



Infrastructure Assessment Report

Prepared for
Auckland Shooting Club Incorporated
287 Tuhirangi Road,
Makarau, Auckland

Prepared by
Terra Group NZ Ltd.
May 2023

PROJECT MANAGEMENT: RESOURCE MANAGEMENT: CIVIL & ENVIRONMENTAL ENGINEERING

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1 INTRODUCTION

Terra Consultants have been engaged by Auckland Shooting Club Incorporated to prepare an infrastructure assessment on the suitability of existing and proposed services to accommodate development at their property identified as 287 Tuhirangi Road. The report is required to accompany an application for resource consent to use the property as a shooting range.

2 SCOPE OF ASSESSMENT

2.1 SCOPE OF WORK

As part of the assessment, the following were carried out:

- A review of the existing topography and the proposed development plan
- Site walk over inspection by engineer to identify any key features that may influence the development and design
- Calculations of anticipated volumes of Stormwater
- Liaison with external Geotechnical & Ecology Consultants

2.2 ASSESSMENT CRITERIA

This report addresses the following items:

Earthworks

Calculation of earthwork volumes and draft management plans for erosion and sediment control

Accessway and Carparking

Design access route and parking areas to approved standards

Stormwater

Calculation of the expected flows from development and propose measures to manage the flows from the site.

Stormwater management of existing and proposed impervious areas.

Flood and Overland Flow

Identify existing flood risk areas and overland flows

Assessment of development areas in relation to flooding

Utilities

Assessment of Utility supply (power and telecom) to service the development

3 SITE DESCRIPTION

The subject site, is legally identified as Lot 2 DP 365701 or 287 Tuhirangi Road, approximately 1-hour drive north west from Auckland’s CBD, 10 minutes’ drive to the south of the property is the small settlement of Kaukapakapa. The majority of the site is covered by grass or scrub, however there are several clusters of regenerating species spread across the property and dense bands of bush and trees are located along the northern and western aspects of the site. The site has an area of approximately 37.9ha with well-defined intermittent stream onsite running from west to east, with small man-made dams.

Vehicle access to the Site is via Tuhirangi Road – a typically quiet 3-kilometre-long rural road of formed, but unsealed, aggregate.

No dwellings have been constructed on the site, however an existing structure containing a staff/club room and double garage has been constructed and is currently used as an accessory building.

The site is currently not serviced in terms of stormwater, wastewater, water, telecom, and power.



Figure 1 – Locality Plan

4 DEVELOPMENT PROPOSAL

The applicant's proposal is to:

Establish an outdoor shooting range complex (Auckland Shooting Club) at 287 Tuhirangi Road, Kakanui.

Existing activities for which retrospective consent is applied for under this application include:

- Four active shooting bays;
- Two parking areas;
- Ancillary structures to support the proposed shooting range:
 - o Administrative office,
 - o Maintenance building,
 - o Two port-a-loos, and
 - o Two rainwater tanks of 25,000m³;
- Vehicle accessway and four (04) culverts from Tuhirangi Road to the centre of the site;
- Earthwork to construct shooting bays and a retaining wall and ballistic fence on the retaining wall of maximum 2m in height to separate shooting bay 01 and the ancillary structures;

Proposed works under this resource consent application include:

- No changes to shooting bays 1-4;
- Existing shooting bay 5 to be abandoned, revegetated and replaced by a new shooting bay;
- Parking area 1 to be abandoned and vegetated;
- Parking area 2 to remain and 15 parking spaces to be provided;
- Earthwork and sediment control to support the construction of shooting bay 5;
- Earthwork and sediment control to develop one (01) passing bay and one (01) road widening area;
- Stormwater infrastructure to convey, treat and discharge stormwater runoff:
 - o An approximately 100m vegetated swale to treat storm water from car parking, ancillary structure area, driveway and discharge through two (02) new culverts and stone riprap structure to a stream;
 - o A system of five contamination treatment and monitoring devices to collect and treat stormwater runoff from shooting bays before discharge to vegetated swale.

5 PROPOSED EARTHWORKS

5.1 EARTHWORK AREAS AND VOLUMES

The proposed areas of earthworks have been defined to within the activity zone.

The proposed earthworks will be required to establish 1 x shooting bay (shooting bay no. 5), roading passing bays and widening. Construction of stormwater treatment swales and 1 x outfall. Reinstatement of carparking and accessway for re-vegetation works.

The development will result in total earthworks being carried out over an area of approximately 2736m². The bulk of the earthworks will be for the construction of shooting bay no. 5 and the swale approx. area of 1050m². The remainder of the earthworks will relate to the accessway improvements, topsoil and revegetation of a portion of parking and roading, approximately 1686m².

The volumes of material associated with these items will total 280m³ cut and 570m³ fill for the shooting bay construction with the balance 408m³ of fill materials shall be sourced from the subject site or imported if required.

Additional material in the form of roading aggregate and topsoil will be brought onto site for the driveway improvements and revegetation of the parking and road areas. It is expected that the project will last approximately 6 weeks for the civil construction phase of the works.

Sediment controls will be put in place prior to earthworks in accordance with Council's requirements. A sediment and erosion control plan RC300 is contained in Appendix 2.

6 EXISTING ACCESS AND CARPARK ASSESSMENT

The existing condition of the vehicle crossing and private accessway has been reviewed as part of the site investigation. To increase the safety level for internal traffic movements, an additional passing bay and various driveway widening has been proposed. The existing access way will be maintained and upgraded where required, the entrance to the property has been formed to council standards and a security gate and signage is currently in use.

The existing access way will be maintained/formed minimum 3.0m carriageway in all areas and one new passing bays will be constructed to improve traffic situation. It is expected that 15 car parking spaces will be formed onsite including 1 disability park and bike racks, this is to accommodate the club members and visitors based on the current demand. As part of this application a separated traffic memorandum has been provided by Terra Consultants, Transportation Engineer.



Figure 2 - 287 Tuhirangi Road Entrance

7 WASTEWATER ASSESSMENT

No onsite wastewater treatment and disposal is existing onsite, and no septic system is proposed. There are two portaloos onsite and the portaloos will remain in place. The portaloos meet the requirements of the gun club. The portaloos toilets are maintained and serviced on a weekly basis to ensure hygiene and sanitation standards are met.



Figure 3 – Onsite portaloos

8 STORMWATER ASSESSMENT

8.1 EXISTING AND PROPOSED

As described in Section 4 – the existing and proposed activities include a small percentage of the site developed into active shooting bays, vehicle accessway, carparking areas and structures for office and storage buildings. Most of the site is undeveloped farmland with natural watercourses and some culverts and drainage for farm tracks. There is an existing stream located within the site, south of the proposed development area.

8.2 STORMWATER QUALITY

Contaminants generally associated with development of this nature and associated access comprise gross pollutants, suspended solids, heavy metals and smaller amounts of hydrocarbons and bacteria. Suspended solids can arise from a number of processes including erosion of exposed surfaces, hydrocarbons from vehicle fuels and airborne dust. Metal contaminants are associated with the wearing of vehicle components such as brake linings, tyres and bearings.

The stormwater contaminant load derived from this development is considered to be low, and contaminants in the stormwater will be treated via the vegetated swales and 'up-flo' filter devices before discharging downstream.

It is proposed to construct a vegetated swale to capture the stormwater runoff from the existing and proposed carparks and accessway areas identified in the Terra Consultants Engineering Plans. The swale will control the stormwater from the impervious catchments and convey the stormwater to a newly constructed outlet structure. The roadside swale drain will provide benefits including:

- A reduction of a range of stormwater contaminants through sedimentation, physical filtration and biofiltration.
- Some reduction in peak flow rates using check dams.
- Recharge of groundwater.

The swale is designed to treat the 75% surface flow water as required in GD01. The design calculations and location of the swale is shown in the Terra Plan RC 400 and 411.

Stormwater runoff from the shooting bays will be directed to 'up flo' filter systems. These systems will capture the first flush and discharge to the roadside swales and culvert prior to the receiving environment.

The shooting bays will comprise of a mixture of compacted natural ground or gravel. The side walls will be grassed earth bunds for stabilisation.

Further detail has been provided in the ENGEO, Environmental Management Plan and Wild Ecology, Ecological Report.

8.3 CHANNEL PROTECTION

Existing stream channels will be protected since erosion flow from the extended detention volume will be treated and detained within the proposed vegetated swales. Appropriate erosion/scour protection measures will also be provided at the discharge outlet structure.

8.4 EARTHWORKS

All installation works for the proposed stormwater system including any minor earthworks and trenching will be undertaken in accordance with relevant Auckland Council requirements for erosion prevention and sediment control.

8.5 ADDITIONAL TREATMENT

As the effects on the water quality for this type of activity vary in relation to the amount of heavy metals and lead are unknown at the resource consent stage, storm water quality will be tested prior to commencement of any shooting. The results of this test will be used as a baseline to monitor water quality, any deuteriation on the quality will then be used as a trigger to implement further research to manage this quality.

Initial concepts include adding lime to stabilise any lead value increase or installing a filter device to the out-let.

8.6 CARPARK AND ACCESSWAY

15 carparking spaces are proposed onsite, the areas will be formed and gravelled to allow for appropriate manoeuvring, vegetated swale drains will be constructed to capture and treat run off from these areas.

8.7 SHOOTING RANGE

One additional shooting range is proposed adjacent to the four existing shooting bays, this new range is designed to best fit into the contours onsite while also meeting the requirements of both safety and competition shooting.

The base of the existing and proposed ranges are constructed with 150mm GAP65 or brown rock on compacted clay for competitor movements and associated club maintenance of the ranges, it is expected grass will revegetate this gravel area to reduce and movement of sediments. The base of the range has a 1% slope toward the front of the range and directed to a treatment device before discharging to the vegetated grassed swales and piped outlet. Each shooting bay will be connected to an 'up-flo' filter device size appropriately for the catchment area.

These will be designed to meet current stormwater regulations by targeting a wide range of pollutants including fine sediment, nutrients, bacteria, metals, oils and grease, and organics.

Compacted clay embankments will form perimeter berms for bullet catchment and acoustic protection, these berms will be hydro seeded to stabilised. Hydro seeded grass

will be used on the range berms to give stability and help blend the range into the environment. The grass has been used with good success on the 4 existing ranges.



Figure 4 – Existing Shooting Bay



Figure 5 – Existing shooting bay

8.8 STORMWATER SUMMARY

It is proposed to construct a vegetated swale to capture the stormwater runoff from the existing and proposed carparks and accessway areas. The swale will control the stormwater from the impervious catchments and convey the stormwater to a newly constructed outlet structure. The outlet will be constructed as green outfall standard, including erosion/scour protection measures.

The runoff from the existing and proposed shooting ranges is to be treated by 'up-flu' treatment device before discharge to vegetated swale and piped culvert.

9 WATER & FIREFIGHTING SUPPLY ASSESSMENT

No reticulated water supply is available for this site, all water will be supplied via rainwater harvesting from the existing cabin & toilet block onsite.

The water tanks have been sized as two 25m³ and located to comply with all requirements for onsite firefighting supply.

10 FLOOD ASSESSMENT

Based on the Wild Ecology, Ecological Assessment Report there are two permanent streams, various intermittent streams and overland flow paths located within the subject site. The locations of these have been accurately surveyed and shown on the engineering plans with an overall summary in the Wild Ecology report shown in figure 6 below. P1 (Kotipuu Stream) is closest to development area south of the shooting bays.

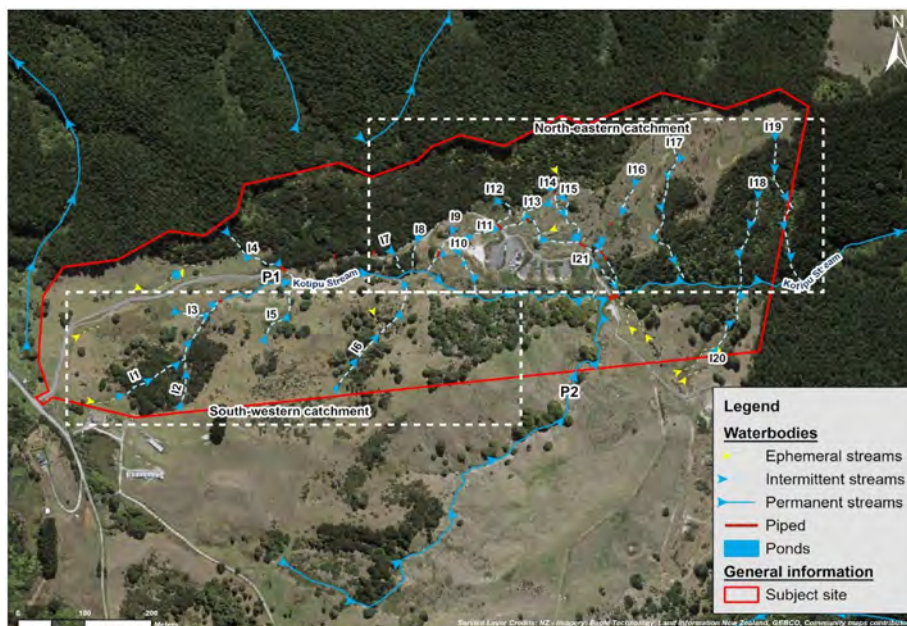


Figure 6 – Stream classification within the subject site boundaries.

The ground levels of the existing and proposed shooting bay range from R.L. 75.0 m to R.L. 69.0 m. The P1 (Kotipu Stream) top of bank level ranges from R.L. 66.0 m to R.L. 60.0 m, therefore the shooting range levels are 9.0 m higher than the Kotipu Stream top of bank.

The construction area for the proposed shooting bay 5 has been design and offset 20m from the stream top of bank. The survey contour levels are shown on figure 7 and the cross-section in relation to the stream shown on figure 8 & 9.

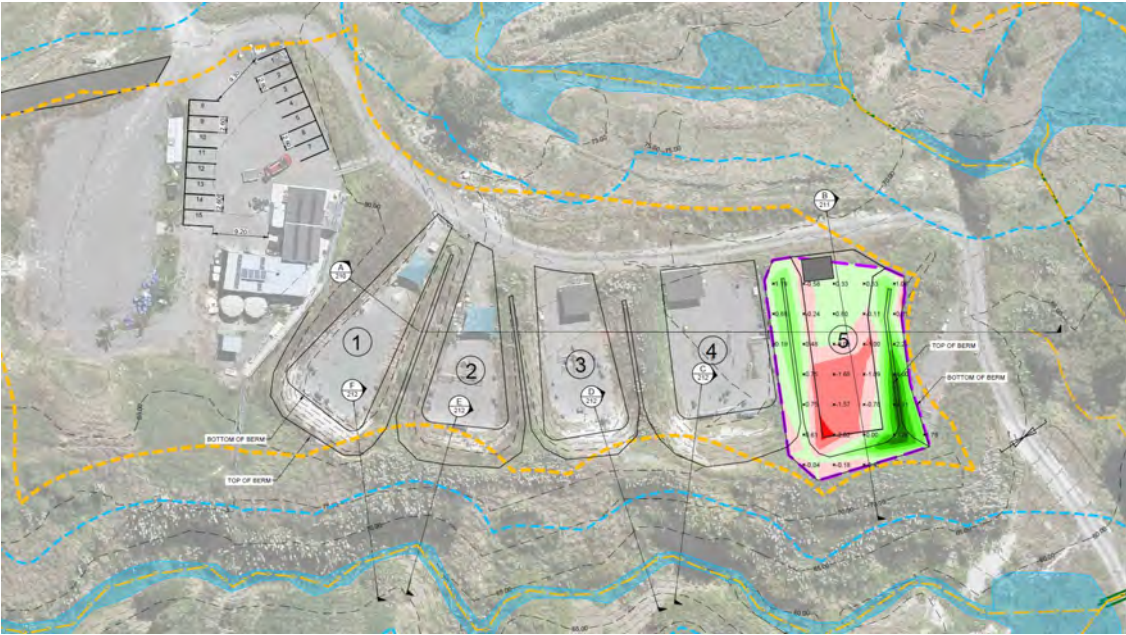


Figure 7 – Plan of development area in relation to the Kotipu stream.

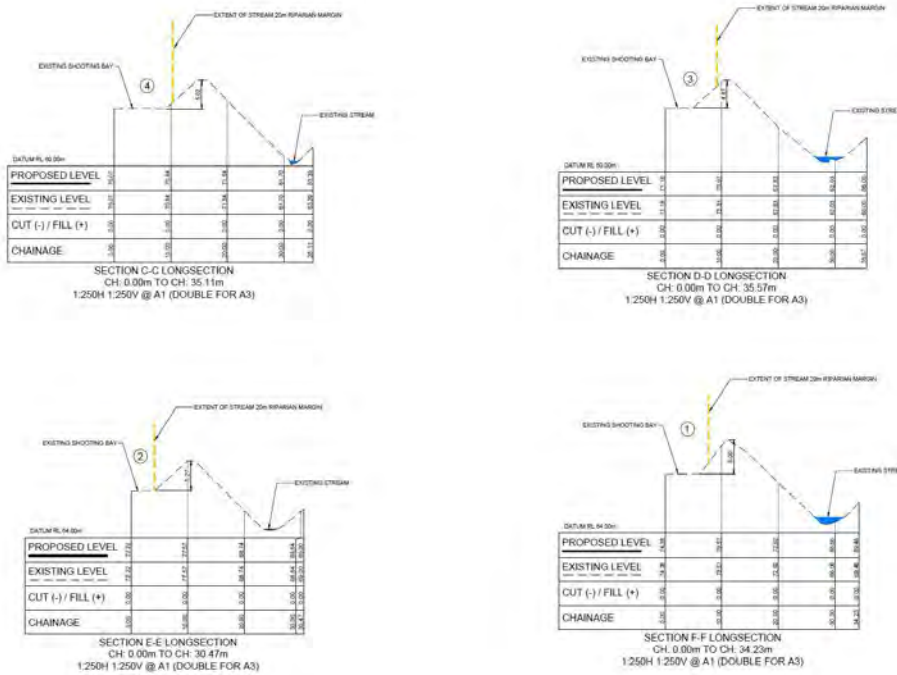


Figure 8 – Cross-sections through existing shooting bays in relation to the Kotipuu stream.

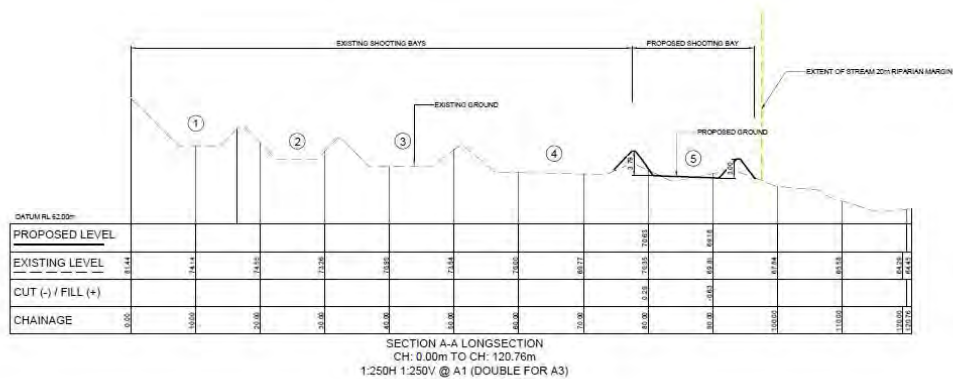


Figure 9 – Cross-sections through existing and proposed shooting bays.

In summary the Kotipuu stream is the nearest flood risk to the development which is south of the shooting ranges. The surveyed cross-sections show the levels from the shooting bays to the top of bank have been calculated to be 9.0 m above stream top of bank. This flood risk assessment confirms the location and levels of the existing and proposed areas will be adversely affected by the 100-year flood level along the Kotipuu stream.

11 POWER AND TELECOMMUNICATIONS

No service connections are proposed for the site. Power for the onsite services are proposed to be provided via solar panels and batteries. Telecommunications will be provided by portable mobile telephones.

There is reasonable service coverage from both telecommunication networks in this area.

12 CONCLUSION

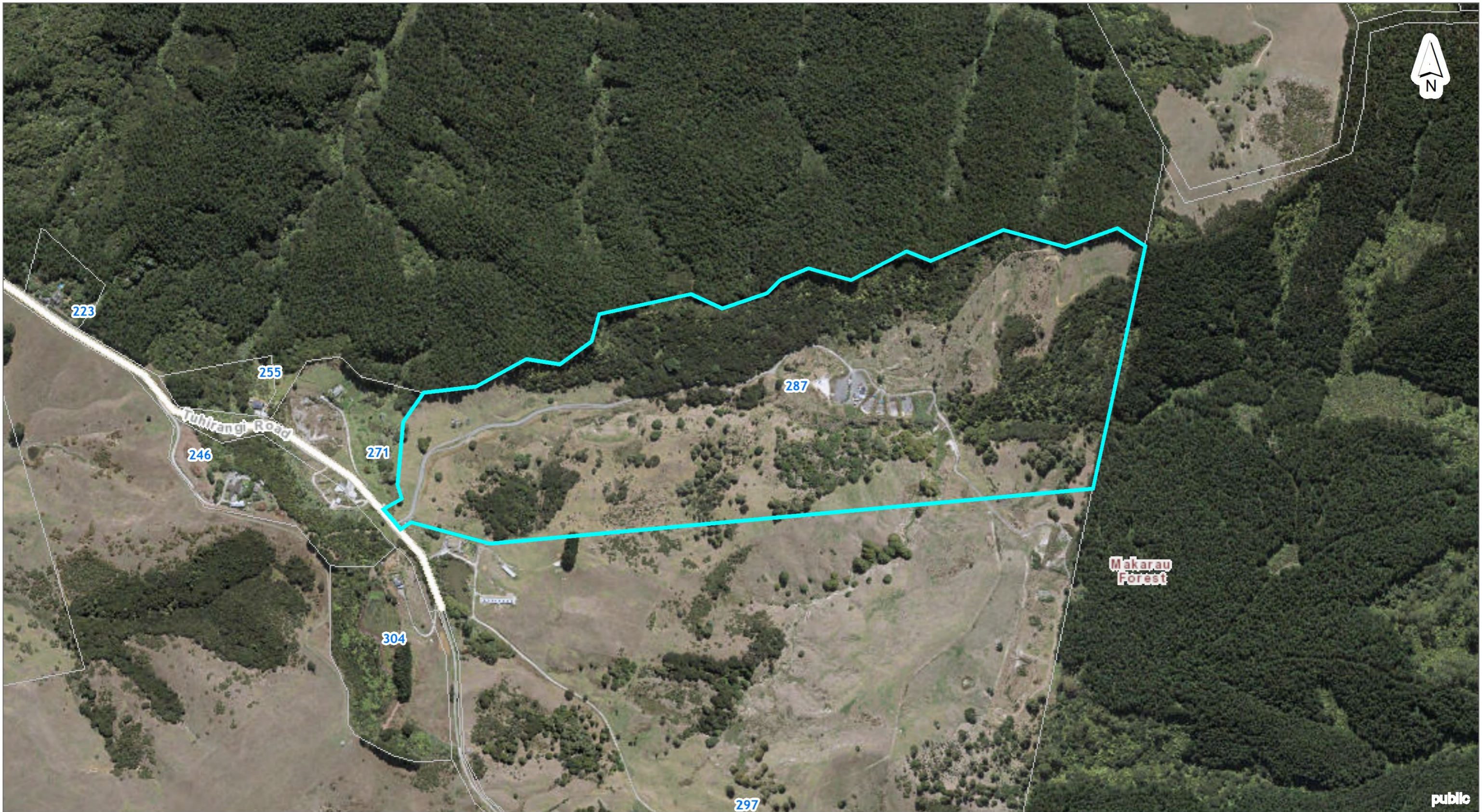
The Property at 287 Tuhirangi Road is proposing to establish an outdoor shooting range complex (Auckland Shooting Club).

The proposal for earthworks has been defined to the construction of 1 x shooting bay, road widening and parking bays, upgrading of swales for treatment and a stormwater outlet. The earthworks volumes have been calculated and erosion and sediment control measures have been proposed to manage the site in accordance with Auckland Council GD2016/005 guidelines during construction with Stormwater management to be employed to operate post construction.

Stormwater management systems consisting of vegetated swales and 'up-flo' filter devices for both managing water flow and treatment of contaminants will be implemented in the development. Vegetated swales will capture the stormwater runoff from the existing and proposed carparks and accessway areas to a controlled outlet. Up-flo filter will be constructed to manage the treatment of shooting bays. These are to be designed in accordance with the Auckland Council Stormwater Code of Practice (SWCoP).

As the site isn't easily connected to utility supplies therefore Telecom, Power, Stormwater and Wastewater will all be supplied or managed onsite.

Appendix 1 GIS PLAN



public

DISCLAIMER:
This map/plan is illustrative only and all information should be independently verified on site before taking any action.
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287 Tuhirangi Road



Scale @ A4
= 1:8,000

Date Printed:
11/05/2023



Appendix 2 TERRA CONSULTANTS ENGINEERING PLANS

287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

CLIENT: AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT No. 230400

ENGINEERING PLANS FOR
RESOURCE CONSENT
REVISION A

MAY 2023



LOCALITY PLAN
N.T.S

**287 TUHIRANGI ROAD,
MAKARAU, AUCKLAND**

CLIENT: AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT No. 230400

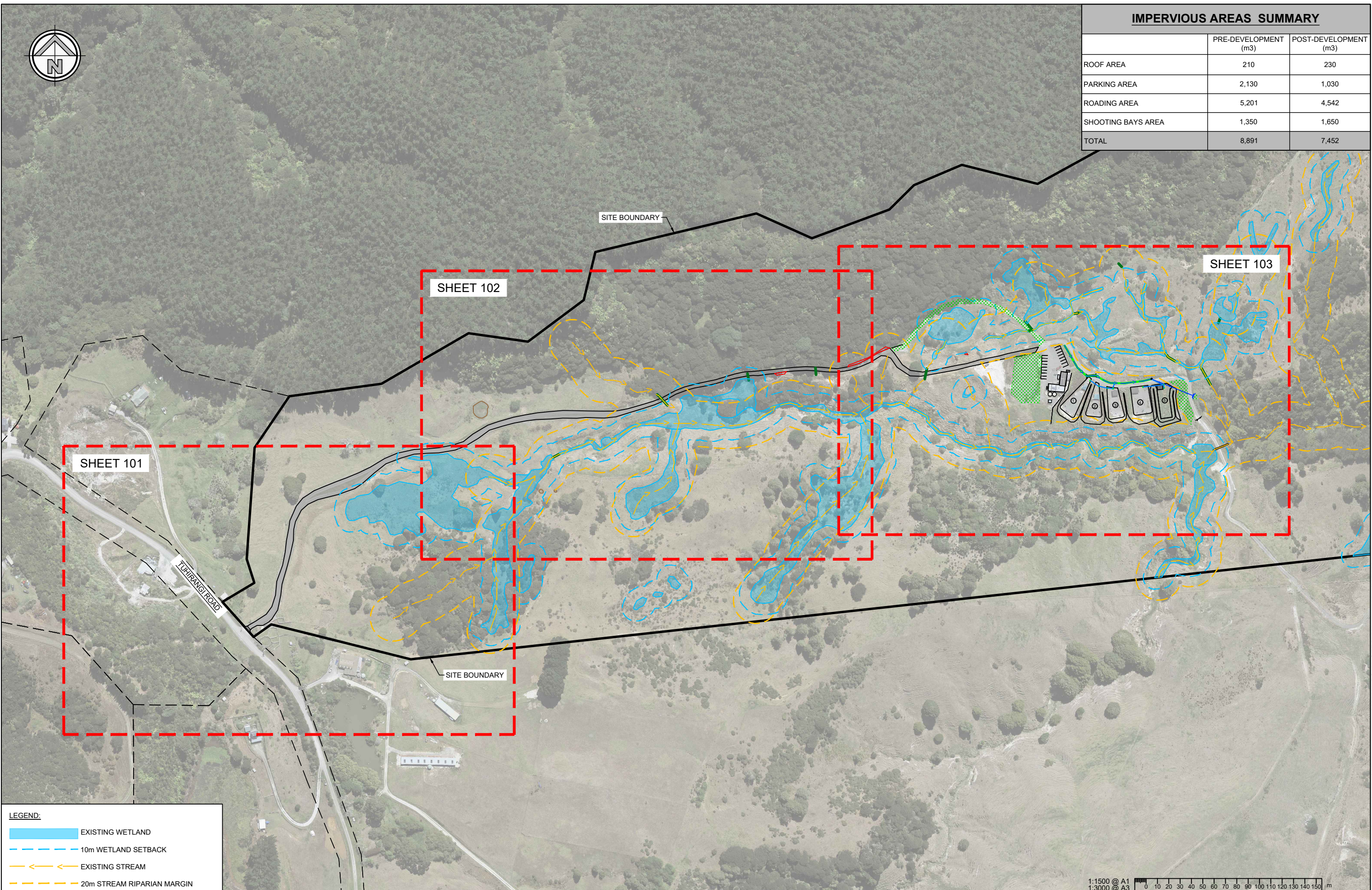
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		05		
		23		
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230400-RC-102	SITE LAYOUT PLAN - SHEET 2 OF 3	A		
230400-RC-103	SITE LAYOUT PLAN - SHEET 3 OF 3	A		
230400-RC-110	SITE OVERALL LAYOUT PLAN - EXISTING WETLAND	A		
230400-RC-111	SITE LAYOUT PLAN - EXISTING WETLAND - SHEET 1 OF 3	A		
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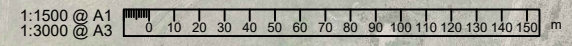
IMPERVIOUS AREAS SUMMARY

	PRE-DEVELOPMENT (m3)	POST-DEVELOPMENT (m3)
ROOF AREA	210	230
PARKING AREA	2,130	1,030
ROADING AREA	5,201	4,542
SHOOTING BAYS AREA	1,350	1,650
TOTAL	8,891	7,452



LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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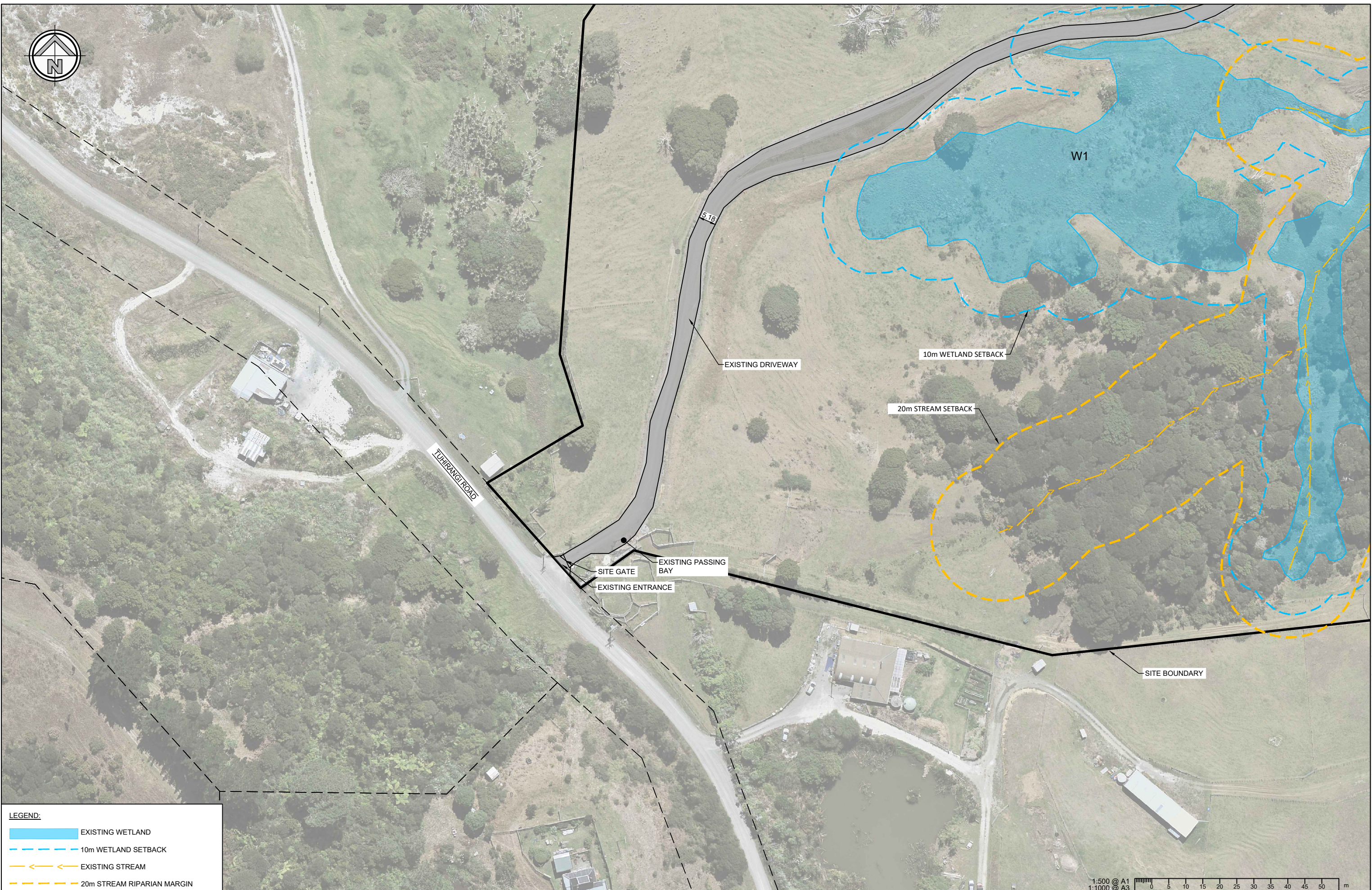
CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
SITE OVERALL LAYOUT PLAN

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:1500
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DWG NUMBER	REVISION
RC-100	A

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LEGEND:

	EXISTING WETLAND
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	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN

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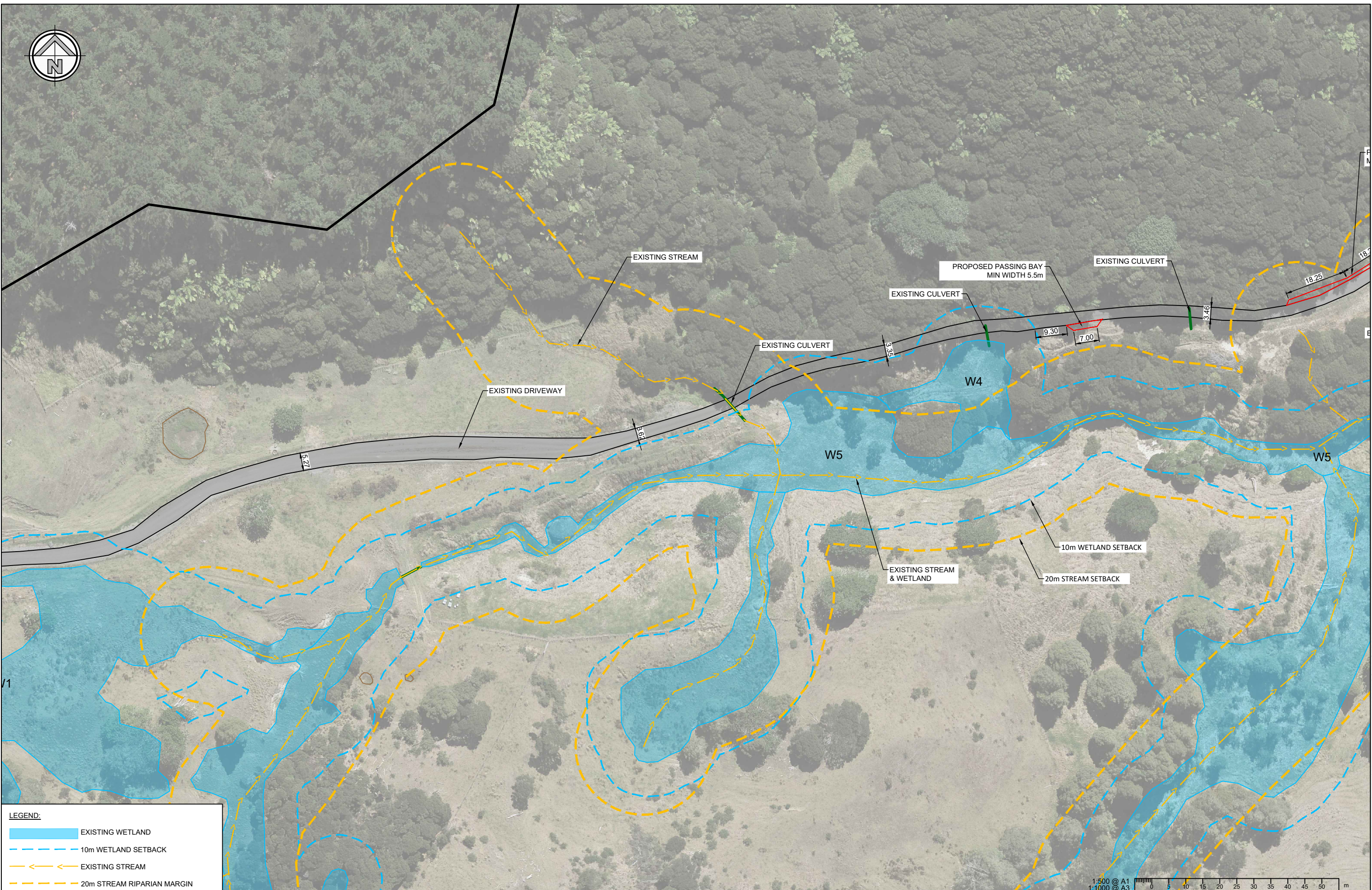
CLIENT
**AUCKLAND SHOOTING CLUB
 INCORPORATED**

PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN
 SHEET 1 OF 3**

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN

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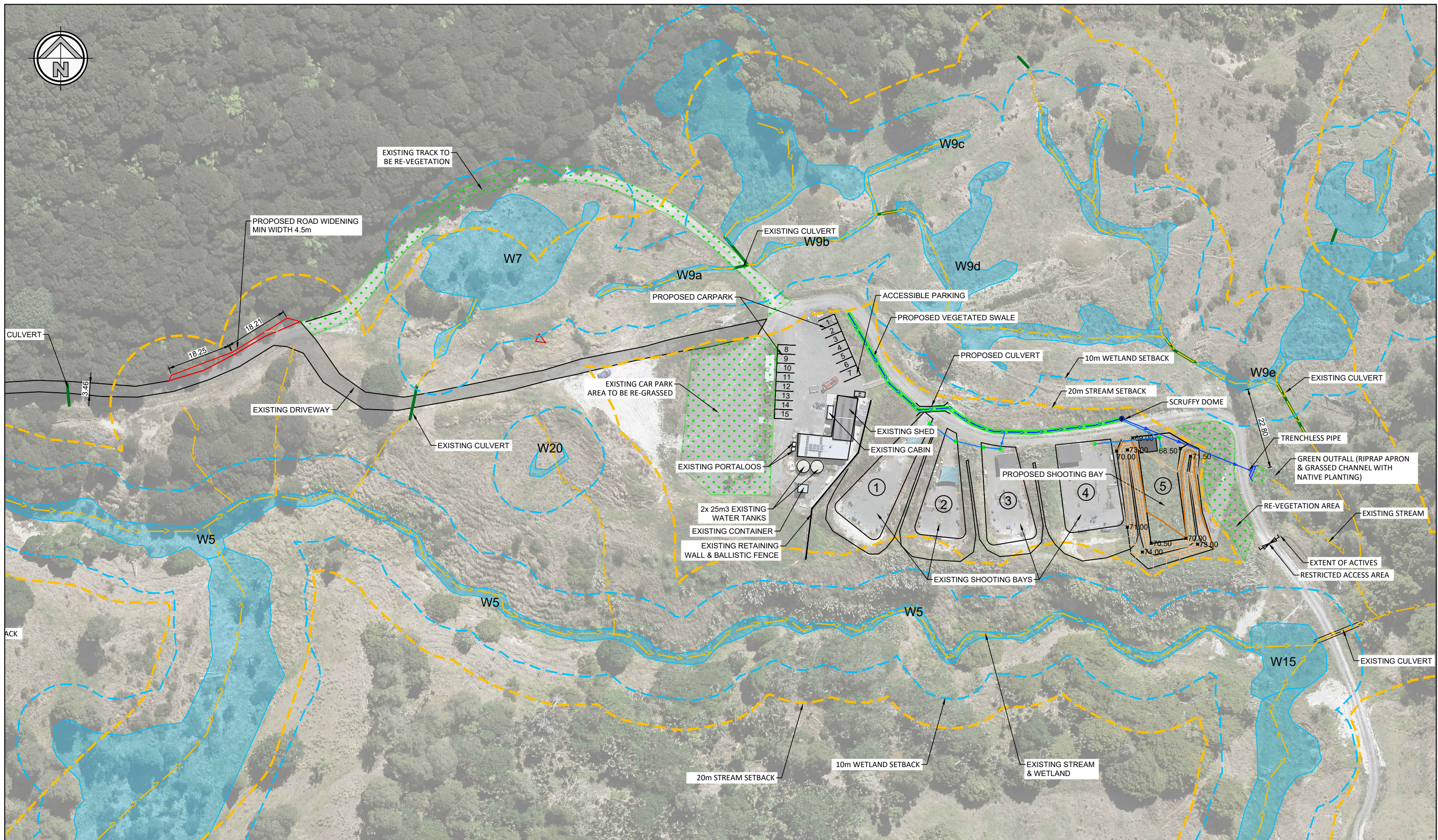
CLIENT
**AUCKLAND SHOOTING CLUB
 INCORPORATED**

PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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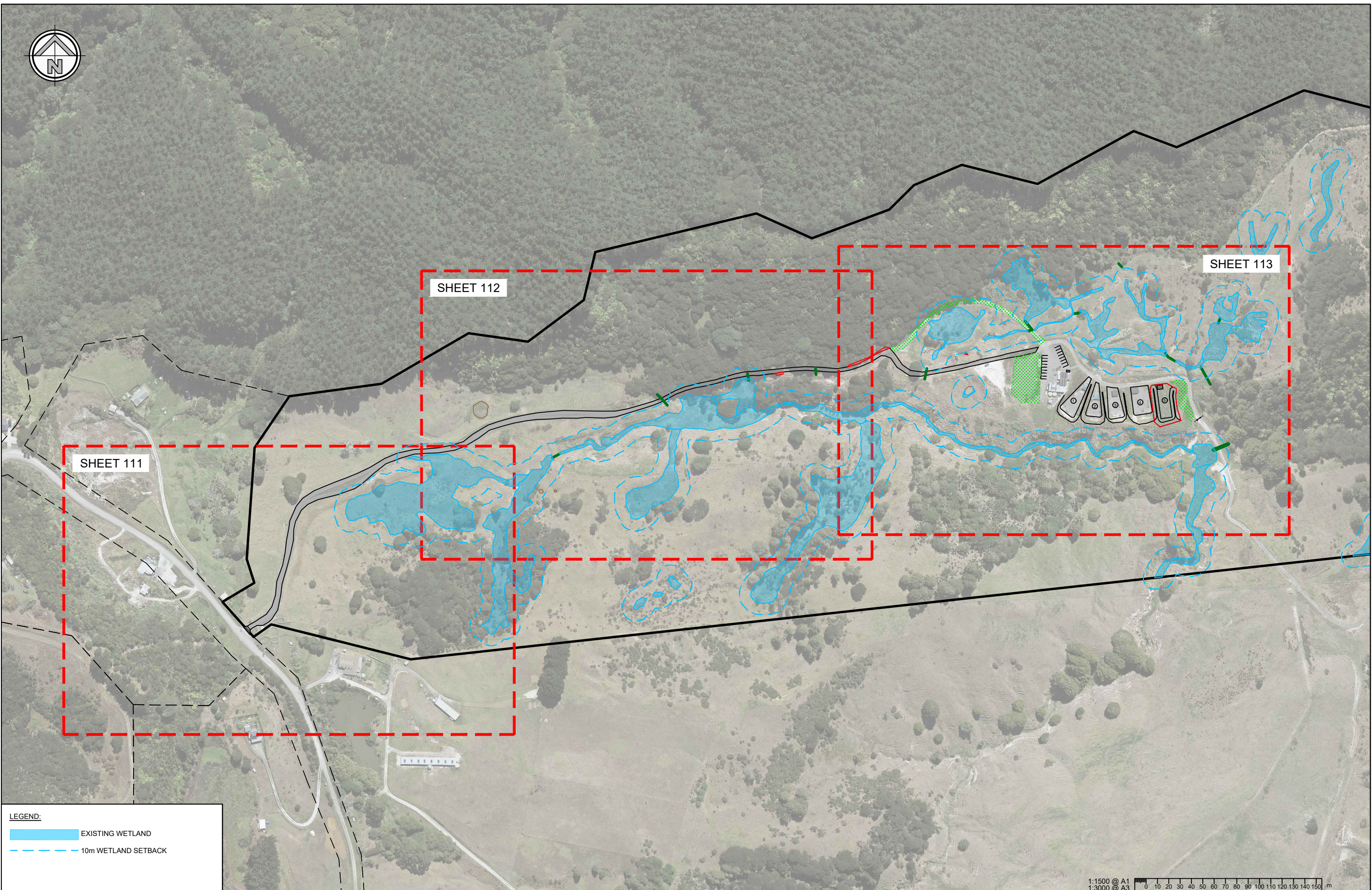
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AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

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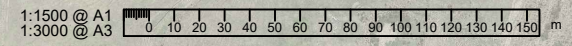
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RC-103	A

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK



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**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE OVERALL LAYOUT PLAN
 - EXISTING WETLAND**

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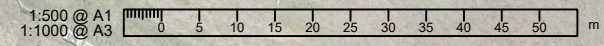
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LEGEND:

EXISTING WETLAND

10m WETLAND SETBACK



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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 INCORPORATED**

PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING WETLAND
 SHEET 1 OF 3**

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1:1:500 A3:1:1000
DWG NUMBER	REVISION
RC-111	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working\dwg\04_resource consent\230400-RC100-SITE PLAN-WETLAND.dwg, 111, 5/23/2023 4:51 pm



PROPOSED ROAD WIDENING
MIN WIDTH 4.5m

PROPOSED PASSING BAY
MIN WIDTH 5.5m

W4

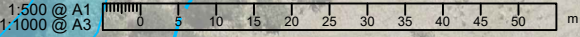
W5

W5

LEGEND:

EXISTING WETLAND

10m WETLAND SETBACK



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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING WETLAND
SHEET 2 OF 3**

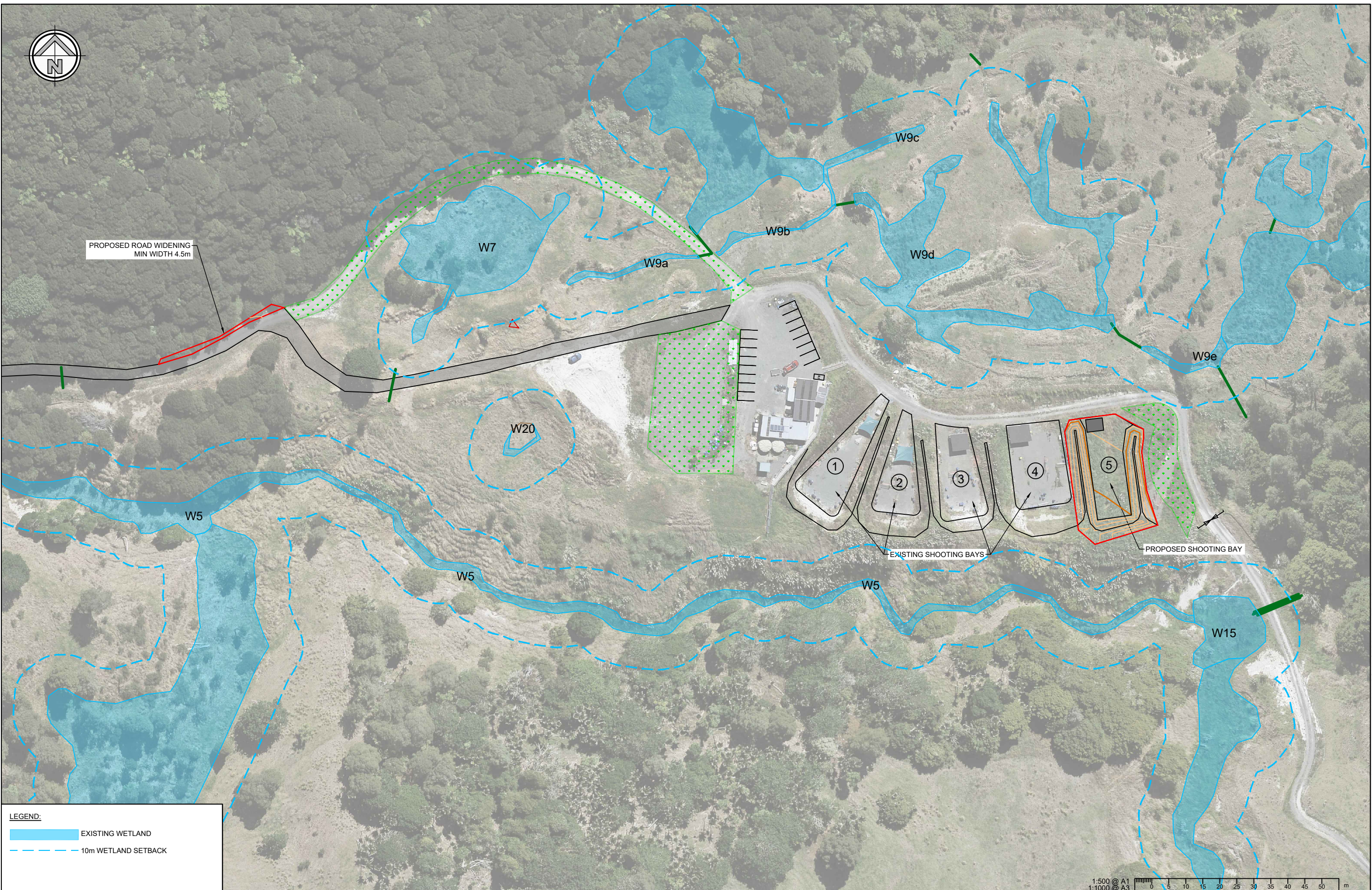
STAGE
FOR RESOURCE CONSENT

PROJECT NUMBER 230400	SCALE A1:1:500 A3:1:1000
DWG NUMBER RC-112	REVISION A

z:\tuhirangi road (287)\engineering\lead drawing\02_working\dwg\04_resource consent\230400-RC1-00-SITE PLAN-WETLAND.dwg, 112_5/23/2023 4:51 pm

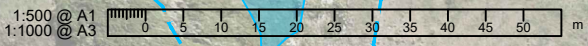


PROPOSED ROAD WIDENING
MIN WIDTH 4.5m



LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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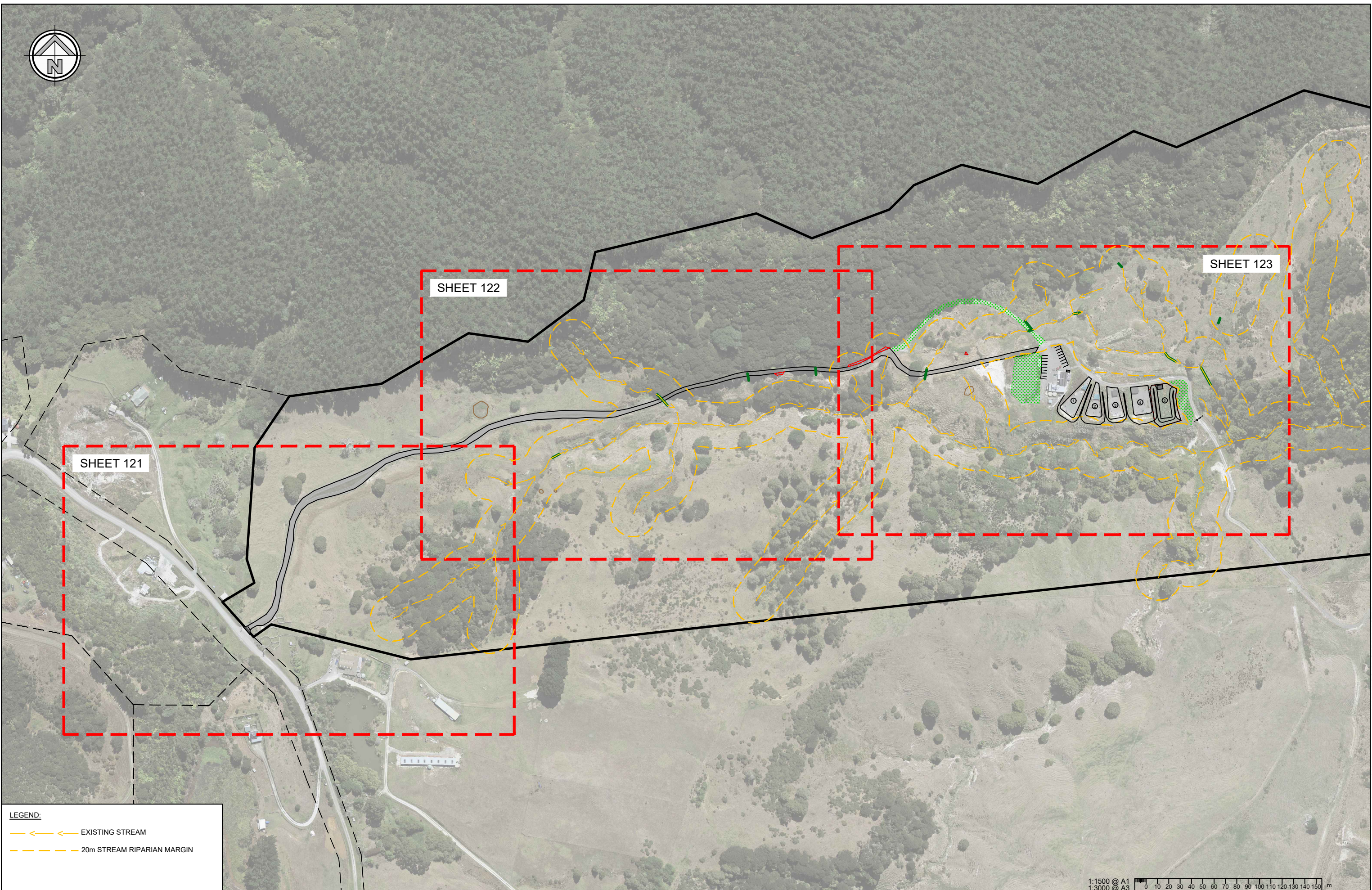
CLIENT
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AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING WETLAND
SHEET 3 OF 3**

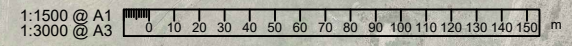
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:500
230400	A3:1:1000
DWG NUMBER	REVISION
RC- 113	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC100-SITE PLAN-WETLAND.dwg, 11/3_5/23/2023 4:51 pm



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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DRAWING TITLE
**SITE OVERALL LAYOUT PLAN
 - EXISTING STREAM**

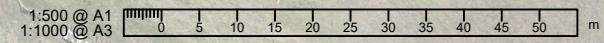
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1:1:1500 A3:1:3000
DWG NUMBER	REVISION
RC- 120	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg_120_5/23/2023 4:51 pm



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING STREAM
 SHEET 1 OF 3**

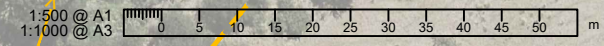
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1:1:500 A3:1:1000
DWG NUMBER	REVISION
RC- 121	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 121_5/23/2023 4:51 pm



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING STREAM
 SHEET 2 OF 3**

STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1:1:500 A3:1:1000
DWG NUMBER RC-122	REVISION A

z:\tuhirangi road (287)\engineering\lead drawing\02_working\dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 122_5/23/2023 4:51 pm



PROPOSED ROAD WIDENING
MIN WIDTH 4.5m



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING STREAM
SHEET 3 OF 3**

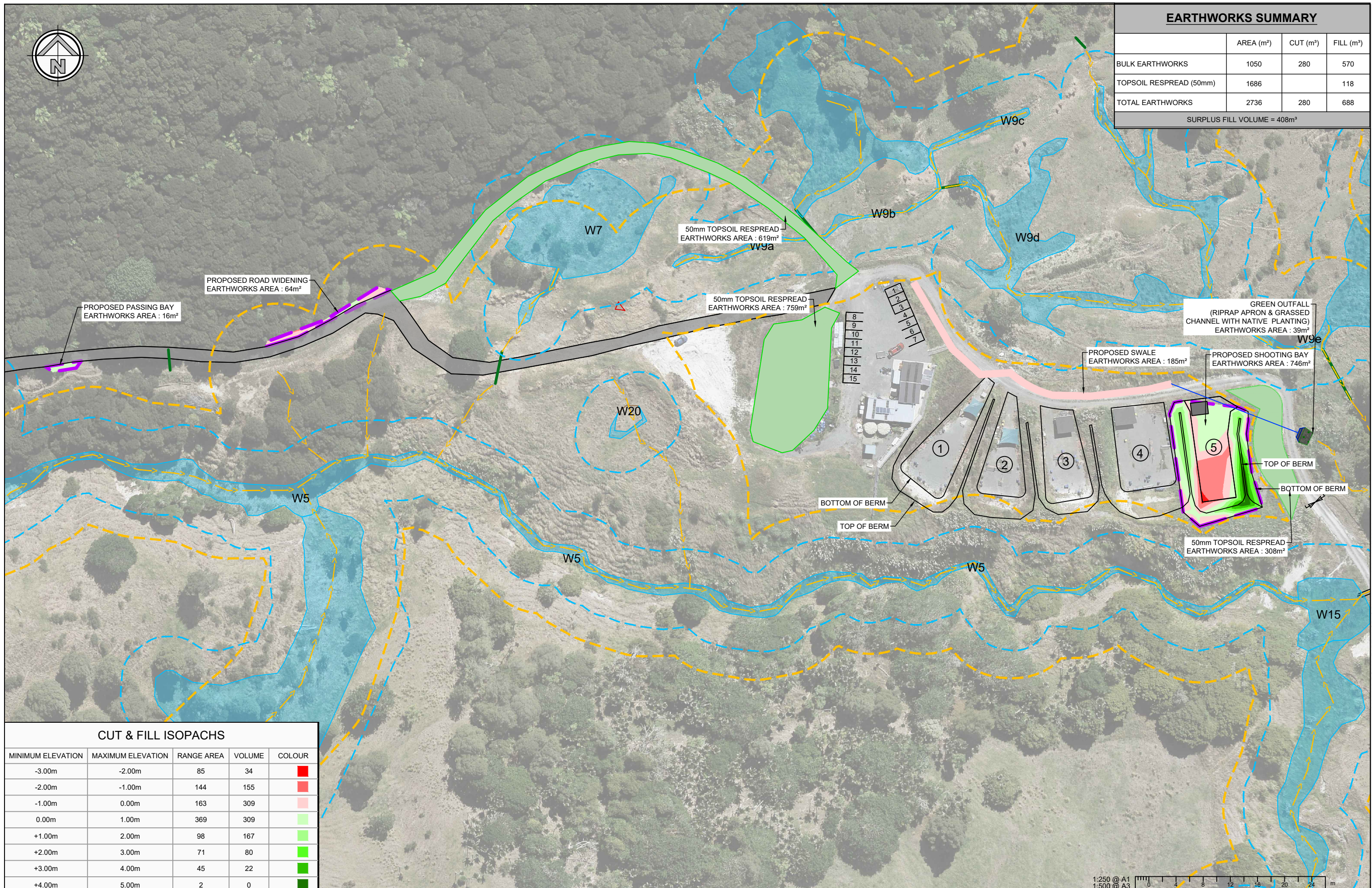
STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1 1:500 A3 1:1000
DWG NUMBER RC- 123	REVISION A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 123, 5/23/2023 4:51 pm



EARTHWORKS SUMMARY

	AREA (m ²)	CUT (m ³)	FILL (m ³)
BULK EARTHWORKS	1050	280	570
TOPSOIL RESPREAD (50mm)	1686		118
TOTAL EARTHWORKS	2736	280	688
SURPLUS FILL VOLUME = 408m ³			



CUT & FILL ISOPACHS

MINIMUM ELEVATION	MAXIMUM ELEVATION	RANGE AREA	VOLUME	COLOUR
-3.00m	-2.00m	85	34	Red
-2.00m	-1.00m	144	155	Light Red
-1.00m	0.00m	163	309	Pink
0.00m	1.00m	369	309	Light Green
+1.00m	2.00m	98	167	Light Green
+2.00m	3.00m	71	80	Green
+3.00m	4.00m	45	22	Dark Green
+4.00m	5.00m	2	0	Dark Green

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DRAWING TITLE
OVERALL EARTHWORKS PLAN

STAGE
FOR RESOURCE CONSENT

PROJECT NUMBER
230400

DWG NUMBER
RC- 200

SCALE
A1:1:500
A3:1:1000

REVISION
A

z:\tuhirangi road (287)\engineering\lead drawing\02_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 200: 5/23/2023 4:52 pm



50mm TOPSOIL RESPREAD
EARTHWORKS AREA : 619m²

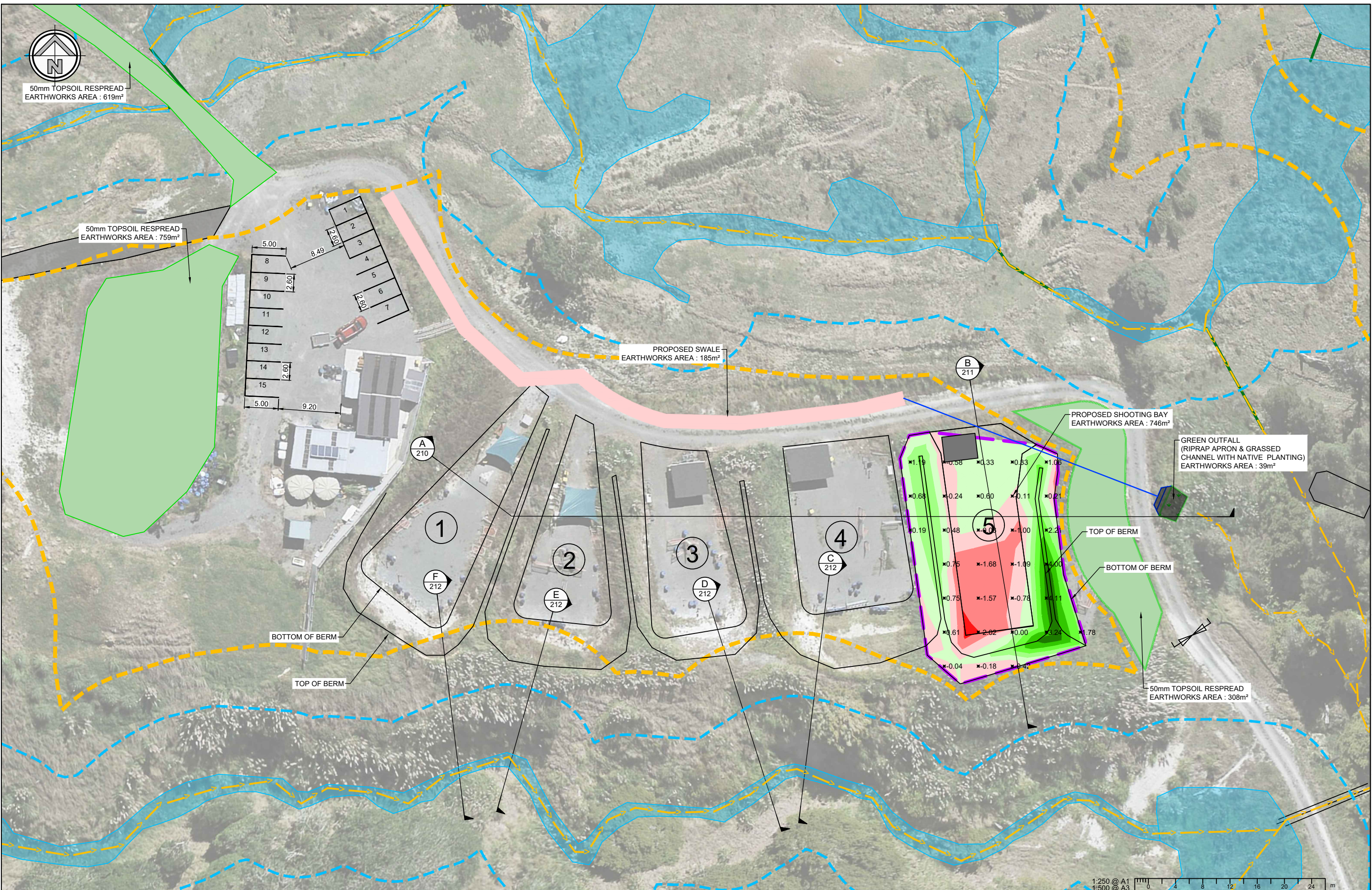
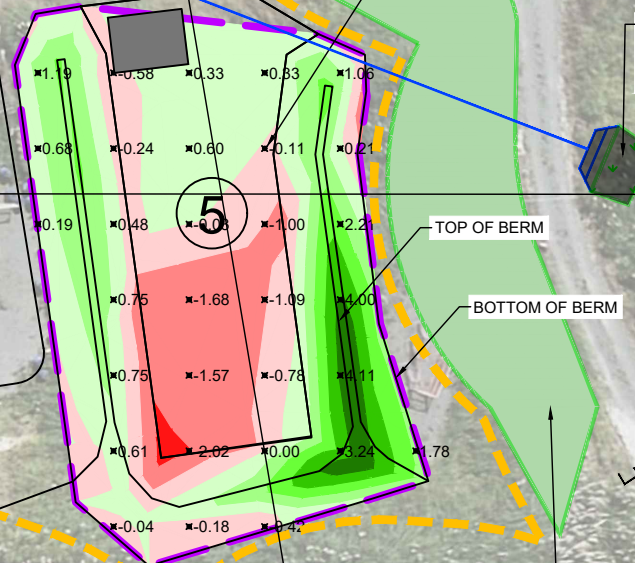
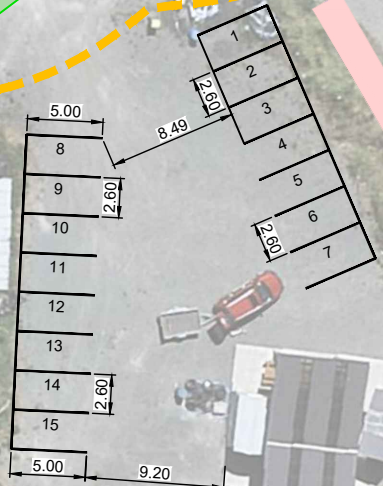
50mm TOPSOIL RESPREAD
EARTHWORKS AREA : 759m²

PROPOSED SWALE
EARTHWORKS AREA : 185m²

PROPOSED SHOOTING BAY
EARTHWORKS AREA : 746m²

GREEN OUTFALL
(RIPRAP APRON & GRASSED
CHANNEL WITH NATIVE PLANTING)
EARTHWORKS AREA : 39m²

50mm TOPSOIL RESPREAD
EARTHWORKS AREA : 308m²



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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	 PO BOX 12858, Penrose, New Zealand Auckland: (09) 357 3557 Northland: (09) 431 4444 Christchurch: (03) 379 5055 Email: terra@terragroup.co.nz Web: www.terragroup.co.nz DRAWINGS ARE COPYRIGHT AND PROPERTY OF TERRA CONSULTANTS

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DRAWING TITLE
**EARTHWORKS PLAN
- SHOOTING BAY**

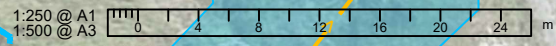
STAGE
FOR RESOURCE CONSENT

PROJECT NUMBER
230400

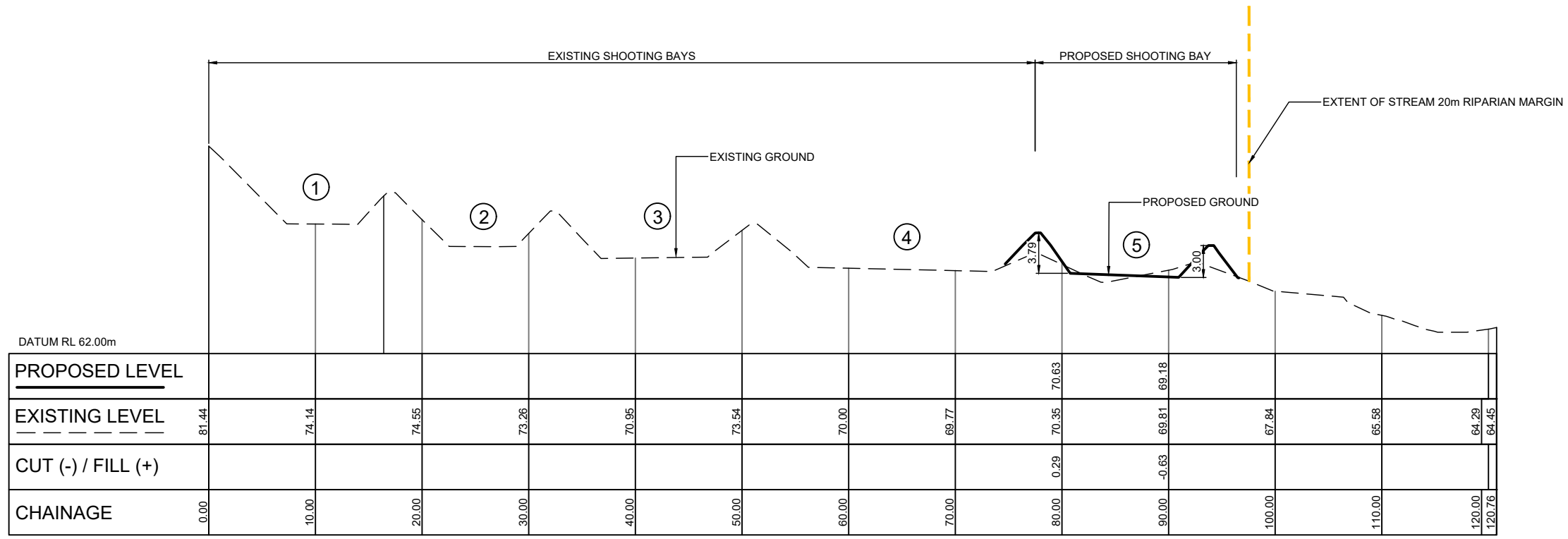
DWG NUMBER
RC- 201

SCALE
A1:1:250
A3:1:500

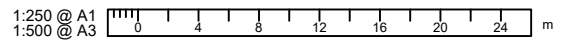
REVISION
A



z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 201: 5/23/2023, 4:52 pm



SECTION A-A LONGSECTION
 CH: 0.00m TO CH: 120.76m
 1:250H 1:250V @ A1 (DOUBLE FOR A3)



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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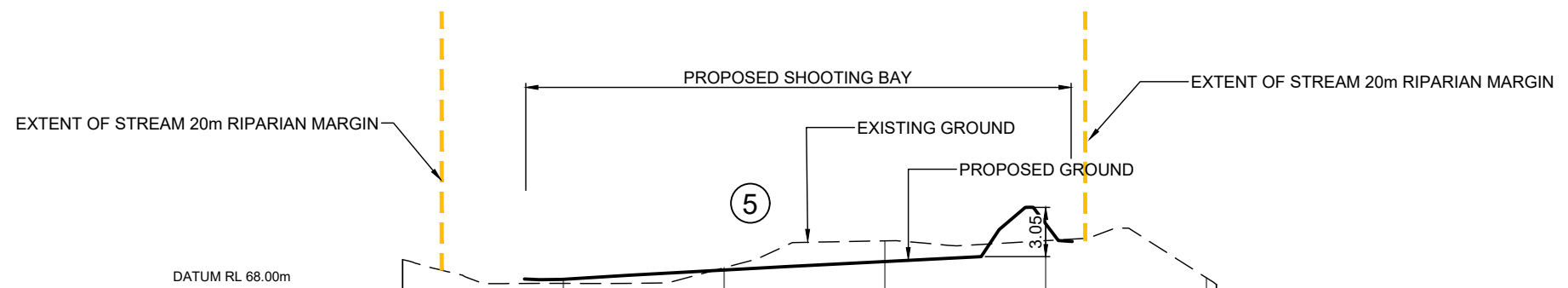
CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
TYPICAL CROSS SECTION SHEET 1 OF 3

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:250 A3:1:500
DWG NUMBER	REVISION
RC- 210	A

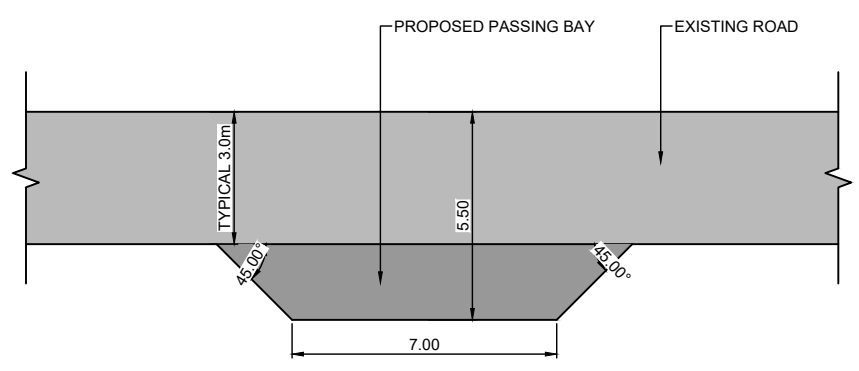
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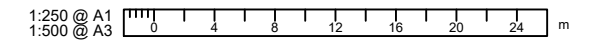
DATUM RL 68.00m

PROPOSED LEVEL	69.97	68.50	69.47	71.14	71.15	68.84	68.43
EXISTING LEVEL	69.97	68.50	69.47	71.14	71.15	68.84	68.43
CUT (-) / FILL (+)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	50.61

SECTION B-B LONGSECTION
 CH: 0.00m TO CH: 50.61m
 1:250H 1:250V @ A1 (DOUBLE FOR A3)



TYPICAL PASSING BAY DETAILS
 1:100 @A1
 1:200 @A3



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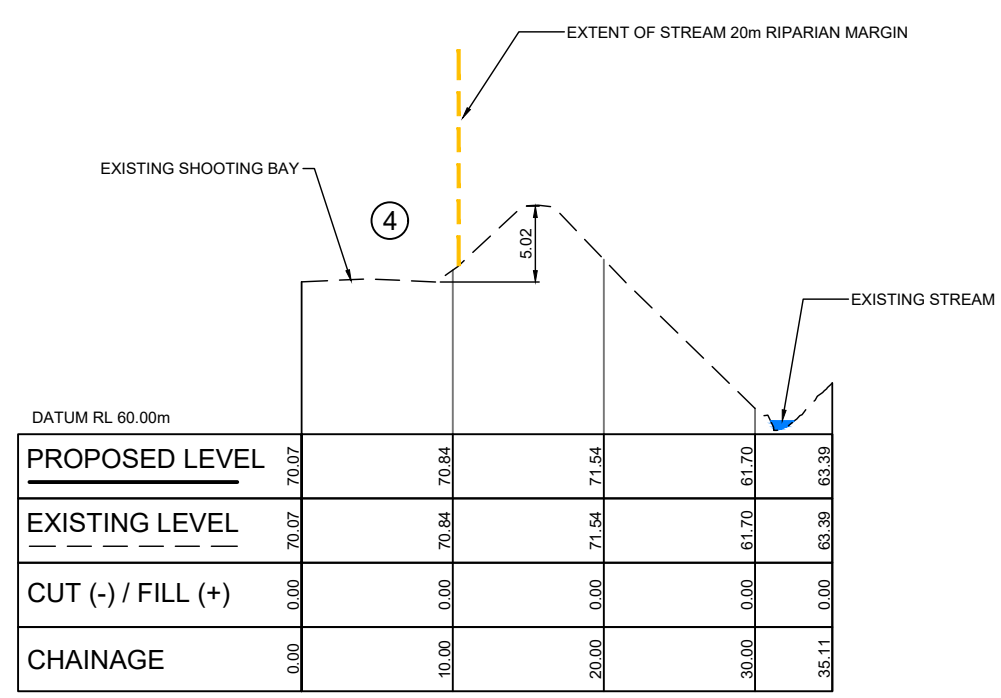
CLIENT
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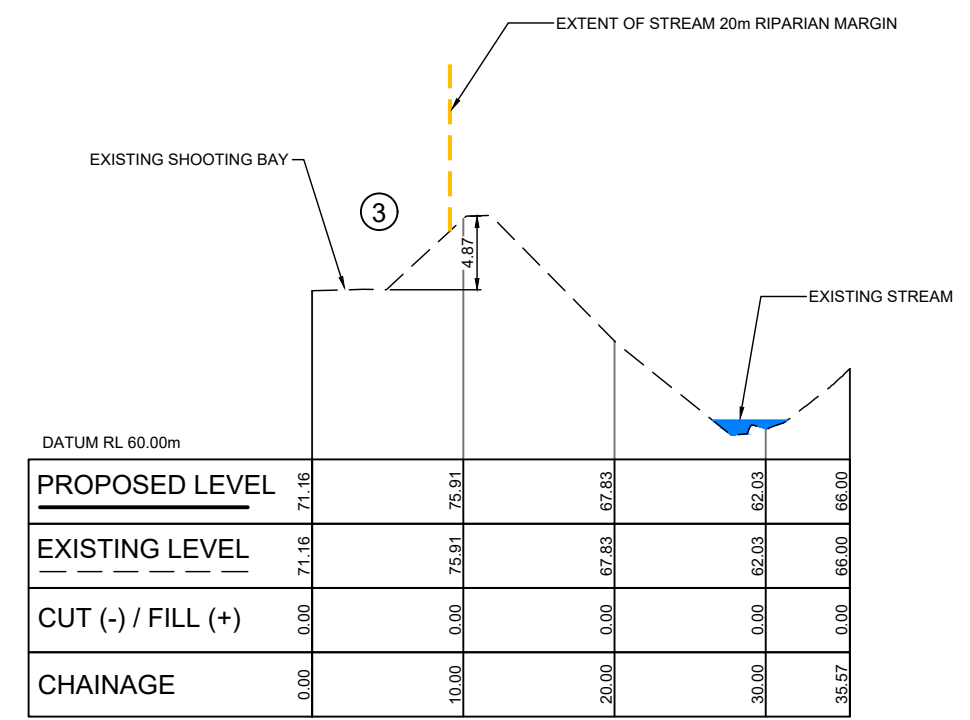
DRAWING TITLE
 TYPICAL CROSS SECTION
 SHEET 2 OF 3

STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1:1:250 A3:1:500
DWG NUMBER RC- 211	REVISION A

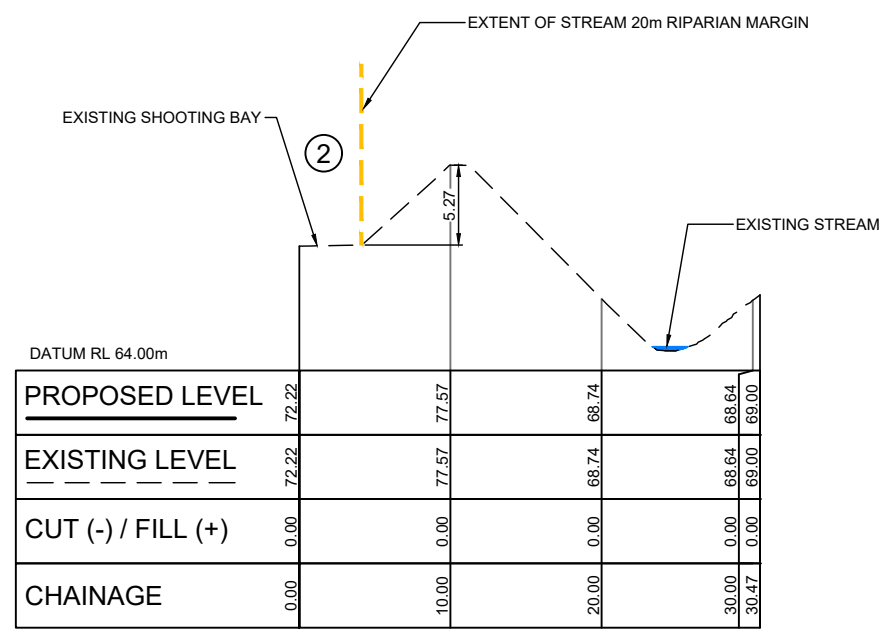
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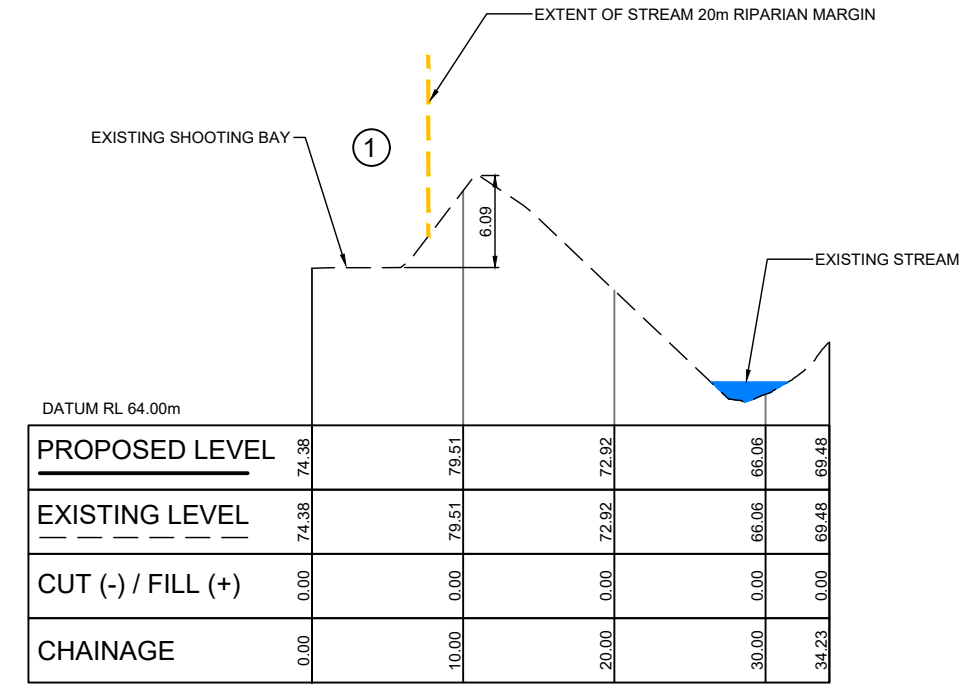
SECTION C-C LONGSECTION
CH: 0.00m TO CH: 35.11m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



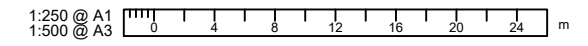
SECTION D-D LONGSECTION
CH: 0.00m TO CH: 35.57m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



SECTION E-E LONGSECTION
CH: 0.00m TO CH: 30.47m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



SECTION F-F LONGSECTION
CH: 0.00m TO CH: 34.23m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



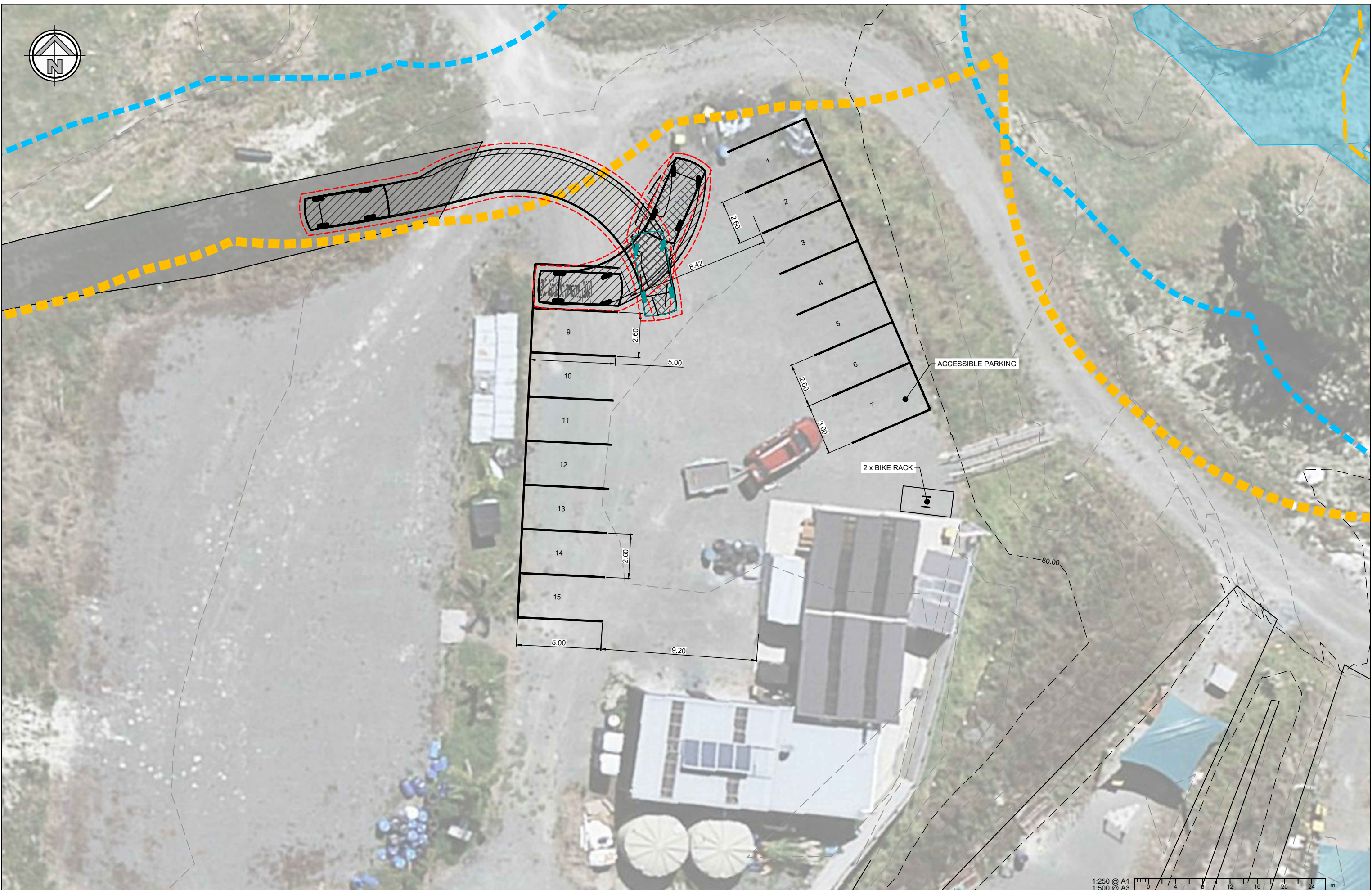
ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	 PO BOX 12858, Penrose, New Zealand Auckland: (09) 357 3557 Northland: (09) 431 4444 Christchurch: (03) 379 5055 Email: terra@terragroup.co.nz Web: www.terragroup.co.nz DRAWINGS ARE COPYRIGHT AND PROPERTY OF TERRA CONSULTANTS

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PROJECT / LOCATION	287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE	TYPICAL CROSS SECTION SHEET 3 OF 3
---------------	---------------------------------------

STAGE	FOR RESOURCE CONSENT
PROJECT NUMBER	230400
DWG NUMBER	RC- 212
SCALE	A1:1:250 A3:1:500
REVISION	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working\dwg\04_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 212, 5/23/2023, 4:52 pm



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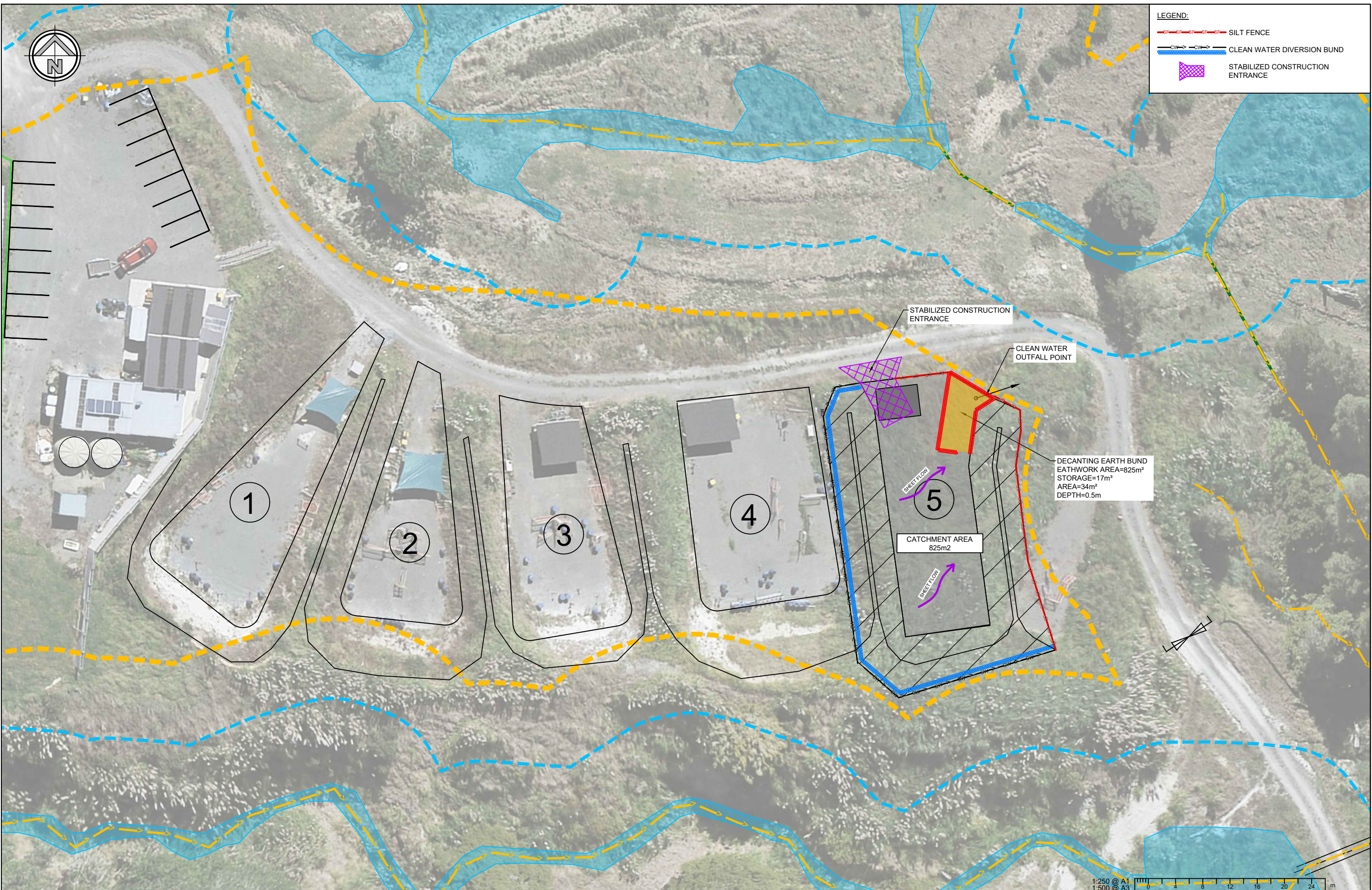
CLIENT
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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
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DRAWING TITLE
TRACKING PLAN

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1 1:100 A3 1:200
DWG NUMBER	REVISION
RC- 220	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working_dwg\04_resource_consent\230400-RC220-TRACKING PLAN.dwg, 230400-RC220-TRACKING PLAN - 220_5/23/2023 5:01 pm



LEGEND:

	SILT FENCE
	CLEAN WATER DIVERSION BUND
	STABILIZED CONSTRUCTION ENTRANCE

STABILIZED CONSTRUCTION ENTRANCE

CLEAN WATER OUTFALL POINT

DECANTING EARTH BUND
 EATHWORK AREA=825m²
 STORAGE=17m³
 AREA=34m²
 DEPTH=0.5m

CATCHMENT AREA
 825m²

SHEET FLOW

SHEET FLOW

1:250 @ A1
 1:500 @ A3

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
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 AUCKLAND**

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1:1:250 A3:1:500
DWG NUMBER RC- 300	REVISION A

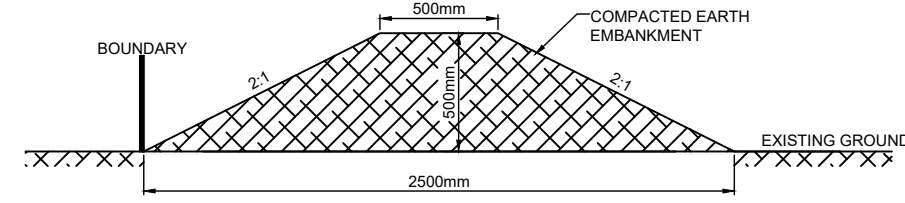
z:\tuhirangi road (287)\engineering\lead drawing\02_resource consent\230400-RC300-EROSION AND SEDIMENT CONTROL PLAN.dwg, 300, 5/23/2023 4:53 pm

POST SPACING CAN BE INCREASED FROM 2 METRES TO 4 METRES TO SUPPORT BY A 16mm DIAMETER HIGH TENSILE WIRE ALONG THE TOP WITH CLIPS EVERY 200mm.

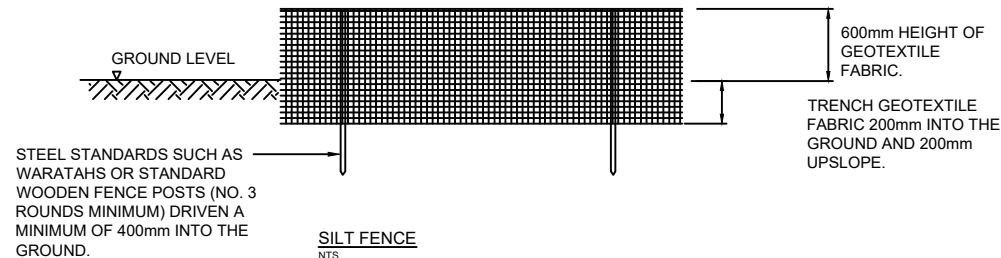
SELF TAPPING WOOD SCREWS

WRAP BOTH ENDS OF THE FABRIC AROUND ONE STAKE AND CLAMP THE OTHER STAKE TO IT USING SELF TAPPING SCREWS AT 150mm SPACINGS.

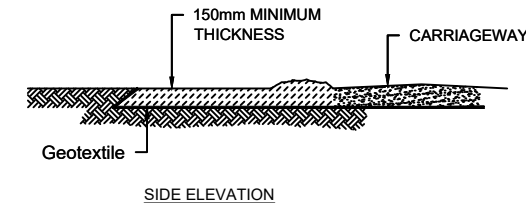
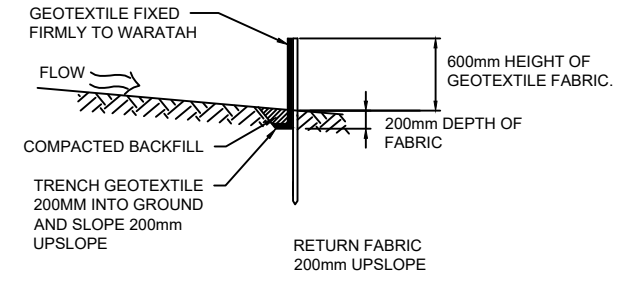
STANDARD DETAIL FOR FABRIC JOIN



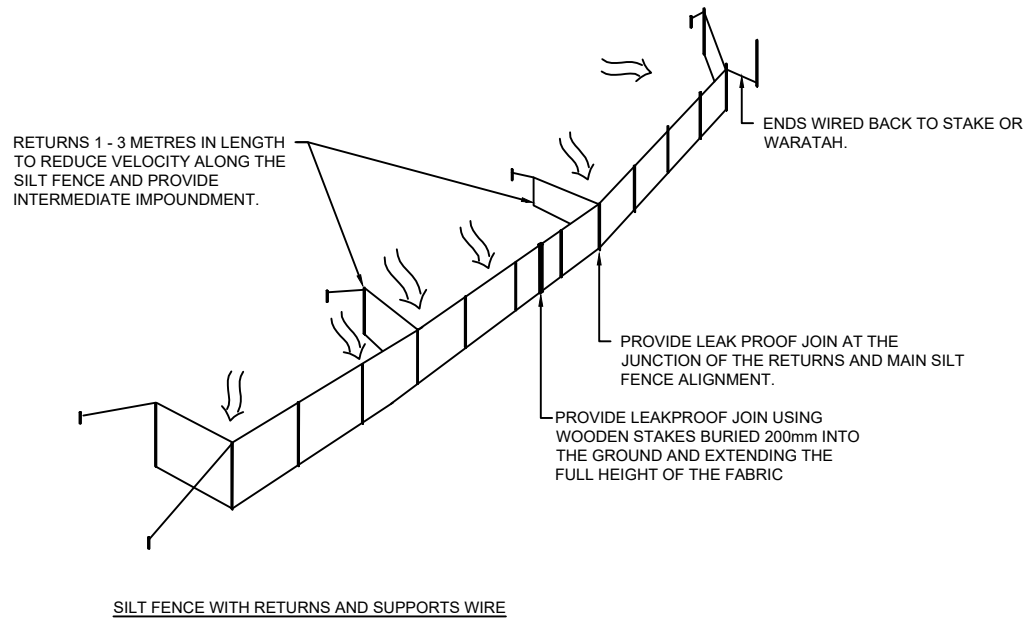
EARTH BUND CROSS SECTION
NTS



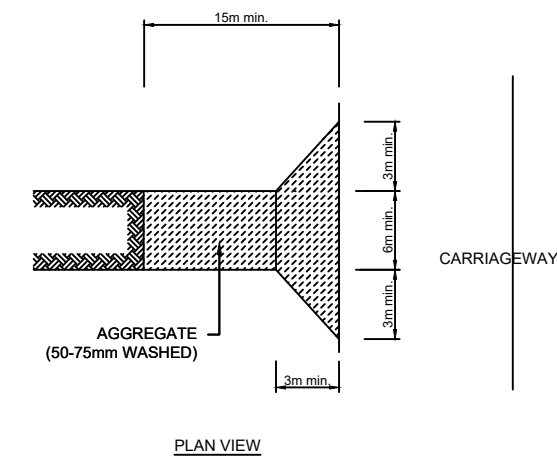
SILT FENCE
NTS



SIDE ELEVATION



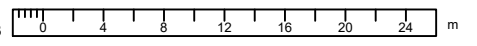
SILT FENCE WITH RETURNS AND SUPPORTS WIRE



PLAN VIEW

STABILISED CONSTRUCTION ENTRANCE
N.T.S.

1:250 @ A1
1:500 @ A3



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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	<p>terra CONSULTANTS PO BOX 12858, Penrose, New Zealand Auckland: (09) 357 3557 Northland: (09) 431 4444 Christchurch: (03) 379 5055 Email: terra@terragroup.co.nz Web: www.terragroup.co.nz DRAWINGS ARE COPYRIGHT AND PROPERTY OF TERRA CONSULTANTS</p>
					DESIGNED		
					DRAWN		
					TRACED		
					CHECKED		

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AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
EROSION AND SEDIMENT CONTROL STANDARD DETAILS

STAGE
FOR RESOURCE CONSENT

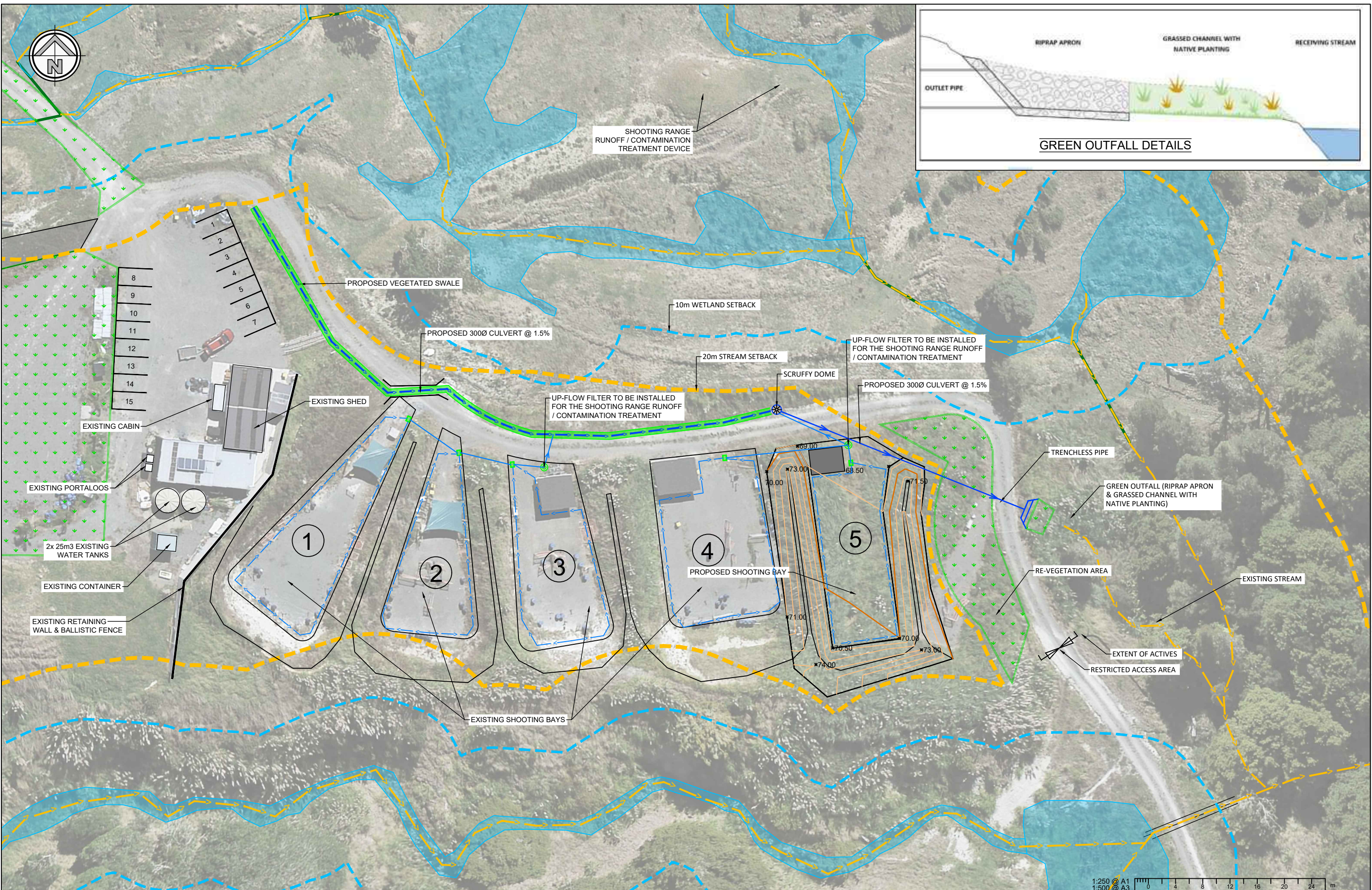
PROJECT NUMBER
230400

DWG NUMBER
RC- 310

SCALE
A1 1:250
A3 1:500

REVISION
A

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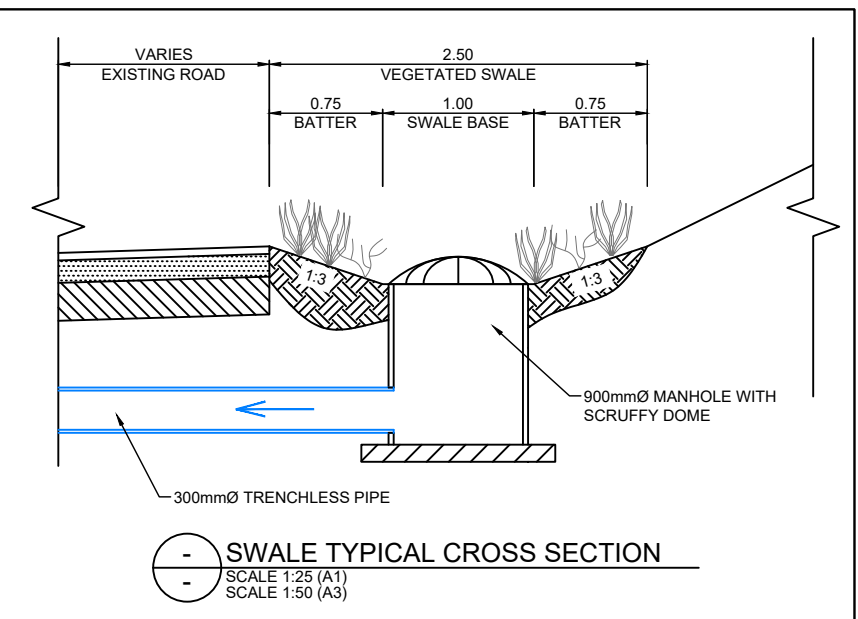
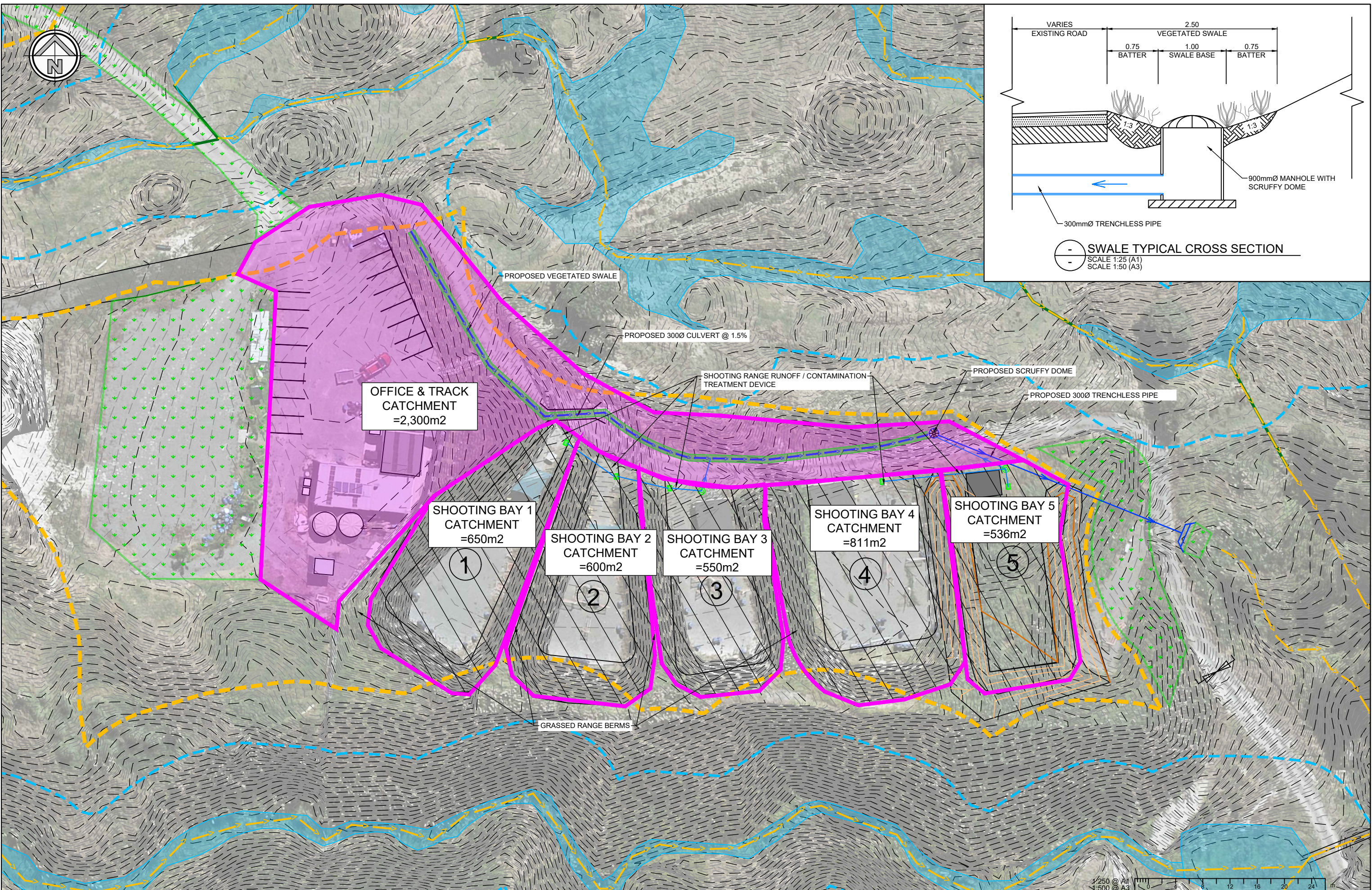
CLIENT
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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
DRAINAGE LAYOUT PLAN

STAGE		FOR RESOURCE CONSENT	
PROJECT NUMBER	230400	SCALE	A1:1:250 A3:1:500
DWG NUMBER	RC- 400	REVISION	A

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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
10 YEAR STORMWATER CATCHMENT PLAN

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:250
230400	A3:1:500
DWG NUMBER	REVISION
RC- 410	A

z:\tuhirangi road (287)\engineering\lead drawing\02 - working dwg\04 - resource consent\230400-RC410-10 YEAR STORMWATER CATCHMENT PLAN.dwg, 410, 9/23/2023 4:54 pm

JOB: 287 Tuhirangi Road, Makarau, Auckland		
SUBJECT: 10 Year Swale Capacity Assessment		
BY: G.CAI	DATE: 2/05/23	JOB NO: 230400

SWALE DESIGN CALCULATIONS

Auckland Council
GD01; C6.0

CATCHMENT AREA

Impermeable Area	3461	m ²
Permeable Area	500	m ²
Total Catchment Area A_c	3961	m²

RUNOFF FLOW

Rational Method

Water Quality Rainfall Intensity	i	10.0	mm/hr
Impermeable Coefficient	C_{imp}	0.95	
Permeable Coefficient	C_{perm}	0.50	
Total Water Quality Flow Q	0.010	m³/s	

SWALE DESIGN

Auckland Council GD01

Water Quality Flow Depth	d	0.062	m
Planting Type		Vegetated	
Channel Slope	s	5.00%	
Base width	b	1.000	m
Side Slope	Z 1:	3	
Mannings 'n'	n	0.250	
Cross-sectional area	A	0.073	m ²
Hydraulic radius	R	0.059	m
Width at Water Level	w	1.37	m
WQV Design Flow Check Q_d	0.010	m³/s $\geq Q$	OK
Velocity V	0.135	m/s	
$V < 0.8m/s$	OK		

$$0.6m < b < 2m$$

$$A = bd + Zd^2$$

$$T = b + 2dZ$$

$$Eq 34$$

$$V = Q/A$$

10 YEAR STORM RUNOFF

10yr Rainfall Intensity	101.0	mm/hr
Total 10 Year Flow Q_{10}	0.099	m³/s

10 YEAR SWALE FLOW

10 Year Flow Depth	d_{10}	0.209	m
Mannings 'n'	n	0.250	
Cross-sectional area	A	0.341	m ²
Hydraulic radius	R	0.186	m
Width at Water Level	w_{10}	2.26	m
Design Flow Check Q_d	0.099	m³/s $\geq Q_{10}$	OK
Velocity V	0.291	m/s	
$V < 1.5m/s$	OK		

Eq 34
 $V = Q/A$

CHECK DAM DESIGN

Check Dams Used	No	Check Dams Not Required
Swale Longitudinal Grade	5.00%	
Check Dam Height	0.10	m
Check Dam Spacing	N/A	m
		Eq 38
Check Dam Volume	-	m ³
Residence Time at WQF	0.0	min
		Eq 36

CHECK 10 YEAR FLOW OVER CHECK DAMS

Depth of Flow Over Check Dam	0.110	m
Depth of Water at Check Dam	N/A	m

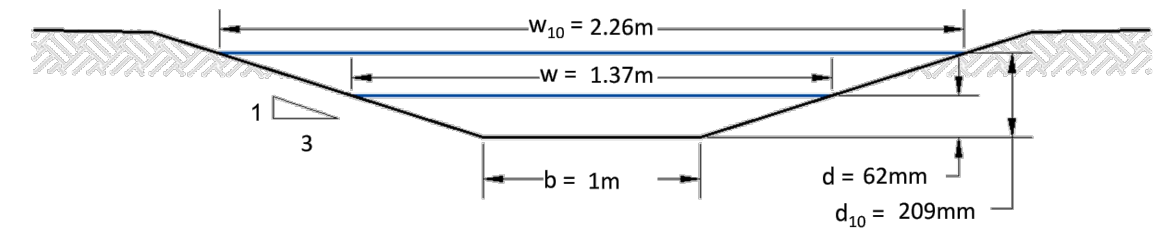
Eq 41

CHECK RESIDENCE TIME

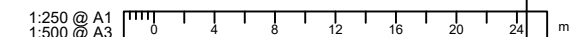
Minimum travel time	t	9	min
Minimum swale length L	72.8	m	

Minimum 9mins
Eq 35 & 36

SWALE DIMENSIONS:



Planting = Vegetated
Longitudinal Slope = 5 %
Check Dams = N/A
Length Required = 72.8 m



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	terra consultants

CLIENT	AUCKLAND SHOOTING CLUB INCORPORATED	DRAWING TITLE	10 YEAR SWALE TREATMENT ASSESSMENT	STAGE	FOR RESOURCE CONSENT
PROJECT / LOCATION	287 TUHIRANGI ROAD, MAKARAU, AUCKLAND	PROJECT NUMBER	230400	SCALE	A1:1:250 A3:1:500
		DWG NUMBER	RC- 411	REVISION	A

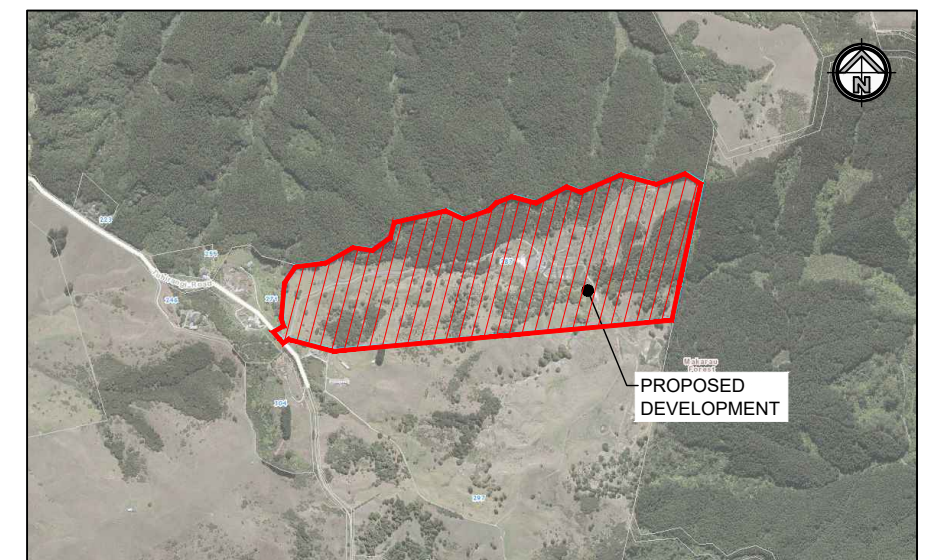
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287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

CLIENT: AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT No. 230400

ENGINEERING PLANS FOR
RESOURCE CONSENT
REVISION A

MAY 2023



LOCALITY PLAN
N.T.S

**287 TUHIRANGI ROAD,
MAKARAU, AUCKLAND**

CLIENT: AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT No. 230400

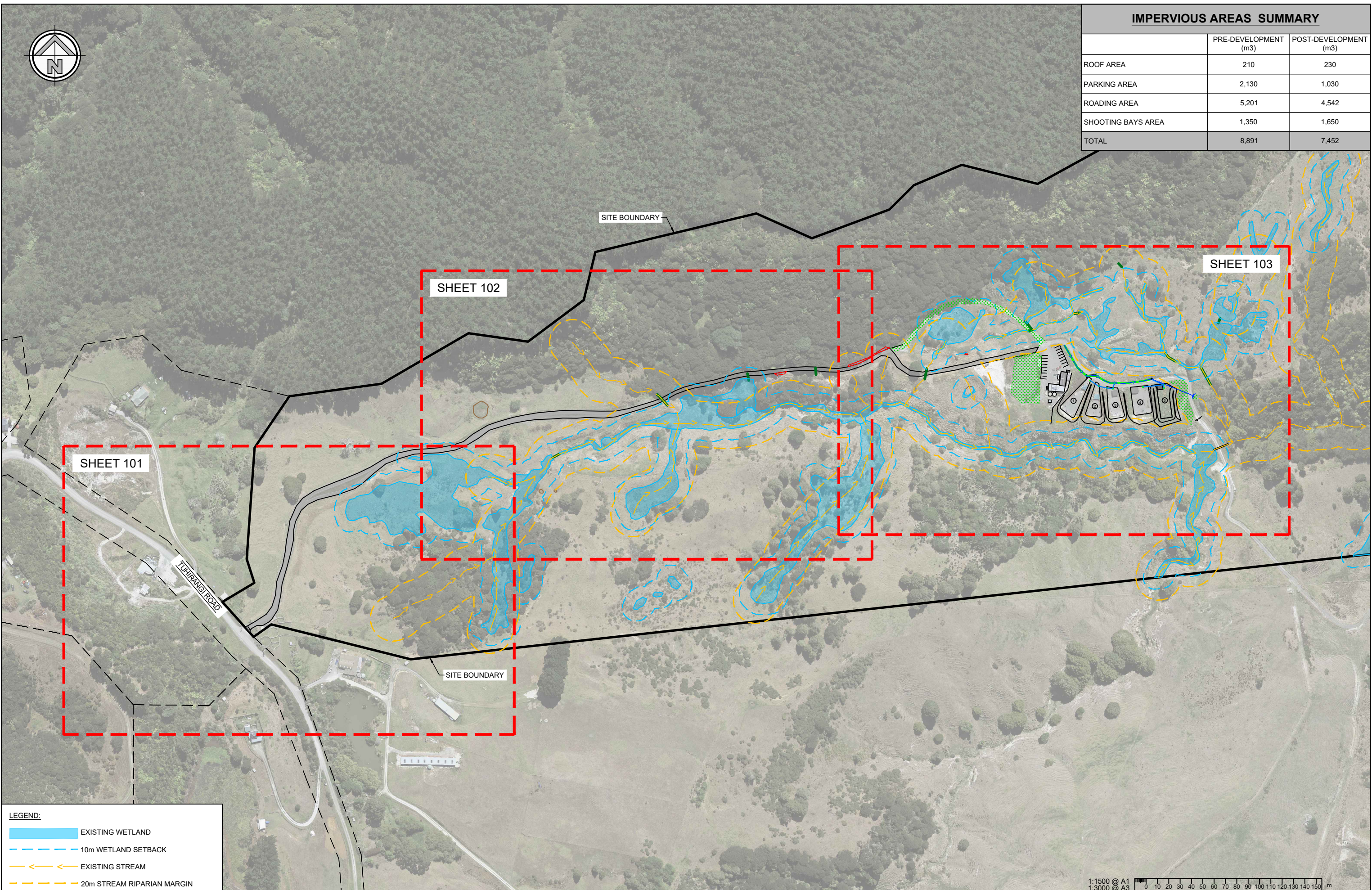
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		19		
		05		
		23		
SITE MODIFICATIONS				
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230400-RC-101	SITE LAYOUT PLAN - SHEET 1 OF 3	A		
230400-RC-102	SITE LAYOUT PLAN - SHEET 2 OF 3	A		
230400-RC-103	SITE LAYOUT PLAN - SHEET 3 OF 3	A		
230400-RC-110	SITE OVERALL LAYOUT PLAN - EXISTING WETLAND	A		
230400-RC-111	SITE LAYOUT PLAN - EXISTING WETLAND - SHEET 1 OF 3	A		
230400-RC-112	SITE LAYOUT PLAN - EXISTING WETLAND - SHEET 2 OF 3	A		
230400-RC-113	SITE LAYOUT PLAN - EXISTING WETLAND - SHEET 3 OF 3	A		
230400-RC-120	SITE OVERALL LAYOUT PLAN - EXISTING STREAM	A		
230400-RC-121	SITE LAYOUT PLAN - EXISTING STREAM - SHEET 1 OF 3	A		
230400-RC-122	SITE LAYOUT PLAN - EXISTING STREAM - SHEET 2 OF 3	A		
230400-RC-123	SITE LAYOUT PLAN - EXISTING STREAM - SHEET 3 OF 3	A		
230400-RC-200	OVERALL EARTHWORKS PLAN	A		
230400-RC-201	EARTHWORKS PLAN - SHOOTING BAY	A		
230400-RC-210	TYPICAL CROSS SECTION - SHEET 1 OF 3	A		
230400-RC-211	TYPICAL CROSS SECTION - SHEET 2 OF 3	A		
230400-RC-212	TYPICAL CROSS SECTION - SHEET 3 OF 3	A		
230400-RC-220	TRACKING PLAN	A		
230400-RC-300	EROSION AND SEDIMENT CONTROL PLAN	A		
230400-RC-310	EROSION AND SEDIMENT STANDARD DETAILS	A		
230400-RC-400	DRAINAGE LAYOUT PLAN	A		
230400-RC-410	10 YEAR STORMWATER CATCHMENY PLAN	A		
230400-RC-401	10 YEAR SWALE ASSESSMENT	A		



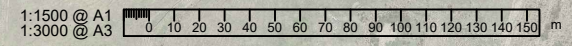
IMPERVIOUS AREAS SUMMARY

	PRE-DEVELOPMENT (m3)	POST-DEVELOPMENT (m3)
ROOF AREA	210	230
PARKING AREA	2,130	1,030
ROADING AREA	5,201	4,542
SHOOTING BAYS AREA	1,350	1,650
TOTAL	8,891	7,452



LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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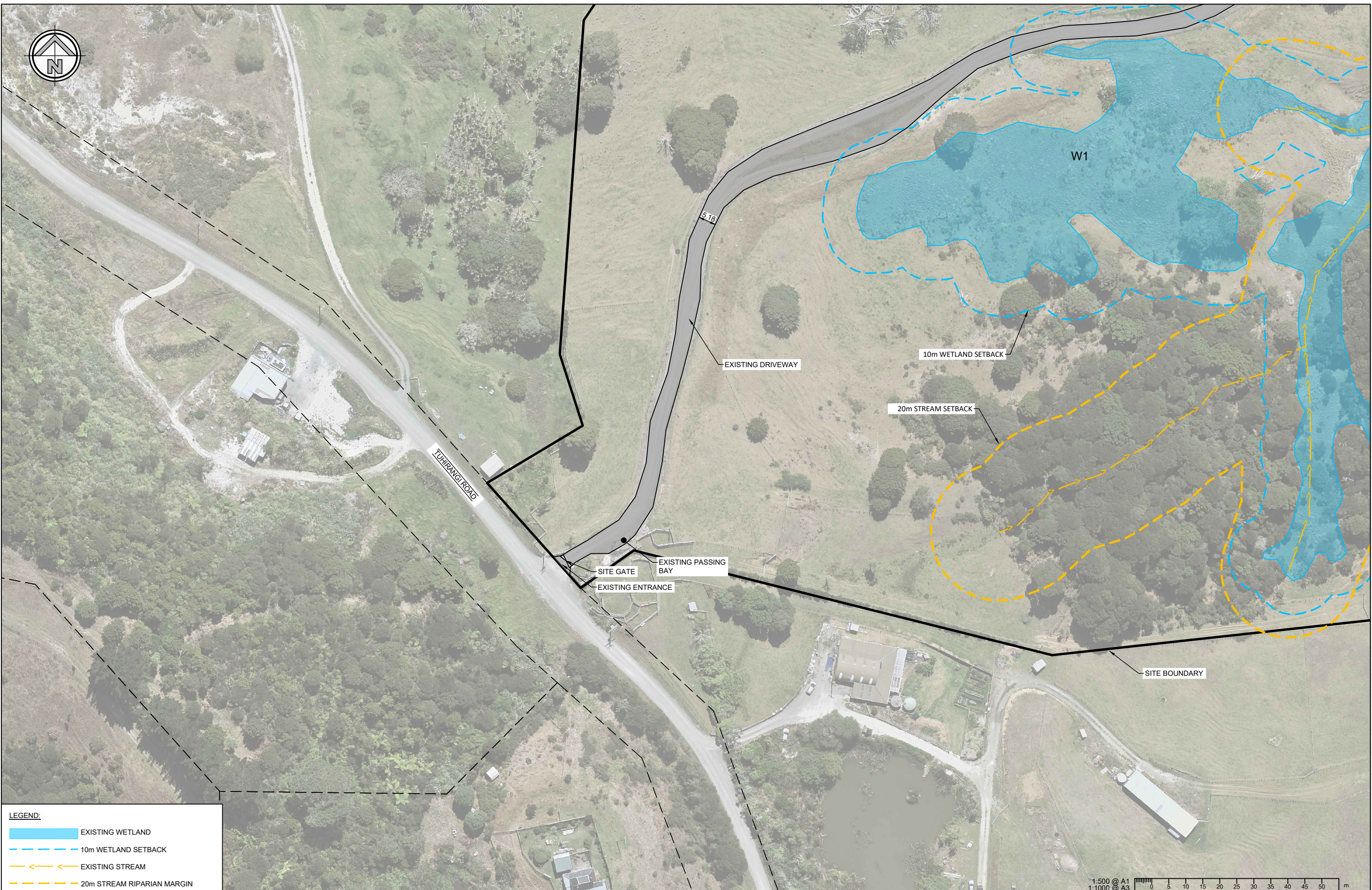
CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
SITE OVERALL LAYOUT PLAN

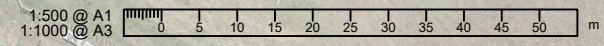
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FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
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DWG NUMBER	REVISION
RC-100	A

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



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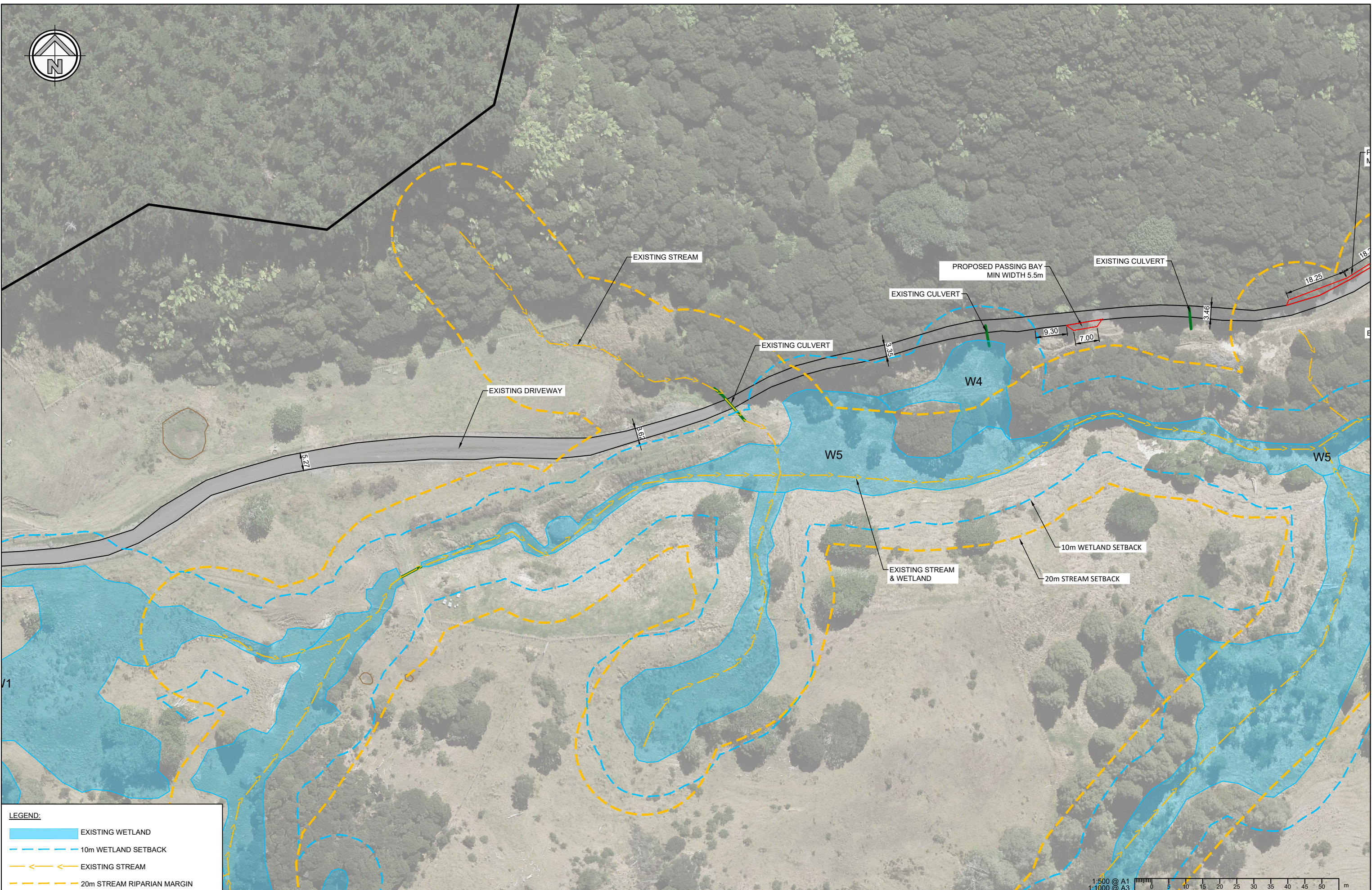
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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN
 SHEET 1 OF 3**

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
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DWG NUMBER	REVISION
RC- 101	A

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN

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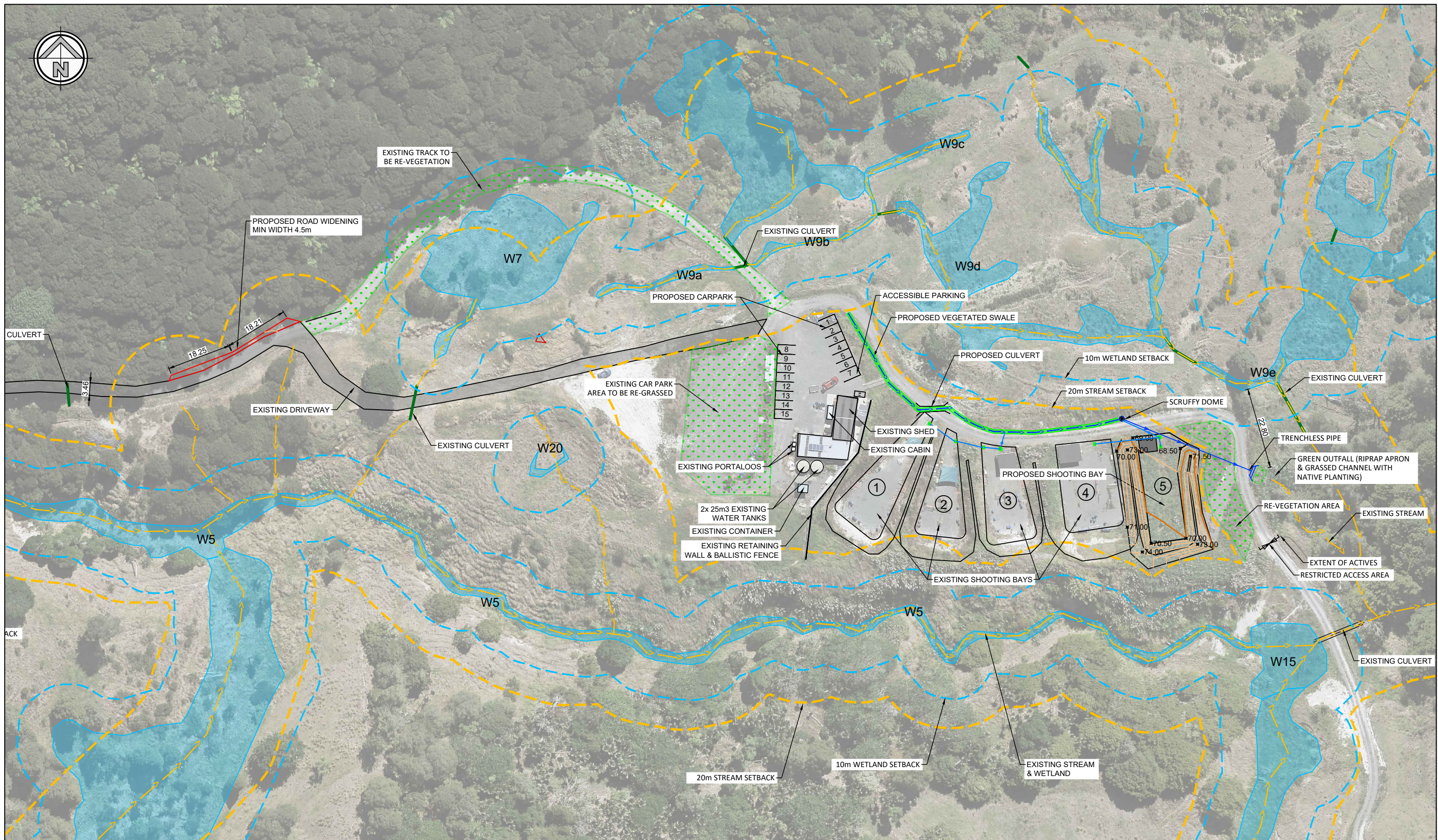
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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN
 SHEET 2 OF 3**

STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1:1:500 A3:1:1000
DWG NUMBER RC-102	REVISION A

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK
	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN

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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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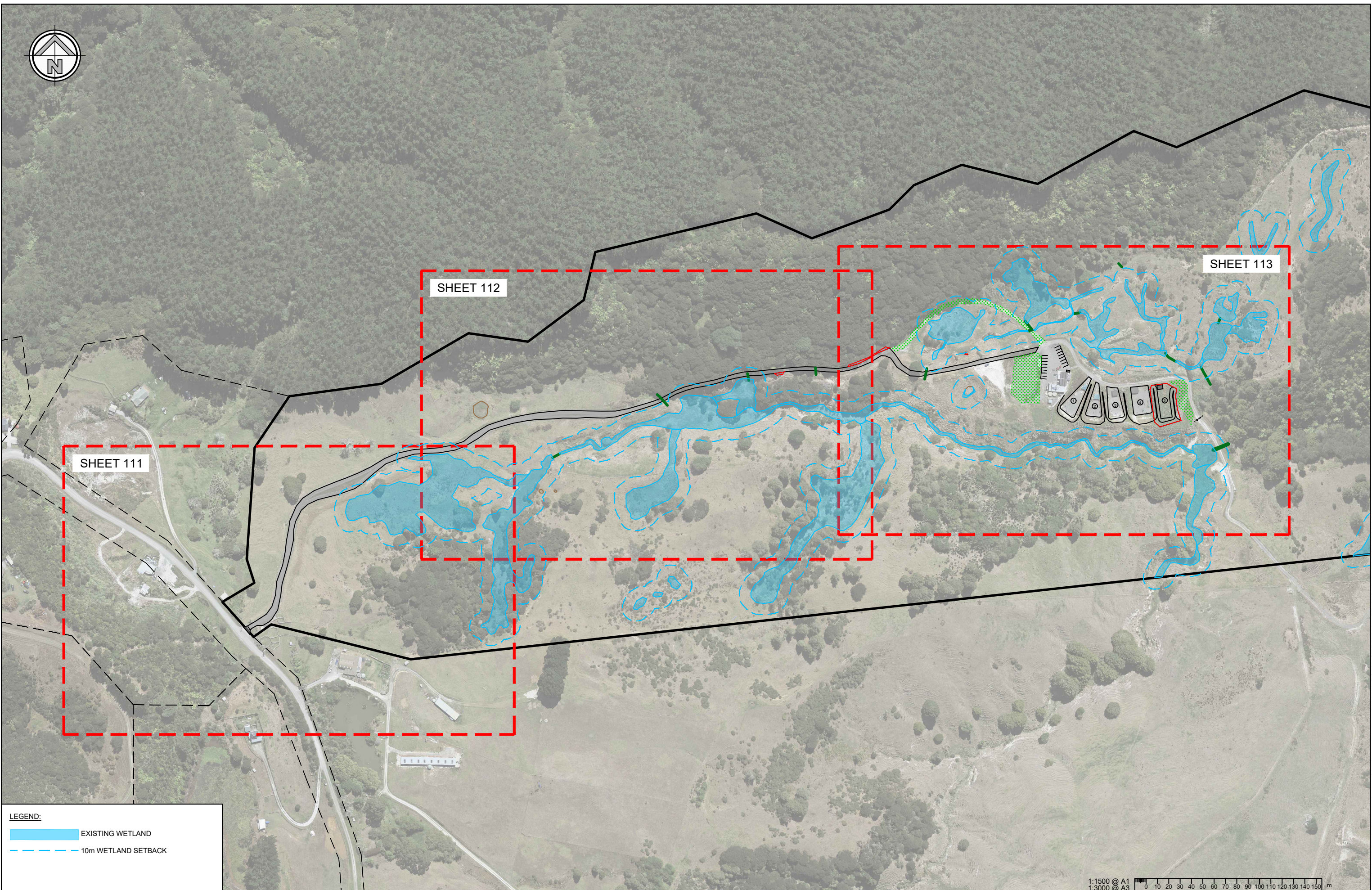
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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
SITE LAYOUT PLAN SHEET 3 OF 3

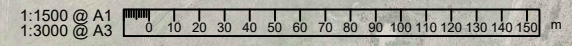
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DWG NUMBER	REVISION
RC-103	A

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK



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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE OVERALL LAYOUT PLAN
 - EXISTING WETLAND**

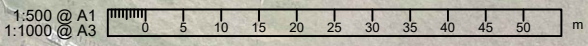
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PROJECT NUMBER 230400	SCALE A1:1:1500 A3:1:3000
DWG NUMBER RC-110	REVISION A

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LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK



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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING WETLAND
 SHEET 1 OF 3**

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1:1:500 A3:1:1000
DWG NUMBER	REVISION
RC-111	A

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PROPOSED ROAD WIDENING
MIN WIDTH 4.5m

PROPOSED PASSING BAY
MIN WIDTH 5.5m

W4

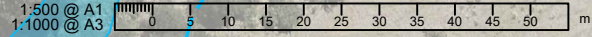
W5

W5

LEGEND:

EXISTING WETLAND

10m WETLAND SETBACK



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
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PROJECT / LOCATION
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DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING WETLAND
SHEET 2 OF 3**

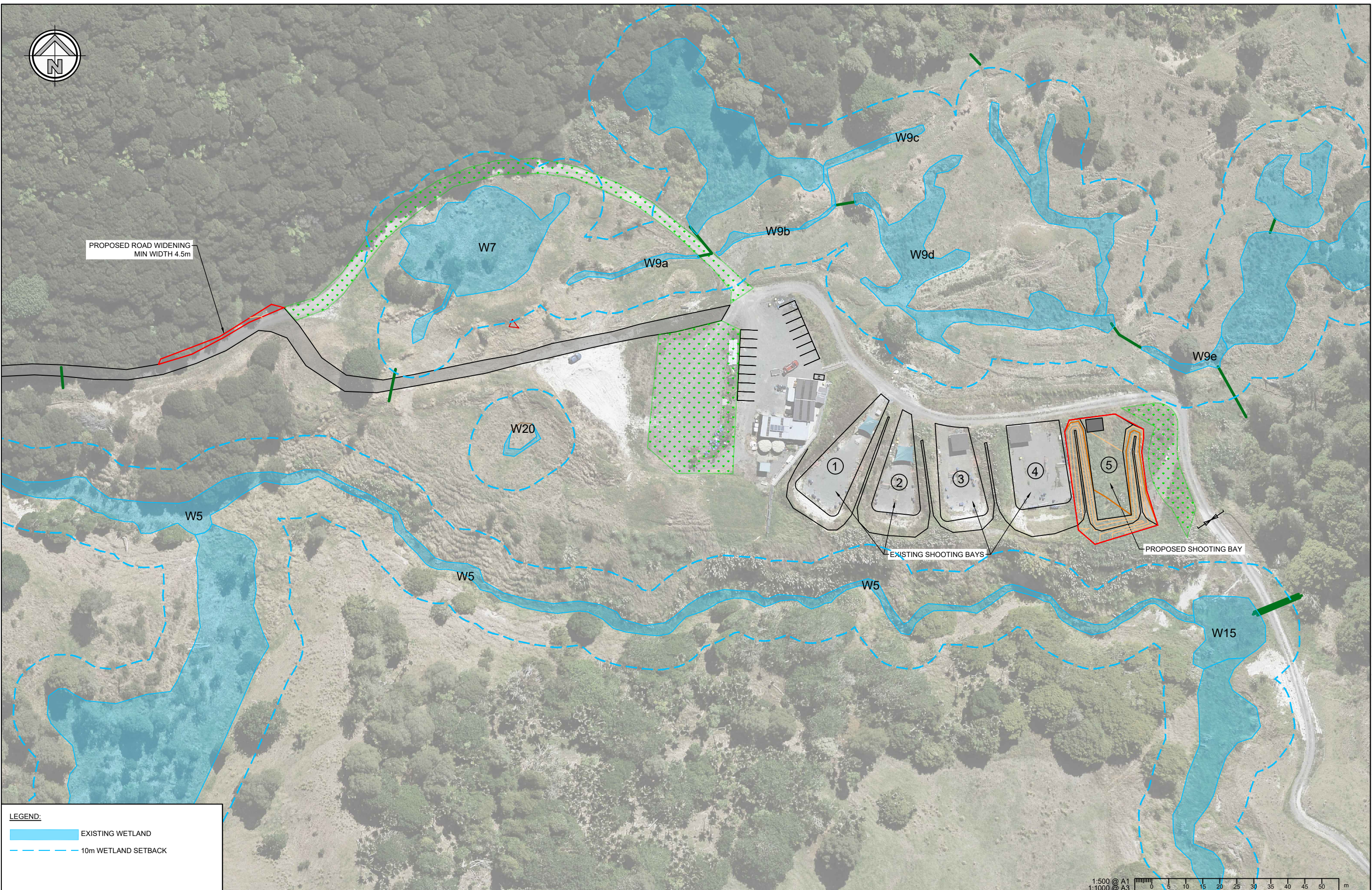
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FOR RESOURCE CONSENT

PROJECT NUMBER 230400	SCALE A1:1:500 A3:1:1000
DWG NUMBER RC-112	REVISION A

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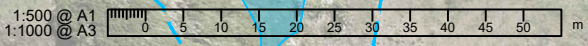


PROPOSED ROAD WIDENING
MIN WIDTH 4.5m



LEGEND:

	EXISTING WETLAND
	10m WETLAND SETBACK



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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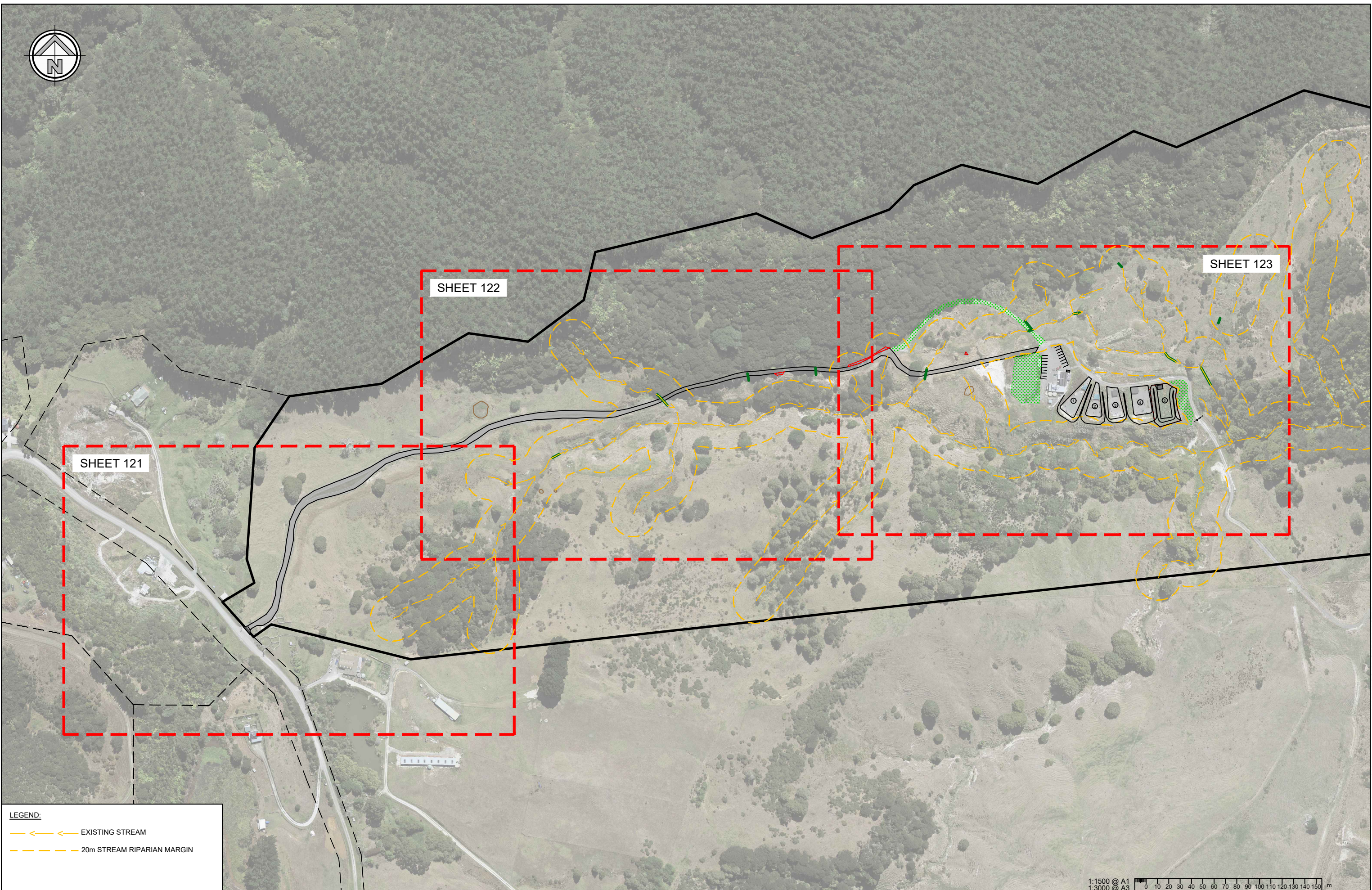
CLIENT
**AUCKLAND SHOOTING CLUB
INCORPORATED**

PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING WETLAND
SHEET 3 OF 3**

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:500
230400	A3:1:1000
DWG NUMBER	REVISION
RC- 113	A

z:\tuhirangi road (287)\engineering\lead drawing\02 - working dwg\04 - resource consent\230400-RC100-SITE PLAN-WETLAND.dwg, 11/3, 5/23/2023 4:51 pm



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN

1:1500 @ A1
1:3000 @ A3

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
SITE OVERALL LAYOUT PLAN - EXISTING STREAM

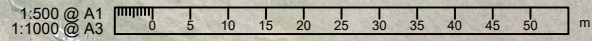
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1:1:1500 A3:1:3000
DWG NUMBER	REVISION
RC- 120	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 120, 5/23/2023 4:51 pm



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING STREAM
 SHEET 1 OF 3**

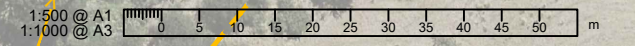
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1:1:500 A3:1:1000
DWG NUMBER	REVISION
RC- 121	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 121_5/23/2023 4:51 pm



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING STREAM
 SHEET 2 OF 3**

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:500
230400	A3:1:1000
DWG NUMBER	REVISION
RC- 122	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 122_5/23/2023 4:51 pm

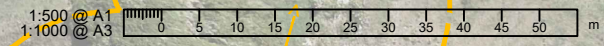


PROPOSED ROAD WIDENING
MIN WIDTH 4.5m



LEGEND:

	EXISTING STREAM
	20m STREAM RIPARIAN MARGIN



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
AUCKLAND**

DRAWING TITLE
**SITE LAYOUT PLAN - EXISTING STREAM
SHEET 3 OF 3**

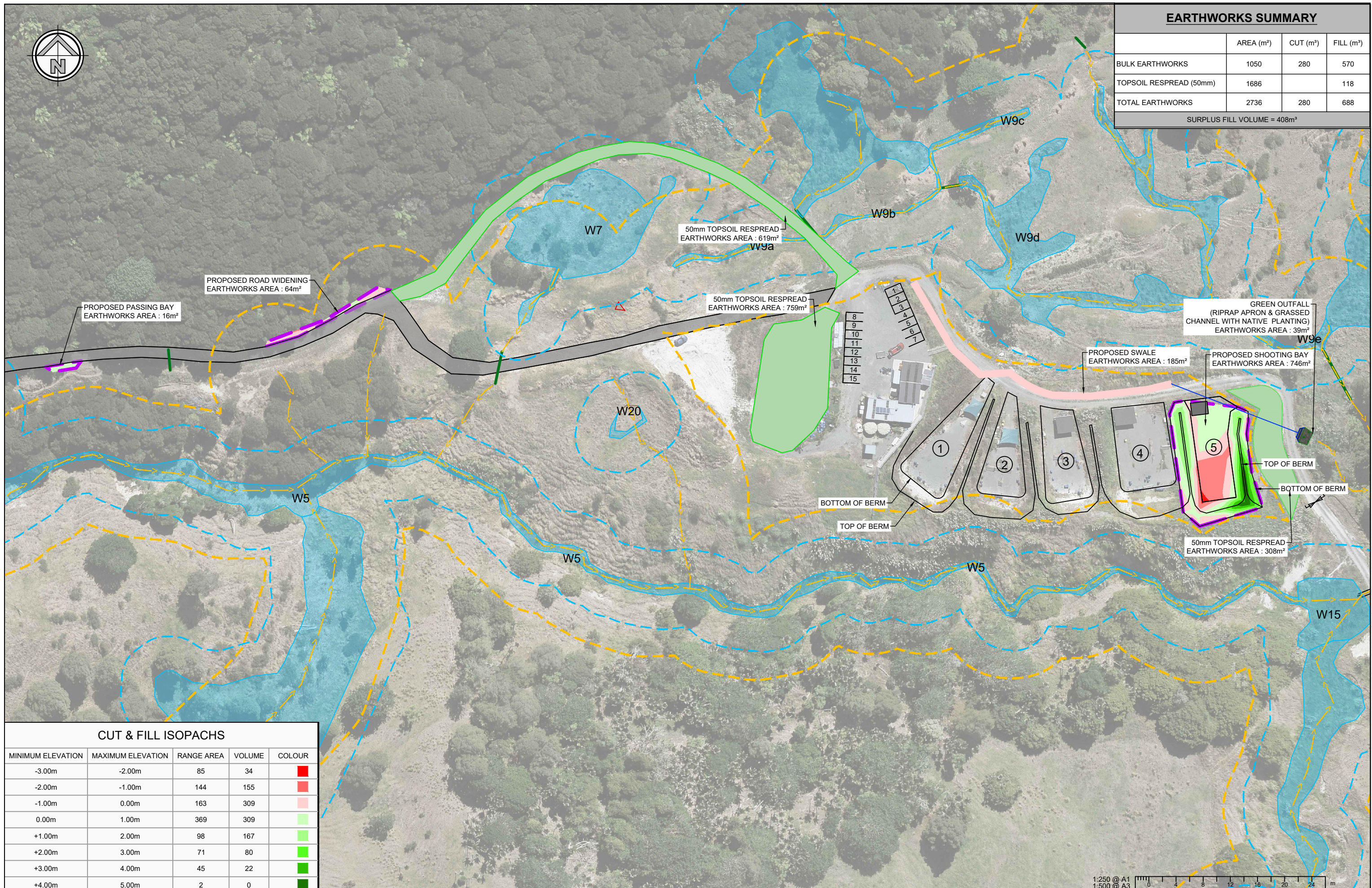
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:500
230400	A3:1:1000
DWG NUMBER	REVISION
RC- 123	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC120-SITE PLAN-STREAM.dwg, 123, 5/23/2023 4:51 pm



EARTHWORKS SUMMARY

	AREA (m ²)	CUT (m ³)	FILL (m ³)
BULK EARTHWORKS	1050	280	570
TOPSOIL RESPREAD (50mm)	1686		118
TOTAL EARTHWORKS	2736	280	688
SURPLUS FILL VOLUME = 408m ³			



CUT & FILL ISOPACHS

MINIMUM ELEVATION	MAXIMUM ELEVATION	RANGE AREA	VOLUME	COLOUR
-3.00m	-2.00m	85	34	Red
-2.00m	-1.00m	144	155	Light Red
-1.00m	0.00m	163	309	Pink
0.00m	1.00m	369	309	Light Green
+1.00m	2.00m	98	167	Light Green
+2.00m	3.00m	71	80	Green
+3.00m	4.00m	45	22	Dark Green
+4.00m	5.00m	2	0	Dark Green

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	terra CONSULTANTS

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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
OVERALL EARTHWORKS PLAN

STAGE
FOR RESOURCE CONSENT

PROJECT NUMBER 230400	SCALE A1:1:500 A3:1:1000
DWG NUMBER RC- 200	REVISION A



z:\tuhirangi road (287)\engineering\lead drawing\02_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 200: 5/23/2023 4:52 pm



50mm TOPSOIL RESPREAD
EARTHWORKS AREA : 619m²

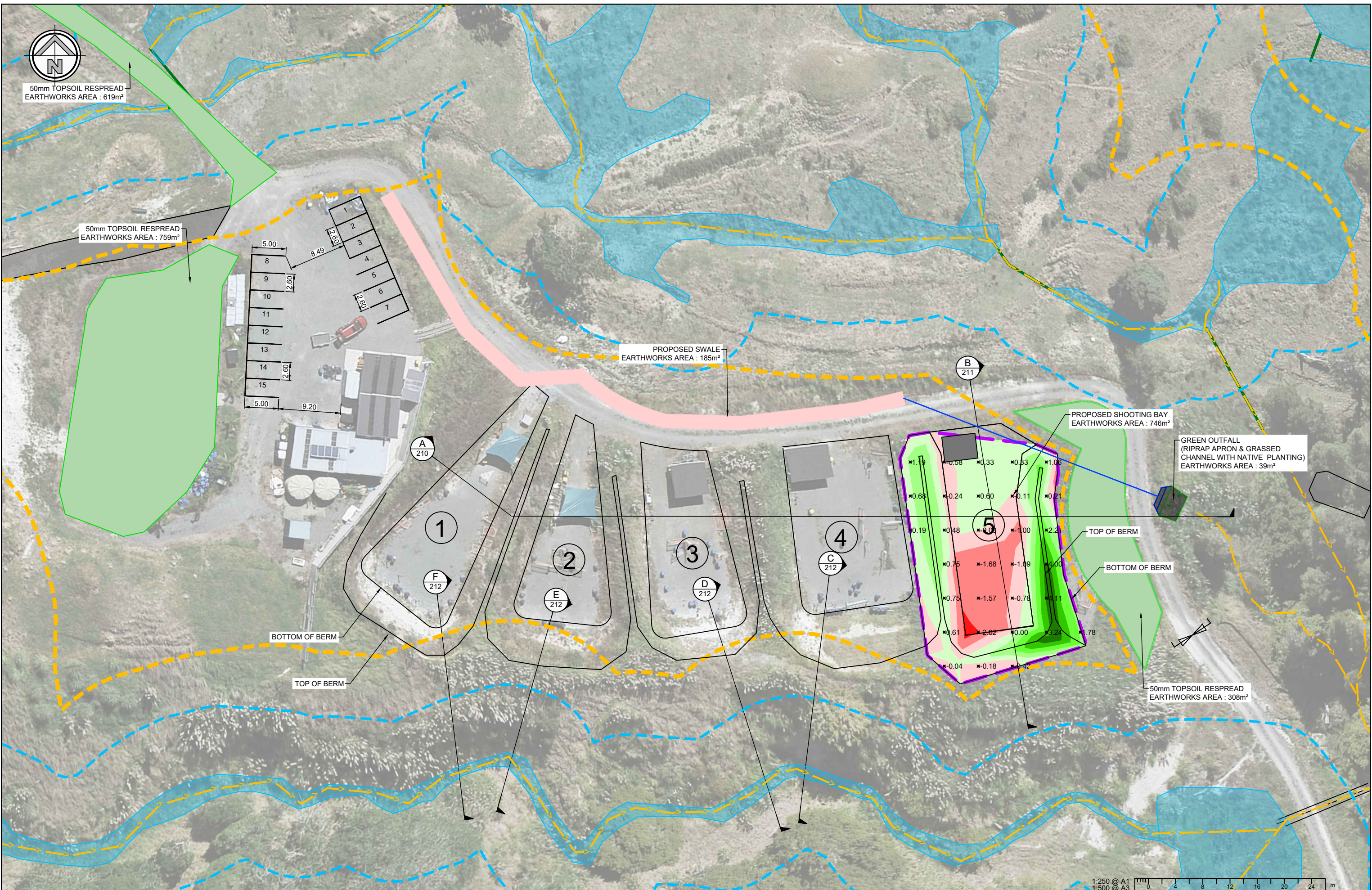
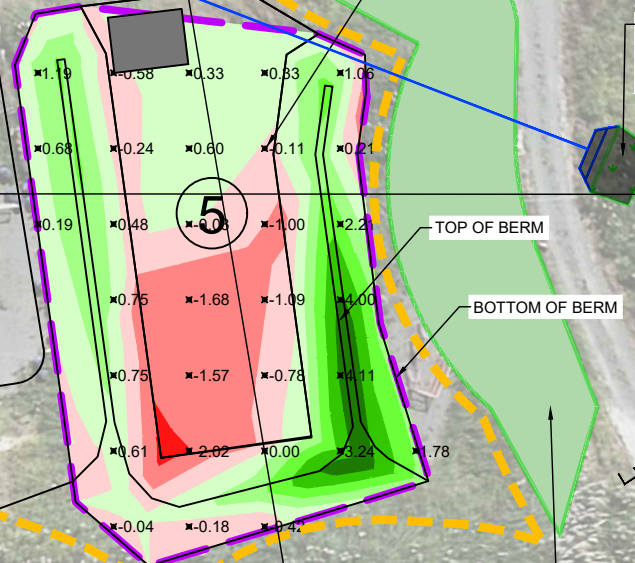
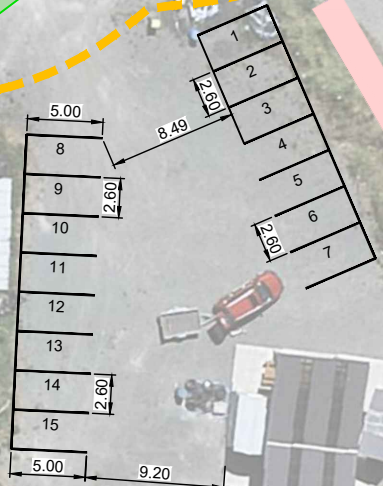
50mm TOPSOIL RESPREAD
EARTHWORKS AREA : 759m²

PROPOSED SWALE
EARTHWORKS AREA : 185m²

PROPOSED SHOOTING BAY
EARTHWORKS AREA : 746m²

GREEN OUTFALL
(RIPRAP APRON & GRASSED
CHANNEL WITH NATIVE PLANTING)
EARTHWORKS AREA : 39m²

50mm TOPSOIL RESPREAD
EARTHWORKS AREA : 308m²



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

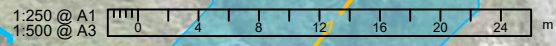
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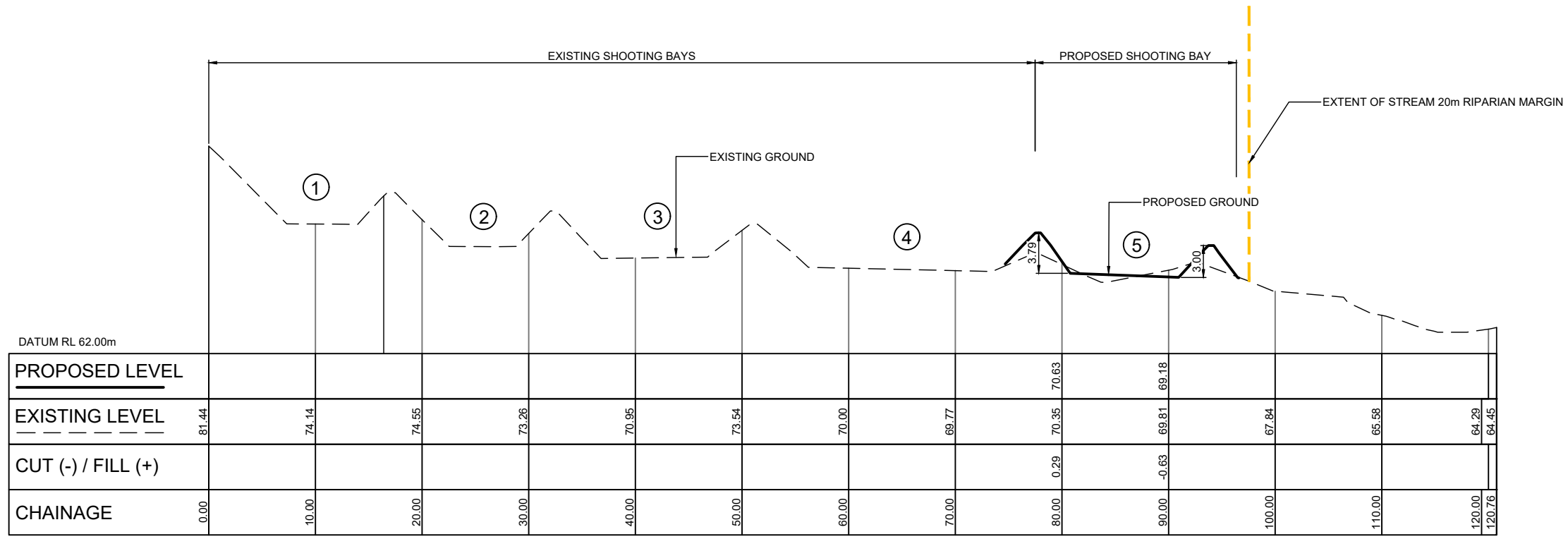
PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
AUCKLAND**

DRAWING TITLE
**EARTHWORKS PLAN
- SHOOTING BAY**

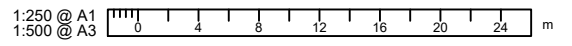
STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:250
230400	A3:1:500
DWG NUMBER	REVISION
RC- 201	A



z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 201: 5/23/2023, 4:52 pm



SECTION A-A LONGSECTION
 CH: 0.00m TO CH: 120.76m
 1:250H 1:250V @ A1 (DOUBLE FOR A3)



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	TERRA CONSULTANTS

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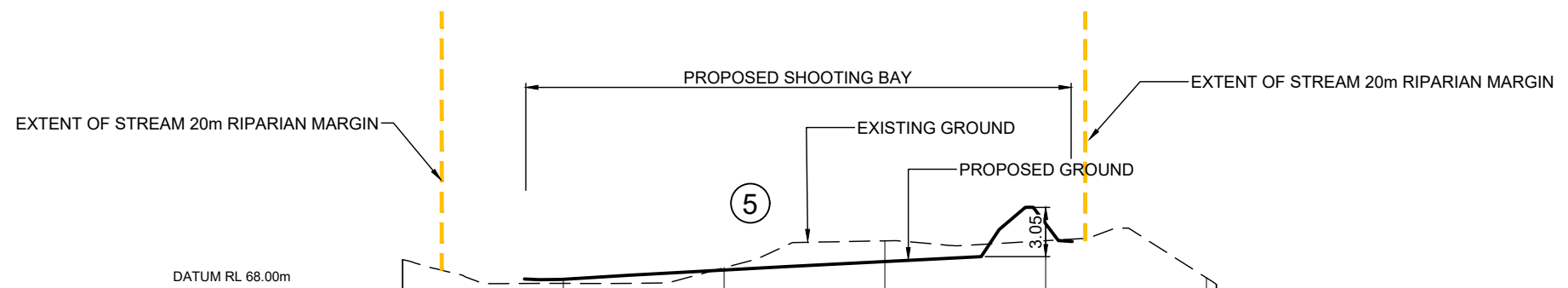
CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
TYPICAL CROSS SECTION SHEET 1 OF 3

STAGE		FOR RESOURCE CONSENT	
PROJECT NUMBER	230400	SCALE	A1 1:250 A3 1:500
DWG NUMBER	RC- 210	REVISION	A

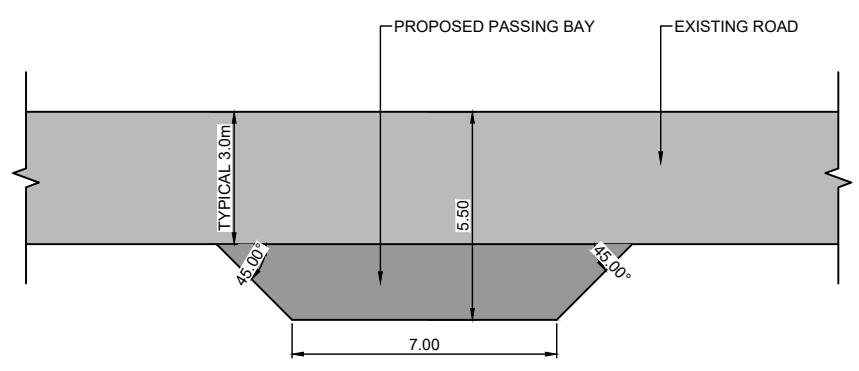
z:\tuhirangi road (287)\engineering\lead drawing\02_working\dwg\04_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 210_5/23/2023 4:52 pm



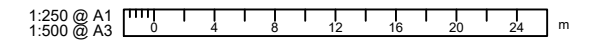
DATUM RL 68.00m

PROPOSED LEVEL	69.97	68.50	69.47	71.14	71.15	68.84	68.43
EXISTING LEVEL	69.97	68.50	69.47	71.14	71.15	68.84	68.43
CUT (-) / FILL (+)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	50.61

SECTION B-B LONGSECTION
 CH: 0.00m TO CH: 50.61m
 1:250H 1:250V @ A1 (DOUBLE FOR A3)



TYPICAL PASSING BAY DETAILS
 1:100 @A1
 1:200 @A3



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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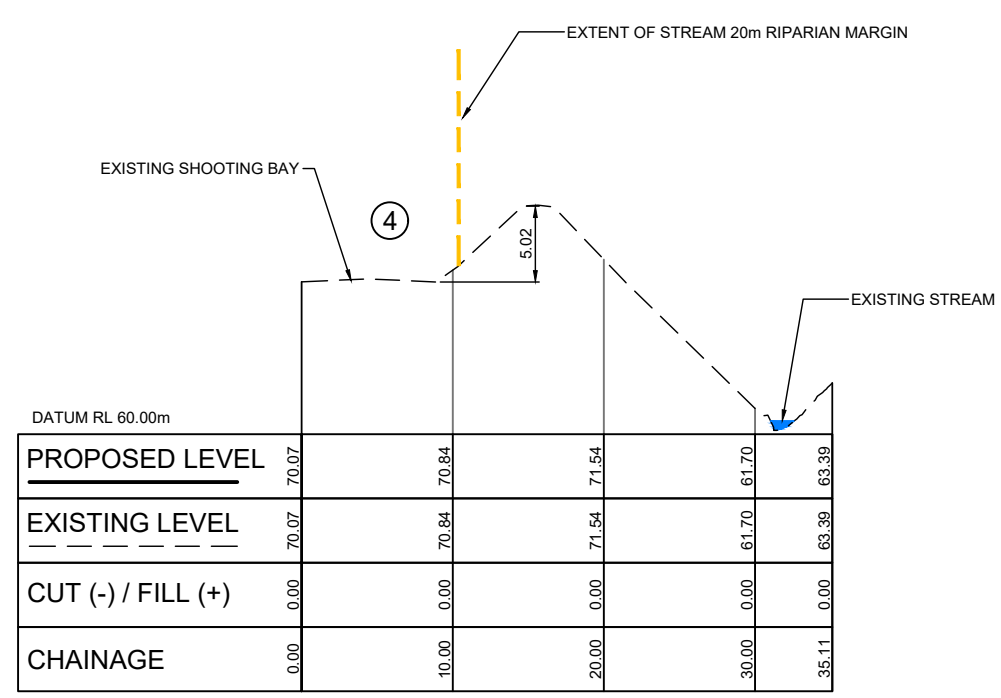
CLIENT
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PROJECT / LOCATION
 287 TUHIRANGI ROAD, MAKARAU,
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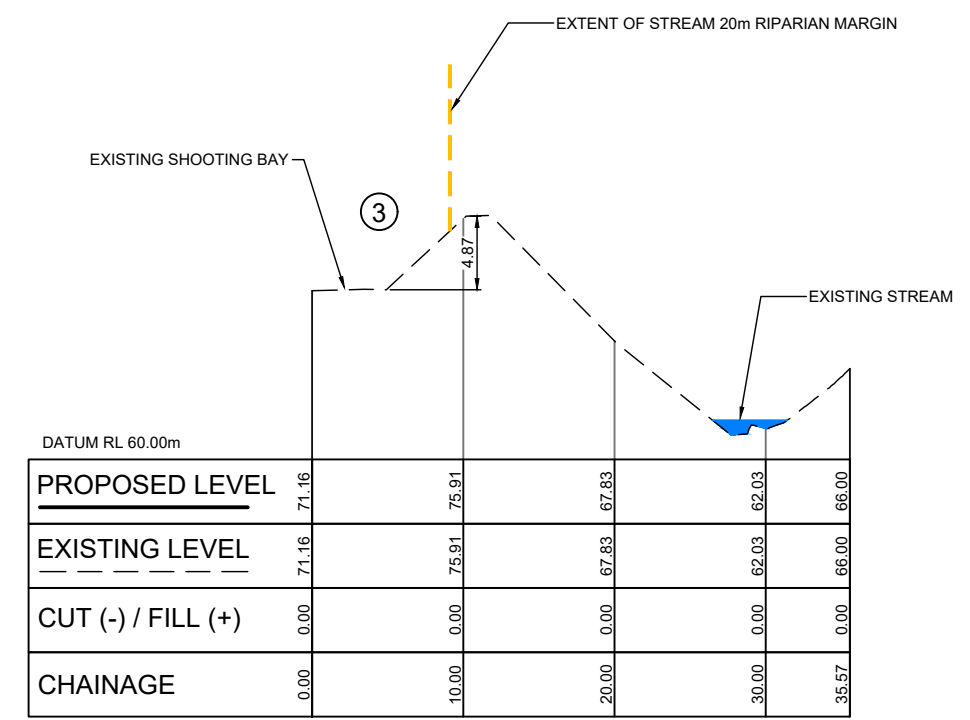
DRAWING TITLE
 TYPICAL CROSS SECTION
 SHEET 2 OF 3

STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1:1:250 A3:1:500
DWG NUMBER RC- 211	REVISION A

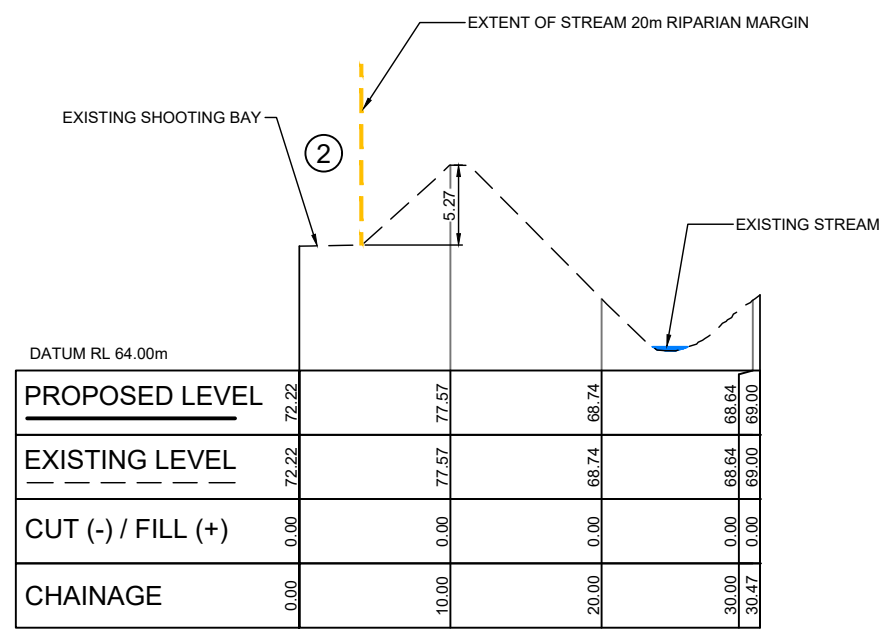
z:\tuhirangi road (287)\engineering\lead drawing\02_working dwg\04_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 211_5/23/2023 4:52 pm



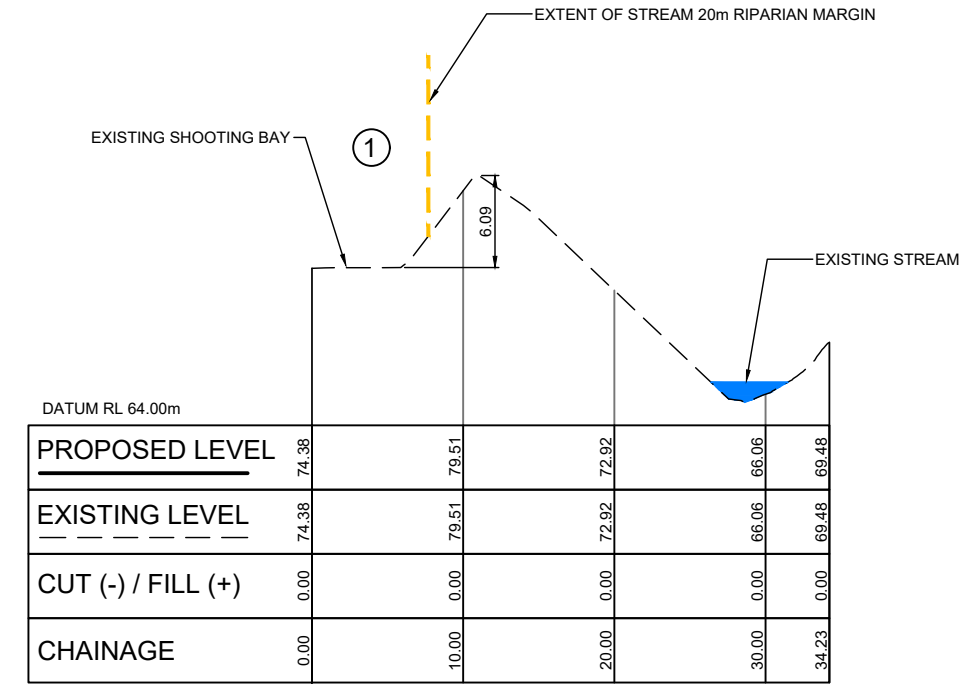
SECTION C-C LONGSECTION
CH: 0.00m TO CH: 35.11m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



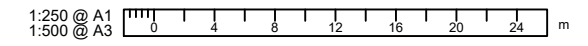
SECTION D-D LONGSECTION
CH: 0.00m TO CH: 35.57m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



SECTION E-E LONGSECTION
CH: 0.00m TO CH: 30.47m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



SECTION F-F LONGSECTION
CH: 0.00m TO CH: 34.23m
1:250H 1:250V @ A1 (DOUBLE FOR A3)



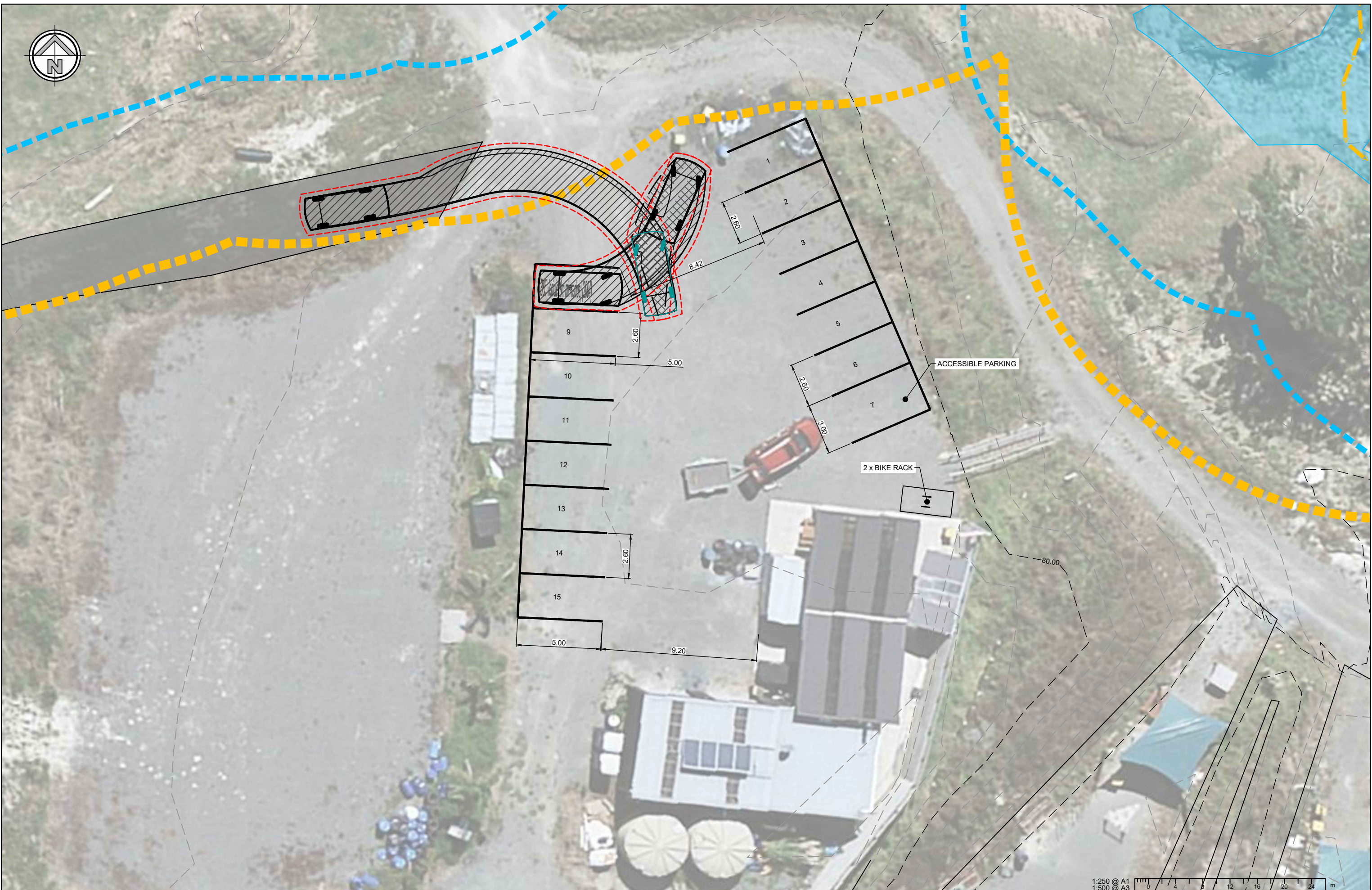
ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	 PO BOX 12858, Penrose, New Zealand Auckland: (09) 357 3557 Northland: (09) 431 4444 Christchurch: (03) 379 5055 Email: terra@terragroup.co.nz Web: www.terragroup.co.nz DRAWINGS ARE COPYRIGHT AND PROPERTY OF TERRA CONSULTANTS

CLIENT	AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT / LOCATION	287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE	TYPICAL CROSS SECTION SHEET 3 OF 3
---------------	------------------------------------

STAGE	FOR RESOURCE CONSENT
PROJECT NUMBER	230400
DWG NUMBER	RC- 212
SCALE	A1:1:250 A3:1:500
REVISION	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working\dwg\04_resource consent\230400-RC200-EARTHWORKS PLAN.dwg, 212, 5/23/2023, 4:52 pm



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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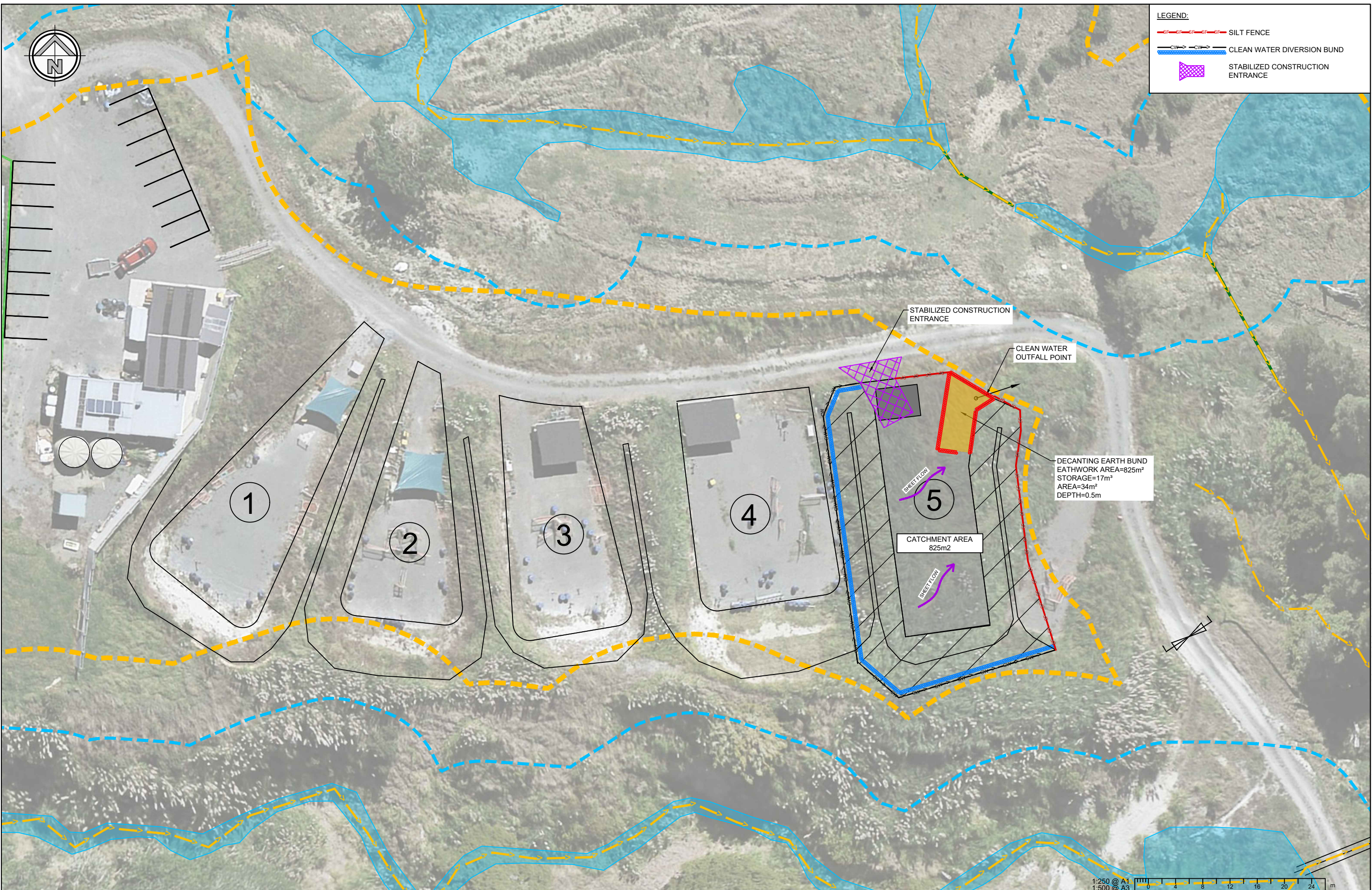
CLIENT
**AUCKLAND SHOOTING CLUB
 INCORPORATED**

PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
TRACKING PLAN

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1 1:100 A3 1:200
DWG NUMBER	REVISION
RC- 220	A

z:\tuhirangi road (287)\engineering\lead drawing\02_working_dwg\04_resource_consent\230400-RC220-TRACKING PLAN.dwg, 230400-RC220-TRACKING PLAN - 220_5/23/2023 5:01 pm



LEGEND:

	SILT FENCE
	CLEAN WATER DIVERSION BUND
	STABILIZED CONSTRUCTION ENTRANCE

STABILIZED CONSTRUCTION ENTRANCE

CLEAN WATER OUTFALL POINT

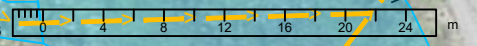
DECANTING EARTH BUND
 EATHWORK AREA=825m²
 STORAGE=17m³
 AREA=34m²
 DEPTH=0.5m

CATCHMENT AREA
 825m²

SHEET FLOW

SHEET FLOW

1:250 @ A1
 1:500 @ A3



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	
					DESIGNED		
					DRAWN		
					TRACED		
					CHECKED		

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PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

STAGE FOR RESOURCE CONSENT	
PROJECT NUMBER 230400	SCALE A1:1:250 A3:1:500
DWG NUMBER RC- 300	REVISION A

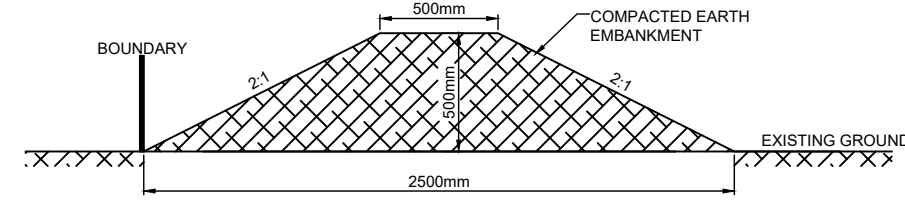
z:\tuhirangi road (287)\engineering\lead drawing\02_resource consent\230400-RC300-EROSION AND SEDIMENT CONTROL PLAN.dwg, 300, 5/23/2023 4:53 pm

POST SPACING CAN BE INCREASED FROM 2 METRES TO 4 METRES TO SUPPORT BY A 16mm DIAMETER HIGH TENSILE WIRE ALONG THE TOP WITH CLIPS EVERY 200mm.

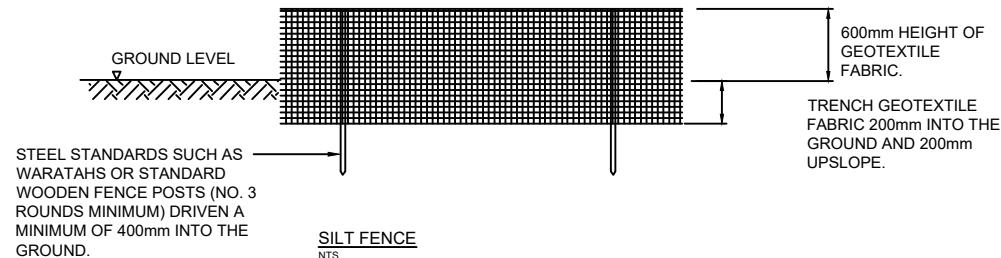
SELF TAPPING WOOD SCREWS

WRAP BOTH ENDS OF THE FABRIC AROUND ONE STAKE AND CLAMP THE OTHER STAKE TO IT USING SELF TAPPING SCREWS AT 150mm SPACINGS.

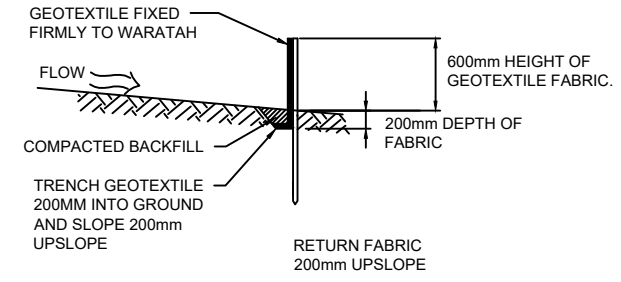
STANDARD DETAIL FOR FABRIC JOIN



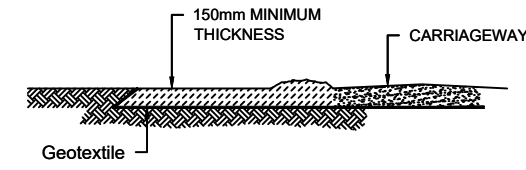
EARTH BUND CROSS SECTION
NTS



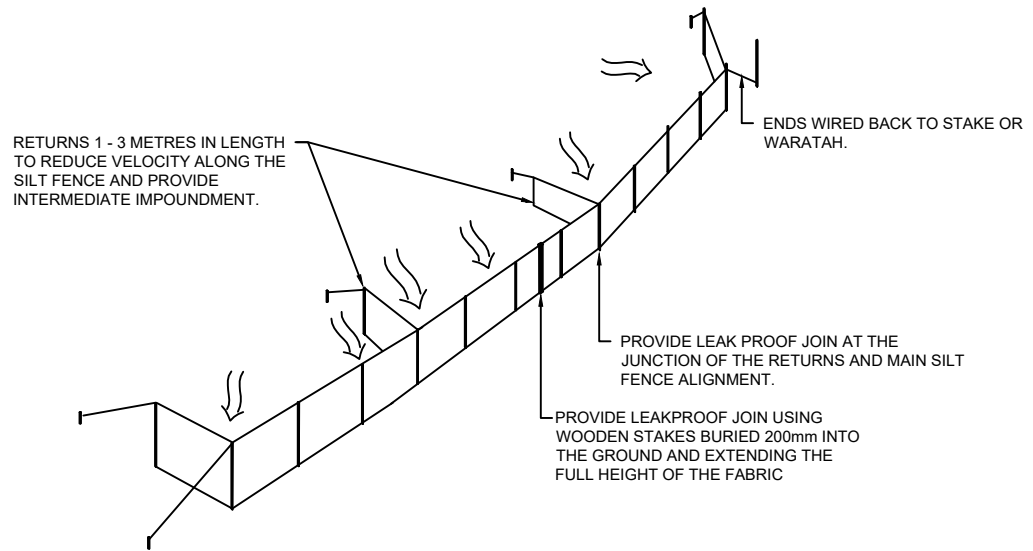
SILT FENCE
NTS



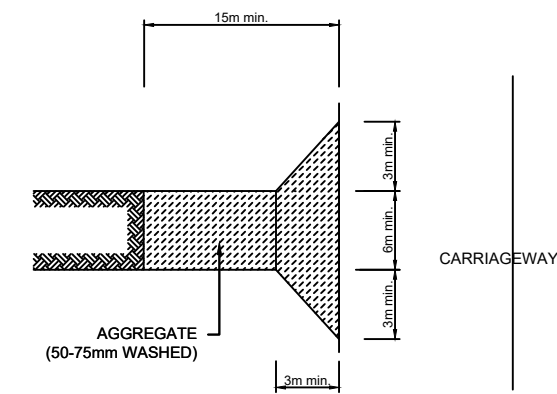
RETURN FABRIC
200mm UPSLOPE



SIDE ELEVATION



SILT FENCE WITH RETURNS AND SUPPORTS WIRE



PLAN VIEW

STABILISED CONSTRUCTION ENTRANCE
N.T.S.

1:250 @ A1
1:500 @ A3

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	<p>terra CONSULTANTS PO BOX 12858, Penrose, New Zealand Auckland: (09) 357 3557 Northland: (09) 431 4444 Christchurch: (03) 379 5055 Email: terra@terragroup.co.nz Web: www.terragroup.co.nz DRAWINGS ARE COPYRIGHT AND PROPERTY OF TERRA CONSULTANTS</p>
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					TRACED		
					CHECKED		

CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
EROSION AND SEDIMENT CONTROL STANDARD DETAILS

STAGE
FOR RESOURCE CONSENT

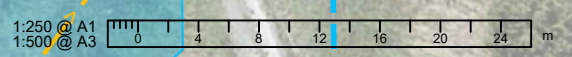
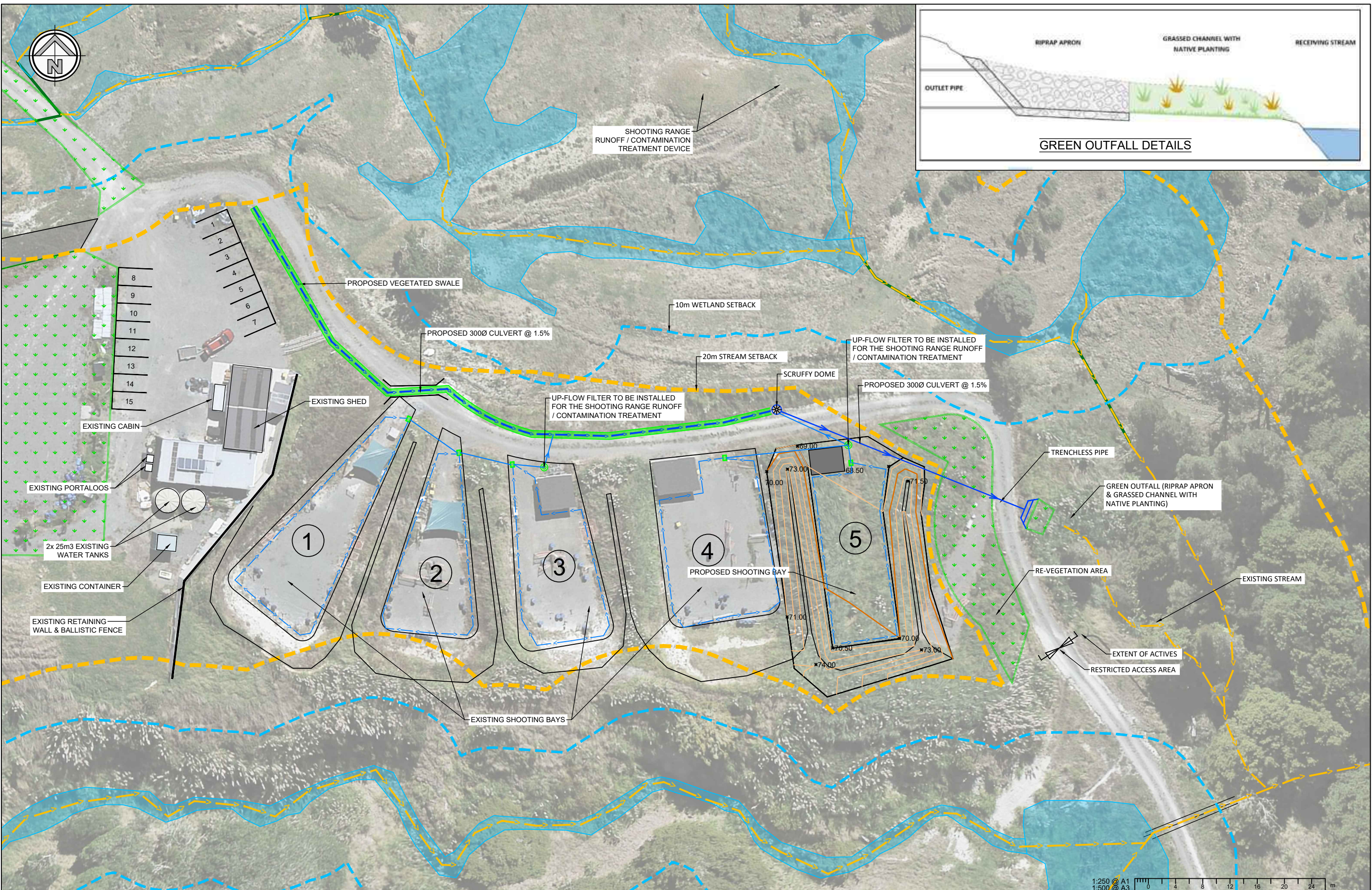
PROJECT NUMBER
230400

DWG NUMBER
RC- 310

SCALE
A1 1:250
A3 1:500

REVISION
A

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A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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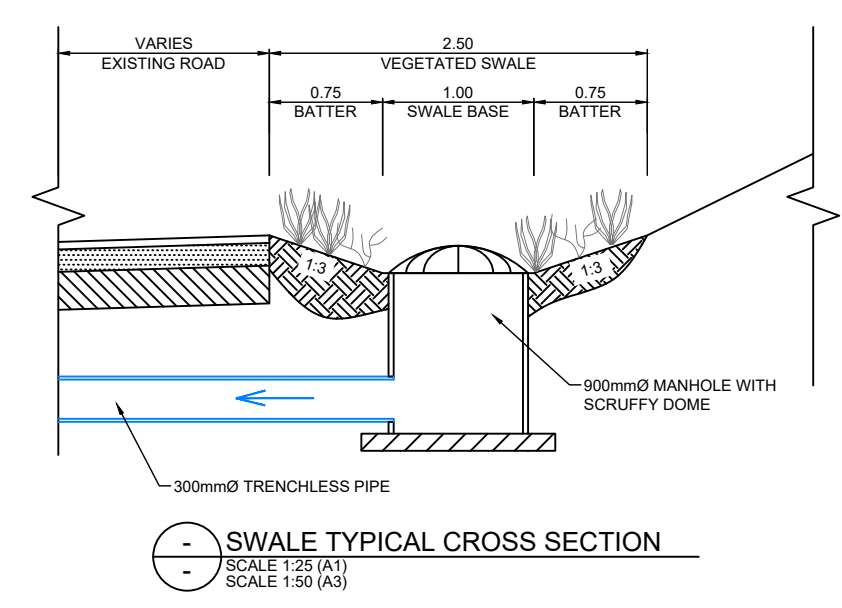
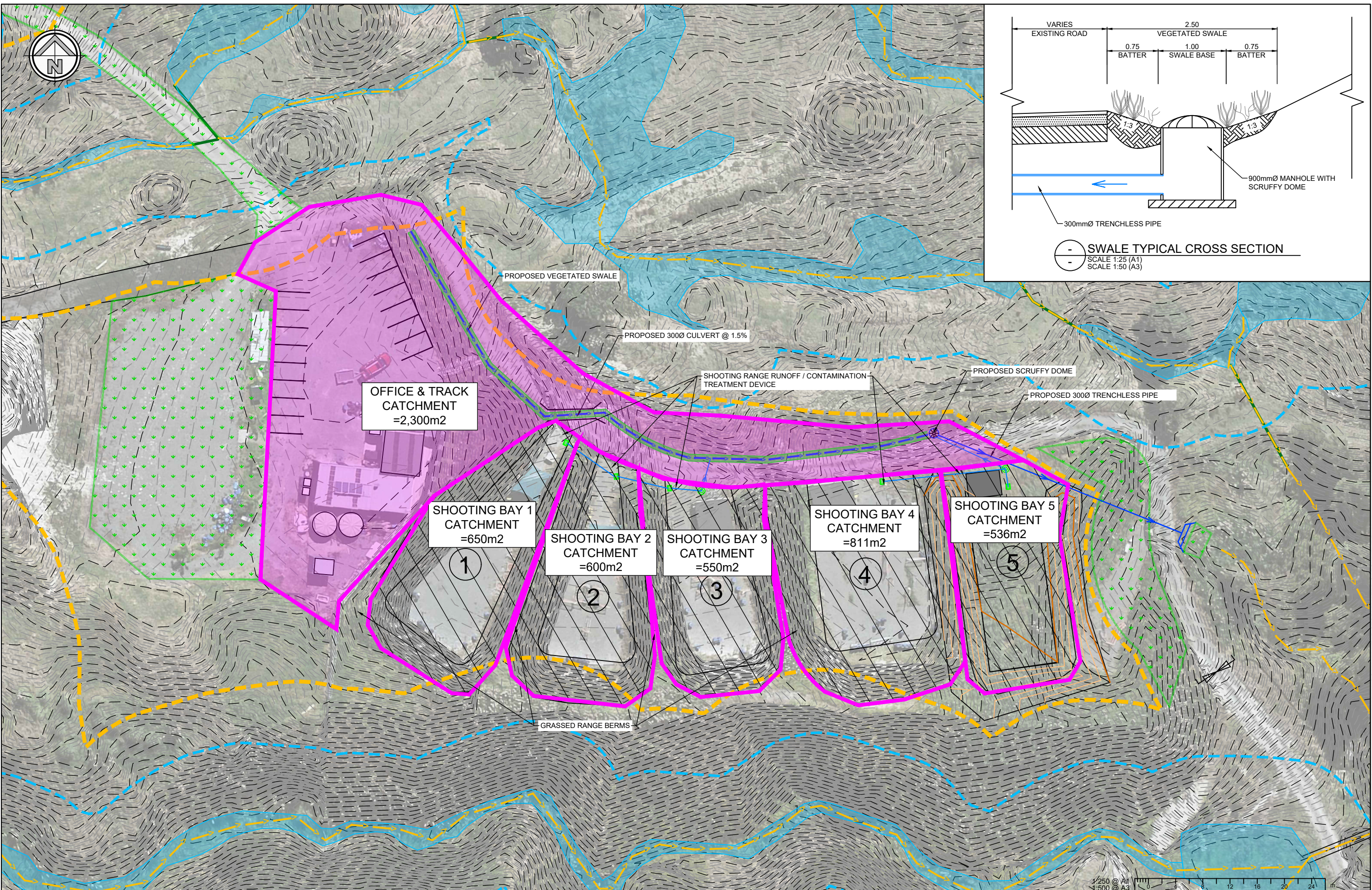
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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
DRAINAGE LAYOUT PLAN

STAGE		FOR RESOURCE CONSENT	
PROJECT NUMBER	230400	SCALE	A1:1:250 A3:1:500
DWG NUMBER	RC- 400	REVISION	A

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OFFICE & TRACK
 CATCHMENT
 =2,300m²

SHOOTING BAY 1
 CATCHMENT
 =650m²

SHOOTING BAY 2
 CATCHMENT
 =600m²

SHOOTING BAY 3
 CATCHMENT
 =550m²

SHOOTING BAY 4
 CATCHMENT
 =811m²

SHOOTING BAY 5
 CATCHMENT
 =536m²

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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CLIENT
**AUCKLAND SHOOTING CLUB
 INCORPORATED**
 PROJECT / LOCATION
**287 TUHIRANGI ROAD, MAKARAU,
 AUCKLAND**

DRAWING TITLE
10 YEAR STORMWATER CATCHMENT PLAN

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:250
230400	A3:1:500
DWG NUMBER	REVISION
RC- 410	A

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JOB: 287 Tuhirangi Road, Makarau, Auckland		
SUBJECT: 10 Year Swale Capacity Assessment		
BY: G.CAI	DATE: 2/05/23	JOB NO: 230400

SWALE DESIGN CALCULATIONS

Auckland Council
GD01; C6.0

CATCHMENT AREA

Impermeable Area	3461	m ²
Permeable Area	500	m ²
Total Catchment Area A_c	3961	m²

RUNOFF FLOW

Rational Method

Water Quality Rainfall Intensity	i	10.0	mm/hr
Impermeable Coefficient	C_{imp}	0.95	
Permeable Coefficient	C_{perm}	0.50	
Total Water Quality Flow Q	0.010	m³/s	

SWALE DESIGN

Auckland Council GD01

Water Quality Flow Depth	d	0.062	m
Planting Type		Vegetated	
Channel Slope	s	5.00%	
Base width	b	1.000	m
Side Slope	Z 1:	3	
Mannings 'n'	n	0.250	
Cross-sectional area	A	0.073	m ²
Hydraulic radius	R	0.059	m
Width at Water Level	w	1.37	m
WQV Design Flow Check Q_d	0.010	m³/s $\geq Q$	OK
Velocity V	0.135	m/s	
$V < 0.8m/s$	OK		

$$0.6m < b < 2m$$

$$A = bd + Zd^2$$

$$T = b + 2dZ$$

$$Eq 34$$

$$V = Q/A$$

10 YEAR STORM RUNOFF

10yr Rainfall Intensity	101.0	mm/hr
Total 10 Year Flow Q_{10}	0.099	m³/s

10 YEAR SWALE FLOW

10 Year Flow Depth	d_{10}	0.209	m
Mannings 'n'	n	0.250	
Cross-sectional area	A	0.341	m ²
Hydraulic radius	R	0.186	m
Width at Water Level	w_{10}	2.26	m
Design Flow Check Q_d	0.099	m³/s $\geq Q_{10}$	OK
Velocity V	0.291	m/s	
$V < 1.5m/s$	OK		

Eq 34
 $V = Q/A$

CHECK DAM DESIGN

Check Dams Used	No	Check Dams Not Required
Swale Longitudinal Grade	5.00%	
Check Dam Height	0.10	m
Check Dam Spacing	N/A	m
Check Dam Volume	-	m ³
Residence Time at WQF	0.0	min

Eq 38
Eq 36

CHECK 10 YEAR FLOW OVER CHECK DAMS

Depth of Flow Over Check Dam	0.110	m
Depth of Water at Check Dam	N/A	m

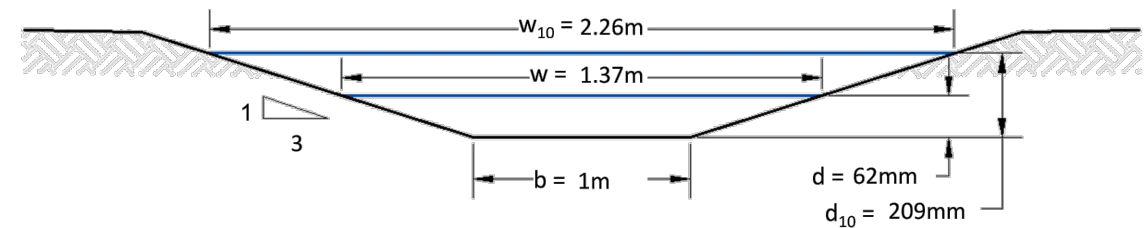
Eq 41

CHECK RESIDENCE TIME

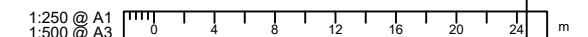
Minimum travel time	t	9	min
Minimum swale length L	72.8	m	

Minimum 9mins
Eq 35 & 36

SWALE DIMENSIONS:



Planting = Vegetated
Longitudinal Slope = 5 %
Check Dams = N/A
Length Required = 72.8 m



ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	03/05/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	terra consultants

CLIENT	AUCKLAND SHOOTING CLUB INCORPORATED	DRAWING TITLE	10 YEAR SWALE TREATMENT ASSESSMENT	STAGE	FOR RESOURCE CONSENT
PROJECT / LOCATION	287 TUHIRANGI ROAD, MAKARAU, AUCKLAND	PROJECT NUMBER	230400	SCALE	A1:1:250 A3:1:500
		DWG NUMBER	RC- 411	REVISION	A

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