotechnical Engineer (CPEng). A project-specific geotechnical earthworks specification will be prepared prior to bulk earthworks commencing.

Sensitive soils management.

Hinuera Formation silts (present at shallow depth across the low-lying plains) and Puketoka Formation silts and clays (exposed in the lower ~6 m of the northern hill cut) are sensitive to remoulding, losing strength rapidly when overworked, over-trafficked, or saturated. Mitigation measures include limiting direct trafficking over exposed sensitive soils, shaping cut surfaces to shed water, and blending sensitive Puketoka Formation silts with non-sensitive volcanic ash materials at a nominal 40:60 ratio to achieve suitable compaction characteristics. Blend proportions will be confirmed through site trials.

Uncontrolled fill.

Following topsoil stripping, any uncontrolled fill (identified during investigation as isolated shallow deposits associated with historic farm activities) will be exposed, inspected, and removed under geotechnical supervision.

Compaction. Fill will be placed in successive lifts, with any natural subgrade or fill surfaces that have become dry ripped prior to placing the following lift to ensure adequate knitting. Moisture conditioning will be applied as required.

Groundwater and dewatering.

Groundwater is anticipated at shallow depths (~1 m below ground level) across the low-lying plains. Temporary groundwater management, including localised dewatering (e.g. sump pumps or well-point spears), will be required to facilitate excavations, particularly for the Mangaheka Stream realignment, wetland construction, swale formation, and deep service trenches, where saturated sandy soils present a risk of running sand conditions. Trench support will be provided where stability cannot otherwise be assured.

Stockpiling.

Temporary stockpile locations will be approved by the Geotechnical Engineer prior to placement and will be set back from steep slopes, proposed pond excavations, and site boundaries. Where stockpiling above potentially unstable ground cannot be avoided, stockpiles will be placed over a wide area with restricted height as directed.

Settlement monitoring.

Instrumented fill-induced settlement monitoring will be undertaken during bulk earthworks. Fill placement over the low-lying plains and at the reservoir platform in the northeastern corner will be staged to allow primary settlements to occur. Construction of settlement-sensitive structures and buried infrastructure will not commence until monitoring confirms that 90% of primary consolidation (T_{90}) has been reached and residual creep settlement is within acceptable limits.

Erosion and sediment control.

Exposed soil surfaces will be stabilised with topsoil and robust vegetation cover to provide long-term erosion protection. Where civil design identifies localised areas of elevated flow velocity or steeper channel gradients, additional armouring (riprap, reno mattresses, or similar) will be incorporated.

Road subgrades.

A preliminary CBR value of 3% will be adopted for design of road subgrades in natural soils, with a Subgrade Improvement Layer (SIL) recommended. Higher CBR values are expected in engineered fill, subject to confirmatory testing.

Acid sulphate soils.

The risk is assessed as low across the site. Where the southern road connection interacts with the paleochannel system near Te Kowhai Road, on-site pH testing will be undertaken during excavation, with isolation of any suspect material if required.

For detailed requirements, refer to the Geotechnical Investigation Report (CMW Geosciences, HAM2025-0116, Rev0, August 2026) and the project-specific earthworks specification to be prepared prior to construction.

5 Topsoil Management

Topsoil is managed separately from structural earthworks throughout the programme. It is a distinct material category: stripped before structural earthworks commence in each area, stockpiled separately, and not mixed with structural fill material at any stage. The following management approach applies across all four earthworks phases.

5.1 Volumes

Topsoil volume item	Calculation	Volume (m ³)	Notes
Total topsoil stripped	Earthwork area x 300mm average strip depth	557,869	Strip ahead of structural earthworks. Strip depth range 0.15–0.5 m per CMW GIR site data. Actual strip depth confirmed by CMW field assessment at commencement of each stage. Stockpiled separately at CMW approved locations. Not mixed with structural fill.
On-site respread:	Respread area includes open space, stream corridor, basin margins, road berms. Estimated as follows: 100mm for Lot area 200mm for Stormwater reserves 300mm for Road berms	219,026	Retained in managed stockpile until final landscaping phase. Quality-protected throughout.
Topsoil surplus: Carted off site	Surplus after on-site respread requirement met	338,843	Screened to remove stones, debris and oversized material. Screened topsoil is to be sold as a landscape supply product where market demand allows, with the balance removed to a cleanfill area. Destinations to be confirmed prior to earthworks commencement.

The respread area estimate is indicative and will be confirmed from the detailed landscape design. If the respread area is larger, the surplus volume reduces proportionally. If smaller, more material is available for sale or cleanfill.

5.2 Stripping & Stockpile Management

Topsoil stripping precedes all structural earthworks in each area. Topsoil stripping depth (nominally 300 mm; range 0.15–0.5 m) shall be closely monitored and assessed by CMW. Upon confirmation that natural subgrade has been reached, the topsoil strip depth for each stage shall be reassessed to determine the volume required to be maintained on site for respreading. The stripping sequence is: (1) strip topsoil to the depth approved by CMW; (2) haul topsoil directly to stockpile up to the targeted volume; (3) off-cart surplus topsoil to a cleanfill site; (4) undertake a topographical survey of the natural subgrade; and (5) reassess against the cut-to-fill earthworks design.

Topsoil stockpile locations require CMW approval before material is deposited. No stockpile is placed on steep or unstable slopes, adjacent to stormwater basin excavations, or within the 10 m Mangaheka Stream setback. Maximum stockpile height 3 m, side slopes at 1V:2H maximum. Silt fence perimeter around all stockpiles. Any stockpile movement or slope instability reported to CMW immediately.

Temporary stockpiles retained for less than three months will not require permanent stabilisation measures, provided they are appropriately managed to prevent instability and off-site effects. Where stockpiles are to remain in place for longer periods, additional stabilisation and management measures may be required and will be addressed through detailed design or contractor methodology.

Note: All stockpiling and reuse operations will be tracked with GPS or site logs to ensure material origin, volumes, and placement areas are accurately recorded for the final Earthwork Completion Report.

6 Environmental Effects Management

6.1 Overview

This section identifies the key environmental effects of the earthworks and the management framework for each. This EWMP sets the consenting-level effects management framework that the CMP implements for approval prior to earthworks.

6.2 Erosion and Sediment Control Plan (ESCP)

Earthworks across 185.9 ha represent a significant erosion and sediment generation risk, particularly given the proximity to the Mangaheka Stream (taonga to mana whenua; habitat for at-risk native fish) and the presence of erodible Kauroa Ashes and sensitive Puketoka Formation silt in the hill terrain.

Erosion and sediment controls have been designed to align with the expected phasing and stage release. Sediment treatment devices have been strategically located so they can be maintained progressively as earthworks areas are opened and stabilised. The proposed controls will be in general accordance with Waikato Regional Council best practice erosion and sediment control measures, as set out in WRC TR2009/02. Regular inspections will be undertaken by the Environmental Representative/Engineer in accordance with the CMP, ESCP and consent conditions. The works will also be subject to compliance monitoring by WRC.

Silt control measures will need to be installed onsite, checked, and confirmed acceptable by the Engineer before works commence in the designated areas. During earthworks, the sediment control measures will be maintained such that they function as proposed.

The site will be progressively stabilised with topsoil and grass seed as earthwork levels are achieved. Silt control measures will only be removed once the site is considered stable in terms of silt runoff.

The following silt and sediment control protection measures are proposed. The sections below cover the generic methodology for all stages of the development. For clarity, refer to the earthworks phase plan and development staging plan included with this application, together with the attached engineering drawings for the detailed earthworks staging methodology.

- A system of clean water diversion bunds will be installed on the high side of the works to direct runoff away from the earthworks areas, minimising the overall volume of water requiring treatment. Where practical, the clean water diversions shall be aligned with the proposed conveyance channels within the development.
- Establish the dirty water diversions where required along the low side of the catchment areas that will collect any peripheral runoff and direct it to temporary sediment ponds located in natural low-lying areas. Bunding within the working area will direct dirty water into Sediment Retention Ponds (SRP) or Decanting Earth Bund (DEB) corresponding to the designed catchment size in each stage. Each pond will be adequately sized, with spillway design as per WRC TR2009/02 guidelines.
- Any areas from which runoff cannot be directed to the natural low-lying areas will have silt fences installed along the low side perimeter.
- Continuous turbidity monitoring at SRP outlets. Turbidity limits will be in accordance with the consent conditions.
- Stabilised vehicle crossings will provide entrances to the earthwork catchment and minimise potential for sediment to leave the site with construction traffic. The crossings will be designed with a crest to ensure retention of sediment laden water within the site.
- Topsoil and Clay stockpiles will be located outside of the Staging area each with bunding to mitigate sediment run-off during rain events. Geotextiles on any stockpiles to prevent rainfall from falling on the stockpiles and to also assist with dust suppression if required.
- Temporary haul roads to minimise silt tracking over areas undisturbed.
- Works shall proceed in a manner that allows worked sections to be completed to a finished standard prior to moving to a new section. It is particularly important to ensure works are being planned according to the forecast so that no area is exposed which cannot be completed or rapidly stabilised prior to a rain event. The programme of works will be discussed with the Contractor to consider their input regarding planned construction processes and methodologies.
- All works are to be stabilised as soon as possible following completion.

- Erosion and sediment control devices are to be kept in place until the completed works are fully stabilised and their removal has been approved.

The existing Mangaheka Stream is to be protected during earthworks in its proximity. A detailed ESCP will be prepared before works commence in these areas, including wetland excavations and stream works earthworks.

Exposed areas will be stabilised temporarily through the placement of straw mulch (conveyance channel slopes), or through the replacement of geotextile material if required in smaller areas (such as temporary, short-term stockpiles). Access tracks or haul roads will be stabilised through the placement of imported clean hard fill providing an instantly stabilised running surface for site plant and machinery.

6.3 Disposal of excavated material

It is assumed that all unsuitable excavated material will be removed from the site by loading it onto truck and trailer units for transportation and disposal at an appropriately authorised and managed facility.

Channel excavation can proceed continuously, with material stockpiled along the excavation edge. Suitable material will be kept stockpiled, covered, and bunded so that it is ready for reuse as fill material.

6.4 Dust

Dust generation is a primary risk given prevailing westerly to northwesterly winds directing earthworks-derived particulates toward Te Kowhai Road residential receptors on the southern site boundary. The dust management set out in the CMP specifies: haul road watering, speed limits on unsealed haul roads, wind-based cessation triggers, and prompt stabilisation of dust-susceptible material.

To manage potential dust effects, the following management measures are proposed:

1. The area exposed for earthworks will be minimised where possible, in accordance with the earthwork staging described in this report.
2. Earthworks shall be effectively stabilised using the following methods:
 - a. Topsoiling and grassing
 - b. Hydroseeding
 - c. Using hay or straw mulching
 - d. Water cart (where required)
 - e. Stabilisation work shall be completed prior to the opening of any subsequent earthworks

An adequate supply of water for dust control, and an effective means of application, will always be available on site during earthworks until the site is fully stabilised.

3. Sufficient water will be available for dust mitigation with water storage tanks (or similar) retained on site until it is fully stabilised. The water tanks will be re-charged via truck and trailer water cart.
4. In the event dust control management is ineffective and if found necessary, the contractor shall employ the use of soil stabilisers (such as polymers or similar) or weatherproof cover where possible.

6.5 Ecological effects

Ecological effects are addressed in the Ecological Impact Assessment and Fish Management Plan prepared by Ecological Solutions Ltd (ESL). Earthworks shall comply with the relevant ecological management requirements applying to the particular works, including pre-clearance surveys, fauna salvage/capture requirements and the applicable FMP, BMHCP, BMP and LMP requirements.

6.6 Cultural effects

Cultural effects are addressed in the Cultural Impact Assessment prepared by the relevant iwi and hapū. Cultural requirements relevant to earthworks include pre-commencement engagement/notification, cultural protocols where required, accidental discovery procedures and incident notification, in accordance with the CIA and consent conditions.

6.7 Stabilisation

Stabilisation of earthworked areas shall be undertaken progressively as final ground levels are reached or where works are temporarily paused for more than 14 days. The following stabilisation measures and timing are proposed in line with WRC guidelines:

Condition	Stabilisation Method	Timeframe
Final earthwork levels achieved	Topsoil and grass seeding	Within 5 working days
Temporary pause in work >14 days	Hydroseeding or straw mulching	Within 7 calendar days
Final surface not expected within 60 days	Polymer stabilisation or erosion control matting	Within 10 working days
Winter shutdown	Stabilisation of all exposed area	Before 30 April annually

Table 6.1: Stabilisation measures and timing (in accordance with WRC guidelines)

Maintenance: All stabilised areas will be monitored weekly and after heavy rainfall (>20mm/hr) to ensure full vegetation cover (minimum 80%) is achieved. Any bare patches or erosion will be repaired promptly with mulching or swift remedial action.

7 Monitoring and Reporting

7.1 ESC monitoring

All sediment control measures will be checked to ensure that they are performing as intended.

A site walk over shall be undertaken daily before leaving the site to identify any corrective maintenance required. A more thorough inspection will be undertaken at the end of each week, or before and after a forecast major storm event, to identify any preventative and/or corrective maintenance required.

A regular program of sediment, debris and trash removal will be undertaken to ensure sediment control measures do not become blocked and ensure they function as proposed. Any large floating matter including any organic matter, i.e., fallen tree litter, reaching the pond or discharge structures is to be removed immediately.

Following any rainfall event exceeding 20 mm over 24 hours, a site walkover shall be undertaken to identify any potential inefficiencies within the designed sediment controls. Any issues shall be rectified and reported.

Specific monitoring and maintenance of each mitigation method is included below:

7.1.1 Retention Pond / Decanting Earth Bund

Chemical treatment will be provided to the pond if 100 mm water clarity is not achieved before discharge; this will be achieved by dosing/flocculation.

7.1.2 Diversion Drains/Clean Water Cut-off Bunds

- Inspect after every rainfall event and during periods of prolonged rainfall for scour and areas where they may breach.
- Repair immediately if required to ensure that the design capacity is maintained.
- Remove any accumulated sediment deposited in the Runoff Diversion Channel / Bund due to low gradients and velocities.
- Carefully check outlets to ensure that these remain free from scour and erosion.

7.1.3 Silt Fence

- Inspect Silt Fences at least once a week and after each rainfall. Make any necessary repairs when bulges occur, or sediment accumulation reaches 50% of the fabric height.
- Any areas of collapse, decomposition or ineffectiveness need to be immediately replaced.
- Remove sediment deposits as necessary to continue to allow for adequate sediment storage and reduce pressure on the Silt Fence. Ensure that the sediment is removed to a secure area.
- Do not remove Silt Fence materials and sediment deposition until the catchment area has been appropriately stabilised. Stabilise the area of the removed Silt Fence.

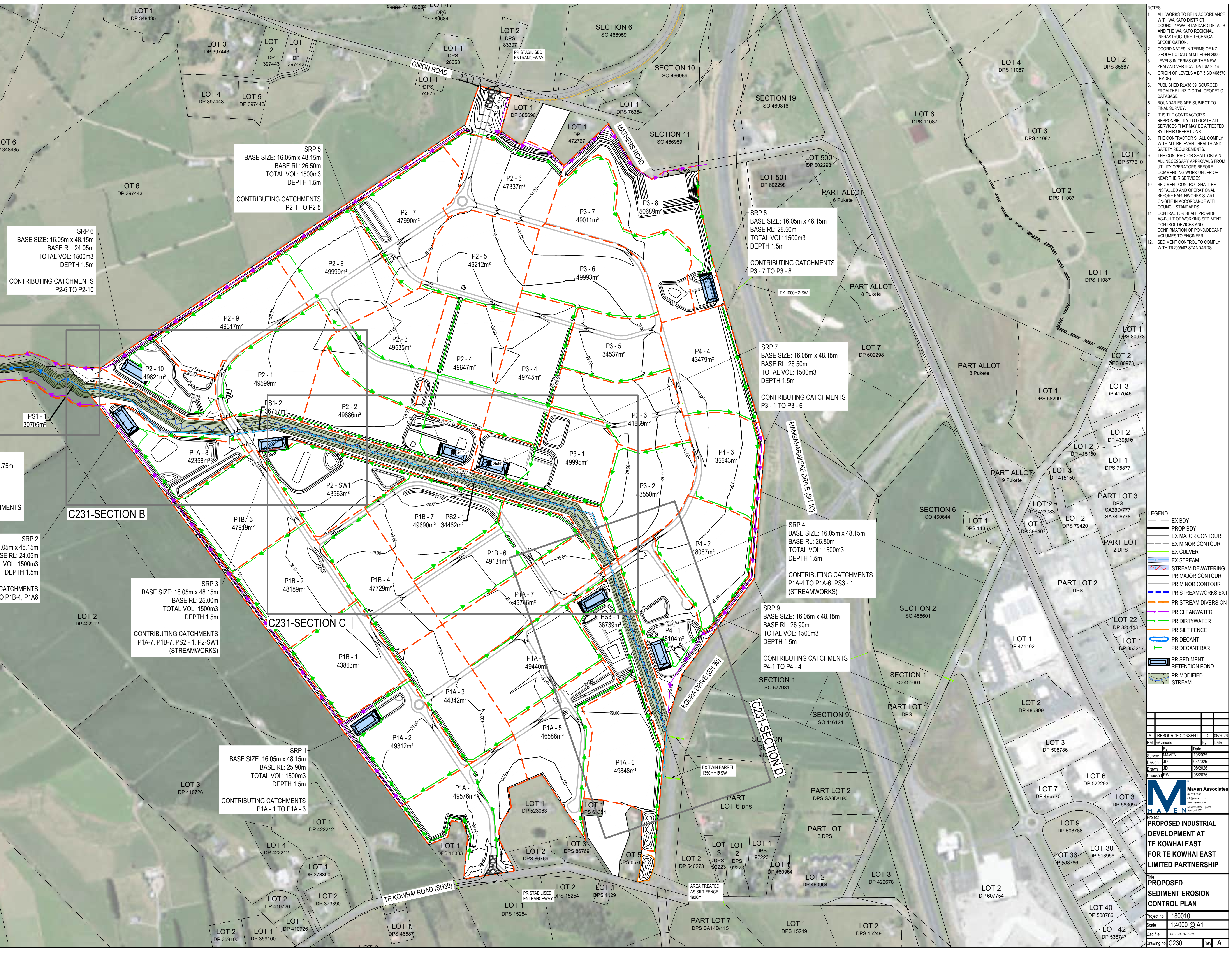
7.1.4 Stabilised Vehicle Entrance

Maintain the stabilised construction entrance in a condition that prevents sediment from leaving the construction site. After each rainfall event, inspect any structure used to trap sediment for the stabilised construction entrance and clean it out as necessary.

8 References

Reference	Author	Date	Relevance to this EWMP
Primary geotechnical and engineering references			
Geotechnical Investigation Report (HAM2025-0116)	CMW Geosciences	28 August 2026	Primary geotechnical basis: Sections 2.1, 4, 5
Hydrogeological Effects Assessment (WGA212384-RP-HG-0007_E)	WGA	28 August 2026	Groundwater levels, dewatering and discharge controls: Section 4
Ecological references			
Ecological Impact Assessment (EclA)	Ecological Solutions Ltd	28 August 2026	Watercourse and drain habitat classification: Sections 2.2, 6.5
Fish Management Plan (FMP)	Ecological Solutions Ltd	28 August 2026	Fish capture and clearance before drain and stream works: Sections 2.2, 6.5
Black Mudfish Habitat Creation Plan (BMHCP)	Ecological Solutions Ltd	28 August 2026	Mudfish salvage and habitat compensation: Section 6.5
Lizard Management Plan (LMP)	Ecological Solutions Ltd	28 August 2026	Pre-clearance survey and salvage: Section 6.5
Bat Management Plan (BMP)	Ecological Solutions Ltd	28 August 2026	Vegetation clearance and tree felling protocols: Section 6.5
Cultural references			
Cultural Impact Assessment (CIA)	Tangata Whenua Working Group	13 August 2026	Cultural effects management, notification and ADP: Section 6.6
Management Plans references			
Draft Construction Management Plan (CMP)	Maven Associates	Rev A	Implementation of the effects framework set by this EWMP: Sections 6.1, 6.2, 7
Draft Stream Works Management Plan (STMP)	Maven Associates	Rev A	Mangaheka modification and drain closure interface: Sections 1.2, 3.1
Standards and guidelines			
NZS 4431:2022 Engineered fill construction for lightweight structures	Standards NZ	2022	Earthworks compaction: Section 4
WRC TR2009/02 Erosion and Sediment Control Guidelines	WRC	January 2009	ESC design standard: Section 6.2

Appendix A.1



SRP 6
BASE SIZE: 16.05m x 48.15m
BASE RL: 24.05m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P2-6 TO P2-10

SRP 5
BASE SIZE: 16.05m x 48.15m
BASE RL: 26.50m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P2-1 TO P2-5

SRP 8
BASE SIZE: 16.05m x 48.15m
BASE RL: 28.50m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P3 - 7 TO P3 - 8

SRP 7
BASE SIZE: 16.05m x 48.15m
BASE RL: 26.50m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P3 - 1 TO P3 - 6

SRP 4
BASE SIZE: 16.05m x 48.15m
BASE RL: 26.80m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P1A-4 TO P1A-6, PS3 - 1
(STREAMWORKS)

SRP 9
BASE SIZE: 16.05m x 48.15m
BASE RL: 26.90m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P4-1 TO P4 - 4

SRP 3
BASE SIZE: 16.05m x 48.15m
BASE RL: 25.00m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P1A-7, P1B-7, PS2 - 1, P2-SW1
(STREAMWORKS)

SRP 1
BASE SIZE: 16.05m x 48.15m
BASE RL: 25.90m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P1A - 1 TO P1A - 3

SRP 2A
BASE SIZE: 11.91m x 35.75m
BASE RL: 24.90m
TOTAL VOL: 900m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
PS1-1

SRP 2
BASE SIZE: 16.05m x 48.15m
BASE RL: 24.05m
TOTAL VOL: 1500m³
DEPTH 1.5m
CONTRIBUTING CATCHMENTS
P1B-1 TO P1B-4, P1A8

- NOTES
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- LEGEND
- EX BODY
 - PROP BODY
 - 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 DIRTYWATER
 - PR SILT FENCE
 - PR DECANT
 - PR DECANT BAR
 - PR SEDIMENT RETENTION POND
 - PR MODIFIED STREAM

A RESOURCE CONSENT		ID	08/2026
Rev	Revisions	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	ID	08/2026	
Drawn	ID	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 SEDIMENT EROSION CONTROL PLAN

Project no
180010

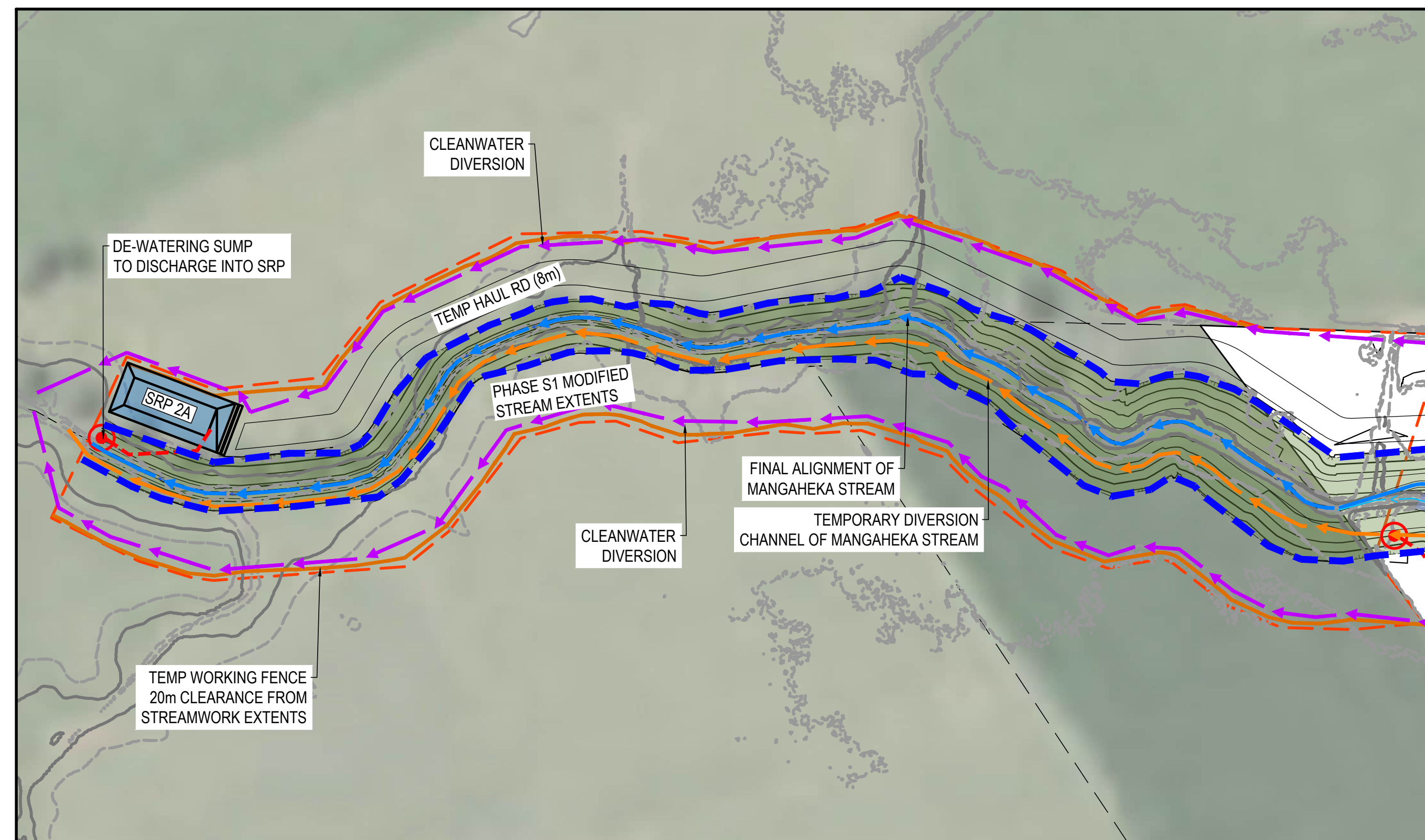
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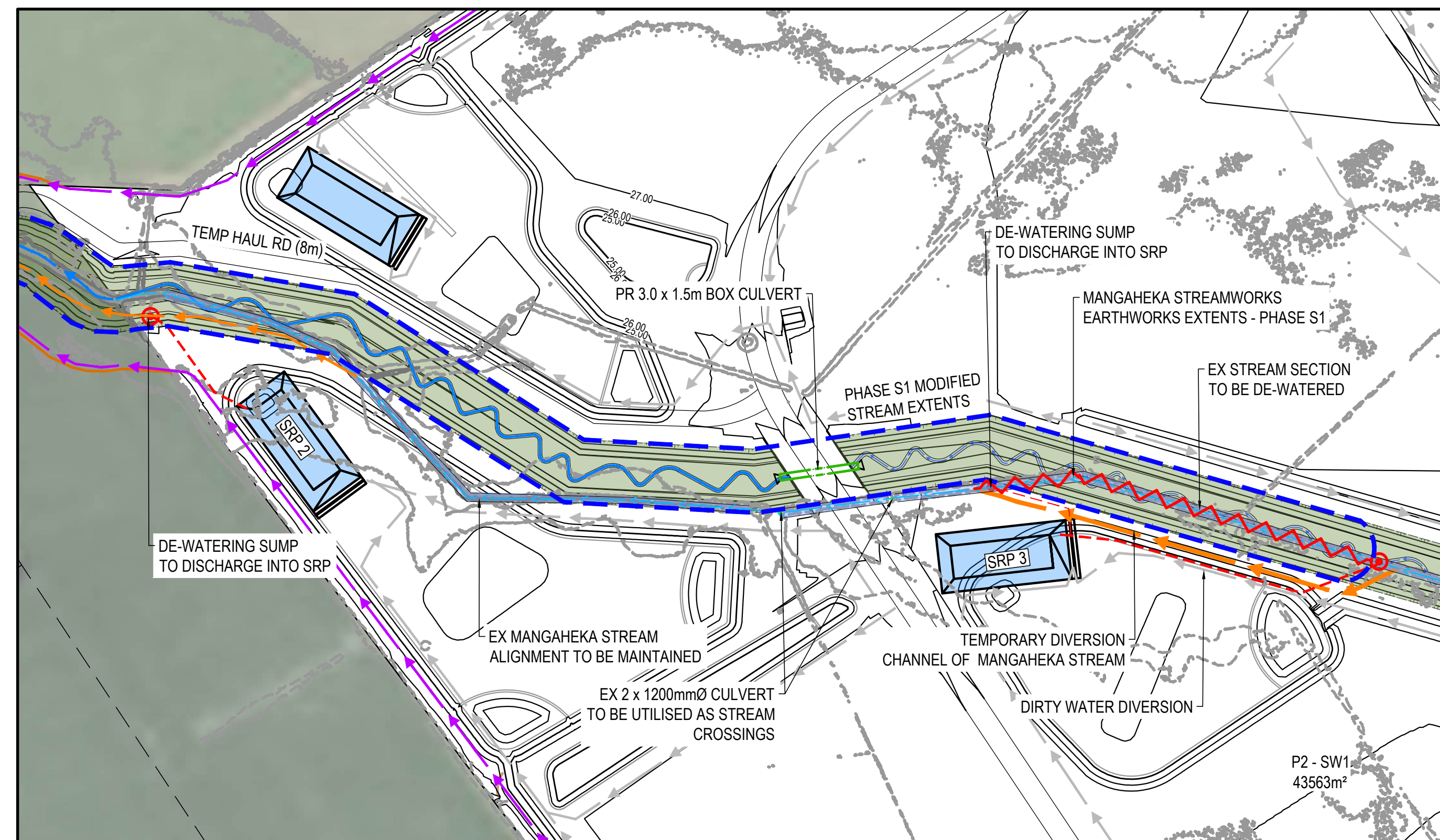
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C230

Rev
A

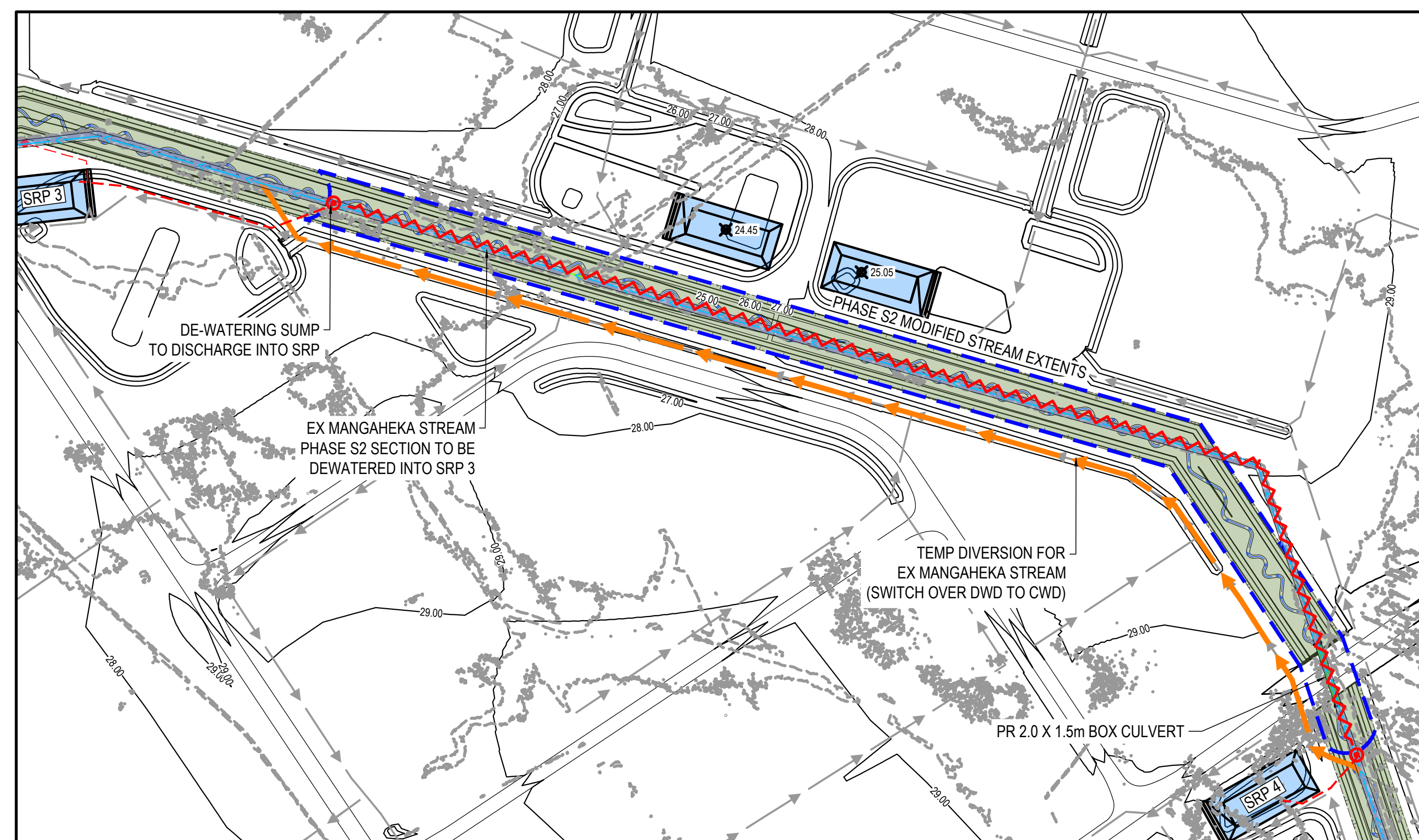
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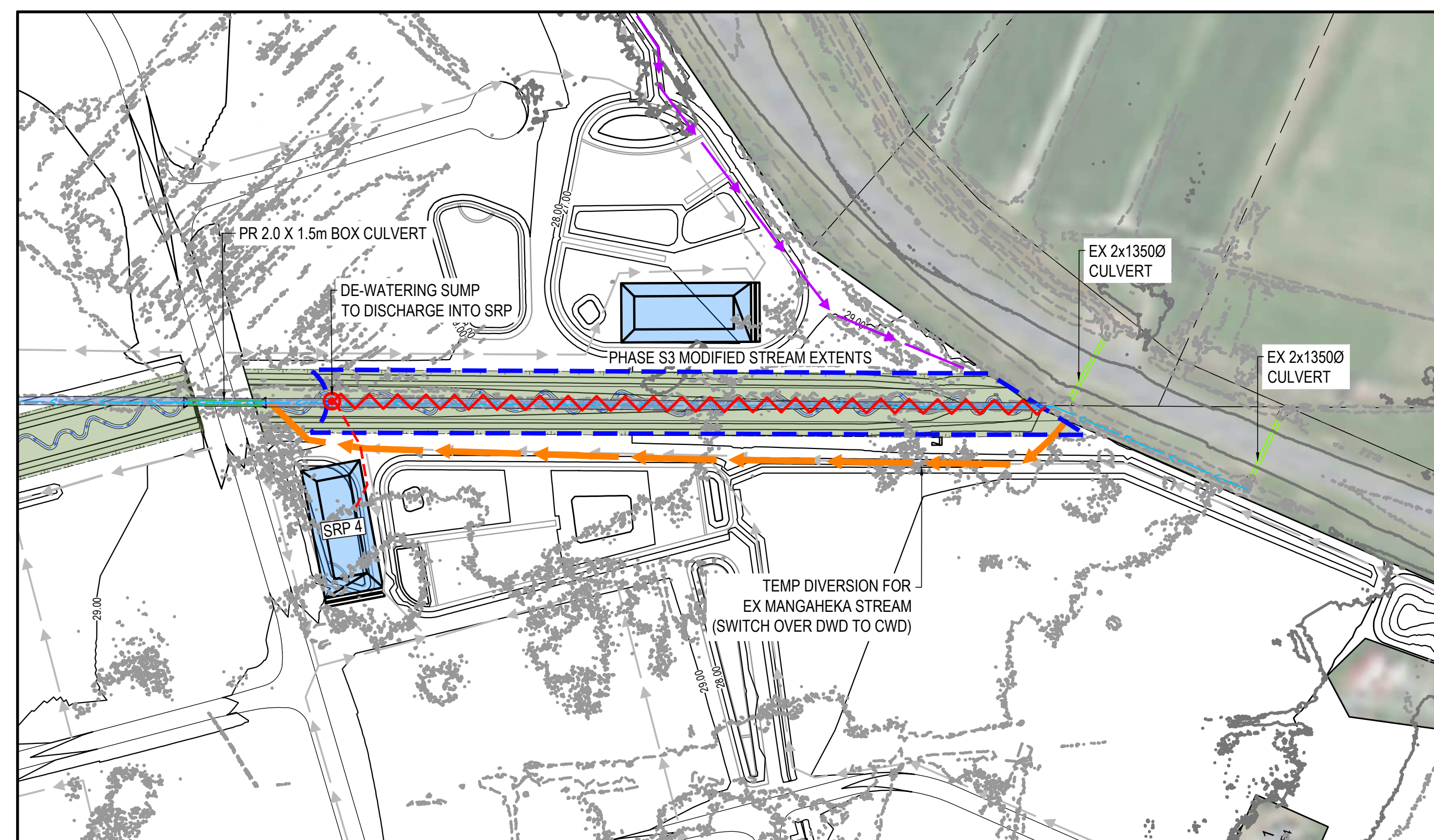
A PHASE S1 - STREAM WORKS LOWERING/WIDENING (EXTERNAL)
C230 SCALE 1:1250 @ A1



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

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- LEGEND
- EX BDY
 - PROP BDY
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 - EX STREAM
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 - PR MAJOR CONTOUR
 - PR MINOR CONTOUR
 - PR STREAMWORKS EXT
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 - PR DIRTYWATER
 - PR SILT FENCE
 - PR DECANT
 - PR DECANT BAR
 - PR SEDIMENT RETENTION POND
 - PR MODIFIED STREAM

Rev	Revisions	By	Date
1	Resource Consent	SP	08/2026
2	Survey	MAVEN	10/2025
3	Design	ID	08/2026
4	Drawn	ID	08/2026
5	Checked	RW	08/2026



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.

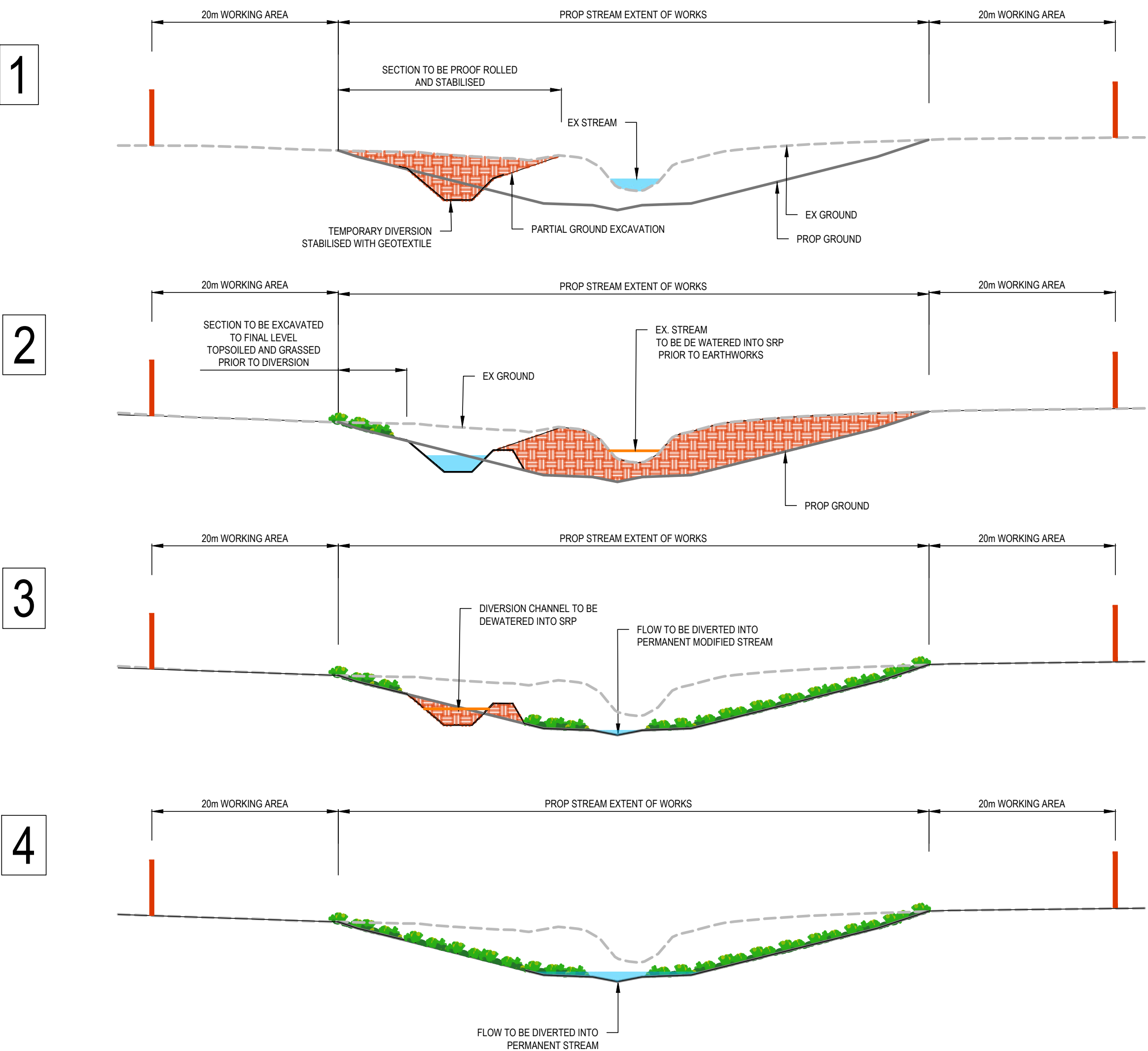
2.0- MANGAHEKA STREAM WORKS

- 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.

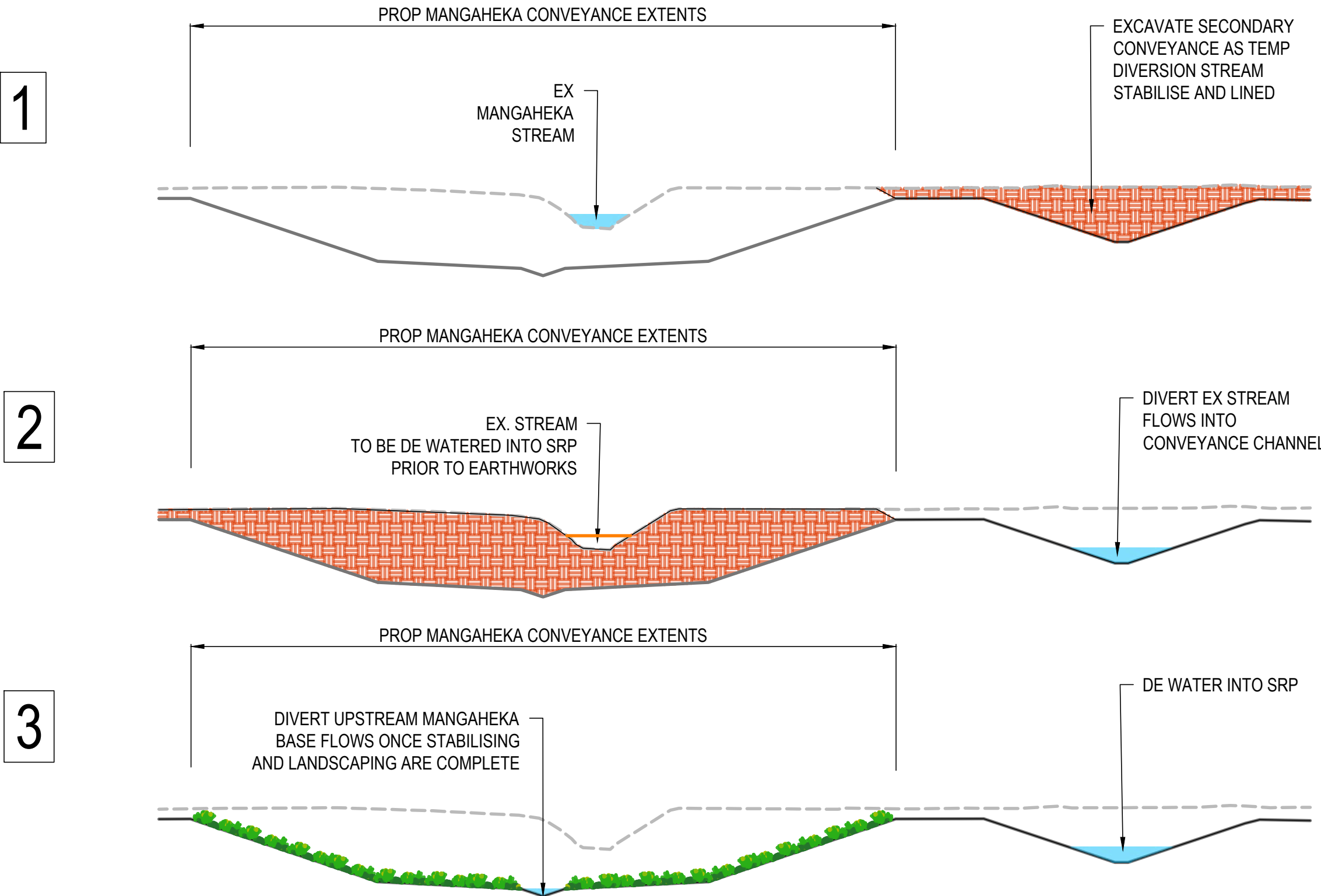
3.0- DIVERSION FLOW CUT OVER

- 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



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LEGEND

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

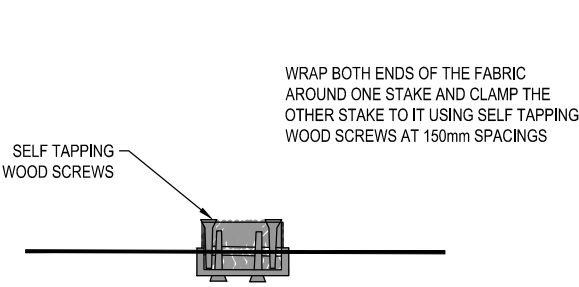
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Rev	Revisions	By	Date
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Survey	MAVEN	10/2025	
Design	JD	08/2026	
Drawn	JD	08/2026	
Checked	RW	08/2026	



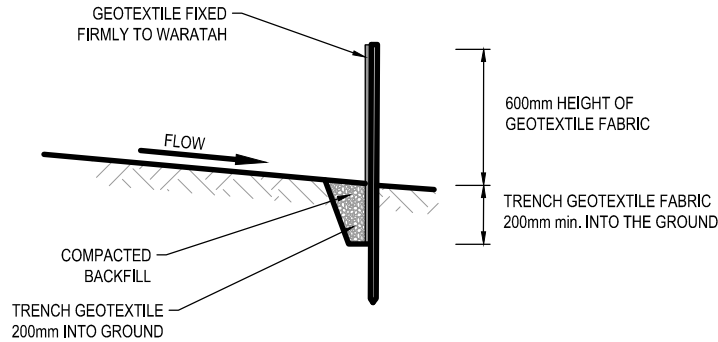
Project
PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED STREAM DIVERSION METHODOLOGY PLAN

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

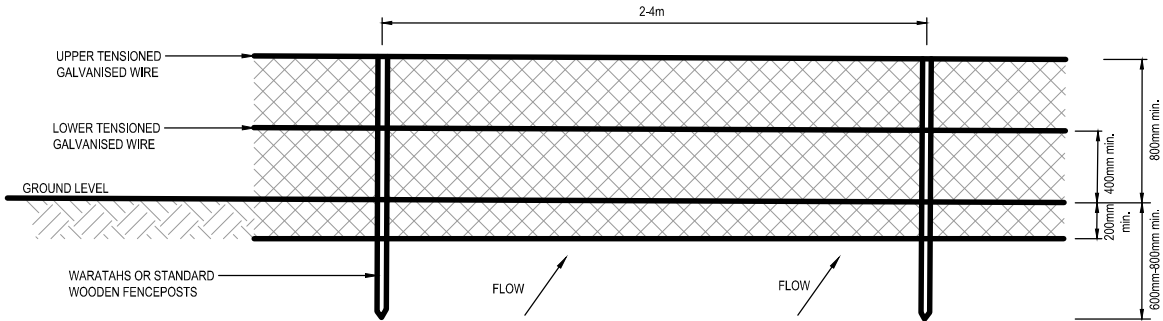


STANDARD DETAIL FOR FABRIC JOIN

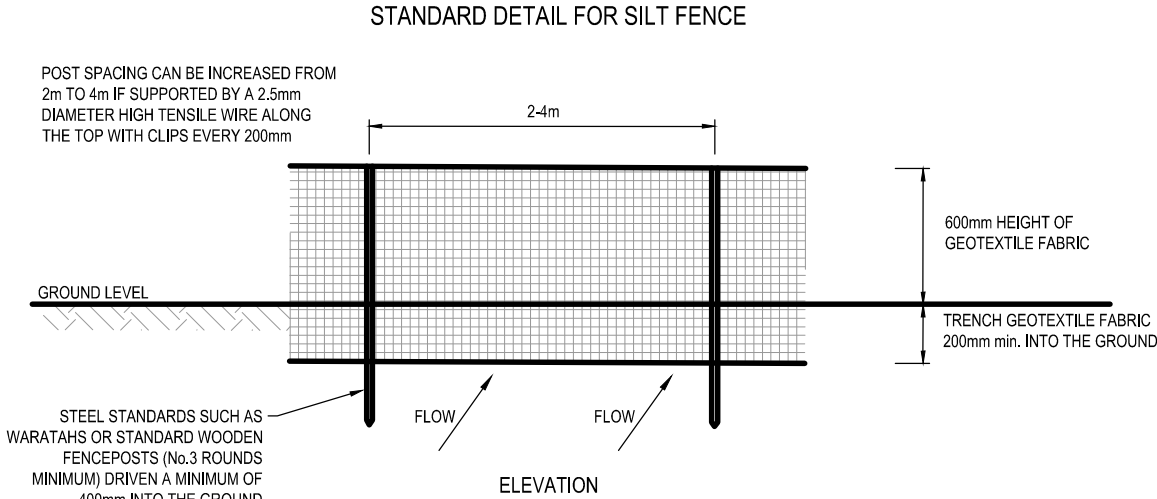


CROSS SECTION

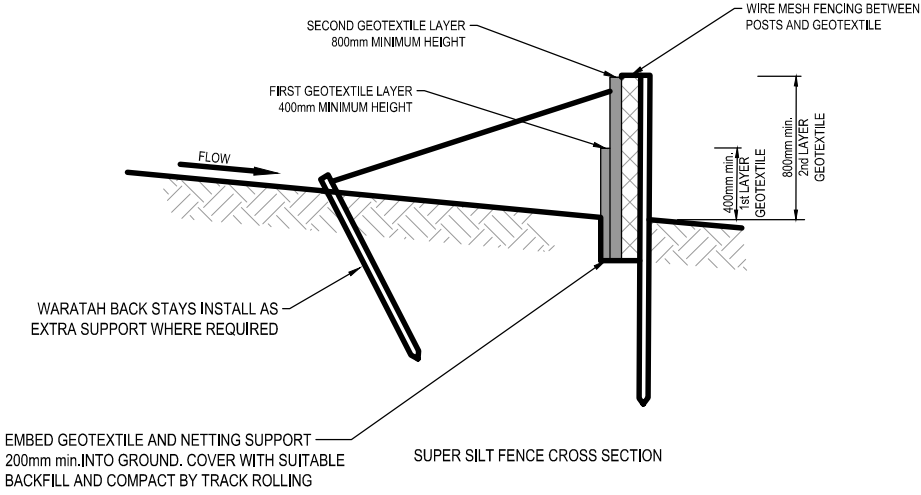
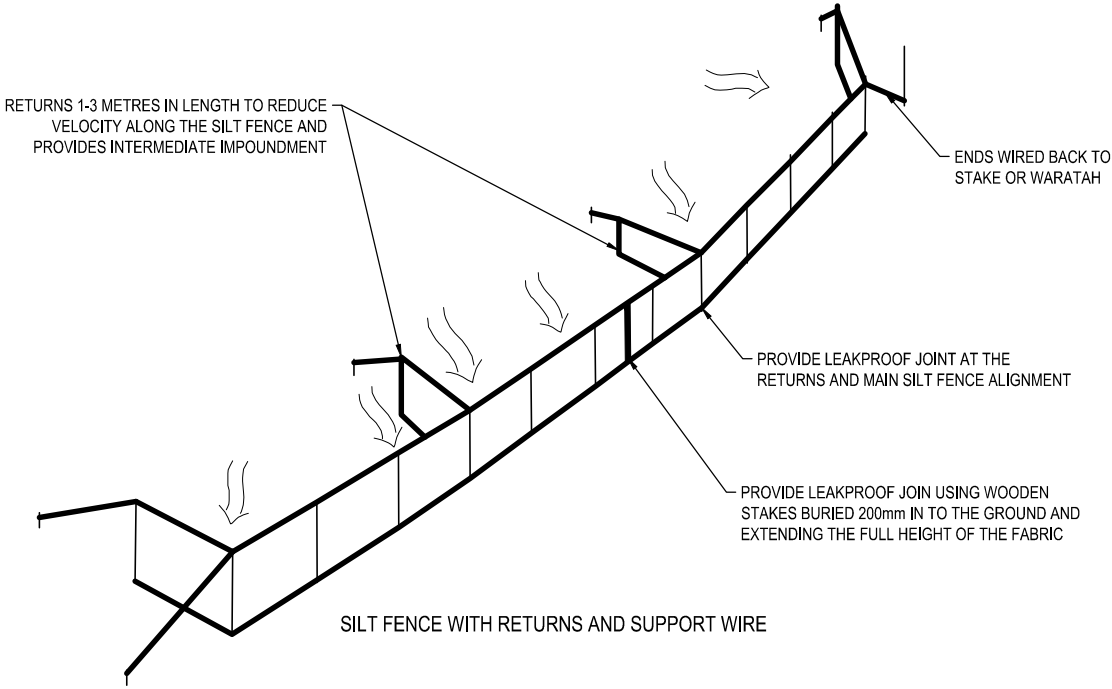
SUPER SILT FENCE DETAIL



ELEVATION



ELEVATION



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A	RESOURCE CONSENT	SP	08/2026
Rev	Description	By	Date
Survey	--	--	--
Design	GD05/TP90	--	--
Drawn	GD05/TP90	--	--
Checked	RW	08/2026	

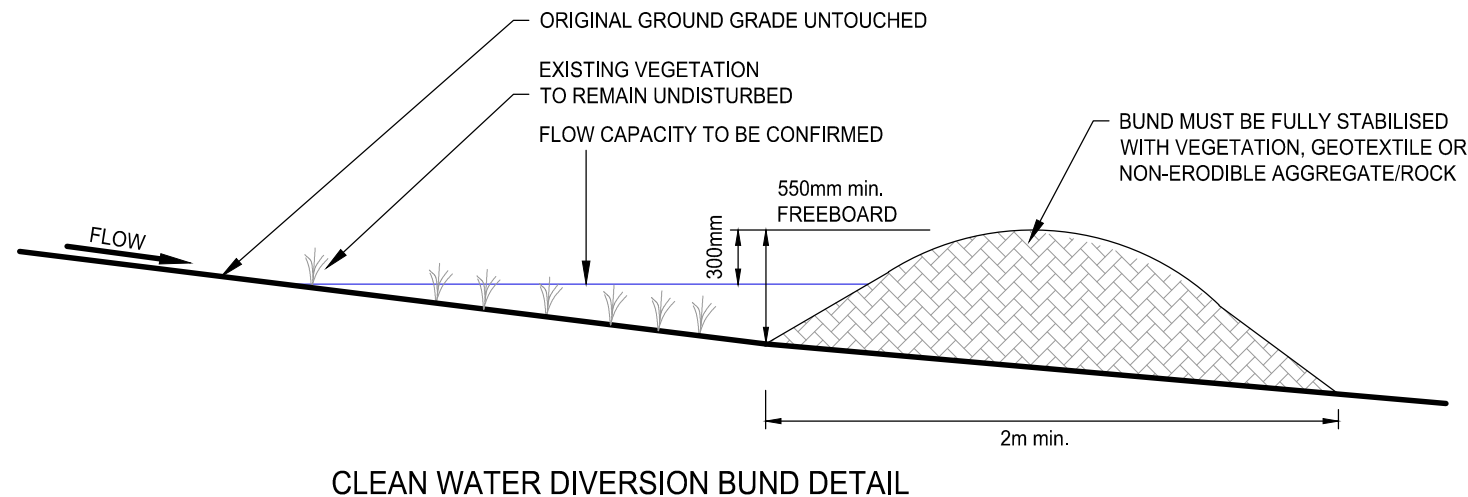
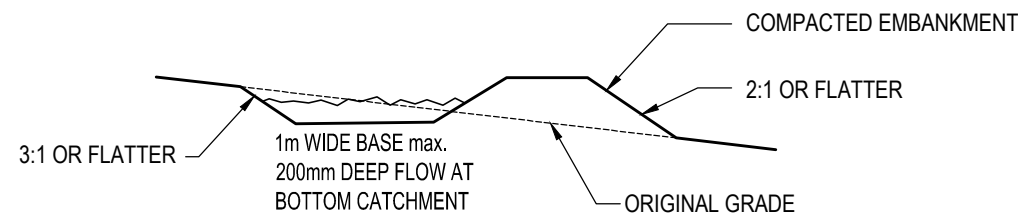
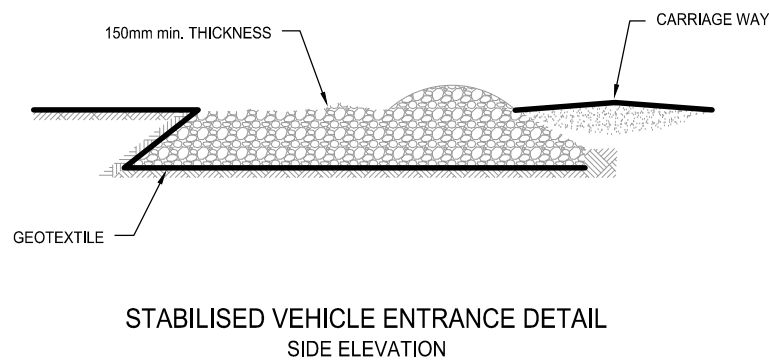
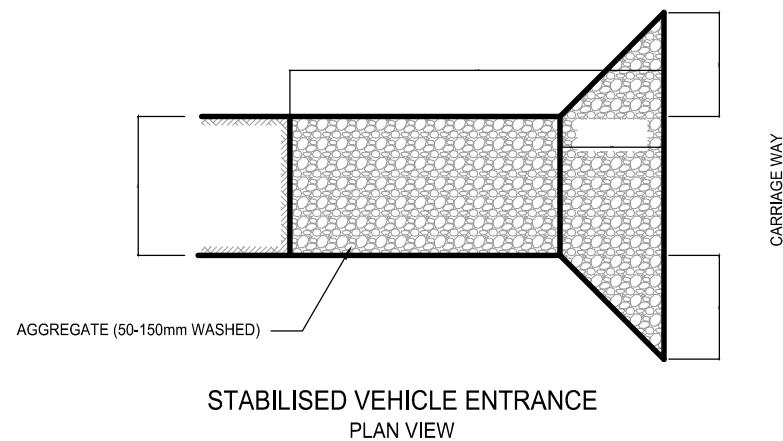
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Project
PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED SEDIMENT EROSION CONTROL DETAILS

Project no.	180010		
Scale	N.T.S @ A3		
Cad file	180010-C235.DWG		
Drawing no.	C235	Rev	A

RESOURCE CONSENT



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 12. SEDIMENT CONTROL TO COMPLY WITH TR2009/02 STANDARDS.

A	RESOURCE CONSENT	SP	08/2026
Rev	Description	By	Date
		By	Date
Survey	--	--	--
Design	GD05/TP90	--	--
Drawn	GD05/TP90	--	--
Checked	RW	08/2026	--

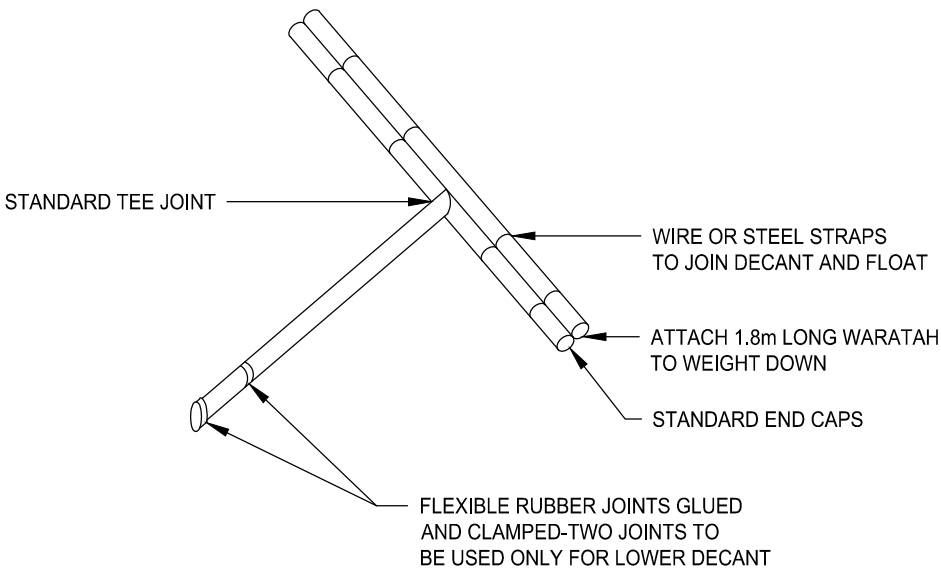
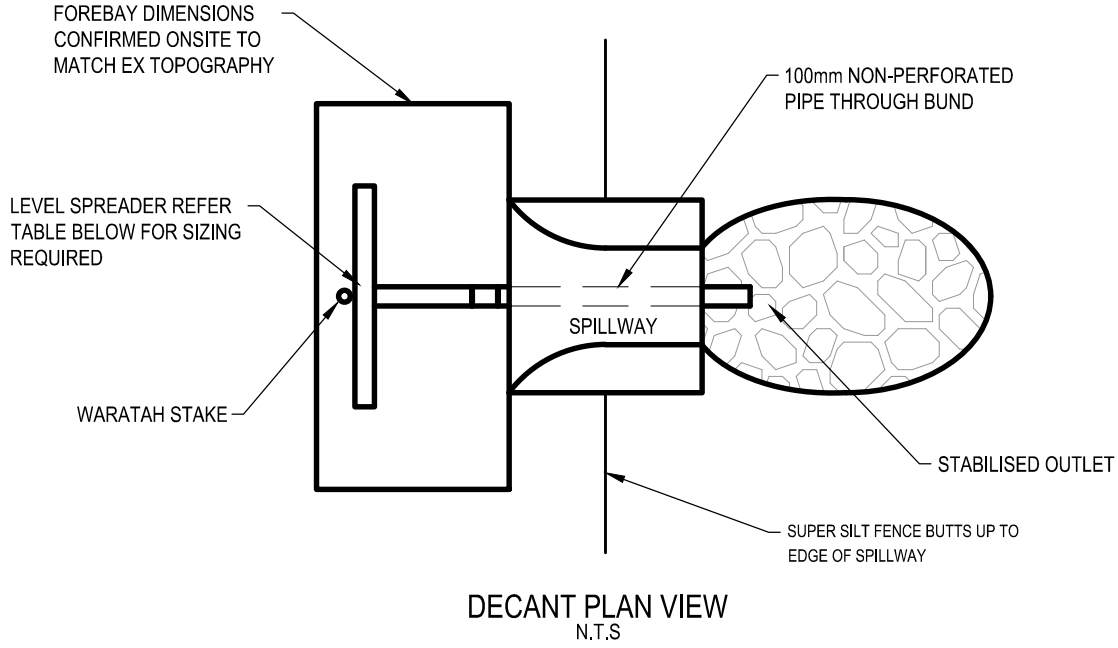
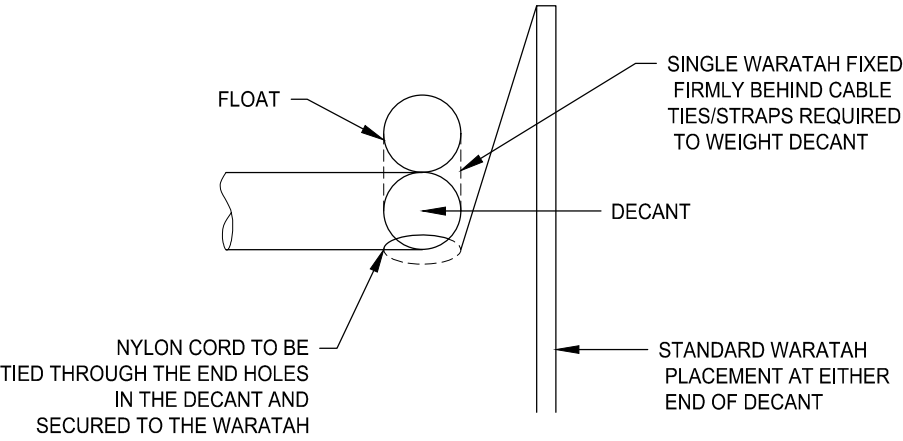
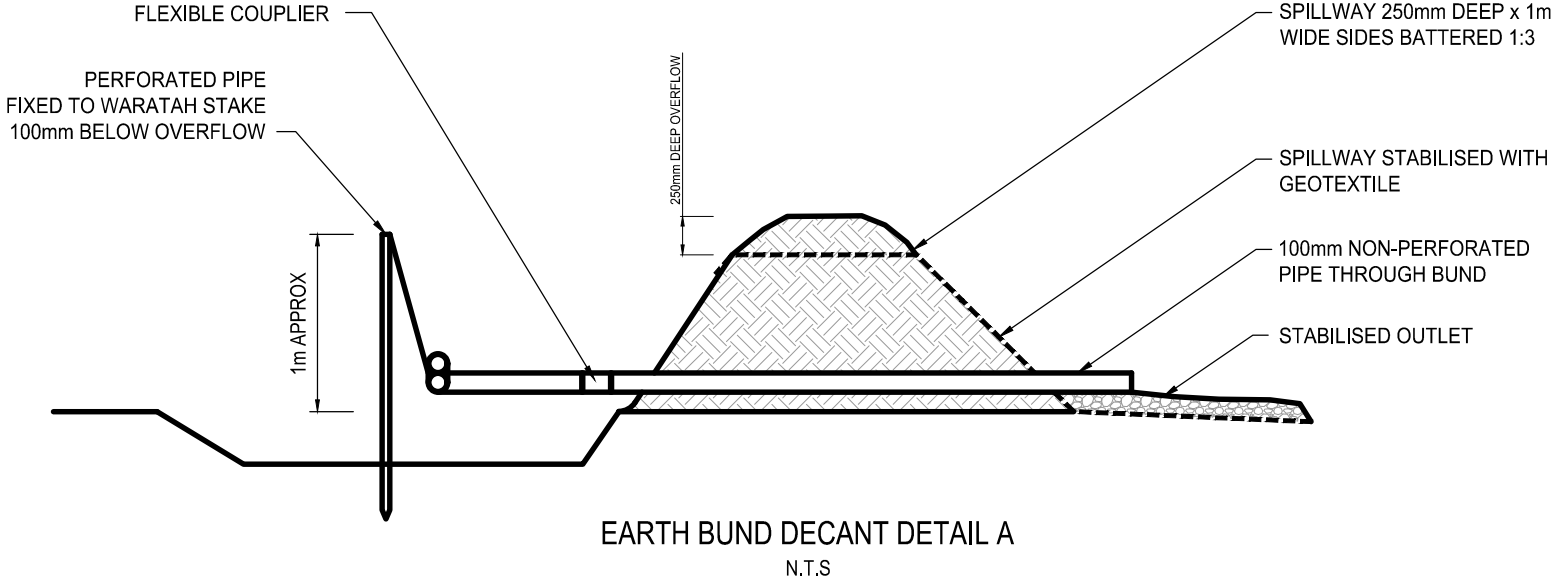
M **Maven Associates**
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Project
**PROPOSED INDUSTRIAL
DEVELOPMENT AT
TE KOWHAI EAST
FOR TE KOWHAI EAST
LIMITED PARTNERSHIP**

Title
**PROPOSED
SEDIMENT EROSION
CONTROL DETAILS**

Project no.	180010
Scale	N.T.S @ A3
Cad file	180010-C235.DWG
Drawing no.	C235-1
Rev	A

RESOURCE CONSENT



LEVEL SPREADER DESIGN CRITERIA (20 YEAR STORM EVENT)				
DESIGN FLOW (m ³ /sec)	INLET WIDTH (m)	DEPTH (m)	END WIDTH (m)	LENGTH (mm)
0-0.3	3	150	1	3
0.3-0.6	5	180	1	7
0.6-0.9	7	220	1	10

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO DISTRICT COUNCIL/IAWAI STANDARD DETAILS AND THE WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
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A	RESOURCE CONSENT	SP	08/2026
Rev	Description	By	Date
		By	Date
Survey	--	--	--
Design	GD05/TP90	--	--
Drawn	GD05/TP90	--	--
Checked	RW		08/2026



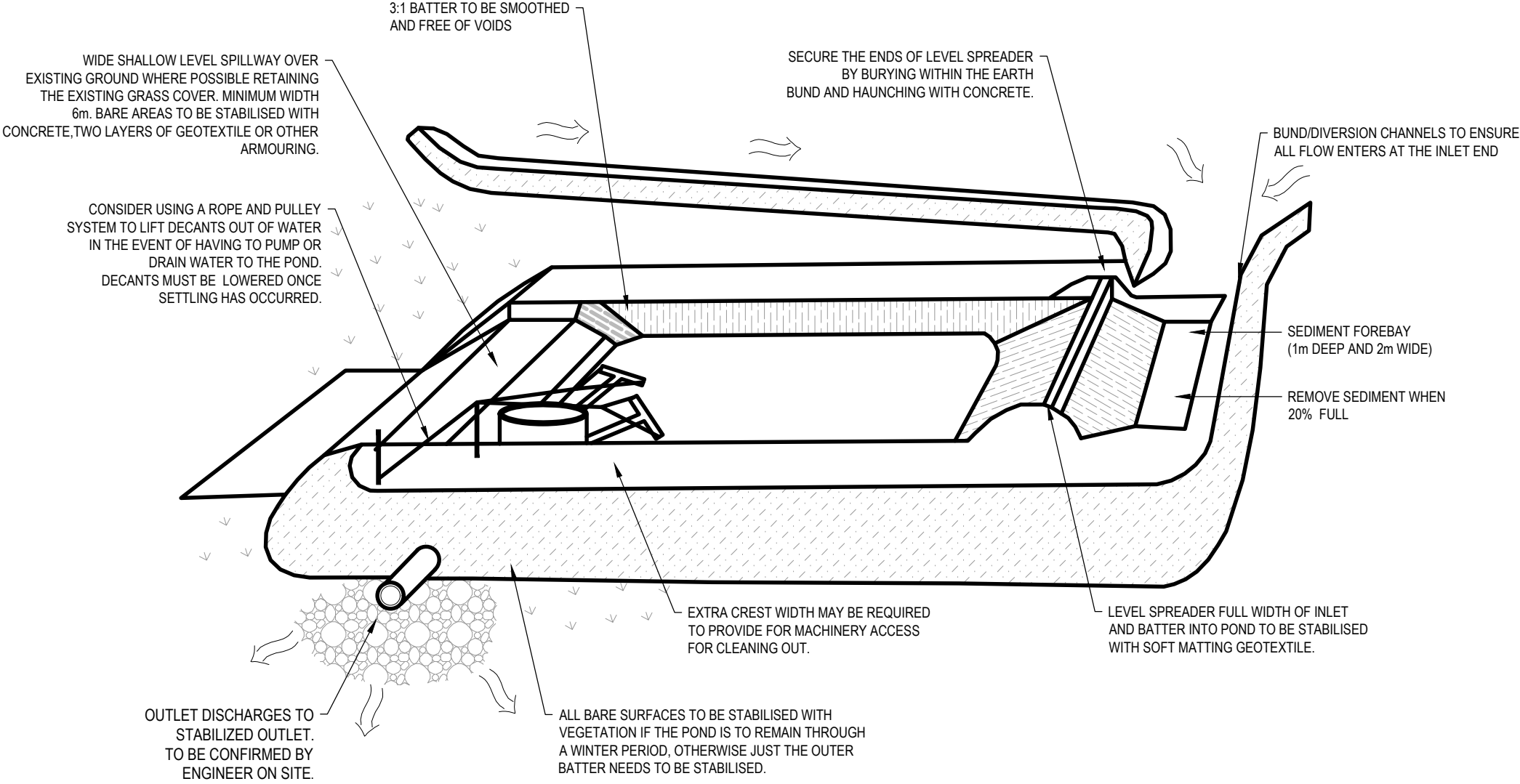
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5 Owens Road, Epsom
Auckland 1023

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

Title
PROPOSED SEDIMENT EROSION CONTROL DETAILS

Project no.	180010		
Scale	CUSTOM @ A3		
Cad file	180010-C235.DWG		
Drawing no.	C235-2	Rev	A

RESOURCE CONSENT



SEDIMENT POND DETAILS
(NTS)

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO DISTRICT COUNCIL/IAWAI STANDARD DETAILS AND THE WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION.
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Rev	Description	By	Date
		By	Date
Survey	--	--	--
Design	GD05/TP90	--	--
Drawn	GD05/TP90	--	--
Checked	RW		08/2026

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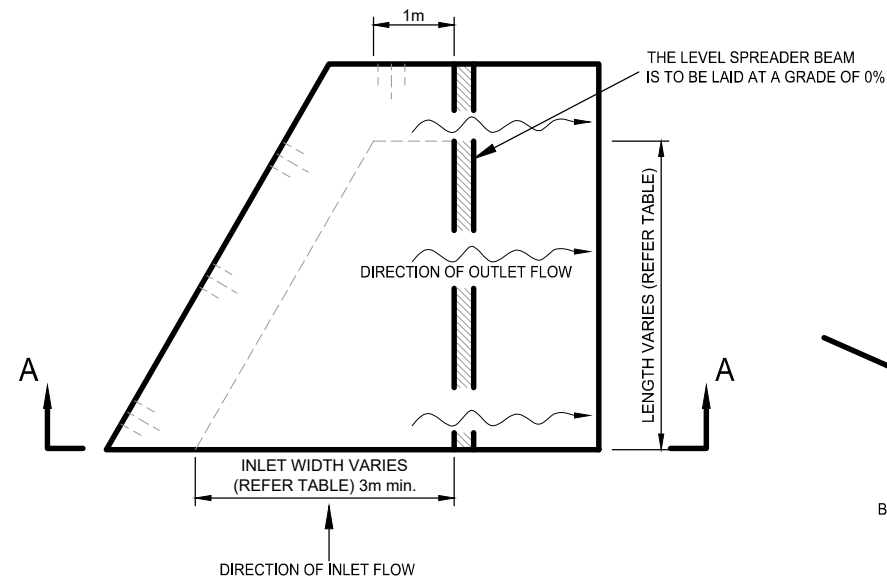
Auckland 1023

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

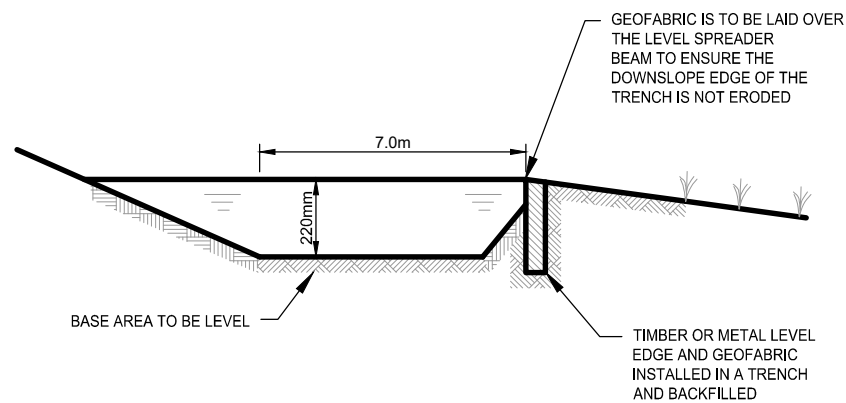
Title
PROPOSED SEDIMENT EROSION CONTROL DETAILS

Project no.	180010		
Scale	CUSTOM @ A3		
Cad file	180010-C235.DWG		
Drawing no.	C235-3	Rev	A

RESOURCE CONSENT

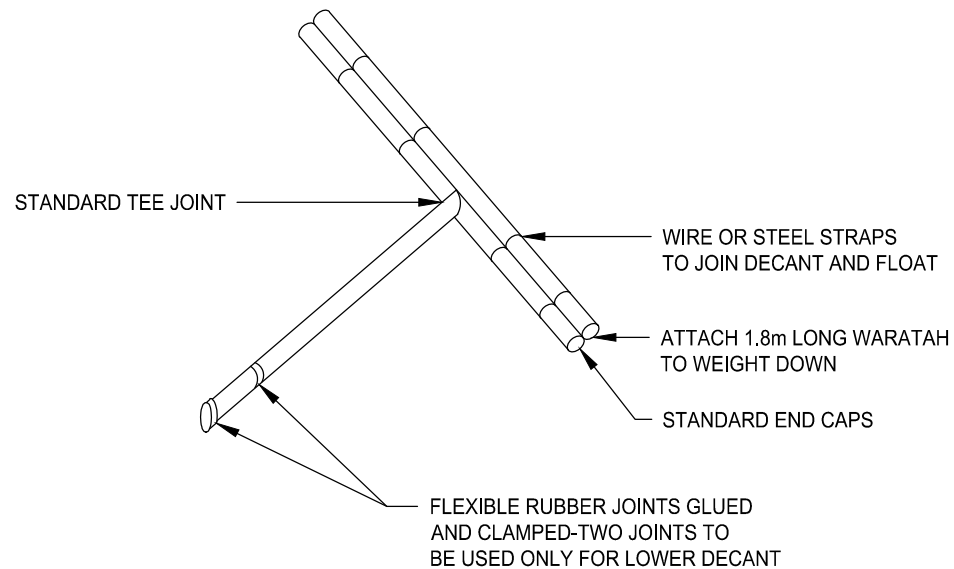
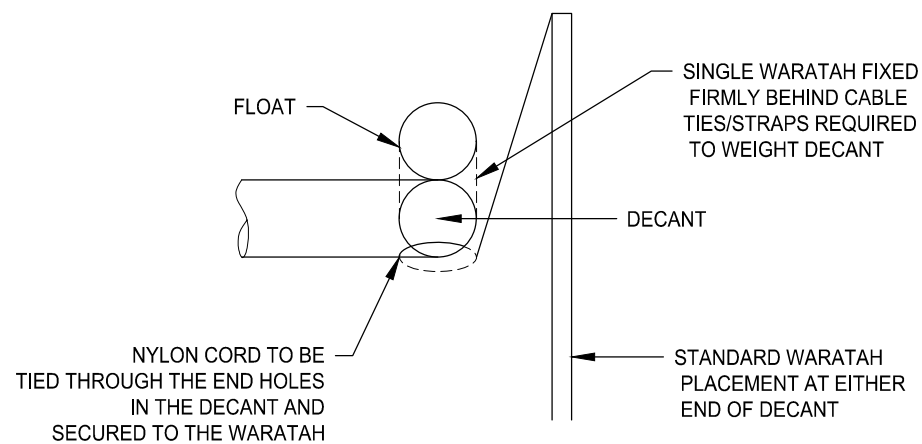


PLAN VIEW



SECTION A-A

LEVEL SPREADER DESIGN CRITERIA (20 YEAR STORM EVENT)				
DESIGN FLOW (m ³ /sec)	INLET WIDTH (m)	DEPTH (m)	END WIDTH (m)	LENGTH (mm)
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0.6-0.9	7	220	1	10



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Rev	Description	By	Date
		By	Date
Survey	--	--	--
Design	GD05/TP90	--	--
Drawn	GD05/TP90	--	--
Checked	RW	08/2026	

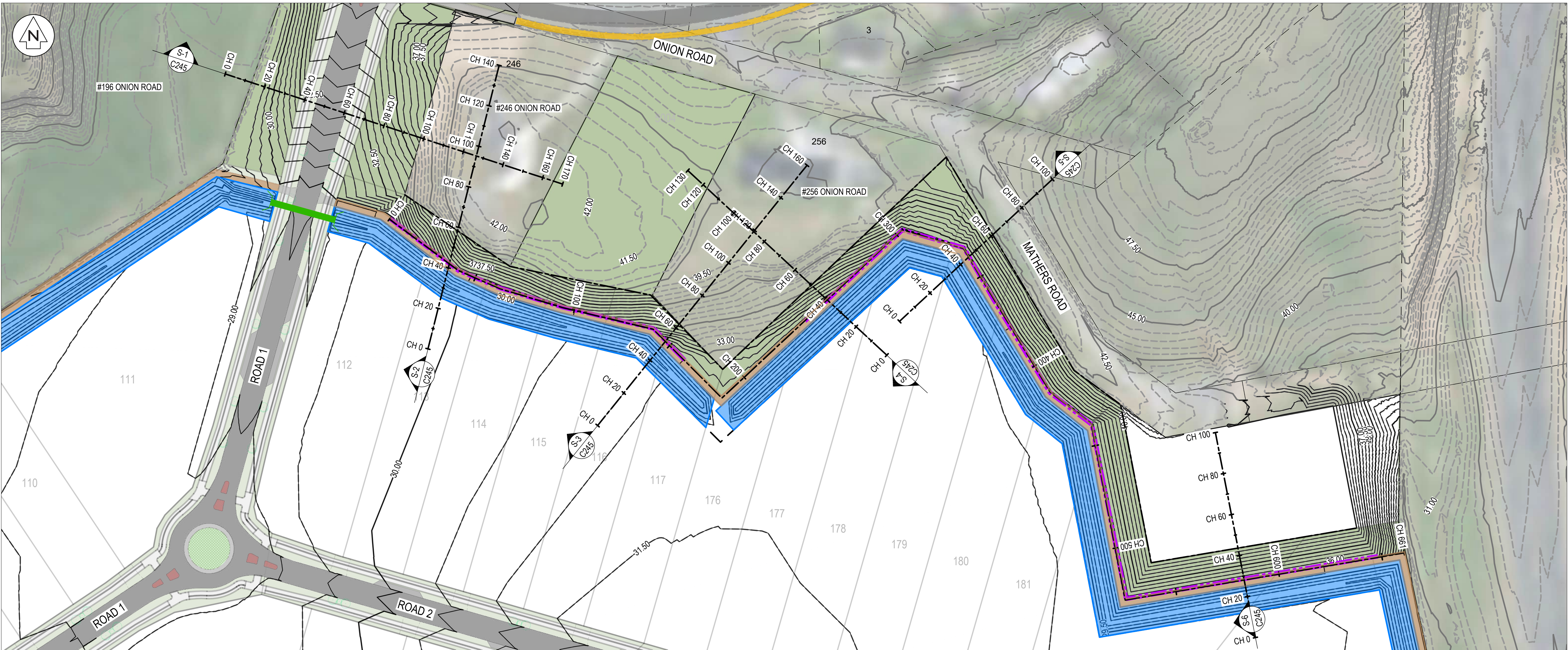
M **Maven Associates**
09 571 0050
info@maven.co.nz
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5 Owens Road, Epsom
Auckland 1023

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

Title
PROPOSED SEDIMENT EROSION CONTROL DETAILS

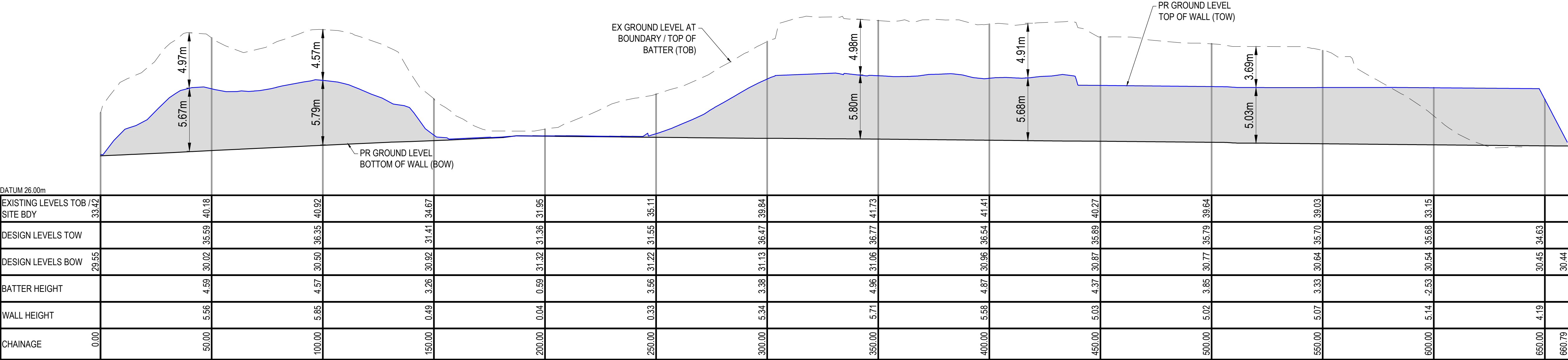
Project no.	180010		
Scale	CUSTOM @ A3		
Cad file	180010-C235.DWG		
Drawing no.	C235-4	Rev	A

RESOURCE CONSENT



RETAINING WALL PLAN VIEW
SCALE 1:1000 @ A1

- LEGEND
- EX GROUND LEVEL AT BOUNDARY / TOP OF BATTER (TOB)
 - PR GROUND LEVEL TOP OF WALL (TOW)
 - PR GROUND LEVEL BOTTOM OF WALL (BOW)
 - PR RETAINING WALL
 - PR CULVERT
 - PR 12.5m WIDE CONVEYANCE CHANNEL
 - PR 3.5m MAINTENANCE TRACK



RETAINING WALL LONGSECTION
SCALE: HORI 1:1000 VERT 1:200

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Project

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

Title

PROPOSED RETAINING WALL PLAN AND LONGSECTION

Project no.

180010

Scale

AS SHOWN @ A1

Cad file

180010-C240.DWG

Drawing no.

C240

Rev

A

By

MAVEN

Date

10/2025

Design

RW

Drawn

RW

Checked

RW

SP

08/2026

Revisions

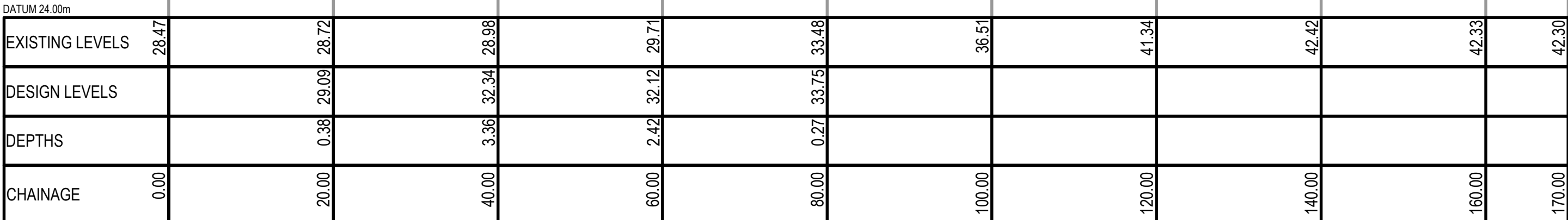
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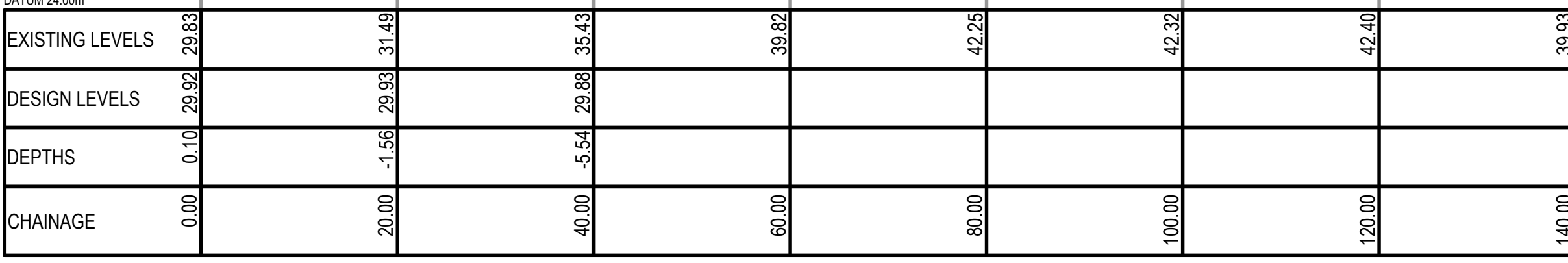
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RESOURCE CONSENT

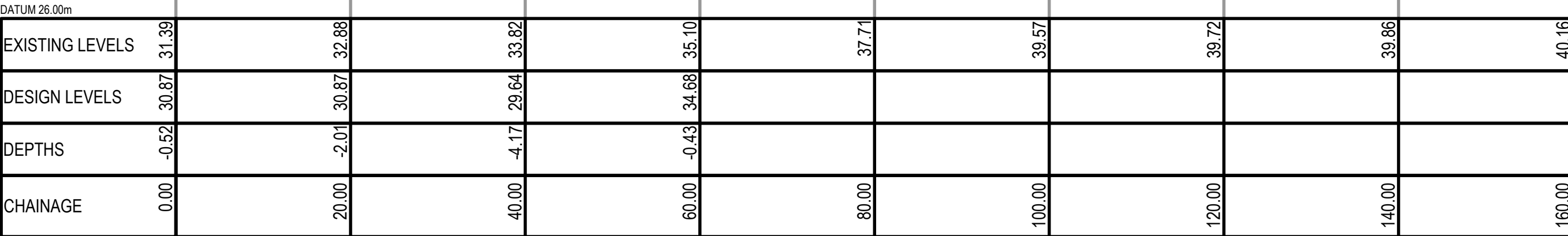
08/2026



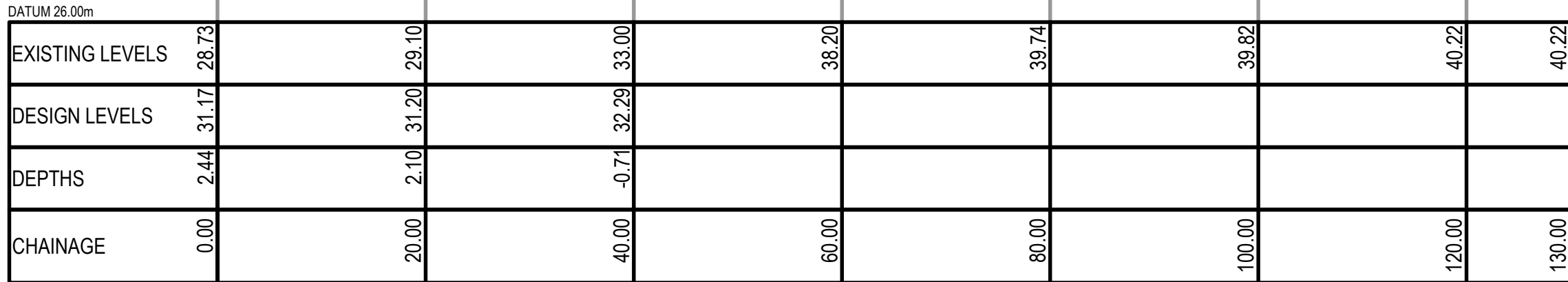
SECTION 1
SCALE: 1000 / 1000



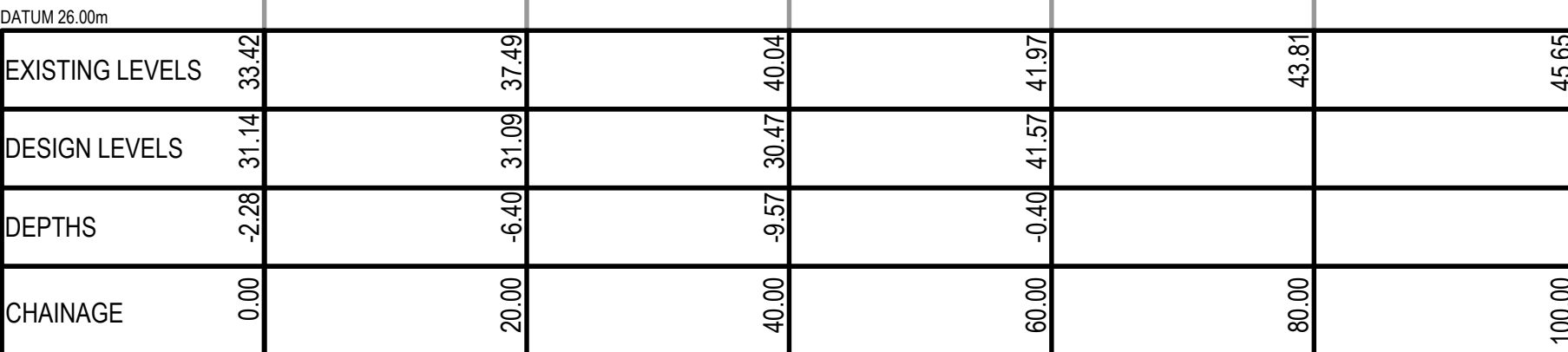
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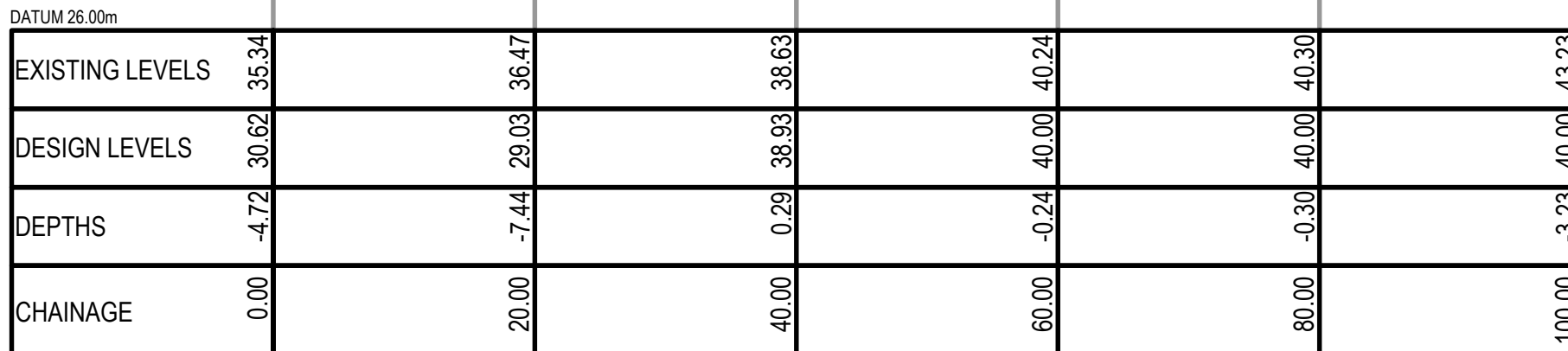
SECTION 3
SCALE: 1000 / 100



SECTION 4
SCALE: 1000 / 100



SECTION 5
SCALE: 1000 / 100



SECTION 6
SCALE: 1000 / 10

— — — — EX GROUND LEVEL
———— PR GROUND LEVEL

[illegible]

Appendix A.2



EX GAS PIPELINE EASEMENT

ONION ROAD

LOT 3
DP 523063

PART ALLOT
215 PSH
SA770/125
(LIMITED AS TO PARCELS)

LOT 2
DP 523063

LOT 1
DP 546273

SECTION 1
SO 473918

SECTION 2
SO 473918

SECTION 2
SO 577981
(LIMITED AS TO PARCELS)

SECTION 26
SO 417000

SECTION 1
SO 416124
(LIMITED AS TO PARCELS)

MANAHAKAKE DRIVE (SH10)

KOURA DRIVE (SH39)

RUFFELL ROAD

TE KOWHAI ROAD (SH39)

RESOURCE CONSENT

- NOTES
- COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
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- LEGEND
- EX SITE BOUNDARY
 - EX BDY
 - EX MAJOR CONTOUR
 - EX MINOR CONTOUR
 - EX CULVERT

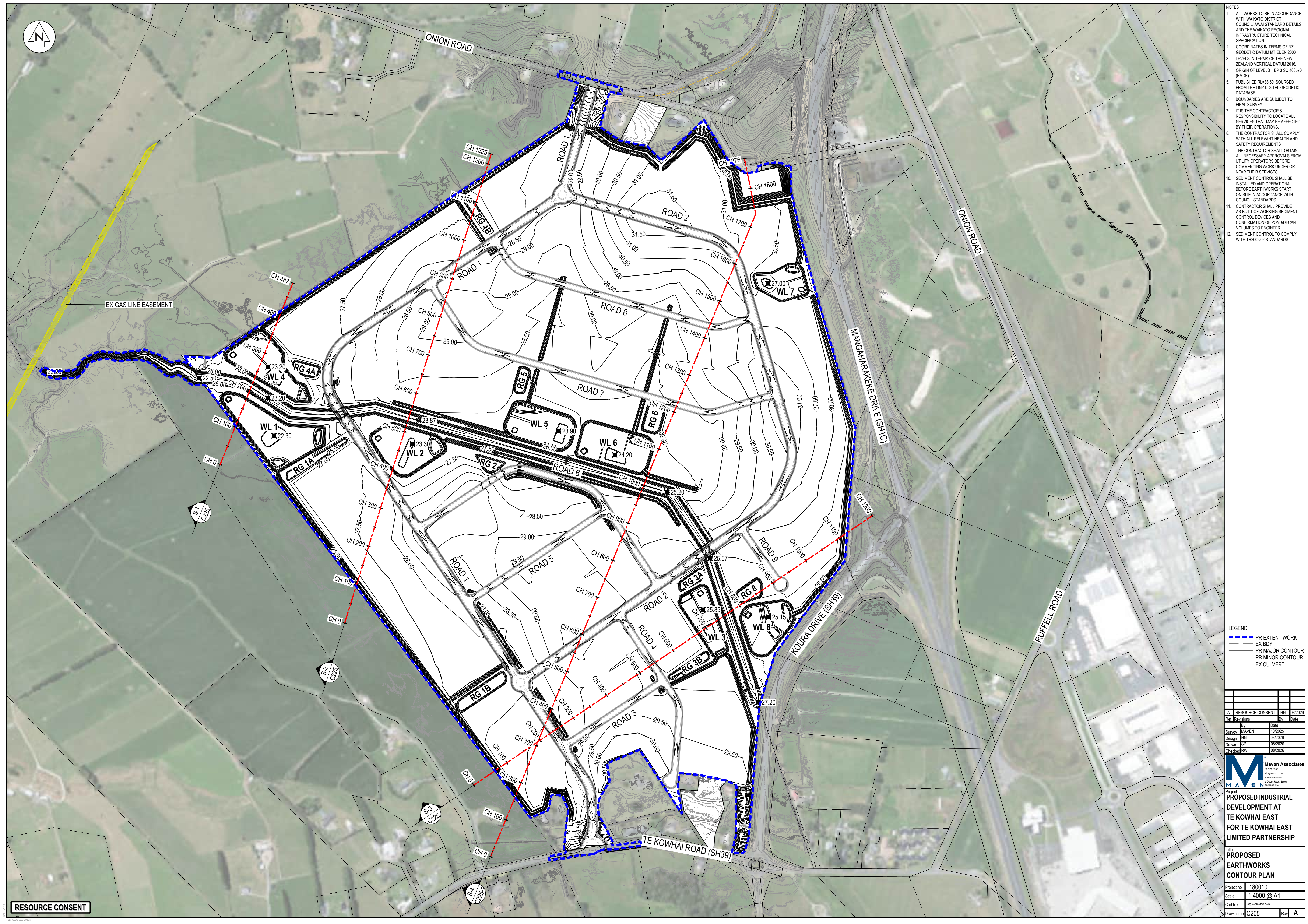
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Rev	Revisions	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	HN	08/2026	
Drawn	SP	08/2026	
Checked	RW	08/2026	



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

Title
EXISTING TOPOGRAPHICAL SURVEY PLAN

Project no 180010
Scale 1:4000 @ A1
Cad file 180010-C200-00A-0000
Drawing no C200 Rev A



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO DISTRICT COUNCIL/MAVIA STANDARD DETAILS AND THE WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION.
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 12. SEDIMENT CONTROL TO COMPLY WITH TR200902 STANDARDS.

- LEGEND
- PR EXTENT WORK
 - EX BDY
 - PR MAJOR CONTOUR
 - PR MINOR CONTOUR
 - EX CULVERT

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



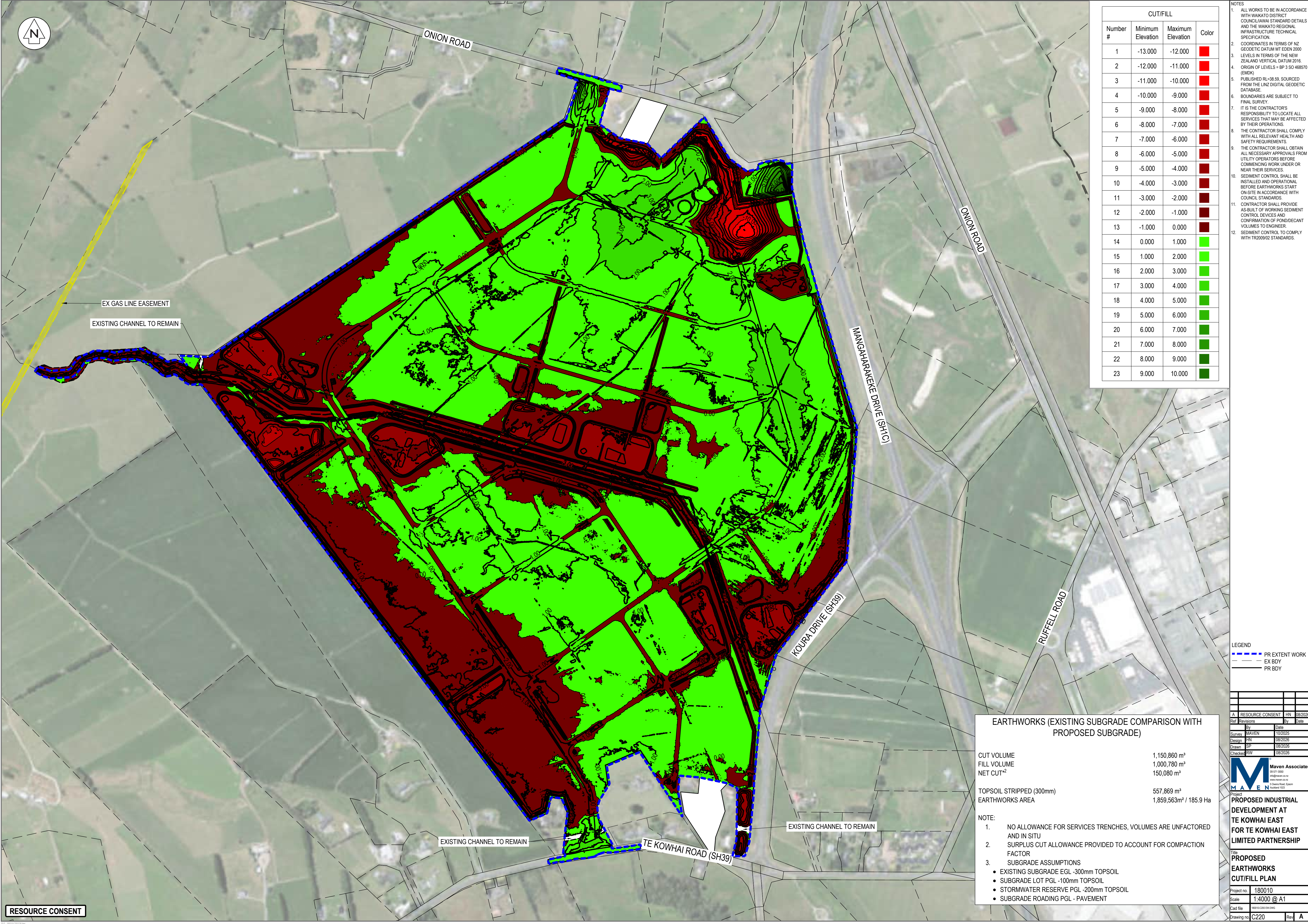
Maven Associates
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Auckland 1020

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

Title
PROPOSED EARTHWORKS CONTOUR PLAN

Project no	180010
Scale	1:4000 @ A1
Cad file	180010-C205 (18-09-2025)
Drawing no	C205
Rev	A

RESOURCE CONSENT



CUT/FILL			
Number	Minimum Elevation	Maximum Elevation	Color
1	-13.000	-12.000	Red
2	-12.000	-11.000	Red
3	-11.000	-10.000	Red
4	-10.000	-9.000	Red
5	-9.000	-8.000	Red
6	-8.000	-7.000	Red
7	-7.000	-6.000	Red
8	-6.000	-5.000	Red
9	-5.000	-4.000	Red
10	-4.000	-3.000	Red
11	-3.000	-2.000	Red
12	-2.000	-1.000	Red
13	-1.000	0.000	Red
14	0.000	1.000	Green
15	1.000	2.000	Green
16	2.000	3.000	Green
17	3.000	4.000	Green
18	4.000	5.000	Green
19	5.000	6.000	Green
20	6.000	7.000	Green
21	7.000	8.000	Green
22	8.000	9.000	Green
23	9.000	10.000	Green

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- LEGEND
- PR EXTENT WORK
 - EX BDY
 - PR BDY

Rev	Revisions	By	Date
A	RESOURCE CONSENT	HN	08/2026



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

Title
PROPOSED EARTHWORKS CUT/FILL PLAN

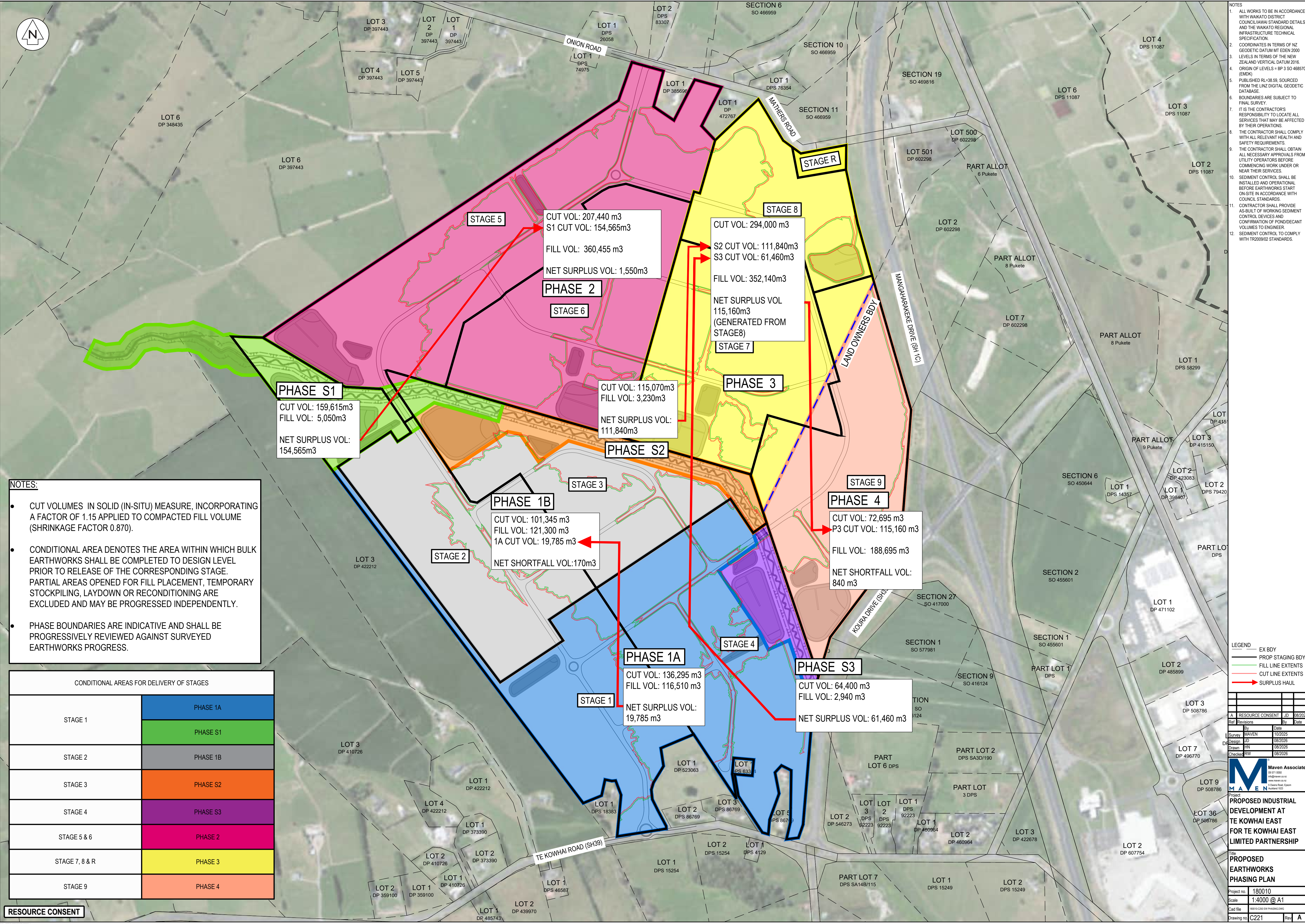
Project no	180010
Scale	1:4000 @ A1
Cad file	180010-0200-000-0000
Drawing no	C220
Rev	A

EARTHWORKS (EXISTING SUBGRADE COMPARISON WITH PROPOSED SUBGRADE)

CUT VOLUME	1,150,860 m³
FILL VOLUME	1,000,780 m³
NET CUT*2	150,080 m³

TOPSOIL STRIPPED (300mm)	557,869 m³
EARTHWORKS AREA	1,859,563m² / 185.9 Ha

- NOTE:
- NO ALLOWANCE FOR SERVICES TRENCHES, VOLUMES ARE UNFACTORED AND IN SITU
 - SURPLUS CUT ALLOWANCE PROVIDED TO ACCOUNT FOR COMPACTION FACTOR
 - SUBGRADE ASSUMPTIONS
 - EXISTING SUBGRADE EGL - 300mm TOPSOIL
 - SUBGRADE LOT PGL - 100mm TOPSOIL
 - STORMWATER RESERVE PGL - 200mm TOPSOIL
 - SUBGRADE ROADING PGL - PAVEMENT



- NOTES:**
- CUT VOLUMES IN SOLID (IN-SITU) MEASURE, INCORPORATING A FACTOR OF 1.15 APPLIED TO COMPACTED FILL VOLUME (SHRINKAGE FACTOR 0.870).
 - CONDITIONAL AREA DENOTES THE AREA WITHIN WHICH BULK EARTHWORKS SHALL BE COMPLETED TO DESIGN LEVEL PRIOR TO RELEASE OF THE CORRESPONDING STAGE. PARTIAL AREAS OPENED FOR FILL PLACEMENT, TEMPORARY STOCKPILING, LAYDOWN OR RECONDITIONING ARE EXCLUDED AND MAY BE PROGRESSED INDEPENDENTLY.
 - PHASE BOUNDARIES ARE INDICATIVE AND SHALL BE PROGRESSIVELY REVIEWED AGAINST SURVEYED EARTHWORKS PROGRESS.

CONDITIONAL AREAS FOR DELIVERY OF STAGES	
STAGE 1	PHASE 1A
	PHASE S1
STAGE 2	PHASE 1B
STAGE 3	PHASE S2
STAGE 4	PHASE S3
STAGE 5 & 6	PHASE 2
STAGE 7, 8 & R	PHASE 3
STAGE 9	PHASE 4

RESOURCE CONSENT

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- LEGEND**
- EX BDY
 - PROP STAGING BDYS
 - FILL LINE EXTENTS
 - CUT LINE EXTENTS
 - SURPLUS HAUL

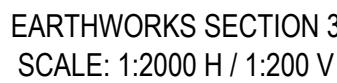
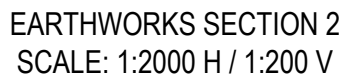
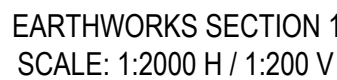
Rev	Revisions	By	Date
A	RESOURCE CONSENT	JD	08/2026
1	Survey	MAVEN	10/2025
2	Design	JD	08/2026
3	Drawn	RN	08/2026
4	Checked	RW	08/2026

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06 571 0500
maven@maaven.co.nz
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3 Chalmers Road, Epsom
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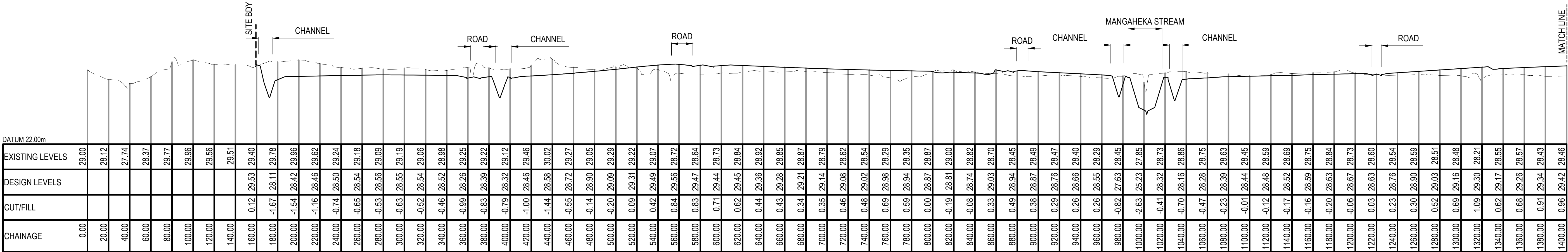
Project
PROPOSED INDUSTRIAL DEVELOPMENT AT TE KOWHAI EAST FOR TE KOWHAI EAST LIMITED PARTNERSHIP

Title
PROPOSED EARTHWORKS PHASING PLAN

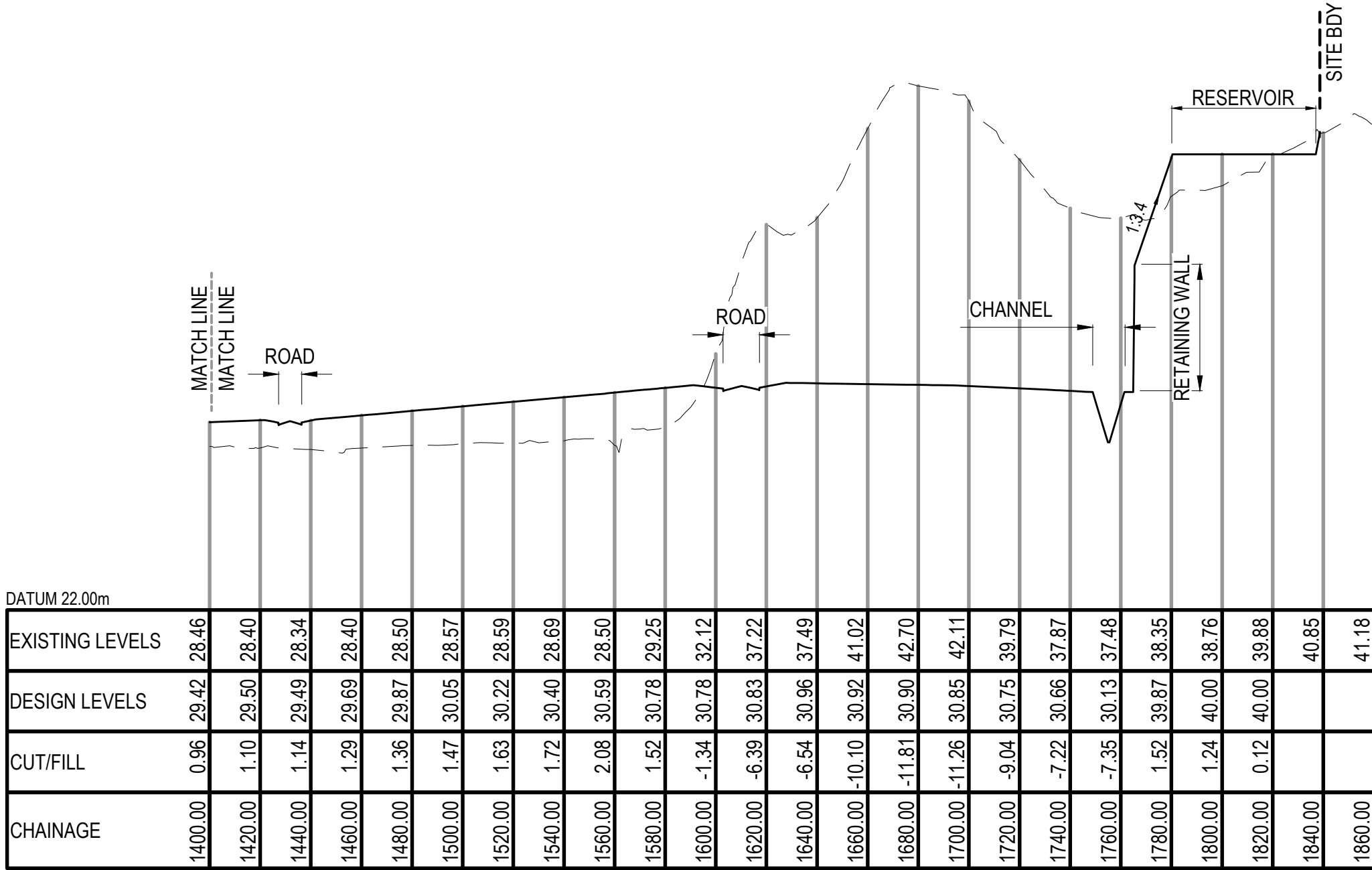
Project no	180010
Scale	1:4000 @ A1
Cad file	180010-C221-EWP PHASING.DWG
Drawing no	C221
Rev	A



Project no.	180010		
Scale	AS SHOWN @ A1		
Cad file	180010-C220 EW.DWG		
Drawing no	C225	Rev	A



EARTHWORKS SECTION 4
SCALE: 1:2000 H / 1:200 V



EARTHWORKS SECTION 4
SCALE: 1:2000 H / 1:200 V

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO DISTRICT COUNCIL/AIAWAJ STANDARD DETAILS AND THE WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATION.
 2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000
 3. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 4. ORIGIN OF LEVELS = BP 3 SO 468570 (EMDK)
 5. PUBLISHED RL=38.59, SOURCED FROM THE LINZ DIGITAL GEODETIC DATABASE.
 6. BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
 7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
 8. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT HEALTH AND SAFETY REQUIREMENTS.
 9. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVALS FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.
 10. SEDIMENT CONTROL SHALL BE INSTALLED AND OPERATIONAL BEFORE EARTHWORKS START ON SITE IN ACCORDANCE WITH COUNCIL STANDARDS.
 11. CONTRACTOR SHALL PROVIDE AS-BUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECANT VOLUMES TO ENGINEER.
 12. SEDIMENT CONTROL TO COMPLY WITH TR2009/02 STANDARDS.

LEGEND

--- EX GROUND LEVEL

--- PR GROUND LEVEL

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



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

Title
PROPOSED SITE EARTHWORKS SECTIONS

Project no.	180010
Scale	AS SHOWN @ A1
Cad file	180010-C225-1.dwg
Drawing no.	C225-1
Rev	A