

Before the Hearings Panel

In the Matter of the Resource Management Act 1991

And

In the Matter of the Proposed Waikato District Plan – Stage 1

And

In the Matter of Hearing 21A – Significant Natural Areas

Brief of Evidence of **Craig John Pilcher** for Bathurst Resources Limited and BT Mining Limited (submitter 771)

Dated: 29 October 2020

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INTRODUCTION

Qualifications and Experience

1. My full name is Craig John Pilcher and I am the General Manager of Domestic Operations at Bathurst Resources Limited (**Bathurst**).
2. I provided evidence, dated 16 September 2020, in the Rural Hearing of the Proposed Waikato District Plan – Stage 1 (Hearing 18). That evidence outlines my qualifications and experience at paragraphs [2] – [4].

Proposed Waikato District Plan – Key Issues

3. The proposed Waikato District Plan (**Plan**) maps a number of significant natural areas (**SNA**) based on desktop studies and which have the potential to unnecessarily restrict the development of areas for coal mining.

SCOPE OF EVIDENCE

4. I provide evidence on behalf of Bathurst and BT Mining Limited (**Bathurst and BT**) on the Plan.
5. The following evidence covers Bathurst and BT's submission and further submission points that relate to SNAs, which are covered by Chapter 3 – Natural Environment, Chapter 22 – Rural Zone and the planning maps within the Plan.
6. In my evidence dated 16 September 2020, I provided a detailed analysis of coal mining in the Waikato, Bathurst, BT and their mines (particularly the Waikato mines), the lifecycle of a mine, the future need for coal mining in the Waikato and the proposed locations for that future mining. That evidence and analysis applies equally to this topic, but is not repeated in this brief of evidence.
7. In this brief of evidence, I will address the following aspects:
 - (a) Functional Need;
 - (b) Identification of Significant Natural Areas;
 - (c) Future Resource Consent Applications and Assessment; and
 - (d) Conclusion.

FUNCTIONAL NEED

8. As I have outlined in my earlier evidence, a coal deposit is fixed in location and must be extracted at that location. I have provided evidence on the significance of

coal deposits in the Waikato District and maps outlining where those deposits are, as well as the ongoing need for coal in the Waikato.

9. In addition, it is more efficient to establish new coal mining in locations that can utilise the existing infrastructure – such as the proposed new coal mining in Ruawaro/Rotowaro North. This is efficient both from a cost perspective and an environmental perspective as it avoids the need to construct new infrastructure.

IDENTIFICATION OF SIGNIFICANT NATURAL AREAS

10. The Plan has identified SNAs throughout the district based effectively on a desktop study, and the disclaimer in the report by Kessels Ecology notes:¹

“The Council strongly advises that the data be used only in conjunction with subsequent additional field surveys, especially if the data will be used to help with decisions on resource consents, the development of district plan and regional plan policy”

11. We are particularly concerned that SNAs have been mapped without ground truthing, within our existing coal mining licences and mining permits, where we hold all necessary rights to mine or have mined the areas in question, and also within our exploration permit (EP 40 698) where we wish to expand our existing Rotowaro mine. I **attach** at **Annexure 1** a plan showing the proposed SNA mapping in relation to the Rotowaro coal mining licence, the Huntly West coal mining licence, EP 40 698 and the Rotowaro coalfield in general.
12. This is of concern to us for the obvious reason that the existence of an SNA on land makes it considerably harder for activities that may impact on the SNA to be consented. Where there is a “genuine” SNA that is one issue but where constraints are imposed based on a high level and untested desktop review, that is concerning. Further, this concern is acknowledged by the author of the Section 42A Report for Hearing 21A, and we note her conclusions that many of the mapped SNAs ground-truthed in preparation of the Section 42A Report were shown to be incorrect.
13. The mapped SNAs ground-truthed as part of the Section 42A Report preparation did not include the proposed SNAs over our coal mining licences, coal mining permits or exploration permit.
14. However, we had already decided to pick an area relevant to BT and to stress test the appropriateness of mapping areas of the land as SNAs. We engaged AECOM to undertake a preliminary assessment of the SNAs mapped within exploration permit 40 698 (Ruawaro). There are two mapped SNAs that affect EP 40 698

¹ Kessels Ecology, *Significant Natural Areas of the Waikato District: Terrestrial and Wetland Ecosystems*, November 2017, inside coverpage.

(SNA 1780 and SNA 1800) and the assessment, which focussed on SNA 1780, is attached at Annexure 2.

15. AECOM sets out the Waikato Regional Council (**WRC**) assessment of the habitat within SNA 1780 as follows:

Table 1 WRC assessment of the habitat in SNA 1780 against the WRPS SNA criteria.

WRPS SNA criteria	Assessment by WRC (Kessels Ecology, 2017)
Criteria 1 - Protected areas	No
Criteria 2 – Coastal marine area	No
Criteria 3 – Threatened species	Yes
Criteria 4 – Under represented habitats (<20%)	Likely
Criteria 5 – Naturally uncommon vegetation or habitat	No
Criteria 6 – Wetland – indigenous flora and fauna	Yes
Criteria 7 – Large example of a habitat type	No
Criteria 8 – Aquatic habitat critical to the self sustainability of a species	No
Criteria 9 – Indigenous vegetation that is a healthy, representative example	Indeterminate
Criteria 10 – Part of an ecological sequence that's not common	No
Criteria 11 – Buffer, link or corridor for another SNA	No

WRC presents the following justification for the classification of the habitats in SNA 1780 as significant;

'(Criteria 3) Declining fauna species have been recorded in the wetland part of this site. (Criteria 6) This site includes indigenous wetland habitats which are likely to be under-represented. (Criteria 9) Unsure of structure and composition and ecological processes.'

16. The work undertaken by AECOM included:
- (a) its desktop review;
 - (b) review of historic aerial photographs;
 - (c) an onsite scoping exercise;
 - (d) a walkover of all areas that could be physically safely accessed;
 - (e) reconnaissance vegetation plots;
 - (f) five minute bird counts; and
 - (g) an assessment of habitat features for potential to support indigenous bat, herpeto fauna and fish species.
17. This involved a number of days work by AECOM ecologists. The resulting report is very detailed and there are a number of points worth highlighting:
- (a) Within each SNA identified by the Plan there are multiple and distinct units and significant habitat variability within these units. This calls into question how an SNA has been delineated in the Plan and the applicability of meeting one criteria in one sub-area and using that as a trigger to designate a much larger area as an SNA.

- (b) AECOM recommended that the boundaries of the discrete sub units that it identified within SNA 1780 be reduced because there are habitats within each of the sub units that do not meet the criteria of the Waikato Regional Policy Statement (**WRPS**).² AECOM noted that the current boundaries were predominantly determined by aerial photos rather than following site walkovers.
- (c) The WRPS significance criteria do not include text that explains how the criteria should be applied or include definitions of key words used e.g. representative. Associated guidance does not remove this ambiguity and the wording in the criteria is open to interpretation. An example of this is Criteria 3 which SNA 1780 is said to meet due to the presence of threatened or at risk fish species. Specifically AECOM found the presence of longfin eels and giant kopuku in the streams within part of SNA 1780 (sub unit 5) and accepted that as these streams extend into the other parts of SNA 1780 it could be considered likely that these species could be present in all of SNA 1780 – though there is no actual evidence of this to date. However AECOM also noted that the criteria 3 does not:³

*“... indicate the **level of usage by indigenous species that would be required for a site to be considered as SNA quality.** This is particularly relevant to species that have large home ranges e.g. native bats.*

*Long-fin eels and giant kopuku are considered ‘at risk -declining’, therefore, it could be interpreted that the habitats in the Study Area would meet criteria 3, if these ‘at risk’ fish species were confirmed to be present, which WRC have indicated that they did in their justification for listing SNA 1780. However, if the presence of these species were to be the sole trigger for classification of a site as an SNA (as defined by the WRPS criteria), **then large sections of stream within New Zealand would be classified as SNA as these species are widespread, albeit they are in decline.**” (Emphasis added)*

- (d) AECOM also questioned how criteria 4 had been applied to SNA 1780 noting:⁴

*“...WRC indicate in their justification of significance for SNA 1780 .. that criteria 4 is likely to be met. **No further comment is provided.**” (Emphasis added)*

² AECOM New Zealand Limited, *Significant Natural Area Survey – Mineral Exploration Permit (EP) 40698 Area*, 12 November 2019, at 4.1, page 25.

³ Above, at 4.2.1.1, page 27.

⁴ Above, at 4.2.2, page 29.

*..the presence of wetland within the Study Area would not trigger this criteria within the WRPS. However, the presence of secondary forest could ... The criteria does not define the characteristics and quality of a habitat that is defined as 'forest'. This is relevant when trying to determine if a habitat is significant and meets the 'forest' definition, as it is common for farms to have a remnant stand of native trees ... This criteria should be linked to criteria 9, which considers 'indigenous vegetation that is a healthy, representative example'. **Further clarification in relation to the quality of an indigenous habitat should therefore be undertaken before it is classified as significant under criteria 4.**" (Emphasis added)*

- (e) In respect of the application of criteria 6 AECOM concludes in respect of SNA 1780:⁵

"... it is considered that the wetlands within the Study Area would not be considered 'representative' based on the information currently available and the guidance provided with the WRPS criteria (criteria 9)" and they recommend that further work be undertaken.

- (f) In respect of the application of criteria 9 WRC arrived at a conclusion of indeterminate. Criteria 9 is that the indigenous vegetation is a healthy representative example. AECOM's assessment is that while all forest within SNA 1780 is secondary, and has been and is subject to grazing, parts of the forest within SNA 1780 could be considered to be a representative example of secondary forest.

18. What I conclude from this exercise is that it is not possible to identify SNAs without proper ecological studies being carried out on the ground, and that the criteria being applied lacks sufficient definition. I would also note that AECOM recommended further field work making it clear that it is not an easy exercise to carry out a full assessment.
19. I understand that this is the same conclusion that the author of the Section 42A Report has come to as well, following the visit to some of the SNA mapped areas. On this basis the Section 42A Report author has recommended the deletion of all SNA mapped areas that have not been ground-truthed, including the SNA mapped areas over our coal mining licence, coal mining permit and exploration permit areas. We support this recommendation.
20. We also understand that, until the relevant plan changes are undertaken, any land use resource consent will require an ecological assessment to determine whether

⁵ Above, at 4.2.4, page 30.

there are any SNAs affected, and this is to be done with reference to the criteria in Appendix 2 of the Plan. The Appendix 2 criteria effectively replicates the criteria provided in the WRPS, which AECOM has identified technical issues with.

FUTURE RESOURCE CONSENT APPLICATIONS AND ASSESSMENT

21. BT wishes to have the opportunity to make resource consent applications in the future to expand its Rotowaro mine to meet the needs of its customers (New Zealand Steel, Genesis, Fonterra and Open Country Dairy).
22. As indicated in my previous evidence, we have identified those areas where we are likely to wish to expand into in the future and the presence of unchallengeable SNAs on the land will make the consenting hurdles higher than is warranted.
23. Any application for resource consent for mining will consider the ecological effects of the proposed mining in detail. The values that the SNAs are seeking to identify (if they exist on the site in question) will be examined thoroughly, and in the context of a particular application so that the effects on the values can be considered and any proposals for offsets or environmental compensation also addressed.
24. Mining is a transitory but necessary activity and we (along with other miners) have a long history of rehabilitation of mining sites, as well as providing offsets and environmental compensation. The comprehensive rehabilitation of sites, and the offsetting and environmental compensation proposed in some cases, often creates exceptional ecological outcomes – some of which are superior to the ecological environment prior to development.
25. In addition to resource consent conditions, the rehabilitation of mines is also required (and therefore secured) pursuant to the relevant coal mining licence or coal mining permits and is conducted at significant cost to Bathurst/BT. Likewise, once offered by an applicant and agreed to by the consenting body, an offset or environmental compensation matter will be secured by resource consent conditions of consent, and in some cases by covenant. Due to this, associated effects are often temporary in nature.
26. In the Waikato there are a number of former coal mines which have been transformed into community facilities e.g. Lake Puketirini as well as the ongoing and successful rehabilitation at our Rotowaro mine.

CONCLUSION

27. Bathurst and BT, as coal miners, have a functional need to locate their coal mining activities where there are suitable coal deposits. These Waikato coal deposits are

nationally significant and rare. Bathurst and BT seek recognition of the functional need to mine at these coal deposits.

28. Bathurst and BT support the removal of the proposed SNA mapping that has not been ground-truthed, particularly over the areas where BT has coal mining licences, coal mining permits and exploration permits.
29. In terms of effects of coal mining on the proposed SNAs, in many cases these effects will be temporary due to rehabilitation requirements secured through both the resource consenting process and the coal mining licences/permits. Offsetting and environmental compensation are also means of managing adverse effects and Bathurst and BT generally support the Plan's offsetting framework.
30. The key concern for Bathurst and BT is to ensure that its mining operations and development are not unduly restricted by the proposed SNA regime and to allow a thorough and robust assessment of effects through the resource consenting process.

Craig John Pilcher

29 October 2020

Annexure 1 - Notified SNA Mapping

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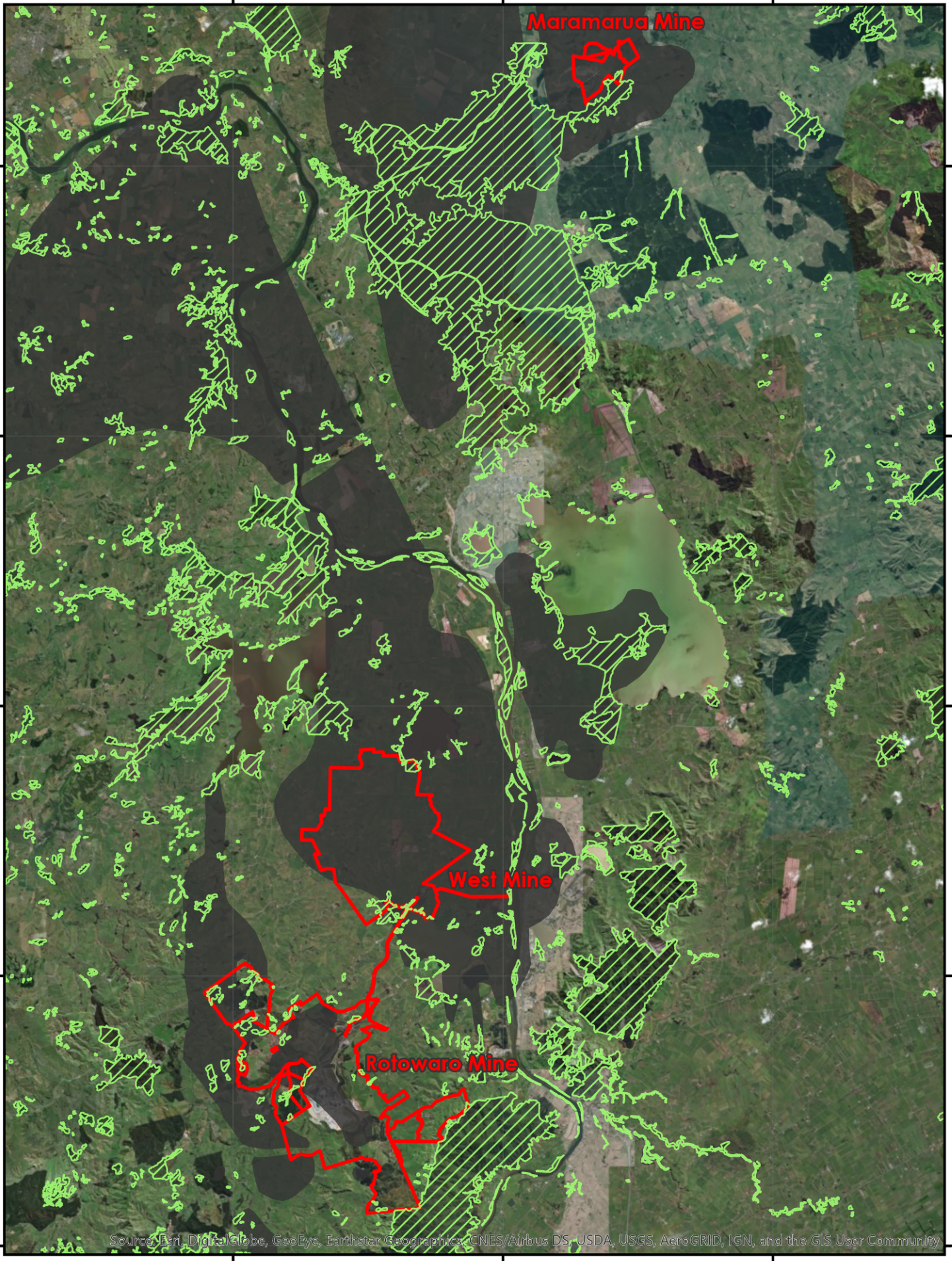
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NZGD 2000 Transverse Mercator

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Legend

-  Proposed Significant Natural Area (Notified 18 July)
-  Bathurst Mining Licence/Permit
-  Coalfield

Coalfield polygons sourced from Kirk, P. A., 1988. Waikato Coal Region: Coalfields and Resources, 1:250,000. New Zealand Geological Survey Miscellaneous Series Map 17. Wellington, New Zealand, Department of Scientific and Industrial Research.

Waikato District
Proposed Waikato District Plan
Significant Natural Area
 SCALE: 1:185,000 A4
 DATE: 26 November 2019
 DRAWN BY: CanardR
 DRAWING NUMBER: 01057-3



Annexure 2 - AECOM Report

BT Mining Limited
12-Nov-2019

AECOM Imagine it.
Delivered.

Significant Natural Area Survey

Mineral Exploration Permit (EP) 40698 Area



Significant Natural Area Survey

Mineral Exploration Permit (EP) 40698 Area

Client: BT Mining Limited

ABN: N/A

Prepared by

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12-Nov-2019

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Quality Information

Document Significant Natural Area Survey

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Date 12-Nov-2019

Prepared by Angela Chaffe and Kate Feickert

Reviewed by Lyndsey Smith

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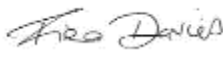
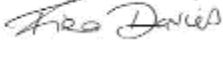
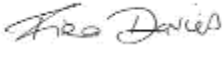
Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1	01 Oct-2019	Draft for internal review	Fiona Davies Associate Director - Environment	
2	04-Nov-2019	Response to client comments	Fiona Davies Associate Director - Environment	
3	12-Nov-2019	Response to client comments	Fiona Davies Associate Director - Environment	

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Executive Summary

AECOM New Zealand Limited (AECOM) has been engaged by BT Mining Limited to survey proposed Significant Natural Areas (SNAs) which are located within BT Mining's existing Mineral Exploration Permit (EP) 40698 area. The SNAs have been identified within the proposed Waikato District Plan. The purpose of the surveys was to assess the condition of the habitat within the SNAs and to determine whether their mapped boundaries incorporated habitat that met the significance criteria listed in Appendix 2 of the proposed Waikato District Plan (originally presented in the Waikato Regional Policy Statement (WRPS) ('WRPS criteria') (refer Appendix A).

The SNAs were identified by Kessels Ecology on the behalf of Waikato Regional Council (WRC) through a desk top review of the Councils Biodiversity Vegetation (BIOVEG 2007) spatial data layer, aerial photographs, threatened flora and fauna dataset, landowner consultation, targeted site visits and community meetings (Kessels Ecology, 2017). The manner in which the proposed SNAs were identified means that there is the potential for the value of an area of habitat to be over and under estimated. Kessels Ecology (2017) states '*The Council strongly advises that the data be used only in conjunction with subsequent additional field surveys, especially if the data will be used to help with decisions on resource consents, the development of district plan and regional plan policy*'.

The two SNAs within the Study Area are comprised of multiple units. SNA 1780 comprises five units (SNA 1 – 5) which are all located within the Study Area. SNA 1800 is comprised of multiple units but only part of one extends into the southern end of the Study Area (SNA 6).

The surveys completed by AECOM focused on the five units within SNA 1780. Access was not available to SNA 1800 at the time of the field survey. In each unit (SNA 1-5) unbounded reconnaissance (RECCE) plots measuring approximately 15 x 15 m were surveyed. The number of plots within each SNA unit varied in accordance with the size of the unit and habitat complexity. In addition, the surveying ecologists walked through each unit, where safe to do so, to gain an understanding of habitat change within each unit, to assess the self-sustainability of the habitats within each unit and the potential for the habitats to support indigenous fauna. Five minute bird counts were also completed.

WRC assessed all of the habitats (SNA 1-5) within SNA 1780 against the WRPS criteria using a desktop assessment approach, rather than assessing each of the units. The findings from the field surveys found habitat variability within and between each unit, as such, this approach was not considered appropriate. Therefore, the survey information collected for SNA 1 - 5 was assessed individually against the WRPS criteria. However, if it was considered that the ecological function of two or more units were linked this was taken into consideration in the assessment of the significance of each SNA unit.

An initial review of habitats within each SNA units was completed to assess if areas could be eliminated as unlikely to be of SNA quality (e.g. criteria 6 and 9). This was found to be particularly relevant in relation to SNA 4 and 5, where there are large areas habitat that are a mix of exotic and native regenerating scrub / forest. The SNA review consequently focused on those habitat types / areas that had potential to meet the WRPS criteria.

The review determined that the mature forest habitat in SNA 1, SNA 3, SNA 4 and SNA 5 does meet criteria 9 within the WRPS criteria, albeit that the area of forest of sufficient quality within SNA 3, 4 and 5 is small. The habitat appraisal also identified that there are habitats within each unit that could support 'threatened' or 'at risk' species. If this were shown to be the case, then these units could meet other significance criteria.

At present SNA 2 does not meet any of the WRPS criteria but has the potential to meet criteria 3 (threatened species) and 8 (aquatic importance) based on the findings from the habitat appraisal that has been completed. Further surveys have been recommended for all SNAs as we do not consider that the desktop review accurately assesses the relevant areas.

1.0 Introduction

AECOM New Zealand Limited (AECOM) has been engaged by BT Mining Limited to survey Significant Natural Areas (SNAs) which are located within BT Mining's existing Mineral Exploration Permit (EP) 40698 area. The SNAs have been identified within the proposed Waikato District Plan. The purpose of the surveys was to assess the condition of the habitat within the SNAs and to determine whether their mapped boundaries incorporated habitat that met the significance criteria listed in Appendix 2 of the proposed Waikato District Plan (originally presented in the Waikato Regional Policy Statement (WRPS) ('WRPS criteria') (refer Appendix A).

1.1 Project location

The EP 40698 area (referred to as the 'Study Area' henceforth) is presented in Figure 1. The Study Area is approximately 10.5 km southwest of Huntly and 4.5km northwest of the existing Rotowaro Mine (refer Figure 1). It is bordered by McDonald Mine Road (south) and Renown Road (east) and covers approximately 365 ha of grazed farmland, plantation forest and indigenous vegetation.

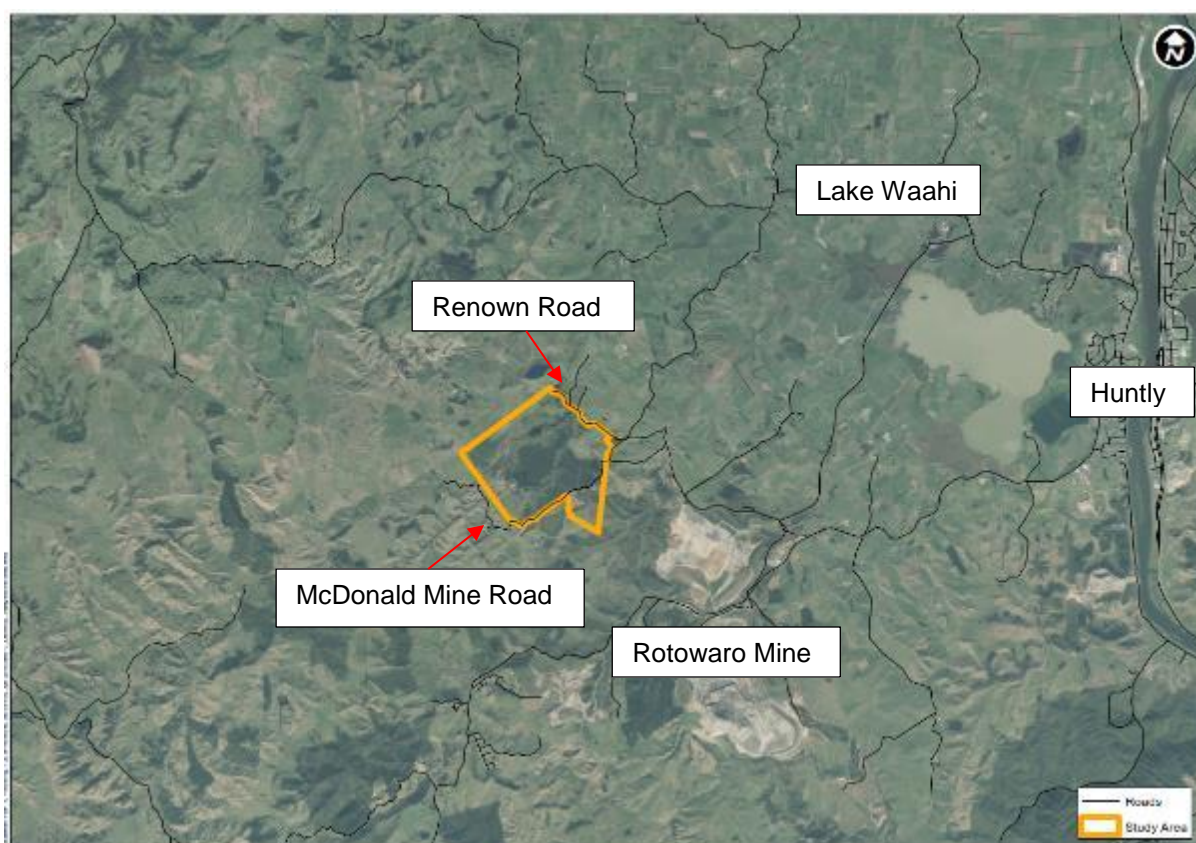


Figure 1 Location of the Study Area in relation to Huntly and Rotowaro Mine.

1.2 Background

BT Mining operates the existing Rotowaro mine (Figure 1), which is located approximately 4.5 km to the south east of the Study Area. The Rotowaro mine commenced in 1915 as an underground mine; later converting to an opencast operation in 1958. The Rotowaro mine produces approximately 650,000 tonnes of coal per annum for a range of domestic customers; however, the current life of the Rotowaro Mine is limited to around four years.

Under the operative Waikato District Plan, the Study Area is zoned for rural land uses, with the area scheduled as a 'Coal Mine Policy Area' (CMPA). The CMPA identifies the presence of potential coal resources in the district and serves to constrain development in the area; however, there are no

specific rules associated with CMPAs. In addition, under the operative Plan there are no natural features of significance identified in the Study Area.

The operative Waikato District Plan is currently under review and the proposed Waikato District Plan (Stage 1) was notified in July 2018. Under new objective and policy direction, the identified CMPAs have been revised. Notably, the operative CMPAs are proposed to be identified as 'Coal Mining Areas' (CMA) under the proposed Plan. Compared to the operative CMPAs, the proposed CMAs are reduced in size and no longer include the Study Area.

Under the proposed Waikato District Plan, two SNAs are identified within the Study Area, which are subject to more stringent controls on how the land is used or developed under the proposed Plan. For the purposes of this assessment the SNAs have been labelled as units. Five units (SNA 1 – 5) are located in SNA 1780, while one unit (SNA 6) is located within SNA 1800 (Figure 2, Figure 4 and Appendix B)

The SNAs were identified by Kessels Ecology on the behalf of Waikato Regional Council (WRC) through a desk top review of the Councils Biodiversity Vegetation (BIOVEG 2007) spatial data layer, aerial photographs, threatened flora and fauna dataset, landowner consultation, targeted site visits and community meetings (Kessels Ecology, 2017). The manner in which the proposed SNAs were identified means that there is the potential for the value of an area of habitat to be over and/or under estimated. Kessels Ecology (2017) states '*The Council strongly advises that the data be used only in conjunction with subsequent additional field surveys, especially if the data will be used to help with decisions on resource consents, the development of district plan and regional plan policy*'.



Figure 2 Location of SNA units within the Study Area.

1.3 Scope and purpose

The purpose of the SNA surveys was to assess the quality of habitat within the SNAs to determine whether it meets the WRPS criteria (refer Appendix A).

The scope of this assessment includes:

- A desktop review which includes a review of historical aerial imagery to understand past disturbance within the Study Area (Section 3.1 and 3.2);

- A description of the ecological values of each SNA based on vegetation surveys, bird surveys and any incidental fauna sightings (Section 3.0);
- An assessment of the value of the habitats in the SNAs to support indigenous species (Section 3.0);
- Maps of the dominant vegetation types within the SNAs (Appendix C).
- A review of the vegetation and habitat values identified within each SNA against the '*Criteria for Determining Significance of Indigenous biodiversity*' as described in Chapter 11A of the Waikato Regional Policy Statement (refer Appendix A and Section 4.0);
- Recommends additional surveys which may be required to strengthen the conclusions reached during this assessment (Section Appendix H).

2.0 Methodology

2.1 Desktop review

To gain an understanding of the local¹ indigenous flora and fauna potentially present in the Study Area, the following information sources were reviewed:

- Department of Conservation (DOC) Bioweb records²;
- iNaturalist website³;
- NIWA freshwater fish database (Crow 2017);
- Significant Natural Areas of the Waikato District: terrestrial and wetland ecosystems (Kessels Ecology, 2017);
- Waikato Regional Council online GIS maps;
- Waikato District Council online GIS maps; and
- Google Earth Pro.

2.2 Historical land use change

Aerial photographs from 1941, 1979 and 1997, which were obtained electronically from the Retrolens Historical Image Resource (LGGA and LINZ 2015), were reviewed to gain an understanding as to how land use has changed within the Study Area and how this has affected vegetation cover.

2.3 Field surveys

2.3.1 Scoping survey

A scoping exercise was undertaken by AECOM ecologists on the 26 July 2019 which included a walkover of the Study Area. A brief inspection of the habitat within the SNAs located within the Study Area was completed to identify safe access routes for surveyors and understand the conditions within the SNA units.

The information gathered was used to inform the approach used during the SNA surveys (refer to Section 2.3.2) and understand any potential constraints.

2.3.2 Significant Natural Area (SNA) surveys

The survey was undertaken by AECOM ecologists between 29 August and 4 September 2019. This included a walkover of each of the SNA units and the completion of Reconnaissance (RECCE) vegetation plots. Five - minute bird counts were also undertaken.

2.3.2.1 Reconnaissance (RECCE) vegetation plots

The composition and structure of vegetation communities present in each SNA unit was sampled using unbounded reconnaissance (RECCE) plots measuring approximately 15 x 15 m (Figure 3 and Appendix B). The RECCE plot methodology is a standardised technique used in New Zealand for the inventory of vegetation communities (Hurst and Allen 2007).

Unbounded RECCE plots are best suited for providing initial species inventories and assesses the cover-abundance of all vascular plant species present within each plot. The methodology delineates the vegetation structure into six height tiers (1: > 25 m; 2: 12–25 m; 3: 5–12 m; 4: 2–5 m; 5: 0.3–2 m; and 6: < 0.1 m) and includes provisions for recording epiphytes and vines. Cover-abundance per tier is estimated according to the following cover classes: 1 (< 1%), 2 (1–5%), 3 (6–25%), 4 (26–50%), 5 (51–75%), 6 (76–100%).

¹ 'Local' was defined as a 15 km radius expanding out from the Study Area.

² <https://www.doc.govt.nz/our-work/monitoring-reporting/request-monitoring-data/>

³ <https://www.inaturalist.org/>

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The locations for each plot were selected to capture the differences in the dominant vegetation types encountered during SNA unit walkthroughs and were orientated so that the suite of species identified were largely represented. The number of plots completed in each SNA unit was determined by the overall size of the unit and the vegetation types present. The surveying ecologists also mapped the extent of indigenous vegetation on the ground to compare to the SNA boundaries mapped by WRC.

Due to high water volumes in the catchment and potential safety risks associated with wetland areas (parts of SNA 2, SNA 4 and SNA 5), these areas were not surveyed in detail. The extent of wetland vegetation was estimated from a safe vantage point.

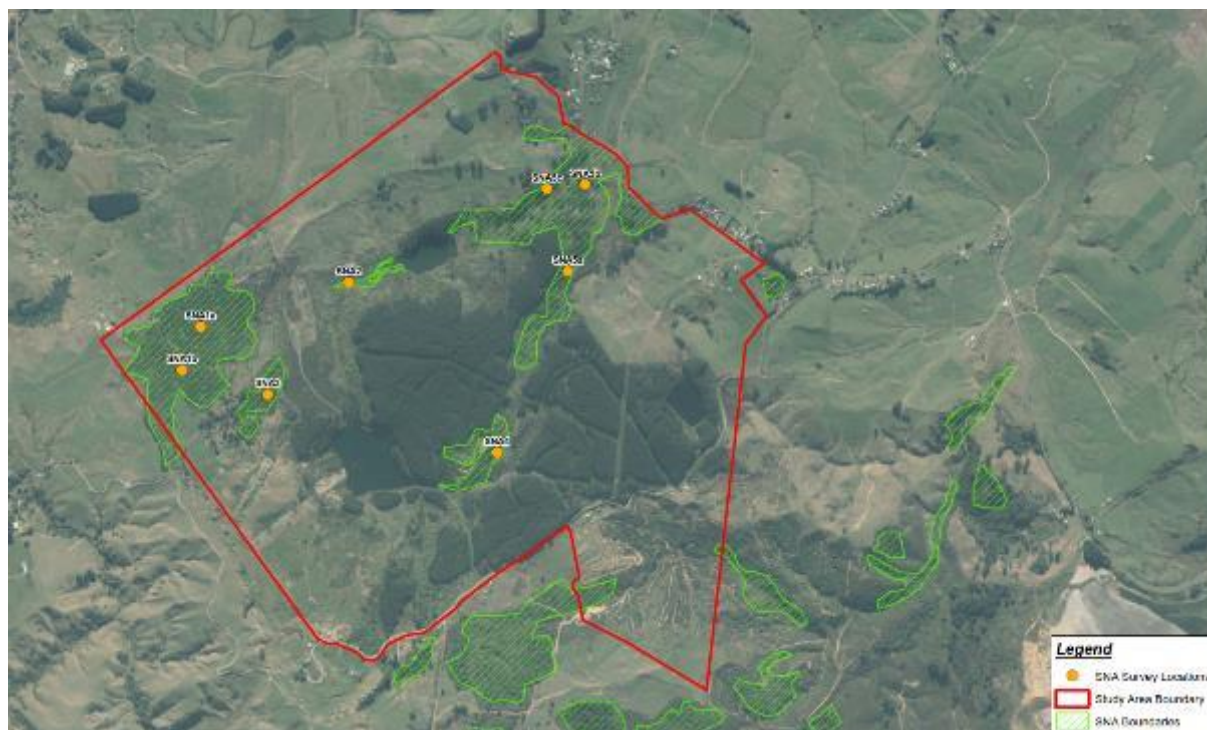


Figure 3 Location of RECCE plots in each SNA.

2.3.2.2 Five-minute bird counts

Bird surveys were undertaken in each RECCE plot using the standardised five-minute bird count (5MBC) method employed by the DOC for monitoring of forest bird species (Hartley and Greene 2012).

Using the protocols developed by Dawson and Bull (1975), a single observer recorded each species identified and the number of individual birds seen and heard during a five-minute sample period. The 5MBCs were completed prior to vegetation sampling to ensure that the presence of surveyors did not influence the abundance and diversity of birds.

2.3.2.3 Habitat observations

Habitat features within each SNA unit were assessed as to their potential to support indigenous bat, herpetofauna and fish species identified during the desktop review (Section 3.1) and also considered disturbance from mammalian pests.

3.0 Results

3.1 Desktop review

3.1.1 Habitats

The proposed Waikato District Plan identifies two SNAs comprised of six units, of local significance, within the Study Area⁴ (Figure 4).

Five units (SNA 1 – 5) are located in SNA 1780, while one unit (SNA 6) is located within SNA 1800. SNA 1800 includes additional units located to the south-east of the Study Area. The location and numbering of the SNAs by WRC are illustrated in Figure 4.

The identification of these sites was completed by Kessels Ecology (2017) on behalf of WRC in accordance with the significance criteria detailed in the Waikato Regional Policy Statement (WRPS). If a site met one or more of the SNA criteria it was considered to be significant and it was subsequently allocated a significance ranking of either 'international, national, regional or local'. The Kessels Ecology (2017) report indicates that this classification was completed in accordance with the Guidelines to apply Regional Criteria and Determine Level of Significance (Environment Waikato and Wildlands, 2002).

The two SNAs (made up of six units – refer Figure 4) located within the Study Area were determined to be of 'local' significance. Local is defined in the Guidelines to apply Regional Criteria and Determine Level of Significance (Environment Waikato, 2002) as;

Locally significant natural areas are healthy examples of relatively common vegetation and habitat types. They are often small areas, but large enough to enable key ecological processes to occur, such as regeneration of seedlings or reproduction of indigenous fauna. These sites may not be particularly significant in their own right, but nevertheless play an important part in a network of natural areas. For example, a locally significant site might be important as a seasonal feeding or breeding area. It might also act as a stepping stone between other natural areas, allowing indigenous fauna to move in search of food or mates. Such sites are likely to provide representative examples of common or typical vegetation types or habitat for common indigenous species. They will not be among the best examples in the Region but will meet Criterion 9 as healthy, functioning, and ecologically viable sites.

The majority of the SNAs identified by Kessels Ecology (2017) were determined from a desk-based review of aerial photos, through consultation and ecological records. It was therefore important as part of this assessment that vegetation/habitat surveys were undertaken to help inform whether the SNAs meet the criteria within the WRPS and subsequently justify their listing as an SNA within the proposed District Plan.

⁴ <https://data.waikatodistrict.govt.nz/layer/95695-significant-natural-area-legal-effect/>
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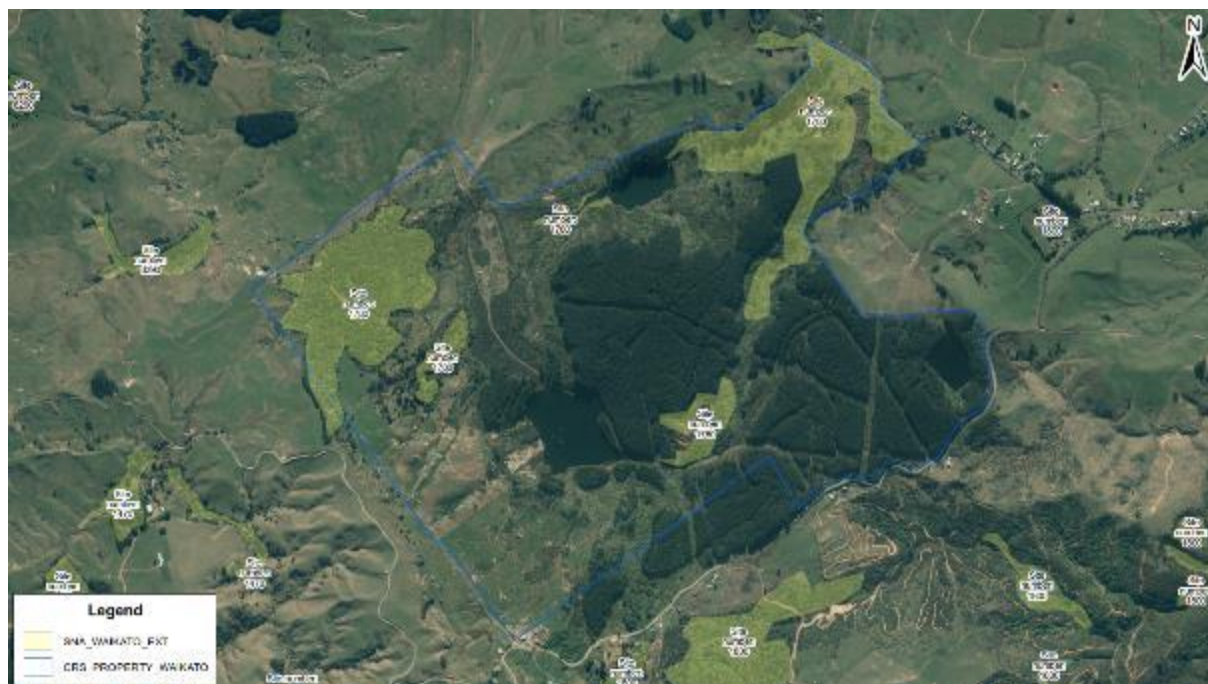


Figure 4 Location and numbering of SNAs by WRC (image provided by WRC).

SNA 1780 is referred to as McKinnon Bush by WRC, and is described as;

'Some small patches of secondary native forest between MacDonald's Mine Road and Renown Road. Areas of tree fern and nikau canopy (Sites of Special Wildlife Interest (SSWI)⁵). Also includes some areas of wetland, parts of which have a willow canopy; Threatened fish species present'.

Table 1 presents a summary of the assessment completed by WRC (Kessels Ecology, 2017) of the five units in SNA 1780 against the WRPS SNA criteria.

Table 1 WRC assessment of the habitat in SNA 1780 against the WRPS SNA criteria.

WRPS SNA criteria	Assessment by WRC (Kessels Ecology, 2017)
Criteria 1 - Protected areas	No
Criteria 2 – Coastal marine area	No
Criteria 3 – Threatened species	Yes
Criteria 4 – Under represented habitats (<20%)	Likely
Criteria 5 – Naturally uncommon vegetation or habitat	No
Criteria 6 – Wetland – indigenous flora and fauna	Yes
Criteria 7 – Large example of a habitat type	No
Criteria 8 – Aquatic habitat critical to the self sustainability of a species	No
Criteria 9 – Indigenous vegetation that is a healthy, representative example	Indeterminate
Criteria 10 – Part of an ecological sequence that's not common	No
Criteria 11 – Buffer, link or corridor for another SNA	No

⁵ Definition provided within The Guidelines to apply Regional Criteria and Determine Level of Significance (Environment Waikato and Wildlands (2002)). Sites of Special Wildlife Interest (SSWI) – Site assessment of wetlands and other habitats throughout New Zealand. This information was gathered by one of DOCs parent organisations, the New Zealand Wildlife Service. It was an attempt to nationally rank all wildlife habitats including wetlands.

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WRC presents the following justification for the classification of the habitats in SNA 1780 as significant;

'(Criteria 3) Declining fauna species have been recorded in the wetland part of this site. (Criteria 6) This site includes indigenous wetland habitats which are likely to be under-represented. (Criteria 9) Unsure of structure and composition and ecological processes.'

SNA 1800, is referred to as Rotowaro Valley Bush by WRC, and is described as;

Several patches of native scrub around Rotowaro. Mainly trees ferns and short scrub with some taller trees; Threatened fauna reported.

Table 2 presents a summary of the assessment completed by WRC (Kessels Ecology, 2017) of the SNA 1800 against the WRPS SNA criteria. A single unit of this SNA extends into the Study Area.

Table 2 WRC assessment of the habitat in SNA 1800 against the WRPS SNA criteria.

WRPS SNA criteria	Assessment by WRC (Kessels Ecology, 2017)
Criteria 1 - Protected areas	No
Criteria 2 – Coastal marine area	No
Criteria 3 – Threatened species	Yes
Criteria 4 – Under represented habitats (<20%)	No
Criteria 5 – Naturally uncommon vegetation or habitat	No
Criteria 6 – Wetland – indigenous flora and fauna	No
Criteria 7 – Large example of a habitat type	No
Criteria 8 – Aquatic habitat critical to the self sustainability of a species	Indeterminate
Criteria 9 – Indigenous vegetation that is a healthy, representative example	No
Criteria 10 – Part of an ecological sequence that's not common	No
Criteria 11 – Buffer, link or corridor for another SNA	No

WRC presents the following justification for the classification of the habitats in SNA 1800 as significant;

'(Criteria 3) habitat for long fin eel (Criteria 8) Unsure of health of stream and representativeness.

3.1.2 Fauna

There are records of indigenous fish within the Study Area and immediately downstream of the Study Area (refer to Table 3 and Figure 5).

There are no other records of indigenous flora and fauna within 10 km of the Study Area. This does not mean that indigenous flora and fauna do not have the potential to be present, it is more an indicator that surveys have not been undertaken or reported within 10 km of the Study Area.

Table 3 Threatened or at risk indigenous fish identified in and adjacent to the Study Area and approx. 1km downstream.

Common name	Latin name	Threat status	Habitat
Fish			
Giant kokopu	<i>Galaxias argenteus</i>	At risk - Declining	Slow flowing lowland pools and streams. Does not penetrate far inland. Recorded in a stream within SNA 5 (1993).

Common name	Latin name	Threat status	Habitat
Inanga	<i>Galaxias maculatus</i>	At risk - Declining	Open rivers, streams, lakes and swamps near the coast. Only present inland where the gradient is low. Recorded 1km downstream of SNA 5 (2015)
Longfin eel	<i>Anguilla dieffenbachii</i>	At risk - Declining	Rivers, streams, lakes ponds and wetlands, including those far inland. Recorded in a stream within SNA 5 (1993) and downstream of SNA 5 (2015).

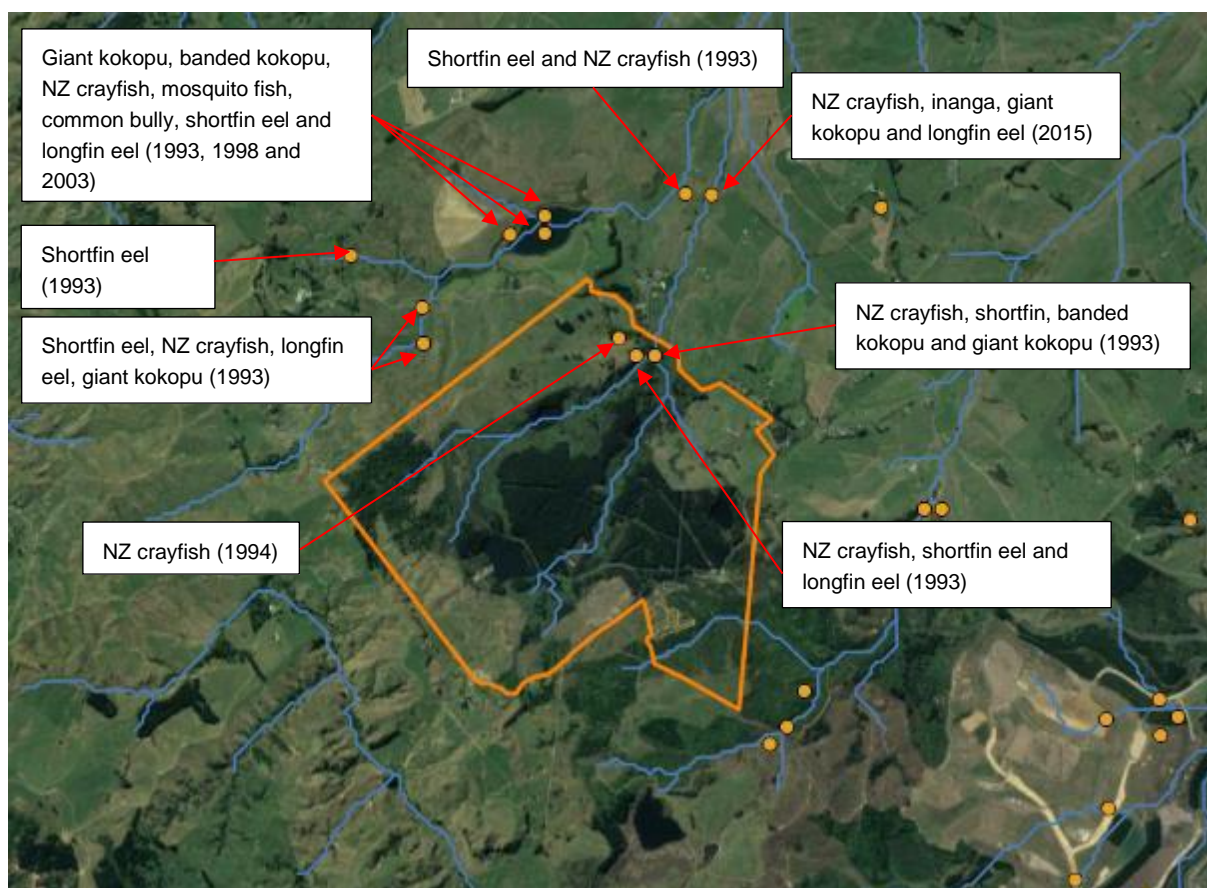


Figure 5 Location of indigenous and exotic fish within Study Area and 1km downstream (NIWA Fish database).

The review of records identified seven indigenous species listed as ‘threatened’ or ‘at risk’ within 10 - 15 km of the Study Area. These are summarised in Table 4 and could be present within the Study Area if the habitat was suitable.

Table 4 Indigenous fauna of conservation concern recorded within 10-15 km of the Study Area.

Common name	Latin name	Threat status	Habitat
Bats			
Long-tailed bat	<i>Chalinolobus tuberculatus</i>	Nationally critical	Long-tailed bats are known to inhabit forest edges, and feed in areas above the forest canopy, along forest margins and around streams and lakes. They are known to roost in both exotic and indigenous trees, where there are cavities such as rot holes, broken limbs and beneath flaking bark. Home ranges are large. The population in Hamilton was

Common name	Latin name	Threat status	Habitat
			estimated to have a home range of 704ha based on radio tracking in 2018-19 (Davidson-watts Ecology, 2019).
Birds			
New Zealand pied shag	<i>Phalacrocorax varius</i>	At risk - Recovering	Mostly present in coastal marine waters, but are occasionally present in freshwater lakes and ponds close to the coast.
New Zealand pipit	<i>Anthus novaeseelandiae</i>	At risk - Declining	Widespread in rough open habitats (farmland and open scrubland).
New Zealand falcon	<i>Falco novaeseelandiae</i>	At risk - Recovering	May breed in intensively farmed areas where suitable bush remnants remain.
Lizards			
Auckland green gecko	<i>Naultinus elegans</i>	At risk - Declining	Occurs in gumland, scrubland and forested habitats.
Forest gecko ⁶	<i>Mokopirirakau granulatus</i>	At risk - Declining	Older forest. May persist in remnant stands, scrub. Broadleaf and mixed forest and scrub, especially small leaved species with dense growth.
Fish			
Giant kokopu	<i>Galaxias argenteus</i>	At risk - Declining	Slow flowing lowland pools and streams. Does not penetrate far inland.
Inanga	<i>Galaxias maculatus</i>	At risk - Declining	Open rivers, streams, lakes and swamps near the coast. Only present inland where the gradient is low.
Longfin eel	<i>Anguilla dieffenbachii</i>	At risk - Declining	Rivers, streams, lakes ponds and wetlands, including those far inland.

3.2 Historical aerial photography

Historical aerial photographs from 1941, 1979 and 1997 illustrate that the Study Area has been subjected to a high level of disturbance.

The first available aerial is from 1941 (Figure 6 & Appendix D). This indicates that much of the natural vegetation has been cleared from the Study Area; potentially as a result of logging or burning. In 1941 the Study Area consisted of cleared farmland, with several stream gullies, which appear to be vegetated. Vegetation can be seen within the boundary of SNA 1 and SNA 3 and some remnant vegetation can be seen in parts of SNA 5. The imagery for SNA 2 appears to be a vegetated stream gully surrounded by grazed pasture.

⁶ Kessels Ecology (2017) states that forest gecko were recorded during the construction of the Huntly Section of the Waikato Expressway.

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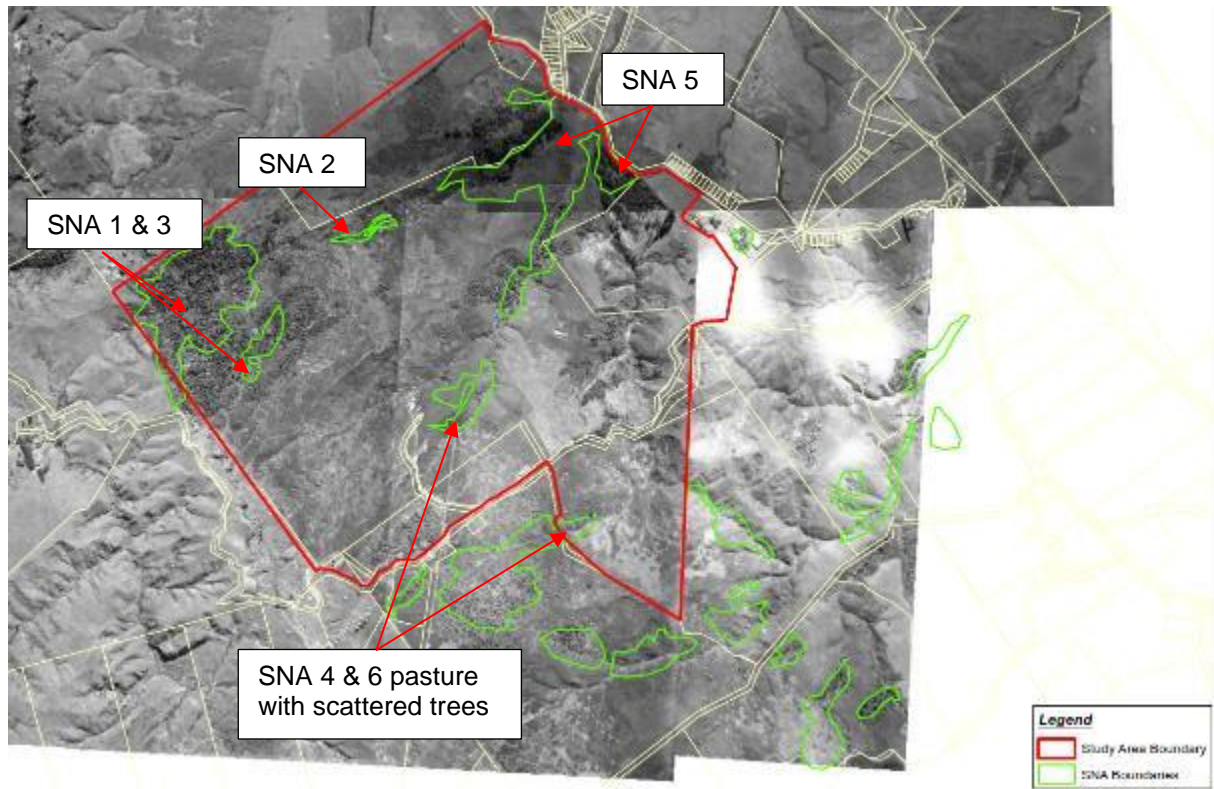


Figure 6 Aerial of Study Area from 1941, overlaid with SNA unit boundaries.

Aerials from 1979 (Figure 7 & Appendix D) indicate that much of the southern portion of the Study Area was bare ground potentially as a result of mining activities. Gully vegetation associated with SNA 5 has been removed in some areas and there has been infilling of gullies. There has also been a reduction in woody vegetation cover around SNAs 1 and 3. SNA 4 appears to be vegetated in part in 1979. The western half has been cleared. There is no standing water in or adjacent to SNA 2. SNA 2 is vegetated, but it appears to be grassland.

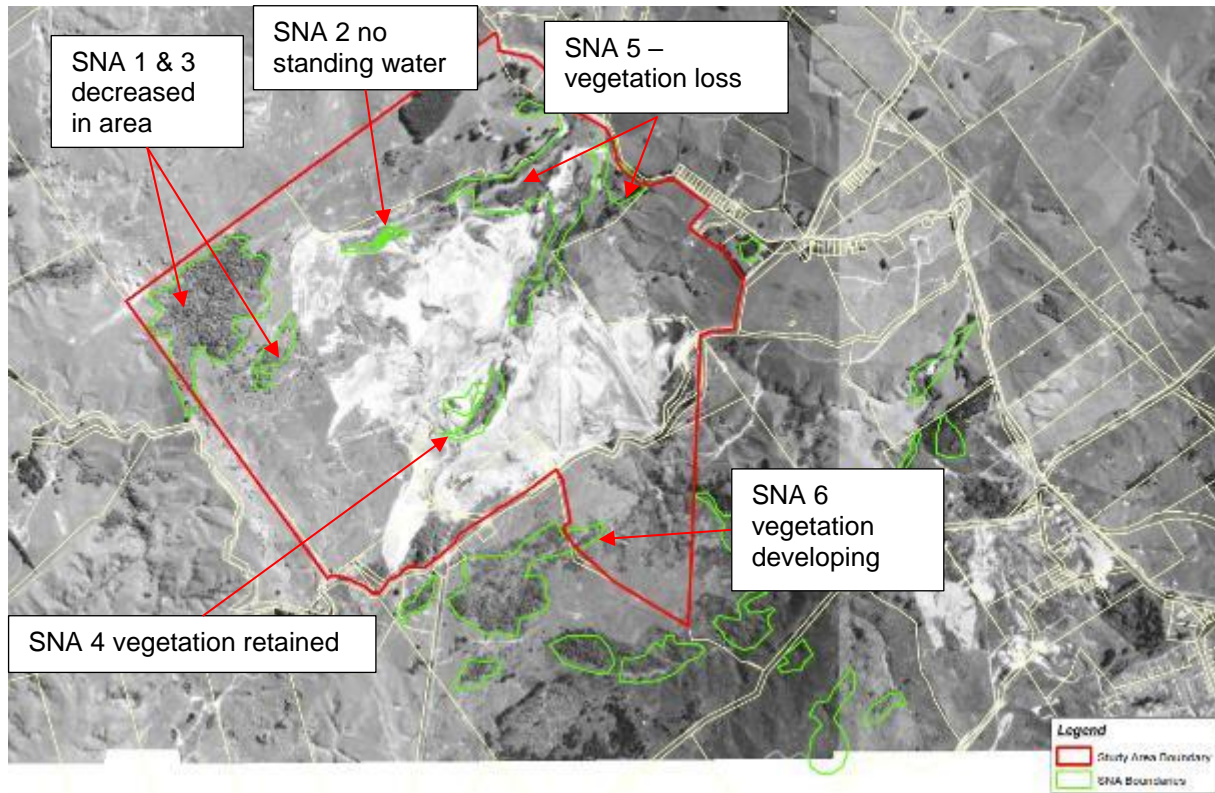


Figure 7 Aerial of Study Area from 1979, overlaid with SNA boundaries.

Aerials for 1997 (Figure 8 & Appendix D) show the site following decommissioning of the mine. Comparison with 1941 aerials suggest that mine operations have infilled a gully running through the middle of the Study Area, redirecting overland flow to abandoned excavation pits which have formed lakes. Two lakes have formed, one of which is adjacent to SNA 2. Most wooded vegetation has been removed from the Study Area, except for small areas of gully vegetation in SNA 5 and vegetation in SNA 1 and SNA 3. Forestry operations appear to have commenced in the Study Area at this time. These stands were felled in 2019.

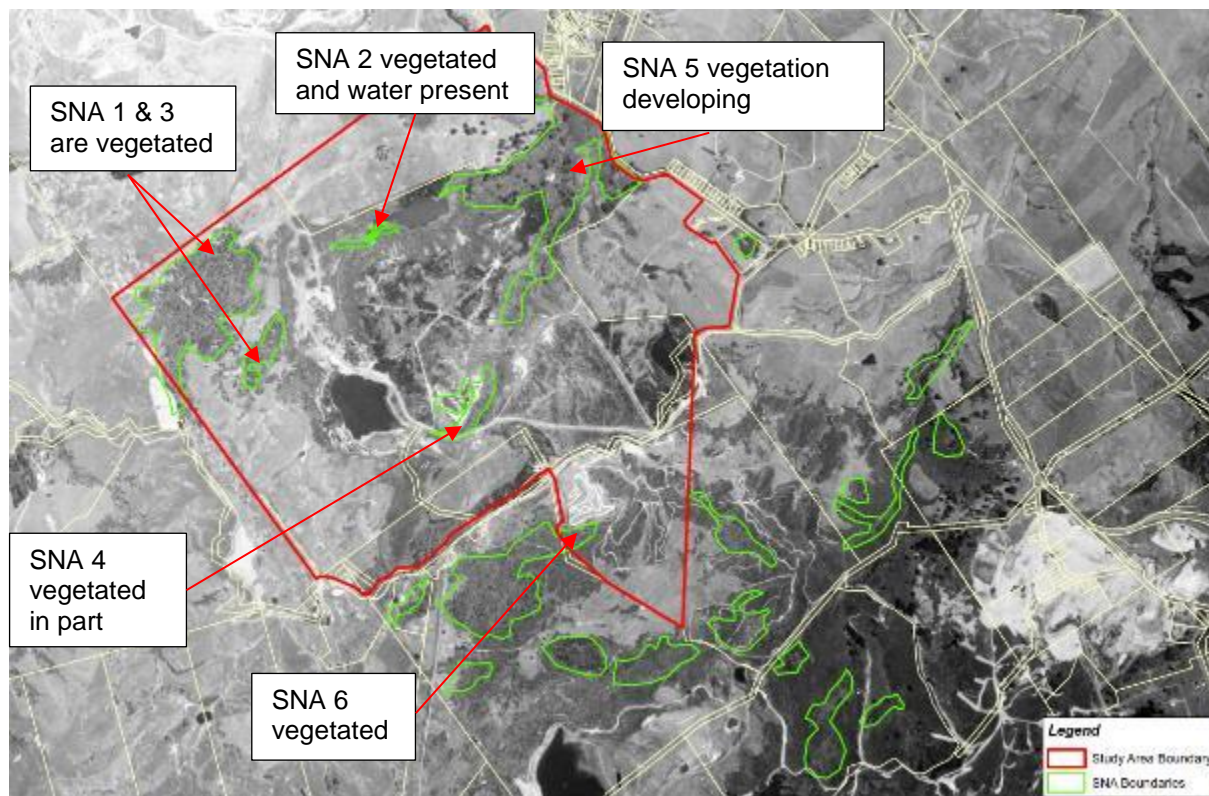


Figure 8 Aerial of Study Area from 1997, overlaid with SNA boundaries.

3.3 Field surveys

3.3.1 Scoping survey

A site walkover was undertaken at five of the six units identified to be of SNA quality in the Study Area (refer to Section 3.1). The main vegetation and topographic features were noted (Table 5 and Figure 2). Each unit was allocated an identification (ID) number for ease of reporting.

Permission to access SNA 6 was not granted for the survey, and therefore is not discussed further in this report.

Table 5 Identification (ID) numbers allocated to each SNA unit present within the Study Area.

SNA ID	WRC Site Number	Area (ha)	Accessed	Main features	Additional notes
1	1780	16.7	Yes	Largely ridge and face vegetation.	One permanent stream noted along the eastern perimeter. Pig rooting and a goat were observed.
2		0.6	No	Wetland surrounded by gully vegetation.	Viewed from a hillside vantage point between SNAs 1 and 3. The presence of water, dense vegetation and steep unstable slopes prevented surveyors from accessing the SNA.
3		2.0	Yes	Ridge and gully vegetation.	Steep gully on western face. Goats encountered during walkthrough.
4		3.0	Yes	Steep gully system surrounded by regenerating vegetation.	A shallow stream runs through the centre of the gully. Pig rooting in disturbed ridge areas.

SNA ID	WRC Site Number	Area (ha)	Accessed	Main features	Additional notes
5		19.0	Yes	Steep gully vegetation surrounding a wetland area.	Two streams run through the gullies located in the south and west. Pig rooting observed.
6	1800	0.9	No	N/A.	SNA on private land and could not be accessed for inspection.

3.3.2 SNA surveys

RECCE and 5MBC surveys were completed at eight survey locations within SNA 1 to 5. This included one in the smaller SNA units (2 to 4) and multiple plots in the larger ones, with two plots in SNA 1 and three in SNA 5.

Direct access to SNA 2 was not possible due to dense vegetation, concealed steep drop offs and wetland within the SNA. An assessment of the vegetation composition was completed based on observations made from a vantage point on the southern gully slope.

The location of each RECCE plot has been illustrated on Figure 3 and in Appendix E. Section 4.0 discusses whether each SNA meets the WRPS criteria. This discussion draws on the information presented in Section 3.3.2.1.

3.3.2.1 SNA descriptions

The following sections provide a description of the habitat within each of the SNA units (1 to 5) based on the results of RECCE plot and 5MBC surveys and general observations of habitat availability and quality. A full species list and RECCE results are provided in Appendix E. Results from the 5MBCs are provided in Appendix F.

3.3.2.1.1 SNA 1



Figure 9 SNA 1 and 3 and the RECCE plots within each SNA.

Indigenous flora

SNA 1 (16.6 ha Figure 9) is the second largest SNA unit and is dominated by mature tawa-podocarp-broadleaf forest, with four main vegetation types identified (refer to Figure C1 in Appendix C);

- Tawa-kahikatea-tree fern;
- Tawa-kahikatea-broadleaf;
- Kahikatea-nikau; and
- Rimu-miro-kahikatea.

SNA 1 is vegetated in the aerial photos from 1941 and remains vegetated throughout the sequence of historical aerial photos (1979 and 1997 (Section 3.2)). This lack of disturbance has allowed trees to reach maturity and structural diversity to develop within the forest. Approximately a third of the SNA is being impacted by grazing, but even in these areas the regeneration of indigenous botanical species was observed.

Two RECCE plots were surveyed in SNA 1 to capture the variation in the vegetation communities in the SNA unit. This included a plot on the north eastern portion of the SNA (plot SNA1a) where there is limited grazing and one in the southern portion (plot SNA1b), which is the subject of grazing and foliar browsing by possums.

Forty-five vascular plant species were recorded in SNA 1 survey plots; 37 were recorded at plot SNA 1a and 27 in plot SNA 1b (refer to Tables E3 and E4 in Appendix E and Figure C1 in Appendix C). This difference in botanical diversity reflects the effect that grazing is having in SNA 1b.

The species recorded were largely comprised of common (not threatened) indigenous species. Carmine rata (*Metrosideros carminea*) and akatea (*Metrosideros perforata*) were frequent throughout the SNA. These are myrtle species which have recently been classified as 'threatened – nationally

vulnerable' in response to the spread of myrtle rust (*Austropuccinia psidii*), which is anticipated to have a significant impact on the range of myrtle species. Two common orchid species, the greenhood (*Pterostylis* sp.) and spider orchids (*Corybas trilobus*) were recorded in the plots and an additional species, peka-a-waka/bamboo orchid (*Earina mucronata*), was also observed in other parts of the SNA unit.

The north eastern portion, in which plot SNA1a was surveyed, is comprised mainly of a tawa (*Beilschmiedia tawa*) and kahikatea (*Dacrycarpus dacrydioides*) canopy (<25m), with a tree fern (*Cyathea* and *Dicksonia* sp.) and nikau (*Rhopalostylis sapida*) understorey with some broadleaf regeneration. Although impacted by pig (*Sus scrofa*) rooting and understorey browsing, it is partially fenced from stock access and provides an example of intact indigenous vegetation which comprises approximately two thirds of SNA 1.

The south western portion of the SNA unit was comprised of distinct groups of tawa, podocarp and broadleaf vegetation; however, the understorey has been grazed by cattle and understorey recruitment is impaired. SNA1b was located in a stand of rimu (*Dacrydium cupressinum*) and miro (*Pectinopitys ferruginea*) canopy (>25m), with a tree fern subcanopy. This location was considered representative of the areas of the SNA impacted by grazing. A few established (12 to 25m+) broadleaf species; horoeka (*Pseudopanax crassifolius*) and rewarewa (*Knightia excelsa*), reflected the composition of vegetation on the western ridge line. Understorey growth was restricted to early succession broadleaf species and ferns which has not yet succumbed to grazing.

Indigenous fauna

Nine bird species were recorded during the 5MBCs. Common indigenous species made up 56% (n=5) of the sampled community. Piwakawaka / fantail (*Rhipidura fuliginosa*) and riroriro / grey warbler (*Gerygone igata*) were the most commonly observed. A kereru (*Hemiphaga novaeseelandiae*) was also recorded at plot SNA1a. It is considered that the forest in SNA 1 provides valuable food resource for non-threatened indigenous forest bird species. There is a low potential that New Zealand bush falcon (listed as 'at risk - recovering') could nest on epiphytes within the forest trees.

There are trees within the SNA unit which have reached an age where features (loose bark, rot holes and cracks) have developed that would have moderate to high potential for long-tailed bat (*Chalinolobus tuberculatus*) to roost. In addition, it was identified that the habitat within the SNA would provide bats with suitable foraging areas. Long-tailed bats have been recorded 10 km south east of the Study Area.

The tawa-podocarp-broadleaf forest was considered suitable habitat for Auckland green gecko, which is 'at risk – declining', and has been recorded within 15 km of the Study Area. There is the potential that forest gecko (*Mokopirirakau granulatus*) ('at risk – declining) could also be present based on the habitat present within the Study Area.

Four streams were observed within the SNA unit boundary. These were soft-bottomed and were observed on the day of the survey to have a low to moderate flow. If flow persists through summer, the streams may provide habitat for indigenous fish species such as longfin eel and giant kokopu, which are 'at risk-declining' and have been recorded in the wider catchment (Figure 5).

3.3.2.1.2 SNA 2



Figure 10 SNA 2 and the RECCE plot within SNA.

Indigenous flora

SNA 2 (0.64 ha Figure 10) is the smallest SNA unit and includes a raupo wetland located at the western end of a small lake. It appears that the lake and wetland have formed after 1979 when mining activity in the Study Area ended (Refer to Figure 7 and Figure 8).

The SNA could not be surveyed in detail due to the density of vegetation to the west and south (dense pampus and gorse), the steepness and instability of the ground (large landslips visible) to the north and the presence of water to the east; which all prevented the surveyors gaining access. However, the general composition was noted from a vantage point.

Approximately 0.36 ha of the SNA was comprised of raupo (*Typha orientalis*) wetland. The northern end of the SNA was dominated by pampas (*Cortaderia selloana*) on its drier south western end (0.03 ha) (refer Table E5 in Appendix E and Figure C2 in Appendix C). The drier margins of the SNA to the north and south were comprised of low diversity regenerating broadleaf forest (0.20 ha) which was approximately 5 m tall (10-20 years old) and has been invaded by gorse (*Ulex europeaus*) and pampas (10% of habitat). Parts of the SNA unit boundary extends over areas of open water (0.05 ha).

Indigenous fauna

Nine of the fourteen bird species recorded during the 5MBC were introduced species which favour open farmland. This reflects the absence of forest vegetation of an age that would be providing food resource to the indigenous bird species that were recorded to be present within other SNA units in the Study Area.

Indigenous aquatic and wetland bird species were not heard during the SNA survey; however, the combination of raupo wetland and open water could provide habitat for at risk species including spotless crane (*Porzana tabuensis*) ('at risk – declining'), dabchick (*Poliiocephalus rufopectus*) ('at risk – recovering') and bittern (*Botaurus poiciloptilus*) ('threatened-nationally critical').

The stream within SNA 2 drains into SNA 5 where longfin eel ('at risk – declining) has been recorded (Figure 5). The surveyors did not observe any instream obstructions between SNA 5 and SNA 2 that would prevent the migration of this species to SNA 2. The wetland could also support black mudfish (*Neochanna diversus*). This species is easily predated in open water by other fish species and therefore they are typically found within wetlands and farm drains where other fish species may be excluded. Ling (2001) indicates that mudfish are not typically found in eutrophic waters, which raupo is an indicator for. Therefore, the risk of mudfish being present is considered to be low.

The regenerating forest and scrub on the outer fringes of SNA 2 was considered suitable habitat for copper skink (*Oligosoma aeneum*) which is wide spread and 'non threatened'. The habitats were not considered suitable for gecko's.

Potential bat roost trees are not present within SNA 2; however, if bats were present in the Study Area the habitats within the SNA would provide suitable foraging habitat. The presence of bats within this SNA unit, would be dependent on there being suitable roosting sites within the wider landscape and other habitats that would provide bats with suitable foraging.

3.3.2.1.3 SNA 3

Indigenous flora

SNA 3 (2 ha Figure 9) is of a similar composition to SNA plot 1b and is visible in all of the historical photos from 1941 to 1997. Mature kahikatea within the adjacent pasture continue to provide a link between SNA 1 and SNA 3. Similar to SNA plot 1b, the habitat in SNA 3 has been impacted by understorey grazing and canopy browsing.

The SNA unit is narrow (approximately 100 m at its widest point and 40 m at its narrowest) and surrounded by gorse and pasture. The southern portion of the SNA unit is comprised of tawa-kahikatea-broadleaf and rimu-miro canopy (refer to Table E6 in Appendix E and Figure C1 in Appendix C) which has been heavily grazed by stock and feral goat (*Capra hircus*). The canopy has also been browsed by possum (*Trichosurus vulpecula*).

A seep at the head of the gully has caused a minor slip which has impacted on vegetation growth in the local area (approximately 100 m²). Two streams flow from gullies in the southern aspect and converge into an area of disturbed raupo wetland located outside of the SNA.

The survey plot in SNA 3 was located in tawa-kahikatea-tree fern forest. This habitat type comprises approximately half of the SNA unit. This habitat type has been affected by grazing, potentially to a greater degree than other habitats within the SNA. Twenty-five species were recorded in the plot, with just one, holly (*Ilex aquifolium*), of exotic origins observed (refer to Table D6 in Appendix D). The canopy was dominated by kahikatea (12 to 25m), with emergent rewarewa (>25m). Mid tiers were comprised of tree ferns and broadleaf species, and the understorey was dominated by nikau. Both carmine rata and akatea were present in this plot. Three wild pigs entered the plot during sampling and rooting was observed in other areas during the walkthrough.

Indigenous fauna

The bird species recorded during the 5MBC were similar to those observed in SNA 1 (Seven species in total recorded of which three were indigenous). The trees are mature and provide a diverse range of food resource for 'non threatened' bird species, there is a low potential that New Zealand bush falcon (listed as 'at risk - recovering') could nest on epiphytes within the forest trees.

Within the SNA unit the surveyors observed several mature trees with features that bats could roost in and standing dead timber with several viable features for roosting. The wider habitat was considered optimal for foraging bats (mix of forest edge and water).

Although the habitat is affected to a greater degree than SNA 1 by grazing, it is considered that if gecko were present in SNA 1 they are likely to also occur within SNA 3.

It was observed that the stream within SNA 3 includes a series of steps and pools which could inhibit the migration of fish species that are poor climbers. However, many of New Zealand's fish species are good climbers and the watercourse in SNA 3 links to those within SNA 5 where long-fin eel and giant kokopu have been recorded.

3.3.2.1.4 SNA 4



Figure 11 SNA 4 and the RECCE plot within the SNA.

Indigenous flora

SNA 4 (3 ha Figure 11) was dominated by pasture in 1941, with scattered trees at the base of the stream gully. It appears that vegetation at the bottom of the gully developed during 1979 and 1997, while the vegetation to the west is subjected to repeated disturbance. This is reflected in the vegetation currently present in the SNA. To the west, low diversity regenerating indigenous and exotic scrub is present (1.4 ha), while to the east, at the base of the gully, there are mature indigenous trees surrounded by regenerating broadleaf forest (1.6 ha), which is more mature than the vegetation to the west. This SNA has recently been surrounded by commercial forestry which was felled earlier in 2019. The surrounding land has been replanted with pine trees and ground cover is a mix of brash, bare ground and exotic scrub (e.g. gorse) (refer to Figure C3 in Appendix C).

The survey plot in SNA4 (plot SNA 4a) was located at the centre of the SNA within the gully where secondary forest is present. The composition of the habitat changes through the SNA units gully. At the northern end the vegetation is dominated by tree ferns, while the southern end includes more Tawa-Kahikatea-broadleaf forest.

Forty-one plant species were recorded in the survey plot (refer to Table E7 in Appendix E), 98% of which were indigenous species. The canopy in this part of the SNA is predominantly comprised of tree ferns and early successional broadleaf species. An old growth emergent pukatea (>25m) recorded on the boundary of the plot and larger rimu and tawa were observed on the western slopes outside the plot. Understorey browsing was less in this SNA unit when compared to the other four SNA units surveyed and as such, understorey recruitment was good. Canopy browsing (from possums) was evident, particularly on pukatea.

A survey plot could not be sampled within the vegetation on the western arm as the area was unsafe to access due to steep unstable embankments; however, general species composition was noted from a vantage point (refer to Figure C3 in Appendix C). This area was comprised of indigenous scrub species, such as hakea (*Hakea sericea*) and manuka ('at risk – declining'), in drier areas and tree

ferns in wetter areas. Exotic scrub species including gorse, pampas, brush wattle (*Paraserianthes lophantha*) and Spanish heath (*Erica lusitanica*) were also observed. A large thicket of pampas was present within an area of open canopy in the centre of the gully. The dominance of exotics to indigenous species varied through this area from 20 – 50 % exotic cover.

Kanuka, carmine rata and akatea ('threatened / at risk') are myrtle species which were recorded in plot SNA 4a. Orchids, peka-a-waka and heart-leaved orchid (*Acianthus sinclairii*) were observed in the forest that forms the eastern half of SNA 4.

Indigenous fauna

Seven bird species were identified during the 5MBC, three were indigenous; including kereru. There is a low potential that New Zealand bush falcon (listed as 'at risk - recovering') could nest on epiphytes within the mature forest trees.

It is considered that the areas of raupo wetland would provide suitable habitat for spotless crane or fernbird (*Bowdleria punctata*) ('at risk – declining').

The mature indigenous trees within the south-eastern part of the SNA offered the highest bat roost potential. In particular a mature kahikatea which had died off in part and then had regrown was considered to offer high bat roost potential. Roosting opportunities are not present within the remainder of the SNA as the trees have not reached a size or age to develop potential roost features. The habitat in the eastern half of the SNA could also provide bats with suitable foraging habitat.

It is considered that there is a low risk of Auckland green gecko and forest gecko being present within the vegetation to the east. In 1941 it appears that the site was dominated by grassland and that since then the gully vegetation has developed. In 1979 there is vegetation in the gully, but it is completely isolated by bare earth. These factors are likely to have significantly reduced the potential for 'at risk or threatened' lizards to be present.

The stream within SNA 4 drains into SNA 5 where longfin eel and giant kokopu have been recorded, which are 'at risk – declining'. If there are no significant obstructions in the watercourse it is considered likely that these species would also be present within SNA 4. There is also the potential for mudfish (refer to SNA 1 for justification) to be present within the wetlands located at the northern tip of the SNA unit.

3.3.2.1.5 SNA 5

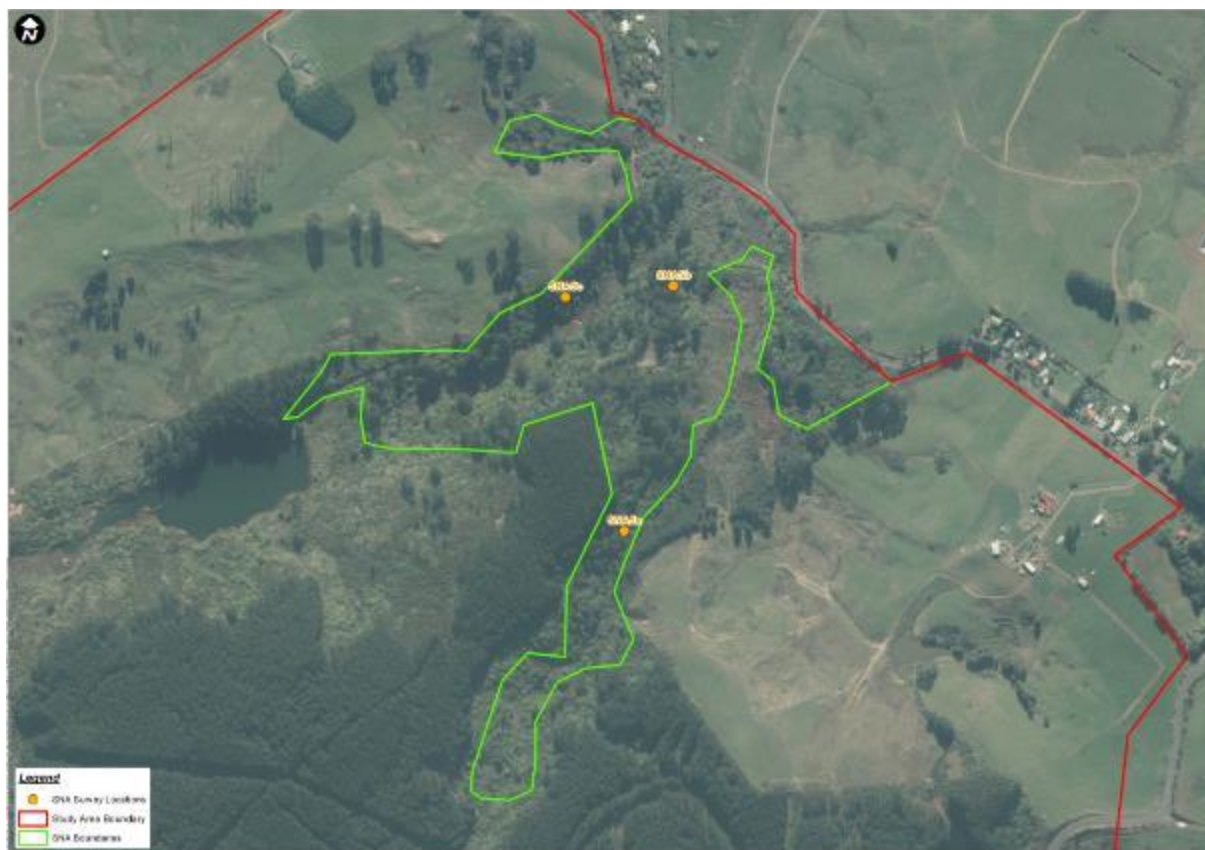


Figure 12 SNA 5 and the RECCE plot within the SNA.

Indigenous flora

SNA 5 is the largest SNA unit within the Study Area (19 ha Figure 12). The habitats within the SNA unit have been the subject of changes in land use and disturbance, including grazing, forestry and mining, between 1941 – 1997 (Section 3.2). The consequence of this is that the majority of the habitat within the SNA unit is a mix of indigenous and exotic species (14.3 ha) (refer to Figure C4 in Appendix C).

To capture the variation in habitat types within the SNA unit three RECCE plots were surveyed. This included a plot within the mature indigenous vegetation located in the southern arm of the SNA unit (plot SNA 5a), one in the middle of the SNA unit which is dominated by pine (plot SNA 5b) and one in a wetter north westerly slope where the canopy was still dominated by pine (plot SNA 5c); refer to Figure B2 in Appendix B.

Fifty-five vascular plant species were recorded in SNA 5 survey plots; 39 were recorded at plot SNA 5a, 18 in plot SNA 5b and 29 in plot SNA 5c (refer to Tables E8 to E10 in Appendix E).

Plot SNA 5a is located at the northern end of the southern arm of the SNA, which includes the oldest indigenous vegetation of the SNA, albeit younger than the vegetation in SNA 1. The vegetation ($n = 39$) in plot SNA 5a was comprised of tawa, kahikatea and broadleaf species in the canopy (>25m) and maintained diversity and structure throughout the tiers. Mahoe (*Meliccytus ramiflorus*) and tree ferns dominated subcanopy tiers, while hangehange (*Geniostoma ligustrifolium* var. *ligustrifolium*), pate (*Schefflera digitata*) and nikau dominated the lowest tier. The southern end, of the southern arm, reduces in quality as the regenerating broadleaf forest is younger and is being encroached by pampas.

Plot SNA 5b was located underneath a canopy of mature pines (*Pinus radiata*) (>25m) in which understorey recruitment was impaired by thick pine needle groundcover. Eighteen species were

recorded in this plot, 72% of which were exotic. The understorey was dominated by early succession species such as mapou (*Myrsine australis*) and weeds, such as pampas and Chinese privet.

Plot SNA 5c was located on a wet gully edge, below mature pines on the western boundary of the SNA. The indigenous canopy was lower than that observed in other plots (5 to 12m) and comprises early successional broadleaf species and tree ferns. The understorey was largely comprised of broadleaf species (i.e. hangehange) and nikau, with a diverse range of fern species. Jasmine, (*Jasminum polyanthum*) an exotic species, was also beginning to establish in the plot. Overall, 29 species were recorded in this plot, of which 26 were indigenous.

Kanuka was recorded in plots SNA 5a and SNA 5b and akatea was recorded in plots SNA 5a and SNA 5c. These are myrtle species which are now considered to be 'at risk' due to the spread of myrtle rust in New Zealand. Peka-a-waka was recorded in plot SNA 5a.

The wetland habitat in the SNA is dominated either by grey willow (*Salix cinerea*) or raupo. The larger areas of raupo surround two streams that flow into the north eastern corner of the SNA unit. A second area of raupo lines the stream which runs from SNA 2.

The north western corner of the SNA unit is dominated by eucalyptus (*Eucalyptus* sp.), macrocarpa (*Cupressus macrocarpa*) and Chinese privet (*Ligustrum sinense*), which are all introduced species. The understorey is heavily grazed.

The northern corner of the SNA (beyond an access track) was not accessed at the time of the survey as landowner permission was not obtained.

Indigenous fauna

Twelve bird species were recorded during the three 5MBC, of which three species were indigenous. An additional two indigenous species, kotare/kingfisher (*Todiramphus sanctus*) and kereru, were heard just prior to the surveys commencing. There is a low potential that New Zealand bush falcon (listed as 'at risk - recovering') could nest on epiphytes within the mature forest trees.

Paradise duck (*Tadorna variegata*) was recorded during the 5MBC, but no other wetland species were heard or seen. It is considered that the areas of raupo and willow-sedge wetland would provide suitable habitat for spotless crane or fernbird (*Bowdleria punctata*) ('at risk – declining').

The bat roost potential within the SNA relates to the exotic trees, particularly the eucalyptus trees. A detailed bat survey was not undertaken of the trees on site, but typically the pine trees were observed to have straight trunks without damage to limbs. Therefore, the surveyor did not observe features within which bats are likely to roost. The eucalyptus trees, however, had large areas of loose bark and also rot holes and broken limbs within which bats could roost.

The habitats within the SNA unit have been the subject of periodic disturbance, and the indigenous vegetation is limited to the southern arm which will have reduced the potential for indigenous geckos to be present, specifically Auckland green gecko and forest gecko which are 'at risk – declining'. It is considered that the habitats in SNA 5 would provide 'non threatened' skink species such as copper skink with optimal habitat.

Three permanent streams were identified in SNA 5. This included one flowing down the gully of the southern arm, one discharging from the small lake to the west and another discharging from the small arm of the north western tip of the SNA. Instream habitat was diverse and included pools, riffle, woody debris and undercut banks, and discharged to raupo and willow-sedge wetland areas in the north east of the SNA. An additional four permanent and intermittent streams and one seep were also identified in the upper slopes of the gullies during the walk through. The historical results indicate that longfin eel and giant kokopu have been recorded to be present within this SNA unit. These species are 'at risk – declining' (Figure 5).

3.3.2.2 Summary table

A summary of the results obtained from the RECCE vegetation plots, 5MBC and habitat observations (i.e. pest animal impacts, habitat for indigenous fauna) has been provided in Table 6. Full results are provided in Appendix E and Appendix F; supporting plans are provided in Appendix B and Appendix C.

Table 6 Summarised SNA unit RECCE and 5MBC results and habitat observations.

Assessment factors	SNA 1	SNA 2	SNA 3	SNA 4	SNA 5
Number of REECE survey locations assessed	2	1	1	1	3
Number of dominant vegetation communities identified	5	4	4	5	8
RECCE plots					
Total number of plant species recorded	45	16	25	41	56
Number of indigenous species recorded (as a %)	44 (98%)	13 (81%)	24 (96%)	40 (98%)	49 (88%)
Number of exotic species recorded (as a %)	1 (2%)	3 (19%)	1 (4%)	1 (2%)	7 (12%)
Canopy foliar browse (possums)	Yes	No access	Yes	Yes	Yes
Understorey damage or browse (cattle, goats or pigs)	Yes	No access	Yes	Yes	Yes
Habitat observations					
Indigenous bat habitat:					
– Potential roost trees	Yes	No	Yes	Yes	Yes - exotic
– Potential foraging (riparian margin or forest edge)	Yes	Yes	Yes	Yes	Yes
Indigenous lizard habitat:					
– Remnant forest or mature forest	Yes	No	Yes - disturbed	Yes - isolated	Yes – disturbed and isolated
– Scrubland/rank grass	Scarce	Yes	Yes	Yes	Yes
Indigenous fish habitat:					
– Streams, rivers or lakes	Yes	Yes	Yes	Yes	Yes
– Swamps or wetland	No	Yes	No	Yes	Yes
Bird species recorded during 5MBC;					
– Exotic bird species	4	9	4	2	7
– Indigenous bird species	5	5	3	4	3
Number of permanent and intermittent streams encountered	4	1	2	1	7

4.0 Discussion

4.1 Review of SNA boundaries

The SNA unit boundaries (1 to 5) presented within the proposed Waikato District Plan were predominantly determined by WRC (Kessels Ecology, 2017) using aerial photos rather than following a site walkover, as stated in Section 1.2 of this report. As such, the location of the SNA boundaries were reviewed as part of the SNA surveys to assess if there were areas of habitat (indigenous and exotic) that could be readily discounted because they are easily identified as not significant against the WRPS criteria 9 (refer to Section 3.1.1 which provides a definition of a local site; should meet criteria 9);

- Habitats dominated by exotic species e.g. gorse, pampas, grassland etc.
- Habitats where the canopy is exotic and indigenous vegetation is in the early stages of regeneration.
- Indigenous vegetation in the early stages of regeneration.

All of the SNA units (1-5) included habitats that would not meet the criteria within the WRPS criteria. As a result, reduced SNA boundaries have been proposed. This was particularly relevant in relation to SNA 4 and 5 (Figure 13 and Figure 14). Table 6 presents proposed updated SNA unit areas based on the rationale listed above. Appendix G includes a series of maps G1 – G4, which illustrates the location of these reduced areas.

Table 7 Rationale for the elimination of habitats not considered to be of SNA quality

SNA ID	Rationale	Current area (ha)	Reduced area (ha)
SNA 1	Area of gorse located on eastern boundary with very low habitat values.	16.6	16.2
SNA 2	Areas of raupo that have been significantly invaded by pampas and indigenous forest vegetation in the early stages of regeneration.	0.63	0.36
SNA 3	Area where grassland dominates.	2.0	1.6
SNA 4	Western half of the SNA is dominated by low diversity indigenous and exotic scrub, which has developed following disturbance.	3.0	1.6
SNA 5	A large areas of habitat comprised of exotic canopy species beneath which indigenous regeneration is occurring.	19.0	3.8



Figure 13 SNA 4 illustrating the extent of habitat considered not to meet the SNA criteria (purple hatching).

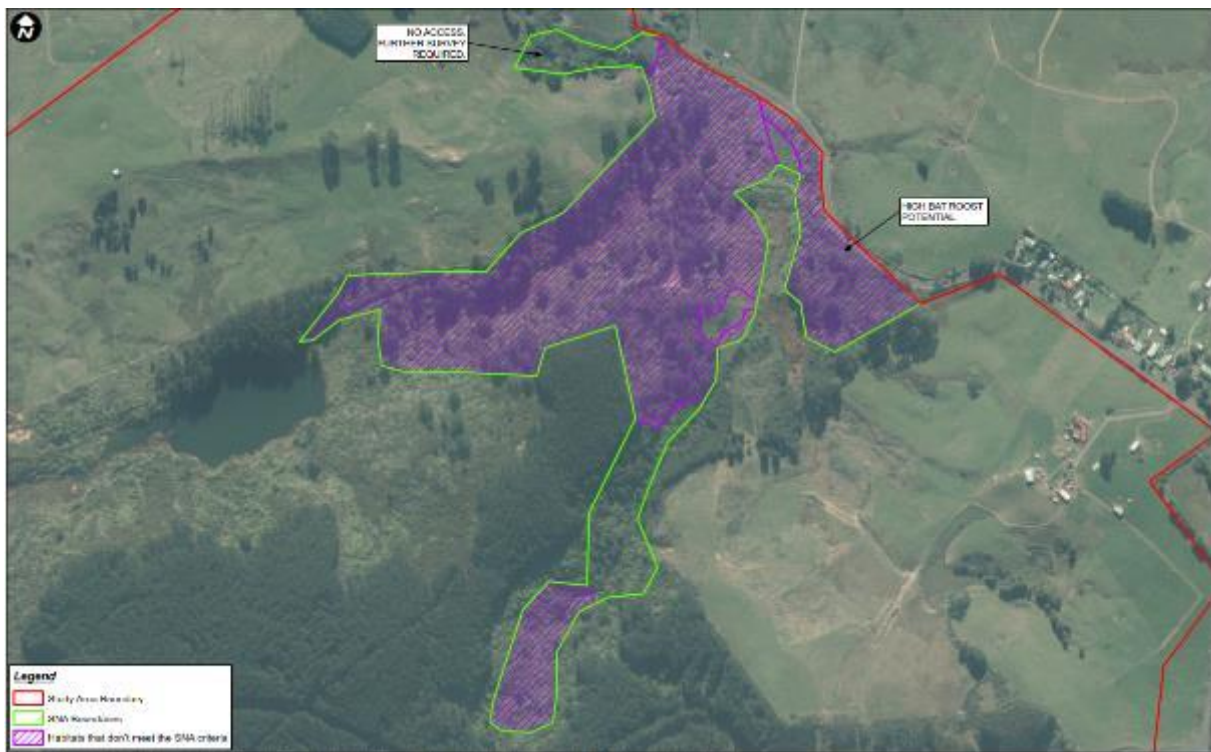


Figure 14 SNA 5 illustrating the extent of habitat considered not to meet the SNA criteria (purple hatching).

4.2 SNA criteria review

The Resource Management Act (1991) requires regional and district councils to protect 'areas of significant indigenous vegetation and significant habitat of indigenous fauna' (RMA (1991) Part 6). However, the RMA does not specify how councils would determine whether a site is 'significant'. As a result each Regional Council has taken a different approach to determine significance, and there are several interpretations of key words used to determine this e.g. representative.

WRC responded to the RMA requirement through the development of significance criteria, and presented these within the WRPS, against which a site is assessed to determine whether it is an SNA (Appendix A). The WRPS states that a site needs to meet one or more of the criteria to be considered of sufficient quality to be listed as an SNA. The proposed Waikato District Plan represents the WRPS criteria in Appendix 2.

Kessels Ecology on behalf of WRC applied the WRPS criteria within Waikato Region and identified SNA sites based on aerial imagery and available ecological information (typically not site visits) (Kessels Ecology, 2017). The SNAs identified by WRC have now been presented in the proposed Waikato District Plan.

The WRPS significance criteria (Appendix 2 of the Waikato District Plan) does not include text that explains how the criteria should be applied or include definitions of key words used by the criteria e.g. representative. Associated guidance documentation; Environment Waikato and Wildlands, 2002, does not remove this ambiguity. Consequently, the wording in the criteria is open to interpretation.

To provide clarity in this assessment the application of criteria 3, 4, 6 and 9 have been discussed in detail below (Section 4.2.1 - 4.2.4). It is these criteria that have been considered relevant when determining the significance of SNA 1-5 based on the information collected during the desk top review and field surveys.

4.2.1 Criteria 3 – threatened species

4.2.1.1 Fish

WRC indicate in their justification of significance that SNA 1780 (SNA 1-5) meets criteria 3 due to the presence of 'threatened' or 'at risk' fish species.

The desktop review completed by AECOM identified the presence of longfin eel and giant kokopu which are considered 'at risk – declining' within the streams in SNA 5. The streams within SNA 5 extend into SNA 1, SNA 2, SNA 3 and SNA 4, therefore, it is considered likely that these species could be present in all of the SNA units within the Study Area.

The WRPS indicates that criteria 3 would be met if;

'it is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are:

- *Classed as threatened or at risk; or*
- *Endemic to the Waikato region, or*
- *At the limit of their natural range.'*

The supporting guidance (Environment Waikato and Wildlands, 2002) does not indicate the level of usage by indigenous species that would be required for a site to be considered as SNA quality. This is particularly relevant to species that have large home ranges e.g. native bats.

Long-fin eel and giant kokopu are considered 'at risk – declining', therefore, it could be interpreted that the habitats in the Study Area would meet criteria 3, if these 'at risk' fish species were confirmed to be present, which WRC have indicated that they did in their justification for listing SNA 1780. However, if the presence of these species were to be the sole trigger for the classification of a site as an SNA (as defined by the WRPS criteria), then large sections of stream within New Zealand would be classified as SNA as these species are widespread, albeit they are in decline.

It is considered that the intent of criteria 3 is to protect habitats that are important to the survival of indigenous fauna. In relation to aquatic species this is picked up by criteria 8 which is focused on the protection of habitats that are of crucial importance to the self-sustainability of an aquatic indigenous

species. In relation to longfin eel and giant kokopu these are considered to be their coastal or marine spawning sites and estuaries that support their sensitive young. WRC in their review of SNA 1780 did not consider that the habitats in the SNA would meet criteria 8.

If black mudfish were found to be present within the wetlands in SNA 2, SNA 4 and SNA 5 and were reproducing this could be justification for the classification of a site as an SNA in accordance with criteria 8.

It is considered that the assessment of the significance of habitats that supports aquatic species is assessed in relation to criteria 8, rather than criteria 3.

4.2.1.2 Myrtle species

The field survey completed by AECOM also identified the following myrtle species within the SNA units in the Study Area;

- SNA 1 – carmine rata and akatea.
- SNA 2 – manuka.
- SNA 3 – akatea and carmine rata.
- SNA 4 – carmine rata, manuka, akatea and kanuka.
- SNA 5 – kanuka and akatea.

The NZ threat classification for these four myrtle species has recently been upgraded from 'not threatened' to 'threatened', as a precautionary measure, in response to the discovery of myrtle rust in New Zealand and the likely impact it is expected to have on myrtle species (de Lange *et al.* 2018). Myrtle rust was first detected in New Zealand in 2017. The Ministry of Primary Industries (MPI) and DOC sought to contain myrtle rust, but it is a wind-borne disease and New Zealand has an abundance of suitable plant hosts it could infect. Consequently it has spread rapidly through New Zealand and is now considered established and widespread.

The four myrtle species listed above are currently widespread in New Zealand. This may change with the expansion of myrtle rust, however, this again means that a designation of an SNA solely on the presence of one of these four myrtle species would result in large areas of New Zealand habitat being classified. As such, it is considered that a habitat would need to meet other criteria or support other 'threatened' or 'at risk' species to justify their classification as an SNA.

4.2.1.3 Other species

The habitat appraisal has identified the potential for long-tailed bats ('Nationally critical') and Auckland gecko and forest gecko ('at risk – declining') to be present. The manner in which these species use their habitat is significantly different.

Lizards have small home ranges and are reliant either on a stand of vegetation being of sufficient size and quality to sustain them or there are good vegetated linkages between a number of smaller parcels of habitat of suitable quality. Therefore, if present they are very dependent on the vegetation within which they are located.

Long-tailed bats have large home ranges and have key habitat features that they use for roosting, commuting and foraging. However, they will adjust the areas used in response to their life stage, seasonal trends in food resource and climatic changes that effect where food resource will be present. There are critical features within the landscape that will support a colony of bats, which can be readily protected by their classification as an SNA. However, there will be other habitats (e.g. pine shelter belts linking to areas of high value foraging) that are less discrete, that are important for the survival of long-tailed bats. Such features should be protected through other planning mechanisms, rather than as a SNA (e.g. Assessment of Ecological Effects (AEE)).

Further survey would be required to determine the presence or absence of 'threatened' or 'at risk' species. If determined to be present, further consideration would be required in relation to how the species use the habitat to determine if its presence would justify the designation of a habitat as SNA, based on its presence alone.

4.2.2 Criteria 4 – Under represented habitat (<20% in the Ecological District)

WRC indicate in their justification of significance for SNA 1780 (SNA 1-5) that criteria 4 is likely to be met. No further comment is provided.

Kessels Ecology (2017) indicated in Table 1 of their report that the Meremere Ecological District has retained large areas of wetland compared to other Ecological Districts. It is estimated that 49.7% of wetland present in 1840 remains (1994) (Kessels Ecology, 2017). It also indicates that the only 5.3% of forest remains within the district.

Therefore, the presence of wetland within the Study Area would not trigger this criteria within the WRPS. However, the presence of secondary forest could, because there is <20% within the district. The criteria does not define the characteristics and quality of a habitat that is defined as a 'forest'. This is relevant when trying to determine if a habitat is significant and meets the 'forest' definition, as it is common for farms to have a remnant stand of native trees e.g. scattered kahikatea. This criteria should be linked to criteria 9, which considers 'indigenous vegetation that is a healthy, representative example'. Further clarification in relation to the quality of an indigenous habitat should therefore be undertaken before it is classified as significant under criteria 4.

4.2.3 Criteria 6 – Wetlands

The justification of significance provided by WRC for Site Number 1780 (SNA 1-5) states that criteria 6 is met. The clarification provided states '*This site includes indigenous wetland habitats which are likely to be under-represented.*'

There are raupo wetlands within three of the SNAs within the Study Area. In SNA 2 the dominant habitat type is a raupo wetland located at the western end of a lake. Small areas of raupo wetland are also present within SNA 4 and SNA 5, but the majority of these wetlands extend beyond the SNA boundaries as drawn by WRC.

The Resource Management Act (1991) identifies a '*wetland as permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet condition's.*' The RMA does not define when a wetland would be considered significant which is also not defined by criteria 6 in the WRPS.

However, it is considered that criteria 6 overlaps with criteria 9. Criteria 9 indicates that habitat is significant when;

*It is an area of indigenous vegetation or habitat that is a **healthy, representative** example of its type because:*

- *its structure, composition, and ecological processes are largely intact, and*
- *if protected from the adverse effects of plant and animal pests and of adjacent landuse (e.g. stock, discharges, erosion), can maintain its ecological sustainability over time.*

Guidance for criteria 9 goes on to state that representative sites are;

'sites that are the best examples of sites that form a network covering the full range of landforms, soil sequences, vegetation and fauna communities within an ecological district (c.f. Shaw 1994). The reality for many landscapes, particularly throughout much of the Waikato, is that a 'representative example' will be the larger and most diverse remaining examples of indigenous vegetation and habitats.'

Meremere Ecological District has retained large areas of wetland compared to other Ecological Districts. It is estimated that 49.7% of wetland present in 1840 remains (1994) (Kessels Ecology, 2017). The wetlands in the district include peat lakes, bogs and swampy habitat associated with and independent of the Waikato River. The Whangamarino Wetland is the largest example of wetland in the district (approximately 7,300 ha (Kessels Ecology, 2017)). All wetland types in the district have declined as a result of agricultural intensification.

Within the Meremere Ecological District, the average size of a wetland (herbaceous freshwater vegetation) is approximately 16 ha, ranging from 0.37 – 2,671⁷ ha (review of Land Cover Database completed by Freshwater Solutions, 2017). The median size for a wetland is approximately 8.4 ha (Freshwater Solutions, 2017).

Raupo wetlands are typically found in the Waikato in still, shallow water around lake edges, streams and farm ditches. Raupo is typically associated with eutrophic water and tends to increase at the expense of other aquatic herbs, in natural wetlands where there is high nutrient runoff from surrounding land (Landcare Research, 2019).

A detailed survey of the wetlands within SNA 2, SNA 4 and SNA 5 has not been completed. However, it is known from aerial photography that the raupo wetlands in all of these sites have formed in the last 40 years, since mining activity ceased on site. The wetlands are small for the district:

- 0.36 ha for SNA 2,
- 0.03 ha (with an additional 0.10 ha including habitat beyond boundary) for SNA 4, and
- approximately 0.92 ha (with an additional 1.85 willow / sedge wetland) for SNA 5.

All wetlands (as above) are affected at their margins by weed encroachment (willow in SNA 5 and pampas SNA 2 and SNA 4).

It is considered that there are larger better quality examples of raupo wetland within the district, in comparison to the areas of raupo wetland within the Study Area, and therefore it is considered that the wetlands within the Study Area would not be considered 'representative' based on the information currently available and the guidance provided with the WRPS criteria (criteria 9).

To support this conclusion, further survey is recommended in SNA 2, 4 and 5 to qualify the condition of the raupo wetlands and the species they could support.

4.2.4 Criteria 9 - Indigenous vegetation that is a healthy, representative example.

WRC indicate in their justification of significance that SNA 1780 (SNA 1-5) that criteria 9 is indeterminate. The clarification provided states '*unsure of structure and composition and ecological processes*'.

There are two habitat types present within the SNAs in the Study Area that would meet the definition of a healthy habitat in accordance with criteria 9 (refer Section 4.2.3);

- Mature or semi-mature secondary broadleaf forest; and
- Raupo wetland.

The significance of the raupo wetland is discussed in Section 4.2.3 and is not discussed further below.

Therefore, the assessment below is focused on the areas of mature or semi-mature secondary broadleaf forest. The assessment takes into consideration whether the habitat would be considered healthy in relation to the WRPS criteria and as to whether they would be representative. Guidelines to apply Regional Criteria and Determine Level of Significance (Environment Waikato and Wildlands, 2002) indicates that representative habitats should be '*the larger and most diverse*' remaining examples.

However, this assessment also needs to take into consideration criteria 4 which has highlighted that <20% of forest habitat remains in the district, therefore, the assessment should not just focus on retaining the largest and most diverse specimens.

4.2.4.1 Mature or semi-mature secondary broadleaf forest

Historically, the ecological district would have been dominated by kauri forest, dense podocarp forest, and wetland vegetation with small areas of rimu-tawa forest in the hill country (Kessels Ecology, 2017). Land cover is now dominated by intensive agriculture and forestry. Indigenous vegetation

⁷ It is assumed that this number does not reflect the total size of Whangamarino as it removes areas of water and non wetland habitat.

within the district is predominantly wetland and regenerating forest. Primary and logged primary forest covers only 5.3% of the district compared to 1840 (Kessels Ecology, 2017).

There is no primary forest remaining within the Study Area. However, there are areas of mature and semi-mature secondary broadleaved forest in the Study Area, including areas that have been continually vegetated since 1941 (SNA 1 and 3).

To gain an understanding as to whether the vegetation within each of the SNAs could be considered to be a representative example, as required by criteria 9 of the WRPS, the following factors were considered;

- Is it of sufficient size and shape to be self sustaining?
- Does it have a consistent, well developed canopy of indigenous species?
- Does the forest include species that would be appropriate to the forest type? and
- Does it contain a significant percentage (at least 25%) of mature indigenous trees?

The WRPS criteria states that significant indigenous vegetation of habitat is where the *structure, composition, and ecological processes are largely intact*. As such, this assessment has focused only on areas of mature or semi-mature forest habitat that is dominated by indigenous forest species.

Therefore, the following assessment does not include the areas of regenerating native vegetation that are in the early or medium stages of regeneration because they are not considered to have a structure, composition and processes that are intact required by the WRPS criteria (purple areas in Appendix G, Figure G1 – G5).

Size

Within the ecological district the average size of a block of indigenous forest is approximately 12 ha, ranging from 0.3 – 2,319 ha (review of Land Cover Database completed by Freshwater Solutions, 2017). The median size for an indigenous forest is approximately 2.9 ha (Freshwater Solutions, 2017).

The size of the indigenous forest blocks within the SNA units in the Study Area are presented in Table 8. This illustrates that the mature secondary forest in SNA 1 (16.2 ha) is larger than the average forest within the district. The forest in SNA 3, SNA 4 and SNA 5 are all smaller than the median size (>2.9 ha) for indigenous forest within the district. However, it is considered that the boundary for SNA 3 could readily be expanded to include areas of forest of a similar composition which are not within the current SNA boundary (as drawn by WRC). This would bring the habitat closer to the median size for a forest block in the district.

Table 8 Size of secondary forest blocks within each SNA.

SNA	Habitat type	Area
SNA 1	Tawa-kahikatea-tree fern; Rimu-miro-kahikatea; Tawa-kahikatea-broadleaf; and Kahikatea-nikau.	16.6 ha
SNA 2	N/A the SNA is dominated by wetland. Regenerating forest is less than 5 m high.	
SNA 3	Rimu-miro-kahikatea; Tawa-kahikatea-broadleaf; and Kahikatea-nikau.	1.6 ha
SNA 4	Tawa-kahikatea-broadleaf; and Regenerating broadleaf.	1.6 ha
SNA 5	Tawa-kahikatea-broadleaf; and Regenerating broadleaf.	0.9 ha (+ 2.92 ha ⁸)

⁸ Access was restricted (landowner permission not obtained for survey) to part of this habitat type, therefore, its quality could not be confirmed.

Shape

The SNA surveys identified that grazing has impacted on the secondary forest within the Study Area, and that the level of grazing varies between the different stands of forest within the SNAs. The effects of grazing were considered most significant in SNA 3 which is narrow (100m at widest point) and consequently weed encroachment has been higher than in some of the other SNAs.

The shape of a forest is important as it effects the ability of the habitat to be self-sustaining. If a forest has a large extent of 'edge' in relation to its size, then the effects of weed encroachment, wind and light increases can influence the composition of the forest. Generally, larger areas and those of compact shape are more resilient to 'edge' effects and have a greater ability to be self-sustaining (e.g. SNA 1). However, in other ecological districts (e.g. Auckland) where forest habitat is limited and forest examples relate to small areas it is thought that these effects can be remedied by effective management and therefore should not be considered in isolation when determining the significance of a habitat (Sawyer and Stanley, 2012).

Species composition and maturity

SNA 1 - The canopy species within SNA 1 are characteristic of a forest in the district including, tawa, rimu, rewarewa, kahikatea, miro and Hall's Totara. The trees are mature, so the canopy is well formed and throughout the SNA trees are >25 m. Mature trees (>8-10 m) comprise up to 90% of the canopy in the SNA unit.

SNA 3 - The canopy species within SNA 3 are characteristic of a wetland forest with kahikatea and rewarewa dominating the upper canopy. The upper canopy is dominated by mature trees (>8-10 m) which comprise up to 80% of the canopy in the SNA.

SNA 4 – The RECCE plot is not a good reflection of the forest composition at the southern end of the SNA because it is located within an area of forest that is dominated by tree ferns. While undertaking their walkover the ecologists identified in the southern end of the SNA that the canopy included kahikatea and tawa. The upper canopy species (>8-10 m) provided >80% cover in this area.

SNA 5 – Plot 5a indicated that the canopy in the southern arm of the SNA was dominated by kahikatea, tawa, rewarewa and karaka. The upper canopy species (>8-10 m) provide >80% cover within the forest habitat.

Conclusion

The forest within all four SNA areas (1, 3, 4 and 5) are considered to be healthy, even though they have been subjected to grazing. Therefore, the focus has been on whether the habitats are considered to be representative, which was defined in the supporting guidance as '*the larger and most diverse*'.

SNA 1 readily meets criteria 9 as it is a larger than average block of forest within the district, also its structure, composition and ecological processes are largely intact. In addition, its size and form mean that it would be self-sustainable over time.

The forest within SNA 3 is of a similar composition and age to SNA 1 and is linked to SNA 1 by kahikatea within the adjacent pasture. Although the boundary of the SNA defined by WRC is less than the median size for a forest in the district, it is considered that the location of the SNA boundary, as drawn by WRC, does not include all areas of forest that could be incorporated. It is therefore concluded that this stand of forest does meet criteria 9, as it is considered to be healthy and representative.

The mature forest within SNA 4 and SNA 5 are smaller than the median size in the district. However, they are diverse, and its structure, composition and ecological processes are largely intact. In addition, these two areas of mature forest are linked by regenerating broadleaf forest, that is currently dominated by tree fern. This is a transitional habitat and is likely to become tawa-kahikatea-broadleaf forest with time. Therefore, this transitional forest is not of SNA quality, as defined by the WRPS guidelines (2002), but it does build on the ecological function and structure of the mature habitat in SNA 4 and 5. Therefore, it is considered that these habitats would be considered significant.

4.2.5 Summary of the assessment against the WRPS Criteria

The survey results (refer Section 3.0) found that the vegetation composition and habitat within each SNA unit (1 – 5) differed and as such it was considered that each unit should be assessed independently against the WRPS criteria, rather than as a whole. Although each of the units were assessed independently, if it was considered that the ecological function of two or more units were linked this was taken into consideration in the assessment of the significance of each SNA unit.

An updated review of each SNA unit against the WRPS criteria is presented in Table 9 to Table 13 and a summary is presented in Table 14. The review draws on guidance documentation that Kessels Ecology (2017) used to make the initial identification of SNAs on behalf of WRC (Environment Waikato, 2002), the current survey information, along with the discussion around WRPS criteria presented in Section 4.2 above.

4.2.5.1 SNA 1

Table 9 Assessment of SNA 1 against the WRPS criteria.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
1 – Protected area.	Not applicable.	No
2 – Coastal marine area.	Not applicable.	No
3 – Threatened species ⁹ .	High long-tailed bat roost potential, but further survey required to confirm presence in the Study Area. Moderate potential for Auckland green gecko and forest gecko, as a remnant population could be present.	To be confirmed.
4 – Under represented habitats (<20%) ¹⁰ .	Kessels Ecology (2017) (Table 1) presents a review of indigenous habitats in relation to Ecological District and whether they are now <20% of their range compared to 1840. The Study Area is within the Meremere Ecological District of which only 5.3% of primary and logged primary forest remains.	Yes - Linked to criteria 9
5 – Naturally uncommon vegetation or habitat.	The SNA is dominated by broadleaf forest habitats that is typical of the district.	No
6 – Wetland – indigenous flora and / or fauna.	There are no wetlands within SNA 1.	No
7 – Large example of a habitat type ¹¹ .	The forest vegetation within the SNA extends for approximately 16.2 ha which is above the average for the district, but it is not considered to be a large example (>1000 ha).	No
8 – Aquatic habitat critical to the self sustainability of a species.	Critical means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas, and migratory pathways. The desktop review identified that there is a high risk of longfin eel and giant kokopu being present within the watercourses in the Study Area, including those within SNA 1. Longfin eel is a widespread freshwater fish, but they are now classified as 'at risk – declining' in part due to overfishing and also due to habitat modification. Sensitive periods of their lifecycle relate to their spawning grounds in Tonga and as	No

⁹ Excludes aquatic species which are covered by criteria 8.

¹⁰ The significance of secondary forest is covered by criteria 9 and is excluded from this criteria.

¹¹ Size of the habitat is taken into consideration in criteria 9, a forest block may not meet criteria 7 but would be considered representative in criteria 9.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
	<p>elvers in New Zealand's estuaries. They spend their adult lives within New Zealand's streams.</p> <p>Giant kokopu spawn within vegetation that is tidally influenced and the young once hatched will spend 4-6 months at sea before migrating upstream to mature.</p> <p>These two species are reliant on streams within New Zealand, but the habitats within the SNAs do not support the critical life stages of these species.</p>	
9 – Indigenous vegetation that is a healthy, representative example.	<p>It is considered that SNA 1 is a health representative example of indigenous vegetation. Aerial photos indicated the presence of indigenous vegetation in 1941 and during the intervening years this has been disturbed e.g. land use changes.</p> <p>The SNA is considered to be larger than the average forest block in the district. In addition its shape and density would prevent weed encroachment. Two thirds of the SNA has been subjected to low levels of grazing (area fenced in part) so that all forest tiers are present. The remaining third has been more significantly impacted by grazing, however, even in these areas indigenous seedlings were observed. This indicates that the forest is self sustaining.</p> <p>SNA 1 is considered to be a 'representative' example of secondary forest, when compared to similar examples within the Waikato due to the maturity of the vegetation within the SNA.</p>	Yes
10 – Part of an ecological sequence that's not common.	The forest is not part of a rare ecological sequence in the Waikato.	No
11 – Buffer, link or corridor for another SNA.	<p>SNA 1 is linked to SNA 3 by kahikatea trees within an area of pasture. It is not considered that this link is necessary for the protection of either site, but if the linkage were to be developed further the overall size of the forest would be increased by the two stands of forest being combined. It is not considered that this criteria is currently met.</p> <p>SNA 1 is located upstream of Lake Whangape. There are a number of SNAs that immediately surround Lake Whangape, which are providing a buffer effect for this important habitat. The habitat within SNA 1 will ensure that water quality from the lakes headwaters remain high, but it is not considered that this is the intent of this criteria. If that were the case then all watercourses leading into Lake Whangape would have been identified as 'significant'.</p>	No
Does SNA 1 meet 1 or more of the significance criteria?	The SNA unit meets criteria 9/4 and has the potential to meet criteria 3.	Yes

4.2.5.2 SNA 2

Table 10 Assessment of SNA 2 against the WRPS criteria.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
1 – Protected area.	Not applicable.	No
2 – Coastal marine area.	Not applicable.	No
3 – Threatened species ¹² .	Low potential for wetland bird species including dabchick, bittern, spotless crane and fernbird. Low potential for lizards (skink) that are 'at risk' or 'threatened'.	To be confirmed.
4 – Under represented habitats (<20%).	There is no primary forest or primary logging forest present (refer to SNA 1, Table 8). Wetland habitat within the ecological district has decreased but it is not considered under represented, according to the WRPS definition.	No
5 – Naturally uncommon vegetation or habitat.	The SNA is dominated by raupo wetland, which has decreased in extent, but is still considered to be common.	No
6 – Wetland – indigenous flora and / or fauna ¹³ .	The Resource Management Act (1991) identifies a <i>wetland as permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions</i> . It does not define what a significant wetland is. Therefore, this assessment has drawn on the definitions of significant habitats in criteria 9. SNA 2 includes approximately 0.36 ha of raupo wetland, which is considered to be small for wetlands in the district (median size 8.4 ha). This wetland has developed after 1979 (<40 years) when mining activity on the site end. The wetlands have developed due to the modification of ground levels within stream gullies, therefore, not artificially created e.g. waste water treatment, but formed as a result of human intervention. Therefore, it is considered that this wetland would not be considered significant based on the information currently available. Further survey is required to determine whether the SNA would meet the WRPS criteria due to other attributes e.g. threatened species.	No
7 – Large example of a habitat type.	The wetland is not considered a large example of raupo wetland (0.36 ha, median wetland in the district is 8.4 ha).	No
8 – Aquatic habitat critical to the self sustainability of a species.	Refer to SNA 1 (Table 8) in relation to the presence of longfin eel and giant kokopu. There is the potential that black mudfish could be present within the wetland. The risk of their presence is considered to be low as the presence of raupo can be an indicator of eutrophic water, which is generally avoided by mudfish (Ling, 2001). In addition, the wetland has only been present for 40 years and indigenous fish species that would predate on black mudfish are known to be present in the adjacent watercourse. All of these factors reduce the potential for this species to be present, but further	To be confirmed.

¹² Excludes aquatic species which are covered by criteria 8.

¹³ Assessment is focused on the quality of the vegetation within the wetland. The wetland could be considered significant due to the presence of 'threatened' and 'at risk' species, but this will be assessed under criteria 3.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
	survey would be needed to confirm. If they were to be present they do not migrate and live their full lifecycle in the wetland, therefore, it would be critical to their survival unlike longfin eel and giant kokopu.	
9 – Indigenous vegetation that is a health, representative example.	The significance of the wetland habitat is assessed in relation to criteria 6. Therefore, it is not reassessed under this criteria.	No
10 – Part of an ecological sequence that's not common.	This area of raupo wetland is not part of a rare ecological sequence in the Waikato.	No
11 – Buffer, link or corridor for another SNA.	Refer to SNA 1 (Table 8) for discussion relating to Lake Whangape.	No
Does SNA 2 meet 1 or more of the significance criteria?	The SNA unit has the potential to meet criteria 3 and 8 but may not meet any criteria.	To be confirmed

4.2.5.3 SNA 3

Table 11 Assessment of SNA 3 against the WRPS criteria.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
1 – Protected area.	Not applicable.	No
2 – Coastal marine area.	Not applicable.	No
3 – Threatened species ¹⁴ .	High long-tailed bat roost potential, but further survey required to confirm presence in the Study Area. Moderate potential for Auckland green gecko and forest gecko, as a remnant population could be present. Low potential for skink that are 'at risk' or 'threatened'.	To be confirmed.
4 – Under represented habitats (<20%).	Refer to SNA 1 (Table 8) for discussion relating to primary forest and primary logging forest.	Yes - Linked to criteria 9
5 – Naturally uncommon vegetation or habitat.	The SNA is dominated by broadleaf forest habitats (rimu-tawa) that are not uncommon within Meremere and the Waikato.	No
6 – Wetland – indigenous flora and / or fauna.	There are no wetlands within SNA 3.	No
7 – Large example of a habitat type.	The forest within SNA 3 was identified to cover (>2 ha), which is the median size for a forest block and therefore could not be considered a large example.	No
8 – Aquatic habitat critical to the self sustainability of a species.	Longfin eel and giant kokopu are considered likely to occur, but it is not considered that the habitat would be critical for the species lifecycle (refer to discussion for SNA 1).	No
9 – Indigenous vegetation that is a health, representative example.	SNA 3 is similar in composition and age structure to SNA 1. The boundary defined by WRC includes >2 ha of forest but it is considered there are areas of forest immediately adjacent to the boundary drawn by WRC that could have been included. Therefore, it is considered that the forest would be similar to the median size for forest blocks in the district (2.8 ha). It was therefore determined that it would be a representative example of a forest block.	Yes
10 – Part of an ecological sequence that's not common.	The forest is not part of a rare ecological sequence in the Waikato.	No
11 – Buffer, link or corridor for another SNA.	SNA 3 is linked to SNA 1 by kahikatea trees within an area of pasture. It is not considered that this link is necessary for the protection of either site, but if the linkage were to be developed further the overall size of the forest would be increased by the two stands of forest being combined. It is not considered that this criteria is currently met. Refer to SNA 1 (Table 8) for further discussion in relation to Lake Whangape.	No
Does SNA 3 meet 1 or more of the significance criteria?	The SNA unit meets criteria 9 / 4 and has the potential to meet criteria 3.	Yes

¹⁴ Excludes aquatic species which are covered by criteria 8.

4.2.5.4 SNA 4

Table 12 Assessment of SNA 4 against the WRPS criteria.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
1 – Protected area.	Not applicable.	No
2 – Coastal marine area.	Not applicable.	No
3 – Threatened species ¹⁵ .	Moderate long-tailed bat roost potential, but further survey required to confirm presence in the Study Area. Low potential for Auckland green gecko and forest gecko, as a remnant population could be present.	To be confirmed.
4 – Under represented habitats (<20%).	Refer to SNA 1 (Table 8) for discussion relating to primary forest and primary logging forest.	Yes - linked to criteria 9
5 – Naturally uncommon vegetation or habitat.	The SNA does not include any habitats that would be considered uncommon.	No
6 – Wetland – indigenous flora and / or fauna.	SNA 4 includes approximately 0.03 ha of raupo wetland (total wetland 0.13 ha which is mainly located outside the defined SNA boundary), which is considered to be small for wetlands in the district (median size 8.4 ha). This wetland has developed after 1979 (<40 years) when mining activity on the site end. The wetlands have developed due to the modification of ground levels within stream gullies, therefore, not artificially created e.g. waste water treatment, but formed as a result of human intervention. Therefore, it is considered that this wetland would not be considered significant based on the information currently available. Further survey is required to determine whether the SNA would meet the WRPS criteria due to other attributes e.g. threatened species.	No
7 – Large example of a habitat type.	The mature secondary forest and wetland in SNA 4 are not considered to be large examples.	No
8 – Aquatic habitat critical to the self sustainability of a species.	Longfin eel and giant kokopu are considered likely to occur, but it is not considered that the habitat would be critical for the species (refer to SNA 1, Table 8). There is a low potential that black mudfish could be present. If they were to be present they do not migrate and live their full lifecycle in the wetland, therefore, it would be critical to their survival (refer to SNA 2, Table 9).	To be confirmed
9 – Indigenous vegetation that is a health, representative example ¹⁶ .	The mature secondary forest in SNA 4 covers > 1 ha, which is below the median of 2.8 ha. Therefore, it is considered to be a small example. However, it is considered to be diverse and healthy (structure, composition and ecological processes are intact). The forest would not meet the definition of representative within the SNA guidance document (Environment Waikato and Wildlands, 2002), but it is considered that the mature forest within SNA 4 and SNA 5 is linked by the regenerating broadleaf forest along the stream gully. This	Yes

¹⁵ Excludes aquatic species which are covered by criteria 8.

¹⁶ Wetlands are not reassessed under this criteria, they are assessed in relation to criteria 6.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
	habitat is not considered in itself to be of SNA quality in its current state, but does add to the value of the mature forest.	
10 – Part of an ecological sequence that's not common.	The habitats within the SNA are not part of a rare ecological sequence in the Waikato.	No
11 – Buffer, link or corridor for another SNA.	Refer to SNA 1 (Table 8) in relation to Lake Whangape. In relation to criterion 9 ecological linkages are discussed between the forest in SNA 4 and 5, but it is not considered that this linkage is protecting each of the SNA habitats.	No
Does SNA 4 meet 1 or more of the significance criteria?	The SNA unit meets criteria 9/ 4 and has the potential to meet criteria 3 and 8.	Yes

4.2.5.5 SNA 5

Table 13 Assessment of SNA 5 against the WRPS criteria.

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
1 – Protected area.	Not applicable.	No
2 – Coastal marine area.	Not applicable.	No
3 – Threatened species.	High long-tailed bat roost potential particularly associated with the eucalyptus trees in the north eastern corner. Low potential for Auckland green gecko and forest gecko, as a remnant population within the indigenous vegetation in the southern arm. Low potential for skink that are 'at risk' or 'threatened'	To be confirmed.
4 – Under represented habitats (<20%).	Refer to SNA 1 (Table 8) for discussion.	Yes - Linked to criteria 9.
5 – Naturally uncommon vegetation or habitat.	The habitats within the SNA are not considered to be naturally uncommon vegetation or habitats.	No
6 – Wetland – indigenous flora and / or fauna.	SNA 4 includes several small areas of raupo wetland (>2 ha), which is considered to be small for wetlands in the district (median size 8.4 ha). This wetland has developed after 1979 (<40 years) when mining activity on the site ended. The wetlands have developed due to the modification of ground levels within stream gullies, therefore, they are not artificially created e.g. waste water treatment, but formed as a result of human intervention. Therefore, it is considered that this wetland would not be considered significant based on the information currently available. Further survey is required to determine whether the SNA would meet the WRPS criteria due to other attributes e.g. threatened species.	No.
7 – Large example of a habitat type.	The habitats within the SNA would not be considered large examples.	No
8 – Aquatic habitat critical to the self sustainability of a species.	Longfin eel and giant kokopu are considered likely to occur, but it is not considered that the habitat would be critical for the species (refer to SNA 1, Table 8). There is a low potential that black mudfish could be present. If they were to be present they do not migrate and live their full lifecycle in the wetland, therefore, it would be critical to their survival (refer to SNA 2, Table 9).	To be confirmed
9 – Indigenous vegetation that is a health, representative example.	The mature secondary forest in SNA 5 covers > 1 ha, which is below the median of 2.8 ha. Therefore, it is considered to be a small example. However, it is considered diverse and healthy (structure, composition and ecological processes are intact). The forest would not meet the definition of representative within the 2002 guidance document, but it is considered that the mature forest within SNA 4 and SNA 5 is linked by the regenerating broadleaf forest along the stream gully. This habitat is not considered in itself to be of SNA quality in its current state but does add to the value of the mature forest.	Yes
10 – Part of an ecological sequence that's not common.	The mature secondary forest in SNA 4 covers > 1 ha, which is below the median of 2.8 ha. Therefore, it is considered to be a small example. However, it is considered to be a diverse and to	No

SNA criteria in WRPS	Discussion	Meets the criteria? Yes or No.
	be healthy (structure, composition and ecological processes are intact). The forest would not meet the definition of representative within the 2002 guidance document, but it is considered that the mature forest within SNA 4 and SNA 5 is linked by the regenerating broadleaf forest along the stream gully. This habitat is not considered in itself to be of SNA quality in its current state but does add to the value of the mature forest.	
11 – Buffer, link or corridor for another SNA.	Refer to SNA 1 (Table 8) in relation to Lake Whangape. In relation to criterion 9 ecological linkages are discussed between the forest in SNA 4 and 5, but it is not considered that this linkage is protecting each of the SNA habitats.	No
Does SNA 5 meet 1 or more of the significance criteria?	The SNA unit meets criteria 9 / 4 and has the potential to meet criteria 3 and 8.	Yes

4.2.5.6 Summary of SNAs

Table 14 Review of the characteristics of SNA habitats within the Study Area against the WRPS criteria.

WRPS SNA criteria	SNA 1	SNA 2	SNA 3	SNA 4	SNA 5
Criteria 1 - Protected areas	-	-	-	-	-
Criteria 2 – Coastal marine area	-	-	-	-	-
Criteria 3 – Threatened species	Further survey	Further survey	Further survey	Further survey	Further survey
Criteria 4 – Under represented habitats (<20%)	Linked to C9	-	Linked to C9	Linked to C9	Linked to C9
Criteria 5 – Naturally uncommon vegetation or habitat	-	-	-	-	-
Criteria 6 – Wetland – indigenous flora and fauna	-	-	-	-	-
Criteria 7 – Large example of a habitat type	-	-	-	-	-
Criteria 8 – Aquatic habitat critical to the self sustainability of a species	-	Further survey	-	Further survey	Further survey
Criteria 9 – Indigenous vegetation that is a healthy, representative example	Yes	-	Yes	Yes	Yes
Criteria 10 – Part of an ecological sequence that's not common	-	-	-	-	-
Criteria 11 – Buffer, link or corridor for another SNA	-	-	-	-	-
Further survey (FS) requirements	Lizard, bird and bat surveys	Fish, wetland birds and wetland condition survey	Lizard, bird and bat surveys	Lizard, bat, bird fish, wetland bird and wetland condition surveys.	Lizard, bat, bird, fish, wetland bird and wetland condition surveys.

5.0 Conclusion

The review of the habitats within the SNA units identified that in all of the SNA units there are habitats that would not meet WRPS criteria 9 e.g. dominated by exotic or early regenerating native species. The definition of an SNA of local significance presented within the Guidelines to apply Regional Criteria and Determine Level of Significance (Environment Waikato and Wildlands, 2002) states that a local site should at least meet criteria 9. Therefore, these habitat areas were eliminated from the detailed assessment against the WRPS criteria (Appendix G).

This is relevant because it affects the size of the habitat in the SNA being assessed against the WRPS criteria. The guidelines (Environment Waikato and Wildlands, 2002) indicate that for a habitat to meet criteria 9 it should be '*a healthy, representative example*' and continues by stating that that a '*representative example*' will be the larger and most diverse remaining examples of indigenous vegetation and habitats'.

The remaining habitats in the SNA units were review against the WRPS criteria. This indicated that mature forest habitat in SNA 1, 3, 4 and 5 (Appendix G – habitats not hatched in purple) meets criteria 9 presented within the WRPS, albeit that SNA 3, 4 and 5 are considered small examples for the district. This is because they were considered to be healthy self-sustaining habitats that were representative based on the definitions provided within the Environment Waikato and Wildlands, 2002 guidance document.

The ecological information currently available indicates that SNA 2 does not meet any of the SNA criteria. However, this assessment has been completed without detailed species survey results and the habitat appraisal identified that there is the potential for the habitat in SNA 2 to support 'threatened' or 'at risk' bird and fish species that would mean the unit meets criteria 3 or 8 of the WRPS.

Appendix H presents details of the surveys that would need to be undertaken if the classification of SNA 2 in the proposed Waikato District Plan were to be challenged.

The table in Appendix H also details the surveys that could be undertaken to determine whether SNA 1, 3, 4 and 5 would met the additional criteria highlighted in Table 14. These surveys would be required to support the argument that these SNA units include habitats that are not of SNA quality e.g. bats will use exotic vegetation.

6.0 References

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7.0 Standard Limitations

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Appendix A

WRPS Significance Criteria

Appendix A WRPS Significance Criteria

Waikato Regional Policy Statement 2016 - 11A Criteria for determining significance of indigenous biodiversity (Table 11-1)

The following criteria are to be used to identify areas of significant indigenous biodiversity and their characteristics as they exist at the time the criteria are being applied. Criteria may be specific to a habitat type including water, land or airspace or be more inclusive to address connectivity, or movement of species across habitat types.

To be identified as significant an area needs to meet one or more of the criteria identified in the table below.

Areas of significant indigenous biodiversity shall not include areas that have been created and subsequently maintained for or in connection with:

- artificial structures (unless they have been created specifically or primarily for the purpose of protecting or enhancing biodiversity); or
- beach nourishment and coastal planting (unless they have been created specifically or primarily for the purpose of protecting or enhancing biodiversity).

Table A1 - Criteria for determining significance of indigenous biodiversity

No.	WRPS SNA significance criteria	Guidance from Environment Waikato (2002)
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.	This may include sites protected under the Conservation Act, Resource Management Act, or with QEII or NWR. The assumption inherent in this criterion is that legally protected areas have been assessed and deemed worthy of protection. Therefore, such sites are assumed to be significant unless challenged, in which case the challenger would have to show that the site does not meet criteria 3-11.
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.	N/A – CMA not present in Study Area
3.	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: <ul style="list-style-type: none"> • classed as threatened or at risk, or • endemic to the Waikato region, or • at the limit of their natural range. 	Species that are threatened with extinction are indigenous species that have been evaluated and placed within any of the "Threatened" categories under the New Zealand Threat Classification System. Endemic to the Waikato Region, means currently only occurs naturally within the Waikato Region.
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.	Used biodiversity layers available on Waikato Regional Council online maps, i.e. kahikatea forest cover, and known depletion of wetland systems in the region (<20% of original coverage).

No.	WRPS SNA significance criteria	Guidance from Environment Waikato (2002)
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.	<p>Geothermal habitats can include geysers, springs, sinter terraces, and hydro-thermally altered soils. They provide habitat for geothermally-influenced vegetation, and heat tolerant bacteria.</p> <p>Chenier plain is a plain comprising shell ridges with infilled muds and other sediment between the ridges. An extensive area at Miranda provides habitat for international wader migrants.</p> <p>Karst ecosystems are limestone systems, providing habitat for specialist limestone plants (e.g. <i>Asplenium cimmeriorum</i>, <i>Gymnostomum calcereum</i>) and fauna (e.g. cave weta).</p>
6	<p>It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with:</p> <ul style="list-style-type: none"> • waste treatment; • wastewater renovation; • hydro electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; <p>unless in those instances they meet the criteria in Whaley et al. (1995)¹⁷.</p>	<p>Wetlands have been severely depleted nationwide, and are recognised as a rare habitat type. The RMA definition of a wetland is: “permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.”</p> <p>Wetlands may have fluctuating water levels and the edge of a wetland may be difficult to define but will generally be where wetland plant species (e.g. raupo) are replaced with dryland species (e.g. kanuka). Note that manuka can occur in wetland and dryland habitats.</p> <p>All artificially-created wetlands listed should also be evaluated using the criteria in Whaley et al. (1995), as well as criteria 1-5 and 7-11 in this table.</p>
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.	<p>This criterion is not intended to select the largest single example of a habitat type in the Waikato Region.</p> <p>Refer to vegetation maps to determine which other parts of the region have similar habitat, and the size of those examples.</p> <p>Refer to natural area inventories, DOC compilations of Sites of Special Wildlife Importance (SSWI), DOC Conservation Management Strategies, Protected Natural Area Programme reports to help determine the species that are typical of each habitat type.</p>

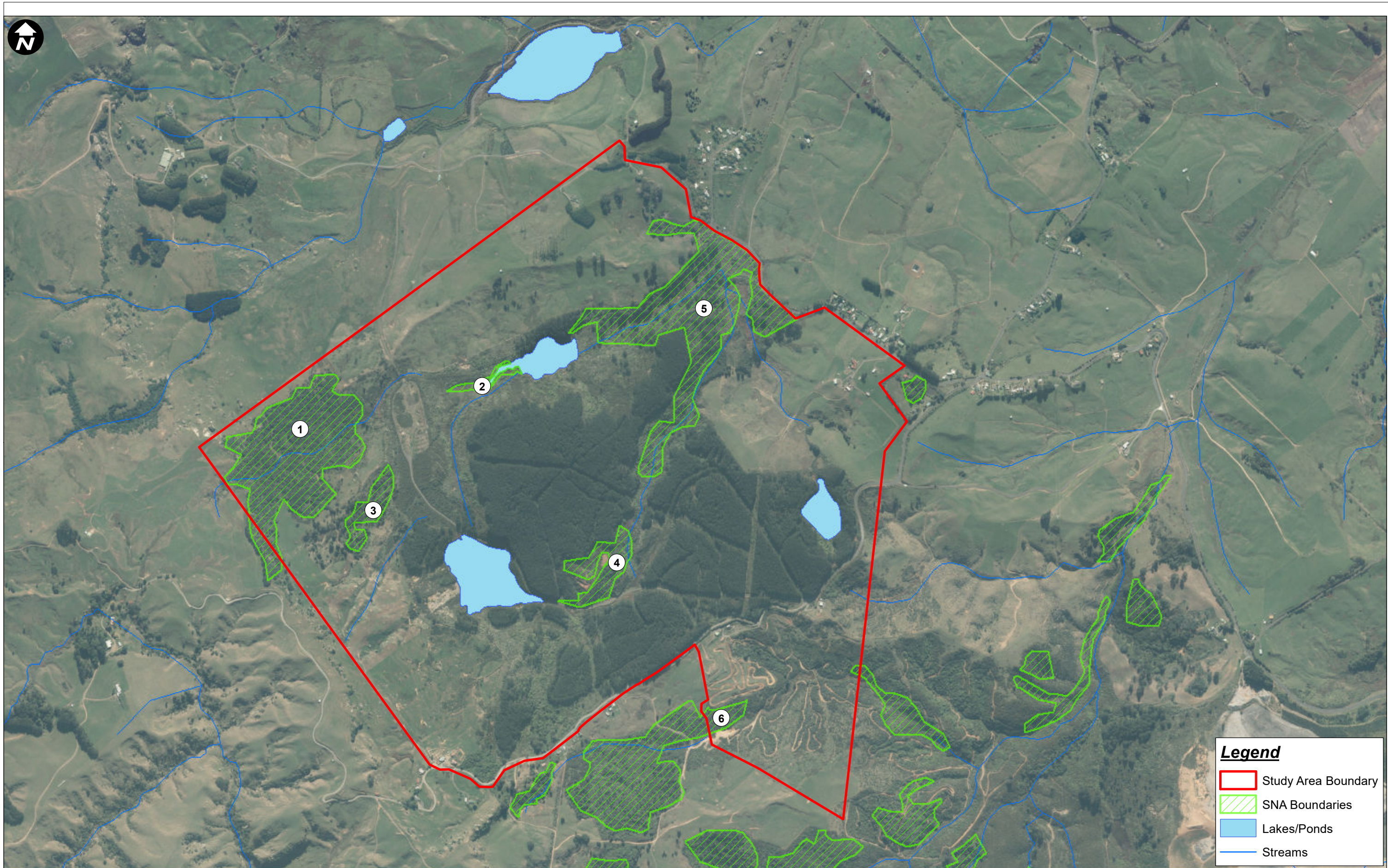
¹⁷ Whaley KJ, Clarkson BD, Leathwick JR. 1995. Assessment of criteria used to determine ‘significance’ of natural areas in relation to section 6(c) of the Resource Management Act (1991). Landcare Research Contract Report. Prepared for Environment Waikato, Hamilton.

No.	WRPS SNA significance criteria	Guidance from Environment Waikato (2002)
8	<p>It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.</p>	<p>Excluding artificial water bodies, except those created for the maintenance and enhancement of biodiversity or as mitigation for a consented activity.</p> <p>Critical means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas, and migratory pathways.</p> <p>It is likely that sound technical advice will need to be obtained from an appropriately qualified and experienced aquatic ecologist.</p>
9	<p>It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because:</p> <ul style="list-style-type: none"> • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time. 	<p>Ecological sustainability means a site's ability to continue to exist as an area of indigenous vegetation or habitat for indigenous fauna when taking into account its size, shape, buffering from external effects, connection to other natural areas, and likely threats. It may change naturally into a different habitat but will remain essentially as indigenous species and of natural character.</p> <p>Ecologists assessing this criterion should take into account the site's size, shape, buffering from external effects, and connection to other natural areas. Other factors to be considered include indigenous regeneration (presence of fruit, seedlings, nests, juvenile animals etc), structural tiers (layers), hydrological processes in wetlands, invasive weeds, pest animals, domestic stock, threat management, management history.</p> <p>Representative areas are sites that are the best examples of sites that form a network covering the full range of landforms, soil sequences, vegetation and fauna communities within an ecological district. The reality for many landscapes, particularly throughout much of the Waikato, is that a 'representative example' will be the larger and most diverse remaining examples</p>

No.	WRPS SNA significance criteria	Guidance from Environment Waikato (2002)
10	<p>It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.</p>	<p>Ecological sequence means a series of two or more connected ecosystem or vegetation types that retain natural transition zones along an environmental gradient. Ecological sequences that are not common in the Waikato region include, but are not restricted to, native dune vegetation through to coastal scrub or forest, lake margins or geothermal systems to native forest, coastal to montane or alpine vegetation.</p> <p>Such sequences should be largely intact (e.g. perhaps bisected by roads but not by large tracts of non-native land cover), such that they can be traversed by the majority of indigenous species that are reliant on such sequences for the completion of part or all of their life-cycles (either by deliberate movement or dispersal of propagules such as seed or pollen).</p> <p>An exceptional, representative sequence will be one of the best examples of its type, taking into account its intactness, composition, and ecological processes.</p>
11	<p>It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.</p>	<p>This also includes riparian vegetation that protects a significant aquatic habitat, e.g. a freshwater fishery.</p>

Appendix B

Identified SNAs and
Sample Locations.



Legend

- Study Area Boundary
- SNA Boundaries
- Lakes/Ponds
- Streams

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SPATIAL REFERENCE

Scale: 1:12,500 (A3 size)

130 65 0 130 260
Meters

Map features depicted in terms of NZTM 2000 projection.

Data Sources:
Cadastral Boundaries – LINZ NZ Cadastral Dataset

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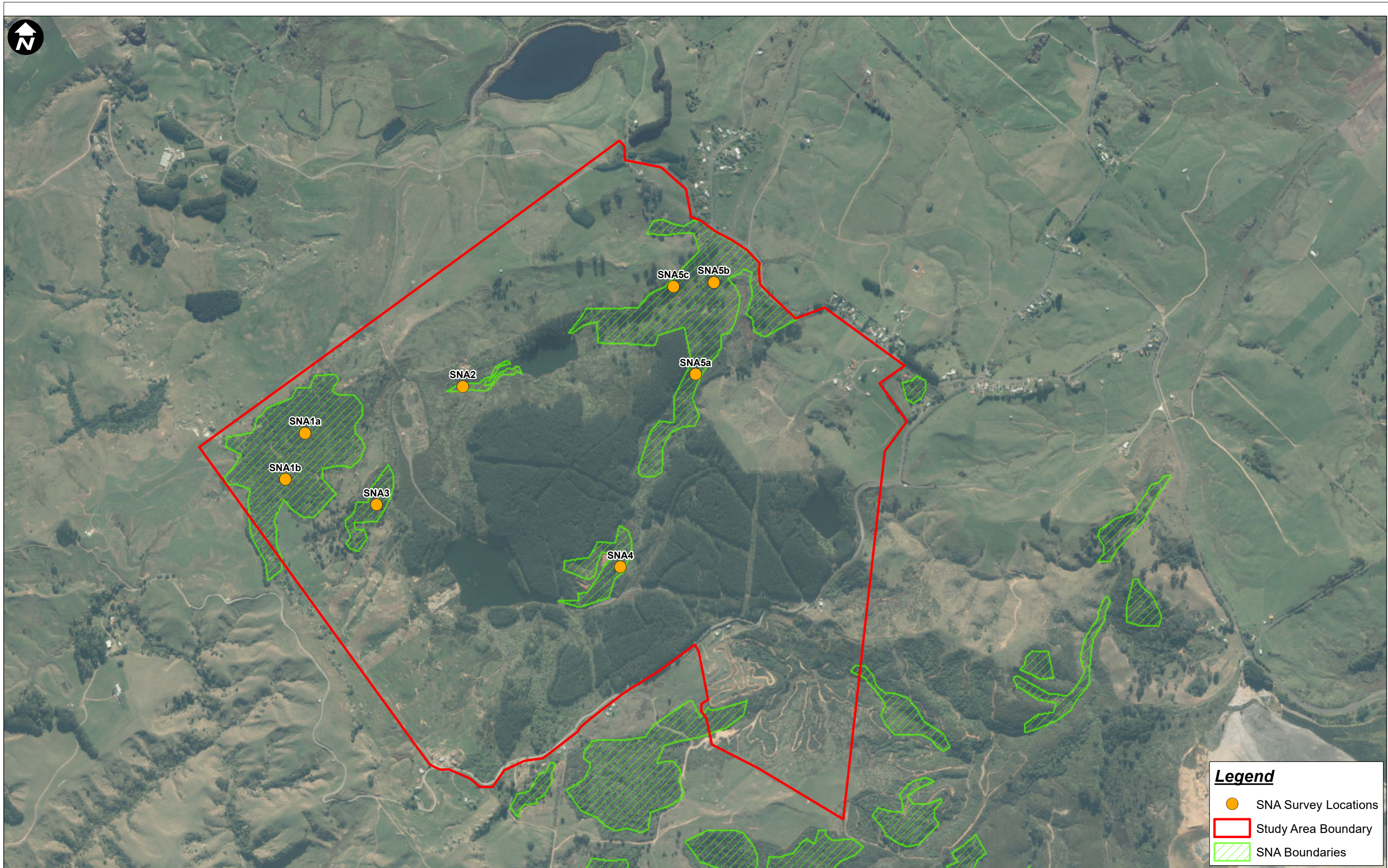
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PROJECT NUMBER
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SHEET TITLE
SNAS WITHIN THE
STUDY AREA

MAP NUMBER
FIGURE B1



Legend

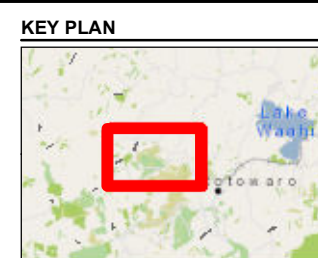
- SNA Survey Locations
- Study Area Boundary
- SNA Boundaries

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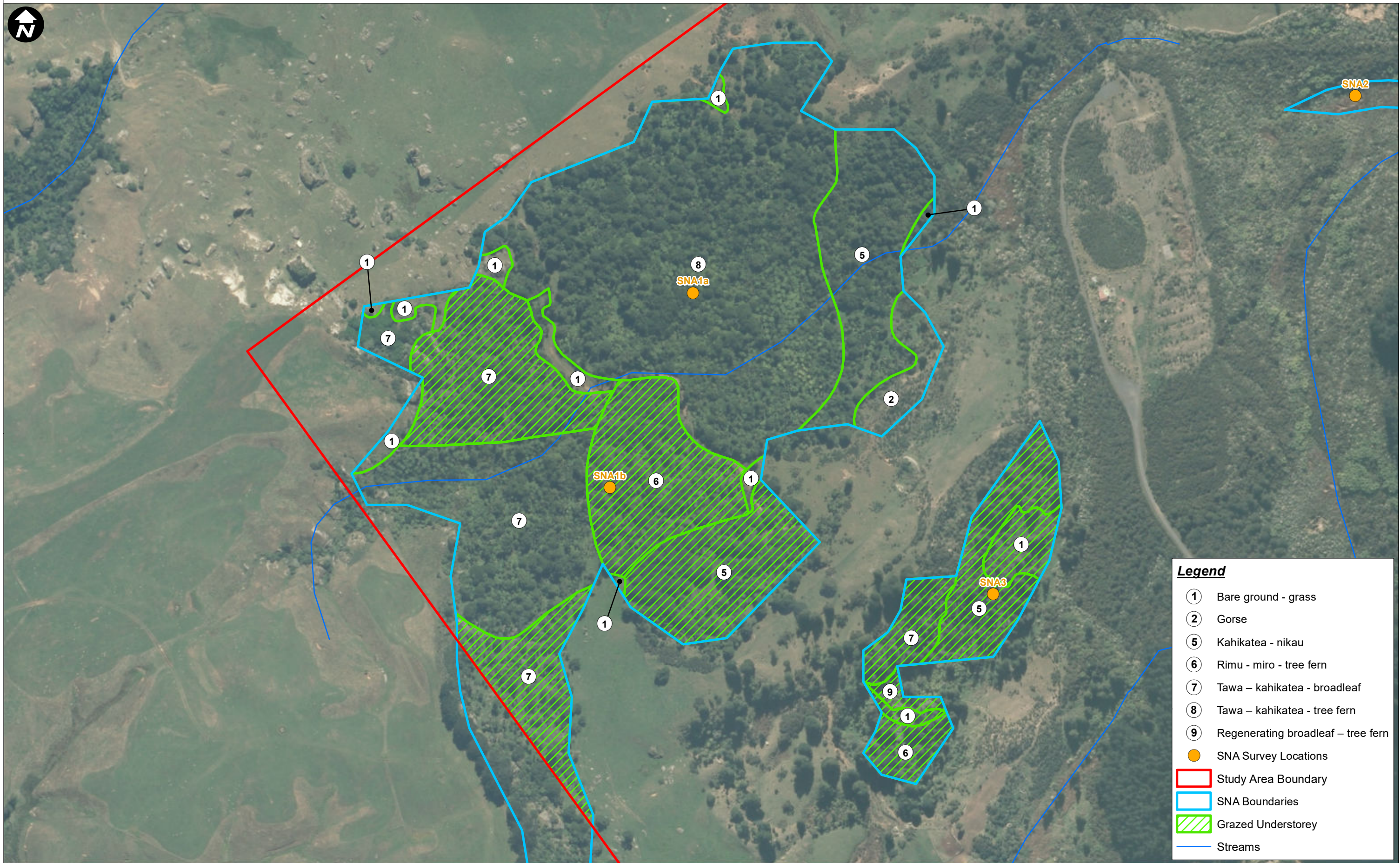
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PROJECT NUMBER
 60589934
SHEET TITLE
 SNA SURVEY LOCATIONS
MAP NUMBER
 FIGURE B2

Appendix C

Dominant Vegetation
Types.



Legend

- ① Bare ground - grass
- ② Gorse
- ⑤ Kahikatea - nikau
- ⑥ Rimu - miro - tree fern
- ⑦ Tawa – kahikatea - broadleaf
- ⑧ Tawa – kahikatea - tree fern
- ⑨ Regenerating broadleaf – tree fern
- SNA Survey Locations
- ▭ Study Area Boundary
- ▭ SNA Boundaries
- ▨ Grazed Understorey
- Streams

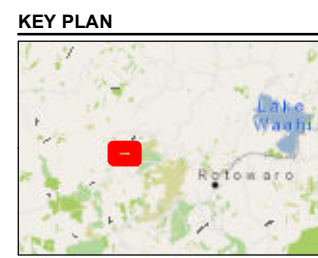
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SHEET TITLE
 DOMINANT VEGETATION
 TYPES
MAP NUMBER
 FIGURE C1



Legend

- ③ Pampas
- ④ Low diversity regenerating scrub
- ⑨ Regenerating broadleaf – tree fern
- ⑫ Raupo
- ⑭ Open water
- SNA Survey Locations
- SNA Boundaries
- Streams

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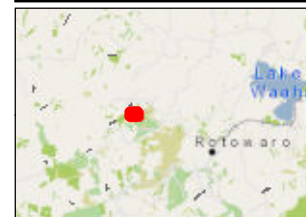


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Scale: 1:1,000 (A3 size)
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PROJECT NUMBER

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SHEET TITLE

**DOMINANT VEGETATION
 TYPES**

MAP NUMBER

FIGURE C2



Legend

- ① Bare ground - grass
- ③ Pampas
- ④ Low diversity regenerating scrub
- ⑦ Tawa – kahikatea - broadleaf
- ⑨ Regenerating broadleaf – tree fern
- ⑫ Raupo
- SNA Survey Locations
- SNA Boundaries
- Streams

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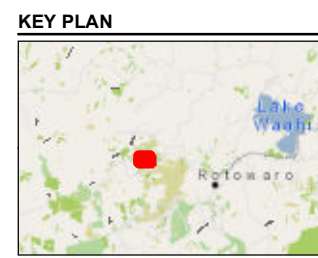
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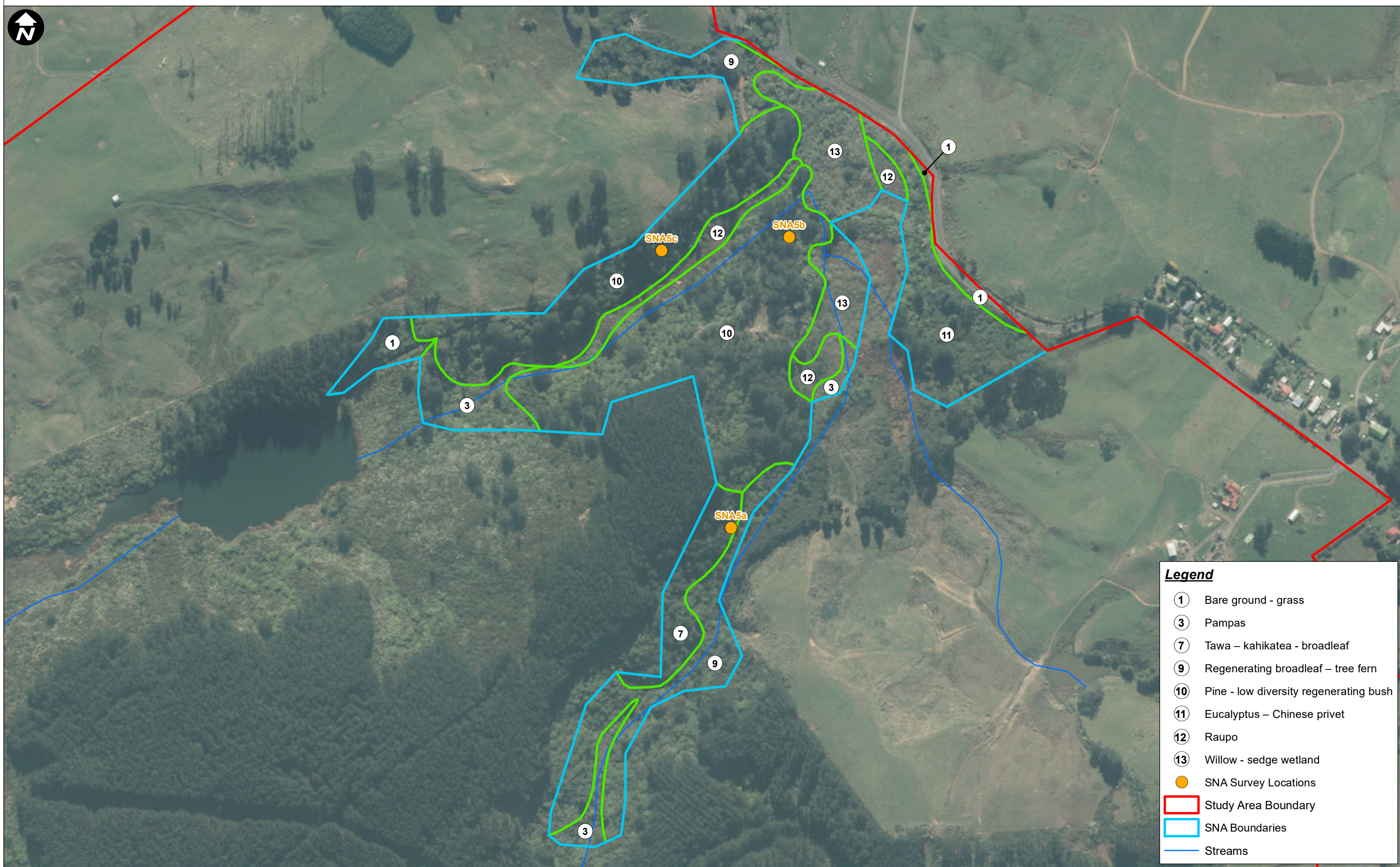
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PROJECT NUMBER
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SHEET TITLE
 DOMINANT VEGETATION
 TYPES
MAP NUMBER
 FIGURE C3



Legend

- ① Bare ground - grass
- ③ Pampas
- ⑦ Tawa – kahikatea - broadleaf
- ⑨ Regenerating broadleaf – tree fern
- ⑩ Pine - low diversity regenerating bush
- ⑪ Eucalyptus – Chinese privet
- ⑫ Raupo
- ⑬ Willow - sedge wetland
- SNA Survey Locations
- ▭ Study Area Boundary
- ▭ SNA Boundaries
- Streams

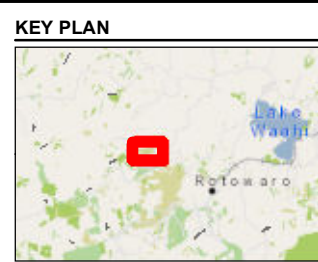
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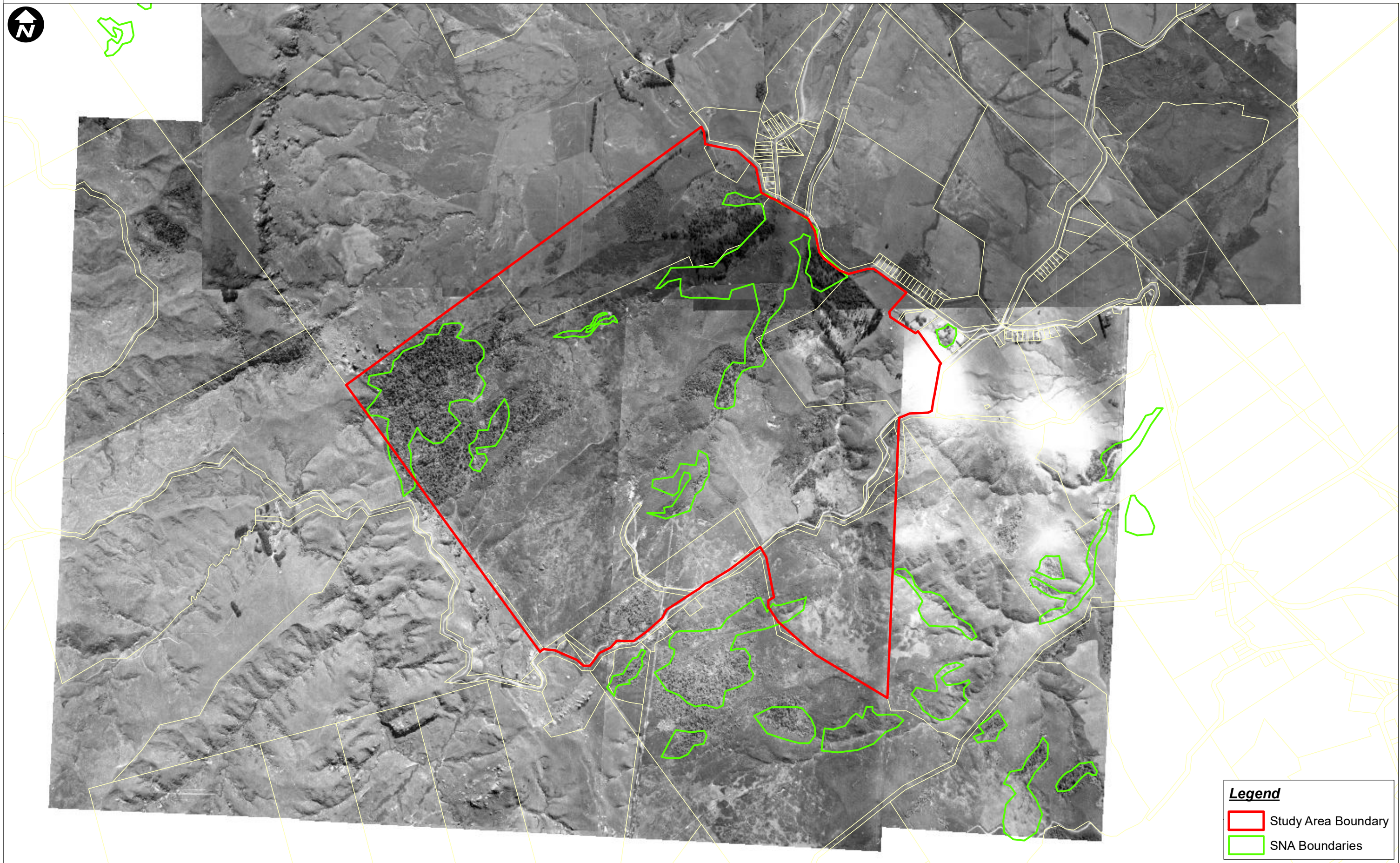
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 DOMINANT VEGETATION
 TYPES
MAP NUMBER
 FIGURE C4

Appendix D

Historical Aerial Imagery



Legend

- Study Area Boundary
- SNA Boundaries

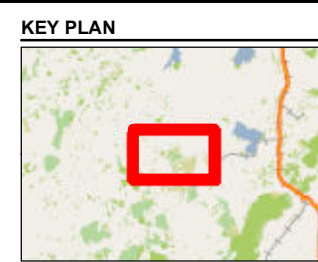
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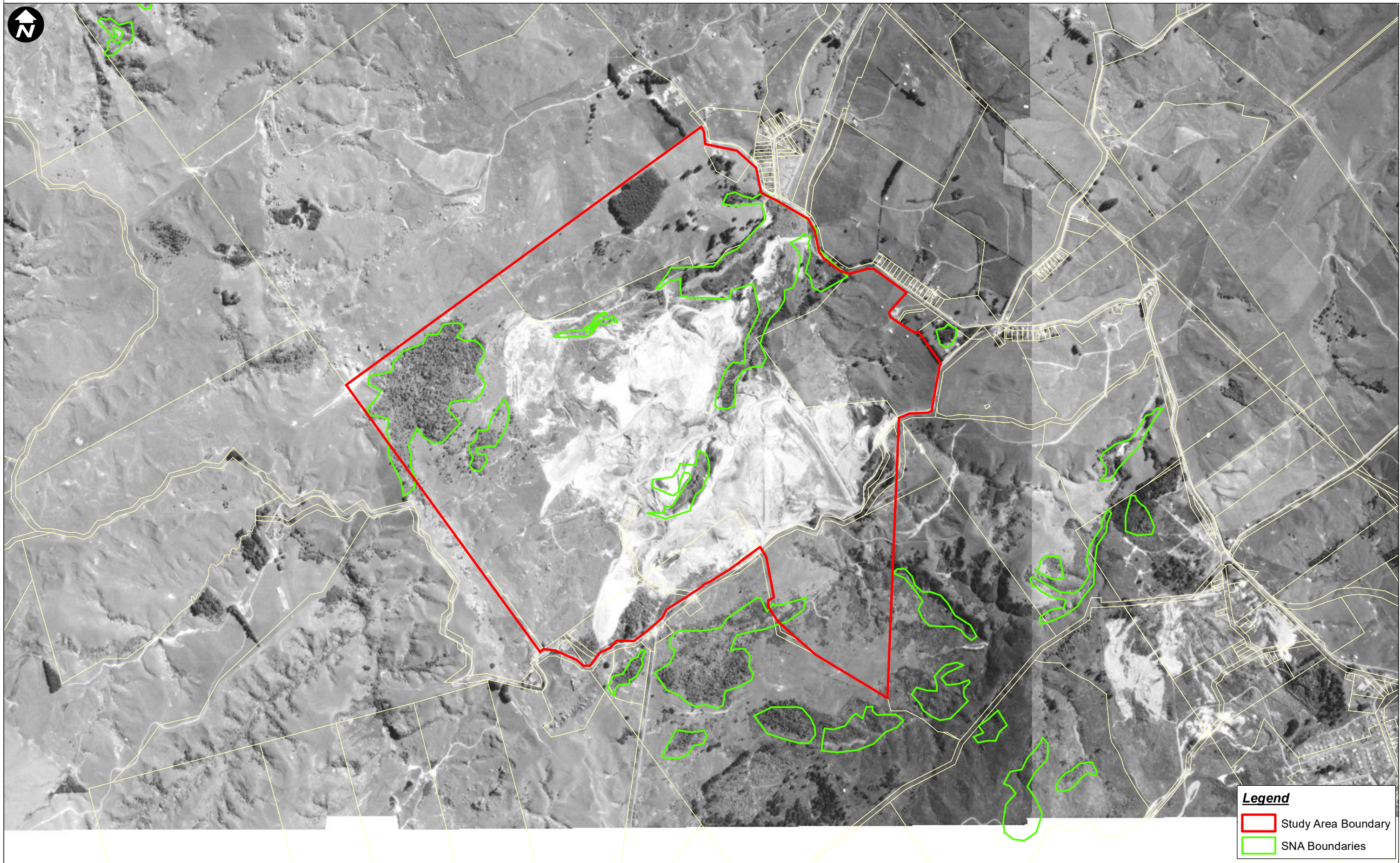
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AERIAL 1941
MAP NUMBER
FIGURE D1



Legend

- Study Area Boundary
- SNA Boundaries

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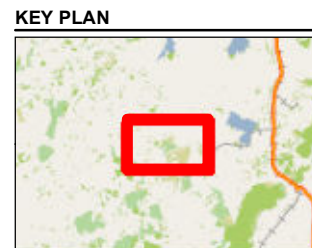
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160 80 0 160 320
Meters

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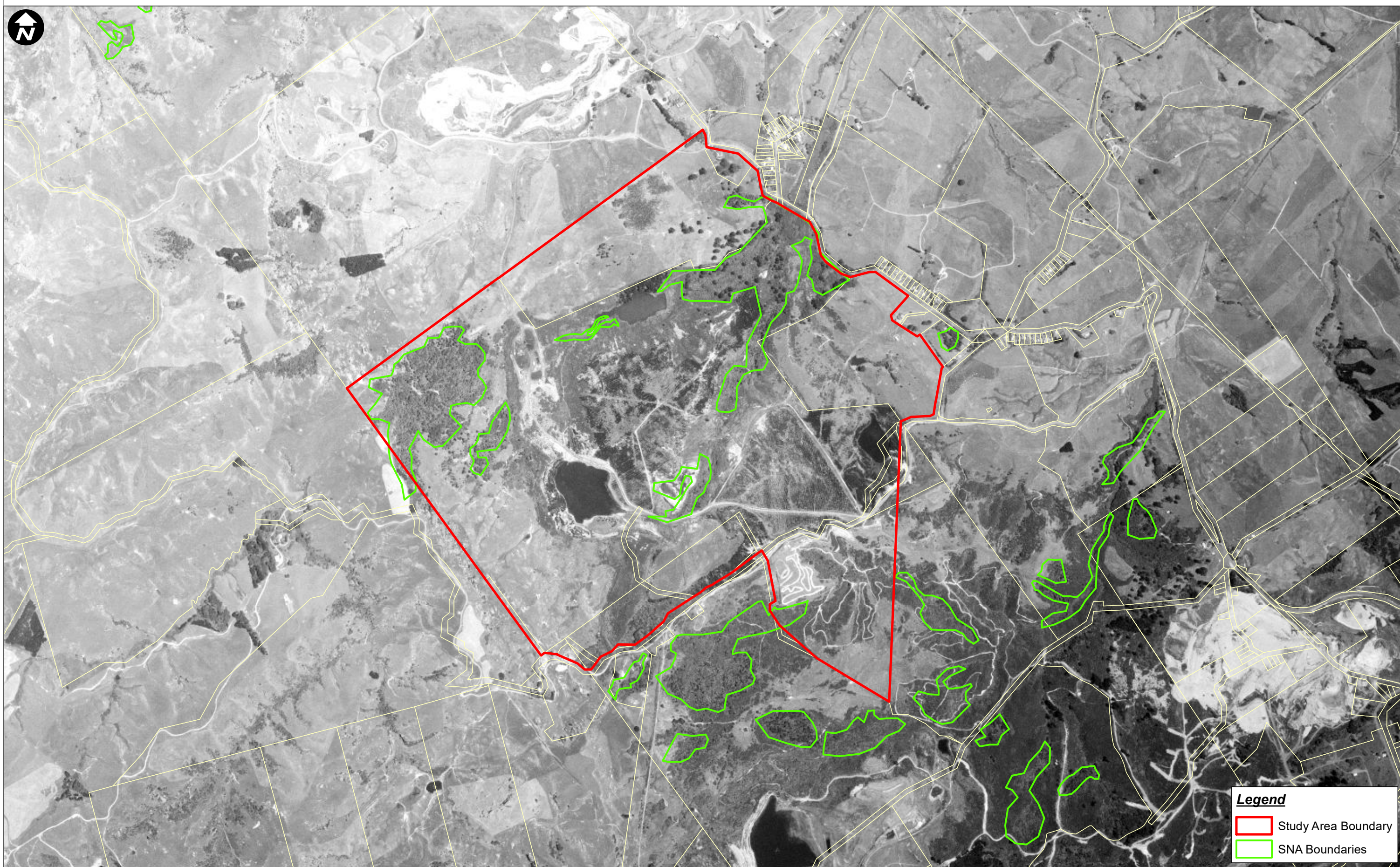
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SHEET TITLE
AERIAL 1979

MAP NUMBER
FIGURE D2



Legend

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- SNA Boundaries

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SPATIAL REFERENCE

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FIGURE D3

Appendix E

RECCE Vegetation Plot Results

DRAFT**Appendix D RECCE Vegetation Plot Results**

This appendix provides the results from the RECCE vegetation plots and incidental species sighting recorded during the site visits undertaken by AECOM between 29 August and 4 September 2019.

The status' noted in Tables D1 and D2 are based on the classifications in de Lange et al. (2018) are denoted as follows:

- NT – Not Threatened;
- AR, D – At Risk – Declining;
- T, NV – Threatened – Nationally Vulnerable; and
- INT – Introduced/exotic species.

Tables D3 to D10 provide a summary of the results from the RECCE vegetation plot surveys completed in SNAs 1 to 5. The cover-abundances classes, the threat status of indigenous plants and identification of exotic/introduced species are identified based on the notes described below.

Notes:	
¹ - Cover class codes:	1 = < 1% 2 = 1 to 5% 3 = 6 to 25% 4 = 26 to 50% 5 = 51 - 75% 6 = 76 - 100%
Bold - plant species 'At Risk' (de Lange <i>et al.</i> 2018):	D = declining Rec = recovering Rel = relict NU = naturally uncommon
<u>Bold + Underlined</u> - plant species 'Threatened' (de Lange <i>et al.</i> 2018):	NC = nationally critical NE = nationally endangered NV = nationally vulnerable
Grey – introduced/exotic species	

Table D1 Complete plant list of all species recorded within RECCE plots

Scientific Name	Common Name	Threat status	Scientific Name	Common Name	Threat status
<i>Acianthus sinclairii</i>	heart-leaved orchid	NT	<i>Jasminum polyanthum</i>	jasmine	int
<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	titoki	NT	<i>Knightsia excelsa</i>	rewarewa	NT
<i>Alseuosmia</i> sp.	toropapa	NT	<i>Kunzea robusta</i> ^{NV}	kānuka	T, NV
<i>Aristotelia serrata</i>	makomako / wineberry	NT	<i>Laurelia novae-zealandiae</i>	pukatea	NT
<i>Arthropteris tenella</i>	jointed fern	NT	<i>Leptolepia novae-zealandiae</i>	lace fern	NT
<i>Asplenium bulbiferum</i>	mouku / hen and chickens fern	NT	<i>Leptopteris hymenophylloides</i>	heruheru / crape fern	NT
<i>Asplenium flaccidum</i>	makawe / drooping spleenwort	NT	<i>Leptospermum scoparium</i> var. <i>scoparium</i> ^D	mānuka	AR, D
<i>Asplenium oblongifolium</i>	huruhuru whenua / shining spleenwort	NT	<i>Leucopogon fasciculatus</i>	mingimingi	NT
<i>Asplenium polyodon</i>	petako	NT	<i>Leycesteria formosa</i>	Himalayan honeysuckle	int
<i>Asplenium trichomanes</i>	maidenhair spleenwort	NT	<i>Ligustrum sinense</i>	Chinese privet	int
<i>Astelia solandri</i>	kōwharawhara	NT	<i>Ligustrum lucidum</i>	tree privet	int
<i>Austroblechnum lanceolatum</i>	nini	NT	<i>Loxogramme dictyopteris</i>	lance fern	NT
<i>Beilschmiedia tawa</i>	tawa	NT	<i>Lygodium articulatum</i>	mangemange	NT
<i>Brachyglottis repanda</i>	rangiora	NT	<i>Meliccytus ramiflorus</i>	māhoe	NT
<i>Carex</i> sp.	carex	-	<i>Metrosideros carminea</i> ^{NV}	carmine rātā	T, NV
<i>Carpodetus serratus</i>	putaputawētā	NT	<i>Metrosideros perforata</i> ^{NV}	akatea	T, NV
<i>Coprosma grandifolia</i>	kanono	NT	<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hounds tongue	NT
<i>Coprosma lucida</i>	karamu	NT	<i>Microsorium scandens</i>	mokimoki	NT
<i>Coprosma rhamnoides</i>	-	NT	<i>Myrsine australis</i>	māpou	NT
<i>Coprosma robusta</i>	karamu	NT	<i>Olearia rani</i> var. <i>colorata</i>	heketara	NT
<i>Coprosma spathulata</i> subsp. <i>spathulata</i>	-	NT	<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	-	NT
<i>Cordyline australis</i>	tī kōuka / cabbage tree	NT	<i>Parablechnum novae-zealandiae</i>	kiokio	NT
<i>Cordyline banksii</i>	Bank's cabbage tree	NT	<i>Pectinopitys ferruginea</i>	miro	NT

Scientific Name	Common Name	Threat status	Scientific Name	Common Name	Threat status
<i>Cortaderia selloana</i>	pampas	int	<i>Phyllocladus trichomanoides</i>	tānekaha	NT
<i>Corybas trilobus</i>	spider orchid	NT	<i>Pinus radiata</i>	radiata pine	int
<i>Corynocarpus laevigatus</i>	karaka	NT	<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa	NT
<i>Cyathea dealbata</i>	pōnga / silver fern	NT	<i>Pittosporum tenuifolium</i>	kōhūhū	NT
<i>Cyathea medullaris</i>	mamaku	NT	<i>Pneumatopteris pennigera</i>	piupiu / feather fern	NT
<i>Dacrycarpus dacrydioides</i>	kahikatea	NT	<i>Podocarpus laetus</i>	Hall's tōtara	NT
<i>Dacrydium cupressinum</i>	rimu	NT	<i>Pseudopanax arboreus</i>	whauwhaupaku / fivefinger	NT
<i>Dianella nigra</i>	tūrutu / New Zealand blueberry	NT	<i>Pseudopanax crassifolius</i>	horoeaka / lancewood	NT
<i>Dicksonia squarrosa</i>	whēkī	NT	<i>Pteris macilenta</i>	sweet fern	NT
<i>Earina mucronata</i>	peka-a-waka / bamboo orchid	NT	<i>Pterostylis</i> sp.	greenhood orchid	-
<i>Elatostema rugosum</i>	parataniwha	NT	<i>Pyrosia elaeagnifolia</i>	leather-leaf fern	NT
<i>Freycinetia banksii</i>	kiekie	NT	<i>Rhopalostylis sapida</i>	nīkau	NT
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	NT	<i>Ripogonum scandens</i>	kareao / supplejack	NT
<i>Griselinia lucida</i>	puka	NT	<i>Schefflera digitata</i>	patē / sevenfinger	NT
<i>Hedycarya arborea</i>	porokaiwhiri / pigeonwood	NT	<i>Streblus heterophyllus</i>	tūrepo	NT
<i>Hymenophyllum flabellatum</i>	mauka / filmy fern	NT	<i>Typha orientalis</i>	raupō	NT
<i>Hymenophyllum</i> aff. <i>rarum</i>	filmy fern	NT	<i>Ulex europeaus</i>	gorse	int
<i>Hypolepis rufobarbata</i>	sticky pig fern	NT	<i>Veronica stricta</i> var. <i>stricta</i>	koromiko	NT
<i>Icarus filiformis</i>	thread fern	NT	<i>Vitex lucens</i>	pūriri	NT
<i>Ilex aquifolium</i>	holly	int			

Table D2 Incidental plant species recorded outside of the RECCE plots and their corresponding SNA they were observed in

Latin name	Common name	Threat status	SNA where present
<i>Earina mucronata</i>	peka-a-waka / bamboo orchid	NT	1
<i>Dysoxylum spectabile</i>	kohekohe	NT	1
<i>Pennantia corymbosa</i>	kaikōmako	NT	1
<i>Typha orientalis</i>	raupō	NT	1, 3, 5
<i>Beilschmiedia tawa</i>	tawa	NT	3
<i>Pectinopitys ferruginea</i>	miro	NT	3
<i>Dacrydium cupressinum</i>	rimu	NT	3
<i>Hakea salicifolia</i>	willow-leaved hakea	int	4
<i>Hakea sericea</i>	prickly hakea	int	4
<i>Ulex europeaus</i>	gorse	int	3, 4
<u>Kunzea robusta</u> ^{NV}	kānuka	T, NV	4
<i>Cortaderia selloana</i>	pampas	int	4
<i>Leucopogon fasciculatus</i>	mingimingi	NT	4
<i>Leptospermum scoparium</i> var. <i>scoparium</i> ^D	mānuka	AR, D	4
<i>Paraserianthes lophantha</i>	brush wattle	int	4, 5
<i>Erica lusitanica</i>	Spanish heath	int	4
<i>Podocarpus laetus</i>	Hall's tōtara	NT	4
<i>Dacrydium cupressinum</i>	rimu	NT	4
<i>Lonicera japonica</i>	Japanese honeysuckle	int	4, 5
<i>Pinus radiata</i>	radiata pine	int	4
<i>Eucalyptus</i> sp.	eucalyptus	int	5
<i>Zantedeschia aethiopica</i>	arum lily	int	5
<i>Crocsmia x crocosmiiflora</i>	montbretia	int	5
<i>Cordyline australis</i>	tī kōuka / cabbage tree	NT	5
<i>Arundo donax</i>	giant reed	int	5
<i>Leycesteria formosa</i>	himalayan honeysuckle	int	5
<i>Salix cinerea</i>	grey willow	int	5
<i>Carex secta</i>	purei	NT	5
<i>Parablechnum novae-zelandiae</i>	kiokio	NT	5
<i>Cupressus macrocarpa</i>	macrocarpa	int	5

SNA 1

Table D3 SNA 1 RECCE plot vegetation information, recorded in plot SNA1a

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		0	5	4	2	3	2	n/a
<i>Beilschmiedia tawa</i>	tawa	-	4	3	-	-	-	-
<i>Cyathea medullaris</i>	mamaku	-	1	1	-	-	-	-
<i>Ripogonum scandens</i>	kareao / supplejack	-	1	1	-	-	-	-
<i>Rhopalostylis sapida</i>	nīkau	-	-	2	1	5	5	-
<i>Hedycarya arborea</i>	porokaiwhiri / pigeonwood	-	-	1	-	-	1	-
<i>Melicytus ramiflorus</i>	māhoe	-	-	2	1	2	-	-
<i>Dicksonia squarrosa</i>	whekī	-	-	5	2	2	1	-
<i>Metrosideros carminea</i> ^{NV}	carmine rātā	-	-	1	1	1	-	-
<i>Metrosideros perforata</i> ^{NV}	akatea	-	-	1	1	-	-	-
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa	-	-	-	2	1	2	-
<i>Carpodetus serratus</i>	putaputawētā	-	-	-	1	-	-	-
<i>Laurelia novae-zealandiae</i>	pukatea	-	-	-	2	2	2	-
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	-	2	3	1	-
<i>Myrsine australis</i>	māpou	-	-	-	1	1	2	-
<i>Dacrycarpus dacrydioides</i>	kahikatea	-	-	-	2	1	1	-
<i>Schefflera digitata</i>	patē / sevenfinger	-	-	-	-	1	1	-
<i>Knightia excelsa</i>	rewarewa	-	-	-	-	1	2	-
<i>Coprosma spathulata</i> subsp. <i>spathulata</i>	-	-	-	-	-	1	-	-
<i>Cyathea dealbata</i>	pōnga / silver fern	-	-	-	-	-	1	-
<i>Coprosma grandifolia</i>	kanono	-	-	-	-	-	1	-
<i>Icarus filiformis</i>	thread fern	-	-	-	-	-	3	2
<i>Asplenium trichomanes</i>	maidenhair spleenwort	-	-	-	-	-	1	-
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	-	-	-	-	-	-	1	-
<i>Leptopteris hymenophylloides</i>	heruheru / crape fern	-	-	-	-	-	1	-
<i>Asplenium bulbiferum</i>	mouku / hen and chickens fern	-	-	-	-	-	1	-
<i>Corybas trilobus</i>	spider orchid	-	-	-	-	-	1	-
<i>Pectinopitys ferruginea</i>	miro	-	-	-	-	-	1	-
<i>Elatostema rugosum</i>	parataniwha	-	-	-	-	-	1	-

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
<i>Asplenium oblongifolium</i>	shining spleenwort	-	-	-	-	-	1	-
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hound's tongue	-	-	-	-	-	-	1
<i>Asplenium flaccidum</i>	drooping spleenwort	-	-	-	-	-	-	1
<i>Microsorium scandens</i>	mokimoki	-	-	-	-	-	-	1
<i>Hymenophyllum flabellatum</i>	mauka / filmy fern	-	-	-	-	-	-	1
<i>Asplenium polyodon</i>	petako	-	-	-	-	-	-	1
<i>Griselinia lucida</i>	puka	-	-	-	-	-	-	1
<i>Astelia solandri</i>	kōwharawhara	-	-	-	-	-	-	1
<i>Lygodium articulatum</i>	mangemange	-	-	-	-	-	-	1

Table D4 SNA 1 RECCE plot vegetation information, recorded in plot SNA1b

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		6	2	4	1	1	2	n/a
<i>Dacrydium cupressinum</i>	rimu	4	-	-	-	-	-	-
<i>Knightia excelsa</i>	rewarewa	2	2	-	-	-	2	-
<i>Dacrycarpus dacrydioides</i>	kahikatea	2	1	-	-	-	-	-
<i>Pectinopitys ferruginea</i>	miro	1	1	-	-	-	-	-
<u>Metrosideros carminea</u> ^{NV}	carmine rātā	1	1	-	1	-	-	-
<u>Metrosideros perforata</u> ^{NV}	akatea	1	1	1	1	1	1	-
<i>Pseudopanax crassifolius</i>	horoeaka / lancewood	-	1	-	-	-	-	-
<i>Podocarpus laetus</i>	Hall's tōtara	-	1	-	-	-	-	1
<i>Dicksonia squarrosa</i>	whekī	-	-	2	-	1	1	-
<i>Cyathea dealbata</i>	pōnga / silver fern	-	-	5	1	-	-	-
<i>Brachyglottis repanda</i>	rangiora	-	-	1	-	-	-	-
<i>Myrsine australis</i>	māpou	-	-	1	-	-	-	-
<i>Melicytus ramiflorus</i>	māhoe	-	-	-	-	-	1	-
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	-	-	-	2	-
<i>Asplenium polyodon</i>	petako	-	-	-	-	-	1	-
<i>Rhopalostylis sapida</i>	nīkau	-	-	-	-	-	2	-
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hound's tongue	-	-	-	-	-	1	1
<i>Carex</i> sp.	carex	-	-	-	-	-	1	-
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa	-	-	-	-	-	1	-
<i>Microsorium scandens</i>	mokimoki	-	-	-	-	-	1	-
<i>Pterostylis</i> sp.	greenhood orchid	-	-	-	-	-	1	-
<i>Corybas trilobus</i>	spider orchid	-	-	-	-	-	1	-
<i>Ligustrum sinense</i>	Chinese privet	-	-	-	-	-	1	-
<i>Asplenium flaccidum</i>	drooping spleenwort	-	-	-	-	-	-	1
<i>Astelia solandri</i>	kōwharawhara	-	-	-	-	-	-	1
<i>Asplenium oblongifolium</i>	shining spleenwort	-	-	-	-	-	-	1
<i>Pyrosia elaeagnifolia</i>	leather-leaf fern	-	-	-	-	-	-	1

SNA 2

Table D5 SNA 2 RECCE plot vegetation information, recorded in plot SNA2

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		0	0	0	6	4	1	n/a
<i>Typha orientalis</i>	raupō	-	-	-	5	3	-	-
<i>Cortaderia selloana</i>	pampas	-	-	-	3	1	-	-
<i>Myrsine australis</i>	māpou	-	-	-	3	1	1	-
<i>Leucopogon fasciculatus</i>	mingimingi	-	-	-	3	1	-	-
<i>Leptospermum scoparium</i> var. <i>scoparium</i> ^D	mānuka	-	-	-	2	-	-	-
<i>Ulex europeaus</i>	gorse	-	-	-	2	-	-	-
<i>Coprosma robusta</i>	karamu	-	-	-	2	1	-	-
<i>Dicksonia squarrosa</i>	whekī	-	-	-	2	2	1	-
<i>Cyathea medullaris</i>	mamaku	-	-	-	2	1	-	-
<i>Cordyline australis</i>	tī kōuka / cabbage tree	-	-	-	1	-	-	-
<i>Pittosporum tenuifolium</i>	kōhūhū	-	-	-	1	1	-	-
<i>Leycesteria formosa</i>	Himalayan honeysuckle	-	-	-	-	1	-	-
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	-	-	1	1	-
<i>Asplenium polyodon</i>	petako	-	-	-	-	-	-	-
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hound's tongue	-	-	-	-	-	1	-
<i>Icarus filiformis</i>	thread fern	-	-	-	-	-	1	-

SNA 3

Table D6 SNA 3 RECCE plot vegetation information, recorded in plot SNA3

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		3	6	4	3	5	4	n/a
<i>Knightia excelsa</i>	rewarewa	1	-	-	-	-	-	-
<i>Dacrycarpus dacrydioides</i>	kahikatea	-	3	-	1	-	-	-
<i>Rhopalostylis sapida</i>	nīkau	-	3	2	1	4	4	-
<i>Ripogonum scandens</i>	kareao / supplejack	-	2	1	1	-	-	-
<i>Meliccytus ramiflorus</i>	māhoe	-	1	1	-	-	-	-
<i>Carpodetus serratus</i>	putaputawētā	-	-	1	-	-	-	-
<i>Cyathea dealbata</i>	pōnga / silver fern	-	-	1	3	3	-	-
<i>Cyathea medullaris</i>	mamaku	-	-	1	-	-	-	-
<i>Hedycarya arborea</i>	porokaiwhiri / pigeonwood	-	-	2	-	1	1	-
<i>Metrosideros carminea</i> ^{NV}	carmine rātā	-	-	1	1	1	-	-
<i>Metrosideros perforata</i> ^{NV}	akatea	-	-	1	1	1	-	-
<i>Ilex aquifolium</i>	holly	-	-	-	2	-	-	-
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	-	-	2	1	-
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa	-	-	-	-	1	-	-
<i>Streblus heterophyllus</i>	tūrepo	-	-	-	-	1	-	-
<i>Laurelia novae-zealandiae</i>	pukatea	-	-	-	-	1	-	-
<i>Myrsine australis</i>	māpou	-	-	-	-	-	1	-
<i>Icarus filiformis</i>	thread fern	-	-	-	-	-	3	1
<i>Pteris macilenta</i>	sweet fern	-	-	-	-	-	1	-
<i>Leptolepia novae-zelandiae</i>	lace fern	-	-	-	-	-	1	-
<i>Microsorium scandens</i>	mokimoki	-	-	-	-	-	-	3
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kowaowao / hounds tongue	-	-	-	-	-	-	1
<i>Asplenium flaccidum</i>	drooping spleenwort	-	-	-	-	-	-	1
<i>Earina mucronata</i>	peka-a-waka / bamboo orchid	-	-	-	-	-	-	1
<i>Pyrrosia elaeagnifolia</i>	leather-leaf fern	-	-	-	-	-	-	1

SNA 4

Table D7 SNA 4 RECCE plot vegetation information, recorded in plot SNA4

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		3	3	5	3	3	2	n/a
<i>Laurelia novae-zealandiae</i>	pukatea	3	-	-	-	-	-	-
<i>Meliccytus ramiflorus</i>	māhoe	-	3	2	1	1	-	-
<i>Dicksonia squarrosa</i>	whekī	-	3	2	1	1	-	1
<i>Cyathea dealbata</i>	pōnga / silver fern	-	2	1	1	-	-	-
<i>Cyathea medullaris</i>	mamaku	-	2	-	-	-	-	-
<i>Hedycarya arborea</i>	porokaiwhiri / pigeonwood	-	1	1	-	-	-	-
<i>Olearia rani</i> var. <i>colorata</i>	heketara	-	2	-	-	-	-	-
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	2	1	4	3	1
<i>Schefflera digitata</i>	patē / sevenfinger	-	-	2	1	-	2	-
<i>Rhopalostylis sapida</i>	nīkau	-	-	3	1	3	3	-
<i>Kunzea robusta</i> ^{NV}	kānuka	-	-	1	-	1	-	-
<i>Cordyline banksii</i>	tī ngahere / Bank's cabbage tree	-	-	1	-	-	-	-
<i>Myrsine australis</i>	māpou	-	-	-	1	-	-	-
<i>Brachyglottis repanda</i>	rangiora	-	-	-	1	-	-	-
<i>Veronica stricta</i> var. <i>stricta</i>	koromiko	-	-	-	-	1	1	-
<i>Parablechnum novae-zealandiae</i>	kiokio	-	-	-	-	1	-	-
<i>Carex</i> sp.	carex	-	-	-	-	3	-	-
<i>Podocarpus laetus</i>	Hall's tōtara	-	-	-	-	1	1	-
<i>Coprosma lucida</i>	karamu	-	-	-	-	1	-	-
<i>Asplenium bulbiferum</i>	mouku / hen and chickens fern	-	-	-	-	1	1	-
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hound's tongue	-	-	-	-	1	-	1
<i>Hypolepis rufobarbata</i>	sticky pig fern	-	-	-	-	1	-	-
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa	-	-	-	-	1	1	-
<i>Elatostema rugosum</i>	parataniwha	-	-	-	-	2	2	-
<i>Austroblechnum lanceolatum</i>	nini	-	-	-	-	2	-	-
<i>Dianella nigra</i>	tūrutu / New Zealand blueberry	-	-	-	-	-	1	-
<i>Pittosporum tenuifolium</i>	kōhūhū	-	-	-	-	-	1	-

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
<i>Phyllocladus trichomanoides</i>	tānekaha	-	-	-	-	-	1	-
<i>Knightia excelsa</i>	rewarewa	-	-	-	-	-	1	-
<i>Ligustrum lucidum</i>	tree privet	-	-	-	-	-	1	-
<i>Dacrycarpus dacrydioides</i>	kahikatea	-	-	-	-	-	1	-
<i>Vitex lucens</i>	pūriri	-	-	-	-	-	1	-
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	-	-	-	-	-	-	1	-
<i>Acianthus sinclairii</i>	heart-leaved orchid	-	-	-	-	-	1	-
<i>Asplenium flaccidum</i>	makawe / drooping spleenwort	-	-	-	-	-	-	1
<u><i>Metrosideros carminea</i></u> ^{NV}	carmine rātā	-	-	-	-	-	-	1
<u><i>Metrosideros perforata</i></u> ^{NV}	akatea	-	-	-	-	-	-	1
<i>Freycinetia banksii</i>	kiekie	-	-	-	-	-	-	1
<i>Arthropteris tenella</i>	jointed fern	-	-	-	-	-	-	-
<i>Microsorium scandens</i>	mokimoki	-	-	-	-	-	-	-
<i>Loxogramme dictyopteris</i>	lance fern	-	-	-	-	-	-	-

SNA 5

Table D8 SNA 5 RECCE plot vegetation information, recorded in plot SNA5a

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		4	5	4	3	3	4	n/a
<i>Dacrycarpus dacrydioides</i>	kahikatea	1	-	-	-	-	-	-
<i>Beilschmiedia tawa</i>	tawa	3	1	-	-	-	1	-
<i>Knightia excelsa</i>	rewarewa	2	-	-	-	-	1	-
<i>Cyathea medullaris</i>	mamaku	1	1	-	-	-	-	-
<i>Corynocarpus laevigatus</i>	karaka	2	-	-	-	-	1	-
<i>Cyathea dealbata</i>	pōnga / silver fern	-	4	3	-	1	-	-
<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	tītoki	-	1	-	-	-	-	-
<i>Meliccytus ramiflorus</i>	māhoe	-	3	2	3	2	2	-
<i>Dicksonia squarrosa</i>	whekī	-	2	1	1	1	-	1
<i>Ripogonum scandens</i>	kareao / supplejack	-	2	-	-	-	-	-
<i>Kunzea robusta</i> ^{NV}	kānuka	-	1	-	-	-	-	-
<i>Metrosideros perforata</i> ^{NV}	akatea	-	1	1	1	1	2	1
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	2	2	2	3	-
<i>Schefflera digitata</i>	patē	-	-	-	1	2	2	-
<i>Rhopalostylis sapida</i>	nīkau	-	-	-	-	3	2	-
<i>Hedycarya arborea</i>	porokaiwhiri / pigeonwood	-	-	-	-	1	1	-
<i>Aristotelia serrata</i>	makomako / wineberry	-	-	-	-	1	-	-
<i>Brachyglottis repanda</i>	rangiora	-	-	-	-	1	1	-
<i>Asplenium bulbiferum</i>	mouku / hen and chickens fern	-	-	-	-	1	1	-
<i>Freycinetia banksii</i>	kiekie	-	-	-	-	1	1	2
<i>Coprosma grandifolia</i>	kanono	-	-	-	-	1	1	-
<i>Olearia rani</i> var. <i>colorata</i>	heketara	-	-	-	-	1	-	-
<i>Alseuosmia</i> sp.	toropapa	-	-	-	-	1	-	-
<i>Austroblechnum lanceolatum</i>	nini	-	-	-	-	-	3	-
<i>Leptopteris hymenophylloides</i>	heruheru / crape fern	-	-	-	-	-	1	-
<i>Coprosma spathulata</i> subsp. <i>spathulata</i>	-	-	-	-	-	-	1	-
<i>Ligustrum sinense</i>	Chinese privet	-	-	-	-	-	1	-

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	-	-	-	-	-	-	1	-
<i>Carex</i> sp.	carex	-	-	-	-	-	1	-
<i>Myrsine australis</i>	māpou	-	-	-	-	-	1	-
<i>Icarus filiformis</i>	thread fern	-	-	-	-	-	2	1
<i>Microsorium scandens</i>	mokimoki	-	-	-	-	-	1	2
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa	-	-	-	-	-	1	-
<i>Asplenium oblongifolium</i>	huruhuru whenua / shining spleenwort	-	-	-	-	-	1	1
<i>Elatostema rugosum</i>	parataniwha	-	-	-	-	-	1	-
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hounds tongue	-	-	-	-	-	-	1
<i>Asplenium flaccidum</i>	makawe / drooping spleenwort	-	-	-	-	-	-	2
<i>Arthropteris tenella</i>	jointed fern	-	-	-	-	-	-	1
<i>Earina mucronata</i>	peka-a-waka / bamboo orchid	-	-	-	-	-	-	1

Table D9 SNA 5 RECCE plot vegetation information, recorded in plot SNA5b

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		4	2	2	3	6	2	n/a
<i>Pinus radiata</i>	radiata pine	6	3	-	1	-	-	-
<i>Cyathea medullaris</i>	mamaku	-	1	3	-	-	1	-
<i>Kunzea robusta</i> ^{NV}	kānuka	-	1	3	1	1	-	-
<i>Meliccytus ramiflorus</i>	māhoe	-	-	2	1	1	-	-
<i>Pseudopanax arboreus</i>	whauwhaupaku / fivefinger	-	-	1	-	-	-	-
<i>Ligustrum sinense</i>	Chinese privet	-	-	-	2	3	-	-
<i>Myrsine australis</i>	māpou	-	-	-	2	3	-	-
<i>Ulex europeaus</i>	gorse	-	-	-	2	-	-	-
<i>Coprosma robusta</i>	karamu	-	-	-	1	-	1	-
<i>Cortaderia selloana</i>	pampas	-	-	-	-	5	1	-
<i>Leucopogon fasciculatus</i>	mingimingi	-	-	-	-	3	2	-
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	-	-	1	1	-
<i>Coprosma rhamnoides</i>	-	-	-	-	-	-	1	-
<i>Prunus campanulata</i>	Taiwan cherry	-	-	-	-	-	1	-
<i>Pittosporum tenuifolium</i>	kōhūhū	-	-	-	-	-	1	-
<i>Asplenium polyodon</i>	petako	-	-	-	-	-	1	-
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	-	-	-	-	-	-	2	-
<i>Dianella nigra</i>	tūrutu / New Zealand blueberry	-	-	-	-	-	1	-

Table D10 SNA 5 RECCE plot vegetation information, recorded in plot SNA5c

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
Overall cover		0	0	3	5	3	2	n/a
<i>Hedycarya arborea</i>	porokaiwhiri / pigeonwood	-	-	2	1	2	1	-
<i>Cyathea dealbata</i>	pōnga / silver fern	-	-	6	2	2	-	-
<i>Cyathea medullaris</i>	mamaku	-	-	2	-	-	-	-
<i>Meliccytus ramiflorus</i>	māhoe	-	-	2	2	-	-	-
<i>Schefflera digitata</i>	patē / sevenfinger	-	-	4	1	1	1	-
<i>Ligustrum lucidum</i>	tree privet	-	-	2	-	-	-	-
<i>Dicksonia squarrosa</i>	whekī	-	-	1	2	2	-	1
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	-	-	3	3	3	-	1
<i>Jasminum polyanthum</i>	jasmine	-	-	2	2	2	2	-
<i>Coprosma grandifolia</i>	kanono	-	-	-	1	-	-	-
<i>Metrosideros perforata</i> ^{NV}	akatea	-	-	-	1	1	1	1
<i>Asplenium bulbiferum</i>	mouku / hen and chickens' fern	-	-	-	-	1	-	-
<i>Dacrycarpus dacrydioides</i>	kahikatea	-	-	-	-	1	1	-
<i>Rhopalostylis sapida</i>	nīkau	-	-	-	-	1	3	-
<i>Parablechnum novae-zelandiae</i>	kiokio	-	-	-	-	1	-	-
<i>Leucopogon fasciculatus</i>	mingimingi	-	-	-	-	1	-	-
<i>Austroblechnum lanceolatum</i>	nini	-	-	-	-	-	1	-
<i>Leptopteris hymenophylloides</i>	heruheru / crape fern	-	-	-	-	-	1	-
<i>Beilschmiedia tawa</i>	tawa	-	-	-	-	-	1	-
<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	tītoki	-	-	-	-	-	1	-
<i>Myrsine australis</i>	māpou	-	-	-	-	-	1	-
<i>Ligustrum sinense</i>	Chinese privet	-	-	-	-	-	1	-
<i>Carex</i> sp.	carex	-	-	-	-	-	1	-
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	-	-	-	-	-	-	1	-
<i>Pneumatopteris pennigera</i>	piupiu / feather fern	-	-	-	-	-	1	-
<i>Hymenophyllum</i> sp.	filmy fern	-	-	-	-	-	1	-
<i>Hymenophyllum rarum</i>	filmy fern	-	-	-	-	-	-	1
<i>Asplenium flaccidum</i>	makawe / drooping spleenwort	-	-	-	-	-	-	1

Scientific Name	Common Name	Cover classes ¹						
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7
		> 25 m	12 - 25 m	5 - 12 m	2 - 5 m	0.3 - 2 m	< 0.3 m	Epiphytes
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	kōwaowao / hounds' tongue	1

Appendix F

5MBC Results

Appendix F 5MBC Results

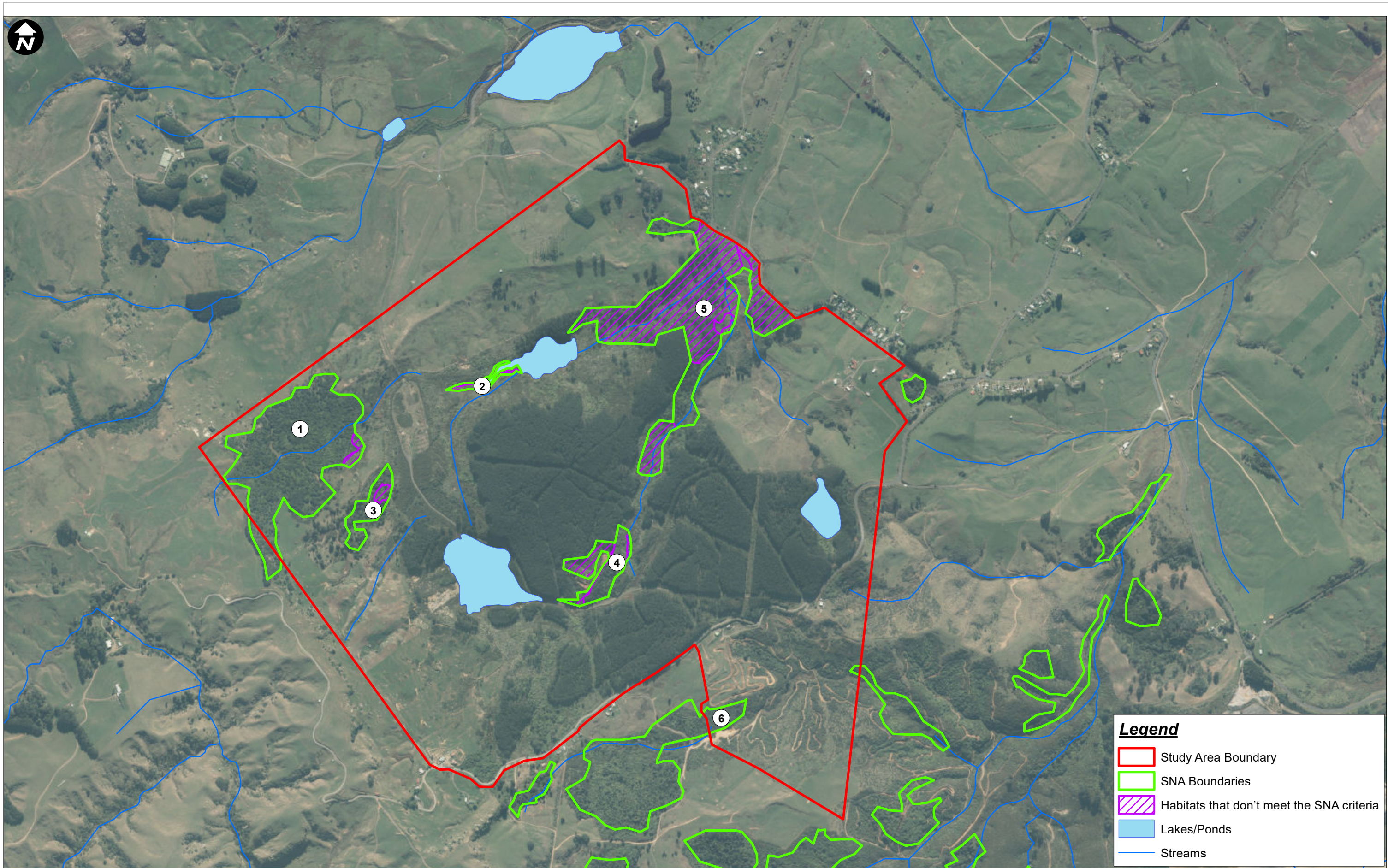
Scientific name	Common name	Threat status ¹⁸	SNA1a	SNA1b	SNA2	SNA3	SNA4	SNA5a	SNA5b	SNA5c
<i>Acridotheres tristis</i>	Myna	Introduced	1	-	1	-	-	-	1	1
<i>Alauda arvensis</i>	Skylark	Introduced	-	-	1	-	-	-	1	-
<i>Carduelis carduelis</i>	Goldfinch	Introduced	2	1	2	1	1	1	1	1
<i>Carduelis chloris</i>	Greenfinch	Introduced	-	-	1	-	-	-	-	-
<i>Circus approximans</i>	Kahu/ swamp harrier	Not Threatened	1	-	1	-	-	-	-	-
<i>Emberiza citronella</i>	Yellowhammer	Introduced	-	-	1	-	-	-	-	-
<i>Fringilla coelebs</i>	Chaffinch	Introduced	4	-	2	-	-	1	-	1
<i>Gerygone igata</i>	Riroriro/ grey warbler	Not Threatened	3	1	-	1	1	1	2	1
<i>Gymnorhina tibicen</i>	Magpie	Introduced	1	-	2	-	-	-	-	1
<i>Hemiphaga novaeseelandiae</i>	Kereru/ wood pigeon	Not Threatened	1	-	-	-	2	-	-	-
<i>Passer domesticus</i>	Sparrow	Introduced	-	-	-	-	1	1	1	1
<i>Platycercus eximius</i>	Eastern rosella	Introduced	-	-	1	1	-	-	-	-
<i>Porphyrio melanotus</i>	Pukeko	Not Threatened	-	-	1	1	-	-	-	-
<i>Rhipidura fuliginosa</i>	Piwakawaka/ fantail	Not Threatened	4	2	2	3	3	2	2	3
<i>Sturnus vulgaris</i>	Starling	Introduced	-	-	-	-	-	1	1	-
<i>Tadorna variegata</i>	Putangitangi/ paradise duck	Not Threatened	-	-	1	-	-	1	-	1
<i>Todiramphus sanctus</i>	Kotare/ kingfisher	Not Threatened	2	-	-	-	-	-	-	-
<i>Turdus merula</i>	Blackbird	Introduced	-	-	2	2	-	3	-	2
<i>Turdus philomelos</i>	Song thrush	Introduced	-	-	-	-	-	1	1	1
<i>Vanellus miles</i>	Spur-winged plover	Not Threatened	-	-	1	-	-	-	-	-

¹⁸ Robertson HA, Baird K, Dowding JE, Elliott GP, Hitchmough RA, Miskelly CM, McArthur N, O'Donnell CFJ, Sagar PM, Scofield P, Taylor GA. 2016. Conservation status of New Zealand birds, 2016. New Zealand threat classification series 21. New Zealand Department of Conservation. ISBN 978-1-98-851423-9.

Scientific name	Common name	Threat status ¹⁸	SNA1a	SNA1b	SNA2	SNA3	SNA4	SNA5a	SNA5b	SNA5c
<i>Zosterops lateralis</i>	Tauhou/ silvereye	Not Threatened	-	-	-	1	2	-	-	-
<i>Total number of birds</i>			9	3	14	7	6	9	8	10
<i>Total number of indigenous birds</i>			5	2	5	3	4	3	2	3

Appendix G

SNA Boundaries



Legend

- Study Area Boundary
- SNA Boundaries
- Habitats that don't meet the SNA criteria
- Lakes/Ponds
- Streams

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 Scale: 1:12,500 (A3 size)
 130 65 0 130 260
 Meters
 Map features depicted in terms of NZTM 2000 projection.
 Data Sources:
 Cadastral Boundaries – LINZ NZ Cadastral Dataset

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SHEET TITLE
 OVERVIEW OF REVISED SNA
 BOUNDARIES
MAP NUMBER
 FIGURE G1



Legend

- Study Area Boundary
- SNA Boundaries
- Habitats that don't meet the SNA criteria

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SPATIAL REFERENCE
Scale: 1:3,000 (A3 size)
30 15 0 30 60 Meters
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Data Sources:
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REVISED SNA BOUNDARIES
(SNA 1 AND 3)
MAP NUMBER
FIGURE G2



Legend

- SNA Boundaries
- Habitats that don't meet the SNA criteria

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SPATIAL REFERENCE
 Scale: 1:1,000 (A3 size)
 10 5 0 10 20 Meters
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 Data Sources:
 Cadastral Boundaries – LINZ NZ Cadastral Dataset

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SHEET TITLE
 REVISED SNA BOUNDARIES
 (SNA 2)
MAP NUMBER
 FIGURE G3



Legend

- SNA Boundaries
- Habitats that don't meet the SNA criteria

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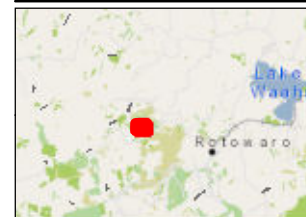
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SPATIAL REFERENCE

Scale: 1:1,500 (A3 size)
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Meters
Map features depicted in terms of NZTM 2000 projection.
Data Sources:
Cadastral Boundaries – LINZ NZ Cadastral Dataset

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SHEET TITLE

REVISED SNA BOUNDARIES
(SNA 4)

MAP NUMBER

FIGURE G4



NO ACCESS.
FURTHER SURVEY
REQUIRED.

HIGH BAT ROOST
POTENTIAL

Legend

- Study Area Boundary
- SNA Boundaries
- Habitats that don't meet the SNA criteria

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KEY PLAN

SPATIAL REFERENCE

Scale: 1:4,000 (A3 size)

40 20 0 40 80 Meters

Map features depicted in terms of NZTM 2000 projection.

Data Sources:
Cadastral Boundaries – LINZ NZ Cadastral Dataset

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SHEET TITLE
REVISED SNA BOUNDARIES
(SNA 5)

MAP NUMBER
FIGURE G5

Appendix H

Scope of Further Survey

Appendix H Scope of Further Survey

Species	SNA units	Survey Period	Survey visits	Duration	Detail
Bats	All	Nov – May	Two visits including the maternity period (Nov – Jan) and the mating period (Feb – May).	Minimum of 14 nights	Automatic Bat Monitors (ABM) will be placed across the Study Area to detect hotspots of activity. It is not sufficient to know whether bats are present. If present, you need to understand how frequently they are using the different habitat types to be able to make a judgement as to whether criteria 3 has been met. It should be noted that ABMs will provide information relating to bat activity, but they will not confirm whether bats are roosting on the site.
Lizards	All	Nov – April	Multiple visits – one to set up and multiple visits over a two week period to complete the surveys	Survey material placed on site a minimum of six weeks prior to survey. Survey lasts for two weeks. The use of pitfall traps could accelerate the process but this required more labour to install and monitor.	It is proposed that artificial refugia (sheets of material) is placed on site within habitat suitable for skinks and geckos. These are left in place for a minimum of 6 weeks prior to the material being checked a minimum of five times over two weeks to determine the presence of lizards. An alternative approach would be pitfall traps, which do not have the same lag period (6 weeks +) that occurs with the artificial covers, but they are labour intensive to install and check.
Wetland birds	SNA 2 SNA 4 SNA 5	Nov - Jan	One visit	Acoustic monitors are left for a minimum of 14 nights before they are recollected	As wetland birds are cryptic the best way to monitor can be through the use of acoustic monitoring. These would be located at key locations within the wetland to confirm the presence or likely absence of 'at risk' or 'threatened' bird species, specifically during the nesting period.
Mudfish (other fish species)	SNA 2 SNA 4 SNA 5	Early September to mid-November.	One visit	Two nights	Gee's minnow traps would be located within the wetland and its associated watercourses for two nights. The traps would be checked each morning to determine the presence of mudfish and other fish species
Wetland condition	SNA 2 SNA 4 SNA 5	Anytime, but summer months recommended due to health and safety access issues	One visit	Three days	The wetland condition will be assessed using the criteria presented within the 'Handbook for Monitoring Wetland Condition' (Clarkson et al, 2003). This looks at the following factors;

Species	SNA units	Survey Period	Survey visits	Duration	Detail
					<ul style="list-style-type: none">• Hydrological integrity – water table equal to or above ground level.• Ecosystem intactness – original area of wetland and habitat connectivity.• Grazing impacts – presence of domestic stock.• Dominance of indigenous plants – extent of indigenous and exotic cover.