STREAMWORKS MANAGEMENT PLAN

Rangitoopuni Development
Riverhead, Auckland

CIVIL ENGINEERING ▾ SURVEYING ▾ LAND DEVELOPMENT

PROJECT INFORMATION

CLIENT:	Rangitoopuni Developments Limited Partnership
PROJECT:	147007 and 147016

DOCUMENT CONTROL

DATE OF ISSUE:	30 April 2025
REVISION	A
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APPROVED BY	[redacted] [redacted] Project Manager

[redacted]

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1. INTRODUCTION

1.1 PROJECT

The purpose of this report is to provide a Streamworks Management Plan for the proposed earthworks / streamworks in support of the proposed Countryside Living Subdivision and Retirement Village development on the southern portion of the Riverhead Forest on behalf of Rangitoopuni Developments Limited Partnership.

The information provided herein outlines the methodology associated with the proposed earthworks onsite, relative to the culvert extensions, and upgrades for accessways associated with the proposed JOALs and roads within the development.

This Streamworks Management Plan provides information in support of a Fast Track resource consent application made under the Fast Track Approvals Act 2024. This report is to be read in conjunction with the engineering drawings, and the documents referred to hereon.

This Streamworks Management Plan and the associated stormwater management and engineering plans and specifications including erosion and sediment control measures have been prepared in accordance with GDO5.

This plan should be read and implemented in conjunction with and consistent with:

a) The detailed stormwater engineering plans, culvert design plans, stormwater outfall design plans, forming part of the approved resource consent(s).

b) Bioresearchers Fish Capture and Relocation Plan.

c) Erosion and sediment control plan approved under this consent, and the associated Earthworks Management Plan.

This Streamworks Management Plan sets out a standard process for the implementation of all streamworks approved under the consent. Specific details relevant to each culvert can be provided prior to construction, which will be based on the overall methodology but will include Council and Contractor feedback as per best practice.

1.2 CODE OF CONDUCT STATEMENT

Although this is not a hearing before the Environment Court, I record that I have read and agree to comply with the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023. I confirm that this report is within my area of expertise, except where I state that I rely upon the evidence or reports of other expert witnesses lodged forming part of the project's application material. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed.

1.3 LEGAL DESCRIPTION

Applicant	Rangitoopuni Developments Limited Partnership
Record of Title	1129815 and 1129816

Legal Description	Lots 1 and 2 DP 590677
Site Area	222.75 ha (Lot 1), 173.6 ha (Lot 2)

1.4 SITE DESCRIPTION

The subject site forms part of the wider Riverhead (Rangitoopuni) Forest holdings. The site is located between Riverhead Township to the east, and Kumeu/Huapai to the south-west. The site is well connected, having ease of connections to SH16 and the Northwestern motorway.

The site features frontage and access from Old North Road (to the south), Deacon Road and Forestry Road. The majority of the site has been recently felled and is intended to be developed for residential purposes.

The site features moderate to steep rolling topography, with prominent ridgelines, gullies and identified streams contained within. The site is contained within two stormwater catchments – Lot 1 straddles the Kaipara Catchment (western half), with the eastern area in the Riverhead Catchment. Lot 2 is wholly contained within the Riverhead Catchment. The streams in the Riverhead Catchment flow east, to the rear of the Township, before discharge into the Rangitopuni River upstream of the Riverhead-Coatesville Highway bridge.

There is no existing building within the site. The site is benefited from several lawful and existing vehicle crossings and forestry roads within, of which is formed to a rural road standard.

The location of the subject site is shown below in Figure 1.

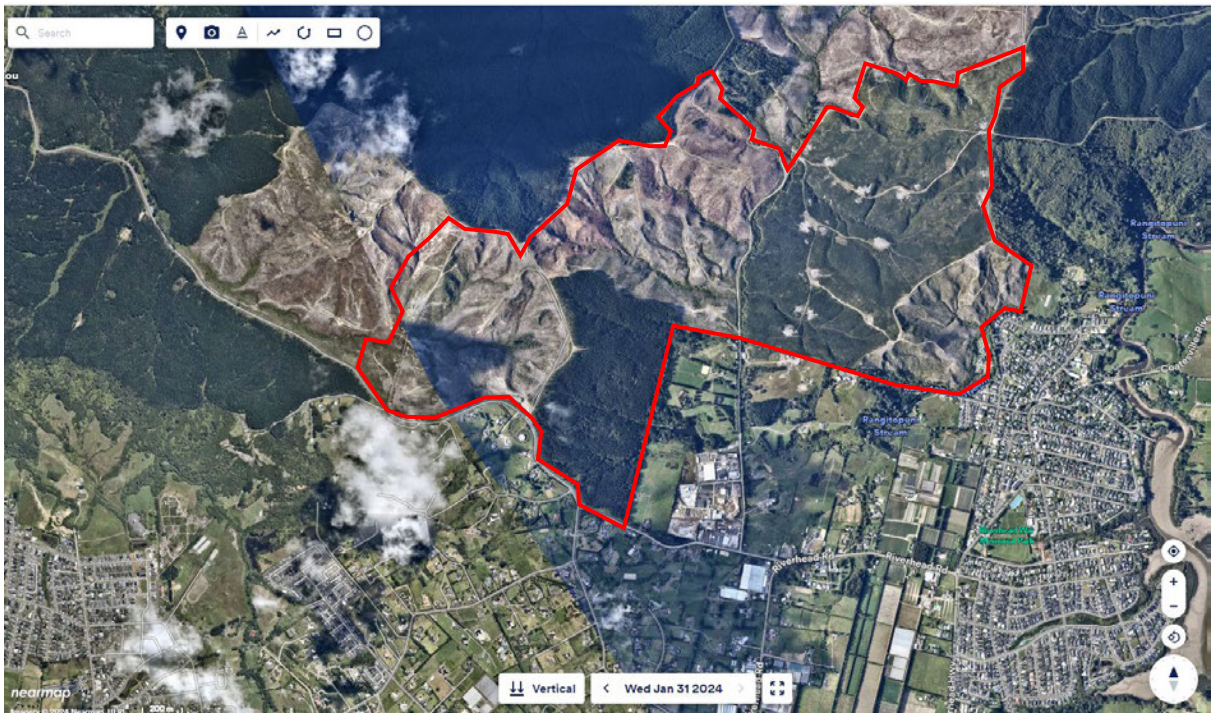

Figure 1: Site Locality Plan (Approximate Lot 1 and 2 boundaries shown in red).

1.5 PROPOSED EARTHWORKS

Earthworks will be undertaken as required throughout the proposed development area and allows for the partial recontouring of the site to enable the proposed countryside living development within Lot 1; and the Retirement Village contained within Lot 2.

A total of 100.6 ha of the site will be earthworked. The extent of earthworks is located within 20m of identified streams, and there are11 culverts which require upgrading and/or modification as part of this consent to enable the construction of the JOALs, private accessways and the Forestry Road extension (public road to vest). There are other culverts for OLFPs, however, these are not included as culverts which require streamworks.

Whilst considerable effort has been made to avoid streamworks; culvert upgrades are a necessity due to topography, provision of access, downstream flood mitigation, fish passage improvements and the requirements of the NES FW.

Construction represents the period when the most significant impact on the downstream receiving environment can occur due to erosion and sedimentation from disturbed land. Erosion and sediment control measures are to be implemented to mitigate downstream impacts.

The Engineering Drawings (attached as Appendix B) detail the extent of works and sediment control measures.

1.6 RESOURCE CONSENT REQUIREMENTS

These matters are subject to Resource Consent for Earthworks accordingly. The conditions of consent will require that erosion and sediment control measures are implemented and maintained in accordance with these guidelines to ensure that the watercourses and wetlands being retaining are protected with appropriate buffer zones.

Proposed measures for erosion and sediment control have been designed in accordance with Auckland Council design manual GD05 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region.

1.7 PROGRAMME OF WORKS

The overall development of the Site will be undertaken in stages, and the full development is expected to take approximately 10 years to complete.

The Countryside Living development will be prioritised with civil works expected to commence for Stages 1-3 in 2025/2026 subject to consents being granted. Further stages of the development will occur from then and will be based on future market demand.

Works associated within the Retirement Village and Forestry Road (public road to vest) are anticipated to start in 2026/2027 earthworks season, although ultimate timing will be subject to obtaining the approvals and various market conditions.

1.7.1 Program of Culvert Works

Construction of all culvert upgrades or remedial works are intended to be carried out in the following steps:

- Install silt control measures, as shown on Engineering Drawings

- Install upstream and downstream coffer dams / sandbags. Dewatering will occur of the stream reach subject to the culvert installation.
- Construct culvert and riprap within the respective stream margin.
- Reinstate stream and then complete the wider earthworks and civil program.

A suitably qualified freshwater ecologist will be present during streamworks as required.

2. PROTECTION MEASURES

Sediment control measures will need to be installed onsite prior to the earthworks commencing. All measures will be checked and confirmed acceptable by the Engineer and council compliance officer prior to any works commencing.

During earthworks, the protection measures will be maintained such that they function as proposed. Refer to section 3.0 of this report for further details in this regard.

Protection measures will only be removed once all works have been completed within the stream and the works area stabilised.

3. CULVERT DESIGN AND RIPRAP

The culverts have been designed to comply with the permitted standards of the AUP, that being a maximum length of 30m. The culverts have been designed so that they can provide fish passage improvements. Whilst the bulk of the culverts have been designed to allow for 1% AEP Flows as required by the NES FW, Culvert 7 and Culvert 1-1 need to provide flood attenuation, and the low-flow culvert cannot be sized for 100-yr flows.

The catchment sizes and flows are significant, and as such typical riprap calculations are not practical. HY-8 model has been used to confirm upstream headwater depths and results culvert barrel flows and associated riprap lengths. A summary of riprap design and lengths are provided below within Figure 2. The full sheet of calculations is provided within the Maven Stormwater Management Plan.

HY-8 CULVERT RESULTS SUMMARY										
CULVERT No.	TYPE	SIZE	CULVERT LENGTH (m)	Flow (m3/s)	VELOCITY (m/s)	RIP-RAP THICKNESS (m)	POOL LENGTH (m)	APRON LENGTH (m)	BASIN LENGTH(m)	BASIN WIDTH (m)
1	BOX CULVERT	5m x 2m	13.57	15.67	3.65	0.30	15.00	5.00	20.00	18.30
2	BOX CULVERT	1.5m x 1.5m	12.43	1.56	3.46	0.45	4.50	1.50	6.00	5.50
3	BOX CULVERT	4m x 2m	14.84	9.33	3.17	0.45	12.00	4.00	16.00	14.67
4	BOX CULVERT	6m x 2m	14.16	16.69	4.15	0.45	18.00	6.00	24.00	22.00
5	BOX CULVERT	2m x 1m	15.82	1.68	2.65	0.15	6.00	2.00	8.00	7.33
6	BOX CULVERT	1.5m x 2m	14.99	7.52	3.66	0.45	12.32	6.16	18.49	13.82
7	PRIMARY-CIR-CULVERT	1.05m ø	29.08	3.58	5.05	0.45	12.54	6.28	18.83	13.60
7	SECONDARY- BOX CULVERT	1.5m x1.5m	24.01	Specific energy dissipation arrangement to be confirmed for the secondary culvert						
COUNTRYSIDE										
13-4	CIR-CULVERT	1.20m ø	14.33	0.58	3.20	0.30	3.15	1.41	4.56	4.09
14-1	BOX CULVERT	1.5m x 1.5m	13.31	4.07	0.56	0.45	12.03	6.01	18.04	13.23
6-6	CIR-CULVERT	1.05m ø	13.41	1.26	4.02	0.45	3.91	1.96	5.87	4.81
1-1	PRIMARY-CIR-CULVERT	1.20mø	15.09	2.55	5.37	0.45	5.04	2.52	7.56	5.94
1-1	SECONDARY-BOX CULVERT	4m x 1.5m	12.36	Specific energy dissipation arrangement to be confirmed for the secondary culvert						

Figure 2: Culvert Riprap Design Lengths from Hy-8 Summary

As such, the permitted maximum of 5m riprap will not be achieved in some instances. Although it is noted, the calculated lengths and widths are not possible in many instances, so final riprap lengths will be agreed between Council and the project ecologist at the detailed design stage.

4. METHODOLOGY OF WORKS

The following section of the Report provides detailed breakdown into the methodology in support of the intended stream works. Please refer to the Maven Earthworks Management Plan (EMP) for details relative to the wider bulk earthworks and sediment controls.

4.1.1 Access

Access to all culvert upgrades will be via existing forestry tracks and/or formed JOALs. All machinery will be kept away from the streams, wetlands and/or margins. Existing culverts and forestry tracks will provide access during time of construction.

4.1.2 Fish Relocation

Given the nature of the culvert upgrade works, there is a requirement to ensure suitable fish removal is done before works start. This will be managed during the damming and pumping process detailed below. The project ecologist will be onsite to ensure this is managed suitably and a standard condition of consent to this effect is expected. Fish exclusions nets will be placed upstream and downstream of the works area, and fishing will be undertaken by the project ecologist. Pumping of the stream reach will only occur once all clear has been given by the project ecologist.

4.1.3 Sediment Controls

Sediment controls will be installed in support of the relevant works area. This will relate to super silt fencing along the edge of the stream margin within the works area, and the construction of the required erosion and sediment controls for the wider earthworks area relative to the stage of development in question.

4.1.4 Dewatering and Construction of Culverts

Once the wider sediment controls are in place for the relevant area, the dewatering process will occur to enable the construction of the relevant culvert and associated riprap. The following section details the methodology that will be employed for all culvert installations within the development:

a) Works will be undertaken during a period of dry weather.

b) Install a coffer dam, bund or steel plates both upstream and downstream of the works area, to enable the remaining water to be pumped out of the reclaimed section. This dirty water will be pumped into the dirty water bund before treatment in the nearby sediment control mechanism before discharge into the stream.

c) Once the upstream catchment is blocked, and the stream section dewatered, the area will be readied for the installation of the Box culvert (or similar), wingwalls and riprap. The works will be contained by the upstream coffer dam and downstream bund. Any sediment laden water would be pumped to the dirty water diversions for treatment before discharge during construction.

In the event of a large weather system coming through, and the streamworks are not complete or stabilised, the works area would be stabilised with geotextile cloth and normal stream flows would be directed through the works area as needed.

4.1.5 Wider Riparian Works

Once the culvert, wingwall and riprap within the stream is in place, wider cut/fill operations will continue. Super silt fences will be constructed along the edges of the associated stream(s). This will contain any sediment from the small embankments.

Wider dirty water flows will be directed to the required mechanisms for treatment before discharge. The controls will need to be in place until the respective catchment is suitably stabilised.

5. Summary and Conclusions

This streamworks management plan has set out the methodology that will enable the construction of the various culverts, wingwalls and associated riprap within the stream margins of the wider site.

Works will be supervised by the project ecologist, as required, and specific details may be subject to consent conditions relative to each construction stage, which would include Council and Contractor feedback as per best practice.

6. APPENDICES

6.i APPENDIX A – ENGINEERING DRAWINGS

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6. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS AND VEHICLE CROSSINGS TO COUNCIL STANDARDS.
7. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS.
8. ALL CATCHPIT LEADS SHALL HAVE MIN COVER 1.0M.
9. ALL LINES TO BE ABANDONED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.

CULVERT 13-4 :REFER TO 147007 - C481

CULVERT 14-1 :REFER TO 147007 - C482

CULVERT 1-1 :REFER TO 147007-C484

CULVERT 6-6 :REFER TO 147007-C483

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
STAGE 6
STAGE 7
STAGE 8
STAGE 9
STAGE 10
STAGE 11
STAGE 12
STAGE 13
STAGE 14

PROPOSED RETIREMENT VILLAGE

NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL STANDARDS.
2. COORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE AUCKLAND VERTICAL DATUM 1946.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
4. PIPE BEDDING: 0 - 10% GRANULAR BEDDING,10 - 20% WEAK CONCRETE BEDDING.GREATER THAN 20% WEAK CONCRETE BEDDING (7MPA PLUS ANTI SCOUR BLOCKS AT 6M CRS).
5. EACH CONNECTION SHALL BE MARKED BY A 50MMX50MM TREATED PINE STAKE EXTENDING 600MM ABOVE GROUND LEVEL WITH THE TOP PAINTED. THIS MARKER POST SHALL BE PLACED ALONGSIDE A TIMBER MARKER INSTALLED AT THE TIME OF PIPELAYING AND EXTENDING FROM THE CONNECTION TO 150MM BELOW FINISHED GROUND LEVEL. CONNECTIONS SHALL BE ACCURATELY INDICATED ON "AS BUILT" PLANS.

LEGEND
- EX BDY
- PROP BDY
- STAGE BOUNDARY
- EX OLFP
- REMOVED EX OLFP
- EXISTING STREAMS
- PR SW FLOW PTH
- PR SW PIPE
- RIPARIAN YARD 20m SETBACK
- WETLAND AREA 100m SETBACK
- EX/PROP SWMH
- PROP SWCP SINGLE
- PR INDICATIVE LEVEL SPREADER - SUBJECT TO DETAIL DEISGN
- PR RIPRAP
- PR CIRCULAR CULVERT
- EX CULVERT
- PR CULVERT
- PR SCRUFFY DOME

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey	LANDPRO	03/22
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
PROPOSED CULVERT OVERALL PLAN

Project no.	147007
Scale	1:10,000 @ A3
Cad file	147007-M-C480 CULVERT OVERVIEW.DWG
Drawing no.	C480 Rev A

RESOURCE CONSENT

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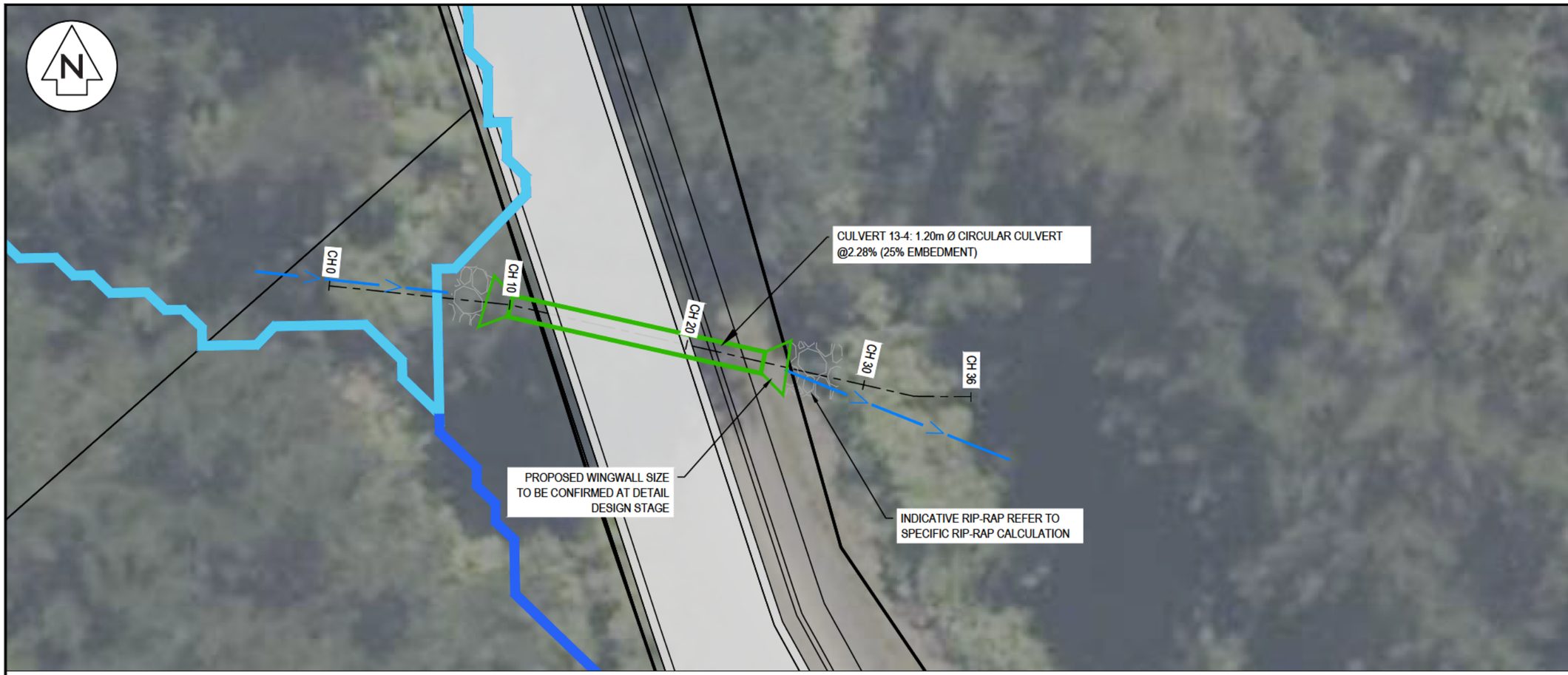

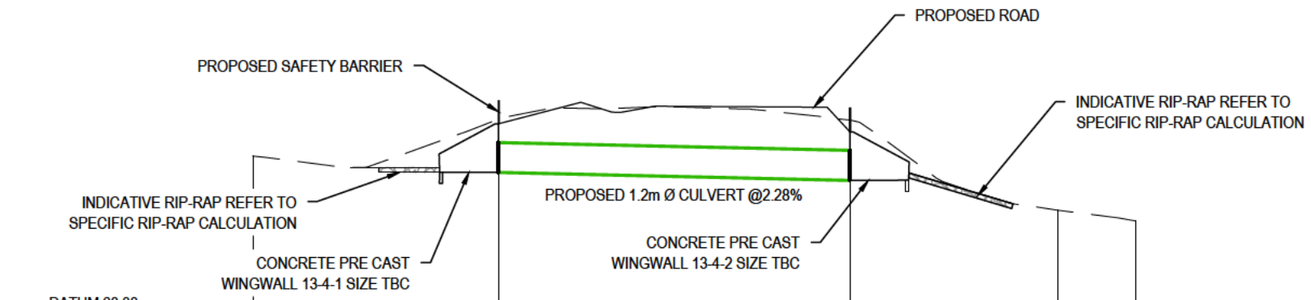

DATUM 60.00m

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DESIGN LEVELS		66.02								
PIPE INVERT			65.82			65.49				
DEPTH INVERT (m)										
PIPE GRADE			1200mm RCRRJ Ø @ 2.28% 14.33m							
CHAINAGE	0.00	5.00	10.00	15.00	20.00	24.35 25.00	30.00	32.85	35.00	36.01

CULVERT 13-4 LONG SECTION
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Legend
- EX BDY
- PROP BDY
- PR OLFP

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	02/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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Title
CULVERT 13-4 LONG SECTION

Project no.	147007
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Drawing no.	C481 Rev A

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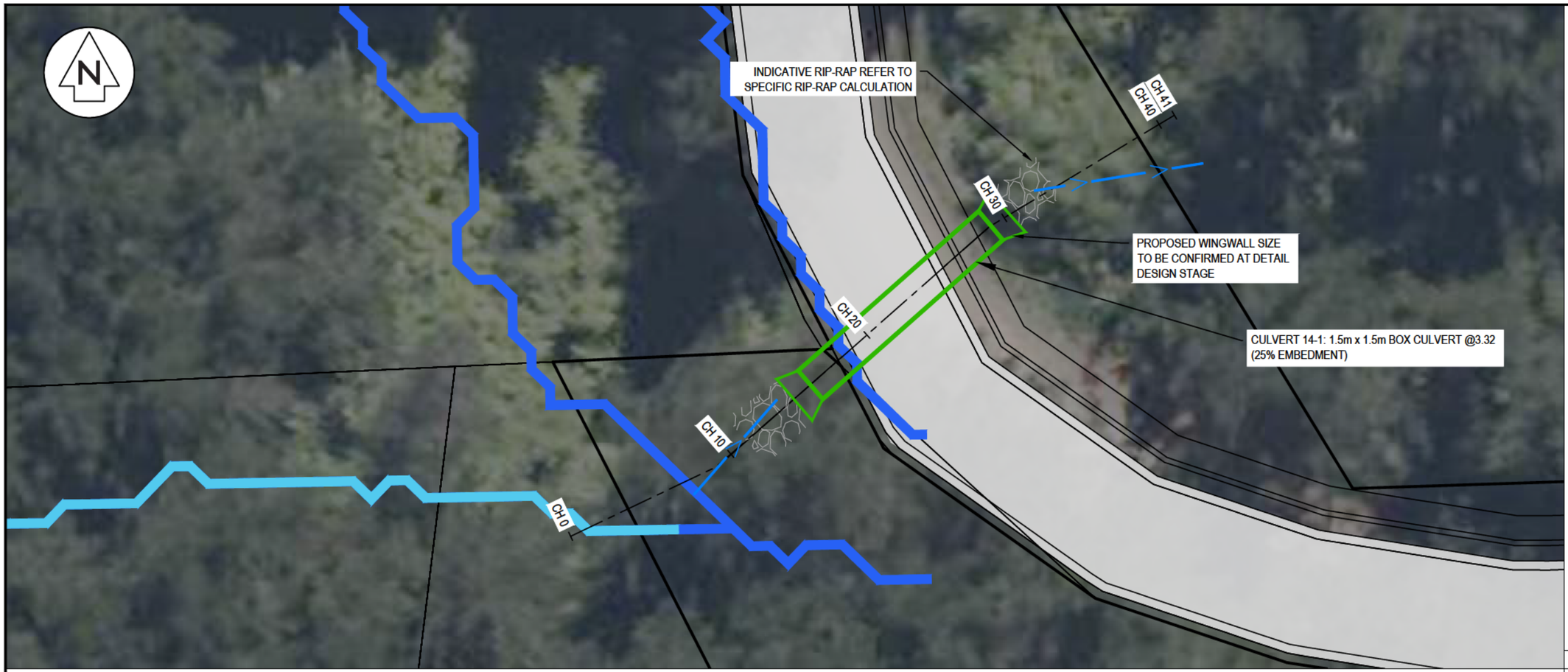
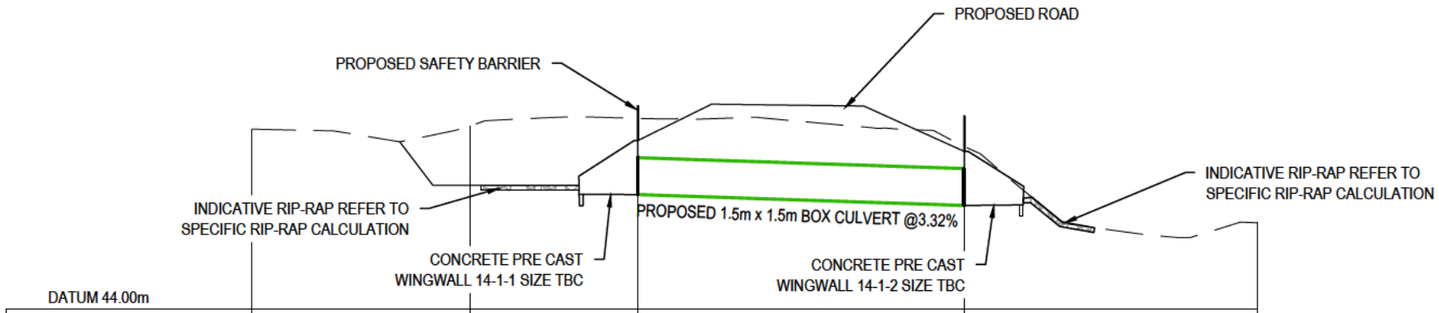


Legend

- EX BDY
- PROP BDY
- PR OLFP



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EXISTING LEVELS	51.34	50.99	51.46	51.70	51.80 51.78	51.81	51.42	50.64	50.08	47.23	47.45 47.52
DESIGN LEVELS			49.05	49.05							
PIPE INVERT					48.67			48.23			
DEPTH INVERT (m)											
PIPE GRADE					1,500 x 1,500 mm Conc Box Culvert Ø @ 3.32% 13.31m						
CHAINAGE	0.00	5.00	8.89	10.00	15.00 15.73	20.00	25.00	29.04	30.00	35.00	40.00 40.99

CULVERT 14-1 LONG SECTION
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	02/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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Title
CULVERT 14-1 LONG SECTION

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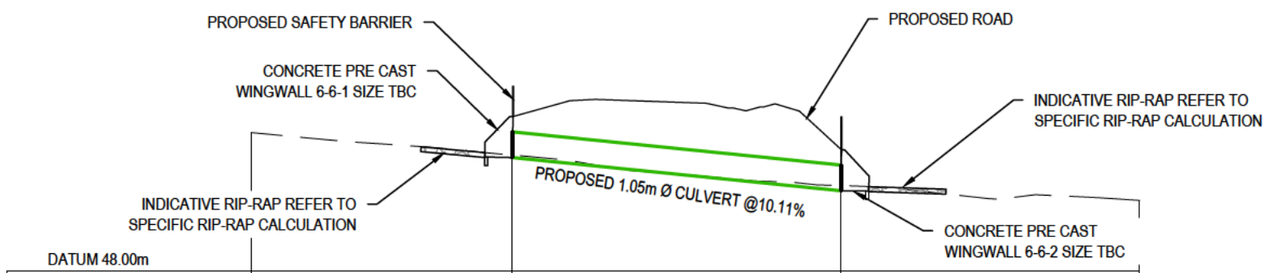

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DESIGN LEVELS					54.95	54.55	52.94				
PIPE INVERT				52.61			51.26				
DEPTH INVERT (m)											
PIPE GRADE				1050mm RCRRJ Ø @ 10.11% 13.41m							
CHAINAGE	0.00	5.00	10.00	10.62	15.00	20.00	24.03	25.00	30.00	35.00	36.20

CULVERT 6-6 LONG SECTION
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Legend
- EX BDY
- PROP BDY
- PR OLFP

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	02/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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Title
CULVERT 6-6 LONG SECTION

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Drawing no.	C483	Rev	A

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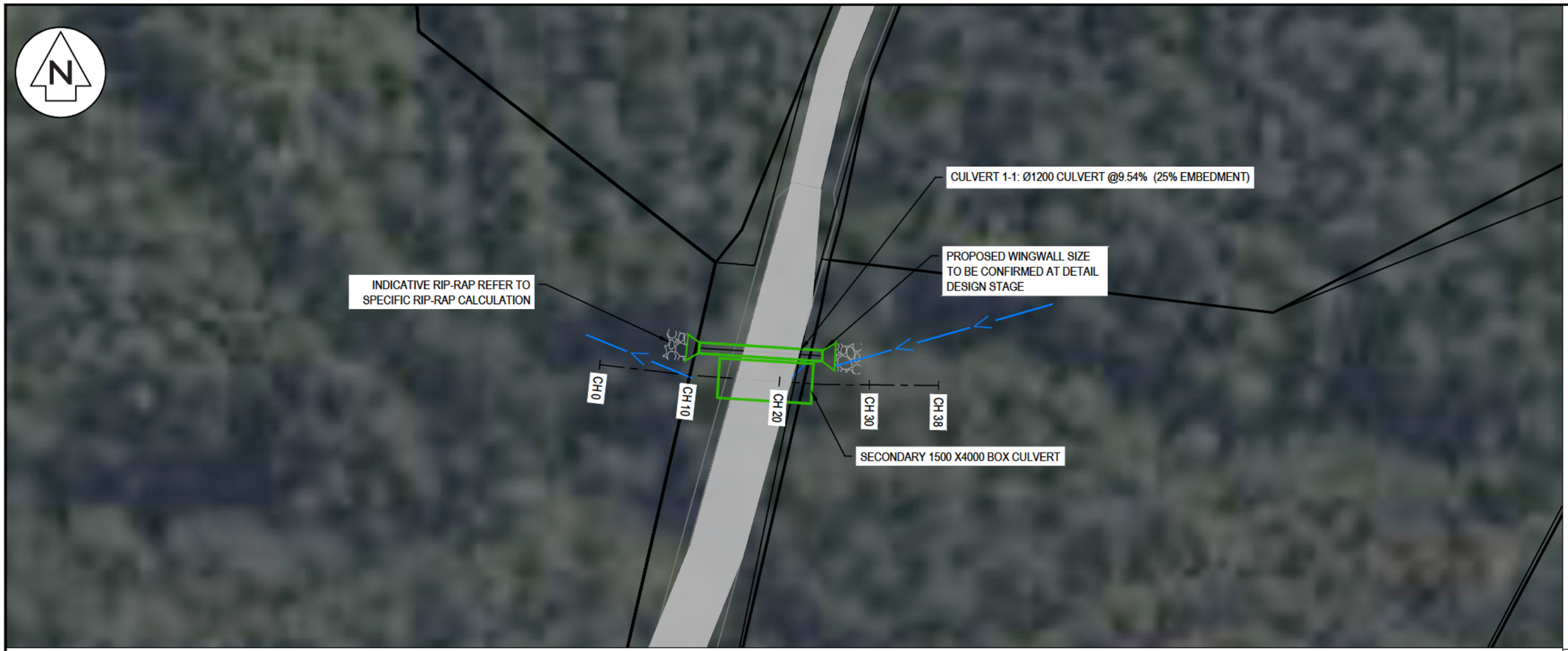

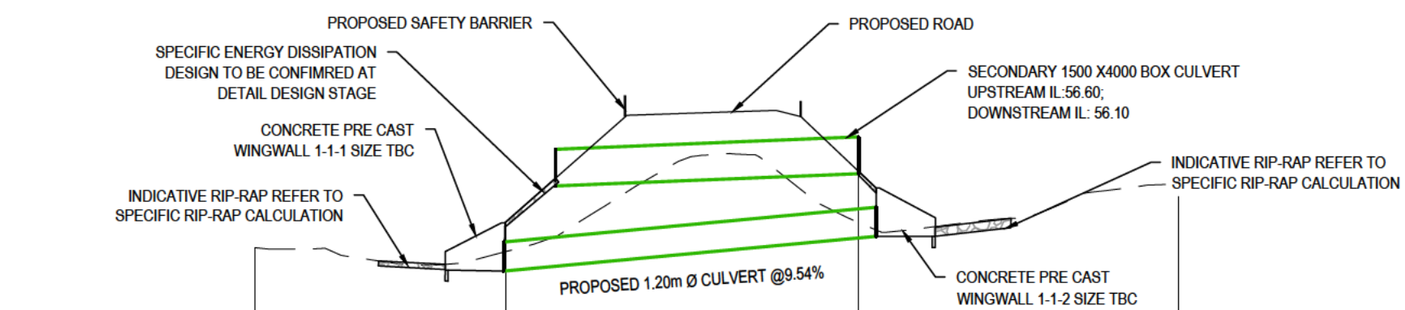

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PIPE INVERT			52.63			54.05			
DEPTH INVERT (m)									
PIPE GRADE			1200mm RCRRJ Ø @ 9.54% 14.86m						
CHAINAGE	0.00	5.00	10.00 10.20	15.00	20.00	24.60 25.00	30.00	35.00	37.64

CULVERT 1-1 LONG SECTION
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Legend
- EX BDY
- PROP BDY
- PR OLFP

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
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Title
CULVERT 1-1 LONG SECTION

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Drawing no.	C484 Rev A

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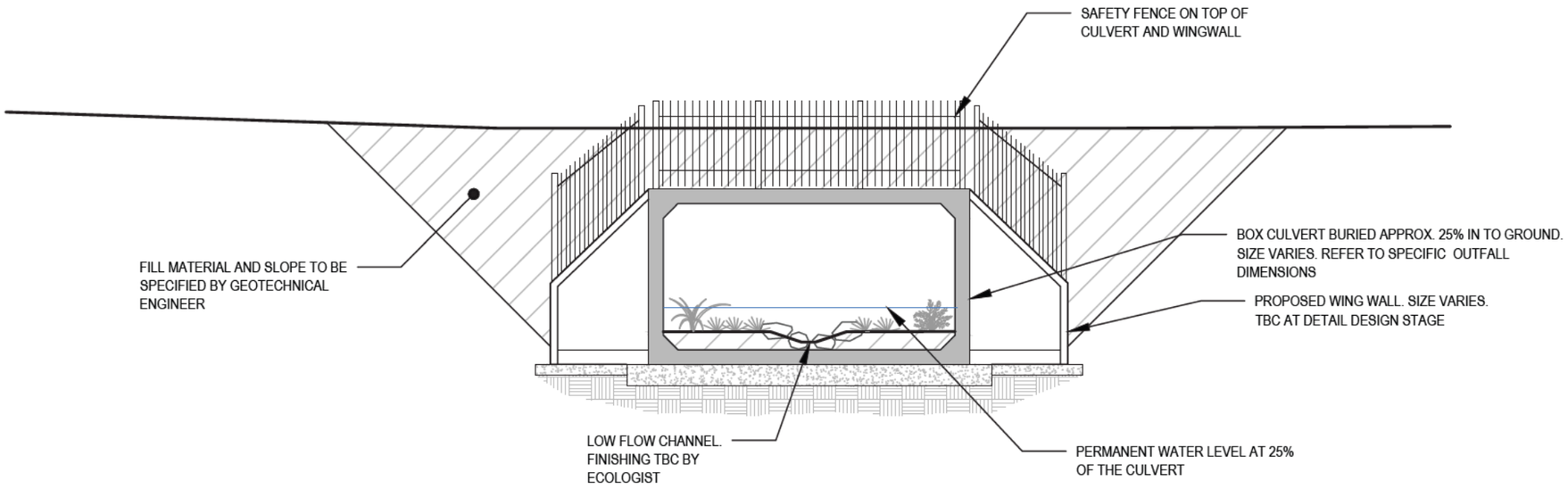
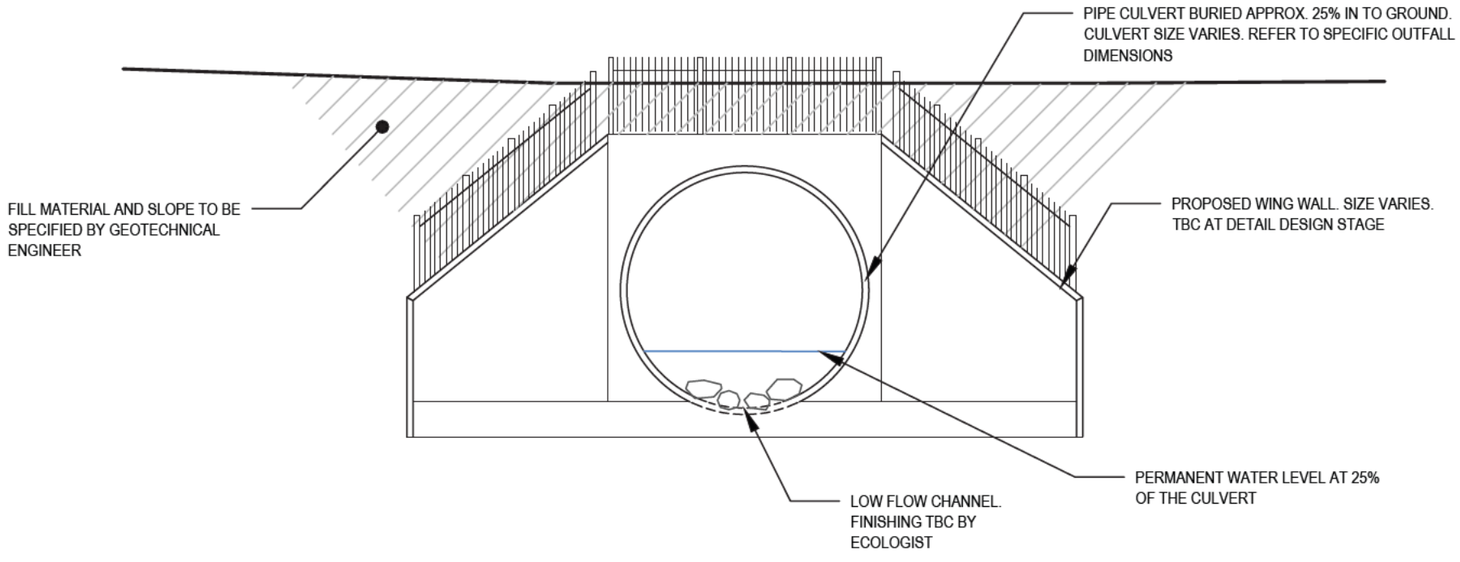


TYPICAL BOX CULVERT CROSS SECTION

SCALE: NTS



TYPICAL CIRCULAR CULVERT CROSS SECTION

SCALE: NTS

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AC	03/2025
Drawn	AC	03/2025
Checked	RW/KH	03/2025

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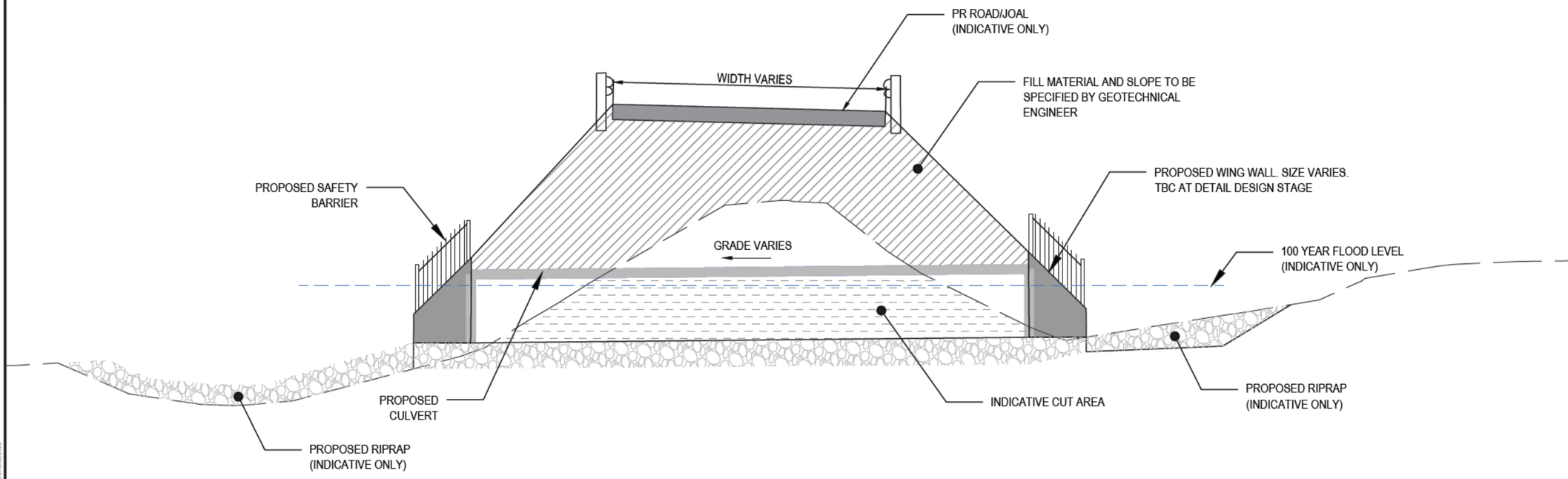
Project

DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title

TYPICAL CULVERT CROSS SECTION

Project no.	147007		
Scale	NTS		
Cad file	147007-M-C490 CULVERT SECTIONS.DWG		
Drawing no.	C490	Rev	A



TYPICAL CULVERT LONG SECTION

SCALE: NTS

RESOURCE CONSENT

LEGEND

EX GROUND

PR GROUND

Rev	Description	By	Date
A	RESOURCE CONSENT	AYC	03/2025

	By	Date
Survey		
Design	AYC	03/2025
Drawn	AYC	03/2025
Checked	RW/KH	03/2025

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Project

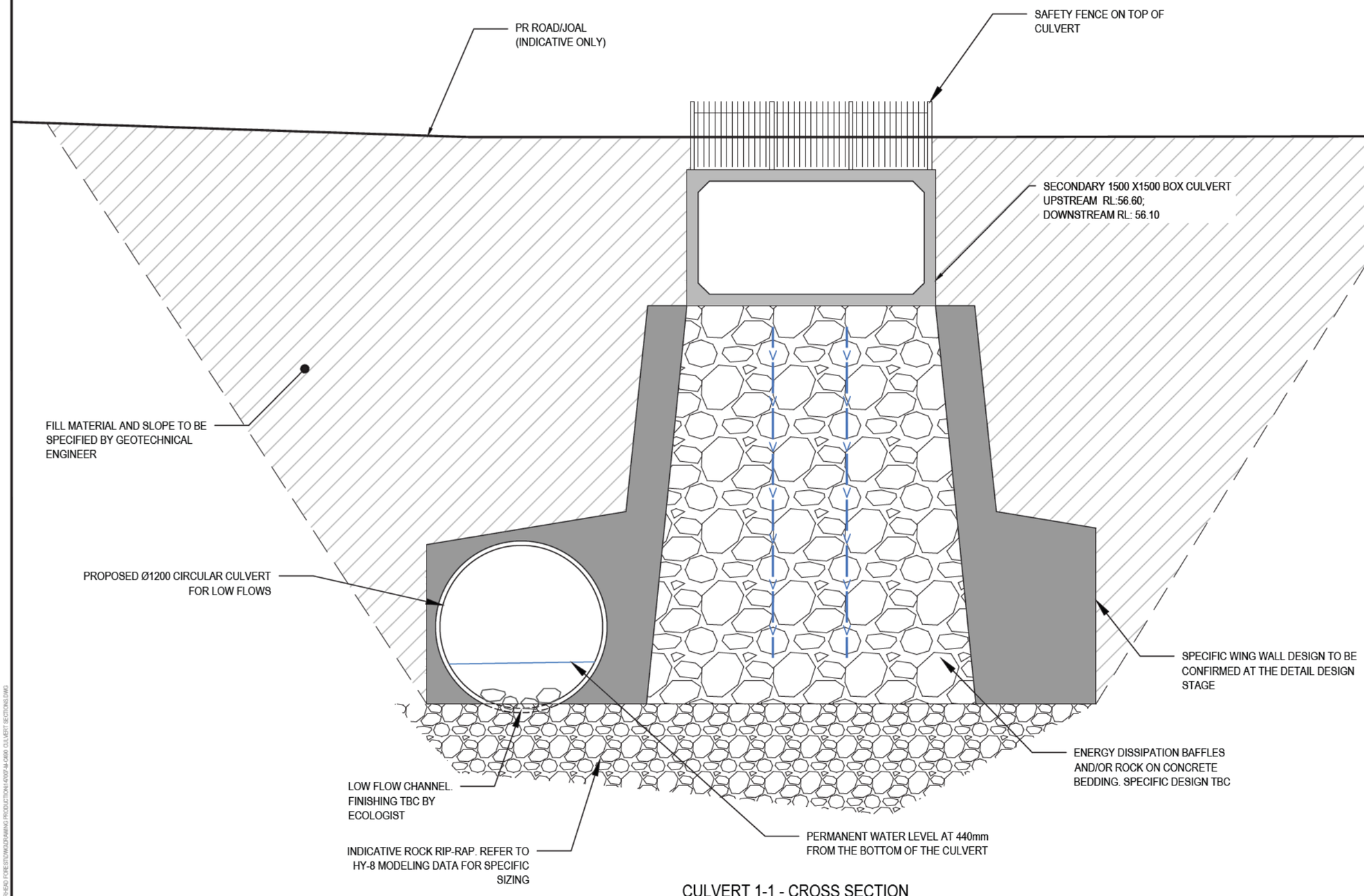
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title

TYPICAL CULVERT LONG SECTION

Project no.	147007		
Scale	NTS		
Cad file	147007-M-C490 CULVERT SECTIONS.DWG		
Drawing no.	C491	Rev	A

CULVERT RIP-RAP DETAILS REFER TO HY-8 MODELING DATA.
DETAIL DESIGN OF THE STABILISED BATTERS AND ENERGY DISSIPATION TO BE CONFIRMED AT THE DETAIL DESIGN STAGE



CULVERT 1-1 - CROSS SECTION
SCALE: NTS

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AYC	03/2025
Drawn	AYC	03/2025
Checked	RW/KH	03/2025

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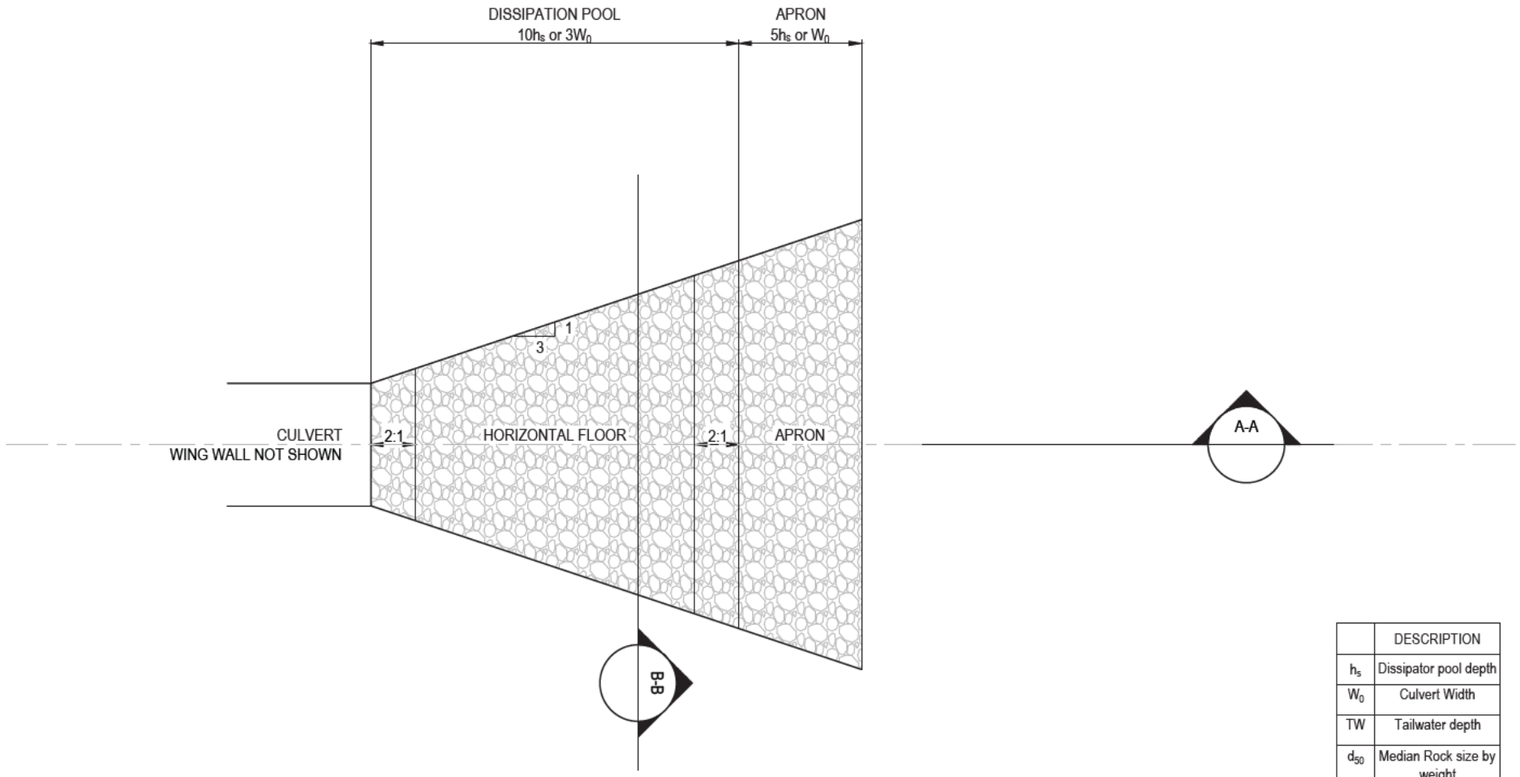
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
CULVERT 1-1 LONG-SECTION

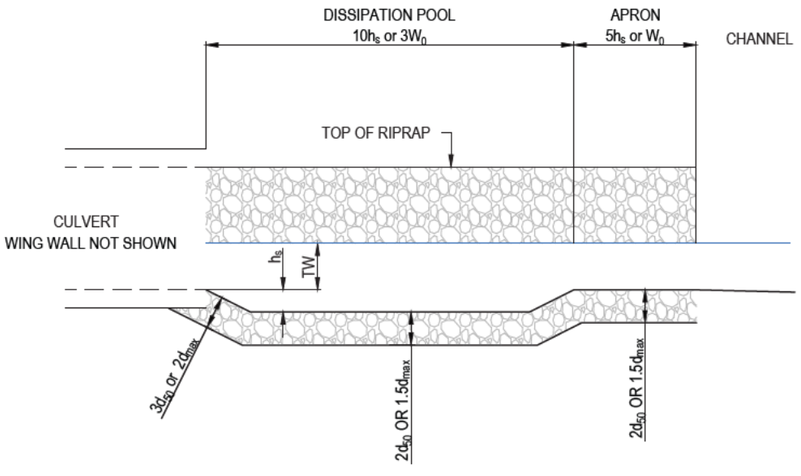
Project no.	147007		
Scale	NTS		
Cad file	147007-M-C490 CULVERT SECTIONS.DWG		
Drawing no.	C492	Rev	A

SPECIFIC CULVERT RIP-RAP DETAILS
REFER TO HY-8 MODELING DATA

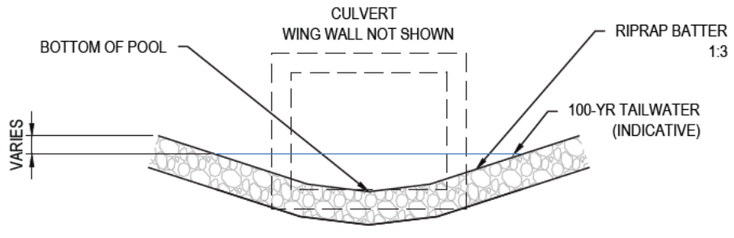


TYPICAL RIP-RAP PLAN VIEW
NTS

	DESCRIPTION
h_s	Dissipator pool depth
W_0	Culvert Width
TW	Tailwater depth
d_{50}	Median Rock size by weight
d_{max}	Max rock size by weight



TYPICAL RIP-RAP LONG SECTION A-A
NTS



TYPICAL RIP-RAP CROSS SECTION B-B
NTS

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AYC	03/2025
Drawn	AYC	03/2025
Checked	RW/KH	03/2025

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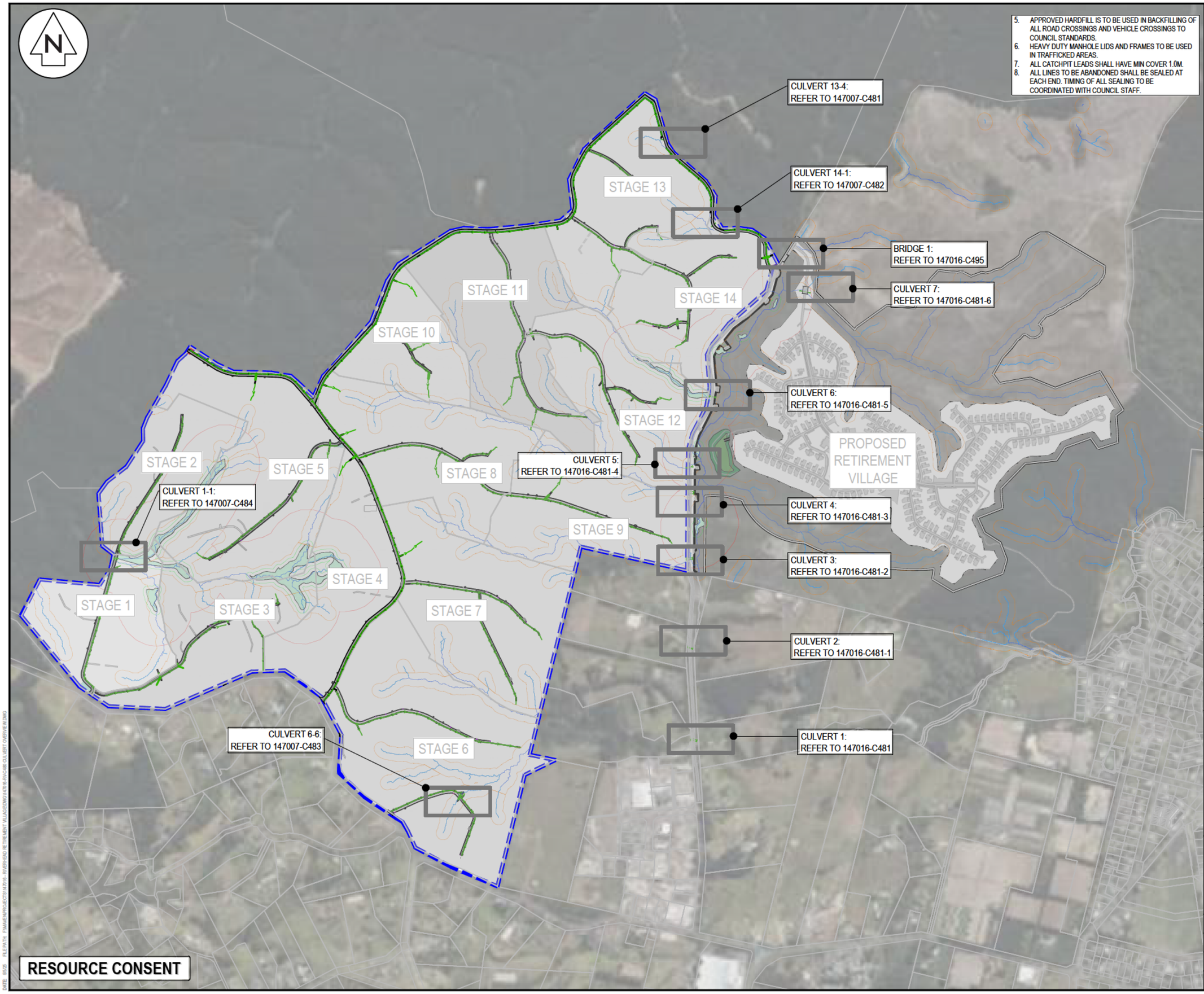
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
TYPICAL RIP-RAP DETAILS

Project no.	147007		
Scale	AS SHOWN @ A3		
Cad file	147007-M-C490 CULVERT SECTIONS.DWG		
Drawing no.	C493	Rev	A



5. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS AND VEHICLE CROSSINGS TO COUNCIL STANDARDS.
6. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS.
7. ALL CATCHPIT LEADS SHALL HAVE MIN COVER 1.0M.
8. ALL LINES TO BE ABANDONED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.

NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL STANDARDS.
2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
3. PIPE BEDDING: 0 - 10% GRANULAR BEDDING,10 - 20% WEAK CONCRETE BEDDING.GREATER THAN 20% WEAK CONCRETE BEDDING (7MPA PLUS ANTI SCOUR BLOCKS AT 6M CRS).
4. EACH CONNECTION SHALL BE MARKED BY A 50MMX50MM TREATED PINE STAKE EXTENDING 600MM ABOVE GROUND LEVEL WITH THE TOP PAINTED. THIS MARKER POST SHALL BE PLACED ALONGSIDE A TIMBER MARKER INSTALLED AT THE TIME OF PIPELAYING AND EXTENDING FROM THE CONNECTION TO 150MM BELOW FINISHED GROUND LEVEL. CONNECTIONS SHALL BE ACCURATELY INDICATED ON "AS BUILT" PLANS.

LEGEND

- EX BDY
- PROP BDY
- STAGE BOUNDARY
- EX OLFP
- REMOVED EX OLFP
- EXISTING STREAMS
- PR SW FLOW PTH
- PR SW PIPE
- RIPARIAN YARD 20m SETBACK
- WETLAND AREA 100m SETBACK
- WETLAND AREA 10m SETBACK
- EX/PROP SWMH
- PROP SWCP SINGLE
- PR INDICATIVE LEVEL SPREADER - SUBJECT TO DETAIL DEISGN
- PR RIPRAP
- PR CIRCULAR CULVERT
- EX CULVERT
- PR CULVERT
- PR SCRUFFY DOME

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey	LANDPRO	03/22
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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Project

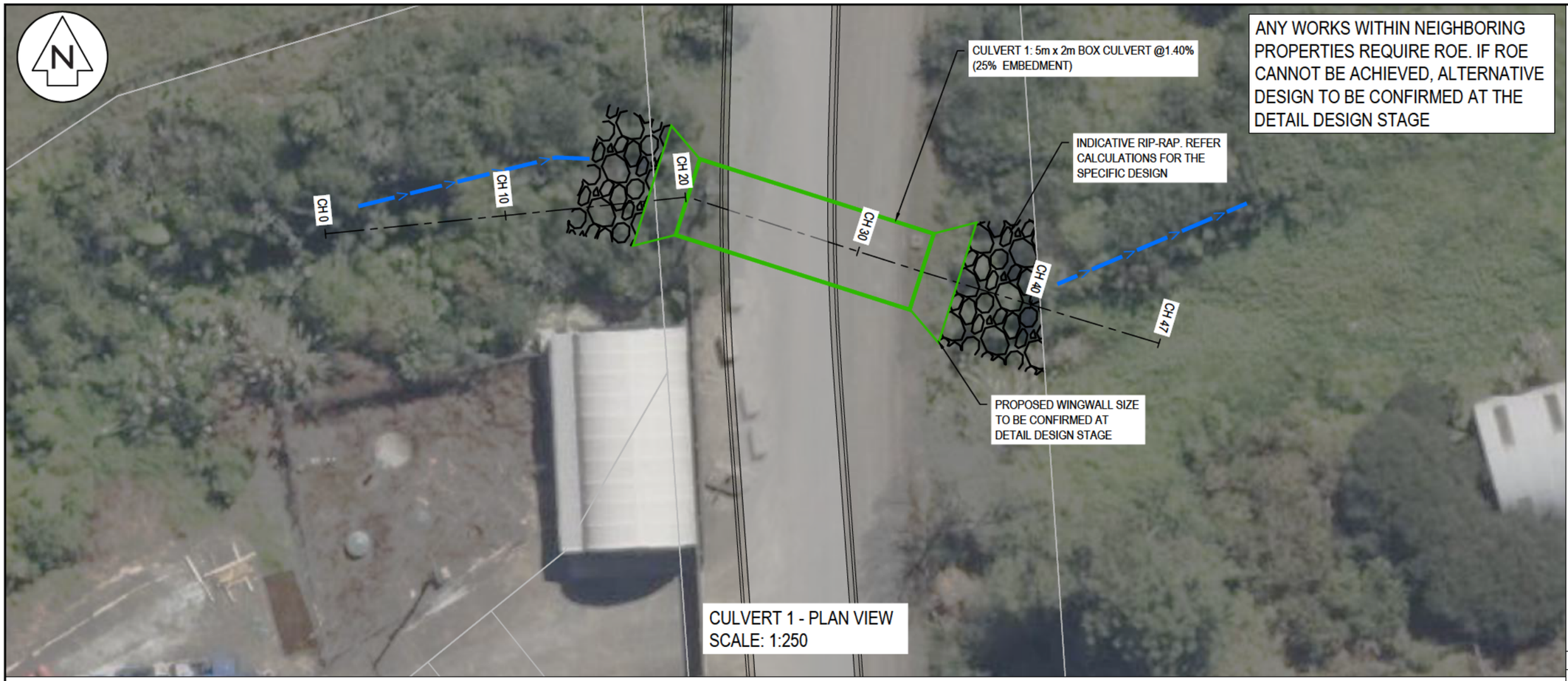
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title

RETIREMENT VILLAGE PROPOSED CULVERT OVERVIEW PLAN

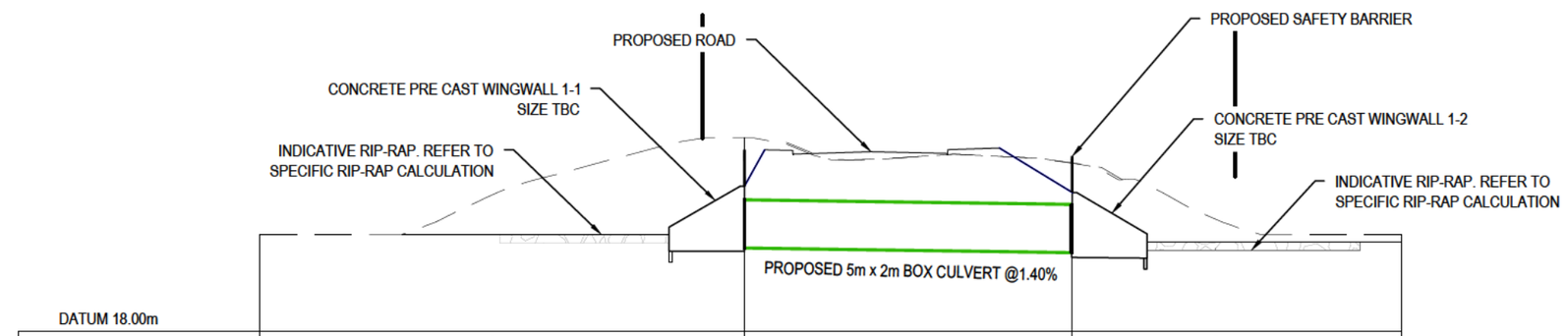
Project no.	147016		
Scale	1:10,000 @ A3		
Cad file	147016-RV-C480 CULVERT OVERVIEW.DWG		
Drawing no.	C480	Rev	A

DATE: 05/26 FILE PATH: P:\MAVEN PROJECTS\147016 RIVERHEAD RETIREMENT VILLAGE\DWG\147016-RV-C480 CULVERT OVERVIEW.DWG



ANY WORKS WITHIN NEIGHBORING PROPERTIES REQUIRE ROE. IF ROE CANNOT BE ACHIEVED, ALTERNATIVE DESIGN TO BE CONFIRMED AT THE DETAIL DESIGN STAGE

CULVERT 1 - PLAN VIEW
SCALE: 1:250



DATUM 18.00m							
EXISTING LEVELS	22.00	23.79	26.00	25.27	24.95	22.49	22.00
DESIGN LEVELS			24.00	25.56	23.75		
PIPE INVERT			21.43		21.24		
DEPTH INVERT (m)							
PIPE GRADE			5,000 x 2,000 mm Conc Box Culvert Ø @ 1.40% 13.57m				
CHAINAGE	0.00	10.00	20.00	30.00	33.69	40.00	47.39

CULVERT 1 LONG SECTION
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

LEGEND
- EX BDY
- PR BDY
- PR OLFP
- EX STREAMS

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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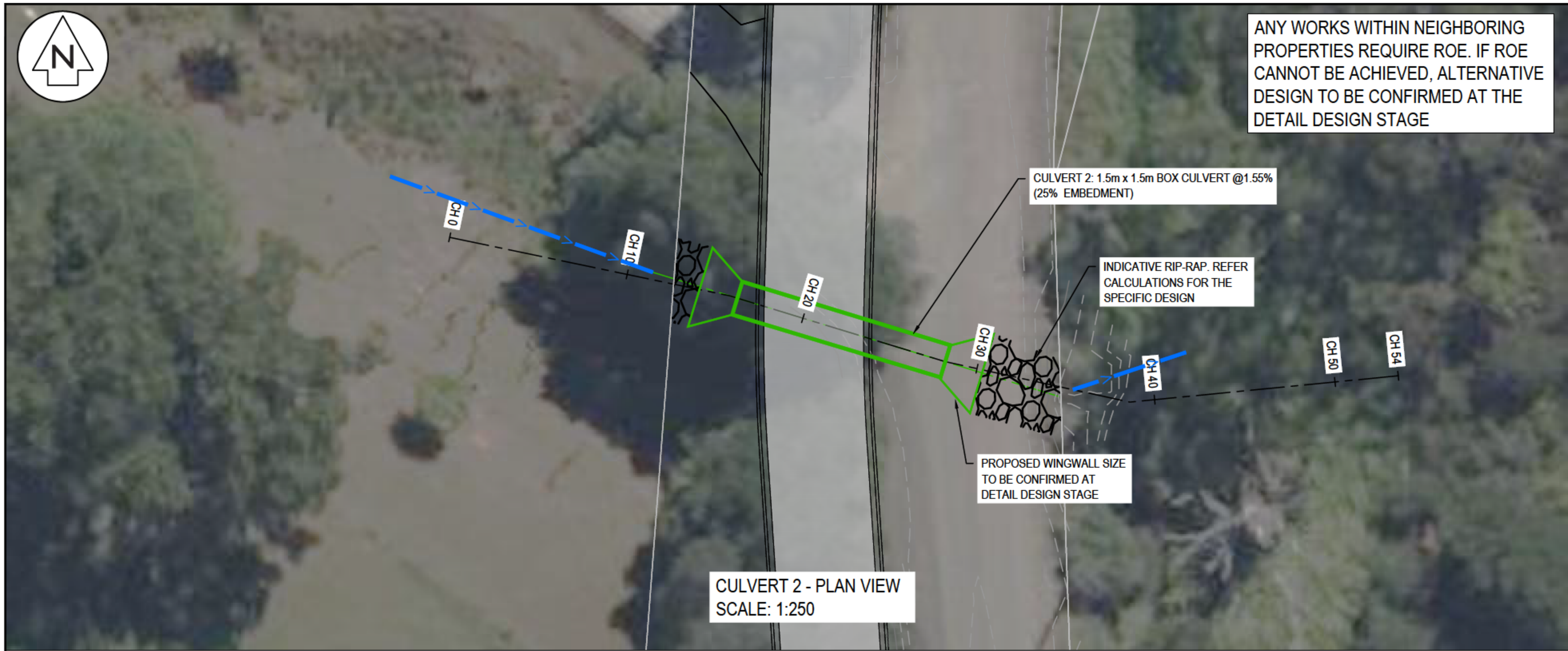
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

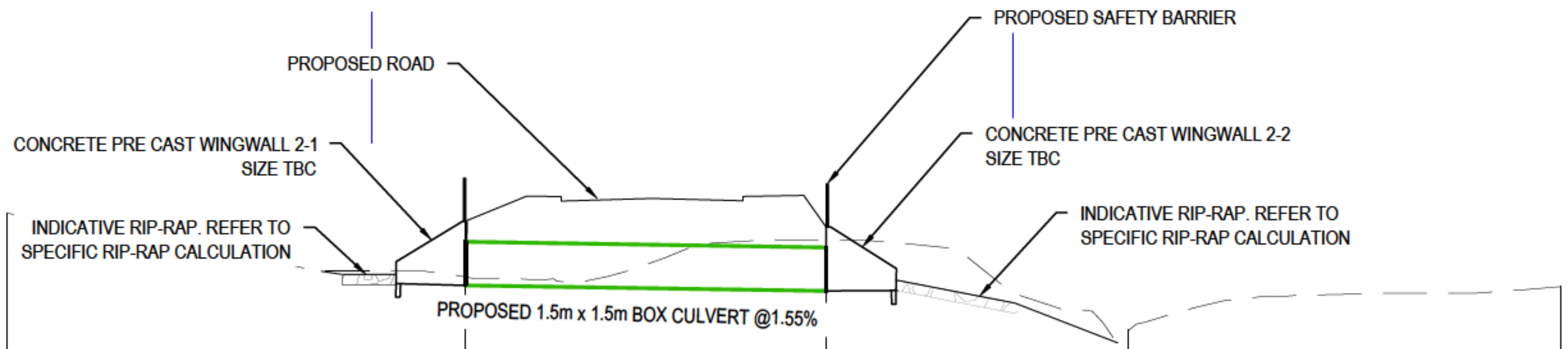
Project no.	147016		
Scale	AS SHOWN @ A3		
Cad file	147016-RV-C481 CULVERT DETAILS.DWG		
Drawing no.	C481	Rev	A

DATE: 03/25 FILEPATH: P:\MAVEN\PROJECTS\147016 - RIVERHEAD RETIREMENT VILLAGE\02\WORK\RV-C481 CULVERT DETAILS.DWG



CULVERT 2 - PLAN VIEW
SCALE: 1:250

LEGEND
- EX BDY
- PR BDY
- PR OLFP
- EX STREAMS



DATUM 18.00m

EXISTING LEVELS	24.76	22.91	22.56	22.43	23.82	23.78	20.72	21.24	22.00	22.22
DESIGN LEVELS			24.48	25.20	24.27					
PIPE INVERT			22.27		22.07					
DEPTH INVERT (m)										
PIPE GRADE			1,500 x 1,500 mm Conc Box Culvert Ø @ 1.55% 12.43m							
CHAINAGE	0.00	10.00	15.78	20.00	28.21	30.00	38.63	40.00	50.00	53.50

CULVERT 2 LONG SECTION-
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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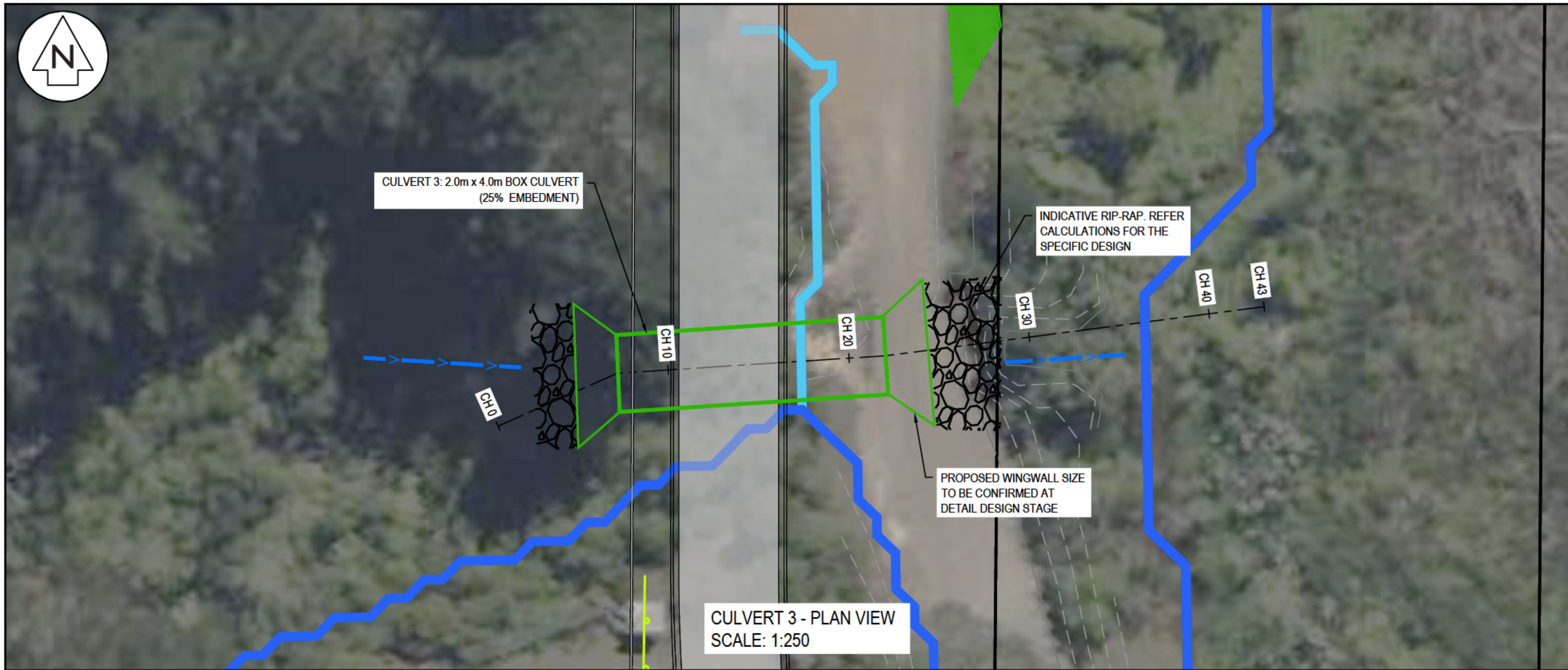
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

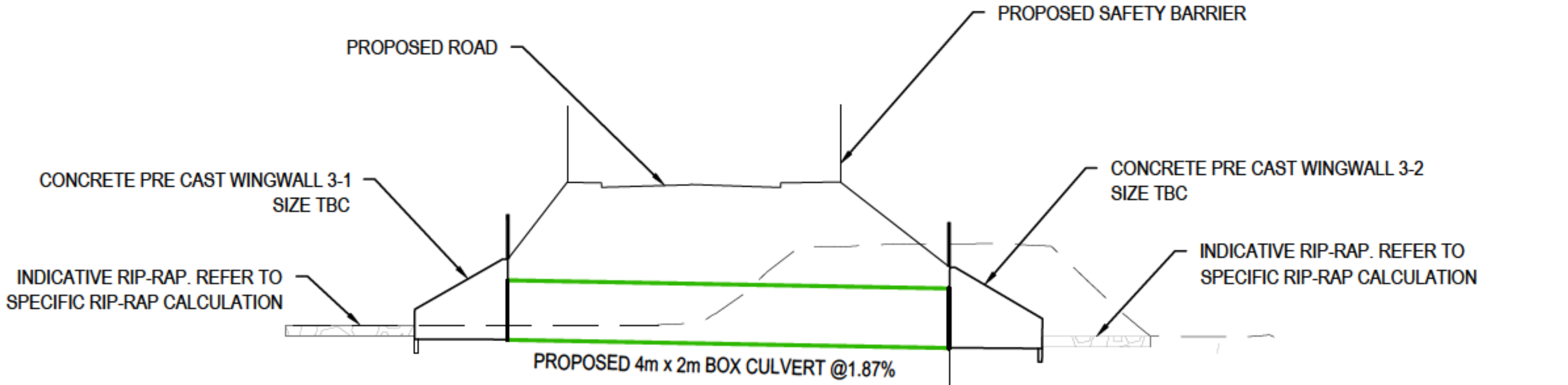
Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

Project no.	147016
Scale	AS SHOWN @ A3
Cad file	147016-RV-C481 CULVERT DETAILS.DWG
Drawing no.	C481-1
Rev	A



CULVERT 3 - PLAN VIEW
SCALE: 1:250

LEGEND
EX BDY
PR BDY
PR OLFP
EX STREAMS



DATUM 20.00m

EXISTING LEVELS				25.50	25.52	22.41		
DESIGN LEVELS			27.57	26.32	24.75			
PIPE INVERT		22.30			22.02			
DEPTH INVERT (m)								
PIPE GRADE		4,000 x 2,000 mm Conc Box Culvert Ø @ 1.87% 14.84m						
CHAINAGE	0.00	7.18	10.00	20.00	22.02	30.00	40.00	43.07

CULVERT 3 LONG SECTION-
SCALE: HORI 1:150 VERT 1:150

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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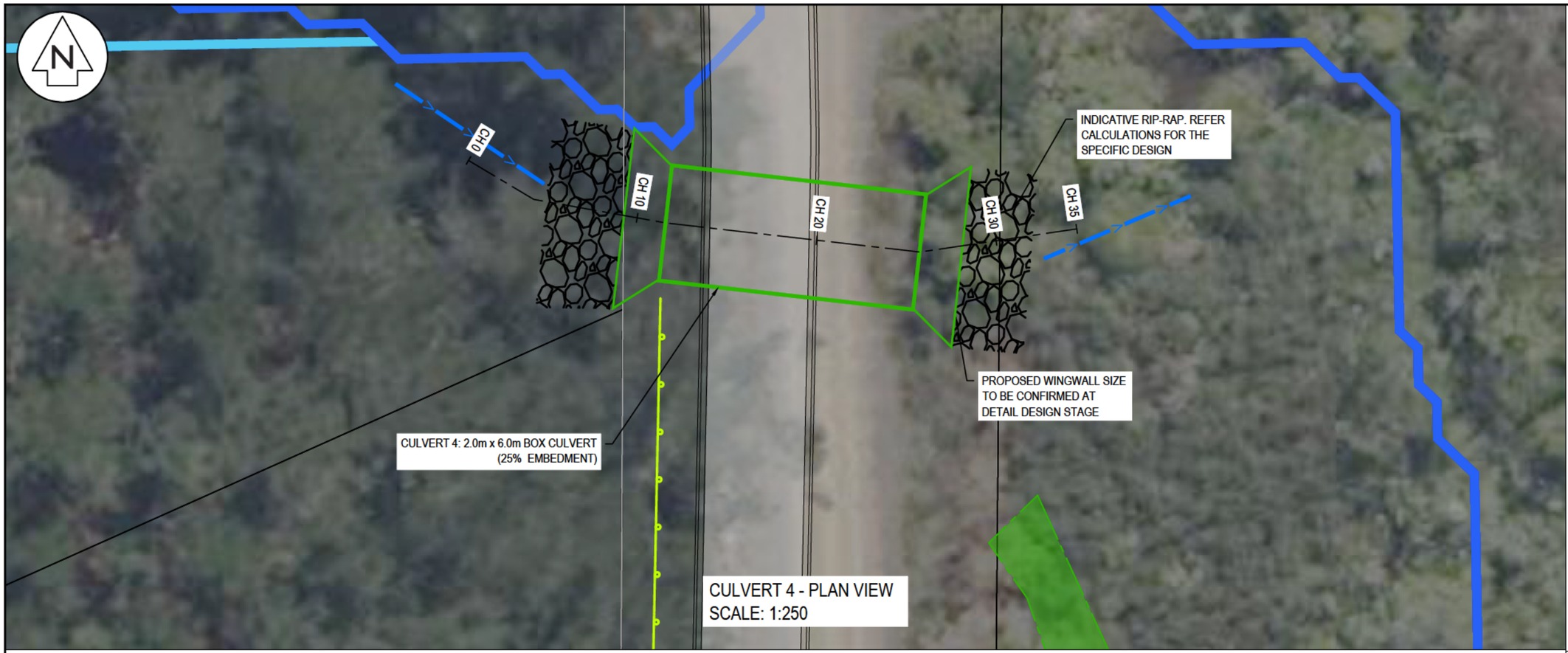
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

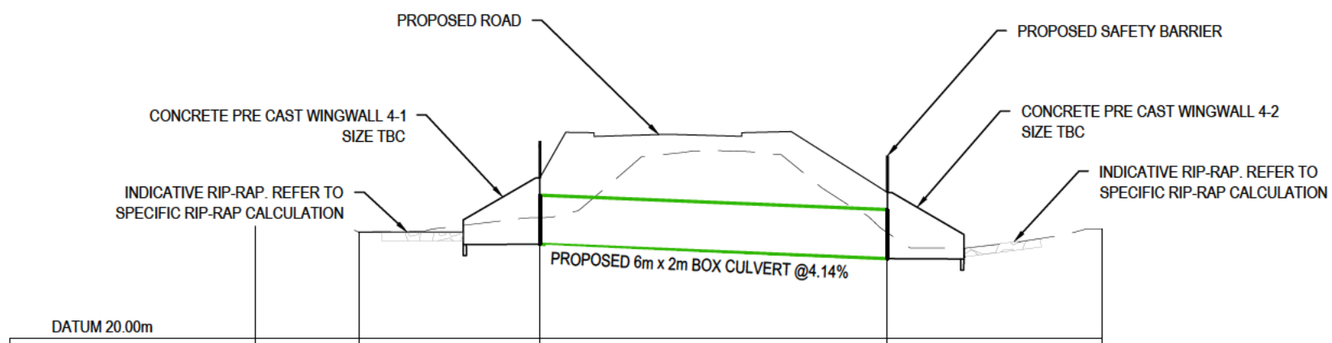
Project no.	147016
Scale	AS SHOWN @ A3
Cad file	147016-RV-C481 CULVERT DETAILS.DWG
Drawing no.	C481-2
Rev	A

RESOURCE CONSENT



CULVERT 4 - PLAN VIEW
SCALE: 1:250

LEGEND
- EX BDY
- PR BDY
- PR OLFP
- EX STREAMS



DATUM 20.00m									
EXISTING LEVELS	25.54	24.35	24.35	24.80	24.93	26.77	27.62	24.97 24.32	23.81	24.46
DESIGN LEVELS					26.56	28.28				
PIPE INVERT					23.85			23.26		
DEPTH INVERT (m)										
PIPE GRADE					6,000 mm x 2,000 mm Conc Box Culvert Ø @ 4.14% 14.16m					
CHAINAGE	0.00	4.20	5.00	10.00	11.60	15.00	20.00	25.00 25.76	30.00	34.51

CULVERT 4 LONG SECTION-
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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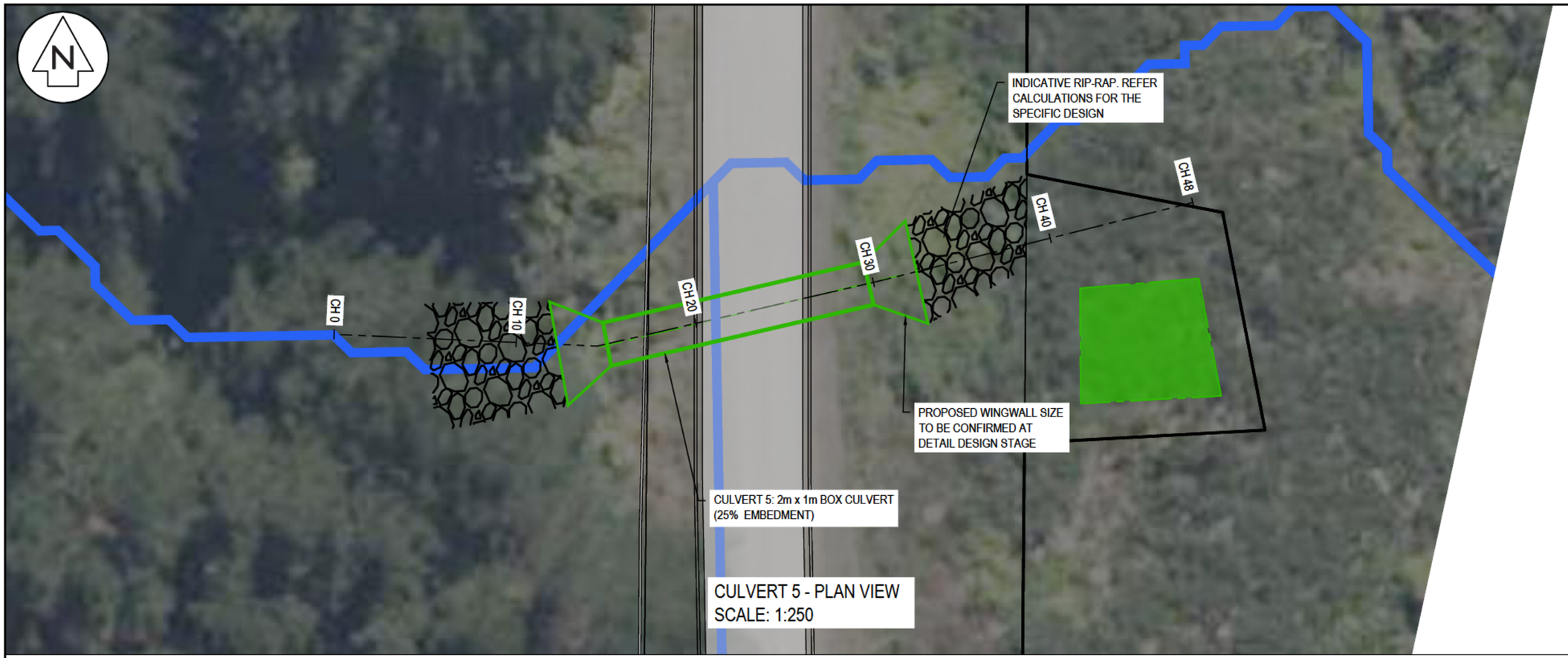
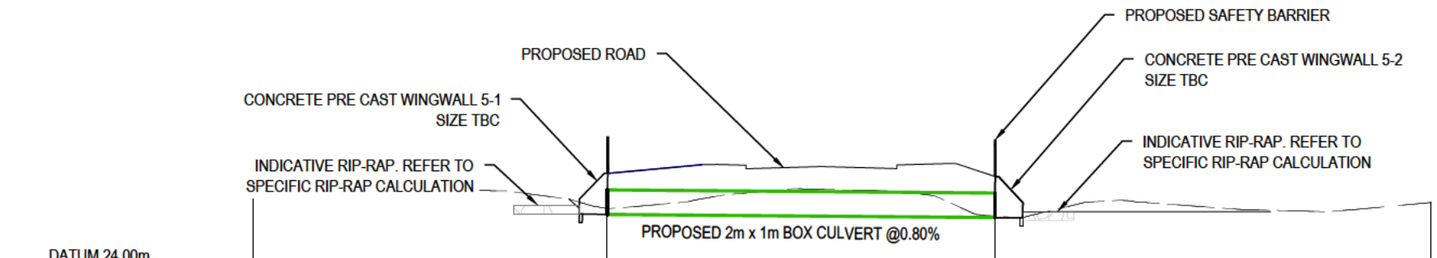
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

Project no.	147016		
Scale	AS SHOWN @ A3		
Cad file	147016-RV-C481 CULVERT DETAILS.DWG		
Drawing no.	C481-3	Rev	A





DATUM 24.00m

EXISTING LEVELS	27.46	27.35	27.13	26.42 / 26.44	27.03	27.15	26.13 / 26.11	26.72	26.39	26.37	26.65
DESIGN LEVELS				27.89	28.18	28.07	27.81 / 27.91				
PIPE INVERT				26.17			26.04				
DEPTH INVERT (m)											
PIPE GRADE				2,000 x 1,000 mm Concrete Box Culvert Ø @ 0.80% 15.82m							
CHAINAGE	0.00	5.00	10.00	14.46 / 15.00	20.00	25.00	30.97 / 30.97	35.00	40.00	45.00	48.06

CULVERT 5 LONG SECTION-
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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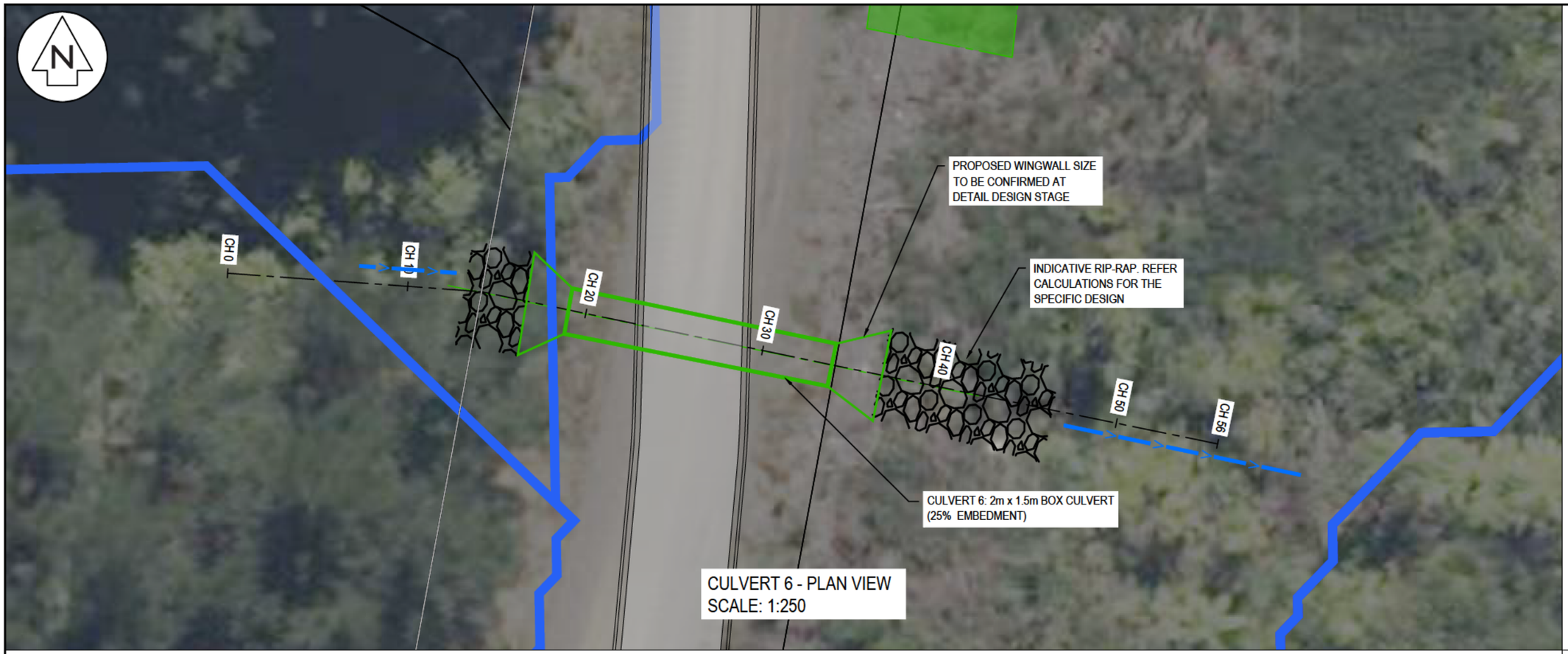
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

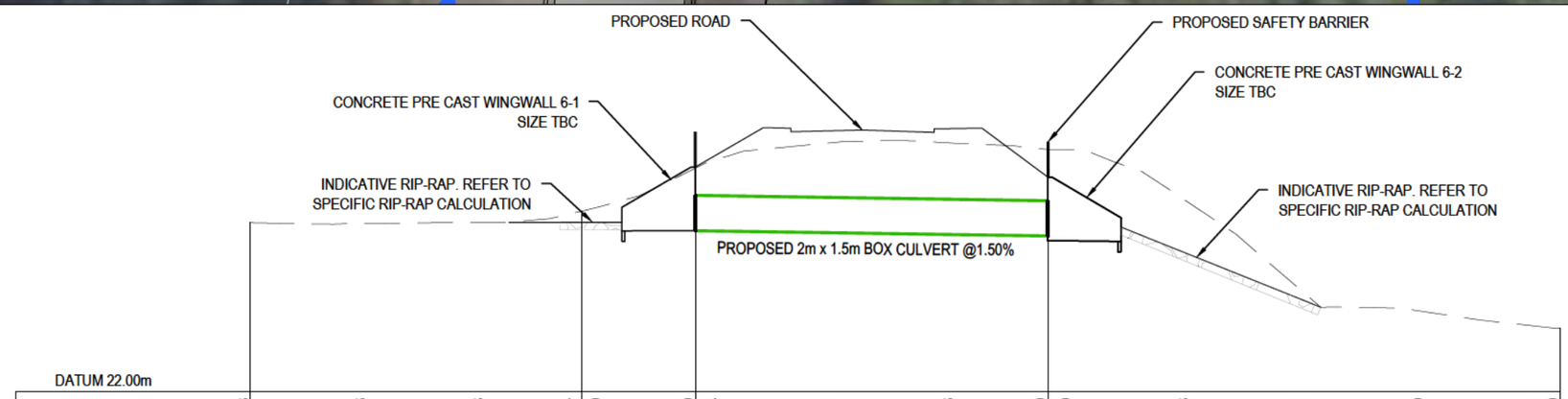
Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

Project no.	147016
Scale	AS SHOWN @ A3
Cad file	147016-RV-C481 CULVERT DETAILS.DWG
Drawing no.	C481-4 Rev A

DATE: 9/5/25 FILE PATH: F:\MAVEN\PROJECTS\147016 - RIVERHEAD RETIREMENT VILLAGE\DRAWINGS\147016-RV-C481 CULVERT DETAILS.DWG



CULVERT 6 - PLAN VIEW
SCALE: 1:250



DATUM 22.00m														
EXISTING LEVELS	29.18	29.16	29.18	29.67	29.90	31.50	31.94	32.61	32.56	32.30	32.29	29.98	26.05	25.39	24.75	24.69
DESIGN LEVELS						31.55	32.17	33.10	33.18	31.13						
PIPE INVERT						28.84				28.62						
DEPTH INVERT (m)																
PIPE GRADE						2,000 x 1,500 mm Conc Box Culvert Ø @ 1.50% 14.99m										
CHAINAGE	0.00	5.00	10.00	14.10	15.00	18.93	20.00	25.00	30.00	33.92	35.00	40.00	45.00	50.00	55.00	55.73

CULVERT 6 LONG SECTION-
SCALE: HORI 1:150 VERT 1:150

LEGEND
- EX BDY
- PR BDY
- PR OLFP
- EX STREAMS

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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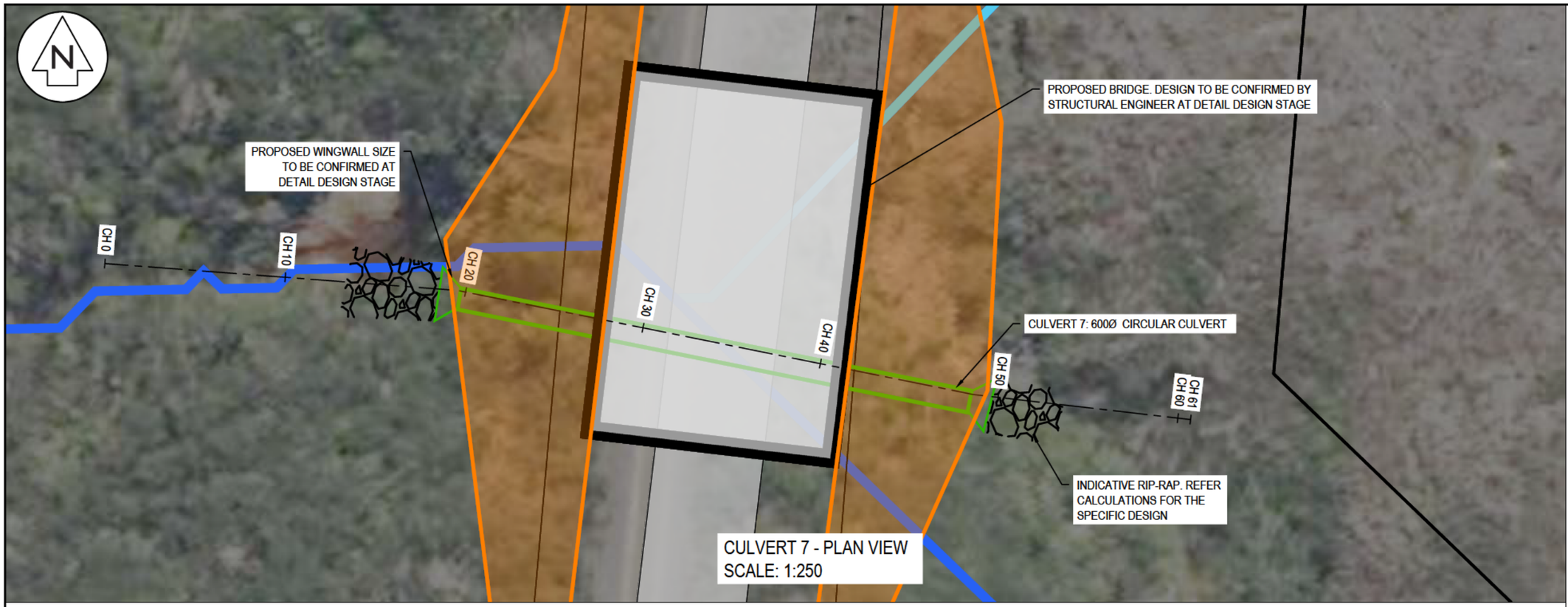
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

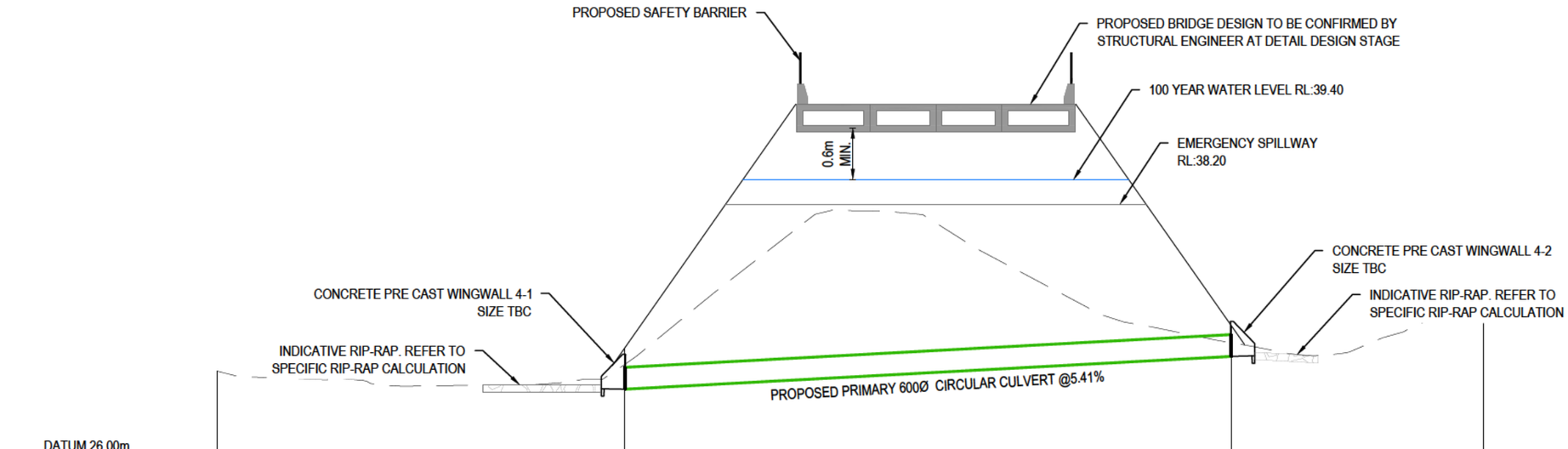
Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

Project no.	147016
Scale	AS SHOWN @ A3
Cad file	147016-RV-C481 CULVERT DETAILS.DWG
Drawing no.	C481-5 Rev A

RESOURCE CONSENT



CULVERT 7 - PLAN VIEW
SCALE: 1:250



DATUM 26.00m					
EXISTING LEVELS	30.08	30.41		31.44	33.61
DESIGN LEVELS		31.20		32.26	
PIPE INVERT		29.22		30.79	
DEPTH INVERT (m)					
PIPE GRADE		600 mm RCRRJ Ø @ 5.41% 29.08m			
CHAINAGE	0.00	19.55		48.63	60.70

CULVERT 7 LONG SECTION-
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

LEGEND
- EX BDY
- PR BDY
- PR OLFP
- EX STREAMS

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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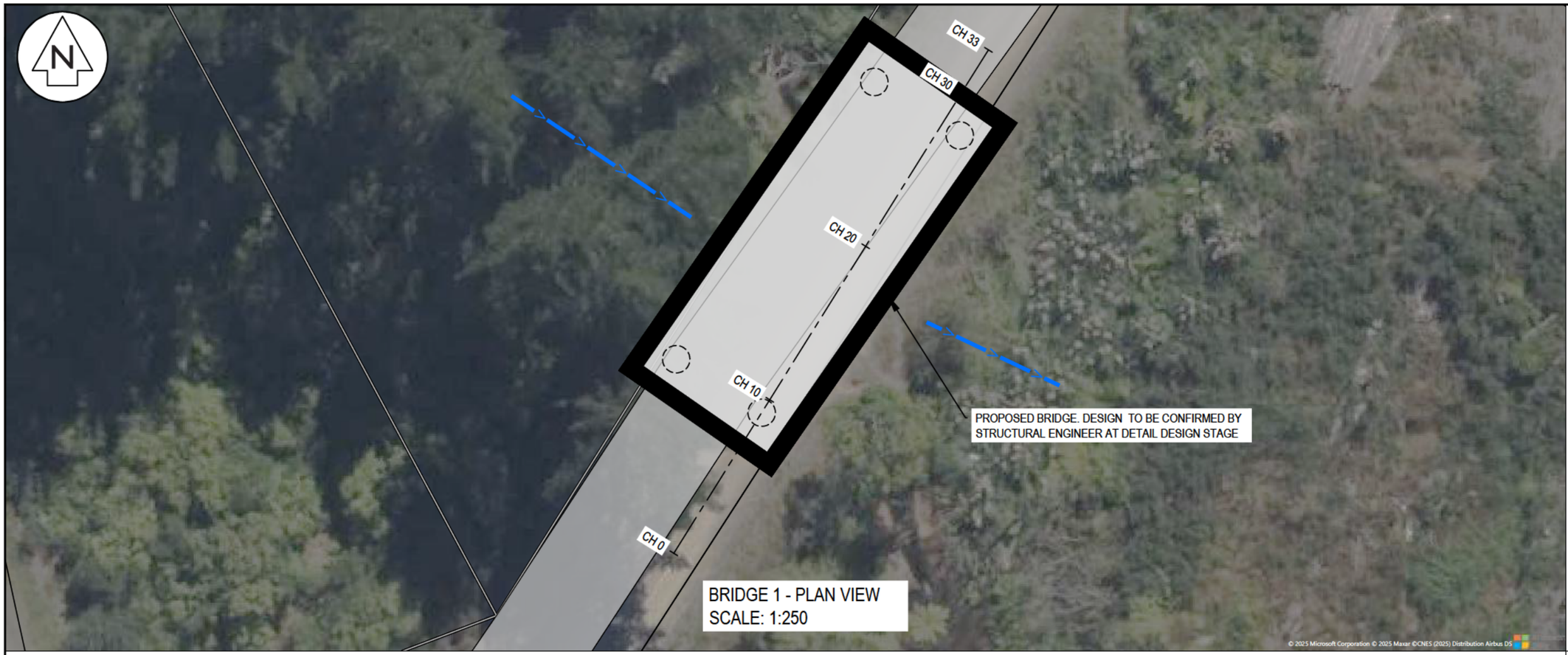
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

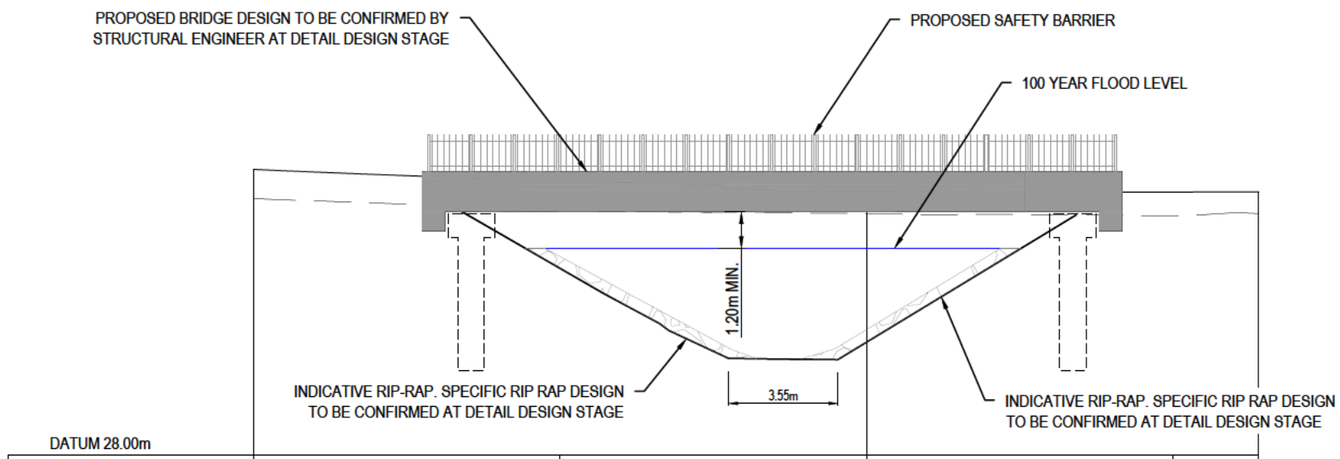
Title
RETIREMENT VILLAGE PROPOSED CULVERT PLAN AND LONGSECTION

Project no.	147016
Scale	AS SHOWN @ A3
Cad file	147016-RV-C481 CULVERT DETAILS.DWG
Drawing no.	C481-6 Rev A



LEGEND

- EX BDY
- PR BDY
- PR OLFP
- EX STREAMS



DATUM 28.00m

EXISTING LEVELS		36.04	35.89	35.81	
DESIGN LEVELS		34.11	31.69		
CUT/FILL		-1.93	-4.20		
CHAINAGE	0.00	10.00	20.00	30.00	32.80

2,000

BRIDGE 1 LONG SECTION
SCALE: HORI 1:150 VERT 1:150

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	EZ	03/2025

	By	Date
Survey		
Design	EZ	03/2025
Drawn	EZ	03/2025
Checked	RW/KH	03/2025

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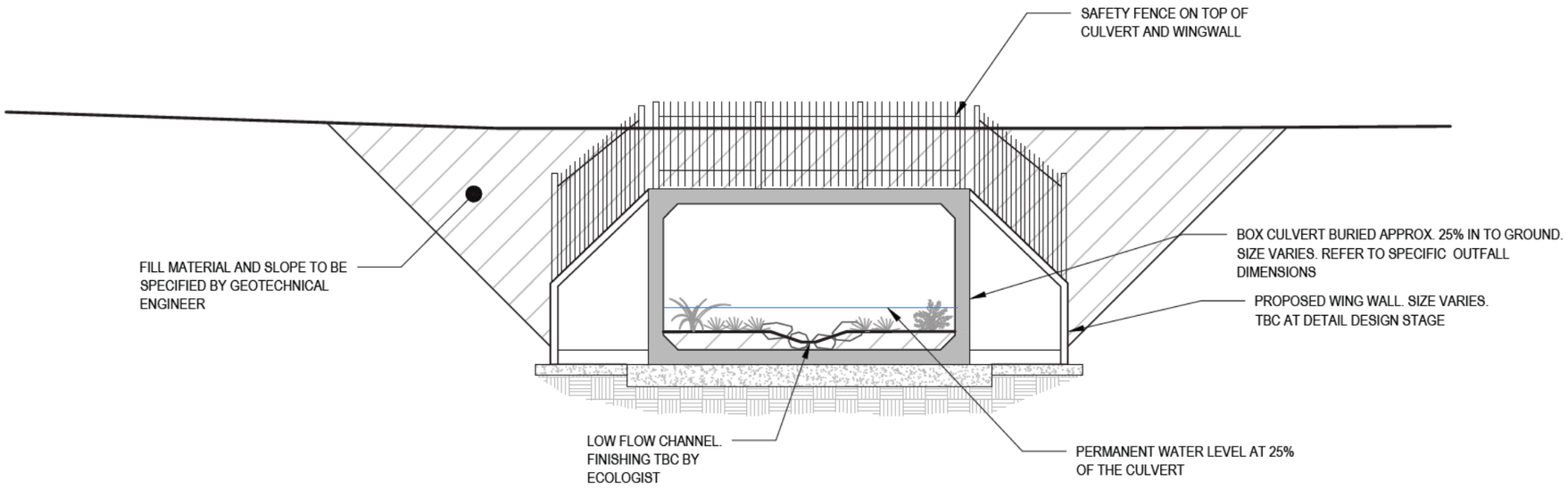
Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
RETIREMENT VILLAGE PROPOSED BRIDGE PLAN AND LONGSECTION

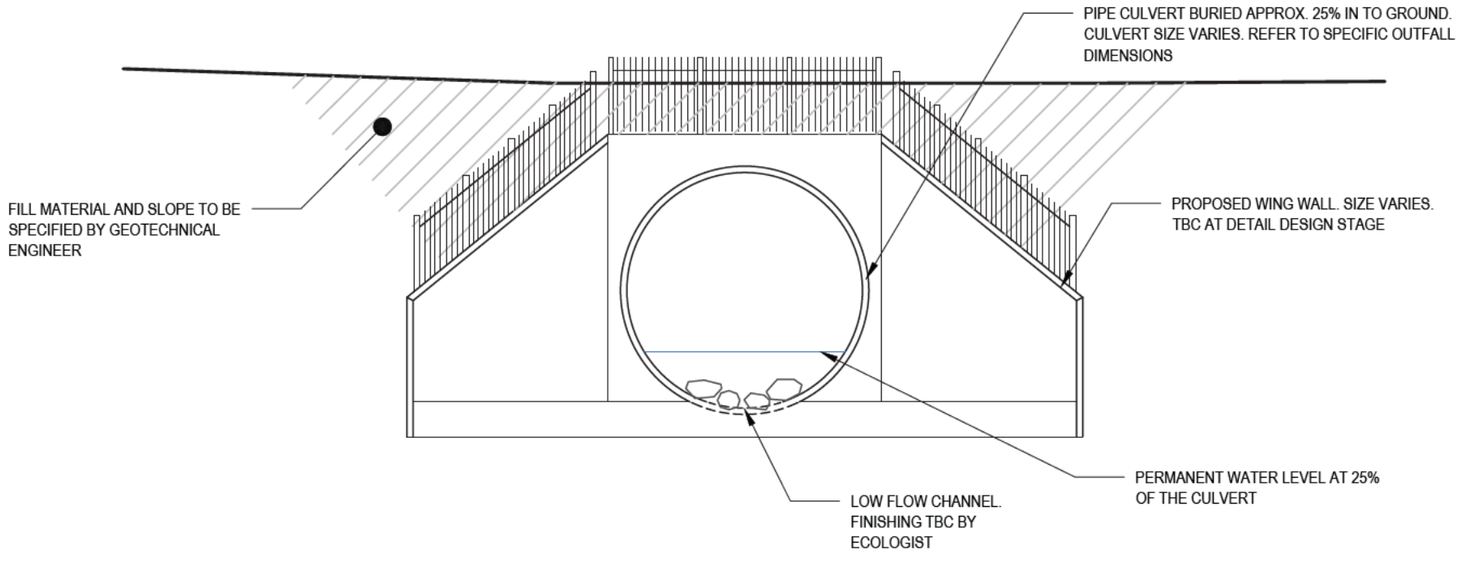
Project no.	147016
Scale	AS SHOWN @ A3
Cad file	147016-RV-C481 CULVERT DETAILS.DWG
Drawing no.	C481-7 Rev A

DATE: 05/26 FILE PATH: F:\MAVEN\PROJECTS\147016 - RIVERHEAD RETIREMENT VILLAGE\DGN\24.01\16-RV-C481 CULVERT DETAILS.DWG



TYPICAL BOX CULVERT CROSS SECTION

SCALE: NTS



TYPICAL CIRCULAR CULVERT CROSS SECTION

SCALE: NTS

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AC	03/2025
Drawn	AC	03/2025
Checked	RW/KH	03/2025

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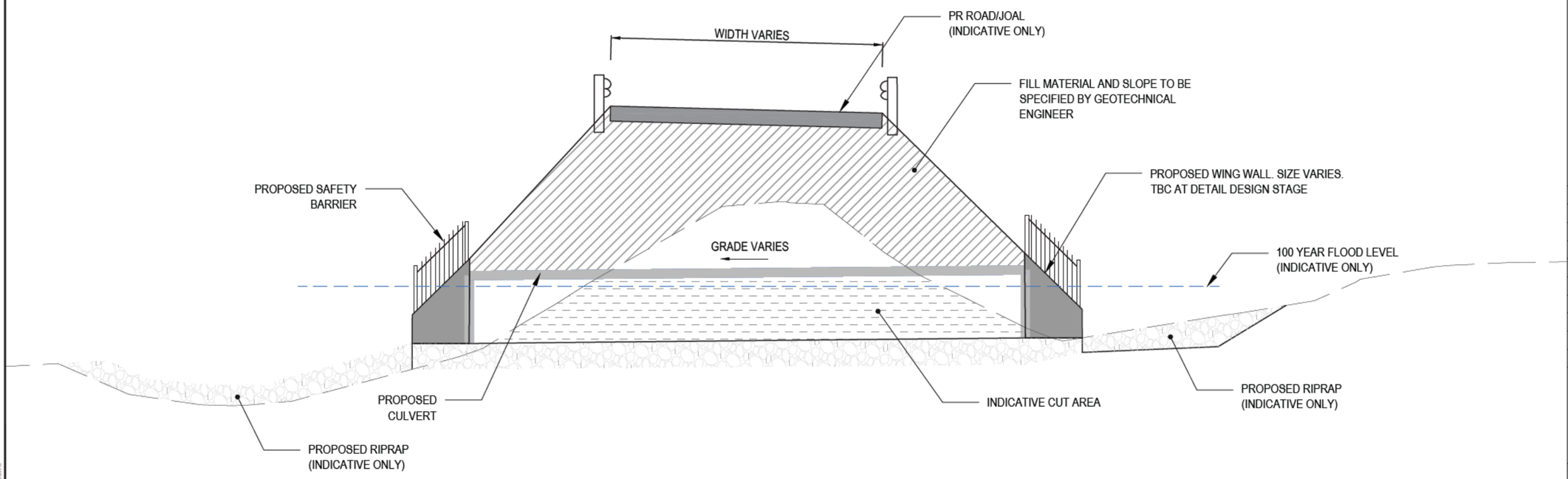
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title

RETIREMENT VILLAGE TYPICAL CULVERT CROSS SECTIONS

Project no.	147016		
Scale	N.T.S		
Cad file	147016-RV-C490 CULVERT SECTIONS.DWG		
Drawing no.	C490	Rev	A



TYPICAL CULVERT LONG SECTION

SCALE: NTS

LEGEND

EX GROUND

PR GROUND

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AYC	03/2025
Drawn	AYC	03/2025
Checked	RW/KH	03/2025

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DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

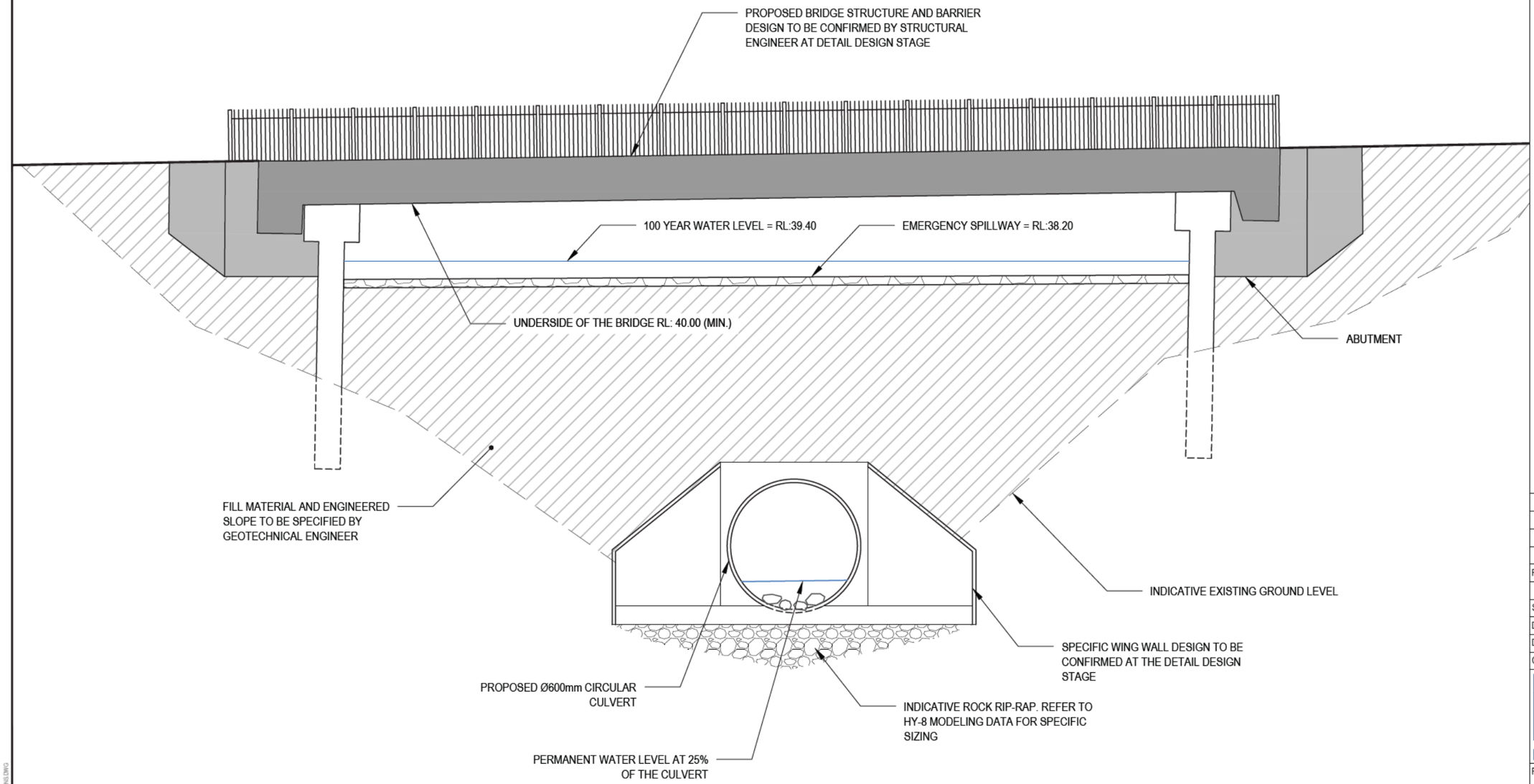
Title

RETIREMENT VILLAGE TYPICAL CULVERT LONGSECTION

Project no.	147016		
Scale	N.T.S		
Cad file	147016-RV-C490 CULVERT SECTIONS.DWG		
Drawing no.	C491	Rev	A

RESOURCE CONSENT

SPECIFIC CULVERT RIP-RAP DETAILS
REFER TO HY-8 MODELING DATA



CULVERT 7 - CROSS SECTION
SCALE: NTS

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AYC	03/2025
Drawn	AYC	03/2025
Checked	RW/KH	03/2025

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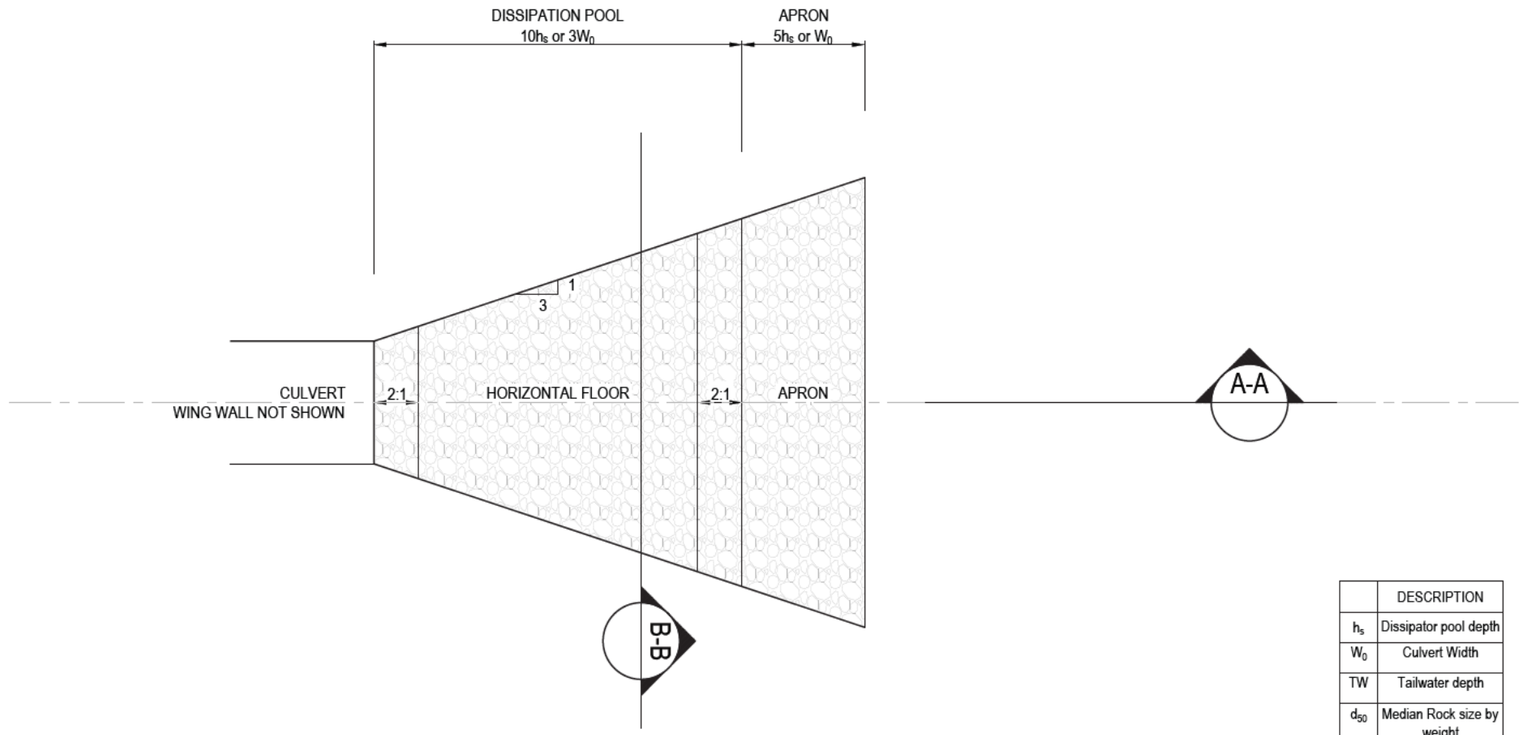
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
RETIREMENT VILLAGE CULVERT 7 DETAILS

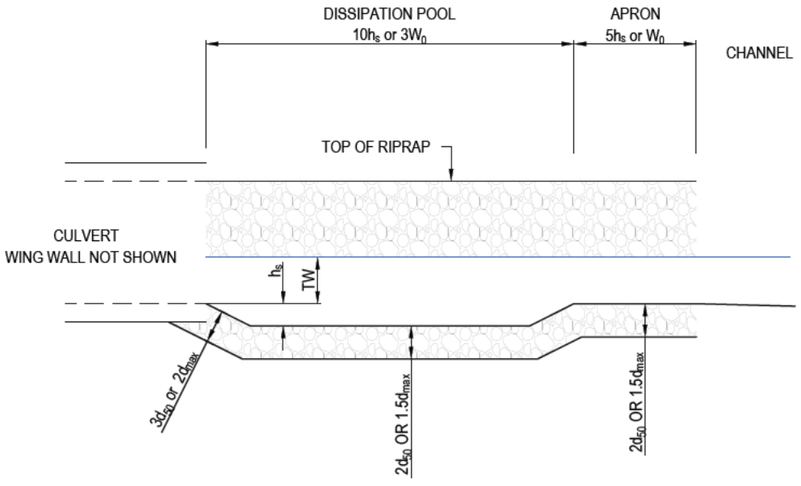
Project no.	147016		
Scale	N.T.S		
Cad file	147016-RV-C490 CULVERT SECTIONS.DWG		
Drawing no.	C492	Rev	A

SPECIFIC CULVERT RIP-RAP DETAILS
REFER TO HY-8 MODELING DATA

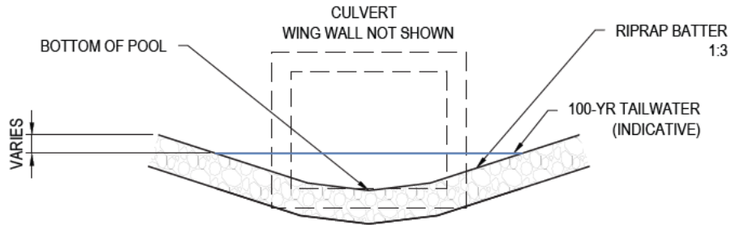


TYPICAL RIP-RAP PLAN VIEW
NTS

	DESCRIPTION
h_s	Dissipator pool depth
W_0	Culvert Width
TW	Tailwater depth
d_{50}	Median Rock size by weight
d_{max}	Max rock size by weight



TYPICAL RIP-RAP LONG SECTION A-A
NTS



TYPICAL RIP-RAP CROSS SECTION B-B
NTS

RESOURCE CONSENT

Rev	Description	By	Date
A	RESOURCE CONSENT	AC	03/2025

	By	Date
Survey		
Design	AYC	03/2025
Drawn	AYC	03/2025
Checked	RW/KH	03/2025

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Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
RETIREMENT VILLAGE TYPICAL RIP-RAP DETAILS

Project no.	147016		
Scale	N.T.S		
Cad file	147016-RV-C490 CULVERT SECTIONS.DWG		
Drawing no.	C493	Rev	A

EARTHWORKS OF UPGRADING EXISTING CULVERT1 TO BOX CULVERT TO BE CARRIED OUT DURING DRY WEATHER SEASON

PUMP UPSTREAM WATER AND DEWATER UNDER SUPERVISION OF THE PROJECT ECOLOGIST INCLUDING ANY FISH RELOCATION IF REQUIRED.

REMOVE EXISTING CULVERT, UNDERCUT THE STREAMBED AND BACKFILL WITH GAP65 AS DIRECTED, PREP STREAMBED FOR PLACEMENT OF NEW CULVERT, INSTALL RIPRAP. CLOTH ANY SIDES OF THE STREAM WHICH ARE EARTHWORKED, TO ENSURE NO SEDIMENT GENERATED RISK

IN 2-YR OR ABOVE RAINFALL EVENT, DAMS TO BE REMOVED. STREAM STABILISED AND WORKS TO COMMENCE AFTER EVENT HAS PASSED. ALL STREAMWORKS TO BE DONE IN ACCORDANCE WITH THE MAVEN ASSOCIATES STREAM WORKS MANAGEMENT PLAN, AND UNDER ENGINEER'S SUPERVISION

COFFERDAM TO BE REMOVED AFTER CULVERT REPLACED. AND REINSTATE NORMAL FLOWS TO THE STREAM

FINAL METHODOLOGY SUBJECT TO CONTRACTOR INPUT AND FINAL STREAM WORK MANAGEMENT AS PER CONDITION OF CONSENT GRANTED

PUMP1 DISCHARGE CLEAN WATER TO DOWN STREAM
3mm SCREEN ON INLET

FISH EXCLUSION NET

PUMP2 DEWATER TO DEB

FISH EXCLUSION NET

UPSTREAM DAM - STEEL ROAD PLATES DRIVEN INTO STREAM BED. OVERLAP 300-400mm WIDTH TO EXTEND 1m EITHER SIDE OF CURRENT WATER LEVEL

DOWN STREAM DAM
STEEL ROAD PLATES DRIVEN INTO STREAM BED 300-400mm OVERLAP AS REQUIRED TO ACHIEVE WIDTH 1m BEYOND CURRENT WATER LEVEL

UPGRADE EXISTING CULVERT INDICATIVE

PROPOSED TYPICAL STREAM-WORKS METHODOLOGY PLAN

RESOURCE CONSENT

NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL STANDARDS.
2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
3. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT HEALTH AND SAFETY REQUIREMENTS.
4. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVAL FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.
5. SEDIMENT CONTROL SHALL BE INSTALLED AND OPERATIONAL BEFORE EARTHWORKS START ONSITE IN ACCORDANCE WITH COUNCIL STANDARDS.
6. CONTRACTOR SHALL PROVIDE ASBUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.
7. SEDIMENT CONTROL TO COMPLY WITH GD05 STANDARDS.

LEGEND
- EX BDY
- PROP BDY
- EX MAJOR CONTOUR
- EX MINOR CONTOUR
- PROP EXTENT WORK
- PROP CLEANWATER
- PROP DIRTYWATER
- PROP SILT FENCE
- PROP DECANT
- PROP DECANT BAR

Rev	Description	By	Date
A	RESOURCE CONSENT	MA	02/2025

	By	Date
Survey	--	--/--/--
Design	--	-
Drawn	MA	02/2025
Checked	RW/KH	03/2025

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Project
DEVELOPMENT OF RIVERHEAD FOREST FOR RANGITOOPUNI DEVELOPMENTS LIMITED PARTNERSHIP

Title
PROPOSED TYPICAL STREAM-WORKS METHODOLOGY

Project no.	147007		
Scale	N.T.S		
Cad file	147007-M-C245 ESC STD DETAILS.DWG		
Drawing no.	C245	Rev	A