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Significant Natural Areas of the Hauraki District

Terrestrial and Wetland Ecosystems

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Significant Natural Areas (SNA) - Hauraki have been derived from analysis and interpretation of aerial photography and/or satellite imagery, along with scientific reports and data (where available), local ecological knowledge and limited field surveys. The data set is an extensive yet provisional inventory and ranking of SNA in the Hauraki District, and is subject to revision through consultation with the Hauraki District Council or other local authorities. Environment Waikato strongly advise that the data be used only in conjunction with subsequent field assessments, especially if the data will be used to help with decisions on resource consents, or in the development of district plan and regional plan schedules, or funding priorities.

This report only covers terrestrial and wetland ecosystems; other ecosystem types will be published in future reports

The absence of an existing natural area from this data set does not imply that such a site is not, or cannot be considered, a significant natural area, a significant area of indigenous vegetation or significant habitat for indigenous species. Such areas should be assessed when and if required. The data have been captured at scales of 1:10,000 or smaller and should not be used at greater scales (e.g. 1:5,000) without detailed field survey.

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ENVIRONMENT WAIKATO

Natural Heritage of the Hauraki District

Kessels & Associates Ltd
ECOLOGY AND ENVIRONMENTAL PLANNING

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[1] Now Opus International Consultants

Executive Summary

Environment Waikato (EW) aims to prioritise areas in the Waikato region, for biodiversity management based on different ecosystems. The primary objective of this project is to develop a GIS-based data set that incorporates the existing spatial information of natural areas, describe key vegetation types, assessment management requirements, ownership status and to assign a biodiversity ranking to spatial units derived from their contributions to national and regional biodiversity goals. The natural areas which meet the appropriate ranking criteria have been termed "Significant Natural Areas" or SNA's.

Only indigenous terrestrial and freshwater wetland natural areas were assessed as part of this inventory.

As this was a desktop exercise, no detailed field work was undertaken and the assessment was carried out using aerial imagery and existing information sourced from reports and databases. The following tasks have been undertaken as part of this analysis:

- All key documents, databases and maps were reviewed to enable a gap analysis to be undertaken of where further work is required.
- EW mapped and digitally captured all indigenous vegetation areas using recently taken aerial photographs and incorporated it into its GIS database.
- Analysis of the indigenous vegetation and fauna characteristics of the Hauraki District was undertaken with respect to the relevant provisions of the Resource Management Act 1991 (RMA) and in particular the ecological significance assessment criteria of the Waikato Regional Policy Statement.
- The SNA boundaries were mapped directly in EW GIS system over the relevant aerial imagery and vegetation boundaries.

Approximately 35,454 ha (or 30%) of the District can be considered as being covered with indigenous vegetation and habitats of one form or another.

The largest indigenous vegetation class are "*Indigenous Forest/Broadleaved Indigenous Hardwoods*" (24,788 ha) and "*Manuka or Kanuka*" (8,827 ha). The large areas of indigenous forest are found within the Coromandel and Hapuakohe Ranges while the Manuka or Kanuka class is so dominant because the majority of the extensive Kopuatai and Torehape Peat Domes are classed as this land cover type.

Two hundred and six Significant Natural Areas were identified within the Hauraki District comprising of approximately 32,677 ha of land (or 28% of the District), containing habitat for at least forty-nine nationally threatened plants and animals. Approximately 25,824 ha or 79% are protected by DoC, Council reserves and QEII/Nga Whenua Rahui covenants, leaving some 6,853 ha (21%) of unprotected SNA's largely on privately owned land.

One site of International Ecological Significance and four sites of National Ecological Significance are located within the Hauraki District.

1 Introduction

Environment Waikato (EW) aims to prioritise areas in the Waikato region, for biodiversity management based on different ecosystems. In order to do so, existing habitats of indigenous flora and fauna (natural areas) need to be identified, their features described and their ecological value assessed. The identification and ranking of natural areas will assist both EW and Hauraki District Council (HDC) to make decisions regarding policy development and prioritising funding and resources for ecological restoration and assessment of resource consents.

As Hauraki District Council is in the process of reviewing its district plan, EW considered that undertaking an assessment of the natural features within Hauraki District was timely. As a consequence, Kessels & Associates Ltd have undertaken a largely desktop exercise to assess natural features using existing information.

This report provides a summary of the methods and results of the desktop exercise. The full data set is held electronically by EW.

Only indigenous terrestrial and freshwater wetland natural areas were assessed as part of this inventory although some coastal ecosystems were partly assessed where not mapped as part of any other project. Other ecosystems are being assessed as part of other projects and that data may be aggregated with this data at a later stage if feasible. This is especially evident around the Firth of Thames and none of the very special ecological values of the Firth were assessed for this study.

2 Project Objectives

The primary objective of this project is to identify most of the natural areas in the Waikato Region in order to generate a top priority list for biodiversity management. To achieve this objective, the EW biodiversity group has developed ecological and management criteria based on the criteria contained within Appendix 3 of the Operative Regional Policy Statement.

The primary objective of this project is to develop a GIS-based data set that incorporates the existing spatial information of natural areas, describe key vegetation types, assessment management requirements, ownership status and to assign a biodiversity ranking to spatial units derived from their contributions to national and regional biodiversity goals. The natural areas which meet the appropriate ranking criteria have been termed “Significant Natural Areas” or SNA’s.

The assessment framework is based on quantitative and qualitative parameters that were set up to make priority settings more systematic and explicit in order to justify a baseline for biodiversity monitoring with community outcomes in the Waikato region.

The Hauraki district terrestrial and freshwater biodiversity GIS mapping has been finalised.

3 Methodology

As this was a desktop exercise, no detailed field work was undertaken and the assessment was carried out using aerial imagery and existing information sourced from reports and databases. The Data Set Name on the EW share files is:

“SNA_Hauraki_2002”.

The following tasks have been undertaken as part of this analysis:

Literature Review. All key documents, databases and maps were reviewed to enable a gap analysis to be undertaken of where further work is required. Key starting documents reviewed were “*An outline of the unprotected conservation values within the Hauraki District Council*” (Kessels & Stanway, 1993) and the Operative District Plan maps; “*Key Ecological Sites for Animal*

*and Plan Pest Contro*l *within the Coromandel Ecological Region*" (Stanway, *et al.,* 2000); unpublished Landcare Research reports on the peat domes; database information, Department of Conservation (DoC) held data (supplied in the form of the BIMS dataset); and Land Information Database maps. The key data sources used in the development of the SNA's are shown as Table 1.

1. **Mapping, Vegetation Typing and Quantifying Existing Natural Features.** EW mapped and digitally captured all indigenous vegetation areas using recently taken 1:10,000 ortho-corrected aerial maps and incorporated it into its GIS database as "*Biodiversity Vegetation (Bioveg) data set*". Kessels & Associates reviewed the dataset, checked accuracy of the line work and assessed the areas in terms of ecologically significance. No specific field work to ground truth the data has been catered for within this project.

2. **Threat and Opportunity Assessment Analysis.** Analysis of the indigenous vegetation and fauna characteristics of the Hauraki District was undertaken with respect to the relevant provisions of the RMA and in particular the ecological significance assessment criteria of the Waikato Regional Policy Statement and in terms of the following nationally recognised criteria:

   - Representativeness: How representative is the area of the full range of ecological diversity in the present natural landscape?;
   - Diversity and pattern: What is the diversity of the ecological units and pattern of vegetation types represented?;
   - Rarity/special features: Presence of locally or nationally threatened species or ecosystems;
   - Naturalness/intactness: Extent of indigenous species and natural communities in the area;
   - Size and shape: Influence of size and shape of the area on ecological viability;
   - Inherent ecological viability/long-term sustainability: Will the features of the area maintain themselves in the long-term;
   - Buffering/surrounding landscape/connectivity: Extent to which an area is buffered from modifying influences. Distance from modifying influences and other natural areas;
   - Fragility and threat: Threat process and agents, effects of proposed modification;
   - Management input: Nature and scale/intervention necessary & restoration potential.

Initially the SNA boundaries were mapped directly in EW GIS system over the relevant aerial imagery and vegetation boundaries.

The extent of each vegetation type was determined from aerial imagery and ground truthing and compiled in a database by a separate contractor. The primary source for the determination of vegetation boundaries and types relied heavily on a desktop exercise using the 2001/2002 WRAPS[2] Aerial Photography. As such it must be regarded as a "point in time" data set representing the state of native terrestrial vegetation and palustrine wetlands as at 2001/2002. Minor field checking of the data was carried out over autumn 2007 to validate the data already captured. The attributes used are shown as Table 2.

[2] Waikato Regional Aerial Photography Syndicate Digital Orthophotos.

Table 1 List of Key Natural Area Reports and Data Sets Available for Hauraki District

Kessels, G; Stanway, E. A. 1993: An outline of the unprotected conservation values within the Hauraki District Council. Department of Conservation, Waikato Conservancy, Hamilton.

Burns, B; Smale, M 2002: Lowland Forests. *In:* Clarkson, B; Merrett, M; Downs, T *eds.* Botany of the Waikato. Waikato Botanical Society Inc. University of Waikato, Hamilton, New Zealand.

Harding, M. 1997: Waikato Protection Strategy – A Report to the Heritage Fund Committee. Forest Heritage Fund, Wellington.

Humphreys, E. A.; Tyler, A. M. 1990: Coromandel Ecological Region. Survey report for the protected natural areas programme. Department of Conservation, Waikato Conservancy, Hamilton.

Leathwick, J. R.; Clarkson, B. D.; Whaley, P. T. 1995: Vegetation of the Waikato Region: current and historical perspectives. Landcare Research Contract Report LC9596/022. Manaaki Whenua - Landcare Research, Hamilton

Nicholls, JL 1979: Waikato Forest Class Map. *Forest Service Mapping Series 6, Sheet No. 4.*

Stanway, E. A.; Kessels, G. H. A.; Christie, K 1999: Key Ecological Sites in the Coromandel Ecological Region. Biosecurity Unit, Environment Waikato. EcoFX & Kessels & Associates, Hamilton.

Walker, S; Price R; & Rutledge, D. 2005 New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs Landcare Research, Christchurch

Unpublished Landcare Research reports on the peat domes

Conservation Management Strategy Database Vol. II Waikato Conservancy

Threatened Plant Database of Waikato Conservancy

DoC Waikato Conservancy Biodiversity Information Management System (BIMS)

QEII National Trust Open Space Covenants

Land Information Database maps

Table 2 Attribute List for the Determination of Significant Natural Areas within Hauraki District

1. Site Number:

The unique site number for each site is an aggregation of the NZMS260 Sheet number the centre of the site is located over, the protection status (UP = Unprotected, P= Protected) and then a unique number (1-198 (a, b)) in logical order roughly from west to east across the Hauraki District.

2. Ecosystem Type:

Lists the type of ecosystem at each site. The types of ecosystems are: Terrestrial, marine and coastal, and Palustrine Wetland. Where a site consists of more than one ecosystem type, it is mapped separately.

3. Protection Status:

States whether the site is 'Protected' or 'Unprotected'. Protected sites are on land owned by DoC (as opposed to just administered by DoC), or are QEII covenants or district reserves or covenants, or Nga Whenua Rahui Kawenata covenants. All other land is considered unprotected. Note some unprotected sites may include very small portions of protected land where it is deemed the protected portions make up too small a component of the site to be significant enough to map and assess as a separate site. The vice versa applies also.

4. DoC Reserve Name:

The name(s) of any DoC reserves that may overlap the site.

5. QEII Covenant:

Identifies whether any QEII covenants overlap the site.

6. District Reserve Name:

The name(s) of any District reserves that may overlap the site.

7. Nga Whenua Rahui Covenant Name:

The name(s) of any Nga Whenua Rahui covenants that may overlap the site.

8. Criteria_1_Protected_or_Preserved (Pick-list of Yes/No/Uncertain/Null):

It is indigenous vegetation or habitat for indigenous fauna that has been specially set aside by statute or covenant for protection and preservation unless the site can be shown to meet none of Criteria 3-11.

9. - Criteria_1_Justification (Memo)

10. - Criteria_2_Recommended_for_Protection (Pick-list of Yes/No/Uncertain/Null):

It is indigenous vegetation or habitat recommended for protection by the Nature Heritage Fund, or Nga Whenua Rahui committees, or the Queen Elizabeth the Second National Trust Board of Directors, unless the site can be shown to meet none of Criteria 3-11.

11. - Criteria_2_Justification (Memo):

12. - Criteria_3_Threatened_or_Endemic_Species_Habitat (Pick-list of Yes/No/Uncertain/Null):

It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: threatened with extinction; or endemic to the Waikato Region.

13. - Criteria_3_Justification (Memo)

14. - Criteria_4_Under_Represented (Pick-list of Yes/No/Uncertain/Null):

It is indigenous vegetation or habitat type that is under-represented (10% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.

15. - Criteria_4_Justification (Memo)

16. - Criteria_5_Uncommon_Before_Settlement (Pick-list of Yes/No/Uncertain/Null):

It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, Chenier plain, or karst ecosystems.

17. - Criteria_5_Justification (Memo)

18. - Criteria_6_Indigenous_Wetland_Habitat (Pick-list of Yes/No/Uncertain/Null):

It is wetland habitat for indigenous plant communities and/or indigenous fauna communities that has not been created and subsequently maintained for or in connection with: waste treatment; or wastewater renovation; or hydro electric power lakes; or water storage for irrigation; or water supply storage; unless in those instances they meet the criteria in Whaley *et al.* (1995).

19. - Criteria_6_Justification (Memo)

20. - Criteria_7_Large_Indigenous_Habitat (Pick-list of Yes/No/Uncertain/Null):

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.

21. - Criteria_7_Justification (Memo)

22. - Criteria_8_Critical_Aquatic_Habitat (Pick-list of Yes/No/Uncertain/Null):

It is aquatic habitat that is a portion of a stream, river, lake, wetland, intertidal mudflat or estuary, and their margins, that is critical to the self sustainability of an indigenous species within a catchment of the Waikato Region and which contains healthy, representative populations of that species.

23. - Criteria_8_Justification (Memo)

24. - Criteria_9_Healthy_Indigenous_Vegetation (Pick-list of Yes/No/Uncertain/Null):

It is an area of indigenous vegetation or habitat that is a healthy and 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.

25. - Criteria_9_Justification (Memo)

26. - Criteria_10_Rare_or_Exceptional_Representation (Pick-list of Yes/No/Uncertain/Null)

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.

27. - Criteria_10_Justification (Memo)

28. - Criteria_11_Ecological_Buffer_Linkage_or_Corridor (Pick-list of Yes/No/Uncertain/Null):

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.

29. - Criteria_11_Justification (Memo)

30. – Animal Management Issue (Pick-list of Yes/No/Uncertain/Null):

Are there any animal pest (as defined in Environment Waikato Regional Pest Management Strategy) management issues at the site?

31. – Animal Management Issue Justification (Memo)

32. – Weed Management Issue (Pick-list of Yes/No/Uncertain/Null):

Are there any weed pest (as defined in Environment Waikato Regional Pest Management Strategy) management issues at the site?

33. – Weed Management Issue Justification (Memo)

34. – Stock Management Issue (Pick-list of Yes/No/Uncertain/Null):

Are there any stock management issues at the site such as a lack of stock proof fencing or the presence of stock?

35. – Stock Management Issue Justification (Memo)

36. – Development Management Issue (Pick-list of Yes/No/Uncertain/Null):

Are there any development management issues at the site such as proposed or operational subdivision, wind farms, clearance, land use change or power pylons?

37. - **Development Management Issue Justification (Memo)**

38. – Other Management Issue (Picklist of Yes/No/Uncertain/Null):

Are there any other management issues at the site not covered by the above categories?

39. – Other Management Issue Justification (Memo)

40. – Significance Level (Pick-list of Local/Regional/National/International)

Overall significance of the site based on an evaluation of the above attributes.

41. – Confidence in Significance (Pick-list of Low/Medium/High):

The confidence the ecologist has in the accuracy of the significance they have allocated to the site.

42. – Justification of Significance (Memo):

The justification for allocating the particular significance to the site if additional to any information in any of the other fields above.

43. - LCDB2 Classes Present:

Aggregation of LCDB2_NAME attribute from any features in GIS_ALL.Biodiversity_Vegetation feature class that overlap the site.

44. – RIVI Landcare Veg Description:

Aggregation of LCARE_VEG_DESCRPTN attribute from any features in GIS_ALL.Indigenous_Vegetation_1992 feature class that overlap the site.

45. - ID (Auto-number):

The unique primary key for each site.

3.1 Data Set Accuracy

3.1.1 Geographic Extent

Only indigenous terrestrial and palustrine wetland ecosystems were assessed as part of this inventory although some coastal ecosystems were partly assessed where not mapped as part of any other project. Other ecosystems are being assessed as part of other projects and that data may be aggregated with this data at a later stage if feasible. This is especially evident around the Firth of Thames.

3.1.2 Positional Accuracy

The boundaries of polygons in this data set were derived from a number of other data sets. The positional accuracy of this data set is thus dependent on the positional accuracy of these other data sets. The EW metadata for these data sets is:

- BIODIVERSITY_VEGETATION (EW document number 1172690)
- WRAPS02_WHOLE_EW (EW document number 881411)
- DOC_CONSERVATION_LAND_EW_CLIP (EW document number 881142)
- QEII_TRUST_COVENANT (EW document number 881117)

- RESERVES_HAURAKI_DISTRICT (EW document number 887248)
- DOC_NGA_WHENUA_RAHUI_COVENANT (EW document number 1215463)

3.1.3 Attribute Accuracy

Many of the attributes will also only be as accurate as the data sets they were derived from (such as whether land is protected or not) is dependent on the accuracy of QEII, DoC and District Reserve data sets. The classification of the vegetation type is based on the accuracy of the classification used in the Biodiversity Vegetation (Bioveg) data set. However, many attributes were recorded based on anecdotal ecological knowledge of the area by Kessels & Associates with additional support from existing literature and reports. Because this was a largely desktop exercise most of the sites have not been surveyed and in reality little is known of their composition other than that derived from limited and often dated data and interpreting aerial photography.

The 11 criteria that the significance of a site is assessed against are found in Appendix 3 of Environment Waikato's Regional Policy Statement. Ecological significance of sites was assessed based on Environment Waikato Guidelines (EW, 2002).

Field checking of approximately five percent of a randomly selected representation of sites was conducted from road sides for some sites where there was uncertainty, but this was limited given the large size of the project. It was also important to consider that the field checking was done in 2007, which is five to six years after the aerial photography was captured. Any field checking had to consider what might have existed at the site five to six years ago. An attribute called "Confidence_in_Significance" was used to indicate the confidence the ecologist has in the accuracy of the significance they have allocated to the site. This is dependent upon the accuracy and availability of information about the site to the ecologist and their confidence in the accuracy of this information.

4 Natural Areas of Hauraki District

4.1 General Overview

4.1.1 The Ecological Districts within Hauraki District

In an ecological context, the Hauraki District lies within the Waikato Ecological Region and also includes the south-east portion of the Coromandel Ecological Region. It comprises of all of the Hauraki Ecological District (ED) in the centre, the Waihi Ecological District to the east, most of the Hapuakohe Ecological District to the west, a small area of Tairua ED in the north-east and a small area of Te Aroha ED in the south-east (refer to Figure 1). Seventy-two ha of the Hinuera ED is contained within the Hauraki District, but as this is a very small area, the biophysical characteristics of this ED are not described in this report.

4.1.2 Main Vegetation Types

There are a wide range of large and relatively unique natural areas within the Hauraki District. From the vast Kopuatai and Torehape peat domes dominating the central flood plains, the distinctive tawa clad ridgeline of the Hapuakohe Range, the scattered kahikatea stands of the plains, the tidal mud flats and mangrove forests of the Miranda Coast, the steep dense bush hill country of the Coromandel Range to the pohutukawa clad coastal forests between Whiritoa and Waihi.

Table 1 is a breakdown of the main vegetation units found within Hauraki district over 1 ha in size when the district was last mapped in detail in 1995 by Landcare research (Leathwick *et al.*, 1995). Vegetation types and bioclimatic zones are shown as Appendix II.

The data shows that indigenous vegetation is well represented within the district, with some 29% of the Hauraki District still containing indigenous vegetation (Walker *et al.*, 2005)[3]. This compares

[3] The main tool for this analysis was Land Environments of New Zealand (LENZ) - a national classification of ecosystems mapped across New Zealand's landscape. For this analysis LENZ Level II which maps 100 different environments nationally was used.

well with other District Councils within New Zealand, with some 9% of the district still containing 'primary' forest of some description

Rimu-tawa forest within the Coromandel Ranges and Hapuakohe Ranges is the largest vegetation unit. Secondary growth kanuka forest and logged kauri and tawa forest are also well represented, with much of this forest type being present along the eastern flanks of Hapuakohe and north-eastern hill country forests south of Whiritoa and north of Waihi.

Relative to most other territorial authorities within NZ, wetlands are very well represented, especially the nationally rare restiad peat wetlands, virtually found entirely within Kopuatai and Torehape wetlands.

However, closer exanimation of Table 3 does highlight that nationally threatened vegetation units (as defined by Walker *et al.*, 2005), are under-represented within Hauraki District. This is typical of districts with large components of flat and easy hill country, with fertile soils, which have been developed for agriculture. Thus, the left most column of Table 2 shows that coastal forest, primary kauri forest, kauri-beech associations and conifer forest (e.g. kahikatea forest) are very under-represented within the district (as well as in New Zealand as a whole). However, while wetlands are nationally very under-represented, the presence of the vast Kopuatai and Torehape Peat Domes mean that Hauraki is well endowed with wetlands.

Table 3 Break down of areas (ha) and percentage composition of Vegetation Units within the Hauraki District (after Leathwick *et al.*, 1995)

Hauraki District is 117,082 hectares (ha) in size					
Code	**Vegetation unit**	**Area (ha)**	**Subtotal (ha)**	**Percentage of District for main Vegetation Categories**	**Percentage of District for Nationally Threatened Vegetation Units**
Primary forest					
P20	Coastal forest	578			0.49%
A	Kauri forest	152			0.13%
D	Rimu-tawa forest	9517			
G1	Lowland steepland and montane conifer/broadleaved forest	236			
L	Conifer forest	137			0.12%
J	Conifer-broadleaved-beech forest	349			
K	Beech forest	95			
Gm		90	11154	9.43%	
Secondary forest					
BL	Secondary broadleaved forest	512			
SL	Secondary small-leaved forest	526			
BS	Secondary broadleaved-small-leaved forest	2301	3339		
Logged forest					
B	Kauri-conifer-broadleaved forest	4110			3.48%
C	Kauri-conifer-broadleaved-beech forest	484			0.41%
N	Tawa forest	3618	8212	6.95%	
Secondary scrub					
bl	Broadleaved scrub	309			
sl	Small-leaved scrub	1625			
bs	Broadleaved-small-leaved scrub	696			
sx	(Exotic pines)/scrub	599	3229	2.73%	
Exotic					
EX	Exotic forest	1307			
ex	Exotic scrub	245	1552	1.31%	
Fernland					
br	Bracken fernland	105	105	0.09%	
Wetland - saline					
mg	Mangroves	58			
jl	Juncus-Leptocarpus	24			
md	Saltmeadow	173	255	0.22%	
Wetland - freshwater					
sg	Sedgelands	581			0.49%
sh	Shrub/sedgelands	1918			
rs	Restiad wetlands	2704			2.29%
wl	Willow wetlands	1361	6564	5.55%	
		TOTAL Ha	**34410**	**29.10%**	**7.40%**

Figure 1 Ecological Districts and Significant Natural Areas within the Hauraki District

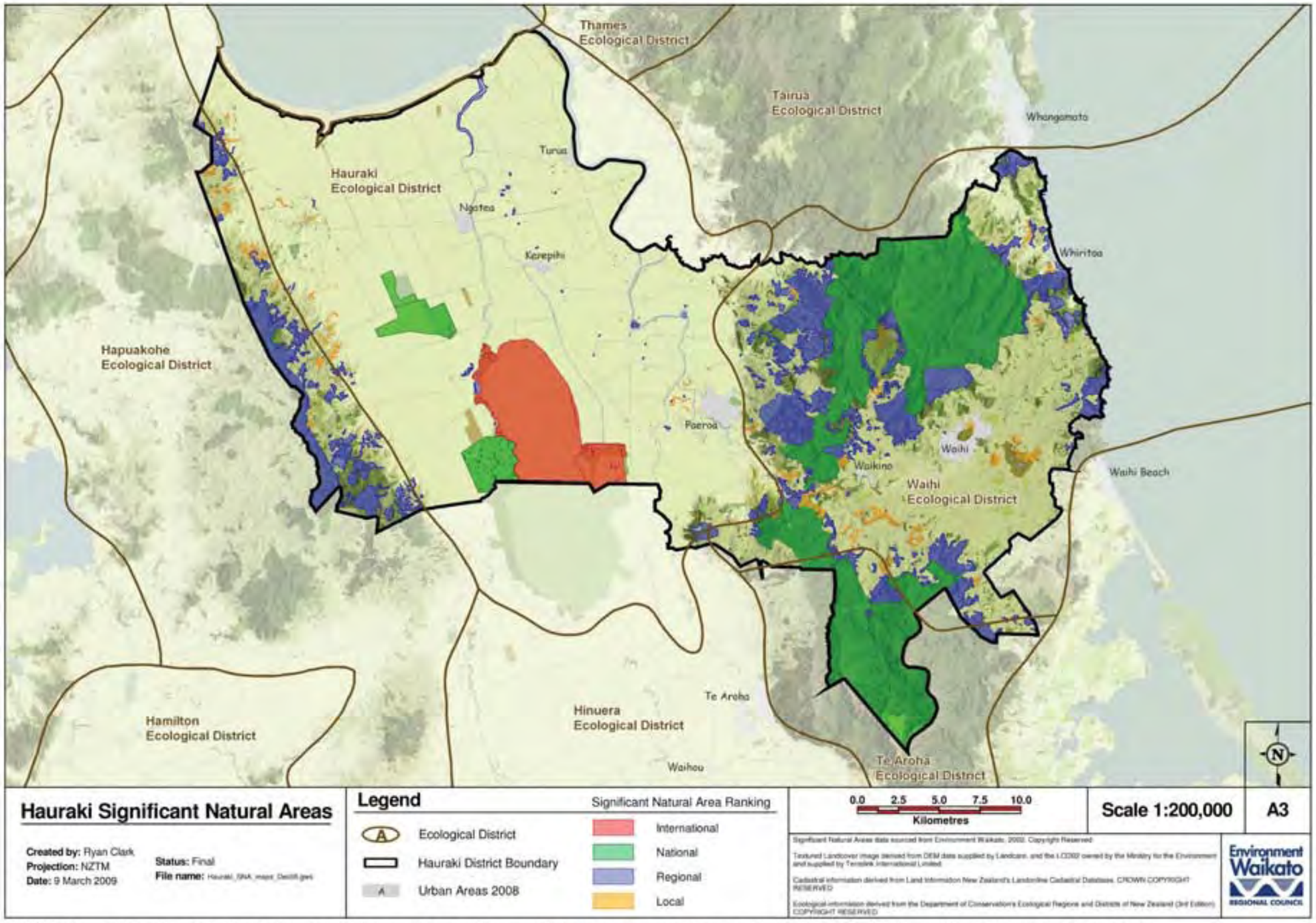


Figure 2 Bioclimatic Zones within the Hauraki District

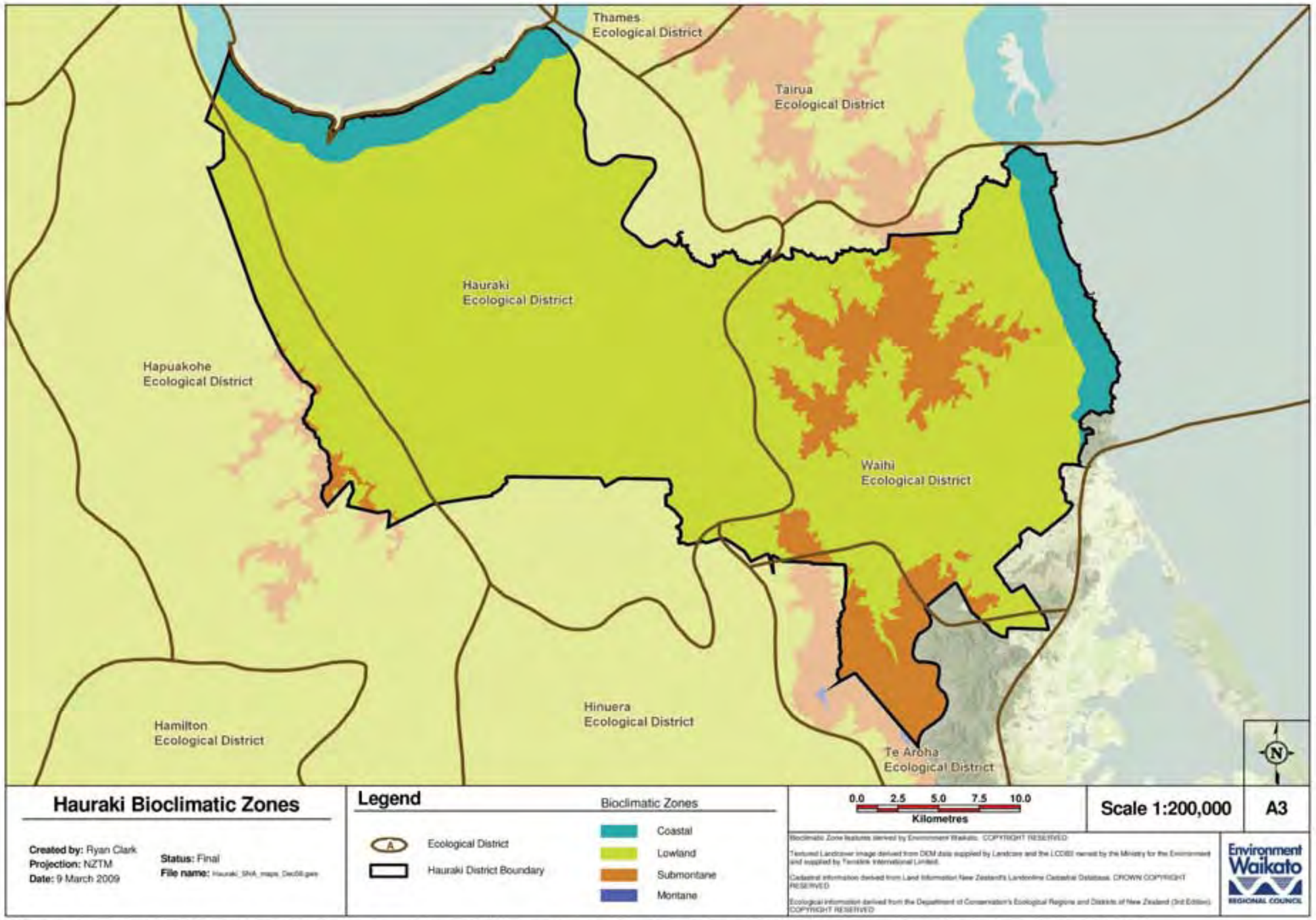
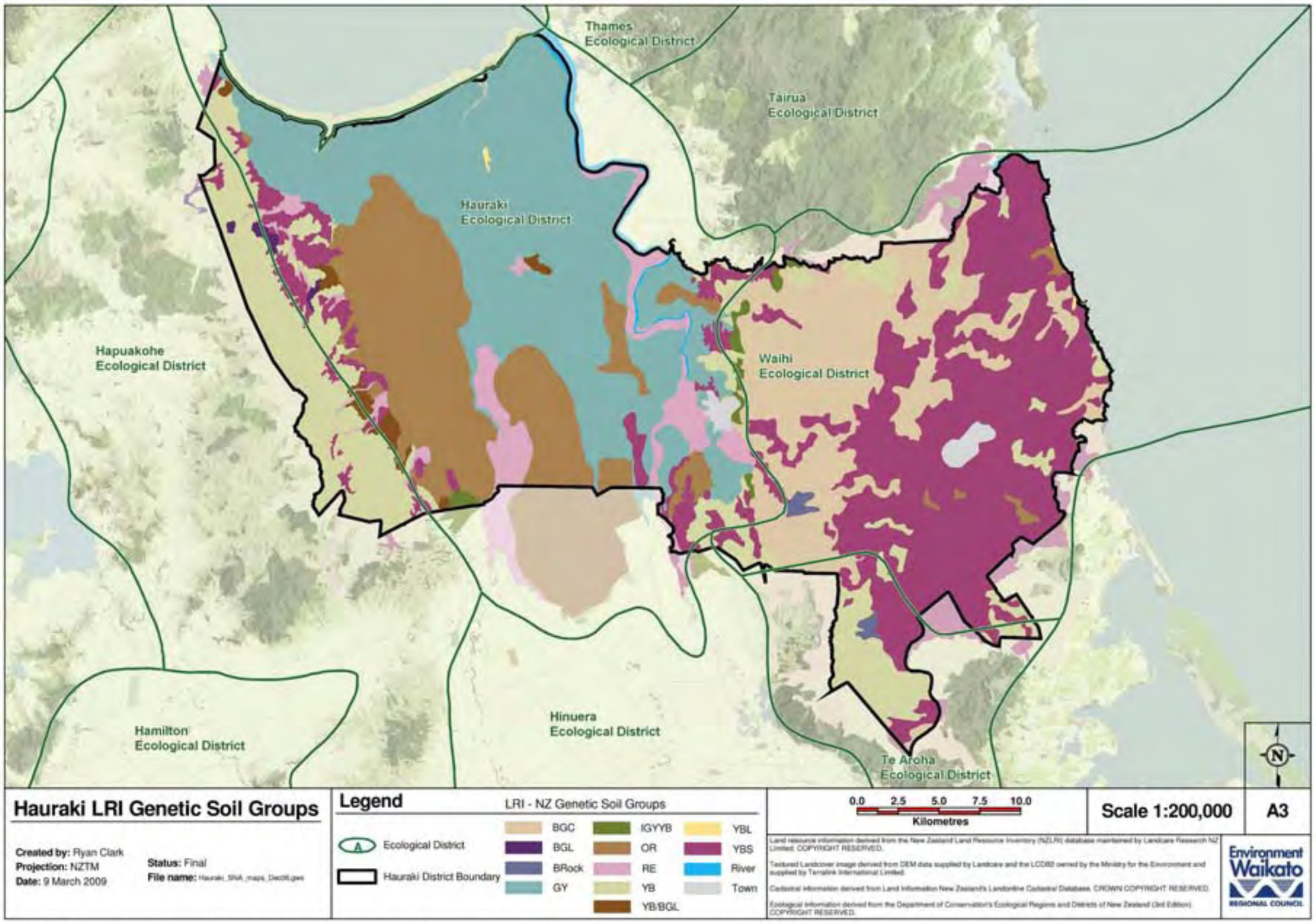


Figure 3 Key Soil Types within the Hauraki District



4.2 Hapuakohe Ecological District

4.2.1 Background

Area of ED within Hauraki District: 8,573 ha

The Hapuakohe ED covers the Hapuakohe Range and the Hangawera Hills. It comprises rolling hill country rising to a high point of 535 m on Mangakawa.

4.2.2 Bioclimatic zones

The low Hapuakohe Range (535 m a.s.l.) is the principal characteristic of this ED. Rolling country is prevalent in the north. The climate is warm and humid and annual rainfall is between 1200 and 1600 mm per annum. This ED encompasses two bioclimatic zones (refer to Figure 2).

4.2.3 Geology and soils

Sandstone and siltstones are the common underlying substrates, with some andesitic volcanics and sediments and occasional coal seams. The soils are dominantly clay textured podzolised soils with impeded drainage.

4.2.4 Vegetation

Formerly, associations of kauri forest, especially kauri-podocarp-broadleaved and kauri-hard beech forest, were dominant with lesser areas of rimu –tawa forest at higher altitudes and dense podocarp forest (mostly kahikatea) on the lower alluvial flood plains.

Kauri-hard beech forest had a limited distribution within the Hapuakohe ED, restricted to the hills and foothills of ranges at the southern end of the district. Major canopy species are kauri, hard beech and tanekaha, with canopy associates of rimu, tawa, and rewarewa. The understorey is characterised by the presence of shrubs such as mingimingi and prickly mingimingi and silver fern and wheki tree ferns.

Kanuka forest, often grazed, is a feature of the eastern foothills of the ED, usually following stream gullies, and occasionally traces of semi-coastal forest are present, with large puriri emergent. Most of the kauri has been logged, but large stands of kauri rickers are common on suitable ridgelines, often in association with tanekaha.

4.2.5 Significant Flora

The kauri-hard beech forests are uncommon and a feature of the Hapuakohe Range. Interestingly, puriri and puriri/(kohekohe-karaka) forest associations are found within a few gullies and within larger native forests tracts, with taraire also being present on occasion.

4.2.6 Significant Fauna

Even only thirty years ago kokako were present within the Hapuakohe Range, but are very likely to be locally extinct now. NZ falcon may still roam this range and kereru are present. Longtail bat are likely to be more widespread and common than presently recorded and further surveys will most likely confirm this.

No searches have been conducted, but Hochstetter's frog and Archey's frog may be present.

Common geckos (such as forest gecko and green gecko) may still be present and copper skink is likely to be widespread.

4.2.7 Key Protected Natural Areas

The Hapuakohe Scenic Reserve is the main protected natural area, encompassing a narrow swath of forest habitats along the ridge line.

4.3 Hauraki Ecological District

Area of ED within Hauraki District: 60,450 ha

4.3.1 Bioclimatic zones

The Hauraki ED consists of alluvial lowlands and swamplands with a warm humid climate and heavy frosts in the winter. It contains two bioclimatic zones (refer to Figure 2). Rainfall is about 1200 mm per annum.

4.3.2 Geology and soils

Holocene swamp and peat, as well as fluviatile pumice deposits, dominate this district which is part of the Hauraki Graben and a former path of the Waikato River. Poorly drained gley soils from alluvial and estuarine deposits and peats, originally swamp forest and wetlands, are the prevalent soils. Extensive areas of deep acid, peaty soils are found in the lowest lying areas and where the water table is high for most of the year, raised peat bogs have developed (refer to Figure 3).

4.3.3 Vegetation

Hauraki ED covers the alluvial lowlands of the Hauraki Plains, including the extensive peatlands of Kopuatai Peat Dome and Torehape Peat Dome. In pre-European times, tall, vast and dense podocarp forest (mostly kahikatea) and wetland vegetation dominated the ED. Small pockets of mixed kauri forest and rimu-tawa forest were present on more elevated country around the margins. Considerable areas of estuarine vegetation, especially mangrove forests, were present along the shores of the Firth of Thames.

Today, the main landuse is highly productive dairy farming, surrounding the very large DoC protected Kopuatai and Torehape Peats Domes prevailing in the centre of the ED.

The two large peat domes comprise mainly herbaceous vegetation dominated by the peat forming species *Empodisma minus* and more sparsely *Sporadanthus ferrugineus*. Other commonly found species include sedges such as *Baumea teretifolia* and *Schoenus brevifolius*, and mosses and liverworts such as *Sphagnum cristatum* and *Goebelobryum unguiculatum,* as well as manuka and *Epacris pauciflora.* Adventive species are few, but do include grey willow along the margins as well as royal fern.

Semi-swamp forest dominated by kahikatea grew on the alluvial river margins. As well as kahikatea, rimu, matai, pukatea, swamp maire, tawa, pokaka, and cabbage tree were common in these forests. Swamp forest and shrubland grew on shallow peat characteristic of the low-lying sites of the plains and the outer margins of the peat bogs. Very small remnants of these once vast forests now remain, and the kahikatea are usually only secondary growth pole stands, and more often than not are grazed by stock or infested by weeds such as privet species.

The majority of the river and stream banks are in pasture grasses and weeds, with stop-banks controlling flood waters. Where mineralized riverine wetlands exist (such as the Flax Block Wildlife Management Reserve), the introduced crack and grey willow are the dominant tree species, with the occasional kahikatea and cabbage tree emerging. Underneath this canopy, very little of the native vegetation cover remains with the adventive reed sweet grass and reed canary grass being almost totally dominant. Where protected from grazing a diverse native understorey can establish. Shrubs of *Coprosma propinqua, C. tenuicaulis,* and cabbage tree, flax, *Carex secta, C. virgata*, *Baumea tenax* and a variety of wetland herbs and ferns, such as swamp kiokio, are commonly found.

4.3.4 Significant Flora

The main peat forming plants of the Hauraki ED are two “restiad” plants – wire rush and *Sporadanthus ferrugineus,* which is a nationally threatened plant. This rush is restricted to Kopuatai, Torehape and Moanatuatua. Other significant plant species found in the bogs of the Hauraki ED include the insectivorous sundews (*Drosera binata* and *D. spathulata*) and bladderwort and the nationally vulnerable club moss – *Lycopodiella serpentinum*. Orchid species found within the bogs include the endangered *Pterostylis micromega*, the vulnerable *Prasophyllum* aff. *patens*, the rare *Calochilus paludosus* and the locally rare *C. robertsonii.*

4.3.5 Significant Fauna

The freshwater wetlands of the Hauraki ED provide abundant habitat for a number of threatened and uncommon bird species. North Island fernbird is habitat restricted and found throughout the large peat bogs, as is spotless crake and the much more elusive and cryptic marsh crake. Australasian bittern find haven in the Hauraki wetlands but also feed on river margins, ponds and flooded paddocks during the winter months.

Long-tail bats have been record within kahikatea stands on the eastern side of Kopuatai.

Black mudfish is probably the only threatened fish species found within the peat bogs, although the now threatened longfin eel is found in a variety of habitats in the lowland streams, rivers and wetlands but is nowhere near as common in these lower reaches as the much more commonly found shortfin eel. Giant kokopu, a nationally threatened fish species, may be found within the Hauraki ED but records are sparse. The rare dwarf Galaxias is a small, unassuming fish found in the mid reaches of the Waihou River, and outside of this ED, but further surveys could rediscover this very rare fish within the Hauraki ED as the habitat is suitable. Lamprey are also likely to be present and breed within sandy backwaters of streams and rivers.

4.3.6 Key Protected Natural Areas

Kopuatai Peat Dome is the largest protected natural area within the Hauraki ED and of international ecological significance. Torehape Peat Bog is also largely protected and administered by the Department of Conservation. Surrounding these wetlands are smaller and more modified DoC managed protected areas, such as the Flax Block and Patetonga Wildlife Management Reserves. Aside from these areas, very little else is protected, but several kahikatea stands are legally protected by Council reserves (e.g. Speedy Reserve) or QEII National Trust Open Space Covenants. King fern occurs in the Kaihere Scenic Reserve.

4.4 Waihi Ecological District

4.4.1 Background

Area of ED within Hauraki District: 43,733 ha

4.4.2 Bioclimatic zones

Waihi ED is characterised by four bioclimatic zones (refer to Figure 2). It is dominated by hilly to steep country to about 750 m a.s.l. with a warm, humid climate. Rainfall ranges from 1400 to 2800 mm per annum.

4.4.3 Geology and soils

This ED comprises largely of volcanic miocene and younger andesites in the central area, surrounded by significant areas of upper tertiary rhyolite and ignimbrite sheets remnants. The hill country north of the Ohinemuri River and the coastal hills comprise of “Beeson’s Island Volcanics”. Younger rock of Minden rhyolites occurs in patches along the northern boundary with the Tairua ED (Regnier, 1987). The rolling country in the south-east of the district comprises younger volcanic rock of the Whitianga group with large areas of alluvial material. The district comprises of mainly steepland soils in the west. In the east, on terraced and rolling land, volcanic ash loam soils dominate which are moderately to strongly leached but are deep and friable and moderately fertile.

4.4.4 Vegetation

Waihi ED covers the southern end of the Coromandel Range and the northern tip of the Kaimai range, and the Ohinemuri River Catchment (incl. the Karangahake Gorge) in between. It includes the east coast between Whangamata and Waihi Beach. Formerly, associations of kauri-podocarp-broadleaved forest dominated the central range spine and hill country of this ED. There were also significant stands of rimu-tawa-kohekohe forest, and at higher altitudes, montane

podocarp (e.g. halls totara)-broadleaved forest. The coast line was once dominated by pohutukawa-puriri forests, with extensive alluvial flood plain podocarp forests in the valleys leading to the coast. Some estuarine and sand dune habitats are also present.

4.4.5 Significant Flora

The coastal cliffs north of Waihi Beach contain reasonably intact representations of original pohutukawa dominated forest and coastal shrublands.

Most of the lowland alluvial podocarp forest is gone, but the Waitekauri Valley still contains small but relatively intact examples of kahikatea and rimu/matai/miro/totara forests.

Small patches of swamp maire may be still found in very wet gully swamps and seeps but are rare.

In the sub-montane zones yellow-silver pine–tawari forest is present, which is important as this association occurs only occasionally in scattered spots on the Coromandel Range.

Significant plant species found in the Waihi ED include *Metrosideros carminea*, *Desmoschoenus spiralis* and *Hebe pubescens* var. *pubescens.*

4.4.6 Significant Fauna

Hochstetter's frog occurs at the southern end of the Coromandel Range, east of Paeroa. Archey's frog is found at higher altitudes within the Coromandel Range and less commonly at mid altitudes.

Threatened bird species present include kereru, New Zealand dotterel (on the coast but also at the Waihi Mine tailings), NZ fernbird and New Zealand falcon. NZ kaka are likely to be regular visitors to both slope and lowland forests. Brown kiwi are now likely to be locally extinct. Caspian terns are present along the cliffs and beaches. One or two individuals of the elusive North Island kokako may still persist in isolated areas within the ranges.

Longtail bats are likely to be found through the ED in suitable habitat and where suitable roost trees and sufficient insect sources are present.

A number of geckos are present including forest gecko, common gecko and elegant tree gecko. As well as the ubiquitous copper skink, the threatened moko skink (*Oligosoma moco*) may be present along estuarine habitats as may be shore skink (*Oligosoma smithi*).

Little is known about terrestrial invertebrates but the paua slug (*Schizoglossa novoseelandica*) has been recorded as being present.

Threatened indigenous fish include giant kokopu, shortjawed kokopu, black mudfish and longfin eel.

4.4.7 Key Protected Natural Areas

The Coromandel Conservation Park and the surrounding reserves form a large area of protected indigenous habitats, consisting mostly of forest, but also containing sub-montane shrublands and smaller wetlands. The Karangahake Gorge contains a mosaic of reserves administered by DoC. Individually these reserves are not of high ecological value, but together they form an important ecological corridor, bridging the east coast with the Hauraki Plains as well as Te Aroha Conservation Park with Coromandel Conservation Park. This gully also has significant restoration potential.

Orokawa Scenic Reserve contains excellent examples of pohutukawa dominant forest. Continued possum control is essential for the ecological well-being of this reserve.

4.5 Te Aroha Ecological District

4.5.1 Background

Area of ED within Hauraki District: 5,850 ha

4.5.2 Bioclimatic zones

Generally summers are warm and moist and winters mild. Mean annual rainfall is high; up to 2500 mm per annum. The Te Aroha ED contains two bioclimatic zones (lowland and montane) with sub-alpine elements being found outside of the Hauraki District (Figure 2).

4.5.3 Geology and soils

The most common rocks are Beeson's Island Volcanics and Waitawheta dacites, with younger flows and dykes of the Omahia andesites overlain. Erosion of the steep slopes of the range has given rise to colluvial deposits at its base (Wilson, 1980).

On steep slopes, rolling country and alluvial fans, soils are of medium fertility. The moderately steep to steep lower western slopes have a soil of brown granular clay. At lower altitudes on the western slopes a band of alluvium derived from andesite and rhyolite is mixed with rewashed volcanic ash (Regnier, 1987).

4.5.4 Vegetation

Even though Te Aroha is the smallest of the Coromandel ecological districts it exhibits considerably diverse and complex vegetation. The vegetation varies from semi-coastal to montane with some sub-alpine elements. There is a mixing of northern and southern elements of New Zealand forest types in this ED and localised areas of unique associations of plant species that do not usually occur together.

The semi-coastal forests on the lower alluvial slopes are the rarest, most reduced in extent, and remnants which remain are highly modified. Totara, rimu and kahikatea are still present in small, and often stream margin remnants. Other species found include titoki, wharangi, karaka, mangeao, tarata, rewarewa, kowhai and pukatea. In lowland forest remnants tawa and kohekohe can be found at lower altitudes mixed with logged podocarps, such as rimu and totara. Kauri can still be found on ridges, but is mostly now reduced to stands of rickers, because of the extensive logging carried out.

At higher altitudes tawa and large podocarps dominate with towai and tawari as well as kamahi being present. On some ridges, hard beech is still present and sometimes kauri with hard beech form strong ridgeline vegetation patterns on north facing slopes.

The lower montane zones are dominated by tawari and kamahi with occasional tawa, miro and totara grading into pockets of red and silver beech at higher altitudes (Regnier, 1987).

4.5.5 Significant Flora

Both towai (northern) and kamahi (southern) and various hybrids between the two species of *Weinmannia racemosa* occur in the Te Aroha ED.

Threatened plant species found include king fern and the wetland water plant *Myriophyllum robustum*. The fern *Loxsoma cunninghamii* is one of New Zealand's "living fossils." Together with three species from Central America, *L. cunninghamii* constitutes the family Loxsomataceae, whose closest relatives existed 60 million years ago. *Coprosma dodonaeifolia* is found in this ED and is endemic to the Coromandel. As Regnier (1987) points out, the Te Aroha ED contains the following significant plant communities:

- Most northern mainland occurrence of silver beech forest;
- Most southern extensive kauri stands in association with other regional species;
- Nationally unique association of hard beech-yellow silver pine;
- Most extensive stands of kauri-hard beech stands remaining within the Coromandel; and
- A sub-alpine element found which is uncommon regionally.

4.5.6 Significant Fauna

Threatened bird species present include kereru, New Zealand dotterel (on the coast but also at the Waihi Mine tailings), NZ fernbird and New Zealand falcon. NZ kaka are likely to be regular visitors to lowland forests. Brown kiwi are now locally extinct.

Longtail bats are likely to be found through the ED in suitable habitat and where suitable roost trees and sufficient insect sources are present.

Hochstetter's frogs and Archey's frogs occur throughout the western and eastern well-forested streams as well as on some ridges.

A number of geckos are present including forest gecko, common gecko and elegant tree gecko.

Little is known about terrestrial invertebrates but the flightless stag beetle (*Geodorcus auriculatus*) is confined to Mount Te Aroha.

Threatened indigenous fish include giant kokopu, shortjawed kokopu and longfin eel.

4.5.7 Key Protected Natural Areas

The key protected natural area is the Kaimai Conservation Park and its surrounding associated reserves.

4.6 Hinuera Ecological District

4.6.1 Background

Area of ED within Hauraki District: 101 ha

4.6.2 Bioclimatic zones

A tiny portion of this ED lies within the Hauraki District. The climate is warm and humid and annual rainfall is between 1000 and 1400 mm per annum. This ED encompasses one bioclimatic zone (refer to Figure 2).

4.6.3 Geology and soils

The underlying geology consists of mostly Pleistocene alluvium and peat and old alluviums carried down the old path of the Waikato River from the Central Volcanic Plateau.

Soils comprise of well drained, friable ash on rolling and hilly land.

4.6.4 Vegetation

Within the Hauraki District, the forest types of Hinuera ED are logged secondary growth tawa-broadleaf remnants, with significant exotic vegetation intruding, such as pine and wattle species.

4.6.5 Significant Flora & Fauna/Protected Areas

No significant fauna or flora or legally protected areas are present within this ED within Hauraki District.

5 Significant Natural Area Analysis

5.1 Bioveg LCDB2 Classes

Table 4 provides a breakdown of the key indigenous vegetation communities found within the Hauraki District in relation to the various protected and unprotected categories.

With exotic grassland being the main vegetation cover, when this and several other smaller land classes are excluded, the remaining vegetation cover, including pine forests, is approximately 39,629 ha or 33 % of the Hauraki District. When various exotic forest types,

are excluded, with the exception of deciduous hardwoods (which usually represent willow dominated wetlands), approximately 35,454 ha (30%) of the district can be considered as being covered with indigenous vegetation and habitats of one form or another.

The largest indigenous vegetation class are "Indigenous Forest/Broadleaved Indigenous Hardwoods" (24,788 ha) and "Manuka or Kanuka" (8,827 ha). The large areas of indigenous forest are found within the Coromandel and Hapuakohe Ranges while the Manuka or Kanuka class is so dominant, because the majority of the extensive Kopuatai and Torehape Peat Domes are classed as this land cover type.

It is noted that the analysis provided in Table 3 using Leathwick's 1995 data set shows some 34,410 ha or 29% of the district is indigenous forest, which is about 1,000 ha less than found in this investigation. It is unclear why this discrepancy has occurred, but more detailed aerial photography now available, combined with some ground truthing for the Bioveg data set has possibly allowed for better differentiation between vegetation types. Reversion of marginal country back to scrub habitat may also contribute to the difference. Nonetheless, the results do suggest that no significant clearance of indigenous vegetation has occurred in Hauraki District in the intervening period.

Given the broad scale of the LCDB2 classifications, detailed analysis of the vegetation classes is not possible. However, further analysis of the Bioveg data set would yield more accurate interpretation of the data if required.

5.2 Significant Natural Areas

Two hundred and six Significant Natural Areas were identified within the Hauraki District comprising of approximately 32,677 ha of land (or 28% of the district). Approximately 25,824 ha or 79%, are protected by DoC, Council reserves and QEII/Nga Whenua Rahui covenants, leaving some 6,853 ha (21%) of unprotected SNA's largely on privately owned land. A summary of these sites and their ecological significance ranking are listed in Appendix III and they are mapped in Appendix IV. Table 5 provides a further spatial breakdown of the component LCDB2 land cover classes in relation to protected versus unprotected SNA's within each of the ecological districts. This summary breakdown is useful, because it gives an indication where the most under-represented and least protected indigenous vegetation classes are found; hence where future management direction should be focussed. This is discussed further in Section 7.2.

Within the Hapuakohe ED, the main vegetation types are indigenous forest and manuka/kanuka. Of the remaining indigenous vegetation, approximately 1,388 ha, or 42% of the SNA's within this ED are protected. Of the unprotected SNA's, the majority (1,115 ha or 58%) are kanuka and manuka scrubland, principally on the eastern foot hills of the Hapuakohe Ranges.

The Hauraki ED, being dominated by the Kopuatai and Torehape Peat Domes, contains SNA's which are predominantly protected (5,587 ha or 76%). The remaining unprotected SNA's comprise of vegetation which is manuka dominated peat wetland (mostly the unprotected portions of the Torehape Peat Dome) and willow dominated wetland. However, a sizable portion of the ED comprises of indigenous forest types of which c. 400 ha is unprotected, much of which is alluvial flood plain forest dominated by kahikatea forest. Given the scarcity of indigenous forest remains on lowland alluvial plains at a national level, this is likely to constitute a considerable portion of lowland forest remnants left within the Waikato Region.

The SNA's within the Waihi ED predominantly comprise of indigenous forest types (a combined area of some 12,364 ha), which are mostly found within the Coromandel Conservation Park. However, a sizable portion of indigenous forest types are found within unprotected SNA's (4,408 ha). Much of this forest is contiguous with the Conservation Park, but several large areas of coastal and semi-coastal forest are also found from Waihi Beach north towards Whangamata. All of these coastal influenced forests are regionally and

nationally under-represented. About 29% of the SNA's found within this ED are unprotected. The remaining 71% are largely within DoC estate.

The Hinuera ED only contains 44.3 ha of indigenous vegetation within the Hauraki District, and of this 24.7 ha is classified as unprotected SNA.

Within the Te Aroha ED, virtually all of the SNA vegetation is indigenous forest of one type or another and is legally protected (92%).

Table 4 Composition of LCDB2 Classes within the Hauraki District in Relation to Protection Status (Area figures in hectares (ha) and calculated in true (spheroidal) measurement interpretation using GeoMedia GIS)

Area of Hauraki District*3	118,800.36
Total area of DoC conservation estate in Hauraki District*3	25,538.44
Total area of QEII covenants in Hauraki District*3	521.91
Total area of District Reserves in Hauraki District*3	377.00
Total area of Nga Whenua Rahui Covenants in Hauraki District*3	526.65
Total area of Protected land in Hauraki District*3	26,964.00
Total area of Other 'Unprotected' land in Hauraki District*1	91,836.36
Total area of SNA land in Hauraki District*2	32,677.39

Area of each Bioveg LCDB2 Class* in:								
Class	**District*3**	**DoC*3**	**QEII*3**	**District Reserve*3**	**Nga Whenua Rahui Covenant*3**	**Total Protected*3**	**Other Unprotected Land*1**	**SNA*2**
Broadleaved Indigenous Hardwoods	3,500.46	1,694.59	16.16	22.38	267.32	2,000.45	1,500.01	2,587.77
Deciduous Hardwoods	1,434.72	1,069.06	0	2.25	0	1,071.31	363.41	1,341.12
Fernland	63.99	35.82	1.03	0	0	36.85	27.14	40.21
Gorse and Broom	603.86	21.93	0	0	16.26	38.19	565.67	0
Herbaceous Freshwater Vegetation	199.1	69.93	0	0	0	69.93	129.17	124.67
Herbaceous Saline Vegetation**	34.12	0	0	0	0	0.00	34.12	34.12
Indigenous Forest	21,287.87	15,593.61	409.38	132.28	121.66	16,256.93	5,030.94	20,855.99
Mangrove**	37.87	10.83	0	0	0	10.83	27.04	37.73
Manuka and or Kanuka	8,827.08	5,974.68	71.95	0.64	78.21	6,125.48	2,701.60	7,653.17
Mixed Exotic Shrubland	128.37	5.34	2.93	1.47	4.94	14.68	113.69	0
Other Exotic Forest	199.63	2.5	0	0.51	0	3.01	196.62	0
Pine Forest - Closed Canopy	2,776.66	39.47	1.06	0.24	12.8	53.57	2,723.09	0
Pine Forest - Open Canopy***	468.78	5.22	0	0	5.54	10.76	458.02	2.61
Unknown or Other (e.g. degraded wetlands in pasture)	66.83	6.7	0	0	0.8	7.50	59.33	0
Total	**39,629.34**	**24,529.68**	**502.51**	**159.77**	**507.53**	**25,699.49**	**13,929.85**	**32,677.39**

* Excludes the following listed LCDB2 Classes
Urban Parkland/Open Space, Short-rotation Cropland
Vineyard, Orchard and Other Perennial Crops
High Producing Exotic Grassland, Low Producing Grassland
Minor Shelterbelts, Major Shelterbelts, Afforestation (not imaged)*
Forest Harvested**,
Minor Shelterbelts
Major Shelterbelts
Afforestation (not imaged)*
Forest Harvested**
** Coastal ecosystems not completely mapped or assessed yet
*** Includes Afforestation (imaged, post LCDB1)

*1 = These figures include paper roads and "Queens chain" land

*2 = These figures are based on the Hauraki Significant Natural Areas attributes and/or geometry and can include paper roads and "Queens chain" land that is located within or adjacent to other, larger properties.
*3 = These figures are based on Cadastral data and therefore generally do not include 'paper roads' and 'Queens Chain' land.

Table 5 Composition of LCDB2 Classes within Each Ecological District within the Hauraki District in Relation to Protection Status (Area figures in hectares (ha) and calculated in true (spheroidal) measurement interpretation using GeoMedia GIS)

	Hapuakohe
Area of each Ecological District in Hauraki District	8,573.03
Total area of DoC conservation estate in that part of Ecological District[*3]	1,375.90
Total area of QEII covenants in that part of Ecological District[*3]	42.95
Total area of District Reserves in that part of Ecological District[*3]	4.5
Total area of Nga Whenua Rahui Covenants in that part of Ecological District[*3]	0
Total area of 'Protected' land in that part of Ecological District[*3]	1,423.35
Total area of Other 'Unprotected' land in that part of Ecological District[*1]	7,149.68
Total area of SNA land in that part of Ecological District[*2]	2,690.02

Area of each Bioveg LCDB2 Class* in:

Class	Eco District	DoC	QEII	District Reserve	Nga Whenua Rahui Covenant	Total 'Protected'	Other 'Unprotected' Land[*1]	SNA[*2]
Broadleaved Indigenous Hardwoods	159.84	7.49	0	1	0	8.49	151.35	86.14
Deciduous Hardwoods	9.49	0	0	0	0	0	9.49	0.95
Fernland	0	0	0	0	0	0	0	0
Herbaceous Freshwater Vegetation	0	0	0	0	0	0	0	0
Herbaceous Saline Vegetation**	0	0	0	0	0	0	0	0
Indigenous Forest	1,930.79	1,273.34	12.69	0.14	0	1286.17	644.62	1,908.60
Mangrove**	0	0	0	0	0	0	0	0
Manuka and or Kanuka	1,208.60	65.37	28.09	0	0	93.46	1115.14	694.33
Unknown or Other (e.g. degraded wetlands in pasture)	0	0	0	0	0	0	0	0
Total	**3,308.72**	**1,350.03**	**40.78**	**1.14**	**0.00**	**1,388.12**	**1,920.60**	**2,690.02**

	Hauraki
Area of each Ecological District in Hauraki District	60,450.12
Total area of DoC conservation estate in that part of Ecological District[*3]	6,270.72
Total area of QEII covenants in that part of Ecological District[*3]	7.17
Total area of District Reserves in that part of Ecological District[*3]	139.07
Total area of Nga Whenua Rahui Covenants in that part of Ecological District[*3]	0
Total area of 'Protected' land in that part of Ecological District[*3]	6,416.96
Total area of Other 'Unprotected' land in that part of Ecological District[*1]	54,033.16
Total area of SNA land in that part of Ecological District[*2]	6,777.83

Area of each Bioveg LCDB2 Class* in:

Class	Eco District	DoC	QEII	District Reserve	Nga Whenua Rahui Covenant	Total 'Protected'	Other 'Unprotected' Land[*1]	SNA[*2]
Broadleaved Indigenous Hardwoods	163.4	3.03	3	0	0	6.03	157.37	21.99
Deciduous Hardwoods	1,399.44	1,067.53	0	1.45	0	1068.98	330.46	1,339.31
Fernland	0	0	0	0	0	0	0	0
Herbaceous Freshwater Vegetation	176.57	69.38	0	0	0	69.38	107.19	112.13
Herbaceous Saline Vegetation**	1.55	0	0	0	0	0	1.55	1.55
Indigenous Forest	258.63	11.16	0.69	4.35	0	16.2	242.43	196.3
Mangrove**	37.87	10.83	0	0	0	10.83	27.04	37.73
Manuka and or Kanuka	5,209.46	4,407.26	1.08	0.64	0	4,408.98	800.48	5,068.80
Unknown or Other (e.g. degraded wetlands in pasture)	63.01	6.7	0	0	0	6.7	56.31	0
Total	**7,309.93**	**5,575.89**	**4.77**	**6.44**	**0.00**	**5,587.10**	**1,722.83**	**6,777.81**

	Hinuera
Area of each Ecological District in Hauraki District	101.03
Total area of DoC conservation estate in that part of Ecological District[*3]	0
Total area of QEII covenants in that part of Ecological District[*3]	0
Total area of District Reserves in that part of Ecological District[*3]	0
Total area of Nga Whenua Rahui Covenants in that part of Ecological District[*3]	0
Total area of 'Protected' land in that part of Ecological District[*3]	0.00
Total area of Other 'Unprotected' land in that part of Ecological District[*1]	101.03
Total area of SNA land in that part of Ecological District[*2]	34.65

Area of each Bioveg LCDB2 Class* in:

Class	Eco District	DoC	QEII	District Reserve	Nga Whenua Rahui Covenant	Total 'Protected'	Other 'Unprotected' Land[*1]	SNA[*2]
Broadleaved Indigenous Hardwoods	1.45	0	0	0	0	0	0.01	0
Deciduous Hardwoods	0	0	0	0	0	0	0	0
Fernland	0	0	0	0	0	0	0	0
Herbaceous Freshwater Vegetation	0	0	0	0	0	0	0	0
Herbaceous Saline Vegetation**	0	0	0	0	0	0	0	0
Indigenous Forest	31.93	0	0	0	0	0	21.31	29
Mangrove**	0	0	0	0	0	0	0	0
Manuka and or Kanuka	10.92	0	0	0	0	0	3.37	5.65
Unknown or Other (e.g. degraded wetlands in pasture)	0	0	0	0	0	0	0	0
Total	**44.3**	**0**	**0**	**0**	**0.00**	**0**	**24.69**	**34.65**

	Te Aroha
Area of each Ecological District in Hauraki District	5,849.91
Total area of DoC conservation estate in that part of Ecological District*3	4,738.47
Total area of QEII covenants in that part of Ecological District*3	0
Total area of District Reserves in that part of Ecological District*3	42.92
Total area of Nga Whenua Rahui Covenants in that part of Ecological District*3	0
Total area of 'Protected' land in that part of Ecological District*3	4,781.39
Total area of Other 'Unprotected' land in that part of Ecological District*1	1,068.52
Total area of SNA land in that part of Ecological District*2	5,145.67

Area of each Bioveg LCDB2 Class* in:

Class	Eco District	DoC	QEII	District Reserve	Nga Whenua Rahui Covenant	Total 'Protected'	Other 'Unprotected' Land*1	SNA*2
Broadleaved Indigenous Hardwoods	319.47	276.00	0.00	0.54	0	276.54	42.93	307.32
Deciduous Hardwoods	0	0	0	0	0	0.00	0	0
Fernland	0	0	0	0	0	0.00	0	0
Herbaceous Freshwater Vegetation	0	0	0	0	0	0.00	0	0
Herbaceous Saline Vegetation**	0	0	0	0	0	0.00	0	0
Indigenous Forest	4,650.91	4,257.99	0.00	42.13	0	4,300.12	350.79	4,629.81
Mangrove**	0	0	0	0	0	0.00	0	0
Manuka and or Kanuka	208.54	195.04	0.00	0.00	0	195.04	13.50	208.54
Unknown or Other (e.g. degraded wetlands in pasture)	0	0	0	0	0	0.00	0	0
Total	**5,178.92**	**4,729.03**	**0.00**	**42.67**	**0.00**	**4,771.70**	**407.22**	**5,145.67**

	Waihi
Area of each Ecological District in Hauraki District	43,733.02
Total area of DoC conservation estate in that part of Ecological District*3	13,119.73
Total area of QEII covenants in that part of Ecological District*3	471.78
Total area of District Reserves in that part of Ecological District*3	190.51
Total area of Nga Whenua Rahui Covenants in that part of Ecological District*3	526.65
Total area of 'Protected' land in that part of Ecological District*3	14,308.67
Total area of Other 'Unprotected' land in that part of Ecological District*1	29,424.35
Total area of SNA land in that part of Ecological District*2	18,029.21

Area of each Bioveg LCDB2 Class* in:

Class	Eco District	DoC	QEII	District Reserve	Nga Whenua Rahui Covenant	Total 'Protected'	Other 'Unprotected' Land*1	SNA*2
Broadleaved Indigenous Hardwoods	2,856.30	1,408.07	13.16	20.85	267.32	1,709.40	1,146.90	2,172.33
Deciduous Hardwoods	25.78	1.53	0	0.81	0	2.34	23.44	0.85
Fernland	63.99	35.82	1.03	0	0	36.85	27.14	40.21
Herbaceous Freshwater Vegetation	22.53	0.56	0	0	0	0.56	21.97	12.54
Herbaceous Saline Vegetation**	32.56	0	0	0	0	0.00	32.56	32.56
Indigenous Forest	14,415.61	10,051.13	396	85.66	121.66	10,654.45	3,761.16	14,092.27
Mangrove**	0	0	0	0	0	0.00	0	0
Manuka and or Kanuka	2,189.56	1,307.01	42.78	0	78.21	1,428.00	761.56	1,675.85
Unknown or Other (e.g. degraded wetlands in pasture)	3.82	0	0	0	0.8	0.80	3.02	0
Total	**19,610.15**	**12,804.12**	**452.97**	**107.32**	**467.99**	**13,832.40**	**5,777.75**	**18,026.61**

* Excludes the following listed LCDB2 Classes
Urban Parkland/Open Space,Mixed Exotic Shrubland
Short-rotation Cropland, Vineyard, Orchard and Other Perennial Crops, High Producing Exotic Grassland, Low Producing Grassland, Minor Shelterbelts, Major Shelterbelts, Pine Forest - Closed Canopy, Pine Forest - Open Canopy***, Other Exotic Forest, Mixed Exotic Shrubland

Afforestation (not imaged)*
Forest Harvested**
** Coastal ecosystem not completely mapped or assessed yet
*** Includes Afforestation (imaged, post LCDB1)

6 Threatened Species within Hauraki District

Forty-nine threatened species have been recorded as being present within Hauraki District as defined by the Department of Conservation (Hitchmough *et al.,* 2007) in the databases searched. These are listed in Tables 6 to 11 below. Section 4 provides a summary of the threatened species found within each ecological district in Hauraki District.

As part of the SNA ranking process, past records of threatened indigenous species were included. However, many species, such as NZ kaka and NZ falcon, are highly mobile and have large territories and vast home ranges. It is difficult to predict where these species may utilise suitable habitats throughout a year so that habitat utilisation is probably much broader than specific points in time as shown on a database.

Other fauna species, such as the two indigenous frog species, giant kokopu and longtail bats, are regularly being discovered in new sites and habitats as ecological investigations for resources consents/scientific research are conducted in conjunction with improved survey methods and technology. To this extent, the SNA database needs to be regularly updated to reflect this.

On the other hand much of the data used for this analysis is older than ten years and some plant and animal species may very well now be locally extinct. A precautionary approach to the use this old data is considered to be pertinent in so far that sites where data is older than twenty-thirty years should be resurveyed to confirm if a threatened species is still present. For example, during the course of this analysis it was difficult to gauge the present extent and abundance of brown kiwi within the Hauraki District and most of the records for kiwi are now older than fifteen years.

Threatened plants are at risk of rapidly becoming locally extinct if a management regime changes or a new pest or disease strikes a local population. Threatened plants situated on privately owned, unprotected land are particularly vulnerable.

Table 6 Threatened Vascular Plant Species Recorded in Hauraki District (Brandon *et al*., 2004)

Common name	Scientific name	Threat category
Sand tussock	*Austrofestuca littoralis*	5 Gradual decline
Kirks daisy	*Brachyglottis kirkii var. kirkii*	4 Serious decline
Bearded orchid	*Calochilus paludosus*	6 Sparse
Red bearded orchid	*Calochilus robertsonii*	6 Sparse
Pingao	*Desmoschoenus spiralis*	5 Gradual decline
Dwarf greenhood	*Linguella puberula*	1 Nationally critical
Bog clubmoss	*Lycopodiella serpentina*	3 Nationally vulnerable
King fern	*Marattia salicina*	4 Serious decline
Stout water milfoil	*Myriophyllum robustum*	5 Gradual decline
	Neopanax laetus	5 Gradual decline
Kirk's kohuhu	*Pittosporum kirkii*	4 Serious decline
Plumed greenhood	*Plumatichilos tasmanicum*	4 Serious decline
Pomaderris	*Pomaderris rugosa*	7 Range restricted
Pale-flowered kumarahou	*Pomaderris hamiltonii*	6 Sparse
Swamp leek orchid	*Prasophyllum* aff. *patens*	3 Nationally vulnerable
Swamp greenhood	*Pterostylis micromega*	1 Nationally critical
Swamp greenhood	*Pterostylis paludosa*	4 Serious decline
Raukawa	*Raukaua edgerleyi*	5 Gradual decline
Giant jointed rush	*Sporadanthus ferrugineus*	7 Range restricted
Yellow bladderwort	*Utricularia australis*	2 Nationally endangered

Table 7 Threatened Bird Species recorded in Hauraki District (OSNZ)

Common name	Scientific name	Threat category
Wrybill	*Anarhynchus frontalis*	3 Nationally vulnerable
Brown kiwi	*Apteryx mantelli*	4 Serious decline
Australasian bittern	*Botaurus poiciloptilus*	2 Nationally endangered
North Island fernbird	*Bowdleria punctata vealeae*	6 Sparse
North Island kokako	*Callaeas cinerea wilsoni*	2 Nationally endangered
New Zealand dotterel	*Charadrius obscurus aquilonius*	3 Nationally vulnerable
Blue penguin	*Eudyptula minor iredalei*	5 Gradual decline
New Zealand bush falcon	*Falco novaeseelandiae*	3 Nationally vulnerable
Kereru	*Hemiphaga novaeseelandiae*	5 Gradual decline
Black-billed gull	*Larus bulleri*	4 Serious decline
New Zealand kaka	*Nestor meridionalis septentrionalis*	2 Nationally endangered
Marsh crake	*Porzana pusilla affinis*	6 Sparse
Spotless crake	*Porzana tabuensis plumbea*	6 Sparse
Caspian tern	*Sterna caspia*	3 Nationally vulnerable
White-fronted tern	*Sterna striata*	5 Gradual decline

Table 8 Threatened Mammal Species recorded within Hauraki District

Common name	Scientific name	Threat category
Long-tail bat	*Chalinolobus tuberculata*	3 Nationally vulnerable

Table 9 Threatened Fish Species recorded in Hauraki District (New Zealand Freshwater Fish Database, NIWA, 2008)

Common name	Scientific name	Threat category
Longfin eel	*Anguilla dieffenbachii*	5 Gradual decline
Shortjaw kokopu	*Galaxias postvectis*	6 Sparse
Giant kokopu	*Galaxias argenteus*	5 Gradual decline
Lamprey	*Geotria australis*	6 Sparse
Black mudfish	*Neochanna diversus*	5 Gradual decline
Koura	*Paranephrops planifrons*	5 Gradual decline

Table 10 Threatened Herpetofauna recorded in Hauraki District (DoC Bioweb, 2009)

Common name	Scientific name	Threat category
Archey's frog	*Leiopelma archeyi*	1 Nationally critical
Hochstetter's frog	*Leiopelma hochstetteri*	6 Sparse
Pacific gecko	*Hoplodactylus pacificus*	5 Gradual decline
Auckland green gecko	*Naultinus e. elegans*	5 Gradual decline
Moko skink	*Oligosoma moco*	6 Sparse

Table 11 Threatened Invertebrates recorded in Hauraki District

Common name	Scientific name	Threat category
Freshwater crab	*Amarinus lacustris*	6 Sparse
Te Aroha stag beetle	*Geodorcus auriculatus*	6 Sparse

7 Conclusions & Recommendations

7.1 Conclusions

The Hauraki SNA inventory is part of a region-wide project. When complete, the full set of inventories will provide a regional context for biodiversity prioritisation, management and monitoring.

Approximately 35,454 ha (or 30%) of the District can be considered as being covered with indigenous vegetation and habitats of one form or another.

The largest indigenous vegetation class are "*Indigenous Forest/Broadleaved Indigenous Hardwoods*" (24,788 ha) and "*Manuka or Kanuka*" (8,827 ha). The large areas of indigenous forest are found within the Coromandel and Hapuakohe Ranges. The Manuka or Kanuka class is so dominant on the Hauraki Plains because the majority of the extensive Kopuatai and Torehape Peat Domes are classed as this land cover type.

Two hundred and six Significant Natural Areas were identified within the Hauraki District comprising of approximately 32,677 ha of land (or 28% of the district). Approximately 25,824 ha or 79%, are protected by DoC, Council reserves and QEII/Nga Whenua Rahui covenants, leaving some 6,853 ha (21%) of unprotected SNAs largely on privately owned land.

The greatest density and diversity of existing threatened indigenous flora and fauna species records are focused on the Coromandel Range, within DoC administered land. However, further surveys and improved detection methods will broaden the extent and diversity of threatened species found within the Hauraki District over time. For example, long-tailed bats are known to have been recorded within a small, privately owned kahikatea fragment near the Kopuatai Peat Dome. Intensive searches for Hochstetter's and Archey's frogs along the margins of streams emanating from the Coromandel Range invariably result in new records for these species.

This analysis was largely a desktop study. It forms the basis of an inventory and scoring of ecologically valuable areas within Hauraki District which will be added to and updated over time. It is to be used in subsequent analyses and community consultation. To this effect, ground truthing is essential and every opportunity should be taken to add or correct information contained in this database where new information comes to hand.

7.2 Recommendations

The following specific recommendations for each ecological district are partly drawn from those outlined by Harding (1997) as well anecdotal observations and analysis of the SNA data.

7.2.1 Waihi Ecological District

The most severely depleted ecosystems in the Waihi ED are the lowland (dense) podocarp forests and coastal forests. Kauri forests are also seriously depleted, though the logged remnants are largely protected. Rimu-tawa forest is also depleted and only half of the remnants are protected. Montane podocarp-broadleaved forest remnants, though much reduced, are fully protected. There has been widespread and almost complete loss of forest cover from the lower altitude south-eastern parts of the ED around Waihi.

Opportunities for the restoration and protection of podocarp forest are limited to small remnants in the Waitekauri Valley. The best opportunities for coastal forest protection are in the southeast, on the coast north of Waihi Beach, south of Mataora Bay, and around Whiritoa Beach. Small areas of unprotected (logged) kauri forest are present west of Whiritoa, east of Hikutaia, and east of Komata. Opportunities for protection of rimu-tawa forest are limited to areas east of Komata and smaller areas north of Waihi.

Opportunities for the protection of linkages and corridors should be focussed on regenerating forest and shrubland, including significant areas of exotic shrubland, around the Karangahake Gorge, to link the Coromandel and Kaimai Ranges, and areas of shrubland south of Whiritoa, to link the montane vegetation communities on the Coromandel Range with the lowland coastal forests.

The Tarariki Reserve (Hauraki District Water Reserve) has a significant biodiversity value as it provides an important ecological corridor between the upper ranges of the southern Coromandel forest and the Hauraki Plains. Restoration centred at this locality would be worthwhile.

7.2.2 Hauraki Ecological District

As the former forest cover of the Hauraki ED has been almost completely removed, indigenous forest only remains as isolated remnants surrounded by intensive farming. The Kopuatai Wetland Management Reserve, covering the Kopuatai Peat Dome, the associated Flax Block Wildlife Management Reserve (WMR) and the Torehape Wetland Management Reserve and Patetonga Lake WMR are the largest protected SNA's with the Kopuatai Peat Dome ranked as being of International Ecological Significance. Many remaining wetlands are threatened by infestations of willow and by the continued drainage of surrounding lands.

Opportunities for further protection of wetland vegetation include an area adjoining the Kopuatai Reserve to the east and two areas north of the Torehape Reserve. Opportunities for protection of podocarp forest are limited to scattered remnants along the Waitakaruru River in the northwest of the ED, on islands in the Waihou River near Wharepoa and Netherton, and on the central Hauraki Plains near Horahia. Another opportunity for forest protection is an area of logged kauri forest and hardwood forest regeneration adjoining the Maratoto West Block, in the east of the ED.

Opportunities for protecting linkages or corridors in the ED are constrained by the intensive land uses that dominate the Hauraki Plains. The further buffering of some wetland areas is possible through wetland restoration and the re-establishment of hydrological regimes. Restoration offers the only long term prospect for further protection of the small kahikatea remnants on the plains.

7.2.3 Hapuakohe Ecological District

Kauri-hard beech forest had a limited distribution within the Waikato Region and is still present within the Hapuakohe ED. In addition, remnant puriri/kohekohe forest is often associated with the logged kauri forest or found within gullies and south-facing ridges of larger kanuka dominated stands and these are worthy of active management and restoration. The more mature stands of kauri-forest with semi-coastal elements adjacent to the Hapuakohe Scenic Reserve, often surrounded by pine forest, should be targeted for active management.

Kanuka forest/scrubland remnants, often still grazed and threatened by helicopter herbicide spraying, are found following the streams draining into the Hauraki Plains with large puriri sometimes still present. Gullies where dense stands of kanuka dominated secondary forest still persist offer ideal opportunities for fencing and margin replanting.

7.2.4 Te Aroha Ecological District

The podocarp forests on the river terraces within the portion of the Te Aroha ED occurring in Hauraki District are the rarest, most reduced in extent and remnants which remain are highly modified. Opportunities for the restoration and protection could be focussed on linking these small podocarp forest remnants in the Waitekauri Valley with the Kaimai Conservation Park in order enhance linkages with the Karangahake Gorge and ultimately the Coromandel Range.

Sporodanthus ferrugineus – Torehape Peat Dome

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APPENDIX I

Scientific Names of Plants Mentioned in the Report

Indigenous Species

Botanical Name	Common Name
Agathis australis	kauri
Alectryon excelsa	titoki
Austrofestuca littoralis	Sand tussock
Baumea tenax	
Baumea teretifolia	common twig rush
Beilschmiedia tawa	tawa
Blechnum minus	swamp kiokio
Brachyglottis kirkii var. kirkii	Kirks daisy
Calochilus paludosus	bearded orchid
Calochilus robertsonii	red bearded orchid
Carex secta	pukio
Carex virgata	swamp sedge
Coprosma dodonaeifolia	
Coprosma propinqua	mingimingi
Coprosma robusta	karamu
Coprosma tenuicaulis	swamp coprosma
Cordyline australis	cabbage tree
Corynocarpus laevigatus	karaka
Cyathea dealbata	silver fern
Dacrydium cupressinum	rimu
Dacrydium dacrydioides	kahikatea
Desmoschoenus spiralis	pingao
Dicksonia squarrosa	wheki
Drosera binata	forked sundew
Drosera spatulata	sundew
Dysoxylum spectabile	kohekohe
Elaeocarpus hookerianus	pokaka
Empodisma minus	wire rush
Epacris pauciflora	tamingi
Goebelobryum unguiculatum	liverwort
Hebe pubescens subsp. *pubescens*	Coromandel koromiko
Ixerba brexioides	tawari
Knightia excelsa	rewarewa
Kunzea ericoides	kanuka
Laurelia novae-zelandiae	pukatea
Lepidothamnus intermedius	yellow silver pine
Leptecophylla juniperina subsp. juniperina	prickly mingimingi
Leptospermum scoparium	manuka
Leucopogon fasciculatus	mingimingi
Linguella puberula	dwarf greenhood
Litsea calicaris	mangeao
Loxsoma cunninghamii	
Lycopodiella serpentina	bog clubmoss
Marattia salicina	king fern
Melicope ternata	wharangi
Metrosideros carminea	carmine rata
Metrosideros excelsa	pohutukawa
Myriophyllum robustum	stout water milfoil
Neopanax laetus	
Nothofagus fusca	red beech

Nothofagus menziesii	silver beech
Nothofagus truncata	hard beech
Phormium tenax	flax
Phyllocladus trichomanoides	tanekaha
Pittosporum eugenioides	tarata
Pittosporum kirkii	Kirk's kohuhu
Plumatichilos tasmanicum	plumed greenhood
Podocarpus hallii	Hall's totara
Podocarpus totara	totara
Pomaderris rugosa	Pomaderris
Prasophyllum aff. *patens*	swamp leek orchid
Prumnopitys ferruginea	miro
Prumnopitys taxifolia	matai
Pterostylis micromega	swamp greenhood
Pterostylis paludosa	swamp greenhood
Raukaua edgerleyi	Raukawa
Schoenus brevifolius	bog schoenus
Sophora microphylla	kowhai
Sphagnum cristatum	
Sporadanthus ferrugineus	giant wire rush
Syzygium maire	swamp maire
Utricularia australis	yellow bladderwort
Vitex lucens	puriri
Weinmannia racemosa	kamahi
Weinmannia silvicola	towai

Adventive species

Botanical Name	**Common Name**
Acacia mearnsii	black wattle
Acacia melanoxylon	blackwood
Glyceria maxima	floating sweetgrass
Ligustrum lucidum	tree privet
Ligustrum sinense	Chinese privet
Lonicera japonica	Japanese honeysuckle
Osmunda regalis	royal fern
Phytolacca octandra	inkweed
Pinus pinaster	cluster pine
Pinus radiata	radiata pine
Salix cinerea	grey willow
Salix fragilis	crack willow
Solanum mauritianum	woolly nightshade
Ulex europaeus	gorse

APPENDIX II

Vegetation Types & Bioclimatic Zone Definitions

The ecosystem types used for analyses for the SNA are adapted from those used in the Landcare Research document Vegetation of the Waikato Region: Current and Historical Perspectives (Leathwick *et al*., 1995). The limitations of the forest types used are recognised, but these forest types are considered adequate for the analysis required for this programme.

Primary Vegetation

"Vegetation which is essentially original in composition and structure".

Rimu-tawa forest: This forest comprises a canopy dominated by tawa, with emergent rimu. Other canopy species are hinau, rewarewa, and pukatea, with kohekohe and puriri near the coast. Other emergent species are northern rata and occasionally miro, kahikatea, and totara.

Rimu-taraire-tawa forest: This forest comprises a canopy, dominated by tawa and taraire, with emergent rimu. Previously present along the lower Waikato River, and localised on northern Coromandel Peninsula, it is now largely absent from the Conservancy.

Rimu-broadleaved forest: This forest comprised a canopy dominated by kamahi, hinau, maire, broadleaf, and quintinia, with emergent rimu, miro, and mountain totara. This forest is largely limited to the Hauhungaroa Range (Pureora ED).

Lowland steepland and montane podocarp/broadleaved forest: This forest comprises montane associations of miro, mountain totara, toatoa and kaikawaka, with towai, taraire, kamahi, and quintinia. At lower altitudes rimu, miro, mountain totara and tanekaha are emergent over a canopy of tawa and kamahi.

Rimu-tawa-beech forest: This forest is similar to (D) above but includes pockets of hard beech, and is present only in the south-west of the Waikato Conservancy.

Rimu-broadleaved-beech forest: This forest comprises rimu, matai, and/or mountain totara emergent over red and/or silver beech and kamahi. It is generally confined to the Hauhungaroa Range (Pureora ED).

Dense podocarp forest: This forest comprises either dense kahikatea on poorly drained alluvial sites in lowland Waikato, or mixed podocarps (totara, rimu, miro, matai, mountain totara) and tanekaha on deep free-draining volcanic soils in the southern Waikato (Western Volcanic Plateau ED).

Rimu-matai-broadleaved forest: This forest is similar to (L) above, but with podocarps less abundant. It comprises occasional rimu, miro, matai, and kahikatea emergent over hinau, rewarewa, maire, tawa, kamahi, pokaka and broadleaf.

(P2) Coastal forest: This forest comprises hardwood species that typically occupy coastal slopes and offshore islands, notably in the Coromandel Ecological Region. Dominant species are pohutukawa, kohekohe, and puiri, with occasional tawa, rewarewa, mangeao, and karaka. It is likely that, in places, the understorey or canopy of this forest has been modified. However, it best fits the definition of 'primary forest' as the remnants have generally not been subjected to intensive logging. Forest remnants on coastal slopes in the west of the Conservancy are, in most cases, included in Vegetation type D (below).

(sc) Mixed scrub and (ts) Tussock shrubland: These vegetation types are confined to areas above the treeline, are of limited extent, and are almost entirely protected in the Conservancy.

(id) Spinifex dunelands: This primary community comprises spinifex, pingao, and a range of low-growing small-leaved shrubs, with a range of adventive herbs, growing on dunelands at scattered sites on the Coromandel Peninsula and west coast.

Saline wetlands, including:

(mg) mangroves
(ma) saltmarsh
(zo) Zostera (eelgrass)
(jl) Juncus-Leptocarpus saltmeadow.

Freshwater wetlands, including:

(fl) raupo-flaxlands
(sg) sedgelands
(sh) shrub/sedgelands
(rs) restiad wetlands.

Logged Forest

(A), (B) and (C) Kauri Forest: These forest types comprise kauri and associated species. No significant areas of unlogged and unprotected kauri forest were recorded during the preparation of the report, except those protected within the Manaia Kauri Sanctuary, even though these forests were once relatively widespread in the Coromandel and northern Waikato. For this reason, these forest types have been grouped together for analysis.

Tawa forest: This comprises tawa-dominant forests – (D), (M) and some (G) above – from which the emergent podocarps have been removed. Tawa is dominant with kamahi, northern rata, hinau, rewarewa, and maire.

Tawa-beech forest: This comprises rimu-tawa-beech forest (H) from which the podocarps have been removed.

Broadleaved forest: Comprises logged forest in which tawa was absent, mostly logged (F), (L) and (M).

Taraire-tawa forest: Comprises logged rimu-taraire-tawa forest (E).

Secondary Forest

"Vegetation which has established after the destruction or disturbance of the previous cover, and which is essentially different from the original vegetation."

Podocarp regeneration, including:

(CO) secondary podocarp forest
(CS) secondary podocarp-small-leaved forest
(CB) secondary podocarp/broadleaved forest.

Hardwood regeneration, including:

(BL) secondary broadleaved forest
(SL) secondary small-leaved forest
(BS) secondary broadleaved/small-leaved forest.

Induced Scrub and Shrubland

All seven indigenous vegetation types have been grouped together for analysis.

Scrub and Shrubland: this group comprises:

(bl) broadleaved scrub
(sl) small-leaved scrub
(co) podocarp scrub
(tf) treefern 'scrub'
(mn) monoao scrub
(bs) broadleaved/small-leaved scrub
(cs) podocarp/small-leaved scrub.

Bioclimatic Zones

Bioclimatic Zones:
Refers to the broad distribution of vegetation zones along both altitudinal and coastal to inland gradients where a particular climatic regime dictates the character of the natural ecosystem. Definitions used in this report are derived from Meurk (1984) and are as follows:

Coastal	Less than 1 km from the coast, and with altitude less than 300 m.
Lowland	Extending from the coastal zone up to an altitude of 800 m in the warm-temperature zone of Meurk (1984).
Montane	Extending from 800 m to 1300 m altitude = the cooler part of the Cool Temperature zone of Meurk (1984).
Sub-Alpine	Extending from 1300 m to 1800 m = Sub-Antarctic zone of Meurk (1984).
Alpine	Extending upwards from 1800 m = the Low Antarctic zone of Meurk (1984).

APPENDIX III

List of Significant Natural Areas within the Hauraki District

List of Unprotected Significant Natural Areas within the Hauraki District

Site_Number	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
S12UP1	Local	Indigenous Forest	Small-Leaved; Rimu-Tawa	Map 1/p.45
S12UP10	Local	Indigenous Forest	Rimu-Tawa	Map 1/p.45
S12UP11	Local	Manuka and or Kanuka		Map 3/p.47
S12UP12	Local	Manuka and or Kanuka	Exotic Plantation	Map 3/p.47
S12UP14	Local	Indigenous Forest	Exotic Plantation; Rimu-Tawa	Map 3/p.47
S12UP17	Local	Indigenous Forest	Dense Conifer	Map 3/p.47
S12UP19	Local	Indigenous Forest		Map 3/p.47
S12UP21	Local	Indigenous Forest; Manuka and or Kanuka	Broadleaf/Small-Leaved	Map 3/p.47
S12UP3	Local	Indigenous Forest		Map 1/p.45
S12UP4	Regional	Indigenous Forest; Manuka and or Kanuka	Small-Leaved; Rimu-Tawa	Map 1/p.45
S12UP5	Local	Manuka and or Kanuka	Small-Leaved	Map 1/p.45
S12UP7	Local	Indigenous Forest; Manuka and or Kanuka	Small-Leaved; Rimu-Tawa	Map 1/p.45
S12UP8	Regional	Indigenous Forest	Rimu-Tawa	Map 1/p.45
S12UP9	Regional	Indigenous Forest; Manuka and or Kanuka	Rimu-Tawa	Map 1/p.45
S13UP23	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa; Tawa	Map 6/p.50
S13UP24	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Exotic Plantation; Broadleaf/Small-Leaved	Map 6/p.50
S13UP25	Local	Broadleaved Indigenous Hardwoods	Broadleaf/Small-Leaved	Map 3/p.47
S13UP26	Regional	Deciduous Hardwoods		Map 3/p.47
S13UP27	Local	Manuka and or Kanuka		Map 6/p.50
S13UP29	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Rimu-Tawa; Tawa; Broadleaf/Small-Leaved	Map 6/p.50
S13UP30	Regional	Manuka and or Kanuka	Tawa; Broadleaf/Small-Leaved	Map 6/p.50
S13UP31	Local	Deciduous Hardwoods		Map 6/p.50
S13UP32	Local	Manuka and or Kanuka		Map 6/p.50
S13UP33	Local	Manuka and or Kanuka		Map 6/p.50
S13UP34	Local	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	Tawa	Map 6/p.50
S13UP35	Local	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka		Map 6/p.50
S13UP36	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka		Map 6/p.50
S13UP39	Regional	Indigenous Forest; Manuka and or Kanuka	Rimu-Tawa; Tawa	Map 6/p.50 Map 11/p.55
S13UP40	Regional	Broadleaved Indigenous Hardwoods	Tawa	Map 6/p.50 Map 11/p.55
S13UP41	Regional	Indigenous Forest; Manuka and or Kanuka	Tawa	Map 11/p.55
S13UP42	Regional	Manuka and or Kanuka	Broadleaf/Small-Leaved	Map 11/p.55
S13UP43	Regional	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	Small-Leaved; Tawa	Map 11/p.55
S13UP44	Local	Indigenous Forest	Tawa	Map 11/p.55
S13UP45	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Small-Leaved; Tawa	Map 11/p.55
S13UP46	Regional	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	Small-Leaved; Exotic Plantation; Rimu-Tawa; Tawa; Broadleaf/Small-Leaved	Map 11/p.55
S13UP47	Regional	Indigenous Forest	Small-Leaved; Tawa; Broadleaf/Small-Leaved	Map 11/p.55
S13UP48	Regional	Manuka and or Kanuka		Map 11/p.55

Site_Number	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
S13UP49	Regional	Indigenous Forest; Manuka and or Kanuka	Exotic Plantation; Tawa	Map 11/p.55 Map 16/p.60
S13UP50	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa; Tawa	Map 16/p.60
S13UP51	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Exotic Plantation; Tawa	Map 16/p.60
S13UP52	Regional	Indigenous Forest; Manuka and or Kanuka	Exotic Plantation; Tawa	Map 16/p.60
S13UP53	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Exotic Plantation	Map 16/p.60
S13UP54	Local	Indigenous Forest		Map 16/p.60
S13UP62	National	Deciduous Hardwoods; Manuka and or Kanuka	Shrub/Sedgeland; Willow	Map 7/p.51
T12UP187	Regional	Herbaceous Freshwater Vegetation; Herbaceous Saline Vegetation; Manuka and or Kanuka	Juncus/Leptocarpus; Pohutukawa	Map 10/p.54
T12UP188	Regional	Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 5/p.49 Map 10/p.54
T12UP189	Local	Indigenous Forest	Broadleaf/Small-Leaved	Map 5/p.49
T12UP193	Regional	Broadleaved Indigenous Hardwoods	Pohutukawa	Map 5/p.49
T12UP194	Regional	Broadleaved Indigenous Hardwoods	Small-Leaved Scrub	Map 5/p.49
T12UP197	Regional	Indigenous Forest	Shrub/Sedgeland; Broad/Small-Leaved Scrub	Map 5/p.49
T12UP198	Regional	Herbaceous Saline Vegetation	Shrub/Sedgeland; Broad/Small-Leaved Scrub	Map 5/p.49
T12UP63	Regional	Herbaceous Freshwater Vegetation		Map 2/p.46
T12UP64	Regional	Mangrove; Herbaceous Saline Vegetation	Salt Meadow; Mangrove	Map 2/p.46
T12UP65	Regional	Indigenous Forest		Map 4/p.48
T12UP66	Regional	Indigenous Forest	Dense Conifer	Map 4/p.48
T12UP67	Local	Indigenous Forest		Map 4/p.48
T12UP68	Local	Indigenous Forest		Map 4/p.48
T12UP70	Regional	Indigenous Forest	Dense Conifer	Map 4/p.48
T12UP72	Regional	Indigenous Forest	Dense Conifer	Map 4/p.48
T13UP100	Regional	Indigenous Forest	Kauri-Conifer-Broadleaf; Tawa	Map 22/p.66
T13UP101	Local	Indigenous Forest	Small-Leaved	Map 22/p.66
T13UP102	Regional	Indigenous Forest		Map 22/p.66
T13UP103	Local	Indigenous Forest		Map 22/p.66
T13UP104	Local	Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Tawa	Map 22/p.66
T13UP105	Regional	Indigenous Forest	Dense Conifer	Map 22/p.66
T13UP106	Local	Broadleaved Indigenous Hardwoods; Indigenous Forest	Small-Leaved	Map 19/p.63 Map 22/p.66
T13UP109	Local	Indigenous Forest	Small-Leaved	Map 22/p.66
T13UP110	Regional	Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Small-Leaved; Tawa; Dense Conifer; Broadleaf/Small-Leaved	Map 19/p.63 Map 22/p.66
T13UP111	Local	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Tawa; (Exotic Pines)/Scrub	Map 19/p.63
T13UP116	Regional	Broadleaved Indigenous Hardwoods	Small-Leaved Scrub; (Exotic Pines)/Scrub	Map 19/p.63
T13UP117	Local	Indigenous Forest	Null	Map 19/p.63
T13UP118	Local	Broadleaved Indigenous Hardwoods	Small-Leaved Scrub	Map 19/p.63
T13UP119	Regional	Indigenous Forest	Tawa	Map 19/p.63
T13UP120	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Small-Leaved Scrub	Map 19/p.63
T13UP124	Local	Indigenous Forest	Broad/Small-Leaved Scrub; Tawa	Map 19/p.63

Site_Number	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
T13UP126	Regional	Deciduous Hardwoods; Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Rimu-Tawa; Tawa; Small-Leaved Scrub	Map 18/p.62 Map 19/p.63
T13UP129	Regional	Indigenous Forest		Map 18/p.62
T13UP131	Regional	Indigenous Forest	Small-Leaved; Rimu-Tawa	Map 13/p.57
T13UP133	Regional	Fernland; Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 13/p.57
T13UP135	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 19/p.63
T13UP137	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Tawa; Dense Conifer; Small-Leaved Scrub	Map 19/p.63
T13UP139	Regional	Indigenous Forest	Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 19/p.63
T13UP141	Regional	Indigenous Forest	Dense Conifer	Map 19/p.63
T13UP142	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa; Exotic Scrub; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved; (Exotic Pines)/Scrub	Map 13/p.57 Map 19/p.63
T13UP143	Regional	Indigenous Forest; Manuka and or Kanuka	Exotic Plantation; Rimu-Tawa; Tawa; Broadleaf/Small-Leaved	Map 9/p.53 Map 13/p.57
T13UP145	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Kauri-Conifer-Broadleaf; Exotic Plantation; Broad/Small-Leaved Scrub; Rimu-Tawa; Tawa; Broadleaf/Small-Leaved	Map 13/p.57
T13UP146	Regional	Fernland; Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Exotic Plantation; Broad/Small-Leaved Scrub; Rimu-Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 9/p.53 Map 13/p.57
T13UP147	Regional	Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 9/p.53
T13UP148	Local	Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Broad/Small-Leaved Scrub; Small-Leaved Scrub	Map 9/p.53
T13UP150	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Tawa	Map 9/p.53
T13UP153	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Conifer-Broadleaf; Broad/Small-Leaved Scrub; Rimu-Tawa; Tawa; Broadleaf/Small-Leaved; Broadleaved Scrub; Steepland Conifer-Broadleaf	Map 9/p.53 Map 13/p.57 Map 14/p.58
T13UP154	Regional	Indigenous Forest	Rimu-Tawa; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 13/p.57
T13UP156	Local	Broadleaved Indigenous Hardwoods	Broad/Small-Leaved Scrub; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 13/p.57
T13UP157	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Broad/Small-Leaved Scrub; Rimu-Tawa; Tawa	Map 13/p.57
T13UP159	Regional	Indigenous Forest	Tawa	Map 19/p.63
T13UP161	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Small-Leaved; Tawa; Broadleaf (Secondary)	Map 14/p.58
T13UP163	Regional	Indigenous Forest		Map 14/p.58
T13UP164	Local	Indigenous Forest		Map 14/p.58
T13UP166	Local	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Small-Leaved Scrub; (Exotic Pines)/Scrub	Map 20/p.64
T13UP167	Regional	Indigenous Forest	Pohutukawa	Map 20/p.64
T13UP168	Regional	Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Tawa	Map 15/p.59
T13UP176	Local	Broadleaved Indigenous Hardwoods		Map 15/p.59
T13UP178	Regional	Indigenous Forest	Pohutukawa	Map 10/p.54

Site_Number	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
T13UP182	Local	Broadleaved Indigenous Hardwoods	Tawa	Map 10/p.54
T13UP183	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Kauri; Kauri-Conifer-Broadleaf; Small-Leaved Scrub	Map 10/p.54
T13UP57	International	Herbaceous Freshwater Vegetation; Deciduous Hardwoods; Manuka and or Kanuka	Restiad; Shrub/Sedgeland; Sedgeland; Willow	Map 17/p.61
T13UP59	Regional	Indigenous Forest	Dense Conifer	Map 12/p.56
T13UP60	Regional	Indigenous Forest	Dense Conifer	Map 12/p.56
T13UP73	Regional	Indigenous Forest		Map 8/p.52
T13UP74	Regional	Indigenous Forest		Map 8/p.52
T13UP75	Local	Indigenous Forest		Map 8/p.52
T13UP76	Regional	Indigenous Forest	Dense Conifer	Map 8/p.52
T13UP77	Regional	Herbaceous Freshwater Vegetation	Dense Conifer	Map 8/p.52
T13UP78	Regional	Indigenous Forest		Map 8/p.52
T13UP79	Regional	Herbaceous Freshwater Vegetation		Map 8/p.52
T13UP80	Regional	Indigenous Forest		Map 8/p.52
T13UP81	Local	Indigenous Forest		Map 18/p.62
T13UP82	Local	Deciduous Hardwoods	Dense Conifer	Map 18/p.62
T13UP83	Regional	Indigenous Forest	Dense Conifer	Map 18/p.62
T13UP84	Regional	Indigenous Forest	Dense Conifer	Map 18/p.62
T13UP85	Regional	Indigenous Forest	Dense Conifer	Map 18/p.62
T13UP86	Regional	Indigenous Forest	Dense Conifer	Map 21/p.65
T13UP87	Regional	Indigenous Forest; Manuka and or Kanuka	Exotic Plantation; Tawa; Broadleaf/Small-Leaved	Map 21/p.65
T13UP88	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa; Small-Leaved Scrub	Map 21/p.65
T13UP89	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa; Exotic Scrub; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved; (Exotic Pines)/Scrub	Map 21/p.65
T13UP90	Local	Deciduous Hardwoods	Dense Conifer	Map 18/p.62
T13UP91	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Broadleaf (Secondary)	Map 22/p.66
T13UP92	Regional	Indigenous Forest	Rimu-Tawa; Tawa	Map 22/p.66
T13UP94	Regional	Indigenous Forest	Kauri-Conifer-Broadleaf; Tawa	Map 23/p.67
T13UP95	Local	Indigenous Forest		Map 23/p.67
T13UP96	Regional	Indigenous Forest	Kauri-Conifer-Broadleaf-Beech; Rimu-Tawa	Map 23/p.67
T13UP98	Regional	Indigenous Forest; Manuka and or Kanuka		Map 23/p.67
T13UP99	Local	Broadleaved Indigenous Hardwoods		Map 23/p.67
U13UP169	Regional	Manuka and or Kanuka	Pohutukawa; Broad/Small-Leaved Scrub	Map 15/p.59
U13UP171	Regional	Indigenous Forest	Pohutukawa	Map 15/p.59
U13UP173	Regional	Manuka and or Kanuka	Pohutukawa; Small-Leaved Scrub	Map 15/p.59
U13UP175	Local	Broadleaved Indigenous Hardwoods	Null	Map 15/p.59

List of Protected Significant Natural Areas within the Hauraki District

QEII National Trust Open Space covenants

Site_Number	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
S12P18	Regional	Broadleaved Indigenous Hardwoods		Map 3/p.47
S12P20	Local	Manuka and or Kanuka		Map 3/p.47
S12P22	Regional	Indigenous Forest; Manuka and or Kanuka	Broadleaf/Small-Leaved	Map 3/p.47
T12P151	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Kauri-Conifer-Broadleaf; Broad/Small-Leaved Scrub	Map 9/p.53
T12P69	Regional	Indigenous Forest		Map 4/p.48
T13P127	Local	Manuka and or Kanuka	Small-Leaved	Map 18/p.62
T13P128	Local	Indigenous Forest; Manuka and or Kanuka	Small-Leaved	Map 18/p.62
T13P136	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Tawa	Map 19/p.63
T13P140	Regional	Indigenous Forest		Map 19/p.63
T13P149	Regional	Fernland; Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Broad/Small-Leaved Scrub; Rimu-Tawa; Tawa; Small-Leaved Scrub	Map 9/p.53

Nga Whenua Rahui covenants

Site_Number	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
T13P179	Regional	Broadleaved Indigenous Hardwoods	Pohutukawa	Map 10/p.54
T13P180	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Pohutukawa	Map 10/p.54
T13P181	Regional	Indigenous Forest	Pohutukawa	Map 10/p.54
T13P184a	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Kauri; Broad/Small-Leaved Scrub; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 10/p.54
T13P184b	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Kauri; Broad/Small-Leaved Scrub; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 10/p.54
T13P185	Regional	Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Broadleaf/Small-Leaved	Map 10/p.54

Hauraki District Council reserves

Site_Number	District_Reserve_Name	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
S12P15	Waitakaruru Recreation Reserve	Local	Broadleaved Indigenous Hardwoods	Rimu-Tawa	Map 3/p.47
S12P16	Henderson Scenic Reserve	Local	Indigenous Forest	Dense Conifer	Map 3/p.47
T12P191b	Moa Hunter Recreation Reserve	Regional	Broadleaved Indigenous Hardwoods	Pohutukawa	Map 5/p.49
T12P71	Speedy's Reserve	Regional	Indigenous Forest		Map 4/p.48
T13P144	Hutchinson Reserve	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa; Tawa	Map 13/p.57
T13P165	Ngatikoi Recreation Reserve	Local	Broadleaved Indigenous Hardwoods; Indigenous Forest	Tawa; Small-Leaved Scrub	Map 20/p.64
T13P93	Isobel Franklin Reserve	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Tawa; Broadleaf (Secondary)	Map 22/p.66

Department of Conservation Protected Areas

Site_Number	DoC_Reserve_Name	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
S12P13	Waitakaruru Scenic Reserve	Regional	Indigenous Forest	Exotic Plantation; Rimu-Tawa	Map 3/p.47
S12P2	Miranda Scientific Reserve	Regional	Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf-Beech; Rimu-Tawa	Map 1/p.45
S12P6	Miranda Scientific Reserve	Regional	Indigenous Forest; Manuka and or Kanuka	Small-Leaved; Rimu-Tawa	Map 1/p.45
S13P28	Matahuru Scenic Reserve	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Exotic Plantation; Rimu-Tawa; Tawa	Map 6/p.50 Map 11/p.55 Map 16/p.60
S13P37	Kaihere North Scenic Reserve	Local	Manuka and or Kanuka		Map 6/p.50
S13P38	Kaihere Scenic Reserve	Regional	Manuka and or Kanuka		Map 6/p.50
S13P61	Torehape Wetland Management Reserve	National	Deciduous Hardwoods; Manuka and or Kanuka	Restiad; Shrub/Sedgeland; Bracken; Willow	Map 7/p.51
T12P186	Te Ramarama Scenic Reserve Stewardship Land; Te Ramarama Scenic Reserve	Local	Manuka and or Kanuka	Broad/Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 10/p.54
T12P190	Te Ramarama Scenic Reserve	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Broadleaf/Small-Leaved	Map 5/p.49 Map 10/p.54
T12P191a	Te Ramarama Scenic Reserve	Regional	Broadleaved Indigenous Hardwoods	Pohutukawa	Map 5/p.49
T12P192	Waimama Recreation Reserve	Regional	Broadleaved Indigenous Hardwoods	Pohutukawa; Small-Leaved Scrub	Map 5/p.49
T12P195	marginal strip - Te Karetu Point	Regional	Broadleaved Indigenous Hardwoods	Small-Leaved Scrub	Map 5/p.49
T12P196	marginal strip - Te Karetu Point	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Broad/Small-Leaved Scrub	Map 5/p.49
T12P64	marginal strip - Waitakaruru to Piako River Coastline	Regional	Mangrove; Herbaceous Saline Vegetation	Salt Meadow; Mangrove	Map 2/p.46
T13P107	marginal strip - Taieri Stream	Local	Indigenous Forest	Small-Leaved	Map 22/p.66
T13P108	stewardship land - Hollis Road	Local	Broadleaved Indigenous Hardwoods	Small-Leaved	Map 19/p.63
T13P112	Kaimai-Mamaku Conservation Park; marginal strip - Ohinemuri River, Karangahake; Waitawheta Stream Marginal Strip	Regional	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	Broadleaf/Small-Leaved; (Exotic Pines)/Scrub	Map 19/p.63
T13P113	Karangahake Scenic Reserve; Kaimai-Mamaku Conservation Park	Regional	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	Exotic Plantation; Broadleaf/Small-Leaved; (Exotic Pines)/Scrub	Map 19/p.63
T13P114	scenic reserve - Karangahake Walkway Tunnel Western Portal; Karangahake Walkway Stewardship Land	Local	Broadleaved Indigenous Hardwoods	Small-Leaved Scrub	Map 19/p.63
T13P115	Karangahake Scenic Reserve	Regional	Broadleaved Indigenous Hardwoods	Small-Leaved Scrub; (Exotic Pines)/Scrub	Map 19/p.63
T13P121	Karangahake Walkway Stewardship Land; marginal strips - Ohinemuri River, Owharoa	Local	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	(Exotic Pines)/Scrub	Map 19/p.63
T13P122	scenic reserve - Mohring	Regional	Broadleaved Indigenous Hardwoods; Manuka and or Kanuka	(Exotic Pines)/Scrub	Map 19/p.63
T13P123	Owharoa Falls Scenic Reserve	Regional	Broadleaved Indigenous Hardwoods	(Exotic Pines)/Scrub	Map 19/p.63
T13P125	Coromandel Forest Park; stewardship land - Waihou Forest (Komata Reefs); stewardship land - Golden Cross Road; marginal strip - Komata Stream	National	Fernland; Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Exotic Plantation; Broad/Small-Leaved Scrub; Rimu-Tawa; Exotic Scrub; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved; (Exotic Pines)/Scrub	Map 9/p.53 Map 13/p.57 Map 19/p.63
T13P130	local purpose reserve (water conservation), Paeroa	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri-Conifer-Broadleaf; Small-Leaved; Rimu-Tawa; Tawa; Broadleaf/Small-Leaved; (Exotic Pines)/Scrub	Map 13/p.57 Map 18/p.62 Map 19/p.63
T13P132	stewardship land - Toomey Stream; marginal strips - Toomey Stream	Regional	Fernland; Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 13/p.57
T13P134	stewardship land - Waikino	Local	Indigenous Forest	Rimu-Tawa	Map 19/p.63
T13P138	marginal strips - Mangakara Stream; Waitekauri river	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Tawa; Dense Conifer; Small-Leaved Scrub	Map 19/p.63

Site_Number	DoC_Reserve_Name	Significance	LCDB2_Classes_Present	RIVI_Landcare_Veg_Description	Map/Page No. (Appendix IV)
T13P152	Coromandel Forest Park	National	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Kauri; Kauri-Conifer-Broadleaf; Small-Leaved; Conifer-Broadleaf; Broad/Small-Leaved Scrub; Rimu-Tawa; Tawa; Broadleaf (Secondary); Small-Leaved Scrub; Broadleaf/Small-Leaved; Broadleaved Scrub; Steepland Conifer-Broadleaf; (Exotic Pines)/Scrub	Map 5/p.49 Map 9/p.53 Map 10/p.54 Map 14/p.58
T13P155	stewardship land - Waihou Forest, Waitekauri; marginal strip - Grace Darling Stream	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Broad/Small-Leaved Scrub; Tawa; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 13/p.57
T13P158	Coromandel Forest Park	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Rimu-Tawa; Tawa	Map 13/p.57 Map 14/p.58 Map 19/p.63
T13P160	stewardship land - Waitete Road	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest	Rimu-Tawa; Tawa	Map 14/p.58
T13P162	Waihi Water Conservation Reserve	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Rimu-Tawa; Tawa; Broadleaf (Secondary); Broadleaf/Small-Leaved	Map 14/p.58
T13P178	marginal strip - Homunga Bay North	Regional	Indigenous Forest	Pohutukawa	Map 10/p.54
T13P184c	Te Ramarama Scenic Reserve Stewardship Land	Regional	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Kauri; Broad/Small-Leaved Scrub; Small-Leaved Scrub; Broadleaf/Small-Leaved	Map 10/p.54
T13P55	Flax Block Wildlife Management Reserve; marginal strips - Flax Block / Patetonga Canal / Piako River	National	Herbaceous Freshwater Vegetation; Deciduous Hardwoods	Willow	Map 17/p.61
T13P56	Kopuatai Wetland Management Reserve; Elstow Canal Conservation Area; Awaiti Conservation Area; Patersons Lagoon Wildlife Management Reserve; marginal strips - Flax Block / Patetonga Canal / Piako River	International	Herbaceous Freshwater Vegetation; Deciduous Hardwoods; Manuka and or Kanuka	Restiad; Shrub/Sedgeland; Sedgeland; Willow	Map 12/p.56 Map 17/p.61
T13P58	Patetonga Lake Wildlife Management Reserve	Regional	Herbaceous Freshwater Vegetation		Map 12/p.56
T13P59	Patetonga (Williams lease) Conservation Area	Regional	Indigenous Forest	Dense Conifer	Map 12/p.56
T13P60	Patetonga (Williams lease) Conservation Area	Regional	Indigenous Forest	Dense Conifer	Map 12/p.56
T13P82	marginal strip - Waihou River	Local	Deciduous Hardwoods	Dense Conifer	Map 18/p.62
T13P90	Kaimai-Mamaku Conservation Park; marginal strips - Ohinemuri & Waitewheta Stream confluence	National	Broadleaved Indigenous Hardwoods; Indigenous Forest; Manuka and or Kanuka	Beech; Conifer- Broadleaf -Beech; Kauri-Conifer-Broadleaf-Beech; Kauri-Conifer-Broadleaf; Small-Leaved; Exotic Plantation; Conifer-Broadleaf; Rimu-Tawa; Tawa; Dense Conifer; Broadleaf (Secondary); Small-Leaved Scrub; Broadleaf/Small-Leaved; Steepland Coni	Map 21/p.65 Map 22/p.66 Map 23/p.67 Map 24/p.68
T13P97	Kaimai-Mamaku Conservation Park; Unnamed Conservation Area; Tamaki Stream Marginal Strip	Regional	Indigenous Forest	Kauri-Conifer-Broadleaf-Beech; Kauri-Conifer-Broadleaf; Rimu-Tawa	Map 23/p.67
U13P170	Orokawa Scenic Reserve	Regional	Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Broad/Small-Leaved Scrub	Map 15/p.59
U13P172	Orokawa Scenic Reserve	Regional	Indigenous Forest; Manuka and or Kanuka	Pohutukawa; Small-Leaved Scrub	Map 15/p.59
U13P174	marginal strip - Homunga Bay North	Regional	Manuka and or Kanuka	Pohutukawa; Small-Leaved Scrub	Map 15/p.59
U13P177	marginal strip - Homunga Bay North	Regional	Indigenous Forest	Pohutukawa	Map 15/p.59

APPENDIX IV

Maps of Significant Natural Areas within the Hauraki District

Hauraki Significant Natural Areas
- Detail Map 1 -

Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_1to5.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

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Hauraki Significant Natural Areas
- Detail Map 2 -

Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_1to5.pws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

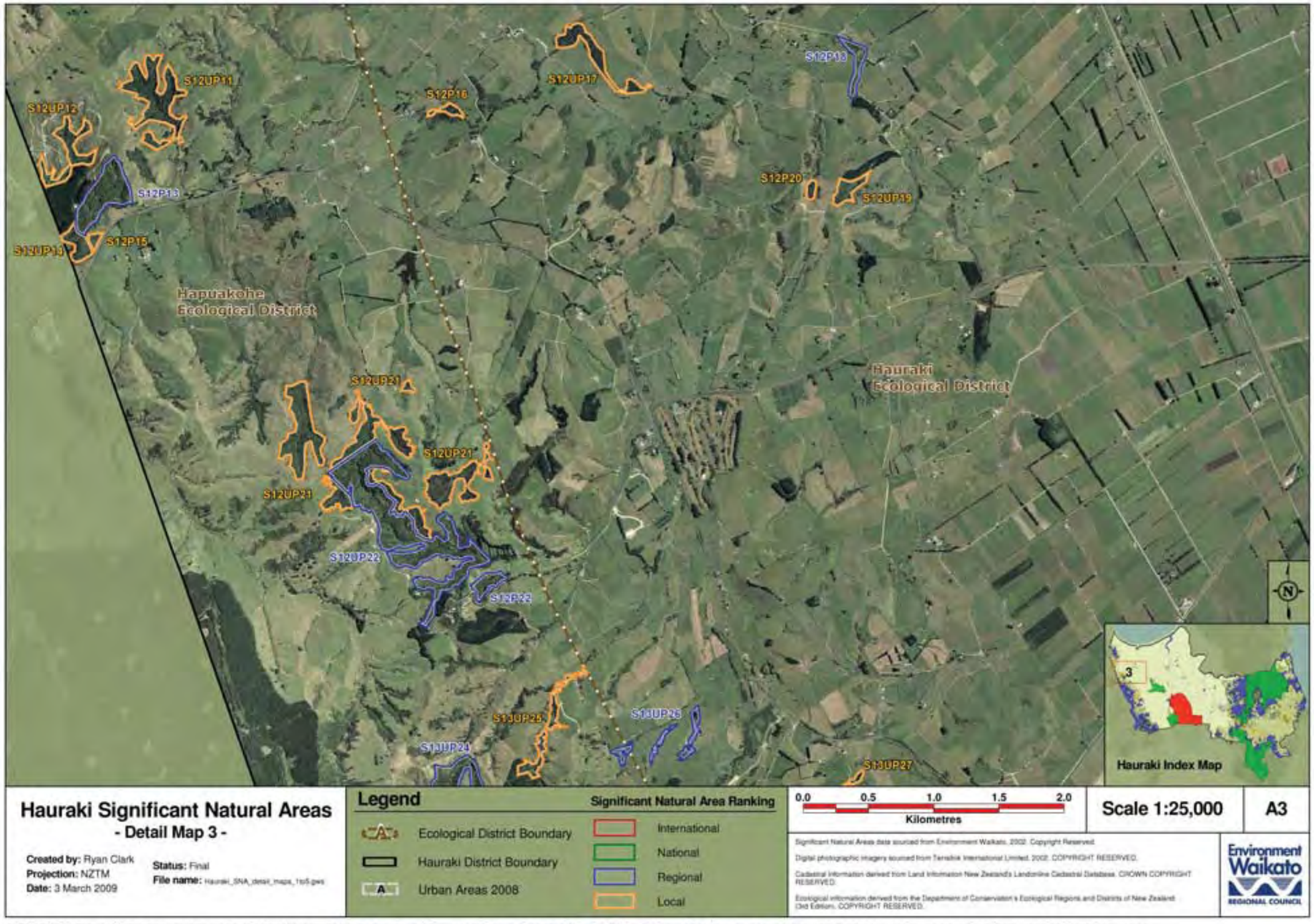
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL



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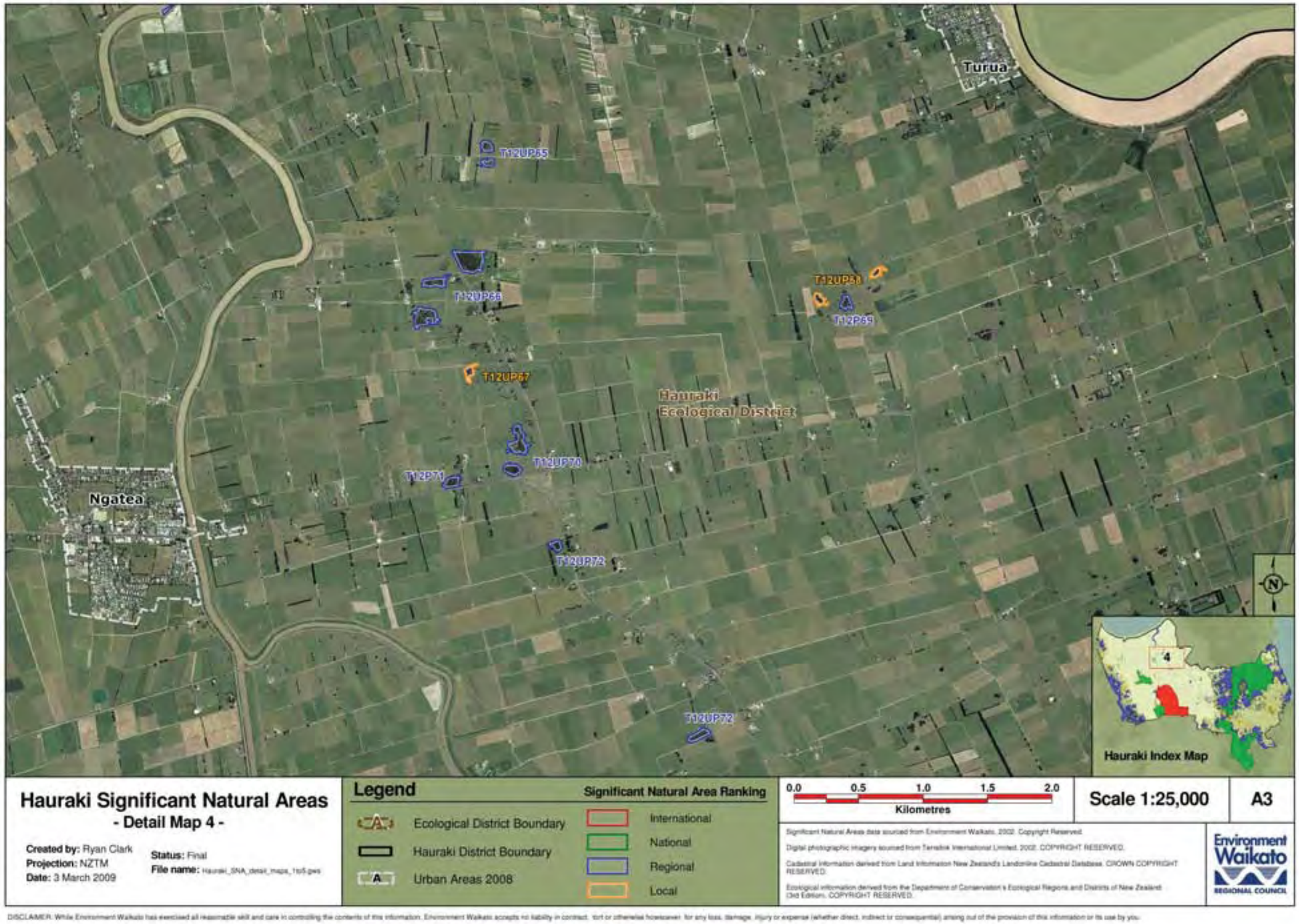

Hauraki Significant Natural Areas
- Detail Map 4 -

Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_1to5.pws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

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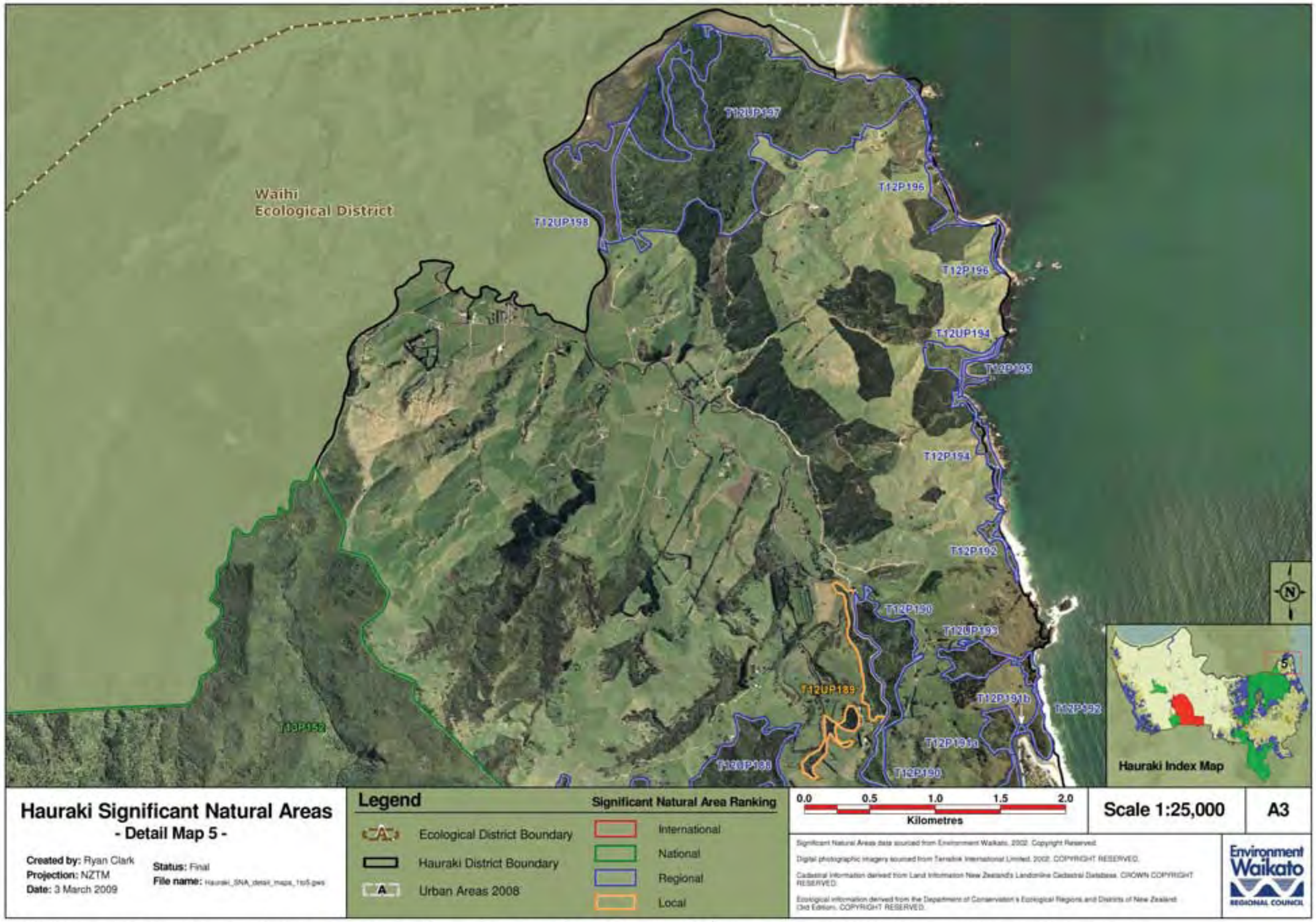

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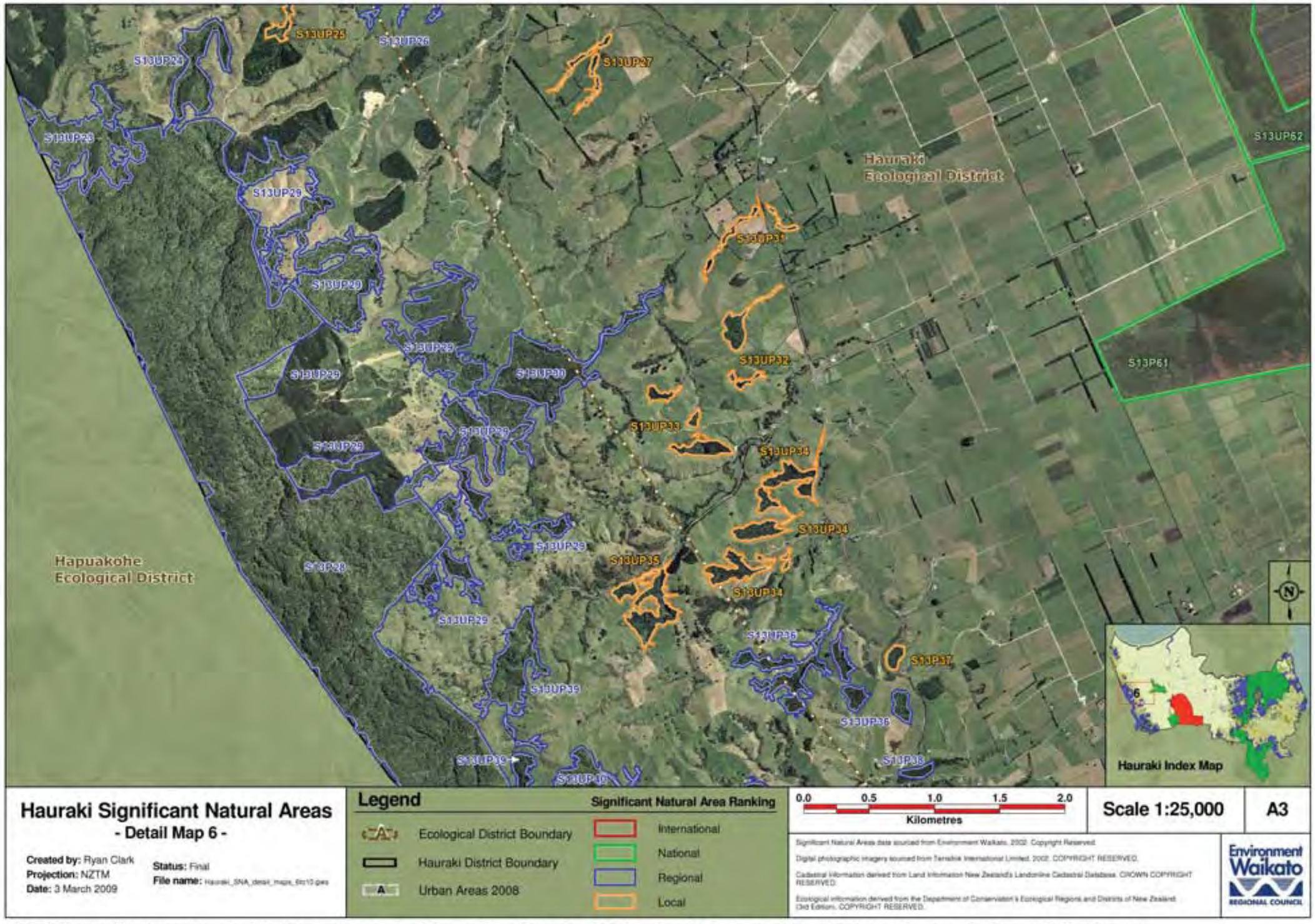
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S13UP27
S13UP24
S13UP23
S13UP28
S13UP29
S13UP31
S13UP32
S13UP30
S13UP33
S13UP34
S13UP35
S13UP36
S13UP37
S13UP38
S13UP39
S13UP40
S13P61
S13UP62
Hauraki
Ecological District
Hapuakohe
Ecological District
Hauraki Index Map
Hauraki Significant Natural Areas
- Detail Map 6 -
Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_6to10.pdf
Legend
Ecological District Boundary
Hauraki District Boundary
Urban Areas 2008
Significant Natural Area Ranking
International
National
Regional
Local
0.0 0.5 1.0 1.5 2.0
Kilometres
Scale 1:25,000
A3
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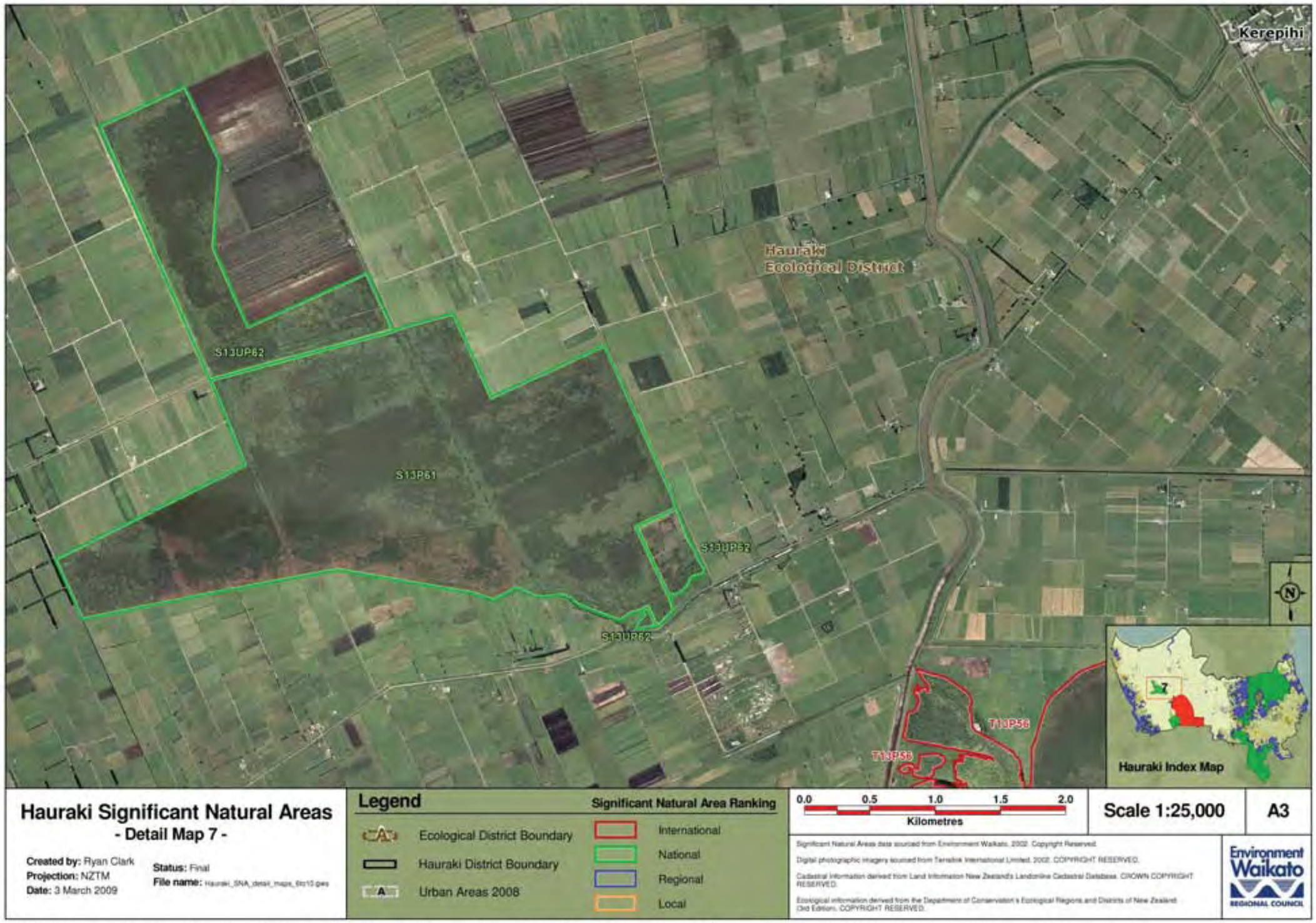


Hauraki Significant Natural Areas
- Detail Map 7 -

Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_6to10.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

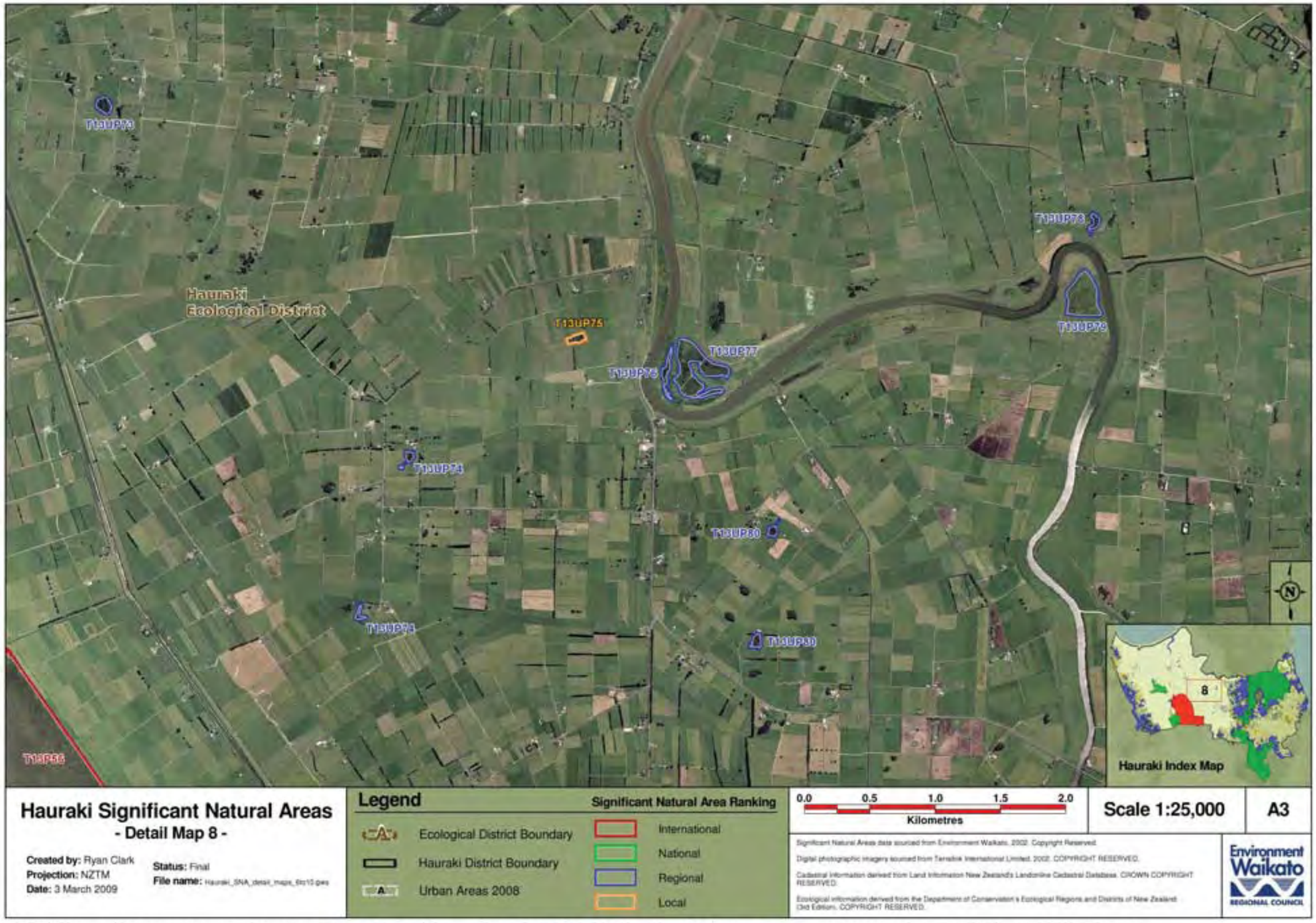
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL



Hauraki Significant Natural Areas
- Detail Map 8 -

Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_6to10.pws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

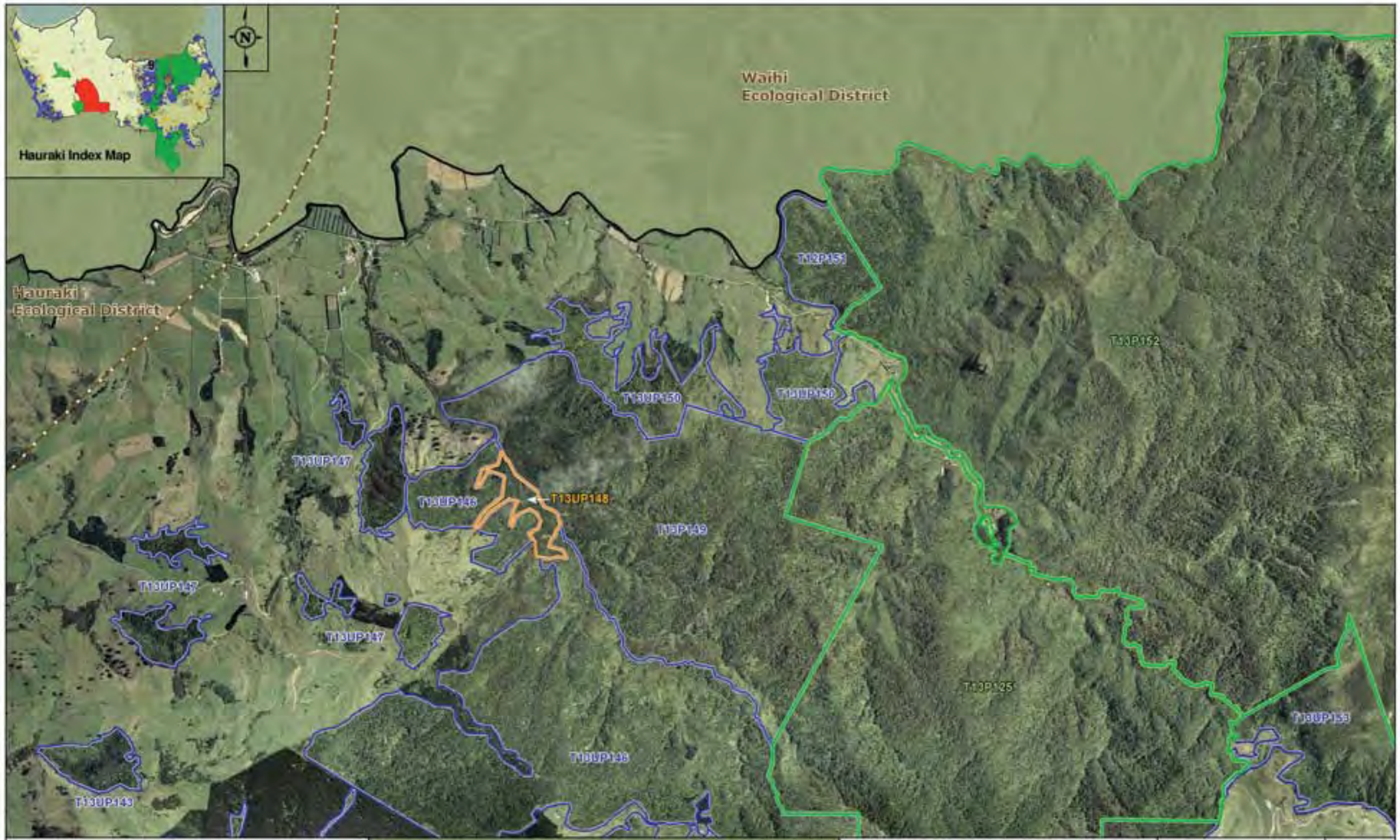
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL



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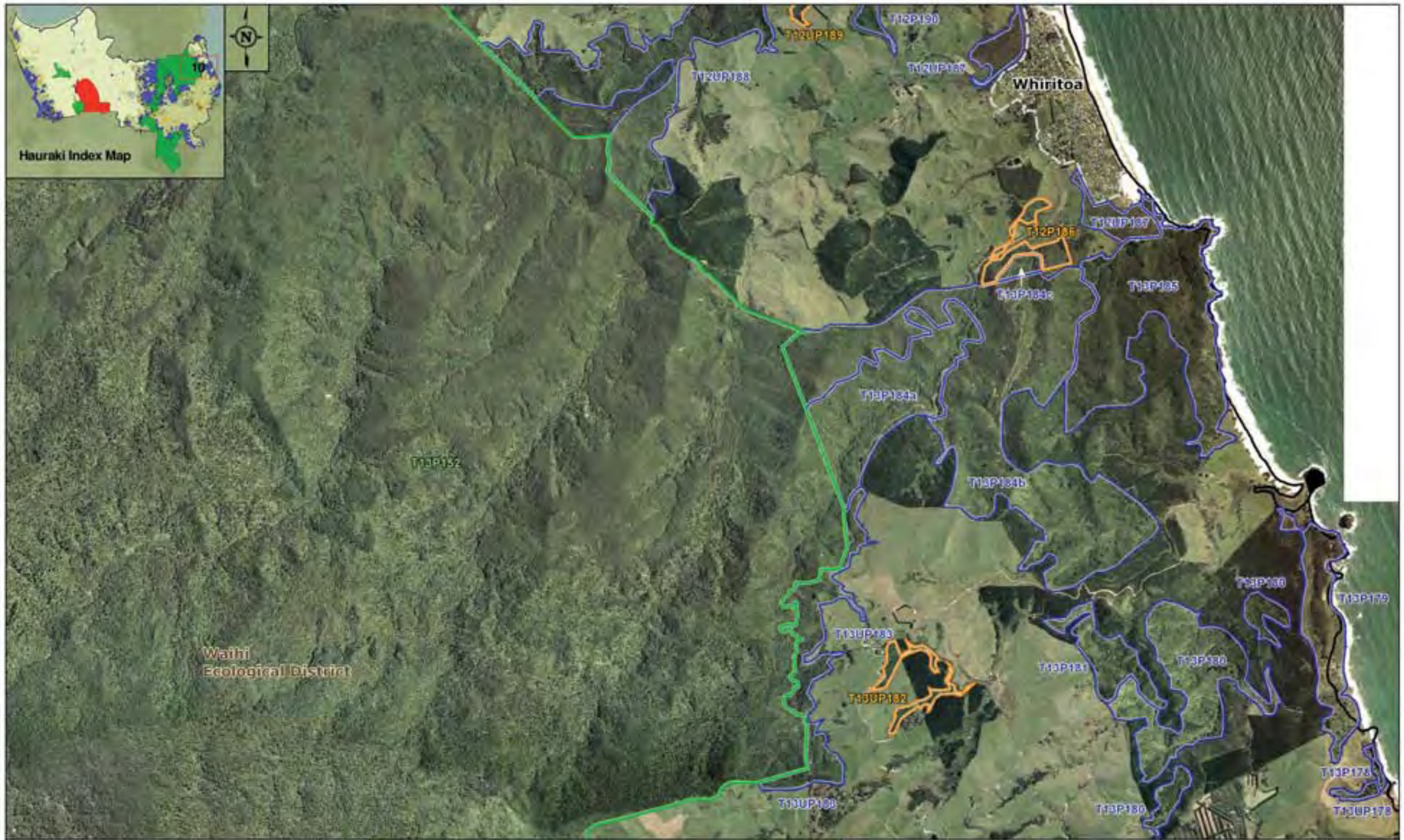


Hauraki Significant Natural Areas
- Detail Map 10 -

Created by: Ryan Clark
Projection: NZTM
Date: 3 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_6to10.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

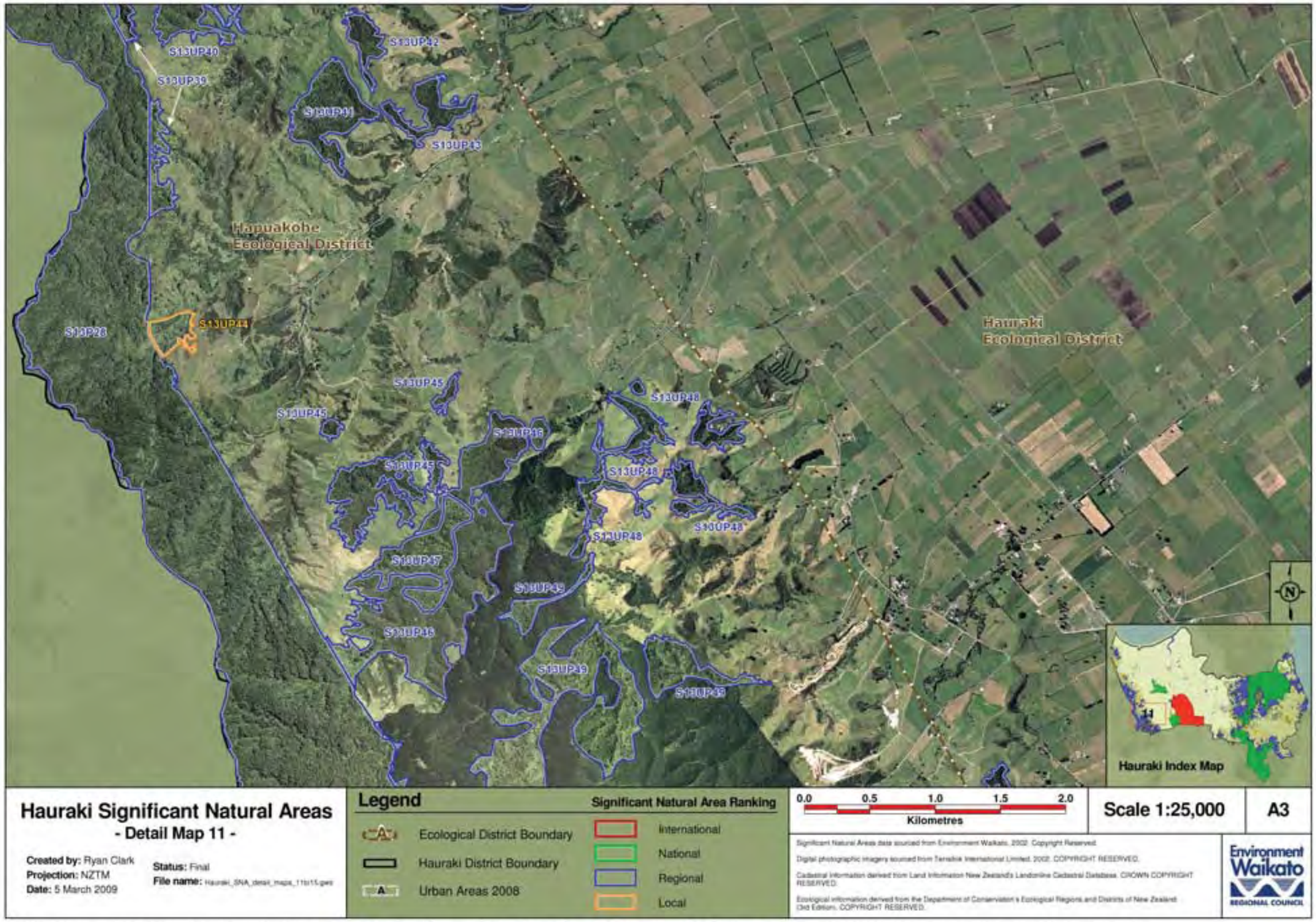
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL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S13UP39
S13UP42
S13UP41
S13UP43
Hapuakohe
Ecological District
S13P28
S13UP44
Hauraki
Ecological District
S13UP45
S13UP45
S13UP46
S13UP45
S13UP48
S13UP48
S13UP48
S13UP47
S13UP49
S13UP46
S13UP49
S13UP38
N
11
Hauraki Index Map
Hauraki Significant Natural Areas
- Detail Map 11 -
Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_11to15.gws
Legend
Ecological District Boundary
Hauraki District Boundary
Urban Areas 2008
Significant Natural Area Ranking
International
National
Regional
Local
0.0 0.5 1.0 1.5 2.0
Kilometres
Scale 1:25,000
A3
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Hauraki Significant Natural Areas
- Detail Map 12 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_11to15.geo

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

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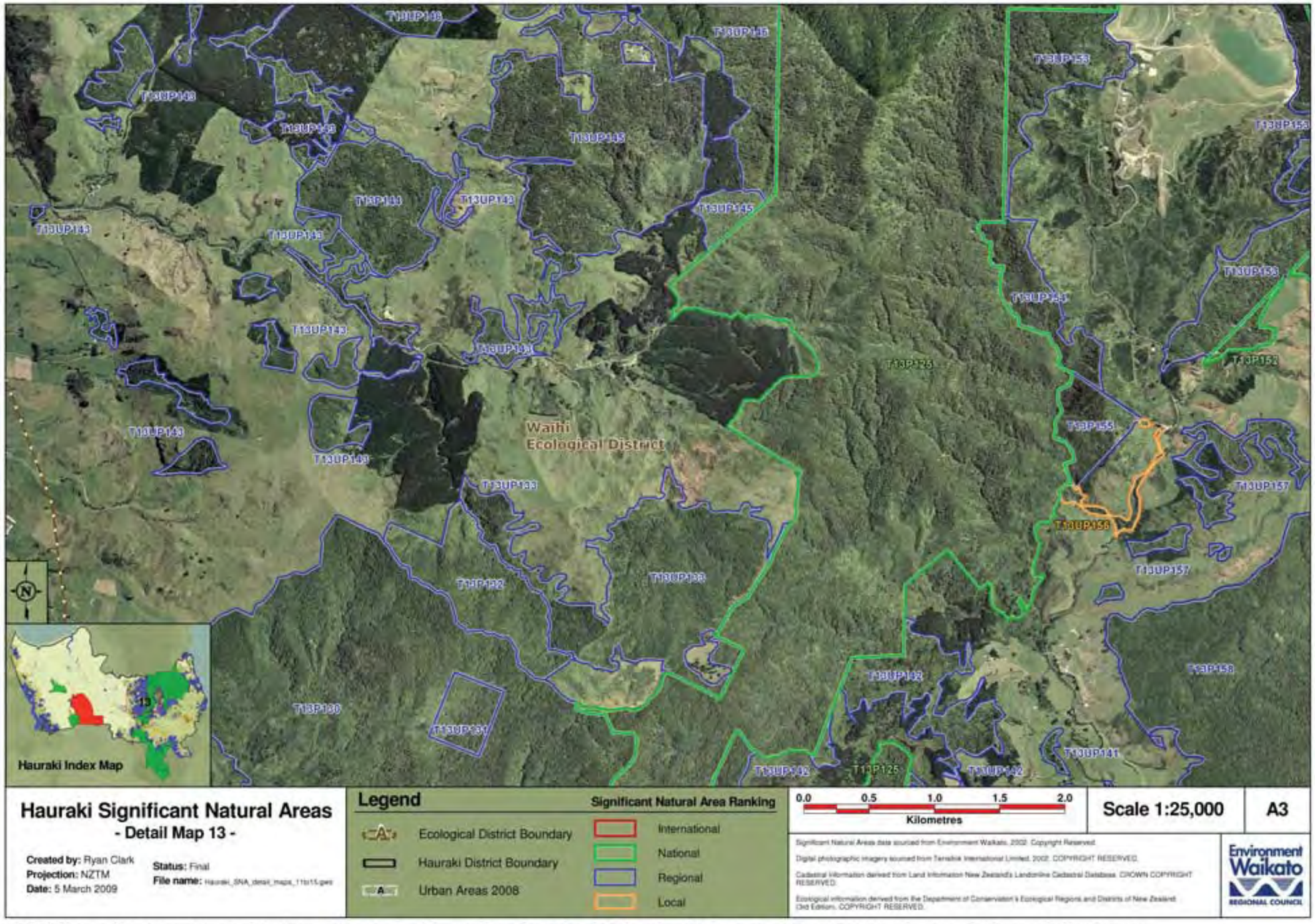

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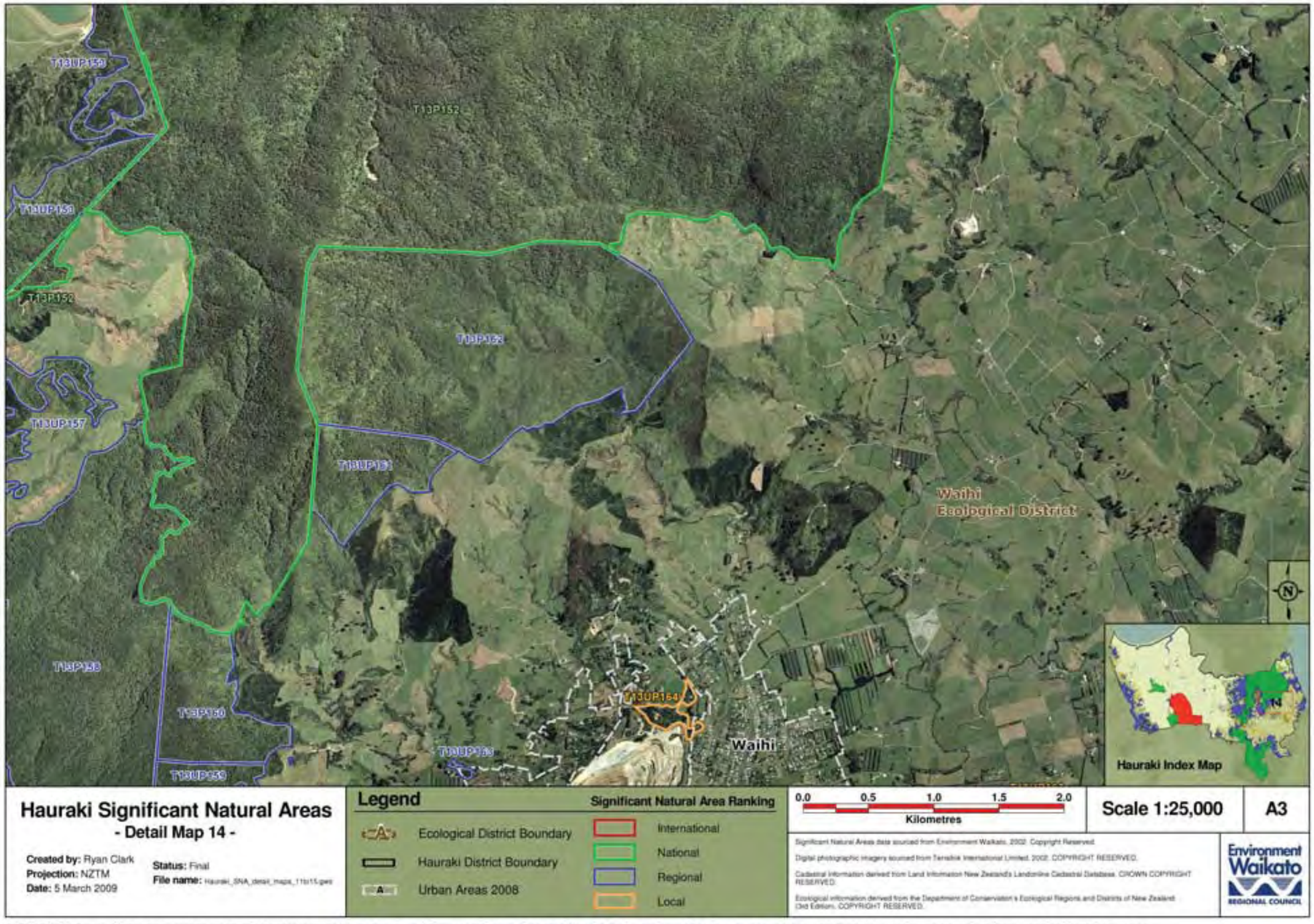


Hauraki Significant Natural Areas
- Detail Map 15 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_11to15.pws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

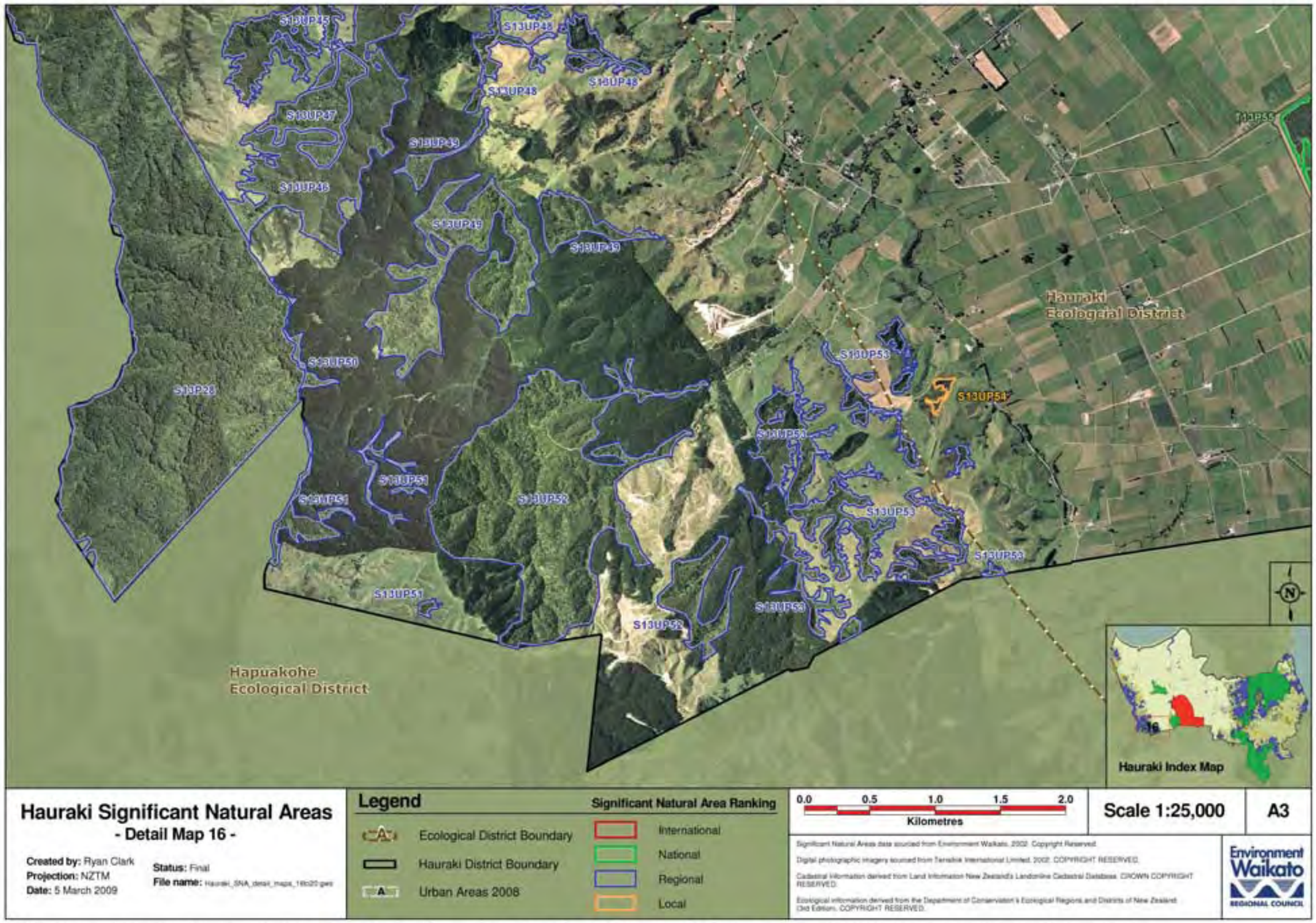
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL



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Hauraki Significant Natural Areas
- Detail Map 17 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_16to20.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

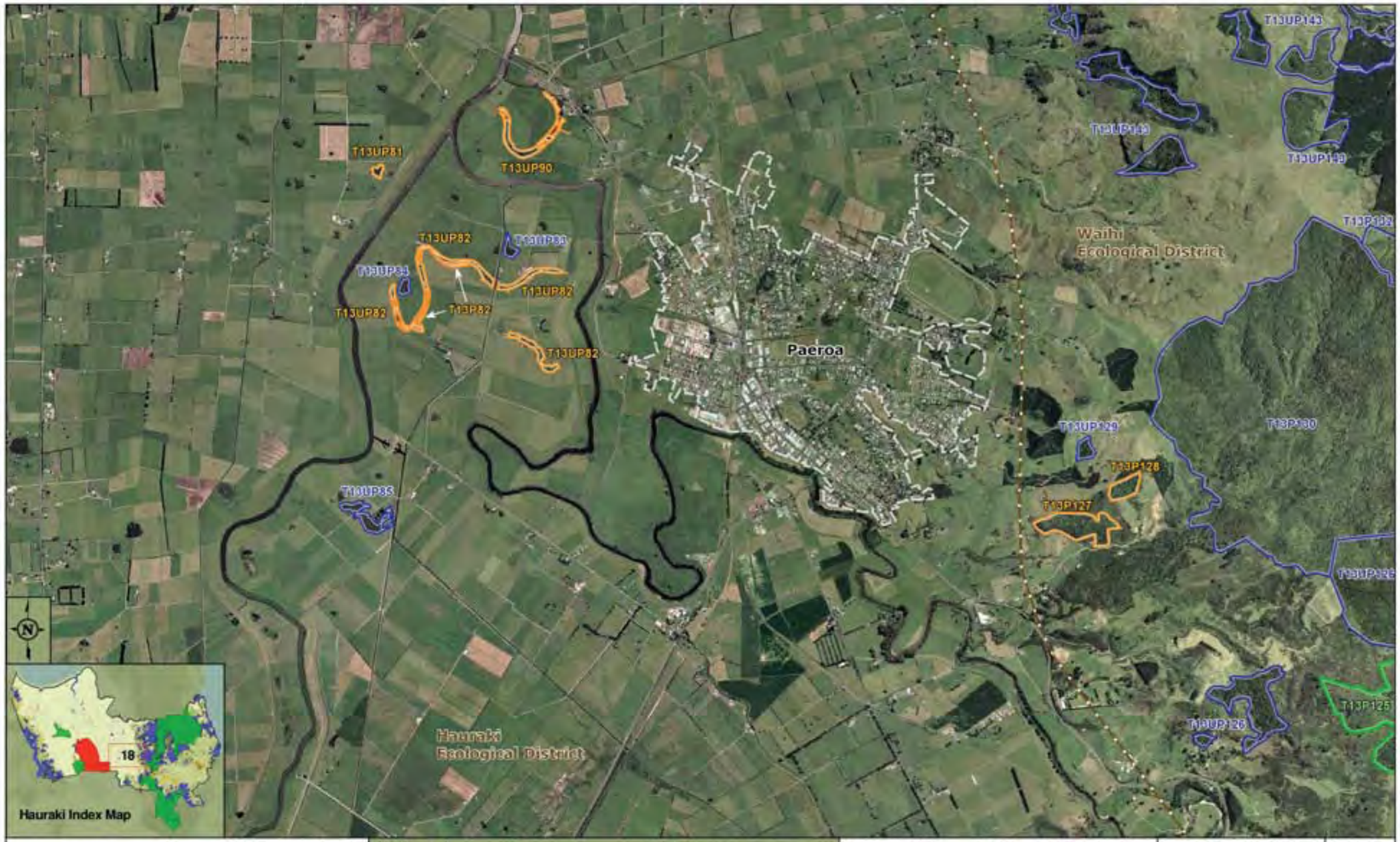
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,500

A3

Environment Waikato REGIONAL COUNCIL



Hauraki Significant Natural Areas
- Detail Map 18 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_18to20.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

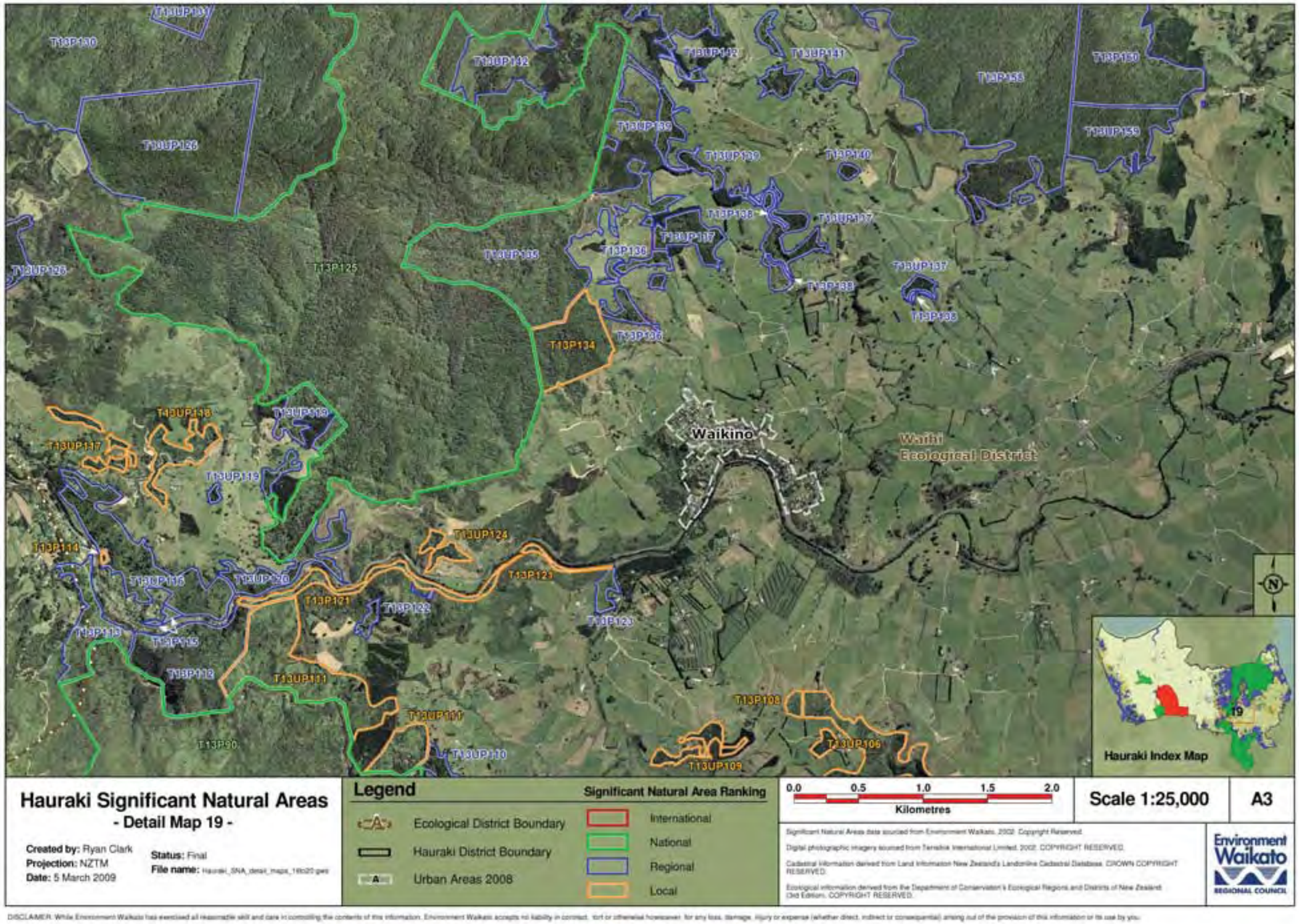
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL



Hauraki Significant Natural Areas
- Detail Map 19 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_19to20.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato REGIONAL COUNCIL

Hauraki Significant Natural Areas
- Detail Map 20 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_14to20.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

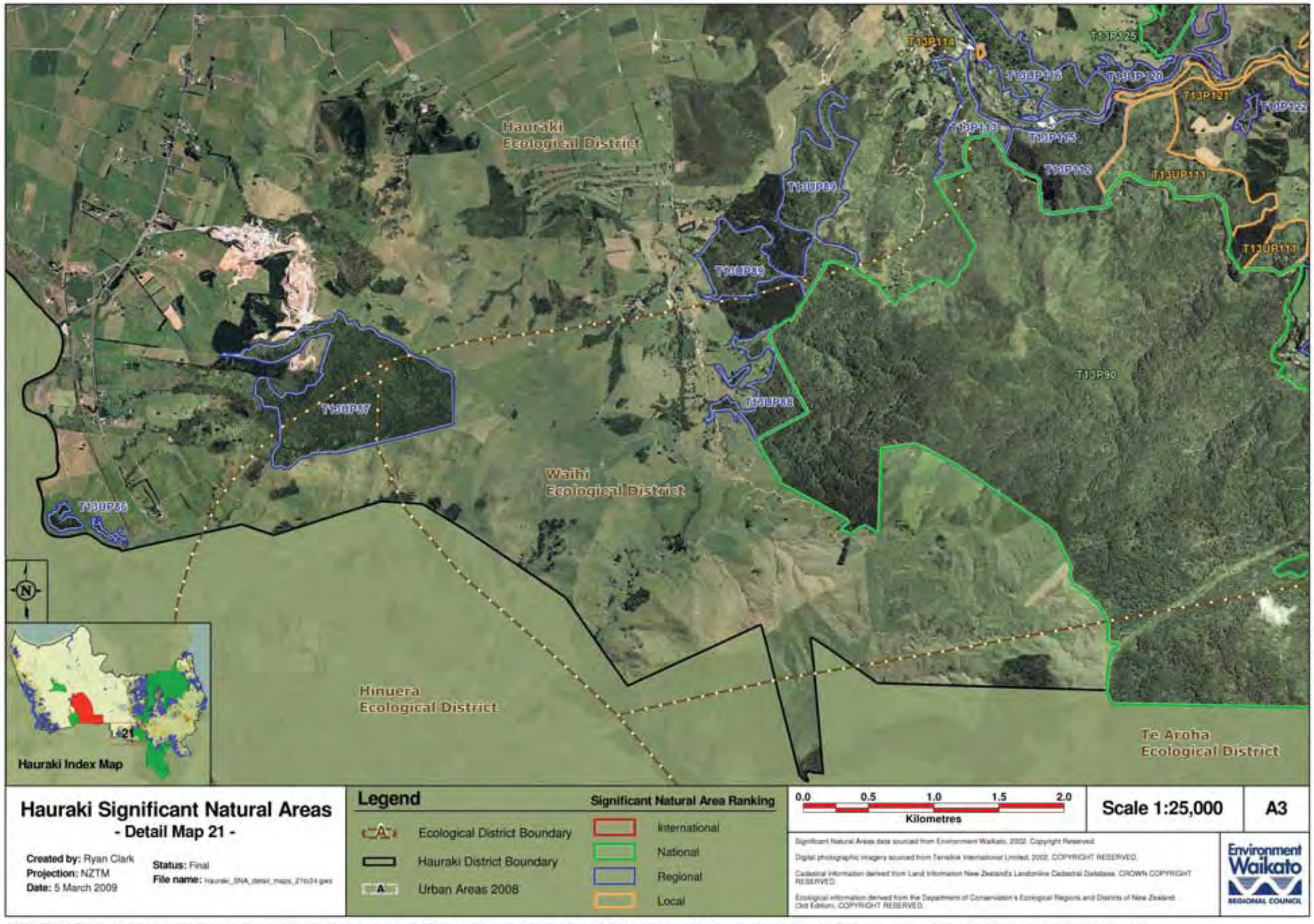
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato Regional Council



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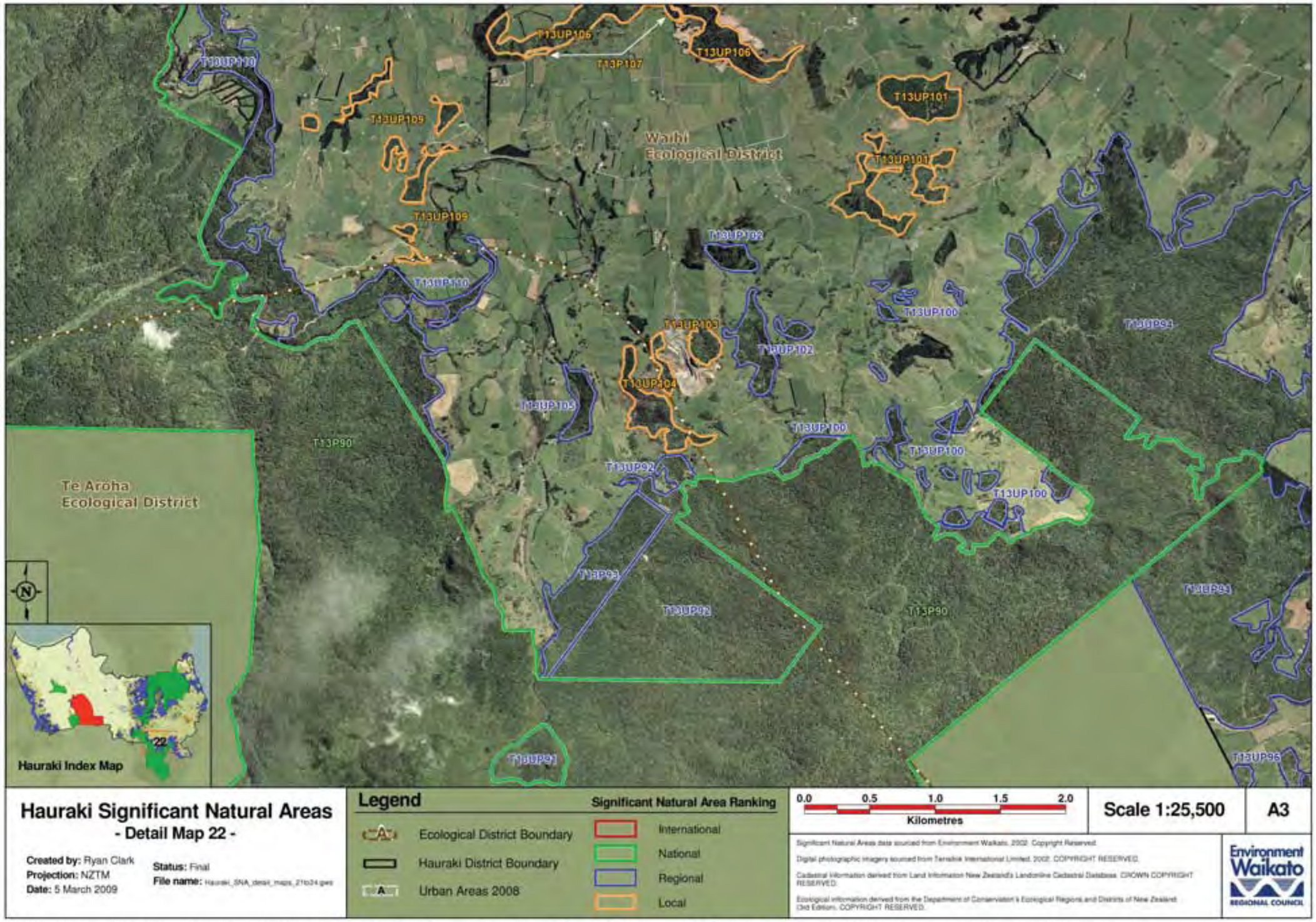
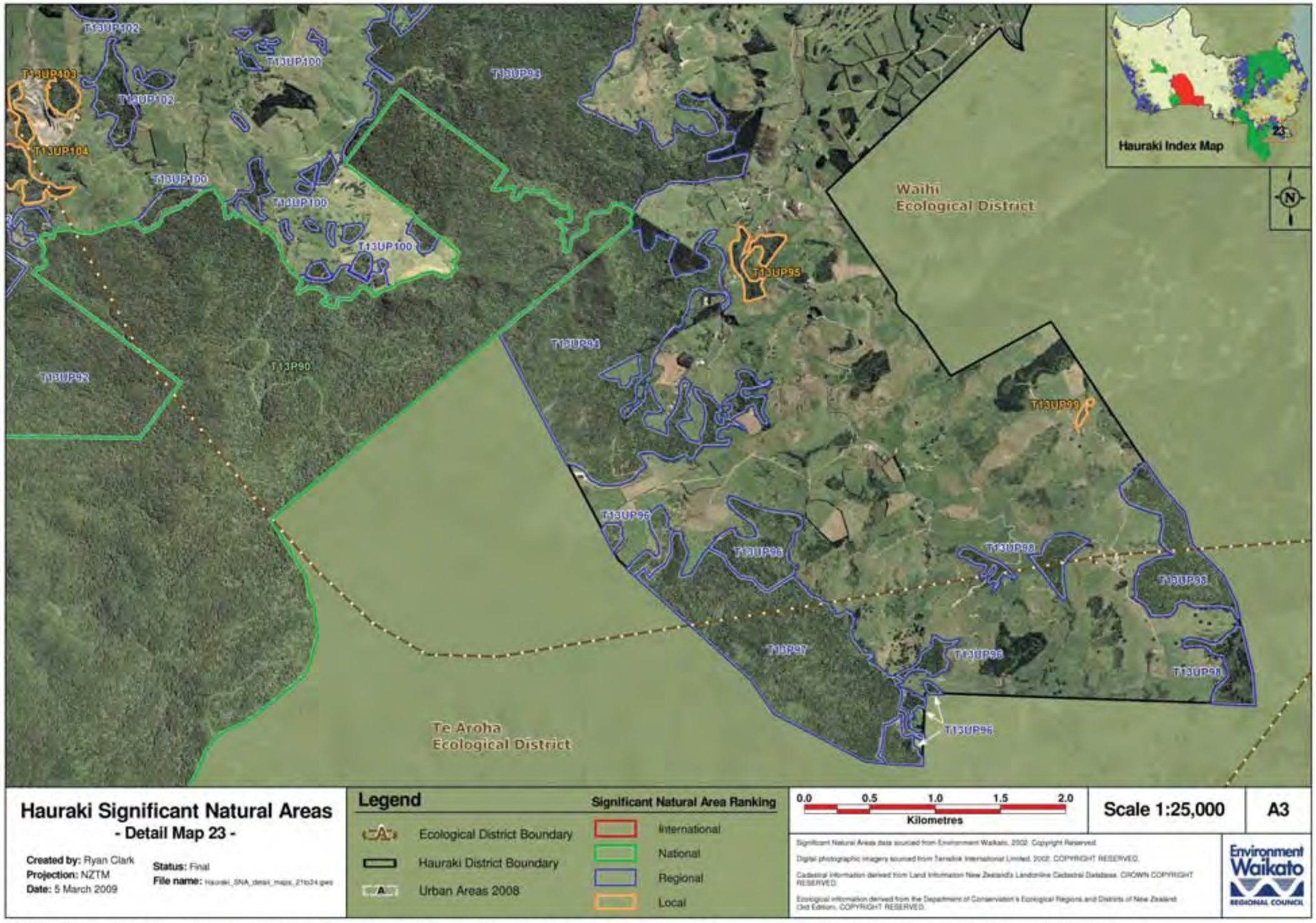




Hauraki Significant Natural Areas
- Detail Map 23 -

Created by: Ryan Clark
Projection: NZTM
Date: 5 March 2009
Status: Final
File name: Hauraki_SNA_detail_maps_21to24.gws

Legend

- Ecological District Boundary
- Hauraki District Boundary
- Urban Areas 2008

Significant Natural Area Ranking

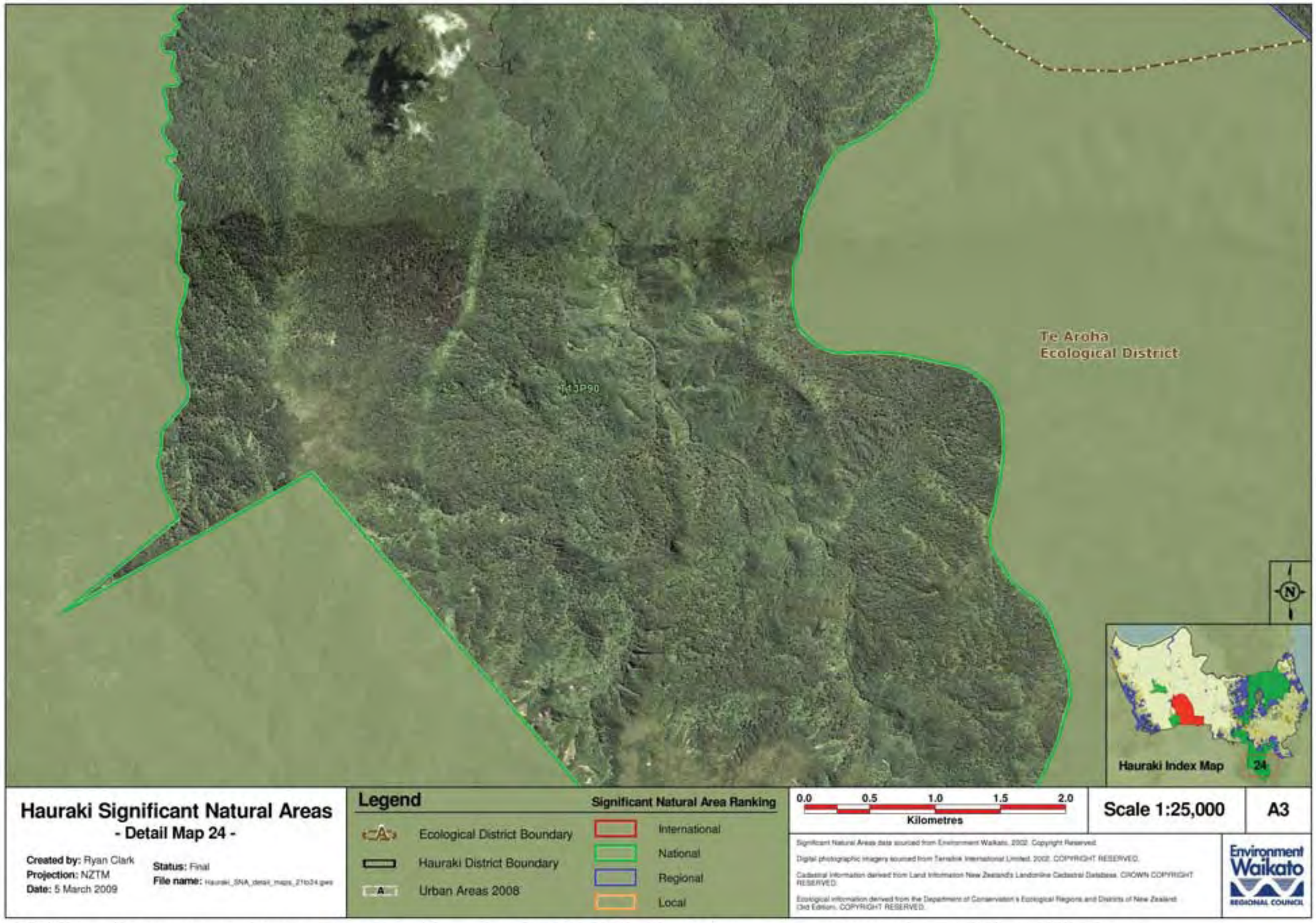
- International
- National
- Regional
- Local

0.0 0.5 1.0 1.5 2.0
Kilometres

Scale 1:25,000

A3

Environment Waikato Regional Council



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