Hamilton City Council
Te kaunihera o Kirikiriroa

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New Zealand

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31 January 2024

Hamilton City Council
By email: mark.roberts@hcc.govt.nz

Attn: Mark Roberts

Tēnā koe Mark

Rotokauri Arterial Network Designation Notice of Requirement – Part 1 response to Section 92 further information request

Thank you for providing Hamilton City Council (HCC) as Requiring Authority the further information request dated 13 December 2023.

The Requiring Authority advises that it has carefully considered the request. It considers that while there are many items within the request that are appropriate to address under s 92 of the Resource Management Act 1991 (**RMA**), the request also includes items which are more appropriately dealt with at a later stage in the processing of this Notice of Requirement (**NoR**). Accordingly, pursuant to s 92A(1)(c) the Requiring Authority gives notice that it will not be providing a response to 26 of the 79 questions as follows:

Questions
15, 20, 21, 22, 27, 29, 30, 39, 43, 44, 45, 48, 49, 52, 53, 54, 55, 56, 58, 61, 62, 63, 64, 65, 66 and 73.

These 26 questions request a level of information that is considered too detailed for the NoR process and will be developed and addressed in future stages (i.e., during detailed design/regional consenting). Addressing the detail now will become redundant as matters will evolve, and so will not assist the Panel in its evaluation of the effects of allowing the requirement under s 168A and making its recommendation under s 171 of the RMA. For example, some questions relating to the management of ecological effects cannot be fully addressed until the existing environment has evolved with the establishment of the Rotokauri Greenway. The detailed design will respond to that new environment and will be submitted to Council for approval in the Outline Plan under s 176A of the RMA closer to the time when the works are to be implemented.

By way of further explanation, as is commonplace with arterial roading projects, it is only possible to provide a general and conceptual design at the time of the designation phase with the detailed design undertaken later. As you will be aware, the designation process under the RMA addresses this issue by enabling the opportunity to lodge a conceptual design in support of the requirement, while Outline Plans provide the opportunity to confirm and clarify detailed design information at a later stage.

The details provided in this NoR show the anticipated operational requirements of the corridors, and the design drawings included in the NoR are indicative plans only to assist with evaluating potential

effects on the environment. In effect this early stage considers a 'corridor' within which the transport corridors would be constructed. Once the specific design is known, and prior to construction, an Outline Plan will be submitted in accordance with s 176A of the RMA. This is reflected in the draft designation conditions.

This approach has been specifically endorsed by the High Court in *Queenstown Airport Corp Ltd v Queenstown Lakes District Counci*l [2013]NZHC 2347 and the EPA in *Aokautere Land Holdings Ltd v Palmerston North City Council* [2023] NZEnvC 35 where the Court confirmed that this process of deferred detail, and with it the full account of how adverse effects will be addressed, is consistent with the statutory scheme.

The Requiring Authority would be willing to meet with you to discuss this issue further if considered necessary.

The remaining 53 questions have been grouped into two parts.

Responses to the nine Part 1 questions have been provided as part of this letter. Part 2 covers the remaining 44 questions, these are being considered further by the Requiring Authority.

Prior to a response on the remaining 44 Part 2 questions being issued, the Requiring Authority may seek clarification from the Territorial Authority on the intent of the questions to better inform the nature of its response.

Response	Question	Timeframe
Part 1	1, 2, 3, 14, 18, 28, 42, 67 and 68.	31 January 2024
Part 2	4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 19, 23, 24, 25, 26, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, 46, 47, 50, 51, 57, 59, 60, 69, 70, 71, 72, 74, 75, 76, 77, 78 and 79.	by 26 April 2024

Below sets out the Part 1 response to your further information request. These responses include minor points of clarification, navigation through the NoR and its supporting documents or any information that already exists but has been provided in a clearer form.

General/Planning

1. *NOR 2.1 Extent of designation*
What alternatives are proposed should the 536m² of Waikato-Tainui land that is required for the upgrade of the Te Kowhai East Road, Maahanga Drive and The Boulevard intersection be unable to be legally secured?

Response: If land is not secured the Requiring Authority would need to consider seeking an alteration to designation to accommodate the required width. No other alternative layout is proposed at this stage in the NoR process and will be determined once detailed design progresses.

2. *NOR 2.2 Purpose of the Designation*
Section 2.2 of the Notice of Requirement document states that the "Designation Purpose incorporates the following outcome".
Please confirm if the text within the blue box in this section is the proposed purpose of the designation to go into the District Plan.

Response: The purpose of the designation to be specified in the District Plan can be found in Form 20, page 1 of the NoR document as **"Transportation and Infrastructure Purposes".**

3. *NOR 2.4.4 Project Objectives*
Please confirm if the public spaces objective refers to the public spaces adjoining the road corridor or the corridor itself which is the subject of the NoR.

Response: Yes, we confirm that the objective in Section 2.4.4 is referring to public spaces adjoining the road corridor, as the Project enables integrated public space outcomes.

Transport

14. *Appendix N 4.4 Other Considerations*
Please confirm why the design of the major arterial Te Kowhai East Road widening is constrained to the existing corridor width.

Response: The existing corridor width in this location is heavily constrained by the existing built environment. As development has progressed over time, the Requiring Authority has sought to future proof this section of Te Kowhai East Road by acquiring road frontage to enable the proposed design to be built. The proposed designation seeks to strike a balance between acquiring land required for road widening, while limiting impacts on adjacent properties.

18. *Appendix N 6.1.2 SIDRA Intersection Modelling*
The modelling report does not assess traffic impacts on existing intersections, such as SH39, Te Rapa Road, Arthur Porter Drive and Wairere Drive. Given the considerable increase in traffic at these key network connections there is a risk that traffic impacts may have been understated.
Please provide analysis of existing intersections to demonstrate impact of additional traffic.

Response: The purpose of the Integrated Transport Assessment (ITA) and associated transport modelling is to inform the proposed design and evaluate the operation of the proposed transport network to ascertain whether the proposed design will safely and suitable accommodate forecast movement by all modes. The NoR is not the process to evaluate the effect of trips generated by the Rotokauri Growth Area, or other growth areas, on the wider transport network outside of the designation. Such evaluation is carried out as part of city-wide planning and transport projects such as the Metro Spatial Plan and city-wide modelling projects.

Stormwater

28. *Appendix D 5.6 Assumptions*

Soakage viability will need to be confirmed as part of subsequent resource consenting. At this stage, it is expected that the post development volume discharged will not therefore match the pre-development volume. Mitigation for this will need to be addressed in future resource consent applications.

Please confirm which resource consents would assess mitigation for soakage viability.

Response: Regional consents for stormwater discharges under Section 3.5.11 of the Waikato Regional Plan would assess mitigation for soakage viability. These resource consents will be applied for as part of the subsequent resource consent process.

42 *Appendix B Stormwater Drawings*

Please provide an updated stormwater drawing set to include the proposed designation boundary.

Drawing CA-2400. The sheet layout is not very clear/visible. Please provide a legible sheet.

Drawing CA-2602 – The roading east of wetland 7b is not shown as being in any wetland catchment. How is this area being treated?

Response:

a. Updated stormwater drawings CA-2401 through 2405 are provided with the designation added as **Attachment 1**.
b. An updated drawing CA-2400 is provided as part of **Attachment 1** without the aerial base and other minor updates have been made to improve legibility. We note the purpose of this drawing is only to act as a key layout plan for the stormwater drawings CA-2401 through 2405 which contain more detail.
c. The road east of wetland 7b up to the railway drains into the existing HJV wetland and is treated there. The existing HJV wetland was designed to serve this subcatchment (Mangaheka subcatchment B shown on drawing CA-2102) and this remains unchanged by the proposed designation. East of the railway the road makes use of the existing drainage network which does not yet have specific treatment measures. Under the draft Te Rapa Integrated Catchment Management Plan (ICMP), HCC has considered various options to provide treatment (ranging from retrofitting raingardens to the roads through to a large end of pipe wetland serving the full subcatchment). While the ICMP is advanced, it is not yet finalised. However, it is HCCs preference for a subcatchment scale wetland to provide treatment which would include the designated roads east of the railway. The design is therefore consistent with HCCs strategic planning for the catchment. However, this does not preclude other treatment options being retrofitted should they be needed under future design and/or resource consenting stages.

Ecology

67. *Appendix G Wetland Classification Report Site Photographs*
Site # 3 is not represented on Figure 8. Where is this located? Please update.

Response: The location of Site 3 is shown in Figure 7. No landowner access was granted for wetland investigations at Site 3 at the time of the survey. This did not have a substantive bearing on the wetland delineation as potential Wetland Site 3 falls outside of the 100m buffer. As such, Site 3 was not included in Figure 8: Wetland Plots.

68. *Appendix G Ecology NZ Supplementary Fauna Report Appendix C Bat habitat assessment table*
The table of the bat roost assessments appears to be incomplete, with roost tree numbers 48-53 appearing on page 14 rather than page 39 or 40.
Please move to the appropriate location.

Response: An amended Appendix G: Supplementary Fauna Report: Appendix C is provided as **Attachment 2**.

Nei aku mihi,

Melissa Slatter
Consultant Planner

On behalf of Hamilton City Council as the Requiring Authority:
Tony Denton
Strategic Transport and Planning Manager
Infrastructure and Assets Group

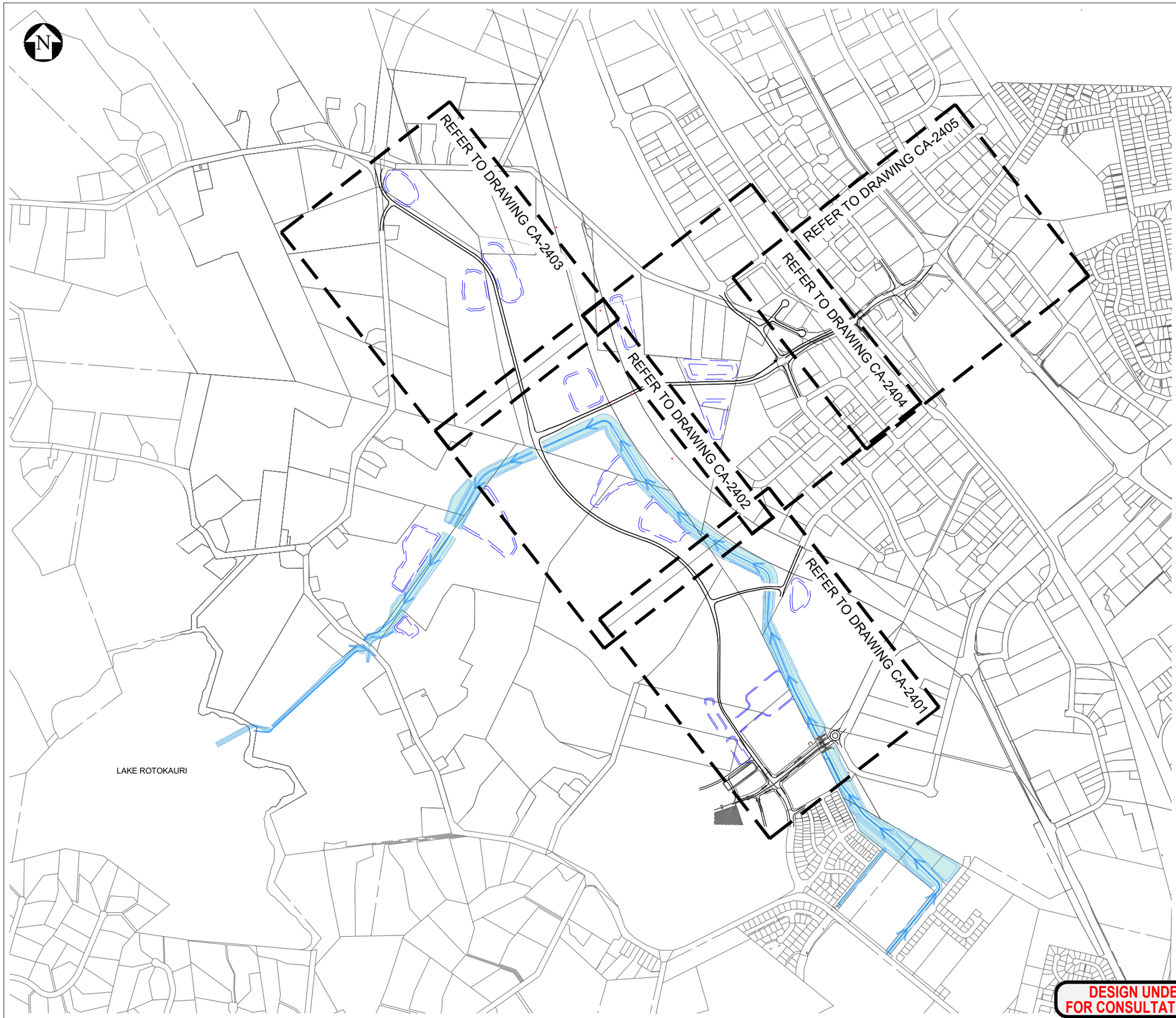
Attachments

Attachment 1:
- Updated stormwater drawings CA-2400, CA-2401 through 2405.

Attachment 2:
- Amended Appendix G: Supplementary Fauna Report: Appendix C.

Attachment 1: Updated stormwater drawings CA-2400 - 2405

Drawing Plotted: 23 Jan 2024 9:33 am



LEGEND

- GREENWAY LOW FLOW CHANNEL AND BASINS
- POTENTIAL FUTURE WETLANDS

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No.	Revision	By	Chk	Appd	Date
H	AERIAL REMOVED	RG	IS	IS	22.01.24
G	NOTICE OF REQUIREMENT UPDATE	JL	IS	CS	02.06.23
F	NOTICE OF REQUIREMENT	AT	IS	IS	11.04.22
E	HCC REVIEW AMENDMENTS	AW	IS	IS	20.12.21

Drawing Originator: Beca

Original Scale (A1) 1:1500	Design	C.Wilson	15.05.20
Reduced Scale (A3) 1:3000	Drawn	S.Bonenkamp	15.05.20
	Dsg Verifier		
	Dwg Check		

Approved For Construction* Date

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Client: Hamilton City Council

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: STORMWATER LAYOUT SHEET

Discipline: CIVIL ENGINEERING

Drawing No.: 4288564-200-CA-2400 Rev.: H

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Document No. 4288564-200-CA-2400.DWG

Drawing Plotted: 23 Jan 2024 2:05 pm

SH1 EXISTING SWALE DIVERTED INTO GREENWAY BYPASSING RAINGARDEN AND SWALE

STATE HIGHWAY 1

CH 1100

END OF PIPE RAINGARDEN RG1

WETLAND SWALE 3
50m x 6m

CH 1200

WETLAND G3

END OF PIPE RAINGARDEN RG1

CH 1300

WETLAND SWALE 4
40m x 6m

CH 30200

CYCLEPATH

GREENWAY CULVERT

END OF PIPE RAINGARDEN RG2

CH 30100

PROPOSED COLLECTOR ROAD 3121.1

DIVERT DRAIN TO GREENWAY

JOIN LINE - REFER SHEET 4288564-200-CA-2402

CH 30000

CH 11500

CH 11400

CH 11300

PROPOSED MINOR ARTERIAL 3100.3

CH 11200

CH 11100

CH 11000

CH 1400

CH 1500

CH 1600

CH 1700

CH 1800

CH 10900

CH 10800

CH 10700

CH 10684.5

CH 10600

TE WETINI DRIVE

DRAINAGE, GREENWAY CULVERT AND ROAD DESIGNED BY OTHERS (RDL)

ALTERNATIVE OUTLET ARRANGEMENTS CAN BE CONSIDERED IN FUTURE DESIGN STAGES SUCH AS A PEDESTRIAN BRIDGE. SIMILAR APPLIES TO THE WETLAND OUTLETS.

FUTURE ROAD (BY OTHERS)

OUTLET TO GREENWAY VIA FOOTBRIDGE OR CULVERT

1 CA-2505

WETLAND G4A

HIGH FLOW BYPASS

INDICATIVE FUTURE DRAINAGE

HIGH FLOW BYPASS

WETLAND G4B

HIGH FLOW BYPASS

DRAINAGE CHANNEL

TOWNCENTRE AREA

TEMPORARY DRAIN DIVERSION TO CULVERT

INDICATIVE FUTURE WETLANDS

FUTURE SUBDIVISION DRAINAGE CORRIDOR TO CULVERT INLET

CYCLEPATH

WEIR OUTLET TO WETLAND

HIGH FLOW BYPASS

INDICATIVE FUTURE DRAINAGE

GREENWAY CULVERT

1800mm OUTLET FROM RDL WETLANDS TO GREENWAY

RAINGARDEN AND PIPE NETWORK

PROPOSED MINOR ARTERIAL 3100.2

PUKENGA AVENUE

TEMPORARY DIVERSION TO CULVERT

CULVERT 2
3m (W) x 2m (H) BOX CULVERT

EXISTING TEMPORARY STORMWATER POND

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LEGEND

- PROPOSED DESIGNATION BOUNDARY
- EXISTING STORMWATER PIPE
- EXISTING WATERCOURSE / OPEN CHANNEL DRAIN
- EXISTING STORMWATER MANHOLE
- EXISTING CATCHPIT
- EXISTING SWALE
- EXISTING CULVERT
- PROPERTY BOUNDARY
- WESTERN INTERCEPTOR SEWER

PROPOSED SERVICES

- PIPED DRAINAGE
- INDICATIVE FUTURE DRAINAGE
- MANHOLE
- RAINGARDEN
- CATCHPIT
- CULVERT
- WETLAND SWALE
- TEMPORARY DRAIN
- CONVEYANCE SWALE
- HEADWALL AND RIP RAP
- HP HIGH POINT
- LP LOW POINT
- DRAINAGE DESIGNED BY OTHERS
- GREENWAY
- INDICATIVE FUTURE WETLANDS

NOTES

1. CONTOURS BASED ON 2019 HCC LIDAR.
2. ROAD DRAINAGE LAYOUT (CATCHPITS/RAINGARDENS/MANHOLES) IS INDICATIVE AND SPACINGS SUBJECT TO DETAILED DESIGN.
3. RAINGARDENS ONLY REQUIRED WHERE DRAINAGE DISCHARGES TO THE GREENWAY.
4. REFER DRAWINGS 4288564-200-CA-2500 TO 2505 FOR CARRIAGEWAY DRAINAGE / RAINGARDEN / CULVERT TYPICAL DETAILS.
5. THE DRAINAGE ARRANGEMENT SHOWN FOR THE ROADS ASSUMES THE GREENWAY CHANNEL HAS BEEN CONSTRUCTED.

No.	Revision	By	Chk	Appd	Date
I	DESIGNATION BOUNDARY ADDED	RG	IS	IS	22.01.24
H	NOTICE OF REQUIREMENT UPDATE	JL	IS	CS	02.06.23
G	NOTICE OF REQUIREMENT	AT	IS	IS	11.04.22
F	UPDATE FOR PEER REVIEW COMMENTS	JL			17.03.22

Drawing Originator: Beca

Original Scale (A1)	1:1500	Design	C.Wilson	15.05.20
Reduced Scale (A3)	1:3000	Drawn	S.Bonenkamp	15.05.20
		Dsg Verifier		
		Dwg Check		

Approved For Construction* Date

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Client: Hamilton City Council Te Kaunihera o Kirikiriroa

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: STORMWATER MANAGEMENT PLAN SHEET 01

Discipline: CIVIL ENGINEERING

Drawing No.: 4288564-200-CA-2401_ Rev.: I

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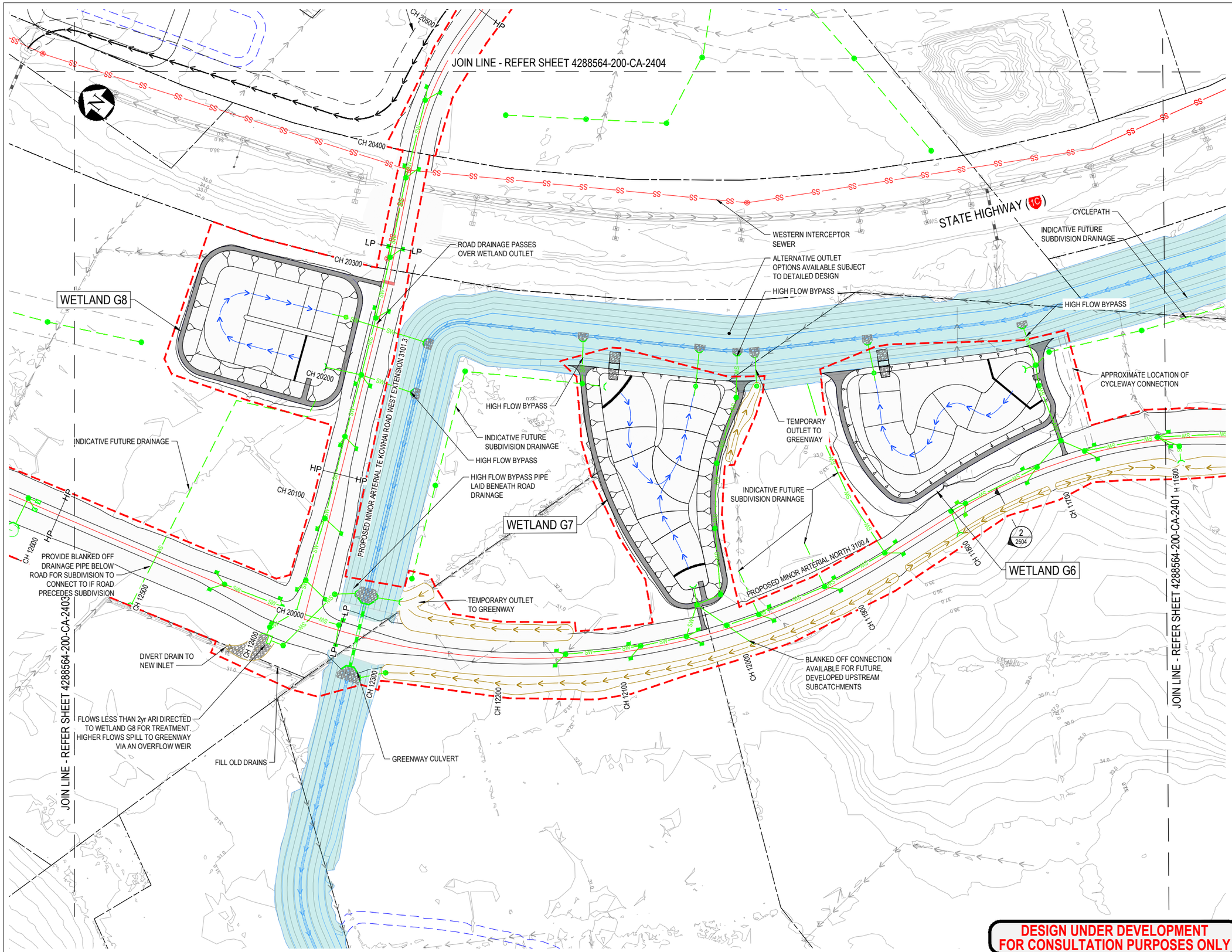

LEGEND

- PROPOSED DESIGNATION BOUNDARY
- SW — EXISTING STORMWATER PIPE
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4. REFER DRAWINGS 4288564-200-CA-2200 TO 2207 FOR CARRIAGEWAY DRAINAGE / RAINGARDEN / CULVERT TYPICAL DETAILS.
5. GREENWAY AND OTHER ICMP STORMWATER MANAGEMENT AREAS ARE SHOWN ON THESE PLANS TO GIVE CONTEXT TO THE ROAD DRAINAGE ARRANGEMENTS. THE ROADING DESIGNATION COVERS THE DRAINAGE NEEDED FOR THE ROAD ONLY
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G	NOTICE OF REQUIREMENT UPDATE	JL	IS	CS	02.06.23
F	NOTICE OF REQUIREMENT	AT	IS	IS	11.04.22
E	HCC REVIEW AMENDMENTS	JL	IS	IS	24.01.22

Drawing Originator: Beca

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Reduced Scale (A3) 1:3000	Drawn	S.Bonenkamp	15.05.20	
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Client: Hamilton City Council

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: STORMWATER MANAGEMENT PLAN SHEET 02

Discipline: CIVIL ENGINEERING

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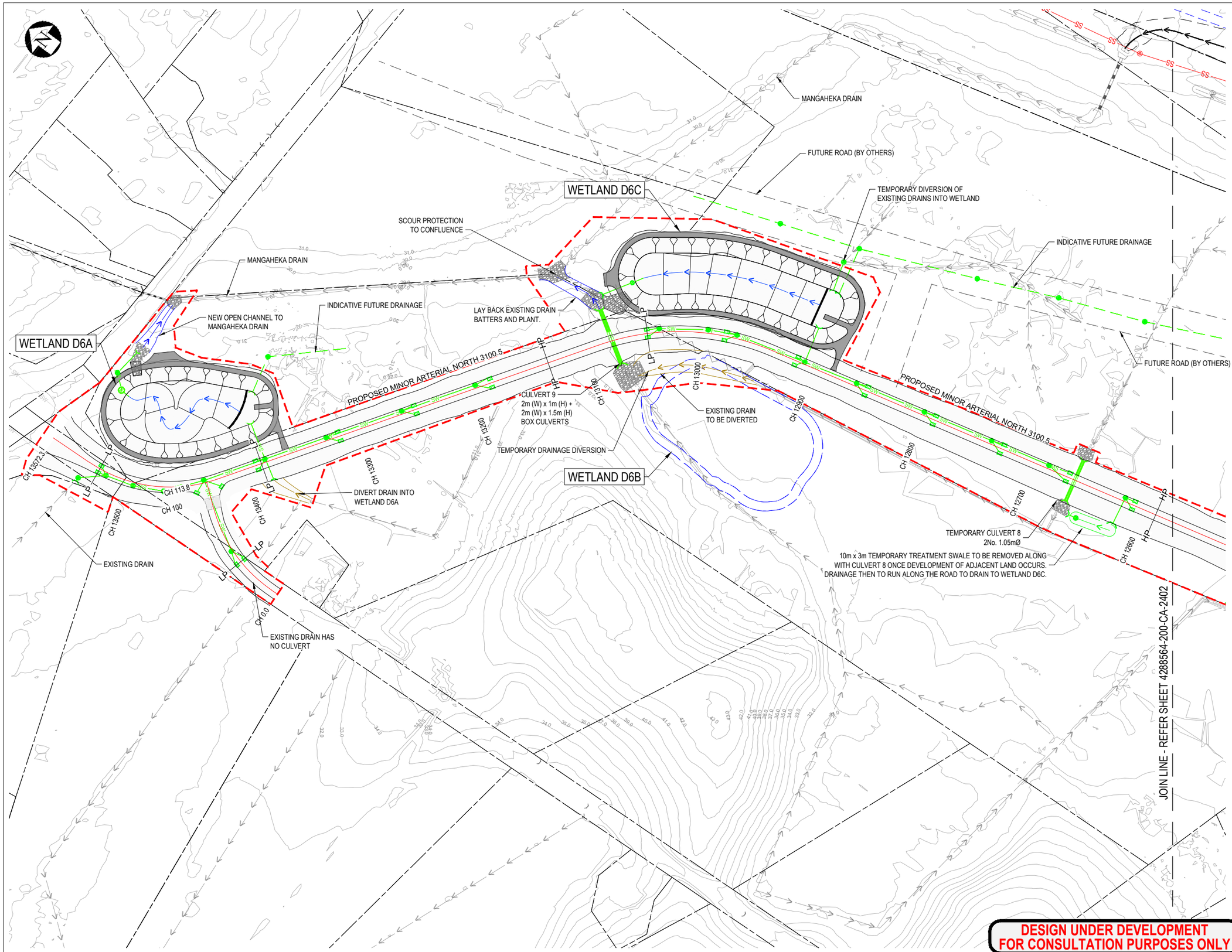

LEGEND

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Drawing Originator: Beca

Original Scale (A1) 1:1500
Reduced Scale (A3) 1:3000

Design	C.Wilson	15.05.20	Approved For Construction*
Drawn	S.Bonenkamp	15.05.20	
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Client: Hamilton City Council

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: STORMWATER MANAGEMENT PLAN SHEET 03

Discipline: CIVIL ENGINEERING

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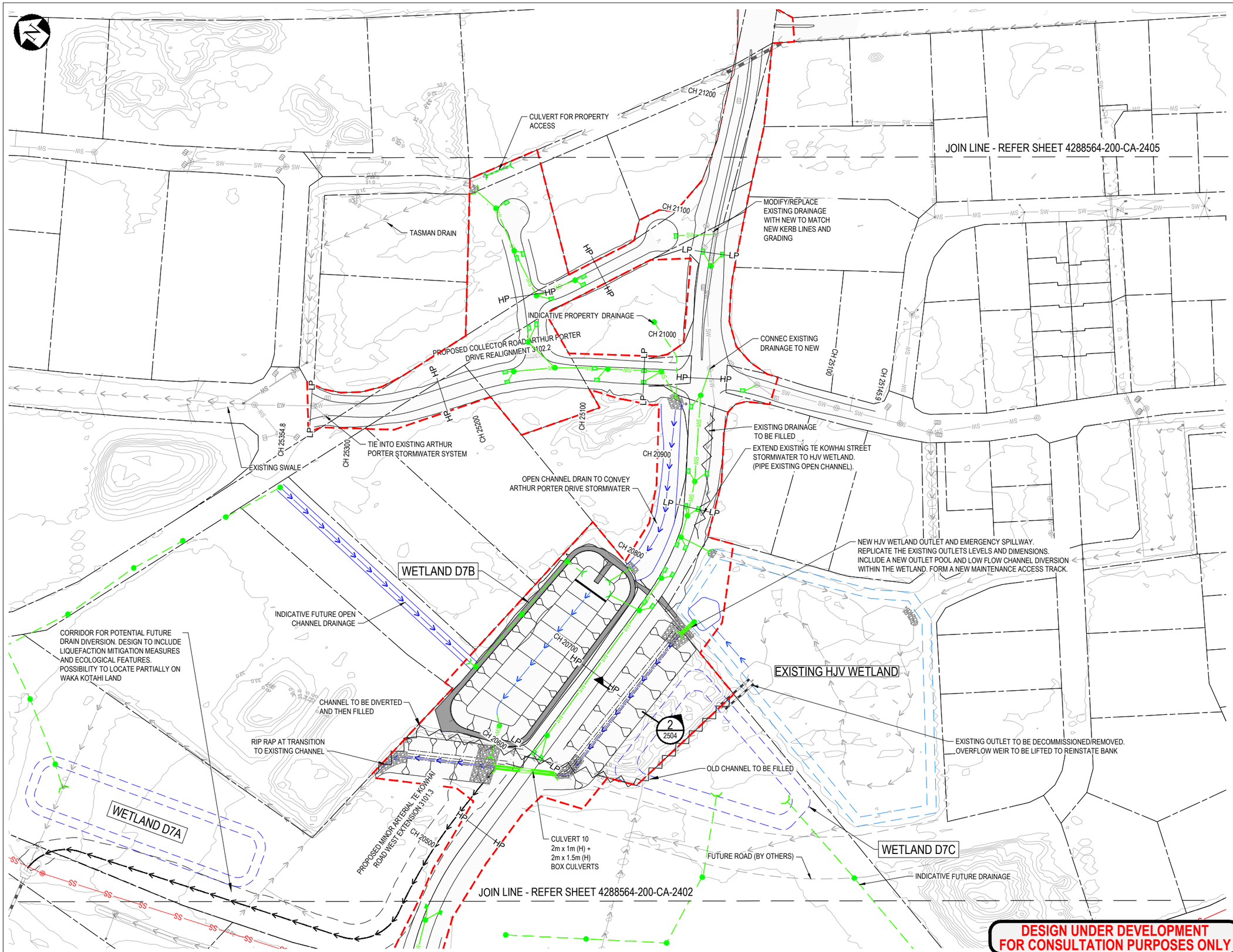

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Drawing Originator: Beca

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Reduced Scale (A3) 1:3000	Drawn	S.Bonenkamp	15.05.20
	Dsg Verifier		
	Dwg Check		

Approved For Construction* Date

* Refer to Revision 1 for Original Signature

Client: Hamilton City Council

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: STORMWATER MANAGEMENT PLAN SHEET 04

Discipline: CIVIL ENGINEERING

Drawing No. 4288564-200-CA-2404 Rev. H

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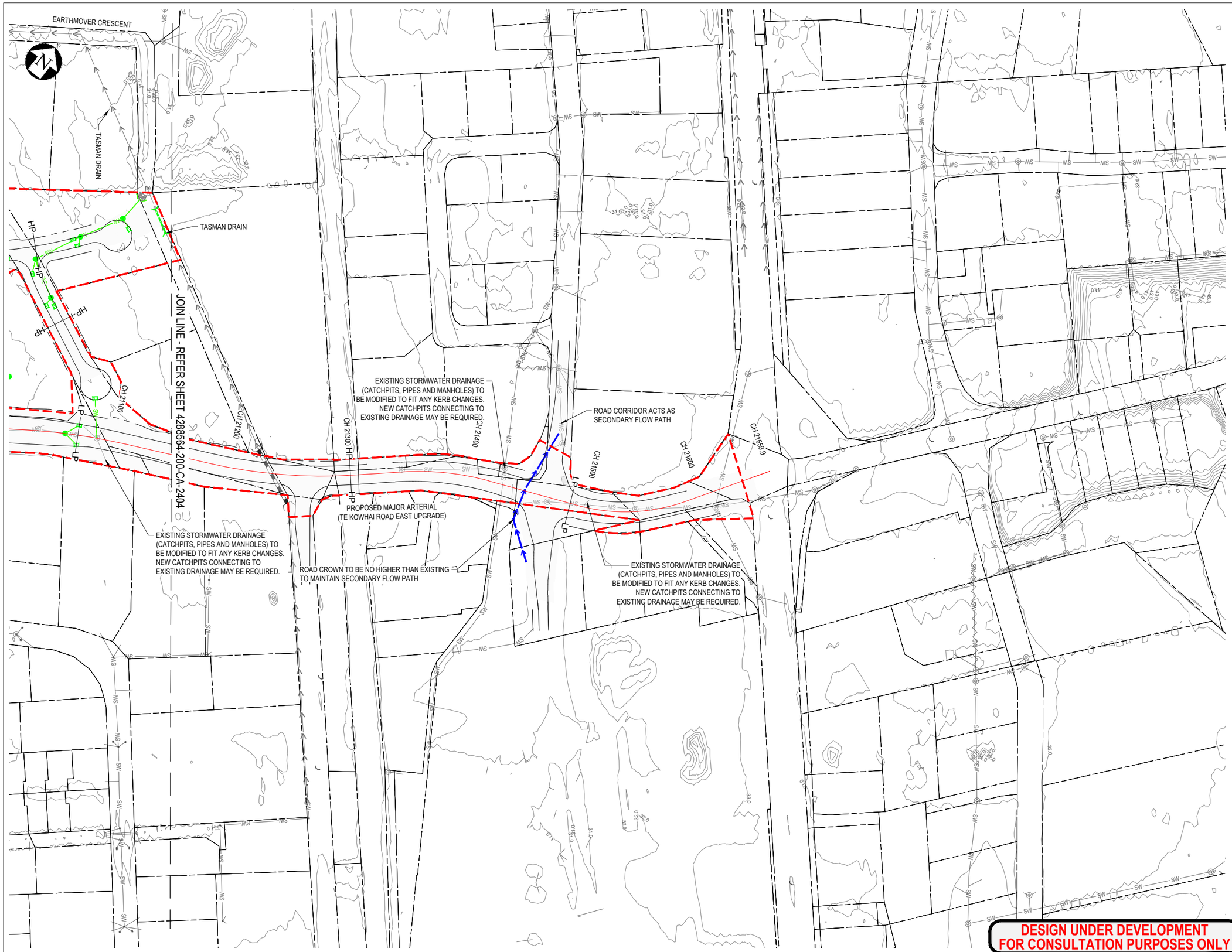

LEGEND

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3. RAINGARDENS ONLY REQUIRED WHERE DRAINAGE DISCHARGES TO THE GREENWAY.
4. REFER DRAWINGS 4288564-200-CA-2500 TO 2505 FOR CARRIAGEWAY DRAINAGE / RAINGARDEN / CULVERT TYPICAL DETAILS.
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Supplementary Fauna Surveys

Rotokauri Arterial Designation

Prepared for BECA
13 April 2021

Report Number 20058.1-001-Rev0

ECOLOGY NEW ZEALAND

Document Sign Off

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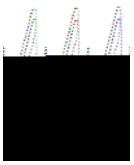

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EXECUTIVE SUMMARY

To support residential and commercial development within the Rotokauri Structure Plan area over the next 20-30 years, Hamilton City Council (HCC) is proposing to create a new arterial road (Rotokauri Arterial Designation) parallel to the current State Highway 1 alignment on the north side of Hamilton city.

This report is prepared to support fauna habitat assessments described in the Ecological Assessment of Effects report for the Rotokauri Arterials Notice of Requirement prepared by BECA. Though construction is not earmarked within the near future, fauna surveys were deemed appropriate to provide baseline information on the current state of environment within the proposed designation footprint.

The surveys detailed within this report provide findings on black mudfish, lizard, and long-tailed bats.

Hamilton City Council and BECA identified targeted areas where knowledge gaps existed for mudfish within the designation area. These un-surveyed areas were located within and adjacent to the Rotokauri Arterial Designation. Desktop assessments were undertaken to further identify potential watercourses to target survey efforts. Infield verification was subsequently undertaken to determine watercourse presence and suitability for trapping by means of Gee-minnow traps and Environmental DNA sampling. With a total of 272 traps deployed across the survey area over the four survey days, only one adult mudfish was captured. This specimen was detected outside of the designation footprint. DNA sampling failed to detect mudfish but did indicate the presence of giant kōkopu (*Galaxias argenteus*) and long-fin eel (*Anguilla dieffenbachii*), both of which are At-Risk species.

Bioacoustic surveys were undertaken for long-tailed bats across the proposed designation footprint. Bat presence was very low with only 1 commuting call detected. Desktop reviews from historical surveys north-west of Hamilton also demonstrate low bat activity and support our survey results. Roosting habitat for bats was found across the alignment, mainly associated with mature macrocarpa and pine. Though roost habitat is present, the likelihood of utilisation by bats is low given the low activity detected on-site and in the surrounding landscape.

Desktop assessments support by in-field habitat assessments, provided understanding that native lizard presence on-site was likely to be restricted to copper skinks. To best support these assessments, multiple checks of artificial cover objects and manual searches were undertaken across the proposed designation footprint to confirm species presence. Both copper skinks and plague skinks were detected within the designation at low numbers. Copper skinks were found within hedgerow habitat and underneath debris items within a farm paddock.

The presence of native fish, bats and lizards will require consideration during the preparation of ecological impact assessment. These assessments will need to commensurately detail specific avoidance and management of any foreseeable impacts on these protected species.

1. INTRODUCTION

This report[1], prepared by Ecology New Zealand Limited ('ENZL') for BECA Limited ('the client'), presents the results of targeted fauna surveys within the Rotokauri Arterial Designation ('the site'). Specifically, this report details the methodology and results of native bat, lizard and fish surveys.

1.1. Background, Purpose and Scope

To support growth in the Rotokauri area, the Rotokauri Structure Plan (RSP) was developed to provide high-level direction on the alignment of the Rotokauri Arterial Designation and locations of community facilities (Rotokauri Greenway project) which will support residential and commercial development within the area for the next 20-30 years. Hamilton City Council (HCC) proposes to create a new arterial road parallel to the current State Highway 1 alignment on the north side of Hamilton city. The proposed footprint transects several private properties between SH1 to the east and Burbush Rd/Exelby Rd/Rotokauri Rd to the west.

The findings from this report are to be used to support the fauna habitat assessments described in the Ecological Assessment of Effects report prepared for the Rotokauri Arterials Notice of Requirement (NOR). The report aims to highlight the presence or potential presence of indigenous fauna species (e.g. mudfish, long-tailed bats and lizards) that will require specific consideration, in order to inform project feasibility and potential future management requirements.

1.2. Site Location, Description and Ecological Context

The Rotokauri Arterial Designation is effectively a north-south corridor that commences in the south at the intersection of Rotokauri Road and Mangaharakeke Drive and proceeds in a generally north-western direction to Koura Drive / Te Kowhai Road (SH39) roundabout. The network also includes a series of west-east corridors that link the Rotokauri growth cell to Te Rapa and the wider Hamilton city transport network.

The proposed Rotokauri Designation (Figure 1)consists entirely of productive agricultural land (predominantly cattle farming) (Table 1). As such the landscape is dominated by intensively grazed pasture grass interspersed with hedgerows and large exotic trees. The site is transected by a number of artificial farm drains, which drain groundwater from the farms into two main drains:

- Drain Number 43 ('Barris' or 'Rotokauri Drain') drains into Lake Rotokauri to the west;
- Drain Number 41 ('McBeth') eventually drains into a tributary of the Waipa River to the west.

[1] This report is subject to the Report Limitations provided in Appendix A.

FIGURE 1

2. METHODOLOGY

2.1. Freshwater Fish

2.1.1. Desktop Assessment

Prior to on-site surveys, a desktop assessment was completed of the New Zealand Freshwater Fish Database to obtain baseline information for the site and look for previous records of target species. The conservation status[2] and pest animal status[3] of each species recorded was then obtained from the relevant technical documents.

2.1.2. Trapping and eDNA Surveys

The freshwater fish surveys were primarily designed to detect the presence of black mudfish (*Neochanna diversus*) due to its conservation status (At-Risk, Declining) and the limited knowledge regarding this species distribution. While the methodologies applied were tailored towards detecting black mudfish, the sampling methods and tools used also provided insight into other non-target native fish present within surveyed areas.

A scope for conducting mudfish surveys across key areas of interest was provided by BECA and was used for planning survey activities (Figure 1Figure 2). The key areas of interest aim to fill in knowledge gaps for this species to determine their presence in areas which had not been historically surveyed.

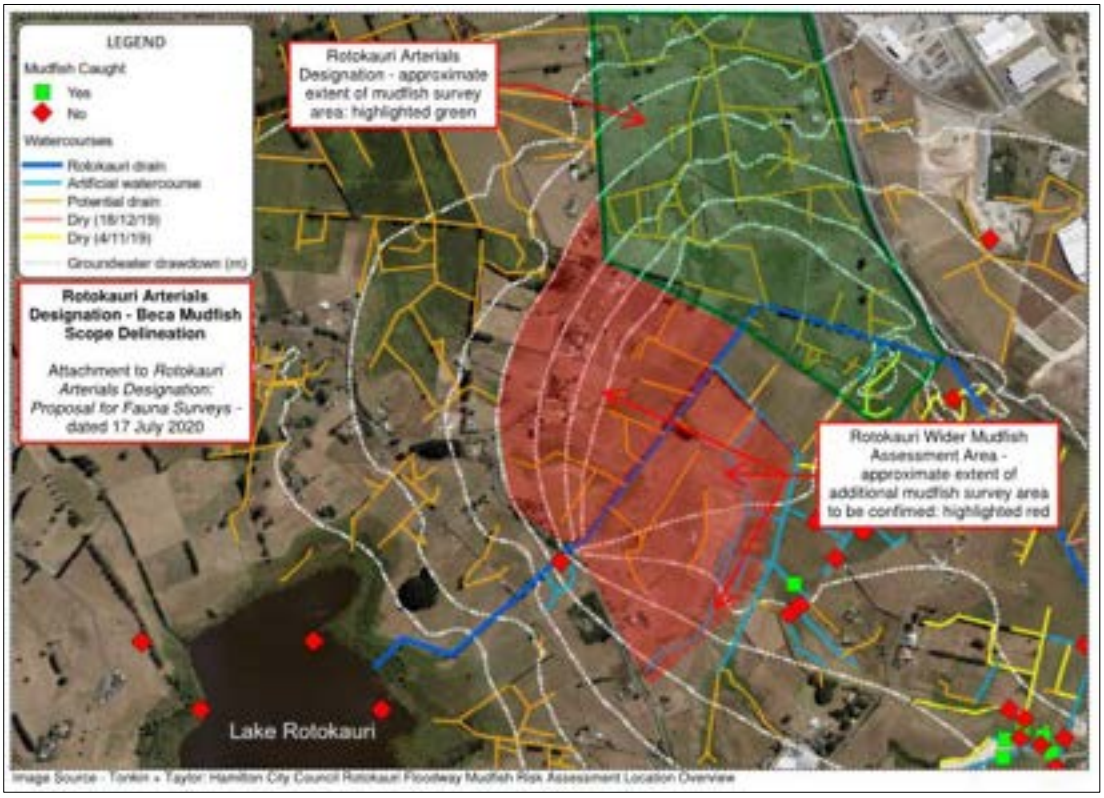


Figure 2 Black mudfish 'scope of survey' map provided by BECA and used to plan field works

[2] Dunn NR, Allibone RM, Closs GP, Crow SK, David BO, Goodman JM, Griffiths M, Jack DC, Ling N, Waters JM, Rolfe JR 2018. Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24.
[3] Waikato Regional Council. Waikato Regional Pest Management Plan 2014-2024

All farm drains across the site were mapped via aerial imagery and on-site ground-truthing prior to surveys commencing. Theoretical survey reaches were identified as a result of these preliminary assessments. Immediately prior to surveys, individual drains were again assessed for suitability for trapping and the number of survey reaches were refined from this information. The purpose of this mapping was to identify suitable survey reaches, not to accurately map all drain reaches across affected properties.

For each reach, a representative 100m survey reach was identified resulting in a total of 28 survey transects. A total of four nights of trapping was completed, with one night of trapping being completed per reach over that time. Within each reach, trapping was completed using fine-mesh Gee's minnow traps at 10m spacings. Where habitat was found to be sporadic along the length of the reach, traps were spaced as close as possible to 10m apart within available habitat.

Given the poor oxygenation of water in artificial drain habitats, traps were placed partially submerged – allowing access to the trap entrance, whilst ensuring atmospheric air was available to breath for any captured fish. Where water depth was too shallow to allow this, traps were dug into the soft substrate in the base of the drain. Traps were secured with a stake and string where required and all were marked with flagging tape and GPS (using *Avenza maps*).

Traps were left in place for one night (no less than 12hrs) prior to checking and where traps were in exposed areas, shade was provided (e.g. covering the trap with vegetation) to prevent stress or harm to any captured fish. Due to the focus on black mudfish, traps were set un-baited, to avoid encouraging predators into the trap.

To supplement trapping effort, a total of 16 Environmental DNA (EDNA) samples were taken across the survey area. A single sample was taken at each of the survey areas according to lab instructions. These were then labelled and marked on Avenza maps before being sent to 'Wilderlab' in Wellington for processing. Ten samples were analysed using single species assays (for black mudfish) and the remaining eight were analysed using a multispecies assay.

Two opportunistic dip net surveys for juvenile black mudfish were also completed in suitable habitat. These were completed as per the mudfish survey guidelines within deeper farm drains where water clarity appeared greatest (2013)[4].

2.2. Long-tailed Bats

2.2.1. Desktop Assessments

The following documents and databases were consulted to determine the presence of long-tailed bats across the subject site and wider landscape:

- Department of Conservation National Bat Database
- Angove-Emery, S (2020) 256 Brymer Road-Bat Assessment. Report Number 20026.1-001 Rev1. Ecology New Zealand Ltd.
- Le Roux, D. S. & Le Roux, N. N. (2012) Hamilton City Bat Survey 2011-2012. Kessels & Associates Ltd.

[4] Ling, N.; O'Brien, L.K.; Miller, R.; Lake, M. 2013: A revised methodology to survey and monitor New Zealand mudfish. Department of Conservation, Wellington (unpublished).

- Mueller,H., Ulrich, C., Purcell, A. (2017) DRAFT Hamilton City Long-tailed Bat Survey 2016-2017. Kessels & Associates Ltd.
- Dixon, O (2020). Spatial distribution survey of long-tailed bats (*Chalinolobus tuberculatus)* north of Hamilton City. University of Waikato.

A review of available satellite imagery of the proposed designation area was undertaken to identify key areas of vegetation cover to target in-field assessments. Key vegetation areas were mapped for later field assessments and were loaded onto the *AVENZA* mobile application to assist field staff to navigate to all areas of interest.

2.2.2. Roost Habitat Assessments

All accessible trees within the proposed project designation were assessed in regard to their potential to host roosting Long-tailed bats (*Chalinolobus tuberculatus*). Assessments focussed on all trees or groups of trees with a diameter at breast height (DBH) ≥15cm. Where trees ≥15cm DBH were noted, a ground level assessment was undertaken by a Level D competent bat ecologist[5]. Potential bat roost trees were considered trees with one or more of the following attributes:

i. Cracks, crevices, cavities, fractured limbs, or other deformities, large enough to support roosting bat(s);
ii. Sections of loose flaking bark large enough to support roosting bats.
iii. A hollow trunk, stem or branches; and
iv. Deadwood in canopy or stem of sufficient size to support roost cavities or hollows.

Where trees or groups of trees were identified as having one or more of the above attributes, they were assigned a roost suitability category based on their likelihood of being occupied by bats.

Table 1 Potential bat roost classifications.

Suitability category	***Roosting Habitat***
Low	*A tree over 15cm DBH with limited roosting potential, e.g. some loose bark or rotted branch tip but low suitability for individual bat to roost.*
Moderate	*A tree over 15 cm DBH with one or more potential roosting features that could be used by individual bats or where it is not clear from the ground inspection if a feature does provide a suitable cavity for bats to roost and therefore requires further inspection.*
High	*A tree over 15cm DBH with one or more potential roost features that are clearly suitable for use by multiple bats.*

[5] Details on bat ecologist competency levels can be found within: Smith, D., Borkin, K., Jones, C., Lindberg, A., Davies, F., & Eccles, G. (2017). Effects of land transport activities on New Zealand's endemic bat populations: reviews of ecological and regulatory literature (No. 623).

2.2.3. Bioacoustic Surveys

Reviews of available satellite imagery were undertaken of the site and surrounding landscape to plan the positioning of acoustic survey equipment for bats. Automatic Bat Monitors (ABM; DOC model AR-4) were used to record ultrasonic echolocation calls emitted by bats. ABMs record and store data passively and remotely and have the capacity to record both long-tailed (40kHz) and lesser short-tailed (28kHz) bat calls at a range of up to approximately 40m[6].ABM survey locations considered coverage of the proposed designation, the presence of linear vegetation corridors, on-site watercourses, and the results of roost habitat assessments.

ABMs were set at 10 locations around the site in areas where bats would be expected to be foraging, commuting, or roosting. ABMs were deployed approximately 3 – 4m high in mature trees, in positions where they were free from foliage and directed into open space areas. ABMs were programmed to record from one hour before sunset to one hour after sunrise each night to ensure date is captured from prior to bats existing their roost, activity throughout the night, and until after they had returned to their roost.

Long-tailed bat activity is influenced by overnight temperatures and rainfall, therefore weather data from the survey period was analysed to ensure conditions were suitable[7]. Valid survey nights were defined as having a minimum overnight temperature of 7°C, less than 5mm of rainfall during the night and low winds. Raw ABM data was analysed using Department of Conservation (DOC) BatSearch Version 3.11. The data from this programme was then entered into an ENZL bat processor which outputs data relating to mean bat passes and total passes for the site. The data was further analysed with regards to date and time of bat passes to determine the timing of activity across site and the occurrence of feeding buzzes was also noted.

2.3. Lizards

2.3.1. Desktop Reviews

The following documents and databases were consulted to determine the diversity and presence of native lizards within the subject site and wider landscape:

- Department of Conservation National Herpetofauna Database (2020).
- Van Winkel, D., Baling, M., & Hitchmough, R. (2020). Reptiles and Amphibians of New Zealand. Bloomsbury Publishing.

A review of available satellite imagery of the proposed designation area was undertaken to identify potential habitat types across the site to target in-field assessments based on the expected diversity on-site. Key vegetation areas were mapped for later field validation and assessments; these were loaded onto the *AVENZA* mobile application to assist field staff to navigate to areas of interest.

[6] Department of Conservation, 2012. Bats: Counting away from roosts – automatic bat detectors
7 O'Donnell, C. F. (2000). Influence of season, habitat, temperature, and invertebrate availability on nocturnal activity of the New Zealand long-tailed bat (Chalinolobus tuberculatus). New Zealand Journal of Zoology, 27(3), 207-221.

2.3.2. Artificial Cover Objects

A preliminary site walk over of the site was undertaken on 17 September 2020 to distinguish the available habitat types across the proposed designation area. During the walk over, key habitat areas were noted to be targeted for the deployment of Artificial Cover Objects (ACOs).

ACOs were industry standard black onduline roofing material measuring approximately 450mm x 450mm. ACOs were installed in representative areas of key habitat types on-site. Installation aimed to bisect habitat areas or were installed on the interface between two habitat types; e.g. pasture grass and vegetated hedgerows. Transects were used to survey targeted areas with an aim to inform species presence/absence.

As ACOs aim to provide supplementary novel refugia, these require a settlement period to ensure animals discover and utilise these new objects in their environment. ACOs would be left undisturbed for no less than 8 weeks to settle in their environment prior to any checks for occupancy were performed.

2.3.3. Visual Encounter Surveys

Visual Encounter Searches were performed by ecologists alongside ACO checks and opportunistically during all other fauna survey field work (i.e. bat and fish surveys). Searches included ecologists passive scanning habitat for basking and forging lizards and where potential refugia was encountered, these were carefully lifted and inspected to detect the presence of lizards. Key refugia/micro-habitat items searched would include both woody debris and strewn rubbish/building materials found across the farmland habitat.

3. SURVEY RESULTS

3.1. Freshwater Fish Surveys

3.1.1. Desktop Assessment

A search of the NZFFD revealed no records of fish or invertebrates within the site. Aerial imagery appears to show the northernmost drains draining to a tributary of the Waipa River, whilst the southernmost drains flow to Lake Rotokauri via the large drain under Exelby Road. Records from Lake Rotokauri included three 'At-Risk species', whilst records from the Waipa River Tributary included two 'At-Risk species'. Additional more recent records provided by Tonkin and Taylor (via BECA) showed records of black mudfish (*Neochanna diversus*) in drains connected to those on-site (see Figure 3). Table 2 lists records from both the NZFFD search and from Tonkin and Taylor (Figure 2).

Table 2: Fish records from catchments contiguous with the site - NZFFD and Tonkin & Taylor

Scientific Name	Common Name	Maori Name	Conservation Status
Anguilla dieffenbachia	Longfin eel	tuna	At-Risk – Declining
Galaxias argenteus	Giant kōkopu	kōkopu	At-Risk – Declining
Galaxias maculatus	Inanga	īnanga	At-Risk – Declining
Neochanna diversus	Black mudfish	waikaka	At-Risk - Declining
Anguilla australis	Shortfin eel	tuna	Not Threatened
Galaxias fasciatus	Banded kōkopu	kōkopu	Not Threatened
Gobiomorphus cotidianus	Common bully	kōkopu, tīpokopoko	Not Threatened
Ameiurus nebulosus	Brown bullhead catfish	n/a	Pest animal
Carrassius auratus	Goldfish	n/a	Pest animal
Gambusia affinis	Gambusia	n/a	Pest animal

Figure 3

3.1.2. Trapping

Locations of survey transects are shown in Figure 6. A total of five species of fish were found during surveys (see Table 3 and Figure 7) including both native and pest fish species[8]. In general, the drains were sparsely populated with shallower drains generally containing fewer fish. Incidental findings of other species included introduced bell frogs (*Litoria* sp.), adult and larval damselflies (possibly *Xanthocnemis* sp.), mayfly larvae (unknown genus) and aquatic beetles (unknown genus). Dip net surveys for mudfish fry did not result in any capture. Targeted macroinvertebrate surveys were not within the scope of this assessment.

Table 3: Fish species caught during surveys within the proposed alignment

Scientific Name	Common Name	Maori Name	Conservation Status
Anguilla dieffenbachia	Longfin eel	tuna	At-Risk – Declining
Neochanna diversus	Black mudfish	waikaka	At-Risk - Declining
Anguilla australis	Shortfin eel	tuna	Not Threatened
Ameiurus nebulosus	Brown bullhead catfish	n/a	Pest animal
Gambusia affinis	Gambusia	n/a	Pest animal

Two At-Risk species were found during trapping, but in low abundance (three longfin eels and one black mudfish). Other species found during trapping (shortfin eels and pest fish) are commonly found in artificial habitats with poor water quality such as the farm drains on-site. These species are widespread in the Waikato (based on NZFFD records and ENZL's experience). Overall, pest fish species dominated the catch (Figure 4) and of the native species found, the shortfin eel was the dominant species (Figure 5) as was expected for this habitat type.

[8] As classified under the Waikato Regional Pest Management Plan, 2014 - 2024

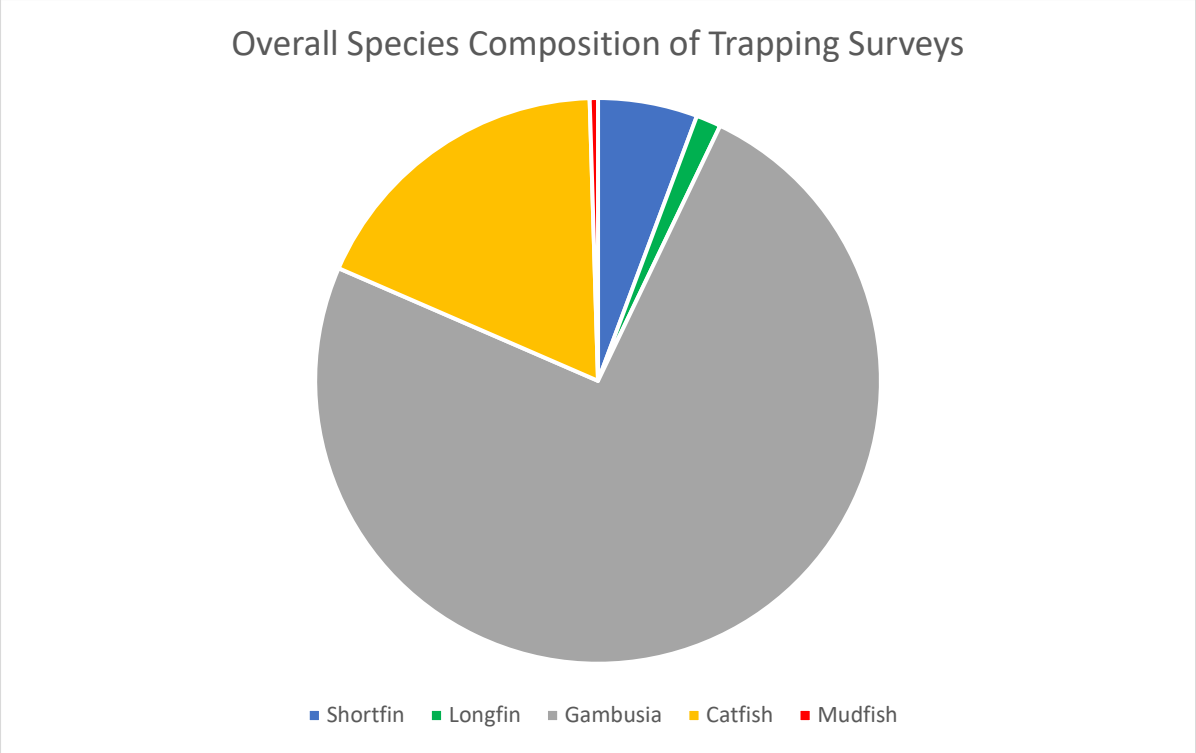


Figure 4: Species found during fish trapping

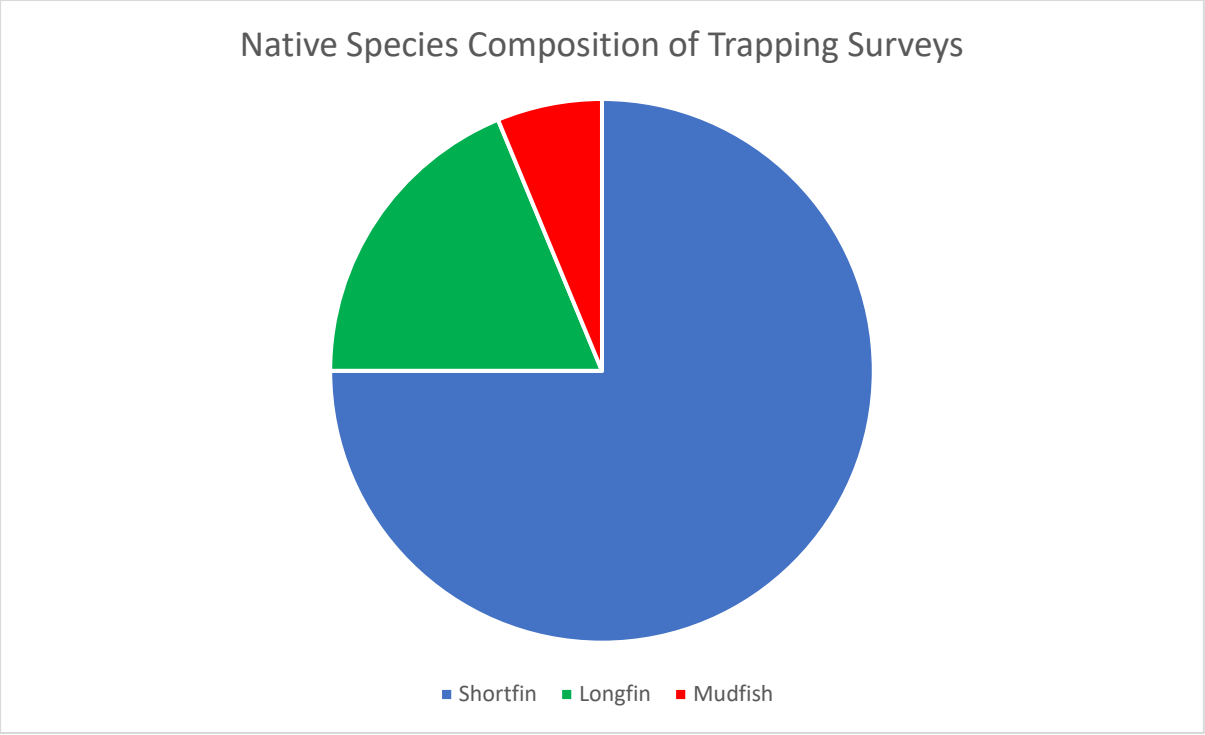


Figure 5: Native fish species found during fish trapping

3.1.3. EDNA Surveys

Sample locations for the 16 eDNA samples are shown in Figure 6. Sampling revealed the presence of six species of fish as detailed in Table 4 below. Whilst this technique revealed a species that wasn't identified during trapping efforts (Giant kōkopu), it was not able to detect the presence of black mudfish. Giant kōkopu were detected only in the large Rotokauri drain in the southern part of the site whilst shortfin eels were detected in both the Rotokauri drain and in several smaller drains. Samples in the middle of the site did not detect any fish species, although shortfin eels were caught in low numbers during trapping.

Table 4: Fish species identified during eDNA surveys

Scientific Name	Common Name	Maori Name	Conservation Status
Anguilla dieffenbachia	Longfin eel	tuna	At-Risk – Declining
Galaxias argenteus	Giant kōkopu	kōkopu	At-Risk – Declining
Anguilla australis	Shortfin eel	tuna	Not Threatened
Ameiurus nebulosus	Brown bullhead catfish	n/a	Pest animal
***Cyprinid* spp**	Not specified	n/a	Exotic or pest animal
Gambusia affinis	Gambusia	n/a	Pest animal

Figure 6

Figure 7

3.1.4. Discussion

The combination of eDNA and trapping surveys found a total of six fish species as well as an unspecified cyprinid (exotic). Those caught during trapping surveys were in low abundance and sparsely populated as would generally be expected in marginal habitat. In addition, the lack of water depth and the focus on black mudfish generally excluded the use of fyke nets which may have eliminated the capture of larger eels. Three 'At-Risk' species were recorded – Giant kōkopu, longfin eel and black mudfish across the survey area.

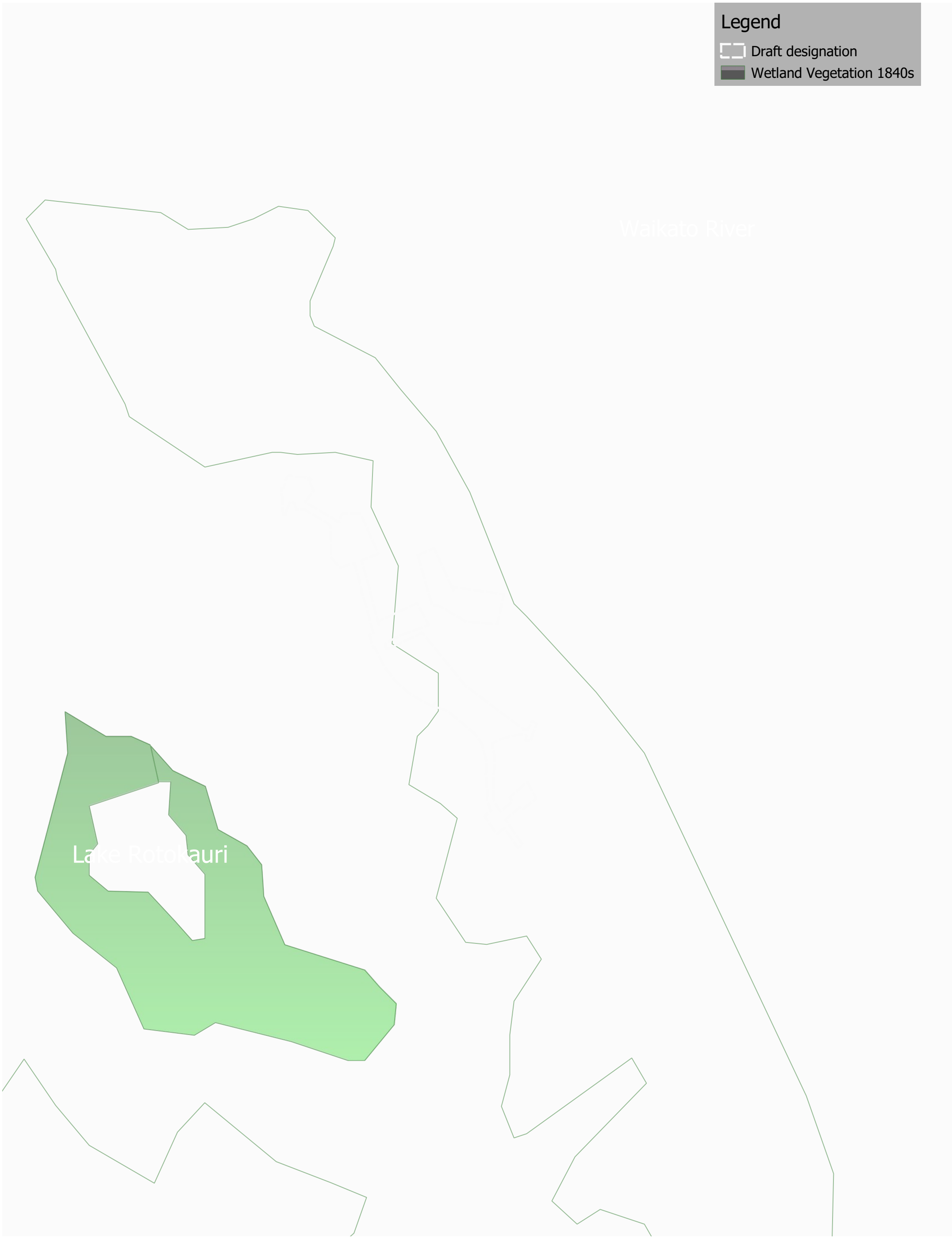
The discrepancies between trapping results and eDNA detections may be attributable to the hydrological influences on the habitats sampled. eDNA sampling protocols have so far been based mainly on flowing streams[9] and as such sampling of habitats which are more lentic in nature may require a refinement of sampling methodologies. This is because the DNA fragments may not be mixed to any degree in more lentic environments compared to in flowing water (i.e., lotic environments).

A single black mudfish was found within the proposed footprint. This was found within a pool immediately preceding a culvert in one of the minor farm drains on-site. Whilst no other fish were caught within the subject surveyed area of this drain, eels were found in a larger drain immediately downstream of the survey area (see Figure 7). Previous records of black mudfish are known in the surrounding area, in systems connected to those on-site[10] (Figure 3). This species is known to occur in small remnant populations particularly in areas that were historically wetlands (often areas that are now farms with artificial drain systems) and around the margins of peat lakes[11].

Waikato Regional Council provides a data layer showing an approximation of vegetative cover in the Waikato Region in the 1840s, including wetland vegetation (Figure 8). Around half of the designation is mapped as having contained wetland vegetation in this era, which aligns with the low-lying topography and requirement for a drainage network across the site. As such, small remnant populations could be expected in the drains on-site, particularly as they can survive periods of drying due to their ability to aestivate.

Giant kōkopu were recorded in three locations along one large drain in the south-west of the survey area. This drain was not trapped due to the lack of likely habitat for mudfish but was contiguous with a watercourse leading to Lake Rotokauri where mudfish have been recorded previously. Longfin eels were also detected in this drain. The presence of predatory fish such as eels and giant kōkopu may have an influence on the ability of black mudfish to persist more widely across the drain network. However, the absence of mudfish in any survey cannot be considered conclusive evidence of their absence due to the chance nature of them encountering a trap and being caught.

[9] Pers. Comms. Shaun Wilkinson, Wilderlab
[10] Pers. Comms. Claire Webb, BECA
[11] Pers. Comms. Bruno David, Waikato Regional Council



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Projection: NZGD 2000 / New Zealand Transverse Mercator 2000
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Figure 8
Historic Wetland Vegetation

Date: 17 March 2021

Plan prepared for BECA by Ecology New Zealand Limited
Author: Jasmine Dungey

3.2. Long-tailed Bats

3.2.1. Desktop Assessments

Desktop reviews from the DOC National Bat Distribution Database and both Hamilton City surveys undertaken between 2011- 2017 do not provide historical information of bat survey works undertaken across the subject Rotokauri Arterial Designation area (Figure 9). The closest historic bat record from the DOC database comes from Horseshoe Lake, approximately 900m from the southern extent of the designation where long-tailed bats had been recorded in 2017. Reviewing this data, over 20 survey locations across Horseshoe Lake and neighbouring tree land to the west have resulted in bat detection at only one location.

A bioacoustic survey for long-tailed bats was undertaken by ENZL between April 30 to 18 May 2020[12], immediately north of horseshoe lake and 650m from the southern extent of the designation at 256 Brymer Road for an unrelated residential development project (Figure 9.). This survey included the use of 15 acoustic bat monitors which recorded for on average 18 valid survey days. During this survey only 4 potential bat passes, and one confirmed bat pass was recorded.

A previously completed bioacoustic survey undertaken by Dixon between 21 November 2019 to 28 January 2020[13] did not detect bats in proximity to the Designation area (Figure 10). Key conclusions within this report detail that long-tailed bat activity appears lower in the northern surrounds (i.e., with 10 km) of Hamilton City compared to the southern edge of the city, and that bat activity tended to be higher in kahikatea forest remnants. These findings aligned with those found in the ENZL study and historical records within the DOC database.

[12] Angove-Emery, S (2020) 256 Brymer Road-Bat Assessment. Report Number 20026.1-001 Rev1. Ecology New Zealand Ltd.
[13] Dixon, O (2020). Spatial distribution survey of long-tailed bats (*Chalinolobus tuberculatus*) north of Hamilton City. University of Waikato.

Figure 9

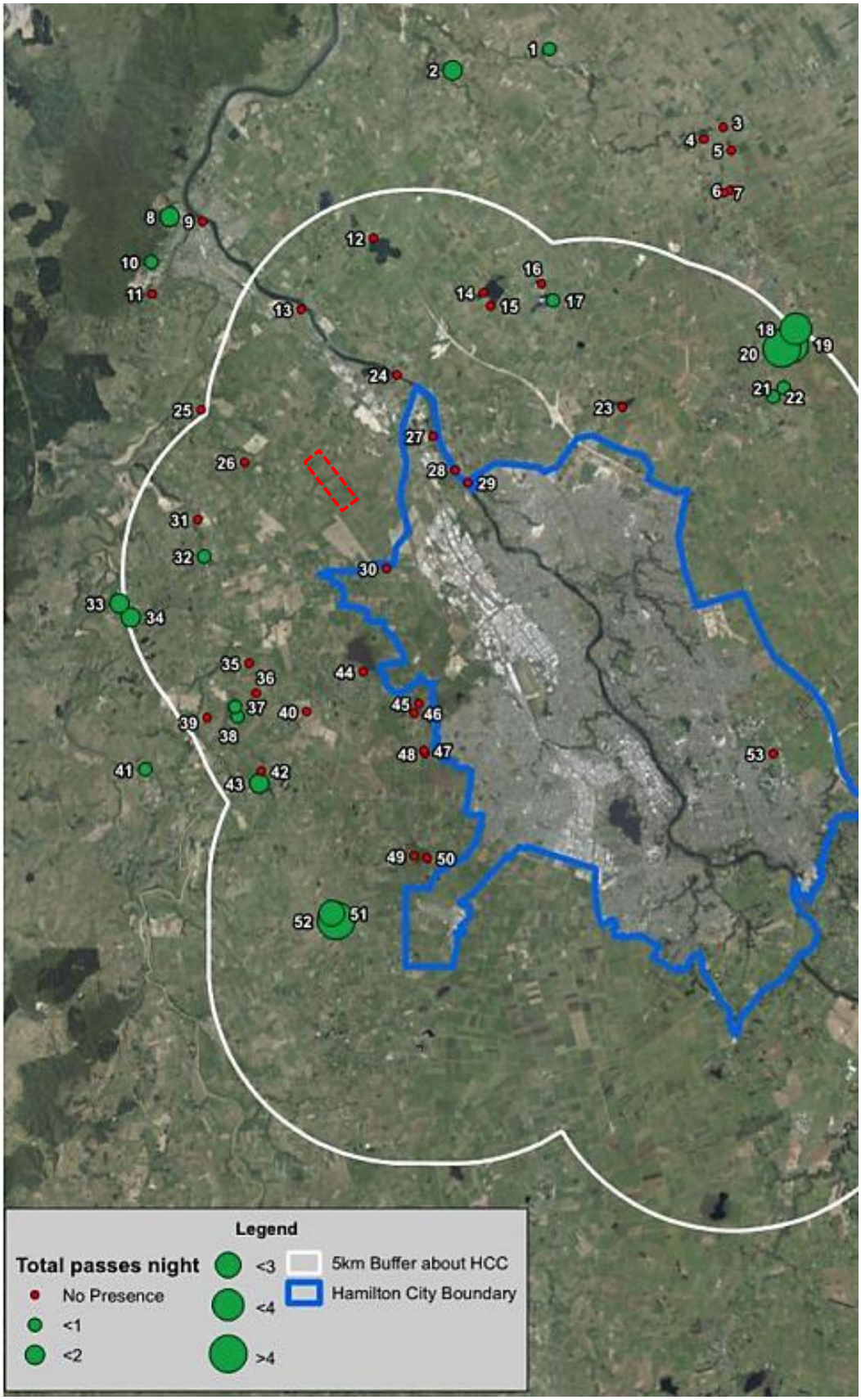

Figure 10: Dixon, O (2020) Locations of ABMs deployed between 21 November 2019 and 28 January 2020. Overlaid dotted red line indicates approximate designation area.

3.2.2. Bioacoustic Survey Results

A total of 10 ABMs were installed across the designation area and set to record between 5th of February to the 26th of February 2021. The survey was conducted during the recognised bat survey period (October to April) when bat activity is at its peak. Regarding long-tailed bat ecology, February reflects an expected post-parturition period for bats where juvenile bats are recently volant[14]. ABMs were positioned across the extent of the designation and focused on areas where resident bats would be expected to be foraging, commuting, or roosting based on habitat assessments on -site.

Hourly weather data during the survey period was sourced from the nearest weather station available in New Zealand's National Climate Database (Hamilton, Ruakura 2 Ews; Appendix B) and included temperature, rainfall, humidity and windspeed data. Over the deployment period, all survey days were considered valid; with rain not occurring on any days within the first 4 hours after sunset.

A single long-tailed bat pass was detected during the survey session at ABM Unit Number 21 (22:35 on the 19th of February 2021) (Figure 11,Figure 12). This result is reflective of the low levels of activity detected in previously completed surveys (refer to Section 3.2.1). The pass was considered a commuting call, and not a social call or feeding buzz. The subject ABM was positioned at a stand of mature macrocarpa trees (*Cupressus macrocarpa*), adjacent to a farm shed area. Several of these trees demonstrated roosting features suitable for bats (refer to Section 3.2.3); however, the timing of the pass (22:35) does not indicate roosting behaviour.

Figure 11 Long-tail bat pass detected at ABM Unit 21.

[14] O'Donnell, C. F. (2002). Timing of breeding, productivity and survival of long-tailed bats Chalinolobus tuberculatus (Chiroptera: Vespertilionidae) in cold-temperate rainforest in New Zealand. Journal of Zoology, 257(3), 311-323.

Figure 12

Battery depletion varied on each ABM providing a range of survey efforts at each site (Table 3). Survey limitations included 1 ABM malfunction and 2 ABMs being found on the ground during retrieval. It is assumed that these two ABMs fell during the night of the 16th where maximum recorded wind gusts (13.4m/sec) were noted during the survey period (Appendix B). ABMs record omnidirectionally and may still record upwards from the ground; however, data from after the 15th of February was considered compromised and not included in the below summary table[15].

Table 5 Summary of ABM survey results.

ABM Unit No.	No. Days Recording	No. Valid Nights	Number of Bat Passes	Mean Bat Passes/Valid Night	No. Feeding Buzzes	Activity Within 1 hour of Sunrise/Sunset
8*	-	-	-	-	-	-
10	14	14	0	0	0	0
13	16	16	0	0	0	0
14	14	14	0	0	0	0
18**	11	11	0	0	0	0
19**	11	11	0	0	0	0
21	15	15	1	0.07	0	0
24	14	14	0	0	0	0
32	5	5	0	0	0	0
34	14	14	0	0	0	0

*ABM malfunction – no recordings.
**ABM found on ground during retrieval – Data from after 15th Feb compromised.

3.2.3. Roost Assessment Results

Trees within the designation boundary were surveyed on the 4th,5th, and 26th of February to determine their potential to be long-tailed bat roosts. Industry-standard criteria were used to guide this assessment which was undertaken by a Level D bat ecologist[16]. Where appropriate, binoculars were used to thoroughly assess the higher up branches and tree trunks. High level commentary noted for each tree/group of trees is included in Appendix C and includes details on:

- *Date and time of assessment;*
- *Unique tree identification number;*
- *GPS location of the tree;*
- *Tree species;*
- *DBH range estimate;*
- *Description of the feature;*
- *Roost suitability category;*

All assessed trees/groups of trees had a red marker nailed onto them and unique tree identification given. Trees were primarily associated with shelter belts but also included isolated mature trees and stands of trees. With exception to a small stand of seven kahikatea in the

[15] A review of the 'compromised' data did not show any indication of bat passes.
[16] Smith, D.; Borkin, K.; Jones, C.; Lindberg, S.; Davies, F.; Eccles, G. (2017). *Effects of Land Transport Activities on New Zealand's Endemic Bat Populations: reviews of ecological and regulatory literature*. NZ Transport Agency.

northern extent of the designation area. All trees that had roosting features were exotic; primarily pine (Pinus sp) and macrocarpa.

A total of 43 trees/group of trees across the designation area and immediate surrounds met the potential bat roost criteria of having a DBH >15cm and at least one identified roost feature (Figure 13). Of these, 12 were classified with suitability categories/Risk ratings as High, 15 as Moderate, and 16 as Low.

Figure 13

3.2.4. Discussion

The mosaic of farmland and specimen exotic trees found across the designation area is characteristic of the rural Hamilton and Waikato Region. While bat activity may be high within this habitat type south-east of Hamilton, increasing evidence is indicating that bat activity appears low in the north-western areas of Hamilton. The bioacoustic data presented in this report provides further evidence for this, with just a single bat pass detected during the survey period. Impacts on long-tailed bat commuting and feeding are therefore expected to be minimal for local bats across the Designation area, and likely limited to impacts at an individual level as oppose to impacts at a population level. Multi-year surveys during key times within the bat survey season will provide more certainty around these impacts.

With little to no bat activity across the designation and immediate local landscape, the potential provision of suitable roosting habitat on-site is not likely to be recognised by resident bats on-site or in the wider landscape. For this reason, the loss of these potential roosting trees may not lead to population level impacts for bats within the local area. The likelihood of bats being within trees during felling activities is also considered low; however, these risks could be further mitigated through pre-clearance management (i.e pre-clearance surveys and/or roost inspections).

It should be recognised that trees which provide potential roosting habitat are rare within the rural setting of the Waikato Region and should be considered for retention where this feasible. Trees which were assigned with 'High' roosting suitability during field works, were mainly located on edges of the proposed Designation (Figure 13). The location of these trees would expectantly mean that they could be avoided during later design and construction phases of the project.

3.3. Lizard Surveys

3.3.1. Desktop Assessments

Desktop reviews of the DOC national herpetofauna database indicates native species presence is restricted to only copper skink (*Oligosoma aeneum*) within a 5km radius from the designation area. Copper skink are currently listed as a 'Not Threatened'[17] species and are often detected within farmland across the Waikato where they persist in rank grass, shelter belts, hedges, residential gardens, and remnant bush. Within a 10km radius, a record of pacific gecko (*Dactylocnemis pacificus*, 'At Risk – Relict') exists along the Waikato river. This species does occur across a range of habitat types (i.e from the coast to lowland forests[18]) but is less likely to occur across a highly modified farmland landscape. Within the 10km radius, additional exotic species include plague skink (*Lamproholis delicata*), and *Ranoidea* frog species.

Of particular interest ornate skinks (Oligosoma ornatum – At Risk Declining) have recently been detected within the Hamilton area[19]. This species is extremely rare in Hamilton, with this observation coming from a remnant block of forest, reflecting the species' natural habitat preference. This species has been documented within novel habitats such as thick weedy

[17] Hitchmough, R.; Barr, B.; Lettink,M.; Monks, J.; Reardon, J.; Tocher, M.; van Winkel, D.; Rolfe, J. 2016: Conservation status of New Zealand reptiles, 2015. New Zealand Threat Classification Series 17. Department of Conservation, Wellington. 14 p.
[18] van Winkel, D., Baling, M., & Hitchmough, R. (2020). Reptiles and Amphibians of New Zealand. Bloomsbury Publishing.
[19] N Harker 2021, pers comm. New Zealand Herpetological Society.

ground cover and rank grassland, but most commonly where there is directly adjacent native bush.

Expectantly, no arboreal species have been detected within proximity to the site due to a general lack of mature forest or scrubland in the landscape.

3.3.2. ACO Survey Results

A total of 75 ACOs were installed across the designation area on 20 October 2020. These were left to settle in the field for over three months, prior to the first check. This settling period was considered suitable to allow enough time for resident lizards to occupy and utilise these retreats. Three independent checks were undertaken of ACOs; undertaken on the 4th and 5th of February and on 11th and 26th of February 2021. This allowed for a total of 207 ACO checks to be completed, noting 18 checks were not completed due to ACOs being grown over and lost or damaged. Checks were generally undertaken between 0930 and 1400 and on warm days without rain (Table 6).

One adult copper skink and two unidentified skinks were documented during ACO checks (Figure 14). Unidentified skinks were not identified due to them fleeing before positive identification. It is however most certain that these were either copper or plague skinks due to their size, shape and known diversity of lizards within the landscape. No confirmed plague skinks were documented under ACO covers. This level of lizard occupancy was considered reasonably low during the survey period which was done during the optimal survey season.

Table 6 Summary of weather data during ACO checks

Station	Date	WDir (Deg)	WSpd (m/s)	GustSpd (m/s))	Rain (mm)	RH (%)	Tmax (c)	Tmin (c)
Hamilton, Ruakura 2 Ews	20210204	147	0.8	8.2	0	79	30.0	11.1
Hamilton, Ruakura 2 Ews	20210205	127	2.3	6.7	0	52	28	14.8
Hamilton, Ruakura 2 Ews	20210211	187	2	9.3	0	78	24.8	15.2
Hamilton, Ruakura 2 Ews	20210226	126	0.5	6.2	0	86	26.4	13.4

Figure 14

3.3.3. Visual Encounter Search Results

Visual encounter searches were undertaken during ACO checks, and within suitable habitat during wider fauna survey works (bats and fish) across the designation and wider area. Areas searched included under debris items (organic and inorganic) next to buildings, across pasture, and within vegetated hedgerows and riparian corridors. Two adult copper skinks were documented during these searches; one within the centre of the designation and one to the west of the designation (Figure 14). These skinks were found under woody debris within a paddock (adjacent to a vegetated riparian margin) and under a piece of building timber adjacent to a farm shed. Two unidentified skinks were documented within hedgerow and riparian vegetation. Unidentified skinks were in an area where both plague and copper skinks were found.

A total of five plague skinks were found during manual habitat searches. These animals were found under a woody debris and a plastic bucket container. Plague skinks were not observed at high densities across the site. When at high density, these are normally frequently observed basking and foraging.

Opportunistic encounters were also made during native fish surveys of the introduced Green and Golden bell frog (*Ranoidea aurea*). Multiple frogs were documented within drainage channels and were also captured within a Gee-minnow trap set for native fish surveys. Additionally, this frog species was documented in the results of eDNA analyses undertaken to supplement native fish surveys. No other herpetofauna species were documented in eDNA results.

3.3.4. Discussion

One native lizard species, copper skink, was identified within and adjacent to the Designation area. It is likely that this represents the only native lizard species within the Designation area and immediately surrounding landscape. This species is frequently encountered within novel ecosystems within the Waikato Region including farmland. This species is currently classified as Not Threatened[20], however an upcoming revision of the threat status of New Zealand lizard species may heighten its threat status to 'At Risk'.

Copper skink populations on-site are likely concentrated within hedgerows, riparian vegetation, rank areas of grass adjacent to streams/drains, a large pile or inorganic rubbish and under rotting debris from felled trees. Scattered individuals may also be present between these areas. Commensurate management of effects will be required to mitigate impacts on this species prior to construction. A tailored lizard management plan will be required which should aim to salvage, offset and/or compensate for foreseeable impacts.

4. CONCLUSION

The targeted surveys undertaken within the Rotokauri Arterial Designation and surrounding areas (i.e mudfish survey areas), confirmed the presence of long-tailed bats and copper skink within the Designation footprint. No mudfish were detected within the footprint; however, these fish were detected south-west of the Rotokauri Arterial Designation in a drainage

[20] Hitchmough, R.; Barr, B.; Lettink,M.; Monks, J.; Reardon, J.; Tocher, M.; van Winkel, D.; Rolfe, J. 2016: Conservation status of New Zealand reptiles, 2015. New Zealand Threat Classification Series 17. Department of Conservation, Wellington. 14 p.

channel which is connected to larger drains that flow across the Designation. The presence of native fish, bats and lizards will require consideration during the preparation of ecological impact assessment. These assessments will need to commensurately detail specific avoidance and management of any foreseeable impacts on these protected species.

APPENDIX A

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ix) Where lengths or other measurements have not been provided by a surveyor, ENZL has used basic GIS mapping and measurement systems to estimate these numbers. These should not be taken as surveyor-level accuracy for the purposes of decision making.

APPENDIX B

Summary of Environmental Conditions During Bat Survey –

Station Name	Agent Number	Network Number	Latitude (dec.deg)	Longitude (dec.deg)	Height (m)	Observing Authority
Hamilton, Ruakura 2 Ews	26117C75734	C75734	37.77389	175.3052	45	*NIWA/AGRESEARCH*

Station	Day (Local Date)	WDir (Deg)	WSpd (m/s)	GustSpd (m/s)	Rain (mm)	RH (%)	Tmax (C)	Tmin (C)
Hamilton, Ruakura 2 Ews	20210207	121	1.4	8.2	0	63	27.5	14.5
Hamilton, Ruakura 2 Ews	20210208	54	1	8.8	0	76	26.9	12.8
Hamilton, Ruakura 2 Ews	20210209	125	0.8	8.8	2.6	86	27	13.3
Hamilton, Ruakura 2 Ews	20210210	27	3.6	9.3	4.4	88	23.2	17.3
Hamilton, Ruakura 2 Ews	20210211	187	2	9.3	0	78	24.8	15.2
Hamilton, Ruakura 2 Ews	20210212	239	1.7	9.8	0	65	24.4	9
Hamilton, Ruakura 2 Ews	20210213	356	0.9	8.8	0	92	27.7	8.2
Hamilton, Ruakura 2 Ews	20210214	111	1	8.2	6.4	78	27.8	11.2
Hamilton, Ruakura 2 Ews	20210215	138	2.2	11.8	11	98	22.2	16.6
Hamilton, Ruakura 2 Ews	20210216	156	1.7	13.4	0	90	25	17.1
Hamilton, Ruakura 2 Ews	20210217	193	2.1	9.8	0	68	24.7	12
Hamilton, Ruakura 2 Ews	20210218	157	1.3	6.7	0	61	24.8	8.4
Hamilton, Ruakura 2 Ews	20210219	98	0.6	8.8	0	96	25.2	7.8
Hamilton, Ruakura 2 Ews	20210220	132	0.9	8.2	0	100	29.3	8.9
Hamilton, Ruakura 2 Ews	20210221	181	1.6	6.2	0	92	29.7	9.2

Hamilton, Ruakura 2 Ews	20210222	138	0.9	9.3	0	96	28.2	11.2
Hamilton, Ruakura 2 Ews	20210223	121	1.3	12.4	0	84	26.5	12.2
Hamilton, Ruakura 2 Ews	20210224	63	2.1	10.3	0	76	27.2	16.4
Hamilton, Ruakura 2 Ews	20210225	62	1.1	6.2	0	70	27.5	15.6
Hamilton, Ruakura 2 Ews	20210226	126	0.5	6.2	0	86	26.4	13.4
Hamilton, Ruakura 2 Ews	20210227	77	0.9	7.7	0	91	27.8	12.9

APPENDIX C

Bat Habitat Assessment - Tree Notes

ID	Date	Time	DBH (cm)	Risk	Tree	Notes
1	2021-02-04	10:15:13.000	40	High	Exotic Tree	Multiple small hollows north and south side of tree. Ground endoscope and climb.
2	2021-02-04	10:21:25.000	50	Moderate	Exotic Tree	Possible honey locust. Two possible hollows on the W side, 4m up the leader. Lower, shallow hollows.
3	2021-02-04	10:27:05.000	60	Moderate	Unknown	Two dead erect leaders with possible deep hollows.
4	2021-02-04	10:37:00.000	30-60	High	Kahikatea	Some dead broken branches, need an arborist inspection higher up the tree.
5	2021-02-04	10:47:24.000	120	High	Poplar	Some dead erect branches seen at 8m+ high. New growth on the tree made ground assessments difficult.
6	2021-02-04	10:53:33.000	130	High	Plane	Four large hollows seen on the north side of the tree trunk and leaders 3m up. Further climbing assessments are required as a lot more hollows across the tree.
7	2021-02-04	11:04:17.000	130	High	Oak	Lots of possible features but the rating may drop after its climbed. Hollow 4m up facing south underside of a leader. Loose bark 4m on east side, facing dead branch. Dead erect branch 8m up. Possible hollow 6m up, N facing. Dead branches.
8	2021-02-04	11:33:21.000	30	Low	Pear	Small, possible hollow 3m up facing north. One crack 4m up facing east
9	2021-02-04	11:44:50.000	40	High	Macrocarpa	One large hollow that goes upward/west facing 5m up. Dead erect leader with cracks.
10	2021-02-04	11:47:53.000	30	Low	Macrocarpa	Some Marginal flaking bark around the entire tree
11	2021-02-04	11:55:24.000	50	Moderate	Cypress	East facing leader/branch with 3 possible hollows at 3m and 4m up. Possibly more features further up. Thickets of small branches.
12	2021-02-04	12:04:25.000	-	Low	Macrocarpa	Marginal back and a small erect dead branch 5m up, east side of tree
13	2021-02-04	12:11:08.000	50	Moderate	Macrocarpa	Possible deep feature in east facing split, 4m up. Likely to reassess after climb as low or NA.
13*	2021-02-04	12:26:58.000	60	Moderate	Macrocarpa	One split facing east with possible hollows, climbing assessment could drop to NA/Low
14	2021-02-04	12:19:21.000	120	NA	Macrocarpa	No features documented
15	2021-02-04	12:23:17.000	140	High	Macrocarpa	Complex with broken branches with twists and splits/cracks. No obvious big hollows.
16	2021-02-04	12:32:00.000	20	Low	Macrocarpa	One small hollow
17	2021-02-04	12:35:18.000	70	Low	Macrocarpa	Several possible hollows under branch/trunk joints across tree.
18	2021-02-04	13:41:59.000	200	High	Macrocarpa	South facing branch, 8m facing west. Broken branch facing NW with possible hollow 12m up. Possible hollow on the east leader 10 up on the east side. Possibly more features higher up.
19	2021-02-04	13:48:58.000	-	High	Macrocarpa	South facing branch, 7m up. Deep hollow facing south. Possible hollow on trunk, 6m up facing SW. Dead branches facing N with hollows possibly more at the top of the tree.
20	2021-02-04	13:56:49.000	-	High	Macrocarpa?	Lots of hollows from top to bottom.
21	2021-02-04	14:02:09.000	110	Low	Macrocarpa	Fallen macrocarpa, hollows low to the ground.

22	2021-02-04	14:06:38.000	200	High	Macrocarpa	Complex, north leader, 4m up facing west has deep hollow. Middle leader dead, hollow 7m up facing west. Southern leader, 10m up facing west under branch
23	2021-02-04	14:15:46.000	50	Low	Macrocarpa/Dead	Fallen stag, two low hollows close to the ground.
24	2021-02-04	14:32:37.000	20	Low	Pine	No features on the tree but a thicket of honey suckle.
25	2021-02-04	14:40:18.000	20	Low	Macrocarpa	No features on the tree but a thicket of honey suckle.
26	2021-02-04	14:42:18.000	20	Low	Macrocarpa	No features on the tree but a thicket of honey suckle.
27	2021-02-04	14:42:44.000	20	Low	Macrocarpa	No features on the tree but a thicket of honey suckle.
28	2021-02-04	14:44:20.000	20	Low	Macrocarpa	No features on the tree but a thicket of honey suckle.
29	2021-02-04	14:52:25.000	100	Moderate	Pine	East facing broken branch 5m up with big splits. Broken branch, south facing needs further assessment. Possible hollow tip branch over drain, facing south. May drop to low after climb.
30	2021-02-04	14:56:33.000	100	NA	Pine	No features documented
31	2021-02-04	15:01:35.000	100	Low	Pine	Some broken, small erect branches 8m up.
32	2021-02-04	15:06:39.000	100	Low	Pine	Some small erect broken branches up high.
33	2021-02-04	15:14:15.000	-	Moderate	Pine	Honey suckle thicket on branches, some dead erect small branches.
34	2021-02-04	15:19:59.000	-	Moderate	Pine	One possible branch, S facing over the drain with hollow. Can be inspected from the ground on the south bank.
36	2021-02-04	15:25:37.000	110	NA	Pine	No features documented
37	2021-02-04	15:26:02.000	60	NA	Pine	No features documented
38	2021-02-04	15:31:10.000	100	Moderate	Pine	One big hollow at head height but currently occupied by a possum.
39	2021-02-04	15:33:02.000	60	Moderate	Pine	One south facing branch, 4m up with a possible feature on the top side
40	2021-02-04	15:34:07.000	120	Low	Pine	Small, erect broken branches
40*	2021-02-04	15:35:23.000	120	Low	Pine	Small, erect broken branches
41	2021-02-04	15:40:35.000	100	Moderate	Unknown	Trees north and south assessed as single tree. North tree has N facing dead leader with loose bark sections. Some dead south facing branches on southern tree can be assessed on the ground of the southern bank.
42	2021-02-04	15:52:17.000	110	High	Pine	Hollow 4m up on main leader. Loose bark and possible hollows on dead stag.
42*	2021-02-04	15:55:02.000	40	NA	Pine	No features documented
43	2021-02-04	16:01:14.000	100	NA	Pine	No features documented
43	2021-02-11	13:40:50.000	100	NA	Pine	No features documented
44	2021-02-11	13:44:35.000	100	Moderate	Pine	One broken branch, cannot see end, 6m up facing north.
45	2021-02-11	13:47:50.000	100	NA	Pine	No features documented
46	2021-02-11	13:51:29.000	100	Moderate	Pine	Split branch facing north, 4m up.
47	2021-02-11	13:55:17.000	100	NA	Pine	No features documented

48	2021-02-11	14:04:06.000	100	Moderate	Pine	Potential gap between the branches and leader.
49	2021-02-11	14:06:59.000	60	NA	Pine	Four leaders, no features documented
50	2021-02-11	14:08:59.000	60	NA	Pine	Three leaders, no features documented
51	2021-02-11	14:13:28.000	100	NA	Pine	No features documented
52	2021-02-11	14:22:39.000	45	NA	Tree Privet	No features documented
53	2021-02-11	14:23:32.000	30	Moderate	Chinese Privet	Hollow branch facing east, 2m up.
53	2021-02-11	14:28:29.000	25	NA	Tree Privet	No features documented

*13, 40, 42, 53 tags have been doubled up in-field. Independent notes and GPS points differentiate are used to trees.