

26 May 2023

Auckland Shooting Club
C/- Terra Group
79 Grafton Road
Auckland 1010

Attn: Corné Roelofse

Geotechnical Addendum - 287 Tuhirangi Road, Makarau, Auckland

(Our Reference: 13704.001.001_03)

1 Introduction

ENGEO Ltd was requested by the Auckland Shooting Club to prepare an addendum to the existing Geotechnical Reports (listed below) to support a retrospective consent which is being sought for the accessway, parking area, and five shooting bays at 287 Tuhirangi Road, Makarau, Auckland. This work has been carried out in accordance with our signed proposal, dated 4 May 2023 (reference 13704.001.001_01), and authorisation by John Taylor to proceed.

The scope of this assessment is limited to a review of the updated development plans (by Terra Consultants Ltd, project number: 230400, rev: A, dated 13 March 2023) and is focussed on the accessway, parking area, and five shooting bays within the central part of the site. This letter summarises the findings of our desktop assessment.

ENGEO has previously prepared the following reports in relation to the development:

- [Geomorphic Assessment](#) – 287 Tuhirangi Road, Makarau (report reference 13704.000.000_02 dated 17 March 2017);
- [Geotechnical Plan Review](#) of 287 Tuhirangi Road, Makarau, Auckland (report reference 13704.000.001_02 dated 9 May 2017); and
- [Revised Geotechnical Plan Review](#) of 287 Tuhirangi Road, Makarau, Auckland (report reference 13704.000.001_06 dated 28 June 2018).

2 Site Description

The site is located at 287 Tuhirangi Road on an elongated section of approximately 37.9 Ha. It is constrained to a ridgeline in the north and a linear, east to west trending site boundary in the south. The site has been partially developed with an accessway to the northwest, carpark area with a single-storey building in the centre of the site serving as a clubhouse, and five shooting bays constructed to the southeast of the carpark.

The site encompasses a number of overland flow paths and two large gullies, which converge in the southeast portion of the site. The site is largely grassed, the norther slopes are vegetated with bush and relatively young shrubs. The northern portion of the site generally slopes towards the south, and the slopes in the southern portion of the site slope towards overland flow paths and gullies. Approximately 20 m south of the constructed shooting bays is the Kotipu Stream.

The 2017 Geomorphic Assessment of the site observed hummocky terrain between the location of the existing shooting bays and the overland flow path. Scour and small-scale dropout were observed on the northern banks of the Kotipu Stream.

Site features and mapped significant geomorphic features are depicted on the attached geomorphic and Terra development plans.

3 Aerial Photograph Review

As part of the Geomorphic Assessment Report issued in 2017 an aerial photograph review was conducted for the location of the proposed shooting bays. This review consisted of a review of aerial photographs up to December 2015, which were available to ENGEO at the time of writing that report.

A supplementary review has been carried out on aerial photographs made available since issuing the Geomorphic Assessment Report. The findings of this review are as follows:

- In December 2015, a network of motocross tracks had been formed across the site and a building constructed within the central portion of the site.
- In February 2017 earthworks appear to have commenced in the vicinity of proposed Shooting Bays 1 to 5. By March 2017 it appears the construction of Shooting Bays 1 to 2 was underway.
- In April 2017 it appears that Shooting Bay 3 had been constructed and that earthworks plant were constructing Shooting Bay 4 at the time of the aerial photograph. The carpark appears to be covered in hardstand at this time. Earthworks appeared to be underway to the west of the carpark.
- In June 2017 it appears that earthwork plant was located within Shooting Bay 3 and that construction of Shooting Bay 4 appeared to be underway. Formed bunds associated with Shooting Bays 1 and 2 appear to be vegetated with grass at this time.
- In May 2018 small structures appear to be constructed in the northern parts of Shooting Bays 3 and 4 and multiple vehicles appear to be in the carpark at this time. The road to the north and a farm track / gravel road have been constructed to the east of the shooting bay areas. Formation of the new accessway appeared to have commenced by May 2018.
- The roadway extending to the north and east of the shooting bays appeared to have had hardstand placed and was more defined in September 2018.
- Construction of the narrow Shooting Bay 5 appeared to have commenced prior to February 2019.
- In June 2021 additional earthworks associated with the new access appeared to have been carried out.

- Further earthworks associated with the western accessway appeared to have been underway in August 2021.

Aerial photographs are attached.

4 Existing Works

Based on our review of aerial photographs, site walkover and correspondence with Terra, it appears that four shooting bays, a carpark, and an accessway to the northwest and southeast have been constructed since the issue of the Revised Plan Review in 2018. We understand that a fifth shooting bay (Shooting Bay 5) was not fully constructed due to an abatement notice issued by Auckland Council.

Based on the plans provided to ENGEO by Terra Consultants Ltd (project number: 230400, rev: A, dated 13 March 2023), we note the following:

- Earthworked bunds for the existing Shooting Bays (1 to 4) had been formed at angles between approximately 40 and 47 degrees to the horizontal and were between 3 m and 7 m high.
- The southern-most bunds associated with Shooting Bays 1 to 4 have been formed between 16 and 22 m from the edge of the Kotipu Stream, with the slope between the stream and these bunds measured (from the provided Terra plans) to be approximately 30 degrees to the horizontal.

The provided Terra Consultant plans are attached to this letter.

ENGEO has not been provided with QA data regarding subgrade stripping, fill placement or the construction methodology for the earth bunds that form Shooting Bays 1 to 4 or any QA data associated with the construction of the access road and carpark.

5 Proposed Earthworks

A site layout plan prepared by Terra Consultants (drawing number RC-103; dated 1 March 2023), copy attached, indicates that future proposed works include:

- Construction of a passing bay and proposed widening of the access road. These works will be carried out on the northern side of the driveway at the base of the northern slope and will be primarily in cut. The passing bay will be minimum 5.5 m width and 5.0 m long, the road widening will be minimum 4.5 m width and 36.5 m long.
- Proposed cut and fills of up to 2.1 m and 4.1 m respectively above existing ground levels. Maximum extent of fills are shown to be located in the southeast portion and maximum cuts are shown to be in the southwest portion of Bay 5.
- The construction of a new shooting bay (Bay 5) to replace the western-most existing shooting bay, as well as associated drainage works. The drainage works are understood to comprise a swale along the north of the existing shooting bays with two culverts proposed to along the existing access way. A green outfall with a riprap apron is proposed to the east of Bay 5 discharging into the existing stream.

- The construction of Shooting Bay 5 will include three earth bunds (along the western, eastern and southern sides of the shooting bay) proposed to be formed at approximately 45 to 60 degrees to the horizontal and up to 3 m high.

6 Summary of Previous Reporting

The previously prepared ENGEO reports identified evidence of active and historic instability in the form of shallow- and deep-seated instability across the site (predominantly in the northern part of site), these features are shown on the attached geomorphological plan.

The proposed road widening and passing bay are located at the base of an area previously mapped as being subject to slope instability.

The existing Shooting Bays 1 to 4, the carpark and proposed Shooting Bay 5 are located within an area previously mapped as having undergone historical earthworks. Obvious signs of historic instability were not mapped within the vicinity of Shooting Bay 5.

The previous reporting included geotechnical recommendations for earthworks and further investigations. However, as the consequence of slope failure of the small batters between shooting bays is considered to be very low to insignificant from a human safety and cost standpoint (i.e. small slumps in the bunds are unlikely to endanger humans or damage structures and are likely to be easily remediated). We have provided additional recommendations below for the works associated with Shooting Bay 5 and the driveway.

7 Conclusions and Recommendations

Shooting Bays

The earthworks appear to have been undertaken without engineering supervision, with associated bunds formed steeper than previous ENGEO recommendations. It is therefore possible that they could undergo localised surficial slumping or scour.

However, as the bunds are of relatively low height, have been vegetated and are located within a rural environment and away from property boundaries with no adjacent consented structures, the risk of damage to persons or structures / infrastructure on account of a minor slump (should one be generated on a bund) is considered to be negligible.

To avoid risk to the stream environment, i.e., adverse effects on ecological values and flooding, we propose that the bunds be rehabilitated to achieve the slope recommended in the previous ENGEO report. The rehabilitation should be undertaken under ENGEO supervision.

In the unlikely event there is a slump, we expect the associated spoil to be relatively easily remediated with conventional earthworks plant.

We recommend earthworks associated with Shooting Bay 5 be observed and tested by a suitably qualified geotechnical professional to a minimum of CM3 level.

Driveway Works

As the proposed driveway widening and passing bay are located in an area of potential instability (and cuts are proposed which may de-buttress the northern slope), we recommend that further geotechnical investigation and slope stability analysis is completed in these areas to assess the suitability of the proposed works and provide associated geotechnical recommendations to achieve the desired outcome without increasing the chance of instability in the area.

8 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Auckland Shooting Club, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iii. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.
- iv. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (09) 972 2205 if you require any further information.

Report prepared by



Hamish Gray

Engineering Geologist



Jacob Cornall

Engineering Geologist

Report reviewed by



Matt Packard, CMEngNZ (CPEng)

Senior Geotechnical Engineer

Attachments:

- Terra Consultants Plans
- Geomorphic Plan
- Aerial Photos

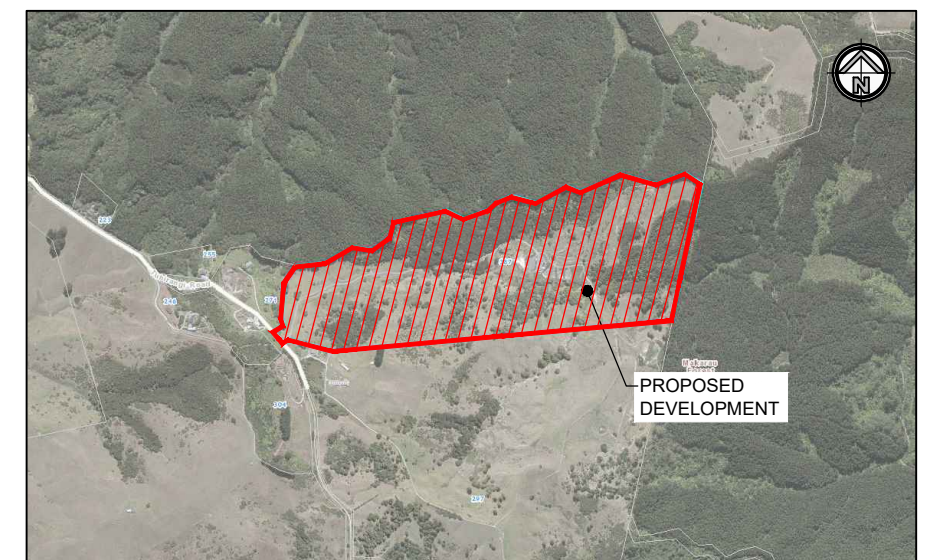
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

CLIENT: AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT No. 230400

ENGINEERING PLANS FOR
RESOURCE CONSENT
REVISION A

APRIL 2023

DRAFT



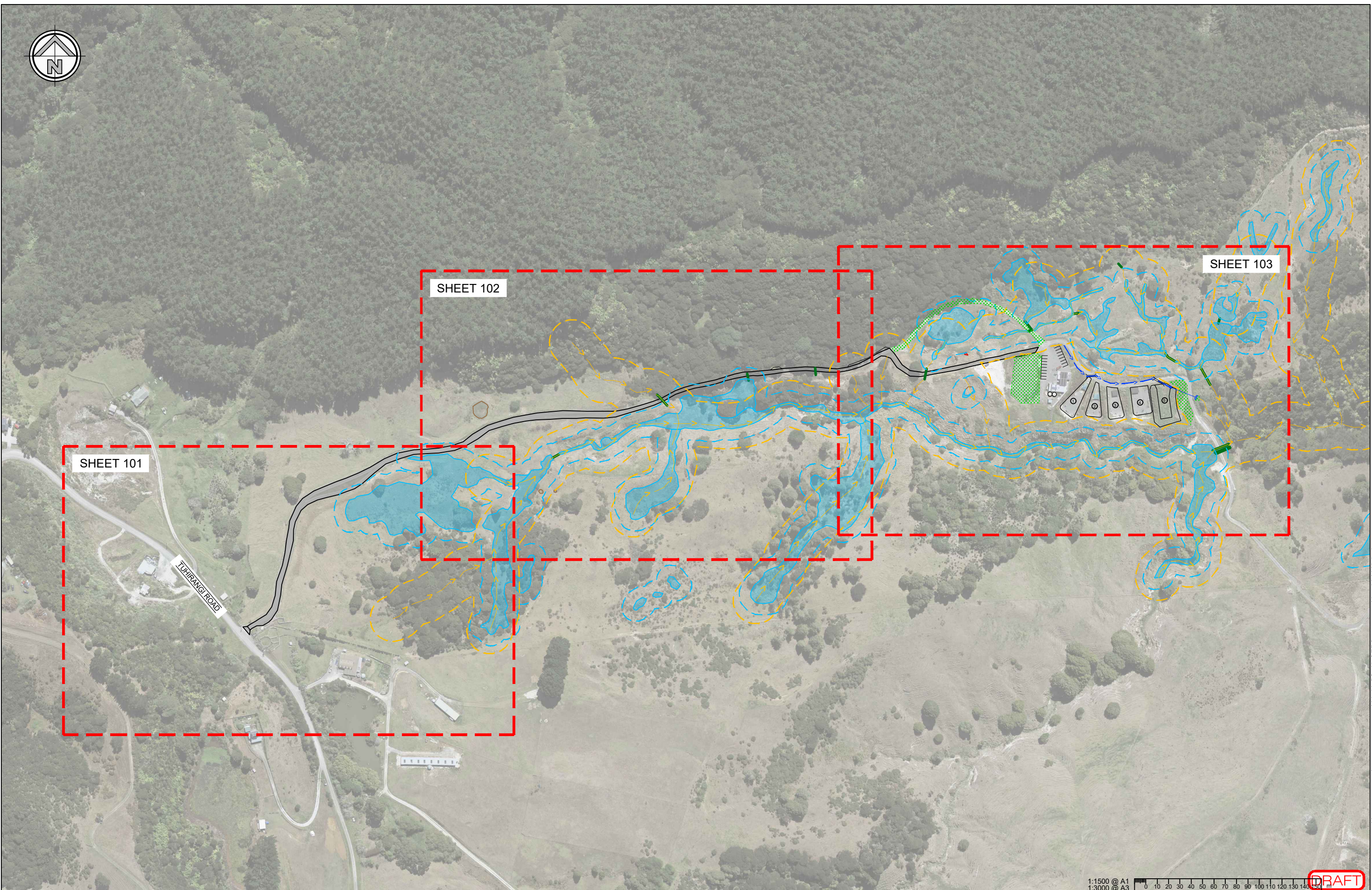
LOCALITY PLAN
N.T.S

287 TUHIRANGI ROAD,
MAKARAU, AUCKLAND

CLIENT: AUCKLAND SHOOTING CLUB INCORPORATED
PROJECT No. 230400

TABLE OF CONTENTS - RESOURCE CONSENT

DRAWING NUMBER		REVISION DATE	
		20	04
		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-200	OVERALL EARTHWORKS PLAN	A	
230400-RC-201	EARTHWORKS PLAN - SHOOTING BAY	A	
230400-RC-210	TYPICAL CROSS SECTION - SHEET 1 OF 2	A	
230400-RC-211	TYPICAL CROSS SECTION - SHEET 1 OF 2	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	



DRAFT

1:1500 @ A1
1:3000 @ A3

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	13/04/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

terra
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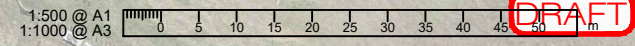
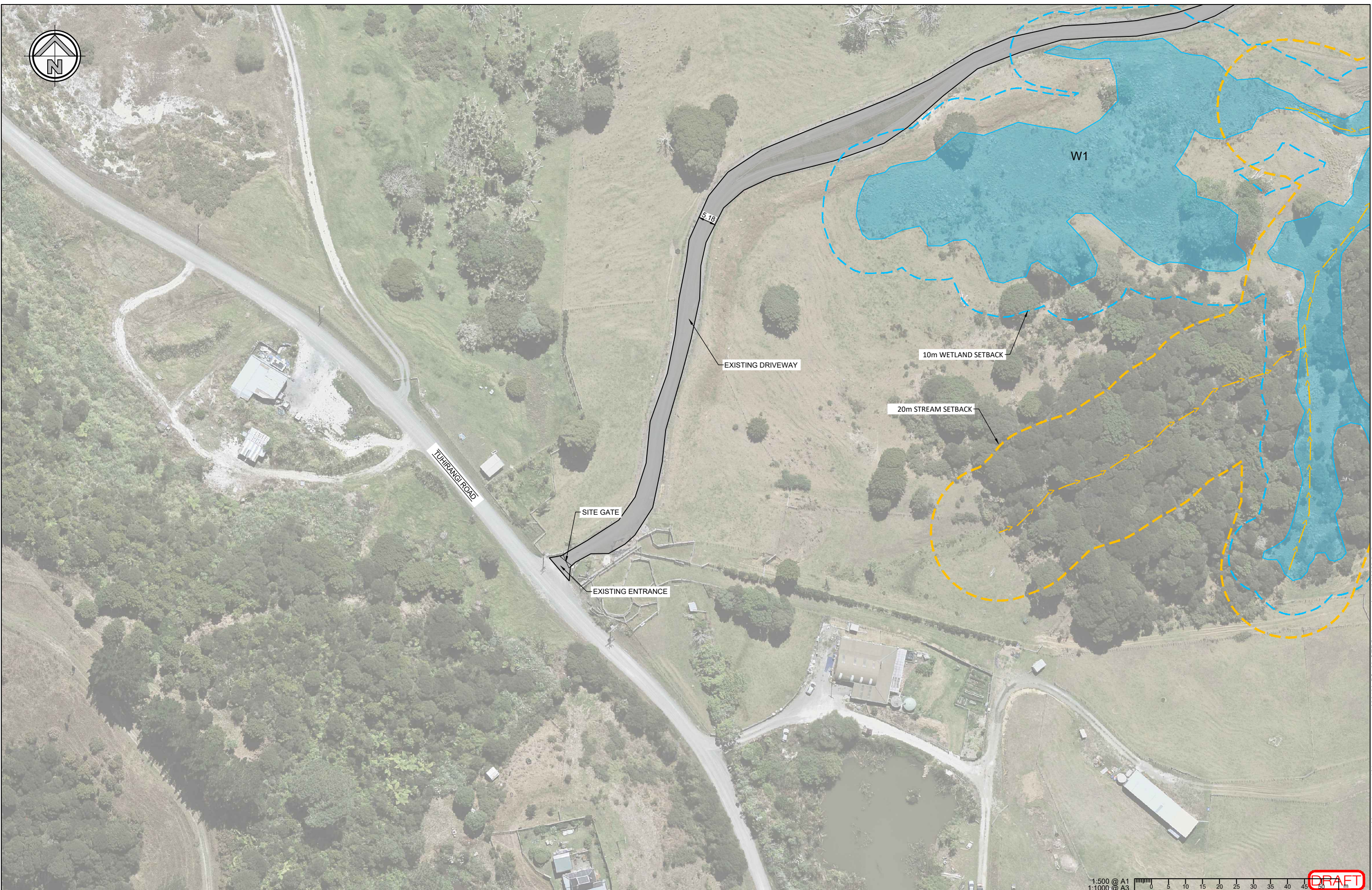
CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
SITE OVERALL LAYOUT PLAN

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE
230400	A1: 1:1499.999996 A3: 1:2999.999993
DWG NUMBER	REVISION
RC- 100	A

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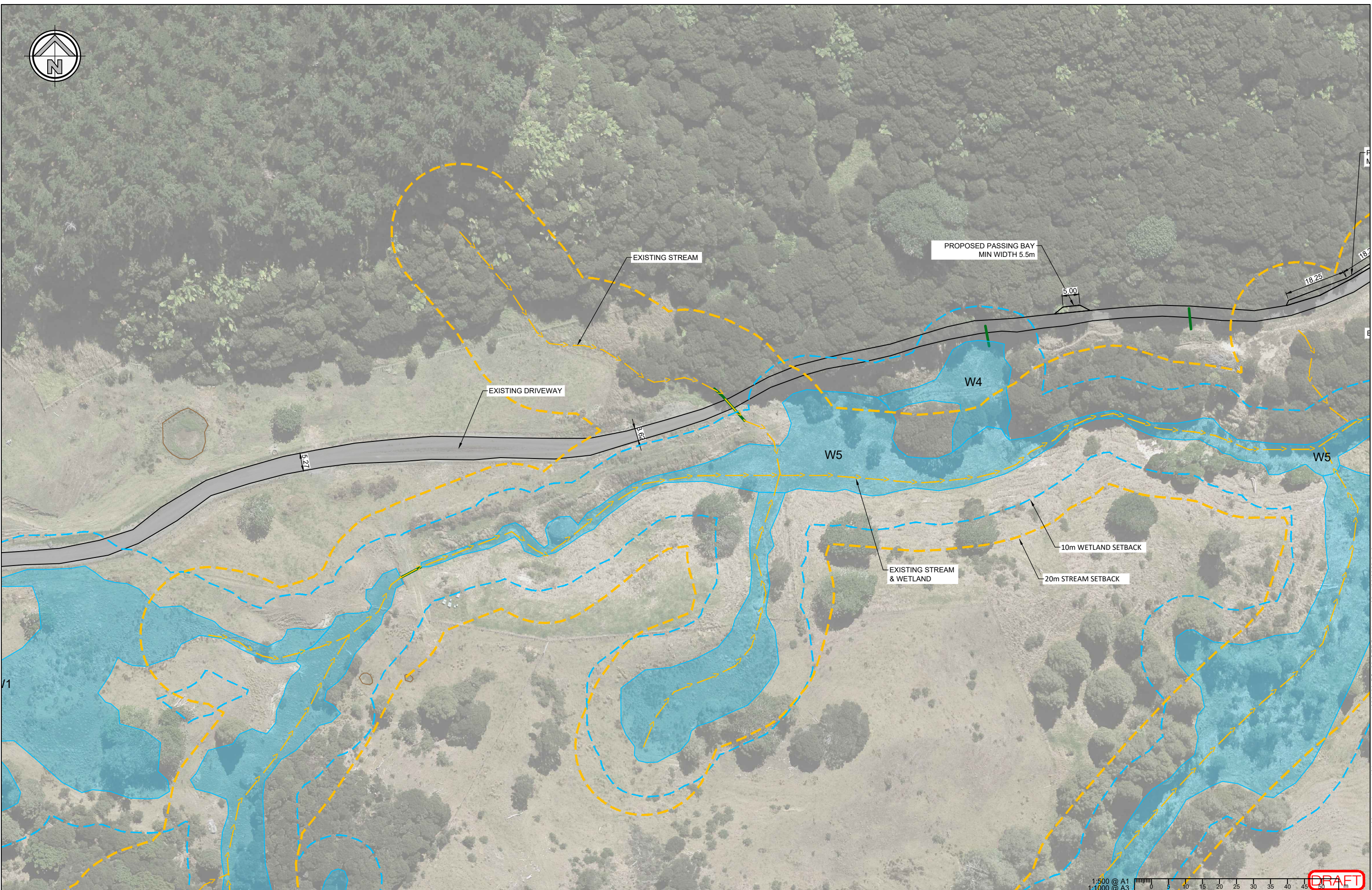
CLIENT
**AUCKLAND SHOOTING CLUB
 INCORPORATED**

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

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

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

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1:500 @ A1
1:1000 @ A3

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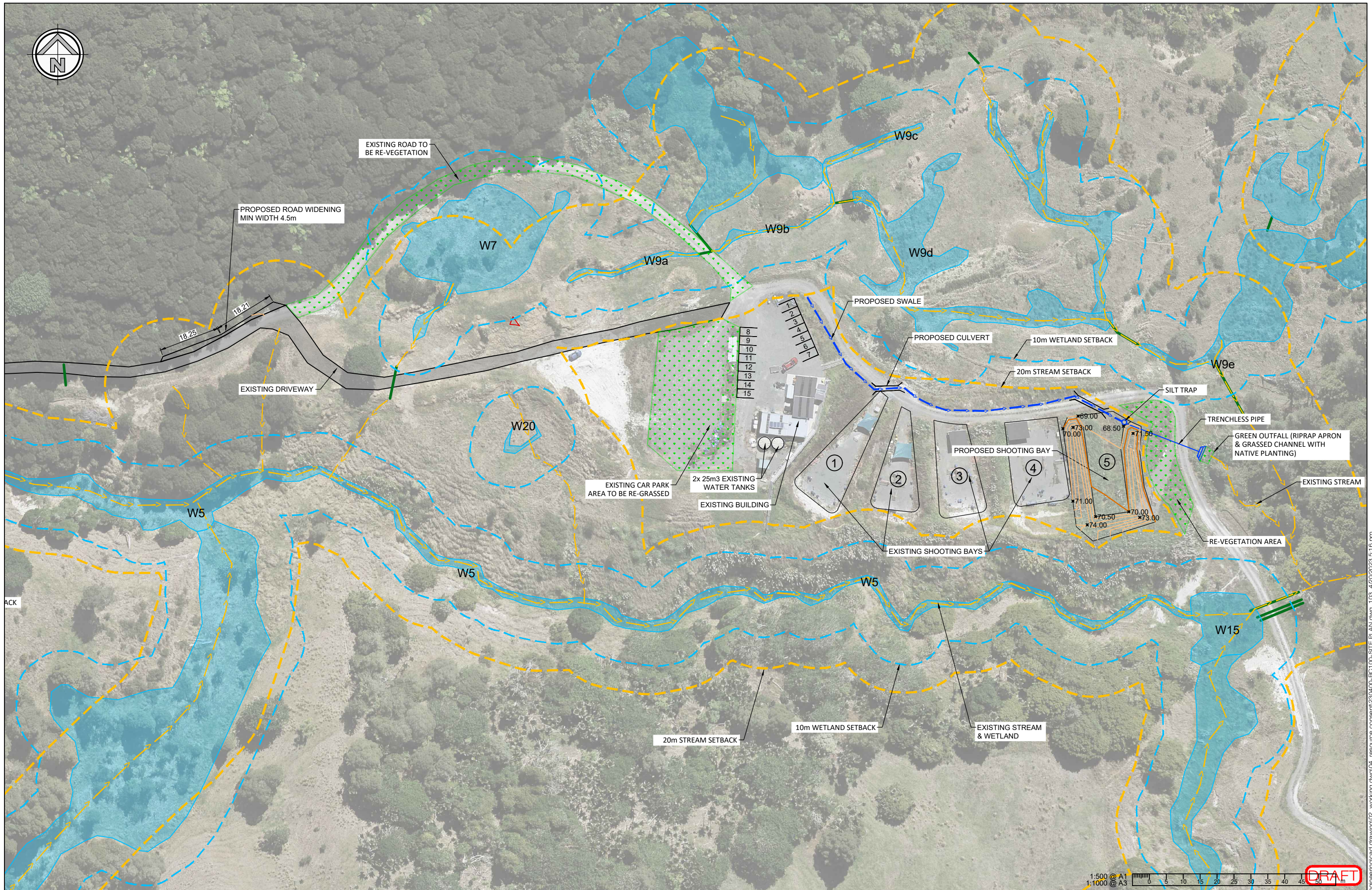
CLIENT
**AUCKLAND SHOOTING CLUB
INCORPORATED**

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

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

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

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1:500 @ A1
1:1000 @ A3

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

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

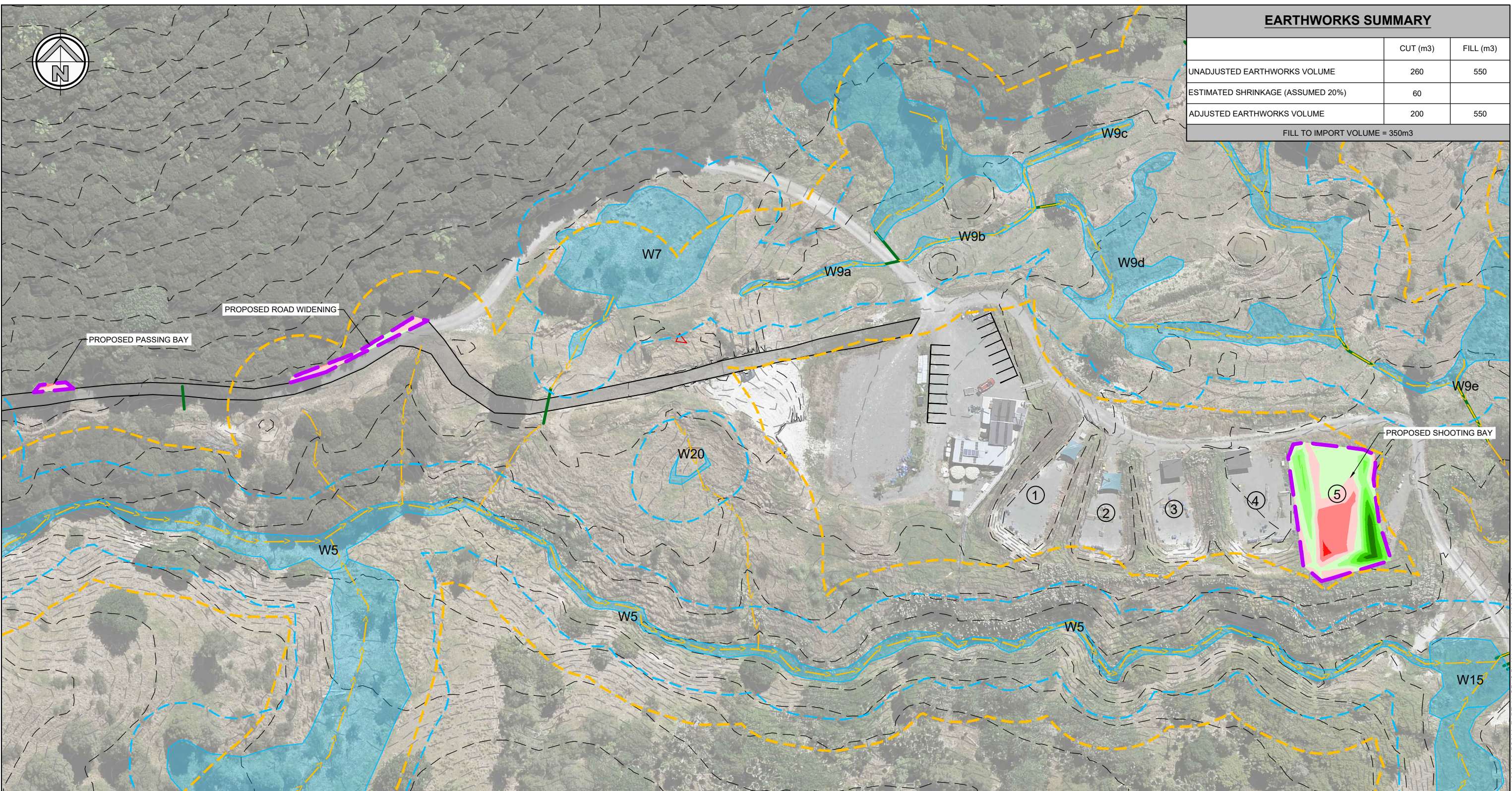
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DWG NUMBER	RC-103	REVISION	A

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EARTHWORKS SUMMARY

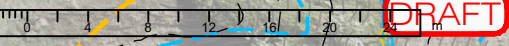
	CUT (m3)	FILL (m3)
UNADJUSTED EARTHWORKS VOLUME	260	550
ESTIMATED SHRINKAGE (ASSUMED 20%)	60	
ADJUSTED EARTHWORKS VOLUME	200	550
FILL TO IMPORT VOLUME = 350m3		



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	Green
+2.00m	3.00m	71	80	Yellow-Green
+3.00m	4.00m	45	22	Yellow
+4.00m	5.00m	2	0	Orange

1:250 @ A1
1:500 @ A3



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ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	13/04/23	FOR RESOURCE CONSENT	GC	GCAI	SURVEYED	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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PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
OVERALL EARTHWORKS PLAN

STAGE
FOR RESOURCE CONSENT

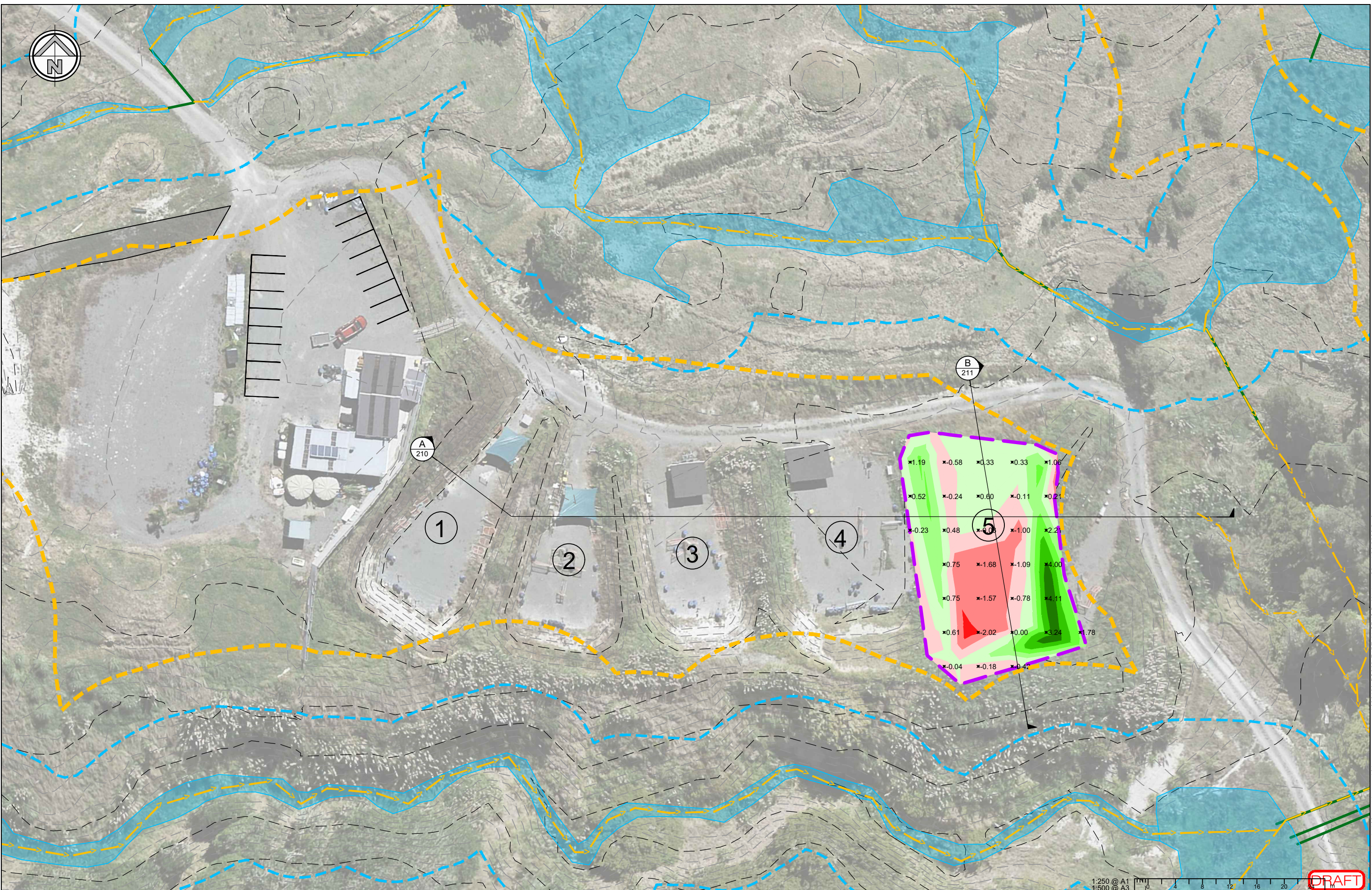
PROJECT NUMBER
230400

DWG NUMBER
RC- 200

SCALE
A1 1:250
A3 1:500

REVISION
A

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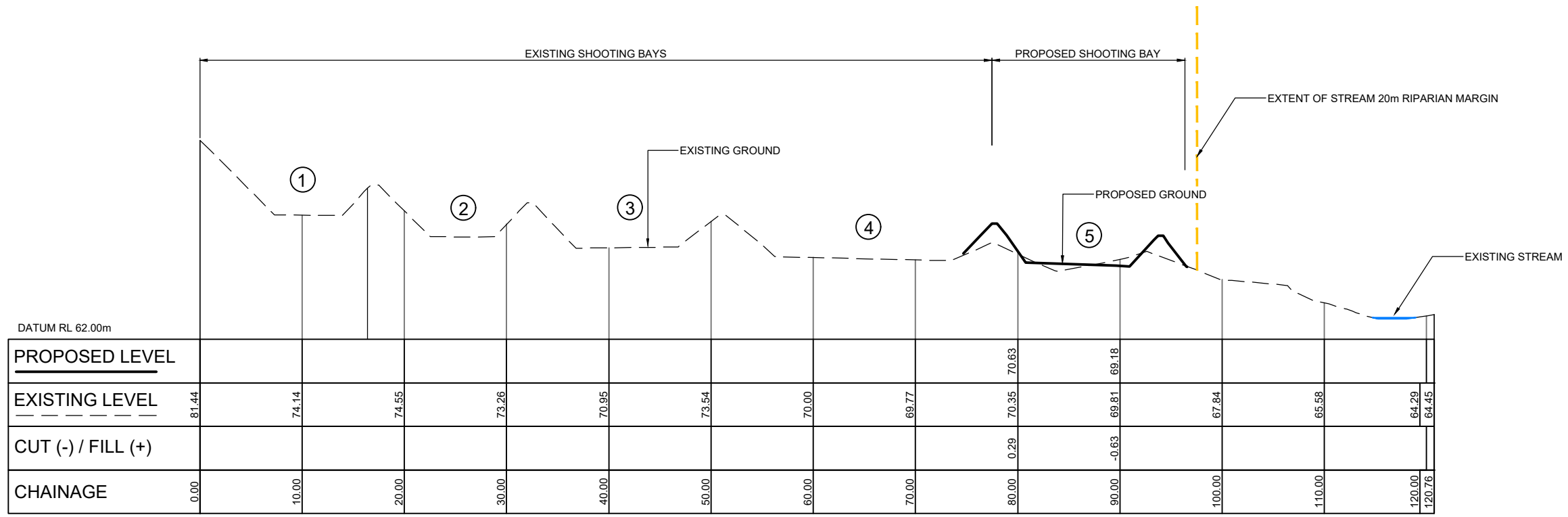
CLIENT
**AUCKLAND SHOOTING CLUB
INCORPORATED**

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

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

1:250 @ A1
 1:500 @ A3

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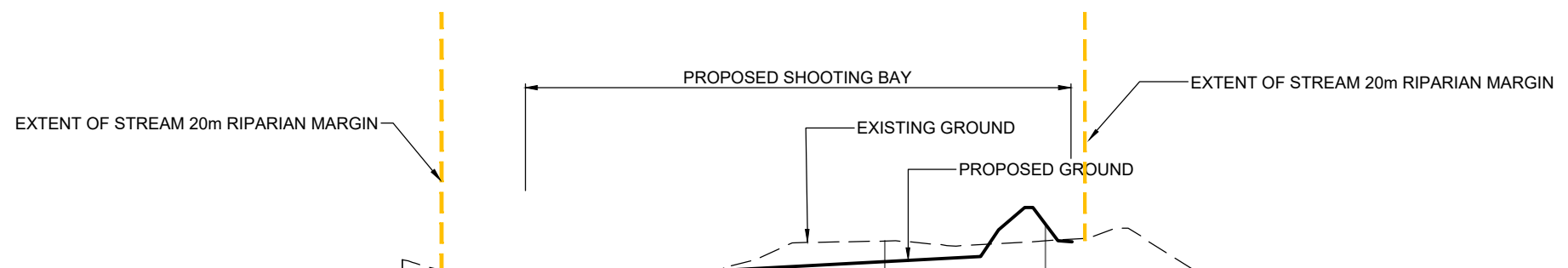
CLIENT
**AUCKLAND SHOOTING CLUB
 INCORPORATED**

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

DRAWING TITLE
**TYPICAL CROSS SECTION
 SHEET 1 OF 2**

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

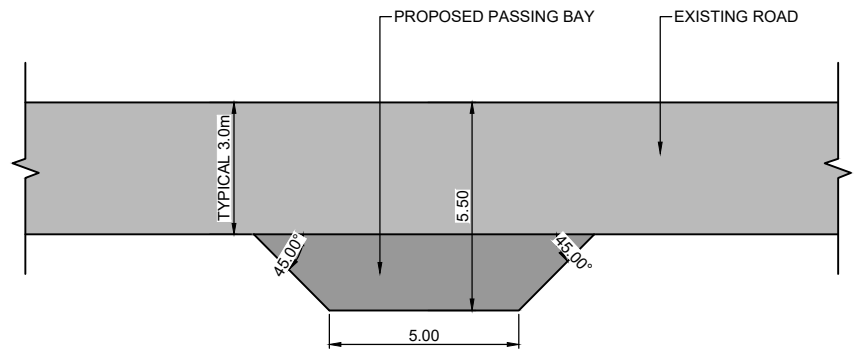
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DATUM RL 68.00m

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

1:250 @ A1
 1:500 @ A3

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ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	13/04/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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 INCORPORATED**

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

DRAWING TITLE
**TYPICAL CROSS SECTION
 SHEET 2 OF 2**

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

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LEGEND:

	SILT FENCE
	CLEAN WATER DIVERSION BUND
	STABILIZED CONSTRUCTION ENTRANCE

EARTHWORKS AREA
825m2

1:250 @ A1
1:500 @ A3

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ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	13/04/23	FOR RESOURCE CONSENT	GC	GCAI	TERRA	01/03/23	

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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

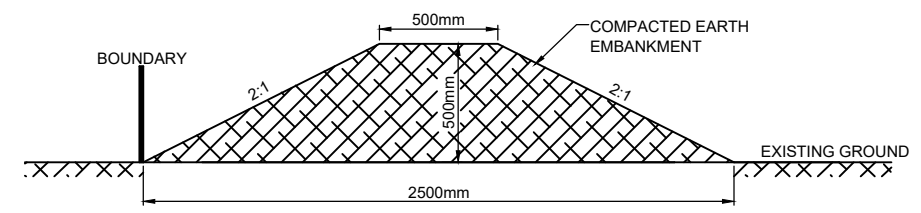
z:\tuhirangi road (287)\engineering\lead drawing\02_resource consent\230400-RC300-EROSION AND SEDIMENT CONTROL PLAN.dwg, 300_4/20/2023 5:17 pm

POST SPACING CAN BE INCREASED FROM 2 METRES TO 4 METRES TO SUPPORT BY A 100mm DIAMETER HIGH TENSILE WIRE ALONG THE TOP WITH CLIPS EVERY 200mm.

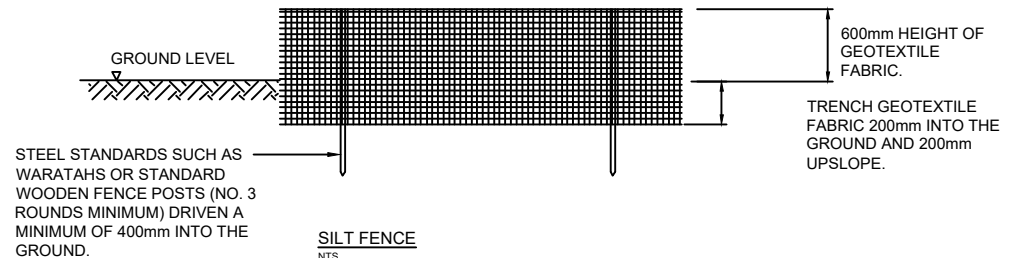
SELF TAPPING WOOD SCREWS

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

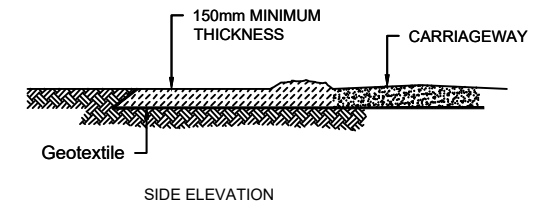
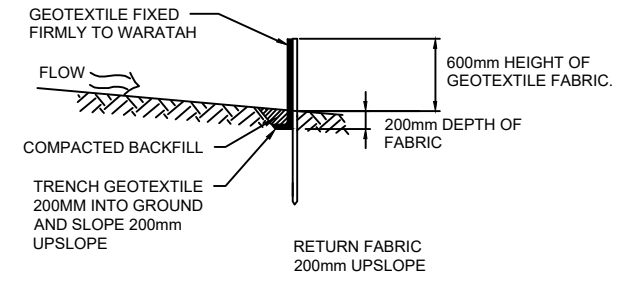
STANDARD DETAIL FOR FABRIC JOIN



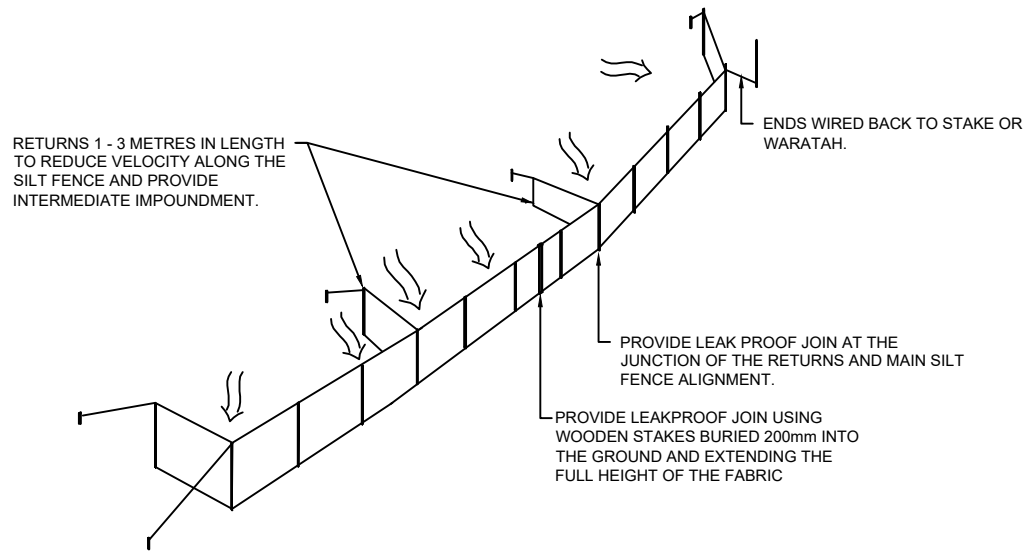
EARTH BUND CROSS SECTION
NTS



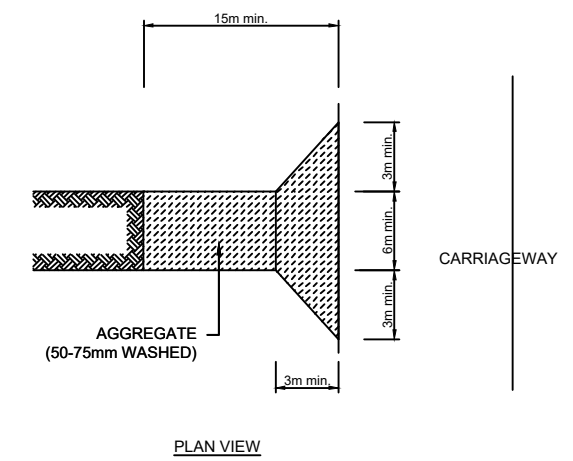
SILT FENCE
NTS



SIDE ELEVATION



SILT FENCE WITH RETURNS AND SUPPORTS WIRE



PLAN VIEW

STABILISED CONSTRUCTION ENTRANCE
N.T.S.

1:250 @ A1
1:500 @ A3

DRAFT

ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	13/04/23	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		

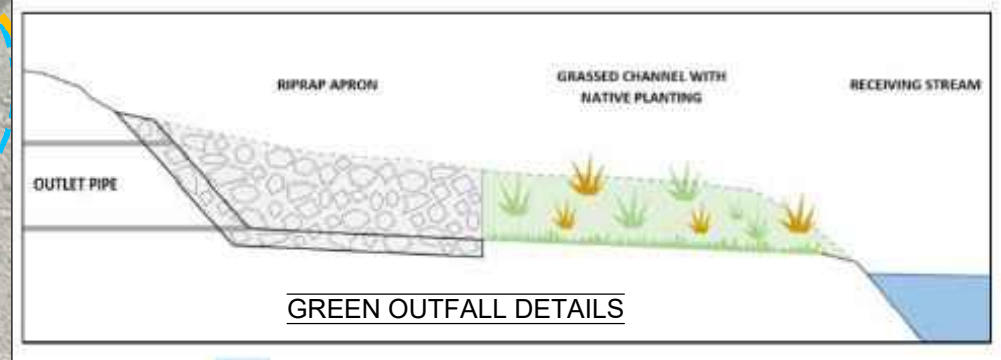
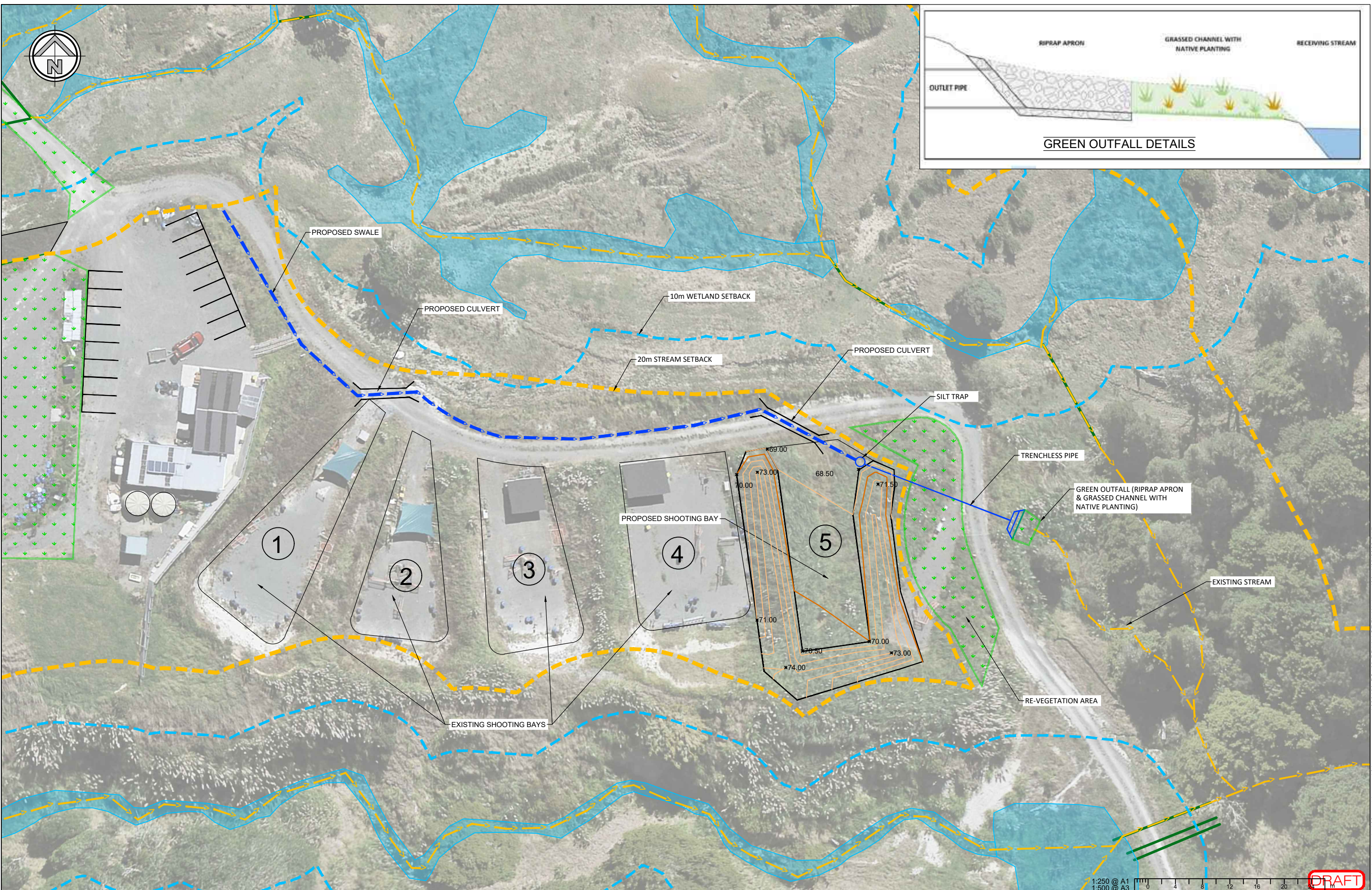
CLIENT
AUCKLAND SHOOTING CLUB INCORPORATED

PROJECT / LOCATION
287 TUHIRANGI ROAD, MAKARAU, AUCKLAND

DRAWING TITLE
EROSION AND SEDIMENT CONTROL STANDARD DETAILS

STAGE	
FOR RESOURCE CONSENT	
PROJECT NUMBER	SCALE A1:1:250 A3:1:500
DWG NUMBER	REVISION
RC- 310	A

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ISSUE	DATE	REVISION	CHKD	DRWN	NAME	DATE	CONSULTANT
A	13/04/23	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
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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LEGEND



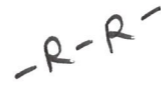





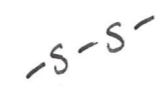
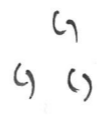



- | | | | | | |
|--|--|---|--|---|--|
|  Ephemeral Stream |  Marshy Land/
Wetland Vegetation |  Ridge |  Bench |  Soil ridges |  Minor scarp |
|  Perennial Stream |  Apparent direction
of Movement |  Spur |  Hummocky
Ground |  Major scarp |  Landslide and
debris area |
| | | | |  Historic, large scale backscarp | |



Photo 1: Aerial photograph from December 2015



Photo 2: Aerial photograph from February 2017



**Aerial photographs of
278 Tuhirangi Road**

Client: Auckland Shooting Club		Page No:
Project: 278 Tuhirangi Road Date: 24/05/2023	Drawn: HG	1
	Checked: JC	Size: A4
Proj No: 13704.001.001	Scale: NTS	Revision: 0



Photo 3: Aerial photograph from March 2017



Photo 4: Aerial photograph from April 2017



**Aerial photographs of
278 Tuhirangi Road**

Client: Auckland Shooting Club		Page No:
Project: 278 Tuhirangi Road Date: 24/05/2023	Drawn: HG	2
	Checked: JC	Size: A4
Proj No: 13704.001.001	Scale: NTS	Revision: 0

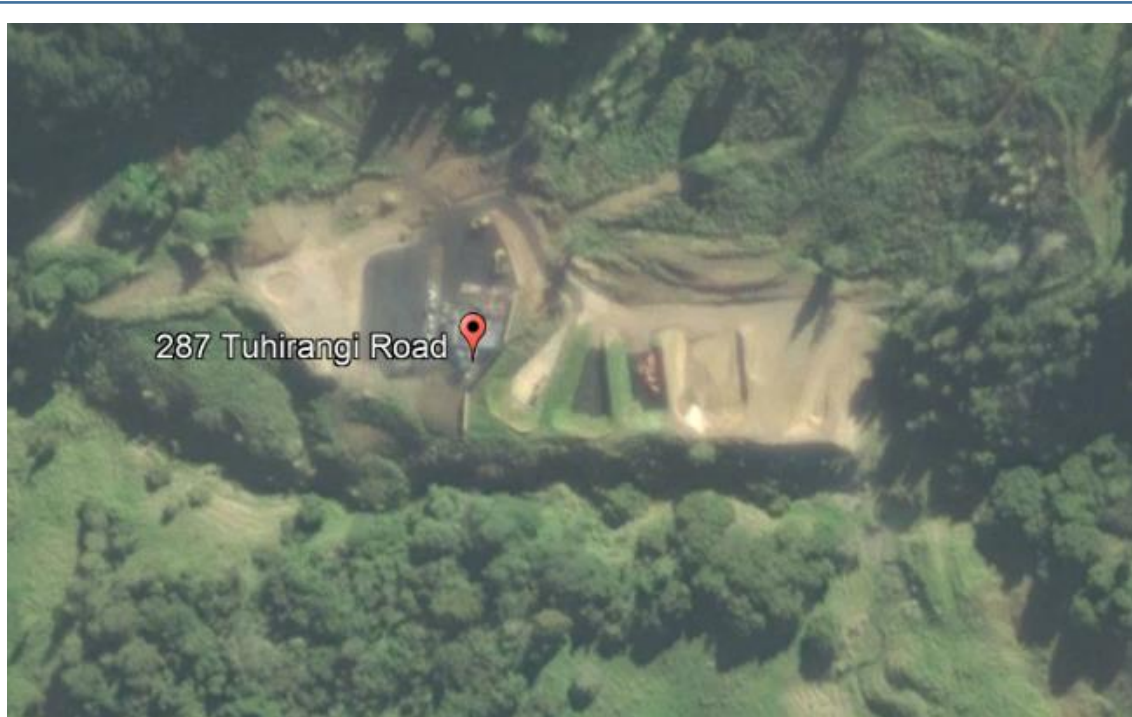


Photo 5: Aerial photograph form June 2017



Photo 6: Aerial photograph form May 2018



**Aerial photographs of
278 Tuhirangi Road**

Client: Auckland Shooting Club		Page No:
Project: 278 Tuhirangi Road Date: 24/05/2023	Drawn: HG	3
	Checked: JC	Size: A4
Proj No: 13704.001.001	Scale: NTS	Revision: 0



Photo 7: Aerial photo from September 2018

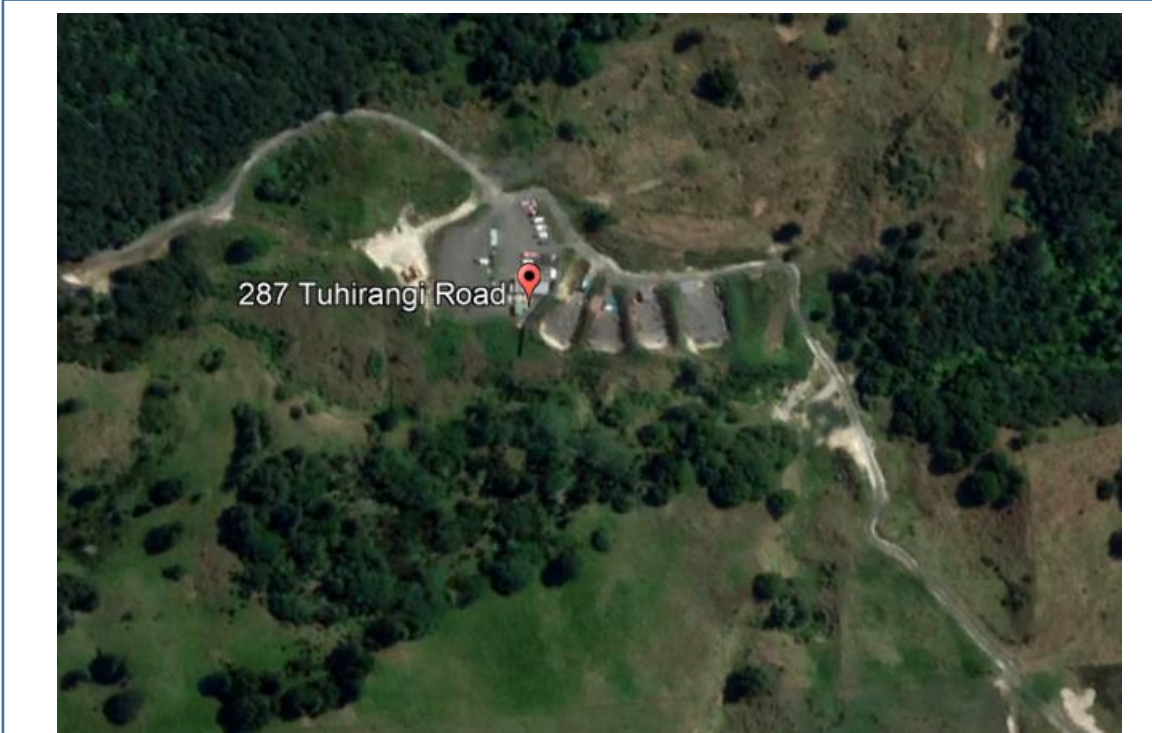


Photo 8: Aerial photo from February 2019



**Aerial photographs of
278 Tuhirangi Road**

Client: Auckland Shooting Club

Project: 278 Tuhirangi Road
Date: 24/05/2023

Proj No: 13704.001.001

Drawn: HG

Checked: JC

Scale: NTS

Page No:

4

Size: A4

Revision: 0

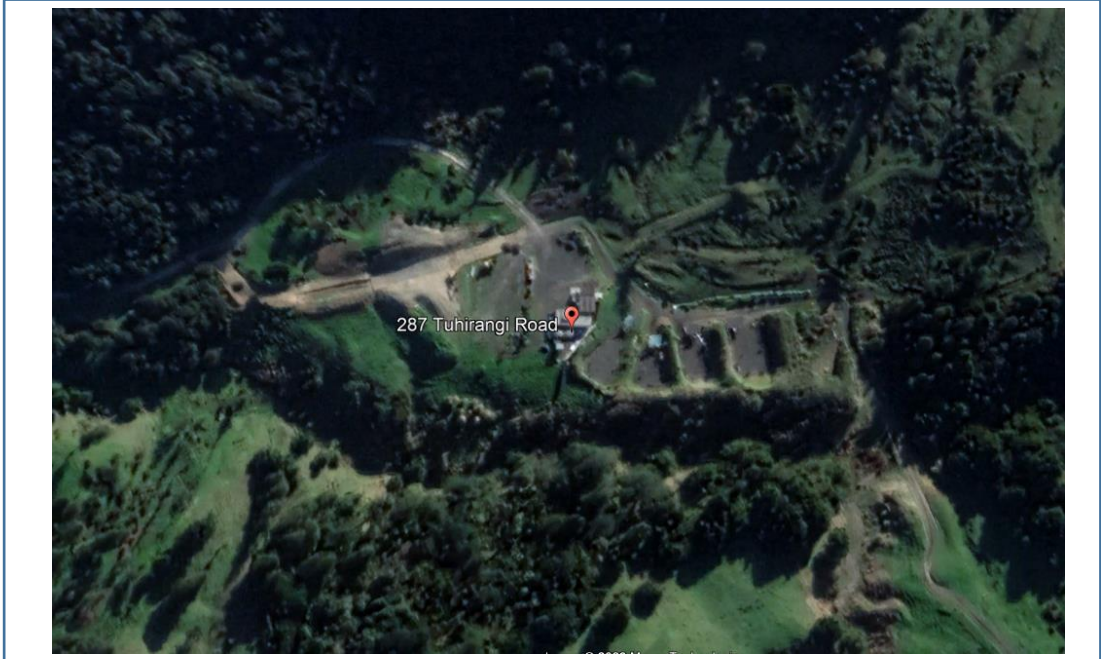


Photo 9: Aerial photo from June 2021

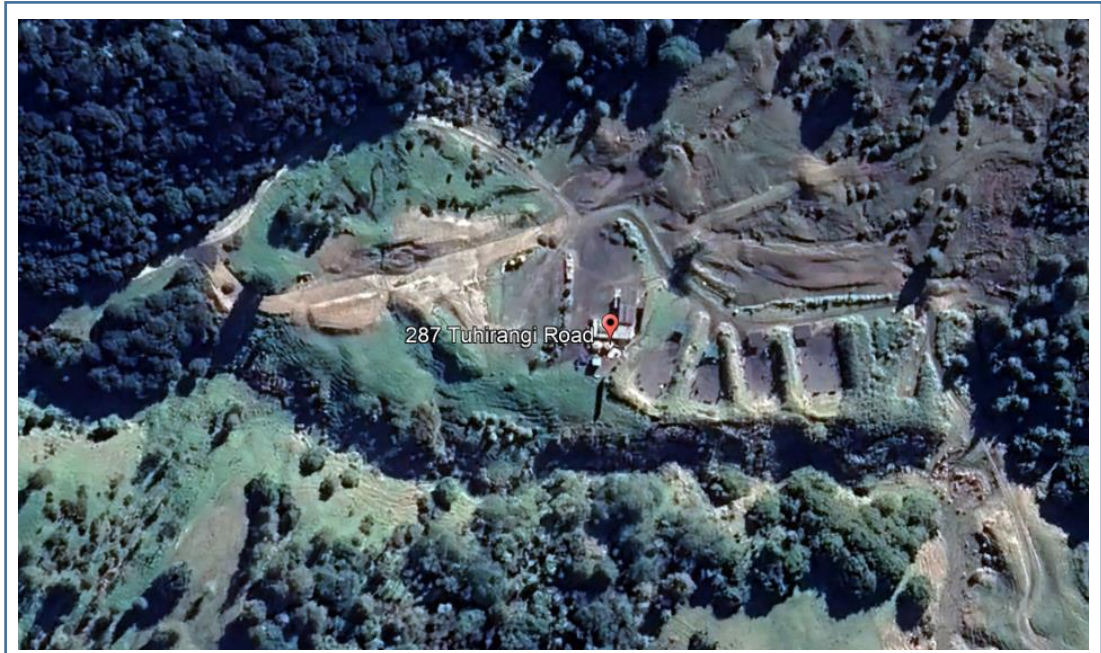


Photo 10: Aerial photo from August 2021



**Aerial photographs of
278 Tuhirangi Road**

Client: Auckland Shooting Club		Page No:
Project: 278 Tuhirangi Road	Drawn: HG	5
Date: 24/05/2023	Checked: JC	Size: A4
Proj No: 13704.001.001	Scale: NTS	Revision: 0