

Natural areas of Kaikohe Ecological District

Reconnaissance Survey Report for the
Protected Natural Areas Programme

NEW ZEALAND PROTECTED NATURAL AREAS PROGRAMME

Linda Conning and Nigel Miller

Published by
Department of Conservation
Northland Conservancy
P.O. Box 842
Whangarei, New Zealand

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ISSN: 0112-9252

ISBN: 0-478-21978-4

Cataloguing-in-Publication data

Conning, Linda, 1954-

Natural areas of Kaikohe Ecological District : reconnaissance survey report for the Protected Natural Areas Programme / Linda Conning and Nigel Miller. Whangarei, N.Z. : Dept. of Conservation [Northland Conservancy], 2000.

1 v. ; 30 cm. (New Zealand Protected Natural Areas Programme, 0112-9252)

Includes bibliographical references.

ISBN 0478219784

1. Ecological surveys—New Zealand—Northland Region.

2. Natural areas—New Zealand—Northland Region. I. Miller, Nigel.

II. Title. III. Series: New Zealand Protected Natural Areas Programme (Series).

Foreword

The Kaikohe Ecological District is a compact area between the Bay of Islands and Hokianga Harbour, and harbours a wealth of ecological values including

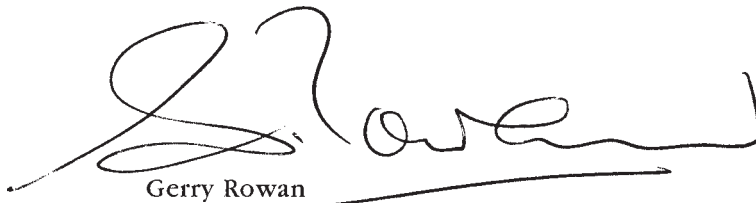
- a rare stand of dense old growth podocarp/kauri
- one of Northland's largest wetlands
- unique associations of volcanic geomorphology with lakes, wetlands and uncommon plants
- a suite of habitats containing the threatened North Island brown kiwi
- gumlands
- remnant puriri forest on volcanic soils
- remnant swamp forests and shrublands

as well as many other areas with significant conservation values.

Many of these areas are mere remnants of a formerly rich ecological heritage.

This survey provides information on the best of what remains and brings their significance into sharp relief.

Kaikohe Ecological District is an area of natural gems, and it is a challenge for landowners, protection agencies and all those with an interest in conservation to find ways to maintain and enhance their values.

A handwritten signature in black ink, appearing to read 'Gerry Rowan', with a long horizontal line extending from the end of the signature.

Gerry Rowan

Conservator - Northland

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Figure 1. Location map of Kaikohe Ecological District (Brook 1996).

Figure 2. Map of surveyed sites, Kaikohe Ecological District.
Land administered by Department of Conservation shown in green.

Abstract

The Kaikohe Ecological District is located between the Bay of Islands in the east and the Hokianga Harbour in the west and covers approximately 62,800 ha, 21% of which comprises natural areas described in this report.

A total of 84 natural areas of ecological significance were identified from a reconnaissance survey undertaken in 1994-95 together with information from existing databases.

The Kaikohe Ecological District contains several distinct features including the largest freshwater body in Northland (Lake Omapere), volcanic cones and basalt lava flows, and the geothermal and gumland heath area of Ngawha Springs, as well as several important wetlands.

The District contains a high diversity of vegetation types, including some areas rare nationally such as gumland, mature podocarp forest, volcanic broadleaf forest, swamp shrubland, and swamp forests. Manuka-kanuka shrubland, broadleaf-podocarp and secondary podocarp forest and are the most common vegetation types.

The protected natural areas network in this District is limited to 2001 ha, almost half of which comprises one site. Priority areas for protection include gumlands, wetlands, mature podocarp, kauri and volcanic broadleaf forests, as well as areas of kiwi habitat.

1. Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

The Protected Natural Areas Programme (PNAP) was established in 1982 to implement s3 (b) of the Reserves Act 1977:

“Ensuring, as far as possible, the survival of all indigenous species of flora and fauna, both rare and commonplace, in their natural communities and habitats, and the preservation of representative examples of all classes of natural ecosystems and landscape which in the aggregate originally gave New Zealand its own recognisable character”.

The goal of the programme is:

“To identify and protect representative examples of the full range of indigenous biological and landscape features in New Zealand, and thus maintain the distinctive New Zealand character of the country” (Technical Advisory Group 1986).

The specific aim of the PNAP is to identify, by a process of field survey and evaluation, natural areas of ecological significance throughout New Zealand

which are not well represented in existing protected natural areas, and to retain the greatest possible diversity of landform and vegetation patterns consistent with what was originally present. To achieve this, representative biological and landscape features that are common or extensive within an Ecological District are considered for protection, as well as those features which are special or unique.

As knowledge and information about the presence and distribution of fauna and flora such as invertebrates and bryophytes is limited, the protection of the full range of habitat types is important to maintaining the diversity of lesser known species.

This report differs from previous PNAP reports in that it is based mainly on a reconnaissance survey and existing published and unpublished data, and includes descriptions of most natural areas within the Ecological District boundaries.

The natural areas described have been evaluated according to two levels of significance based on specified criteria (see Section 2), and are not confined to Recommended Areas for Protection (RAPs), as defined in previous PNAP reports.

This approach was adopted so that the survey report better meets the broader information requirements of the Department of Conservation arising from the Resource Management Act 1991 (RMA) and the Convention on Biological Diversity (1992).

The Purpose and Principles of the RMA are set out in Part II of that Act and include:

- safeguarding the life-supporting capacity of air, water, soil, and ecosystems;
- the preservation of natural character of the coastal environment, wetlands and lakes, and rivers and their margins;
- the protection of outstanding natural features and landscapes;
- the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;
- intrinsic values of ecosystems;
- maintenance and enhancement of the quality of the environment.

The Convention on Biological Diversity (1992), under the auspices of the United Nations Environment Programme, has promoted the concepts of biodiversity and ecosystems.

These concepts are reflected in this report in the number of sites, their size, and the emphasis on buffers and linkages in the identification and assessment of sites.

1.2 ECOLOGICAL REGIONS AND DISTRICTS

New Zealand's physical environment is very diverse, and this is reflected in the diversity of indigenous plant and animal communities. In recognition of the biogeographic differences between various parts of New Zealand, a classification of Ecological Regions and Districts has been established (McEwen 1987).

An Ecological District is a local part of New Zealand where the topographical, geological, climatic, soil and biological features, including the broad cultural pattern, produce a characteristic landscape and range of biological communities. Ecological Districts are grouped together into a series of Ecological Regions on the basis of shared general ecological and geological characteristics. In some cases, a single very distinctive Ecological District is given the status of ecological region to emphasise its uniqueness (Technical Advisory Group 1986).

The New Zealand Biological Resources Centre co-ordinated the mapping of the country into more than 260 districts in 1982. Ecological Regions and Districts in northern New Zealand have recently been redefined to more accurately classify ecological variation within the Northland and Auckland areas (Brook 1996).

The PNAP uses the division of Ecological Districts as a framework throughout the country for determining ecological significance, including representativeness.

1.3 CONTENTS OF THIS REPORT

This report presents the findings of a reconnaissance PNAP survey of Kaikohe Ecological District. It includes maps and brief descriptions of most of the indigenous natural areas within the Ecological District, together with an analysis of the main vegetation types and information on threatened species and other taxa of scientific interest.

The natural areas described have been assessed according to ecological criteria outlined in Section 2.4.

Soil descriptions are given only for sites listed in Arand et al. (1993) as being of regional, national or international importance (see Appendix 8.3).

1.4 KAIKOHE ECOLOGICAL DISTRICT

The Kaikohe Ecological District covers 62,800 ha to the south of Puketi Forest, with Lake Omapere located roughly in the centre of the District. It stretches from the Waima River in the west to Pakaraka in the east, and includes the upper catchments of the Waitangi River. In the south it includes the Punakitere Valley to Lake Tauanui. The underlying geology of Mangakahia Complex sedimentary and basaltic volcanic rock types is typical of the District.

Apart from Lake Omapere itself, the largest freshwater body in Northland, there are many ecological features of note within this Ecological District. To the south

and east of Lake Omapere, volcanic cones and basalt lava flows have produced some of the best examples of volcanic broadleaf forest in the Region, which are important for the sustenance of kukupa, as well as for their representative values.

Where water flow has been impeded, remnants of swamp forest and wetland can sometimes be found.

The geothermal and gumland heaths of Ngawha Springs are unique within the Region, as are several of the volcanic broadleaf forest remnants on the eastern side of the District.

In the west, Pukewharariki Forest and its associated outliers contain some of the best examples of mixed podocarp/kauri/broadleaf forest remaining in private ownership in Northland. Other forest remnants and exotic plantations form large contiguous forested mosaics.

The District is one of the Northland strongholds for the NI brown kiwi.

Of the natural areas identified, 51% is forest, 34% shrubland, 1.5% is swamp forest and swamp shrubland, 3.5% wetland, and 10% lakes or open water, totalling 13,790 ha.

2. Methodology

2.1 GENERAL APPROACH

Information on the composition, extent and ecological values of indigenous natural areas within the northern portion of the Northland Conservancy was obtained during reconnaissance surveys using rapid semi-quantitative methods carried out in 12 Ecological Districts between 1994 and 1996. Field work was carried out mainly by three Department of Conservation staff and co-ordinated in the Whangarei Office of the Northland Conservancy. The survey of Kaikohe Ecological District was part of that larger study.

Natural areas were identified from topographic maps, existing databases, published and unpublished reports, aerial photographs and field and aerial observations. Areas were identified without regard for tenure. Consequently many natural areas which are administered by the Department of Conservation as well as other protected areas were also surveyed using the same methodology. This provided a consistent approach to determine representativeness of unprotected natural areas.

Each site was mapped and described. Having evaluated the sites (see Criteria, section 2.4), they were grouped according to one of two levels of ecological significance (see section 4). Scientific names of species for which common names have been used are given in Appendix 8.4 (Fauna) and Appendix 8.5 (Flora).

In writing this report, extensive use was made of information from existing biological databases such as the Sites of Special Biological Interest (SSBI) database, Rare Plants Database, Freshwater Fisheries Database, Amphibians and Reptiles Database, Bio-sites, the New Zealand Geopreservation Inventories, published information, and Department of Conservation internal reports. The SSBI database in the Northland Conservancy was the source of a considerable amount of information, particularly concerning fauna. Herbarium records from Auckland Institute and Museum and Landcare Research, Lincoln, were also consulted. Geographical and geological information was gained from existing published and unpublished maps.

Although few sites were surveyed in detail, a large amount of data was collected, considerably expanding the information base for the Ecological District.

2.2 CONSULTATION WITH LANDOWNERS

Because of the magnitude and geographic range of the surveys being undertaken (nine full and three part Ecological Districts to be completed in a two-year period), personal contact with all landowners was not possible.

Therefore all ratepayers were advised by way of a mailed leaflet (Appendix 8.2) informing them of the programme and the reason for it. The leaflet was signed by the Northland Conservator of the Department of Conservation, Northland Conservancy, and provided contacts for further information. A press release on the survey methodology and photograph of the survey team was featured in the local newspapers (see Appendix 8.2).

In many instances permission for access was sought from landowners either by telephone or direct visit, and was generally given. In very few cases was access refused.

Consultation with Ngapuhi runanga was undertaken by the Conservancy Manager Protection at meetings attended at Kaikohe.

2.3 DATA ACQUISITION AND ANALYSIS

A rapid, reconnaissance field survey was carried out to record and map the ecological and geomorphological characteristics, habitat type, and canopy vegetation of each identified natural area. Most of this work was carried out from roads or high points using telescopes and binoculars.

Where the opportunity arose, e.g. at a landowner's request, some sites were inspected in more detail and transects within the habitat were undertaken, while a few isolated sites were identified and described from aerial survey and photographs. Information on some sites in the latter category remains limited, and it is likely that some ecological units have not been recorded.

Natural areas were mapped using five broad categories of habitat types: forest, shrubland, wetland, duneland, and estuary (see Appendix 8.6).

At each site, the composition and relative abundance of canopy plant species was estimated and recorded on the field survey sheet (see Appendix 8.1) in the following four categories: greater than 50% cover was defined as “abundant”; 20–50% as “common”; 5–20% as “frequent”; and less than 5% as “occasional”.

Canopy composition based on percentage cover abundance is widely considered to be a valuable approach for description of forest stands. This technique and variations of it, for description of canopy composition, is well established and used throughout the world (see for example Kershaw & Looney 1985; Mueller-Dombois & Ellenberg 1974) as well as within New Zealand (see for example Atkinson 1962, 1985; Leathwick & Rogers 1996; Park & Walls 1978). The specific technique for vegetation description at each site is based on the approach set out in Myers et al. (1987).

This semi-quantitative method was favoured because of the time constraints for the field survey, the extensive areas to be covered, and because it could be applied to all vegetation types, with ground cover plant species or substrate being recorded in non-forest habitats. More detailed, and therefore more time-consuming and expensive methods, would not necessarily provide more useful information for assessing representativeness. The disadvantage of this survey approach is that it did not provide a great deal of information on the distribution of uncommon and threatened species or of understorey species.

Classification of canopy vegetation types was done by a combination of manual sorting and computer analysis using TWINSpan (Hill 1979). TWINSpan is a multivariate analysis programme for two-way classification of site and species data. It provides an indicator species analysis at each partitioning of data during classification, and displays the final result in an ordered two-way species-by-site table.

In the present study, TWINSpan was used to classify sites according to canopy vegetation composition, as determined from field surveys. Abundance categories of canopy species were coded numerically in the data set as follows: 4 - Abundant (> 50% of the canopy); 3 - Common (20–50%); 2 - Frequent (5–20%); 1 - Occasional (<5%). Vegetation types were determined according to the “abundant” and “common” categories. In many instances, no one species was classified as “abundant” but more than one species was “common”.

Site groupings determined in the analysis by TWINSpan enabled the identification of common and less common vegetation types within the District and to define the vegetation component of the ecological units.

Landform and geology were classified using information from published and unpublished maps, reports and topographical maps. This information was combined with vegetation types to determine ecological units defined by particular vegetation-geomorphological characteristics, e.g. kanuka forest on hillslope, raupo reedland in swamp. Most sites contain a range of ecological units.

Representativeness was assessed by determining the frequency of the different ecological units remaining in the Ecological District, Region, or nationally.

Because of resource constraints, the framework of land systems used in some PNA reports was not used in this survey or report.

Other relevant information such as fauna observations, threats and landowner information collected incidentally was also recorded on the survey sheet for each site. Once the field reconnaissance or survey had been completed, sites were numbered, and information from other databases, e.g. SSBI and threatened species information, was incorporated into the site descriptions.

Survey forms are held by the Department of Conservation, Northland Conservancy Office, Whangarei.

2.4 CRITERIA FOR ASSESSING HABITAT SIGNIFICANCE

The natural areas described in this report meet at least one of the following criteria:

- They are of predominantly indigenous character, by virtue of physical dominance or species composition.
- They provide habitat for a threatened indigenous plant or animal species.
- They include an indigenous vegetation community or ecological unit, in any condition, that is nationally uncommon or much reduced from its former extent.

The conservation values of these areas were then assessed using a two-level classification of habitat significance based on the PNAP ecological criteria of representativeness, rarity and special features, diversity and pattern, naturalness, habitat structure and characteristics important for the maintenance of ecosystems (buffer, linkage or corridor, size and shape).

The highest value areas (Level 1) are those which contain significant vegetation and/or significant habitats of indigenous fauna and are defined by the presence of one or more of the following ecological characteristics:

1. Contain or are regularly used by critical, endangered, vulnerable, declining, recovering, or naturally uncommon taxa (i.e. species and subspecies), or taxa of indeterminate threatened status nationally.
2. Contain or are regularly used by indigenous or endemic taxa that are threatened, rare, or of local occurrence in Northland or in the Ecological District.
3. Contain the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units.
4. Have high diversity of taxa or habitat types for the Ecological District.
5. Form ecological buffers, linkages, or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.
6. Contain habitat types that are rare or threatened in the Ecological District or regionally or nationally.
7. Support good populations of taxa which are endemic to Northland or Northland-Auckland.
8. Are important for indigenous or endemic migratory taxa.

9. Cover a large geographic area relative to other similar habitat types within the Ecological District.

Level 2 sites are natural areas that support populations of indigenous flora and fauna not identified as meeting the criteria for Level 1. They are sites which:

- contain common indigenous species,
- may be small and isolated from other habitats,
- may contain a high proportion of pest species,
- may be structurally modified, e.g. forest understorey grazed,
- have not been surveyed sufficiently to determine whether they meet the criteria for Level 1 sites.

Categories of species rarity and threat are based on Molloy & Davis (1994), and de Lange et al. (1999) (see Appendix 8.3).

2.5 UPDATING OF DATA

Natural ecosystems and habitats are dynamic, both physically and biologically. Some areas are less stable than others, e.g. wetlands, which are particularly susceptible to changes in groundwater hydrology whilst others change more gradually, e.g. forest. The status and composition of species also changes over time, and this could result in changes to the value of some habitats.

Human-induced activities and changes, both within or adjoining significant natural areas, can rapidly speed up the processes of change. Fire, followed by the invasion of adventive weeds, can dramatically modify shrublands. Drainage of adjoining land can alter the water tables of wetlands thus lowering the quality of the habitat and facilitating the establishment of weeds. Ongoing piecemeal destruction or modification of habitats and sustained grazing of bush remnants will, in the long term, completely eliminate some habitats.

It would be desirable to obtain more detailed information on many of the sites identified within this report, to gain a fuller appreciation of the values present. The natural areas identified in this survey will require regular monitoring to note changes in both species and habitat composition and condition.

3. Ecological character

3.1 TOPOGRAPHY/GEOLOGY

The Kaikohe Ecological District adjoins the head of the Hokianga Harbour, rises to 360 m in elevation, and comprises moderately dissected to rolling hill country of allochthonous Cretaceous-Paleogene Mangakahia Complex and Motatau Complex sedimentary rock units, mantled by upper Neogene Kerikeri Volcanics.

Mangakahia Complex sandstone, mudstone and siliceous mudstone outcrop over much of the western part of the District. At Pukewharariki, the sandstone is bluff-forming. There are also small areas of Motatau Complex bluff-forming calcareous mudstone and sandy limestone in the Waihou Valley, and of glauconitic sandstone and muddy limestone near Pouerua.

The Kerikeri Volcanics include eroded and deeply weathered basaltic flow remnants, and younger blocky basaltic lava flows and scoria cones. There is also a rhyolite dome north of Kaikohe, and an active geothermal field and associated freshwater wetlands at Ngawha Springs.

Wetlands ponded by Kerikeri Volcanics lava flows are common, and include the 1200 ha Lake Omapere and 100 ha Lake Owhareiti. There are extensive Quaternary alluvial deposits along the valleys of the Whakanekeneke, Utakura, Waitangi, and Waiaruhe Rivers.

3.2 CLIMATE

The Kaikohe Ecological District has a mild, humid and generally windy climate, winds being predominantly from the south-west.

Weather information is from the Kaikohe weather station (204 m asl).

The average rainfall is 1766 mm per year, with most rainfall occurring during winter (42.5 % of the annual rainfall occurs between May and August). The driest months are January and November, averaging 5% and 6% of the annual rainfall respectively. Dry spells (period of 15 days or more having less than 1 mm of rain per day) may occur during summer and early autumn.

The District is also subject to periodic cyclonic storms in late summer and early autumn which bring heavy rainfall and may have widespread effects such as floods, slips and windfalls. Heavy rainfall also occurs when northeasterly flows arise between ridges of high pressure to the east and troughs over the Tasman Sea.

The mean annual temperature is 14.7°C. January and February are the warmest months with the mean temperature being 19°C, and July is the coldest month (10°C). Daily temperature variations are minor, with few extremes of temperature or frosts.

The District has about 2000 hours of bright sunshine per year.

(Source: Moir et al. 1986)

3.3 VEGETATION

Botanical nomenclature in this report follows Allen (1961), Moore & Edgar (1970), Healy & Edgar (1980), Webb et al. (1988), and Druce (1992). A full list of common names used in the text with their botanical reference is to be found in Appendix 8.5.

3.3.1 Historical

The gumland vegetation at Ngawha formerly supported kauri (*Agathis australis*) forest, destroyed by fires hundreds of years before European settlement, with small swampy areas of sedge and fern (Clunie 1983).

It is likely that kauri was also dominant on the present gumlands at Aratoro and Punakitere.

Broadleaf forest formerly covered the volcanic flats east of Lake Omapere, with swamp forest on low-lying land.

The hill country in the west of the District was forested with mature kauri “as far as my eye could reach” near the shores of the Hokianga (Ensign McCrea from the sailing ship *Dromedary* in 1820, as recorded in Sale 1978).

3.3.2 Broad pattern

In the west of the District, regenerating shrublands cover broken hill country, with pockets of broadleaf-podocarp forest occurring in gullies, and kauri on higher ground.

Remnants of broadleaf-podocarp forest occur on volcanic soils east of Lake Omapere, and manuka (*Leptospermum scoparium*) and sedges dominate the gumlands south of Kaikohe. Significant wetlands remain south and east of Kaikohe.

The volcanic broadleaf forest, with its combination of puriri (*Vitex lucens*) and taraire (*Beilschmiedia tarairi*), is preferred by the threatened kukupa (*Hemiphaga novaeseelandiae*), and is very important for maintaining local kukupa populations, having a sustained fruiting potential. This forest type is one of the most productive, in terms of density of individuals utilising them, for the threatened kukupa in Northland. Puriri and taraire are pivotal species for kukupa in other parts of Northland, the two species collectively contributing to over 75% of the observed diet in winter (taraire), spring (both) and summer (puriri) (Pierce & Graham 1995).

3.3.3 Main vegetation types

Sbrublands

Manuka and kanuka

Manuka is dominant as a canopy species on 14 sites, and occurs on both basalt lava flows, as well as on sandstone or mudstone, frequently on margins of bush, wetland or stream, or as a linkage between forest remnants, often in areas of frequent disturbance. Its significance in this Ecological District is mainly derived from these linking and buffering functions, but it may also be a habitat for NI brown kiwi.

Within this type, gorse (*Ulex europaeus*), totara (*Podocarpus totara*) and mamaku (*Cyathea medullaris*) may occur frequently or occasionally, with tanekaha (*Phyllocladus trichomanoides*), towai (*Weinmannia silvicola*), and kahikatea (*Dacrycarpus dacrydioides*) sometimes occurring as scattered emergents.

Manuka and kanuka (*Kunzea ericoides*) occur as co-dominants in four large sites, again with a major linking function.

Gorse and mingimingi (*Leucopogon fasciculatus*) may be scattered throughout. At some sites, gorse is co-dominant. Scattered totara, kahikatea, cabbage tree (*Cordyline australis*), and puriri may be present.

These types occur throughout the District, but are more extensive in the west, probably because of the pattern of land development.

Co-dominance with other species

At Motukiore, in the west of the District, mahoe (*Melicactus ramiflorus*) is co-dominant in a more diverse canopy with frequent kowhai (*Sophora microphylla*), cabbage tree, and lacebark (*Hoberia populnea*), as well as gorse and occasional nikau (*Rhopalostylis sapida*). At Pukewharariki, cabbage tree is co-dominant with manuka and towai with nikau frequent.

Bracken (*Pteridium esculentum*) is co-dominant at Waikaramu Rd, with frequent hangehange (*Geniostoma rupestre*) and occasional gorse.

South of Kaikohe, mamangi (*Coprosma arborea*) and towai are co-dominant. Exotics (*Acacia* and *Hakea*) are co-dominant on the Whakarungangana gumfield.

Gumlands

A highly distinctive and predominantly indigenous vegetation type occurs on acidic strongly podzolised soils associated with a hardened upper silica pan which forms a barrier to root growth, air and moisture. Species occurring in this habitat type are tolerant of very harsh environmental conditions, and many, such as species of fern, sundew, orchid and sedge, are seldom present in any other habitat type. Manuka is the most dominant species in this habitat, but sedges of the *Baumea* and *Schoenus* genera and tangle fern (*Gleichenia dicarpa*) are locally dominant. Acid peat bogs form where drainage is impeded, and are usually dominated by *Baumea* species.

Ecological units occurring on gumland soils in the Kaikohe Ecological District include:

- Manuka shrubland with associated species being mingimingi, kumerahou (*Pomaderris kumerabo*), bracken, *Dracophyllum lessonianum*, *Dianella*, *Schoenus tendo*, and tangle fern. Gorse and prickly hakea (*Hakea sericea*) may occur to varying degrees.
- Manuka-*Gleichenia* shrubland in which *Dracophyllum lessonianum* is frequent.
- Manuka-*Baumea-Schoenus* shrub-sedgeland in which *Baumea teretifolia* and *Schoenus brevifolius* are intermixed with manuka and frequent *Dracophyllum lessonianum*, *Dianella*, *Tetraria capillaris*, *Epacris pauciflora*, and *Lepidosperma australe*.
- *Baumea-Schoenus-Gleichenia* sedgeland with associated species being *Epacris*, *Tetraria*, manuka and *Dracophyllum*.
- Manuka-*Baumea-Gleichenia* shrubland.

- *Gleichenia* fernland with *Baumea teretifolia* and *Dracophyllum*.
- Peat bogs dominated by *Baumea* species including locally dominant swards of *B. complanata* on damp substrates in disturbed areas (L. Forester pers. comm. 2000).

Broadleaf forest

Secondary manuka-kanuka forest

Nine sites contain forest types in which either manuka or kanuka or both are co-dominant species. In all but two sites, towai is also co-dominant, with taraire being the co-dominant in the remaining two areas. Rimu, kahikatea, taraire and tanekaha may occur frequently.

A variety of other species occur in the canopy including totara, tawa (*Beilschmiedia tawa*), puriri, titoki (*Alectryon excelsus*), kawaka (*Libocedrus plumosa*) and nikau, with kauri, northern rata (*Metrosideros robusta*), and pukatea (*Laurelia novae-zealandiae*) being occasional emergents.

Taraire forest occurs at eight sites, mainly in the central part of the District, on both volcanic and sandstone and mudstone substrates. None of the sites occurring on volcanic soils are protected.

Puriri, totara, towai, rewarewa (*Knightsia excelsa*), kahikatea, and tanekaha may be frequent, with tawa, pukatea, kohekohe (*Dysoxylum spectabile*), nikau, rimu, and northern rata all likely to be present.

Taraire-karaka forest occurs at only one site, Mihi Rd.

Taraire-puriri forest occurs at 12 sites throughout the District, although the majority are centred on the volcanic substrates.

On the sandstone and mudstone, totara, towai and rewarewa occur frequently. On the volcanics, rewarewa is likely to be frequent, and totara present. A variety of other canopy species occur on both types, including rimu, northern rata, pukatea, kawaka, miro (*Prumnopitys ferruginea*), tawa, kohekohe, kauri, kowhai, titoki, matai (*P. taxifolia*), and karaka.

Taraire-puriri-towai forest occurs at one site, Otamarangi Stream.

Towai forest occurs at ten sites, also on a variety of substrates. Taraire, rewarewa, puriri, and totara are likely to be frequent, with other canopy species including rimu, tawa, manuka, kanuka, kauri, pukatea, northern rata, and kahikatea.

Towai-taraire forest also occurs at ten sites, mostly in the west of the District, all of which are different from the sites where towai forest occurs. Two sites coincide with sites where taraire forest occurs, and three coincide with areas where taraire-puriri forest occurs.

Totara, puriri and rewarewa occur frequently in most of the towai-taraire sites. Kanuka, tanekaha, rimu, kahikatea, tawa, nikau, and mamaku are frequent at some sites.

Other species present are similar to taraire-puriri forest except for hinau (*Elaeocarpus dentata*), mangeao (*Litsea calicaris*), monoao (*Halocarpus kirkii*), and tanekaha replacing the lowland species of kowhai and titoki.

Towai-tawa forest occurs at only one site, Scott's Rd Bush, and towai-rewarewa forest occurs only at Pukewharariki.

Puriri forest

This type is found only in Northland and near Pukekohe. In this District it occurs at four sites, all in the Waimate North area, and is limited to small remnants. Taraire, rewarewa, totara, rimu, kahikatea, and karaka are present.

Kowhai

Kowhai occurs as a co-dominant with other species in small pockets at three sites:

- with puriri and karaka at Horeke,
- with puriri at Waihoanga,
- with kanuka at Rurunga Stream.

Titoki

Titoki occurs as a co-dominant with other species in small pockets at four sites in the east of the District:

- with puriri and taraire at Taumatataraire,
- with puriri at Pouerua,
- with taraire and mahoe at Kahutoto,
- with karaka and mahoe at Kahutoto.

Broadleaf-podocarp forest

Secondary manuka-kanuka-totara forest

This type occurs at nine sites mainly in the west and south of the District on Mangakahia sedimentary soils and associated with alluvium, and riparian and wetland margins. Kahikatea is usually frequent, and towai and puriri occasional. Tanekaha is frequent on the hill country in the west.

Secondary manuka-kanuka-totara-tanekaha forest

Tanekaha is co-dominant with these species at six sites which are also in the west of the District. Associated species include rimu, kahikatea, towai, puriri, rewarewa, kauri, and northern rata.

Secondary manuka-kanuka-tanekaha forest occurs at two sites in the north-west of the District with frequent totara and towai and occasional whau (*Entelea arborescens*).

Secondary kanuka-tanekaha-towai forest and manuka-kanuka-towai-kauri forest each occur at one site near Utukura in the west of the District, and kanuka-totara-taraire forest occurs at one site in the far west of the District.

Secondary manuka-kanuka-totara-kahikatea forest occurs at six sites mainly in the west of the District on Mangakahia sedimentary-derived soils. Within this type, tanekaha is frequent. Associated species include puriri, rimu, rewarewa, and taraire. Kanuka-kahikatea forest occurs atnKaiepeha Swamp.

Taraire-totara forest occurs at four sites in the centre of the District with frequent puriri and towai.

Kanuka is co-dominant with this type at Rakautao Bush south of Ngawha.

Taraire-kahikatea forest is found at Horeke in the west, and with puriri also a co-dominant at Donaldson's Rd, and totara co-dominant at Motukiore and Scotts

Rd. Nikau is co-dominant with this type at Horeke. Rewarewa, manuka, kanuka and towai may be frequent within these sites.

Totara-taraire-puriri forest occurs at five sites across the District. Rewarewa and towai may be frequent. Totara-puriri forest occurs at Wehirua Rd, with frequent taraire. Puriri-totara-kahikatea forest occurs at Horeke, Waitaheke and Okokako.

Towai-totara forest, and variations of it, occur at eight sites, mainly in the central part of the District. Puriri, manuka, kanuka, tanekaha and kahikatea may be frequent within this type.

Manuka is co-dominant at Te Toke Stream, and kanuka at Rakautao Bush south of Ngawha. Rewarewa also occurs as a co-dominant at Rakautao. Kahikatea is co-dominant at Scotts Rd and Reservoir Bush, and taraire is co-dominant at Hui te Werawera in the headwaters of the Waitangi River.

Towai-tanekaha forest occurs at three sites in the west (Guthrie's Block, Wairere Stream and Pukewhao Forest Mosaic).

Podocarp forest

Most of the podocarp forest in this District is secondary in nature. However, at Pukewharariki, a unique stand of mature rimu-totara-miro-kahikatea forest remains. This is more fully described in site report P05/024.

Secondary totara forest occurs at 13 sites in the central area of the District. Puriri, taraire, kahikatea and rewarewa may be frequent.

Secondary kahikatea forest occurs on 24 sites throughout the District, although some of these ecological units are very small, being either pockets within a larger area of indigenous vegetation, or remnants. Seven sites are on alluvium, generally with totara occurring frequently, and puriri and pukatea may also be associated with this type.

Seven sites occur on sedimentary rock types. Totara, towai, taraire, puriri, and nikau may be frequent. Rimu and pukatea may also be present.

The remainder of the sites occur on basalt lava flows or talus. Totara, rewarewa, and puriri are usually present.

Kahikatea-totara forest occurs at 15 sites, mainly in the central part of the District. Puriri, taraire, nikau, rimu and towai may be frequent. Kauri, pukatea, northern rata, rewarewa, kowhai, and kohuhu (*Pittosporum tenuifolium*) may also be present. Tanekaha is co-dominant at Cooks TV Block. An area of totara-rimu forest occurs at Waikaramu Rd.

Tanekaha

Vigorous tanekaha regeneration occurs in the Cooks Airstrip Block, with manuka/kanuka and totara.

Kauri

Although once widespread, dense kauri dominance is now uncommon in the Ecological District.

Mature kauri are present as scattered trees in forest throughout the District, but occurs as secondary growth in isolated clumps at Mangatoa Stream Bush, Monument Bush, Waihoanga Rd Bush and Te Toke Stream.

Kauri is co-dominant with kawaka in a small area of mature primary forest at Pukewharariki.

Elsewhere kauri is co-dominant in secondary forest:

- with towai at Waihoanga Rd Bush and Titihuatahu,
- with towai and manuka/kanuka at Whitecliffs,
- with rimu at Scotts Rd (a minute area),
- with tanekaha at Moehau,
- with tanekaha, taraire and totara at Carrs/Waimahe Stream.

Swamp shrubland and forest

Swamp shrubland occurs on six sites associated with significant wetlands in the District, five of which contain manuka as a key component. They include:

- manuka dominant with frequent flax (*Phormium tenax*) and occasional cabbage tree, at Lake Omapere [Note that this site was largely destroyed by land development in 1997].
- manuka-*Coprosma propinqua* dominant with frequent cabbage tree and *Baumea articulata*, and occasional kahikatea at Te Keene Stream Swamp (P05/064).
- manuka-kohuhu-putaputaweta (*Carpodetus serratus*) with frequent cabbage tree and kahikatea at Punakitere Valley.
- manuka-cabbage tree-*Carex* sp. with frequent *Juncus* sp. and occasional swamp maire (*Syzygium maire*) at Okaka Rd.
- manuka-*Baumea* association with occasional puriri and swamp maire at Kaipeha Swamp.

The remaining area is *Coprosma propinqua*-*C. rigida*-*Bolboschoenus* sp. with frequent *Carex* sp. and umbrella sedge and occasional swamp maire, cabbage tree, kahikatea, putaputaweta, and *Muehlenbeckia australis*.

Swamp forests

These are extremely rare due to past development of the fertile sites on which they tend to occur. Sites such as this, which are frequently waterlogged during winter and dry in summer, provide a limiting set of physical conditions which give rise to a unique assemblage of flora and fauna, some of which, such as swamp maire, cannot survive under any other conditions.

Swamp forest occurs at nine sites, in eight of which kahikatea is prominent.

These types include:

- kahikatea dominance at Te Keene Stream Swamp (P05/064),
- kahikatea-pukatea at Lake Omapere and Waingaruru Swamp,
- kahikatea-cabbage tree at Kaipeha Swamp,
- kahikatea-cabbage tree-swamp maire at Ngawha Swamp and Youngs Kahikatea Remnant,
- kahikatea-kanuka with frequent pukatea and cabbage tree with occasional swamp maire at Maraeroa Swamp.

The remaining type is kowhai-*Coprosma propinqua*-*Gabnia* with *Cyperus ustulatus*. Kahikatea, manuka, flax, broom (*Carmichaelia australis*), *Muehlenbeckia complexa*, and pampas (*Cortaderia selloana*) are also present.

Wetlands

Twenty three wetlands have been surveyed in the Kaikohe Ecological District, all of which are fertile or semi-fertile in nature.

- (i) Open water occurs at six sites, with Lakes Omapere, Owhareiti and Tauanui being the largest.
- (ii) Raupo (*Typha orientalis*) reedland occurs in abundance at 13 sites. Cabbage tree, flax, *Carex* sp., manuka, kahikatea, *Coprosma propinqua* and crack willow (*Salix fragilis*) occur frequently or occasionally at eight sites.

Raupo occurs in association with other species at several sites:

- with *Calystegia* at Motukiorie,
- with *Carex* at Okaka Rd,
- with *Baumea* at Horeke Rd and Rakautao,
- with each of toetoe (*Cortaderia fulvida*), flax, and cabbage tree, respectively, at Waingaruru Stream.

- (iii) Flax occurs as a dominant in a tiny remnant near Lake Omapere.
- (iv) Manuka-flax with frequent raupo and occasional cabbage tree occurs at Kaipeha swamp.
- (v) *Baumea* sedgeland occurs at Kaipeha swamp.
- (vi) *Juncus* rushland occurs on the margins of Lake Omapere.
- (vii) *Eleocharis sphacelata* sedgeland occurs at Lake Owhareiti, Tautoro wetland and Waiare Rd Pond.
- (viii) *Apodasmia similis* sedgeland occurs in the Maraeroa Swamps, with frequent raupo and occasional cabbage tree.
- (ix) *Carex* sedgeland occurs in the Tautoro wetland with occasional umbrella sedge, *Juncus* and *Baumea* sp.
- (x) Crack willow treeland occurs at Pakaraka in the Kahutoto and Te Keene Stream Swamps.

3.3.4 Species of botanical interest

The botanical values of most of the sites in this Ecological District outside of the areas administered by the Department of Conservation or protected under covenant are not well known.

The exceptions are the assemblages on the volcanic geomorphology at Pouerua, Kahutoto Stream and Lake Tauanui, where coastal species such as *Coprosma macrocarpa* and wharangi (*Melicytus ternata*) are to be found.

The fern ally *Isoetes* aff. *kirkii*, found in Lake Omapere, is of restricted distribution in the North Island with the nearest location being some Rotorua lakes (Champion & Rowe 1996).

The bladderwort *Utricularia delicatula*, found at Ngawha, is of restricted distribution in Northland.

Species uncommon in Northland to be found in this Ecological District include:

- nettle (*Urtica incisa*) - Pouerua Cone,
- black maire (*Nestegis cunninghamii*) - Waikuku Rd,
- whau - Pukewhao Forest Mosaic and Pouerua Bush,
- *Blechnum vulcanicum* (Pouerua Bush).

3.3.5 Threatened plant species

(See Appendix 8.3 for Categories of Threat)

Baumea complanata - Declining

A sedge with strap-like leaves growing from a fan-shaped base which grows in damp to seasonally dry areas among manuka, often near lakes and streams (Wilson & Given 1989), but appears to favour damper substrates. It can form dominant swards in disturbed areas but is generally overtopped in heath conditions (L. Forester pers. comm. 2000). It was formerly found from Waikato north but is currently restricted to Ngawha, Taheke, Waipoua and Te Pahi.

Caladenia atradenia - Naturally Uncommon - Sparse

A tall, hairy, dark reddish-green orchid, with a strongly hooded dorsal sepal. New Zealand plants appear to have only two rows of calli on the labellum, as opposed to four rows in the Australian *C. iridescens*. Distribution is from Kaitiaki to Auckland, Bay of Plenty, Wellington and north-west Nelson (St George et al. 1996). In this District it is known from Aratoro (L. Forester pers. comm.).

Colensoa physaloides - Declining

A distinctive blue-flowered, shrubby lobeliaceous plant with hydrangea-like foliage. It is a monotypic genus, endemic to Northland, some of its offshore islands and Rakitu Island, east of Great Barrier Island (P. de Lange pers. comm. 1996). It is found scattered through forest areas, generally beside streams and tracksides, and on talus slopes. Vulnerable to browsing, it is absent from areas where goats or stock roam. In this District it is known from Aratoro.

Isoetes* aff. *kirkii - Critically Endangered-Taxonomically Indeterminate

This aquatic plant grows in mud, submerged in 50 cm or more of water, and is an endemic quillwort consisting of tufted, linear, undivided leaves with swollen bases (Brownsey & Smith-Dodsworth 1989). The northern form has flabellate leaves and may be a distinct taxon. It is currently known only from Lake Omapere (L. Forester pers. comm. 2000).

Korthalsella salicornioides - Naturally Uncommon-Sparse

A dwarf mistletoe usually parasitic on manuka and kanuka (Poole & Adams 1990), found on manuka at Ngawha.

Peperomia tetraphylla - Naturally Uncommon-Sparse

A small succulent herb with branches pubescent at the nodes, often a low epiphyte. It is very uncommon in Northland (L. Forester pers. comm. 1997) and is generally found in the East Cape-Bay of Plenty area and also occurs in Australia and Polynesia (Allan 1961). Known from only one site in this

Ecological District (on volcanic rocks), with single records also from Ahipara and Whangaroa Ecological Districts.

Pittosporum pimeleoides* subsp. *pimeleoides - Naturally Uncommon-Sparse

A small shrub growing to 2 m with slender branches and narrow-oblong leaves crowded at tips or whorled (Poole & Adams 1990), is found growing on dry and fairly open ridge sites, usually with mingimingi under tanekaha and kauri. Known only from north of Auckland and now known mostly from north of Whangarei (Wilson & Given 1989). Found in forest south of Ngawha Springs.

Sicyos australis - Vulnerable

Commonly known as the native cucumber, this scrambler is much reduced from its former extent, restricted mostly to offshore islands from the Three Kings to the Bay of Plenty, also the Kermadecs, Lord Howe, and Norfolk Islands (Smith-Dodsworth 1991). It is found in this District at Pakaraka with the only other mainland records at Te Paki and one site in the Whangaruru Ecological District (I. Forester pers. comm. 2000).

Thelymitra malvina - Range Restricted

This sun orchid (with “pink whiskers”) is found on gumland soils, generally in proximity of old kauri stumps. In this District it is known from Ngawha, and it is also found at Lake Ohia and in Australia.

Thelypteris confluens - Vulnerable

A recent (year 2000) record for this marsh fern is from a swamp in the Ngawha area. Once widespread, this fern is now confined to swamps north of Auckland and in the Bay of Plenty, usually found in open areas amongst reeds and long grass (Brownsey & Smith-Dodsworth 1989).

Todea barbara Vulnerable

A fern with leathery fronds found on dry sites within gumland vegetation, and also known from Australia (Wilson & Given 1989). In this Ecological District it is known from Ngawha.

Species previously recorded in the Ecological District but which have not been recorded for some time and may be extinct within the Ecological District

A number of threatened species known from similar habitats in other districts are likely to be present, particularly in the gumland habitats, but have not been recorded. They include: *Lycopodiella serpentina* (Vulnerable), one of the smallest club mosses, found on open sites on gumland soils amongst *Gleichenia* and sundews; *Phylloglossum drummondii* (Endangered), a fern ally restricted in New Zealand to low, open manuka north of Auckland, growing with sedges on seasonally damp gumland sites; and also the yellow-green mistletoe *Ileostylus micranthus* (Declining).

3.4 FAUNA

Information on fauna in this report has been compiled from SSWI and SSBI data bases, as well as from field observations during this survey. The status of individual species is derived from Bell (1986), and Molloy & Davis (1994) (see Appendix 8.3. Bell's "Threatened" equates to "Vulnerable"). Nomenclature follows Heather & Robertson (1996) for birds and Gill & Whitaker (1996) for reptiles.

A comprehensive discussion and checklist of fauna, particularly invertebrates, is beyond the scope of the present study. However, it is recognised that the invertebrate fauna, both common, e.g. tree weta, and less common, e.g. *Peripatus* and the forest ringlet butterfly (*Dodonidia helmsii*) are a significant facet of indigenous ecosystems. With the present state of knowledge of these species, the protection of the whole range of habitat types is considered important to ensure populations of invertebrates are maintained.

The individual site descriptions detail known significant fauna only. Most of the common bird species of Northland, both indigenous and introduced, are to be found in the District. A checklist of common fauna recorded is included in Appendix 8.4.

3.4.1 Threatened bird species

NZ dabchick *Poliiocephalus rufopectus*

Endemic Category C

Recorded from on Lake Owhareiti (on which Australasian little grebe (*Tachybaptus novae-hollandiae*) is more frequently reported).

NI brown kiwi *Apteryx australis mantelli*

Threatened endemic Category A

Kiwi are found throughout the District, especially east, north and west of Kaikohe in forest and shrubland, including remnants in farmland. Threats include dogs, small predators, and habitat loss.

Kukupa (NZ pigeon) *Hemiphaga novaeseelandiae novaeseelandiae*

Threatened endemic Category B

Found throughout the District, this species potentially thrives in the fertile volcanic broadleaf-podocarp forest in the vicinity of Kaikohe. Threats include possums, rats, and other predators (including humans). Predator control programmes undertaken by some landowners have reportedly produced a positive recruitment response.

NI kaka *Nestor meridionalis septentrionalis*

Threatened endemic Category B

Thought to have been present historically. Anecdotal reports of sightings south of Kaikohe are thought to be vagrants, rather than reflecting resident populations, which are now restricted in Northland to the Hen and Chicken Islands and Bream Head (Ray Pierce pers. comm.). Predators, especially mustelids, are thought to be the main threat on the mainland.

Australasian bittern *Botaurus poiciloptilus*

Threatened Category O

Recorded from the larger wetlands in the District, and possibly utilises smaller wetlands as well. The main threat is habitat destruction.

Brown teal *Anas chlorotis*

Endemic Category C

Once widespread in swampy streams and tidal estuaries, only a small number of birds remain in the wild outside of Great Barrier Island. A small released and managed population exists in the Puketi Rd area. Predators are the main threat.

3.4.2 Bird species of regional and district significance

These are not considered nationally threatened but are rare in both the Ecological Region and District.

NI fernbird *Bowdleria punctata vealeae*

Regionally threatened endemic found in the major sedge habitats in the District.

Pied tit *Petroica macrocephala toitoi*

Populations have been restricted by habitat fragmentation generally to large mature forested areas.

Found at Aratoro and Pukewharariki.

Banded rail *Rallus philippensis assimilis*

A species which was once widespread and for which Northland is its national stronghold.

Found at Waingaruru Stream Swamp.

Spotless crane *Porzana tabuensis plumbea*

A species with restricted distribution, confined on the mainland largely to dense reed beds, especially raupo, and found at a variety of wetland sites throughout the District.

3.4.3 Threatened and regionally significant snails

Kauri snail *Paryphanta busbyi busbyi*

Threatened endemic Category C

Found throughout the District.

Liarea turriculata waipoua

Endemic to northern Northland in the west from Kaitaia to Waipoua.

Found at Pukewharariki.

Liarea turriculata turriculata

Endemic to northern Northland in the east from Kaitaia to Warkworth.

Other Northland endemic snails include “Golden phenacohelix”, *Fectola charopiformis*, and *Rytida dunniae*.

3.4.4 Threatened fish

Banded kokopu *Galaxias fasciatus* Category C

Northland mudfish *Neochanna beleios* Category A (provisional)

Recent studies of mudfish from Ngawha, Oromahoe, and Kerikeri Airport show these populations are physically and genetically different from *Neochanna diversus* (black mudfish - a Category C species found in coastal and lowland peaty sites of Pleistocene era such as Kaimaumu, Hauraki Plain, and Waikato). As a new species of restricted distribution, it is likely to become a Category A species (V. Kerr pers. comm. 2000).

3.4.5 Regionally significant lizards

Ornate skink *Cyclodina ornata*

In Northland this species is uncommon on the mainland and generally found only on offshore islands. Found at Pukewharariki.

3.5 THREATS

Habitats on margins or in successional stages are under threat from afforestation and the invasion of exotic species such as gorse and pampas. Other areas are being incrementally degraded by grazing. The fertile wetlands, swamp shrubland and forests are under threat from drainage and land development.

In the more mature forested areas possums, goats, pigs and cattle constitute the main threat. (A list of introduced mammals is in Appendix 8.4.)

Apart from eliminating or reducing human-related threats, forest areas need to be managed to control animal pests and more open habitats managed for plant pests, to ensure long-term viability of the natural habitats.

4. Site descriptions

Records of threatened flora and fauna have been sourced from herbarium and other databases mentioned in Section 2.1, the Kiwi Recovery Programme (for NI brown kiwi), or from direct observations by Department of Conservation staff during the course of this survey.

The status of all records was checked prior to inclusion in this report. All records included were deemed to be valid as from 1992 or more recent, unless otherwise stated.

Only significant fauna data have been included in these site reports. See Appendix 8.4 for common fauna in the Kaikohe Ecological District.

The percentage cover of ecological units has not been included in some of the site descriptions, where much of the information has been drawn from previous surveys and reports which did not record this.

4.1 LEVEL 1 SITES

SITE NAME	SURVEY NO.	GRID REF.
Horeke Road East Bush	O05/076	O05 685 435
Omao Bush	O05/077	O05 680 415
Rurunga Stream Forest	O05/078	O05 665 419
Otautu Stream Headwaters	O05/079	O05 665 435
Wairere Stream Forest Mosaic	O05/080	O05 660 460
Whitecliffs	O05/081	O05 690 470
Whitecliffs Ltd Bush	O05/082	O05 670 487
Pukewhao Forest Mosaic	O05/083	O05 650 485
Carrs/Waimahe Stream Bush	O05/084	O05 625 465
Motukiore Bush Association	O05/085	O05 620 450
Maraeroa Swamps	O05/086	O05 685 508
Moehau Wetland and Forest Mosaic	O05/088	O05 645 410
Taheke River Wetlands	O06/005	O06 683 395
Aratoro Stream Bush	P05/001	P05 810 580
Scotts Road Bush	P05/002	P05 830 570
Otamarangi Stream Bush	P05/003	P05 830 545
Whakanekeneke River Bush	P05/005	P05 805 545
Lake Omapere and Environs	P05/006	P05 830 500
Waikaraka Stream Bush	P05/007	P05 783 575
Waihoanga Stream Forest Outlier	P05/008	P05 775 585
Donaldsons Road Bush	P05/010	P05 755 545
Mihi Road Bush	P05/011	P05 775 535
Okoro Stream Bush	P05/012	P05 735 543
Forest Road Bush	P05/013	P05 733 577
Te Toke Stream Shrubland	P05/014	P05 715 535
Cooks TV Block	P05/015	P05 725 535
Cooks Road Bush No. B	P05/016	P05 743 528
Cooks Airstrip Block	P05/017	P05 735 520
Puriri Farm Bush	P05/018	P05 795 515

SITE NAME	SURVEY NO.	GRID REF.
Okaka Road Wetland	P05/019	P05 712 517
Horeke Road Swamp	P05/020	P05 703 512
Utakura Bush	P05/021	P05 710 500
Waihoanga Bush	P05/023	P05 785 490
Pukewharariki Forest	P05/024	P05 740 460
Guthries Block	P05/025	P05 715 420
Mangatoa Stream Bush	P05/026	P05 769 420
Monument Bush	P05/027	P05 809 435
Waihoanga Road Bush	P05/028	P05 817 459
Reservoir Bush	P05/029	P05 826 457
How Road Bush	P05/030	P05 840 410
Rakautao Bush	P05/031	P05 877 406
Titihuatahu	P05/032	P05 910 430
Ngawha Geothermal Field	P05/033	P05 895 428
Ngawha Swamps	P05/034	P05 885 460
Youngs Kahikatea Remnant	P05/035	P05 873 457
Ngawha Bush	P05/037	P05 878 468
Remuera Settlement Road Remnants	P05/038	P05 863 485
South Omapere Kahikatea Remnant	P05/039	P05 844 491
Waingaruru Stream Swamp	P05/040	P05 900 476
Waitaheke Road Bush	P05/041	P05 902 470
Taumatataraire Stream Bush	P05/042	P05 940 475
Waiaruhe Bush Remnants	P05/043	P05 955 498
Pouerua Cone	P05/044	P05 953 473
Pouerua Bush	P05/045	P05 950 460
Lake Owhareiti and Jacks Lake	P05/046	P05 960 455
Ngawhitu Bush	P05/047	P05 955 440
Kahutoto Stream Remnant	P05/050	P05 970 497
Puketotara/Patukauwae/Te Keene Str. Swamp	P05/064	P05 978 509
Waikaramu Road Bush	P05/066	P05 915 510
Waimate Broadleaf Remnants	P05/067	P05 904 524
Waikuku Road Bush	P05/068	P05 885 525
Bullman Road Broadleaf Remnants	P05/069	P05 858 517
Lake Omapere Swamp Forest Remnant	P05/070	P05 845 511
Wehirua Road Bush	P05/071	P05 846 536
Hui te Werawera Stream Bush	P05/073	P05 880 560
D Cooks Bush	P05/074	P05 925 567
Atkins/Ohaio Bush	P05/075	P05 936 560
Tauanui Volcanic Lake and Environs	P06/007	P06 890 330
Tauanui Volcanic Broadleaf Remnant	P06/008	P06 891 346
Punakitere Valley Swamp Forest	P06/010	P06 882 368
Kaipeha Swamp	P06/018	P06 780 340
Punakitere/Ninihi Road Bush	P06/019	P06 753 350
Korowhata Stream Pond	P06/080	P06 828 371
Mangatoa/Punakitere Riverine	P06/086	P06 730 378
Tautoro Wetland	P06/088	P06 868 352
Whakaruangangana Gumfield	P06/089	P06 800 395
Karakamatamata Scenic Reserve	P06/091	P06 724 390

HOREKE ROAD EAST BUSH

Survey no.	O05/076
Survey date	24 May 1994
Grid reference	O05 685 435
Area	292.6 ha (forest 194.6 ha; shrubland 98 ha)
Altitude	20-245 m asl

Ecological unit

- (a) Manuka-totara-tanekaha shrubland on hillslope (c. 30%)
- (b) Kahikatea-taraire forest on hillslope (c. 10%)
- (c) Puriri-karaka-kowhai forest on rock outcrop (c. 5%)
- (d) Nikau-kahikatea-taraire forest on hillslope (c. 20%)
- (e) Puriri-totara-kahikatea forest on hillslope (c. 25%)
- (f) Kahikatea forest on hillslope (c. 5%)
- (g) Manuka shrubland on hillslope (5%)

Landform/geology

Steeply dissected hill country underlain by Tangihua Complex igneous rocks in the north with the remainder in Mangakahia Complex sandstone and mudstone.

Vegetation

A large secondary and heavily cutover forest mosaic which is linked by plantation forestry to the large Pukewharariki block (P05/024).

Type (a) Manuka-totara-tanekaha shrubland to six metres contains frequent kauri and *Hakea* sp. with occasional rimu, cabbage tree and mamaku. Towai is occasional to frequent.

NB Approximately 15 ha of this type was cleared in 1997.

Type (b) Kahikatea-taraire forest includes frequent manuka, puriri, towai and rewarewa with occasional rimu and northern rata.

Type (c) Puriri-karaka-kowhai forest occurs at O05 694 436.

Type (d) Nikau-kahikatea-taraire forest includes puriri, manuka and totara with occasional pukatea, northern rata and rewarewa.

Type (e) Puriri-totara-kahikatea forest includes rewarewa with occasional pukatea, northern rata and rimu.

Type (f) Kahikatea forest - tall secondary forest occurring on the south east corner, with frequent taraire, pukatea and totara and occasional titoki, rimu and kohekohe.

Type (g) Manuka shrubland - occurs on the southern tip, with occasional cabbage tree, totara and gorse.

Fauna

NI brown kiwi (Category A threatened species), while not confirmed within this site, are known to be present in contiguous forest to the north-east and it is likely that they occur here also.

Significance

The large puriri component may be important as a seasonal food source to kukupa which, in other parts of Northland, are known to target puriri fruit in the summer months.

Figure 3. Horeke Road East Bush, O05/076

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

The site contains several vegetation types not well-represented in the Ecological District. It is a representative site for types (a), being a large area of dense and vigorous regeneration, and (e), also by far the largest area of its type; the only site in the Ecological District of types (c) and (d); and one of the largest sites for type (f).

An upper catchment/riparian protection function is implied, as well as a refuge function for forest species during harvest of adjoining pines.

OMAO BUSH

Survey no.	O05/077
Survey date	24 May 1994
Grid reference	O05 680 415
Area	52.3 ha (forest 25.3 ha; shrubland 27 ha)
Altitude	20–134 m asl

Ecological unit

- (a) Towai-taraire forest on hillslope (40%)
- (b) Kahikatea-totara-manuka forest on hillslope (40%)
- (c) Manuka shrubland on hillslope (20%)

Landform/geology

Occurs on a Kerikeri basalt flow remnant including talus slope and ridge crest merging with Mangakahia Complex sandstone on the lower hillslopes.

Vegetation

Secondary and cutover forest remnant with peripheral shrubland.

Type (a) - Towai-taraire forest with frequent totara, kanuka, puriri, rewarewa with occasional pukatea, rimu and northern rata.

Type (b) - Kahikatea-totara-manuka forest includes frequent tanekaha with occasional rimu.

Type (c) - Manuka shrubland - a regenerating area with locally common secondary kahikatea, gorse, tanekaha, and bracken with frequent *Hakea* sp. Also present are cabbage tree, pampas, and occasional matai, small-leaved milk tree, Smith's tree fern, *Coprosma rigida* and *Coprosma rotundifolia*.

Fauna

Kauri snail (Category C threatened species).

Significance

Presence of kauri snail.

The assemblage of plant species within the regenerating manuka is of botanical interest due to the presence of Smith's tree fern, usually found at higher altitudes and in wetter areas of Northland, and three species of divaricating shrubs of scattered distribution in Northland.

Part of a stepping stone linkage, which exists between the large forest blocks of Waima and Pukewharariki. A portion of the site buffers a watercourse.

Figure 4. Omao Bush, O05/077

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

RURUNGA STREAM FOREST

Survey no.	O05/078
Survey date	24 May 1994
Grid reference	O05 665 419
Area	46 ha (forest 36.2 ha; shrubland 7.8 ha, wetland 2 ha)
Altitude	<20 m asl

Ecological unit

- (a) Kanuka-kowhai forest on alluvium (35%)
- (b) Manuka/kanuka-totara forest on hillslope (c. 60%)
- (c) Raupo reedland in swamp (5%)

Landform/geology

Two small forest and wetland remnants separated only by Moehau Road. The larger of the two occurs on rolling hill country underlain by Mangakahia Complex sandstone.

Vegetation

- (a) Kanuka-kowhai forest

The alluvial riparian forest is suffering the effects of stock grazing but retains areas of relative intactness. Associated species here include kahikatea, *Muehlenbeckia australis* with occasional titoki, NZ passion flower, flax, cabbage tree and lacebark.

- (b) Manuka/kanuka-totara forest

Secondary forest adjoining the wetland contains frequent tanekaha and kahikatea.

- (c) A small (c. 3 ha) raupo dominant wetland borders Horeke Road. Other species associated with the wetland include cabbage tree, nikau, manuka and occasional kahikatea, mapou and *Coprosma propinqua*.

Fauna

NI fernbird (regionally significant) is present within the freshwater wetland.

Significance

Includes representation of two uncommon and declining habitat types - those of mineralised freshwater wetlands and riparian alluvial forest. It is the only site in the Ecological District for type (a) and a representative example of type (c).

Presence of fernbird.

A riparian protection function is implied.

Figure 5. Rurunga Stream Forest, O05/078
Each grid is 1000 m × 1000 m and equals 100 ha.
s = shrubland; f = forest; w = wetland.

OTAUTU STREAM HEADWATERS

Survey no.	O05/079
Survey date	24 May 1994
Grid reference	O05 655 435
Area	166.8 ha (forest 105.6 ha; shrubland 61.2 ha)
Altitude	<20 m-120 m asl

Ecological unit

- (a) Taraire-puriri forest on hillslope (60%)
- (b) Manuka/kanuka-totara forest on hillslope (25%)
- (c) Manuka/kanuka-towai forest on hillslope (15%)

Landform/geology

Dissected hill country underlain by Mangakahia Complex sandstone.

Vegetation

A secondary and cutover forest remnant. Associated canopy species include:

Type (a) Taraire-puriri forest - towai, rewarewa, kahikatea, nikau with occasional rimu, northern rata, pukatea, kawaka, miro, tawa, totara and kohekohe.

Type (b) Manuka/kanuka-totara - towai, tanekaha and occasional puriri.

Type (c) Manuka/kanuka-towai forest - emergent rimu and kahikatea with occasional tawa, totara and emergent kauri and northern rata.

Fauna

Kukupu (Category B threatened species).

Significance

Habitat for kukupu.

The dominant forest type (taraire-puriri) is known to be a preferred kukupu feeding habitat type, able to retain pigeons year-round. It is the largest area of taraire-puriri forest in the Ecological District on Mangakahia sandstone and this type exhibits a wide diversity of canopy species.

Type (c) is one of only three examples of its type in the Ecological District and has the most diverse canopy.

The site exhibits a substantial emergent element, now uncommon in the Ecological District.

An upper catchment/riparian protection and refuge function during the harvest of adjoining pines is implied.

Figure 6. Otautu Stream Headwaters, O05/079
Each grid is 1000 m × 1000 m and equals 100 ha.
s = shrubland; f = forest.

WAIRERE STREAM FOREST MOSAIC

Survey no.	O05/080
Survey date	19 May 1994
Grid reference	O05 660 460
Area	314.3 ha (forest 170 ha; shrubland 144.3 ha)
Altitude	20–190 m asl

Ecological unit

- (a) Manuka/kanuka shrubland on hillslope (30%)
- (b) Towai-tanekaha forest on hillslope (5%)
- (c) Manuka/kanuka-tanekaha forest on hillslope (20%)
- (d) Kanuka-taraire forest on hillslope (10%)
- (e) Manuka/kanuka-towai forest on hillslope (5%)
- (f) Towai-taraire forest on hillslope (30%)

Landform/geology

Underlain by predominantly dissected sandstone hill country with Kerikeri volcanic basalt remnants and basalt talus at the northern end. Mangakahia Complex siliceous mudstone is also present in the Okakari Stream valley.

Vegetation

A large cutover and secondary forest remnant, exhibiting a mosaic of vegetation types linked together with shrubland.

Associated canopy species include:

Type (a) Manuka/kanuka shrubland - occasional gorse and mingimingi.

Type (b) Towai-tanekaha forest - kanuka, taraire, emergent rimu and occasional emergent northern rata and kauri.

Type (c) Manuka/kanuka-tanekaha - totara, towai and occasional whau.

Type (d) Kanuka-taraire forest - tanekaha, towai, rewarewa with occasional totara, nikau, puriri, northern rata and kawaka. Occurs at O05 653 457.

Type (e) Manuka/kanuka-towai forest - rewarewa and kahikatea.

Type (f) Towai-taraire forest - rewarewa, totara, tanekaha, northern rata with occasional kanuka, kauri, kawaka, kahikatea, rimu, miro and puriri. Occurs at O05 661 456.

Significant flora

Kawaka and whau (sparse distributions in Northland).

Fauna

NI brown kiwi (Category A threatened species) (P. Miller 1992).

Kukupu (Category B threatened species).

Significance

The largest remaining portion of a once-extensive shrubland/secondary forest mosaic which extended from the large Pukewharariki Forest tract in the east, to Pukewhao/Horeke in the west. This remnant is still linked to Pukewharariki and other small remnants by plantation forest and is well placed to perform a significant refuge function during logging. An upper catchment/riparian protection function is implied.

Figure 7. Wairere Stream Forest Mosaic, O05/080

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Habitat for kukupa and kiwi.

An important representative site, with types (c) and (d) being one of only two sites within the Ecological District, and types (b) and (e), each being one of only three examples; also a representative site for types (a) and (f), the latter being a large area exhibiting a diversity of canopy species.

A large emergent rata component, uncommon in Northland, exists in the Okarari catchment.

Two regionally significant plant species present.

WHITECLIFFS

Survey no.	O05/081
Survey date	24 May 1994
Grid reference	O05 690 470
Area	69.9 ha (forest 53.3 ha; shrubland 16.6 ha)
Altitude	180–220 m asl

Ecological unit

(a) Manuka/kanuka-towai-kauri forest on hillslope

Landform/geology

Dissected hill country underlain by Mangakahia Complex sandstone.

Figure 8. Whitecliffs, O05/081

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Vegetation

Two closely associated remnant forest areas which, until recently, were linked. However, the 80 ha area identified as a SSBI in 1978 has partially been converted to *Pinus radiata*, effectively splitting the habitat in two.

Associated canopy species include: puriri, tanekaha and emergent northern rata.

Fauna

NI brown kiwi (Category A threatened species) were present in 1978 and it is likely that they are still present.

Significance

The area is linked by plantation forest to the large Pukewharariki block to the east and to other small remnants to the west.

It is the only example of this vegetation type in the Ecological District.

An upper catchment/riparian protection and refuge function during logging of adjoining pines is implied.

Habitat for NI brown kiwi.

WHITECLIFFS LTD BUSH

Survey no.	O05/082
Survey date	19 May 1994
Grid reference	O05 670 487
Area	51.4 ha
Altitude	100-220 m asl

Ecological unit

(a) Kanuka-tanekaha-towai forest on hillslope (80%)

(b) Totara-taraire-puriri forest on hillslope (20%)

Landform/geology

Underlain by Kerikeri volcanic basalt remnant forming the upper slopes and Mangakahia Complex sandstone with some basalt talus downslope.

Figure 9. Whitecliffs Ltd Bush, O05/082

Each grid is 1000 m × 1000 m and equals 100 ha. f = forest.

Vegetation

Secondary and cutover forest on a steep north face. Associated canopy species include:

Type (a) Kanuka-tanekaha-towai forest - totara, rimu, kahikatea and rewarewa with occasional emergent northern rata.

Type (b) Totara-taraire-puriri forest - rewarewa with emergent northern rata.

Fauna

Both kukupa (Category B threatened species) and NI brown kiwi (Category A threatened species) have been recorded from within this forest, as well as common forest birds.

Significance

Contains a considerable emergent northern rata element, which is still generally in good health, an uncommon situation in Northland.

It is the only example recorded in the Ecological District of type (a).

Habitat for kukupa and kiwi.

Provides upper catchment protection and refuge function for kiwi during logging operations in the adjacent production forest.

PUKEWHAO FOREST MOSAIC

Survey no.	O05/083
Survey date	19 May 1994
Grid reference	O05 650 485
Area	238.7 ha (forest 133.2 ha; shrubland 105.5 ha)
Altitude	0-215 m asl

Ecological unit

- (a) Manuka/kanuka shrubland on hillslope (40%)
- (b) Towai-tanekaha forest on hillslope (20%)
- (c) Manuka/kanuka-tanekaha forest on hillslope (40%)

Landform/geology

A Kerikeri volcanic basalt plateau remnant in the vicinity of Pukewhao Trig with highly dissected Mangakahia Complex siliceous mudstone hill country to the west and north.

Figure 10. Pukewhao Forest Mosaic, O05/083

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Vegetation

A secondary forest/shrubland mosaic. Associated canopy species include:

Type (a) Manuka/kanuka shrubland - occasional gorse and mingimingi.

Type (b) Towai-tanekaha forest - kanuka, taraire and emergent rimu with occasional emergent northern rata and kauri.

Type (c) Manuka/kanuka-tanekaha forest - totara and towai with occasional whau.

Significant flora

Whau, an uncommon plant with limited distribution in Northland.

Fauna

Not surveyed.

Significance

The site has coastal riparian values as it adjoins the Wairere River estuary and the Hokianga Harbour proper. This coastal element is indicated by the presence of whau (regionally significant).

An upper catchment/riparian protection function is implied.

It is one of only two sites within the Ecological District of type (c), and one of only three sites of type (b).

CARRS/WAIMAHE STREAM BUSH

Survey no.	O05/084
Survey date	25 May 1994
Grid reference	O05 625 465
Area	128.5 ha
Altitude	0-160 m asl

Ecological unit

(a) Taraire-totara-kauri-tanekaha forest on hillslope (20%)

(b) Kanuka-totara-tanekaha forest on hillslope (15%)

(c) Kanuka-totara-taraire forest on hillslope (15%)

(d) Manuka shrubland on hillslope (45%)

(e) Kahikatea forest on alluvium (5%)

Landform/geology

On dissected hill country underlain by Mangakahia Complex sandstone.

Vegetation

Cutover and secondary forest remnant with peripheral shrubland. *Pinus radiata* plantation forest is being planted adjoining these blocks which will provide a link between these and other remnant forests between Horeke and Moehau.

Types (a) and (b) occur in the small eastern block.

Types (c), (d) and (e) occur in the larger western block.

Type (a) Taraire-totara-kauri-tanekaha forest - puriri, kanuka, rewarewa and emergent kahikatea with occasional emergent rimu, miro and northern rata.

Type (b) Kanuka-totara-tanekaha forest - occasional puriri, rewarewa, towai and emergent rimu and northern rata (also present in the western block).

Type (c) Kanuka-totara-taraire forest - towai, rewarewa, tanekaha and emergent rimu and kahikatea with occasional tawa and emergent kauri and northern rata.

Type (d) Manuka shrubland - occasional tanekaha.

Type (e) Kahikatea forest - totara and kowhai. Occurs on the flats adjoining the Perunui River.

Fauna

NI brown kiwi (Category A threatened species) and kauri snail (Category C threatened species) reported (1994).

Significance

This site contains the only examples in the Ecological District of types (a) and (c). Type (e), kahikatea forest on alluvium, is an uncommon vegetation type in the Ecological District and Region.

Contains a considerable emergent element, an uncommon feature in the Ecological District.

Habitat for two threatened species.

Some riparian protection values are implied.

Figure 11. Carrs/Waimahe Stream Bush, O05/084

Each grid is 1000 m × 1000 m and equals 100 ha. f = forest.

MOTUKIORE BUSH ASSOCIATION

Survey no.	O05/085
Survey date	25 May 1994
Grid reference	O05 620 450
Area	420 ha (forest 166 ha; shrubland 250 ha; wetland 4 ha)
Altitude	20–183 m asl

Ecological unit

- (a) Kanuka-totara-tanekaha forest on hillslope
- (b) Taraire-kanuka forest on hillslope
- (c) Taraire-totara-kahikatea forest on hillslope
- (d) Manuka/kanuka-mahoe shrubland on hillslope
- (e) Manuka/kanuka shrubland on hillslope
- (f) Raupo-*Calystegia* sp. association in swamp
- (g) Gorse scrub on hillslope

Landform/geology

The total area constitutes a large remnant mosaic on dissected hill country underlain by Mangakahia Complex sandstone with small freshwater wetlands in some valleys particularly the Waiwhao Stream.

Vegetation

Several small areas of remnant cutover and secondary forest linked by fire induced shrubland tending to the ridges. Associated canopy species include:

Type (a) Kanuka-totara-tanekaha forest - emergent rimu with occasional puriri, rewarewa and emergent kahikatea.

Type (b) Taraire-kanuka forest - totara, puriri, rewarewa, nikau with occasional pukatea, tawa, titoki and northern rata.

Type (c) Taraire-totara-kahikatea forest - tanekaha, towai, kanuka, rewarewa, emergent rimu and occasional, pukatea, kawaka, miro, puriri, tawa, titoki and emergent kauri.

Type (d) Manuka/kanuka-mahoe shrubland - kowhai, cabbage tree, lacebark, gorse and occasional nikau.

Type (e) Manuka/kanuka shrubland - to eight metres tall with scattered totara and kahikatea

Type (f) Raupo-*Convolvulus* wetland

Type (g) Gorse scrub - frequent manuka and occasional pampas.

This site is part of a larger area of contiguous vegetation, much of which comprises gorse and tobacco weed. Only that shrubland and scrub providing a direct linking or buffering function has been identified, but the additional scrubland may be of value and may harbour kiwi.

Fauna

NI brown kiwi (Category A threatened species), kukupa (Category B threatened species). The small swamp rail, the spotless crane, is present in high numbers within the wetland (regionally significant).

Figure 12. Motukiore Bush Association, O05/085

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest; w = wetland.

Significance

Large size and contains representation of an uncommon ecosystem - fertile freshwater wetlands.

Type (b) is represented at only two sites in the Ecological District, and type (c) at only four sites. At this site type (c) exhibits a diversity of other species present.

A representative site of type (d) which is not common in Northland and not represented in the protected areas network.

Habitat for threatened and regionally significant fauna.

A riparian protection function is implied.

MARAEROA SWAMPS

Survey no.	O05/086
Survey date	2 June 1994
Grid reference	O05 685 508
Area	6.5 ha
Altitude	< 5 m asl

Ecological unit

- (a) Raupo reedland in swamp
- (b) *Apodasmia* sedgeland in swamp
- (c) Kahikatea-kanuka forest on alluvium

Landform/geology

Alluvial and estuarine deposits.

Vegetation

This site comprises two small remnant wetlands within the Lower Utakura River valley (a third wetland also identified in 1978 and registered as a SSBI has since been drained, reducing the total area by c. 9 hectares). They do not appear to be grazed. Exotic shrubland borders both, but the wetlands are not currently under threat from weeds.

Figure 13. Maraeroa Swamps, O05/086
Each grid is 1000 m × 1000 m and equals 100 ha.
w = wetland.

Associated species include:

Type (a) Raupo reedland - occasional flax.

Type (b) *Apodasmia* sedgeland - raupo and occasional cabbage tree.

Type (c) Kahikatea-kanuka forest - pukatea, cabbage tree and occasional swamp maire.

Fauna

Spotless crane (regionally significant).

Significance

Representative of two rare and diminishing ecosystems - mineralised freshwater wetlands (type (a)) and alluvial swamp forest. It is the only site in the Ecological District of types (b) and (c).

Habitat for spotless crane, a regionally significant species.

MOEHAU WETLAND AND FOREST REMNANT

Survey no.	O05/088
Survey date	2 August 1994
Grid reference	O05 645 410
Area	120.2 ha (forest 59.8 ha; shrubland 12.6 ha; swamp shrubland 19.8 ha; swamp forest 29 ha)
Altitude	0-155 m asl

Ecological unit

(a) Kauri-tanekaha forest on hillslope (10%)

(b) Towai forest on hillslope (30%)

(c) *Coprosma propinqua*-*Coprosma rigida*-*Bolboschoenus* swamp shrubland on alluvium (10%)

(d) Kowhai-*Coprosma propinqua*-*Gabnia* swamp forest on alluvium (20%)

(e) Manuka shrubland on hillslope (30%)

Landform/geology

Estuarine deposits and dissected hill country underlain by Mangakahia Complex sandstone.

Vegetation

Approximately 50% of this site is secondary and cutover forest. The remainder is in modified brackish marsh, alluvial shrubland and alluvial swamp forest remnant.

Canopy species associated with the forest types include:

Type (a) Kauri-tanekaha forest - manuka and taraire.

Type (b) Towai forest - occasional totara, hinau, rimu, tawa, puriri and taraire.

Type (c) *Coprosma propinqua*-*Coprosma rigida*-*Bolboschoenus* swamp shrubland - *Carex* sp. and *Cyperus* sp. with occasional swamp maire, cabbage tree, kahikatea, putaputaweta and *Muehlenbeckia australis*.

Figure 14. Moehau Wetland and Forest Remnant, O05/088

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest; w = wetland.

Type (d) Kowhai-*Coprosma propinqua*-*Gabnia* swamp forest - pampas and *Cyperus ustulatus* with occasional kahikatea, *Muehlenbeckia complexa*, manuka, broom and flax.

Fauna

Faunal values are largely unknown, but include common forest birds.

Significance

Despite being modified by stopbanks and internal drainage, which has encouraged a significant invasive weed problem (pampas and gorse), the site remains one of the few within this Ecological District which exhibit altitudinal gradients from hill country (155 m asl) through to the coastal marine area.

It also contains two wetland vegetation types which are rare in Northland - *Coprosma propinqua*-*Coprosma rigida*-*Bolboschoenus* swamp shrubland and Kowhai-*Coprosma propinqua*-*Gabnia* swamp forest on alluvium (20%) and which are the only examples of their type in the Ecological District.

TAHEKE RIVER WETLANDS AND RIVERINE FOREST

Survey no.	O06/005
Survey date	2 May 1994
Grid reference	O06 683 395
Area	24.5 ha approximately (9.5 ha wetland; 15 ha forest)
Altitude	< 20 m asl

Ecological unit

- (a) Raupo reedland in swamp
- (b) Manuka shrubland on alluvium
- (c) Manuka/kanuka-totara forest on alluvium and hillslope

Figure 15. Taheke River Wetlands and Riverine Forest, O06/005

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest; w = wetland.

Landform/geology

Two small fertile freshwater wetlands about one kilometre apart adjacent to the lower Taheke River and situated on an irregular surfaced Taheke basalt flow.

Vegetation

The wetlands include as associated species occasional cabbage tree and flax, with the manuka dominant periphery being shared with totara and occasional wattle, tanekaha and crack willow.

The riverine forest adjoins the northern wetland and comprises a narrow strip about a kilometre in length, grading into low manuka and discontinuous vegetation.

It contains frequent taraire and kahikatea, as well as karaka, puriri, pukatea, rewarewa, rimu, matai, kauri, black wattle, Chinese privet, kowhai, nikau, kiekie, cabbage tree, with flax along the river margin.

Fauna

Not surveyed.

Significance

Sites such as these where a freshwater wetland abuts a saline or brackish vegetation type and riverine forest have been reduced to near extinction within the Hokianga Harbour.

Represents a rare and diminishing habitat type, both within this Ecological District and nationally.

ARATORO STREAM BUSH

Survey no.	P05/001
Survey date	27 May 1994
Grid reference	P05 810 580
Area	664.7 ha (forest 257.7 ha; shrubland 407)
Altitude	80–314 m asl

Ecological unit

- (a) Manuka shrubland on plateau (30%)
- (b) Kanuka-towai forest on hillslope (25%)
- (c) Towai forest on hillslope (5%)
- (d) Taraire-puriri forest on hillslope (20%)
- (e) Manuka-totara-tanekaha forest on hillslope (20%)

Landform/geology

The site has a very complex geomorphology which includes Kerikeri volcanics basalt flow and talus on the escarpments and hillslopes to the north of Aratoro Stream, Akarana supergroup massive to flaggy calcareous mudstone with sandstone beds in the Porotekoitiamo Stream area, and Mangakahia Complex sandstone and mudstone lithofacies north and south of Aratoro Stream with siliceous mudstone in the valley. The deeply incised valleys and intervening ridges have been cut into the sedimentary rocks of these latter groups.

Figure 16. Aratoro Stream Bush, P05/001

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Vegetation

A large area of shrubland/gumland and secondary forest on the edge of a Kerikeri basalt plateau remnant with small cutover forest pockets within deeply incised valleys forming a large forest outlier to Puketi Forest.

Associated species include:

Type (a) Manuka dominated gumland with frequent mingimingi, *Dracophyllum* sp., umbrella fern, kumerahou, *Schoenus* sp. and occasional *Hakea* sp. within gum digging induced shrubland.

Type (b) Kanuka-towai forest - kahikatea, tanekaha, totara, taraire, mamaku and rewarewa are frequent with occasional rimu, puriri, titoki, kauri and northern rata.

Type (c) Towai forest - rewarewa, mamaku tree fern with occasional manuka, rimu, puriri and taraire.

Type (d) Taraire-puriri forest - kahikatea, towai, rewarewa, nikau, hinau, tanekaha and totara with occasional kauri, kawaka, miro, northern rata, kohekohe and tawa.

Type (e) Manuka-totara-tanekaha forest - occasional rimu and kahikatea.

Significant flora

At least 18 species of orchid have been recorded including *Caladenia atradenia* (Naturally Uncommon - Sparse).

Fauna

High numbers of NI fernbird (regionally significant) are present within the gumland.

NI brown kiwi (Category A threatened species), 4-5 pairs present in the Puketi Scenic Reserve in 1997 (I. Wilson pers. comm.) and extend into the older growth forest of the valleys.

Kukupa (Category B threatened species), pied tit (regionally significant).

Australasian bittern (Category O threatened species) (SSBI 1979) and brown teal (Category C threatened species) (1987) also recorded within the site.

Significance

An important representative site with a diversity of rock and vegetation types, and containing representation of a rare and diminishing vegetation type - gumland. It is the only example of type (b) in the Ecological District and one of only 2 examples of type (a).

The gumland vegetation of the plateau is notable for its diversity of native orchids (> 10 species).

Habitat for several threatened and regionally significant flora and fauna.

Brown teal formerly present, and as a released population is located to the north of this site, could re-establish here.

Its large size contributes to catchment/riparian protection.

Aratoro is a soil site of national importance:

- (i) contains a moderate range of little-disturbed soil-native vegetation associations,
- (ii) is an excellent example of a leaching sequence of brown loams,
- (iii) is the only example of Ruatangata soils in national and regional inventory,
- (iv) is a good example of uncommon Hihi, Waiotu, Taumata-Okaihau soils (Arand et al. 1993).

Approximately 463 ha of this forest block are administered by the Department of Conservation, including 54 ha of scenic reserve and 28 ha of stewardship land comprising the Puketi Scenic Reserve in the north of the site. To the south of this reserve approximately 200 ha of freehold land separates it from the 380 ha Aratoro stewardship block.

SCOTTS ROAD BUSH

Survey no.	P05/002
Survey date	27 May 1994
Grid reference	P05 830 570
Area	200 ha
Altitude	140–280 m asl

Ecological unit

- (a) Totara-kahikatea-taraire forest on hillslope
- (b) Totara-kahikatea-towai forest on alluvial plain and gentle hillslope (Kingett-Mitchell)
- (c) Towai-kanuka-rewarewa forest on hillslope
- (d) Towai-totara forest on hillslope
- (e) Towai-tawa forest on gully sides
- (f) Towai-taraire forest on hillslope
- (g) Secondary totara forest on volcanic flats and gentle hillslope (<5%)
- (h) Kauri-rimu forest on volcanic flat and hillslope (<1%)
- (i) Kahikatea forest on volcanic flats (c. 5%)

Figure 17. Scotts Road Bush, P05/002

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Landform/geology

Valley system is underlain by Mangakahia Complex micaceous sandstone and siliceous mudstone deeply incised into the plateau of Kerikeri volcanic basalt lava and talus escarpments.

Vegetation

A cutover and secondary forest remnant within the upper Whakanekeneke River valley. Associated canopy species include:

Type (a) Totara-kahikatea-taraire forest - puriri, rewarewa, northern rata, nikau, towai are frequent, and occasional matai, rimu, tawa, pukatea, tarata and kohuhu.

Type (b) Totara-kahikatea-towai forest with puriri and locally common mamaku occurs in the western part of the site.

Type (c) Towai-kanuka-rewarewa forest with taraire, tanekaha and occasional kahikatea, rimu, tawa, puriri and emergent kauri and northern rata.

Type (d) Towai-totara forest with taraire, kahikatea, tanekaha and occasional rewarewa, puriri, hinau and emergent kauri.

Type (e) Towai-tawa forest with frequent taraire and occasional emergent Hall's totara and northern rata.

In the subcanopy, sapling Hall's totara, tawa, mamangi, kanono, wheki and supplejack are common and locally abundant. Hen and chicken fern occurs frequently. Kidney fern and the filmy fern *Hymenophyllum demissum* are abundant at ground level.

Type (f) Towai-taraire forest with puriri and totara comprises a small area at the southern end of the site with an understorey of kohekohe, mamangi, mahoe and pigeonwood.

Type (g) Secondary totara forest occurs on the margins in the southeastern corner where *Selaginella* is invading.

Type (h) Kauri-rimu forest with tanekaha. Only a vestige remains on the margin at P05 833 533 of what was once a more extensive vegetation on the flats, judging from isolated trees in paddocks nearby.

Type (i) Kahikatea forest with occasional taraire, totara and puriri.

Where stock have penetrated, particularly on margins, there is little or no understorey.

Fauna

Kukupa (Category B threatened species) and NI brown kiwi (Category A threatened species) have been recorded at this site.

Significance

Contains representation of several uncommon associations - being the only sites in the Ecological District of types (c), (e) and (h), and representative site for types (a), (b), (d) and (i).

Habitat for threatened fauna.

The forest is important for upper catchment erosion control and riparian function maintaining downstream water quality and providing suitable instream habitat for a range of native fish and invertebrates in the Whakanekeneke River, which is regionally significant because of the extensive area of indigenous vegetation remaining in its upper catchments.

The site includes approximately 10 ha of Crown land, part of the Aratoro stewardship area.

OTAMARANGI STREAM BUSH

Survey no.	P05/003
Survey date	27 May 1994
Grid reference	P05 830 545
Area	30.2 ha
Altitude	150-270 m asl

Ecological unit

- (a) Taraire-puriri-towai forest on hillslope
- (b) Towai-kahikatea forest on hillslope and gully (Kingett-Mitchell)
- (c) Kahikatea-totara forest on hillslope

Landform/geology

Within an incised valley cut into Te Kuiti Group glauconitic sandstone and Mangakahia Complex micaceous sandstone and mudstone.

Vegetation

Secondary and cutover forest remnant.

Figure 18. Otamarangi Stream Bush, P05/003
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Type (a) Taraire-puriri-towai forest with rewarewa, pukatea and kahikatea constitutes more than 50% of the area.

Type (b) Towai-kahikatea forest with puriri, totara and taraire with occasional rewarewa and pole rimu. Nikau and mamaku occur in the sub-canopy.

Type (c) Kahikatea-totara forest with puriri, taraire and occasional rimu, kauri and northern rata.

Fauna

Kukupu (Category B threatened species).

Significance

Habitat for kukupu.

Type (a) is the only example of its type in the Ecological District.

Its situation is very similar to Scotts Road Bush and it could be considered as part of that entity, performing the same function upon the same river system. Both of these sites are also likely to perform a linking role between the large forests of Puketi to the west and Opuia to the east.

WHAKANENEKE RIVER BUSH

Survey no.	P05/005
Survey date	2 June 1994
Grid reference	P06 805 545
Area	140 ha total
Altitude	40-200 m asl

Ecological unit

- (a) Taraire forest on hillslope
- (b) Puriri-totara-taraire forest on gentle hillslopes (Kingett-Mitchell)
- (c) Totara-kahikatea-towai forest on plains and gentle hillslopes
- (d) Totara-kahikatea forest on hillslope/alluvium

Landform/geology

A closely grouped collection of ten secondary forest remnants on a range of geomorphic bases including valley alluvium, Te Kuiti Group bioclastic sand, limestone bluffs, dissected hillslopes in Mangakahia Complex sandstones and mudstones, Kerikeri volcanic basalt plateau remnant and associated basalt talus slopes.

Vegetation

Although unfenced, many of these fragments are linked by scattered trees and narrow riparian strips. Associated canopy species include:

Type (a) Taraire forest with kahikatea, totara, puriri and nikau and occasional pukatea, rewarewa, kowhai, kohekohe, *Griselinia lucida* and northern rata.

Type (b) Puriri-totara-taraire forest with kahikatea.

Type (c) Totara-kahikatea-towai forest with puriri and locally common mamaku.

Type (d) Totara-kahikatea forest with occasional pukatea, kowhai, matai, puriri and titoki.

Figure 19. Whakanekeneke River Bush, P05/005

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Fauna

Kukupā (Category B threatened species), NI brown kiwi (Category A threatened species) reported (B. King 1997).

Significance

Habitat for threatened fauna.

Representative of association of landform and vegetation types (a) and (d), both of which exhibit a diversity of canopy species.

The collective size of the remnants and buffering of the Whakanekeneke River and its tributaries, contribute to its overall significance.

LAKE OMAPERE AND ENVIRONS

Survey no.	P05/006
Survey date	25 May 1994
Grid reference	P05 830 500
Area	1288.6 ha (forest 14.3; shrubland 6.2 ha; swamp shrubland 58.1 ha (cleared 1997); lake 1210 ha)
Altitude	238 m asl

Ecological unit

- (a) Open water in lake
- (b) Manuka swamp shrubland in swamp
- (c) Towai-totara forest on lake margin
- (d) Kahikatea forest on lake margin
- (e) *Juncus* rushland on lake margin

Landform/geology

The lake was formed by the damming of a valley by a Kerikeri volcanic lava flow and the lake is mainly encircled by basalt lava with minor low-relief Mangakahia Complex sandstone rocks and areas of alluvium.

Vegetation

The largest freshwater lake in Northland, with a small catchment of 1700 ha, Lake Omapere was described in 1985 by the Northland Catchment Commission as eutrophic with up to two tonnes of phosphate entering it every year from the adjoining catchment, and with possibly as much as 15 tonnes of phosphorus being released in a fairly short time prior to the 1985–86 algal bloom.

It is a shallow lake (maximum depth 1.9 m), in which the algal bloom of 1985–86 coincided with the collapse of weed beds of *Egeria densa* which covered most of the lake.

Silver carp (*Hypophthalmichthys molitrix*) were introduced in 1988–89, and a permeable rock barrier was established at the lake outlet.

The lake remained unvegetated until 1994. *Egeria* has re-established and, at the time of writing, it was again well-established in dense beds over 80% of the lake floor and may revert to an algal dominated state (D. Kokich Northland Regional Council pers. comm. June 2000).

Potamogeton ochreatus and *Chara corallina* occur in open patches between clumps of *Egeria*. In shallow margins, *Glossostigma elatinoides*, *G. cleistanthum*, *Nitella stuartii*, and *Elatine gratioloides* occur adjacent to emergent sedges (Champion & Rowe 1996).

Phytoplankton identified in 1996 included the diatom *Aulacoseira granulata* which was common, with low numbers of other diatoms, green and yellow-green algae. The cyanobacteria *Microcystis* was present in very low numbers.

Very little native vegetation remains either adjoining the lake or within the catchment. Wetland margins have largely been drained, facilitating the fast movement of nutrified runoff into the lake without the benefit of nutrient extraction by the roots of marsh vegetation.

Associated species include:

Type (b) Manuka swamp shrubland with flax and occasional cabbage tree. Cleared in 1997.

Type (c) Towai-totara forest - manuka with occasional kahikatea, rewarewa and cabbage tree.

Figure 20. Lake Omapere and Environs, P05/006

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest; w = wetland.

Type (d) Kahikatea forest - totara with occasional puriri.

Significant flora

This is the only site in Northland for the fern ally *Isoetes* aff. *kirkii* (Critically Endangered - Taxonomically Indeterminate) which is of restricted distribution in the North Island, with this being the only remaining site north of Rotorua. The plant was only recently rediscovered in the lake and appears to be very rare (L. Forester pers. comm. 2000).

Fauna

Black swans are abundant. Other species recorded include paradise shelduck, grey duck, black shag, pukeko, pied stilt, Australasian bittern (Category O threatened species) and NI fernbird (regionally significant species).

Black swan numbers declined from approximately 8000 to 1000 following the algal bloom, and are currently around 3000.

A large colony of black shag (45+) utilise the marginal forest for breeding.

Aquatic fauna includes koura (1997), freshwater mussel in high numbers, common bully, smelt, long-finned eel, short-finned eel, goldfish, mosquitofish and silver carp. At the time of writing, there is a proposal to introduce grass carp (*Ctenopharyngodon idella*) to control the *Egeria*.

Significance

The largest freshwater lake in Northland. It is classified as a moderately well-defined landform of scientific, educational and scenic value, with national importance (Kenny & Hayward 1993).

Types (b) and (e) are the only examples of their types in the Ecological District recorded in this survey.

The only Northland site of a very rare and threatened aquatic plant species.

A strip on the western side of the lake comprising 5.5 ha is administered by the Department of Conservation.

WAIKARAKA STREAM BUSH

Survey no.	P05/007
Survey date	31 May 1994
Grid reference	P05 783 575
Area	51.8 ha (forest 38 ha; shrubland 13.8 ha)
Altitude	40-236 m asl

Ecological unit

- (a) Taraire-towai forest on hillslope (65%)
- (b) Manuka shrubland on hillslope (5%)
- (c) Puriri-taraire forest on bluffs (10%)
- (d) Kahikatea forest on hillslope (20%)

Landform/geology

Moderate to steeply sloping hill country underlain by Te Kuiti Group calcareous mudstone and bioclastic sandy limestone on the bluffs and Akarana Supergroup massive to flaggy calcareous mudstone with sandstone beds.

Vegetation

This site is composed of four closely associated forest remnants. Associated canopy species include:

Type (a) Taraire-towai forest - puriri, rimu, kahikatea, totara with occasional pukatea, rewarewa, hinau and northern rata.

Type (b) Manuka shrubland - occasional towai and mamaku tree fern.

Type (c) Puriri-taraire forest - karaka, totara and occasional kowhai.

Type (d) Kahikatea forest - totara, towai with occasional rimu and taraire.

Figure 20. Waikaraka Stream Bush, P05/007

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Fauna

Kukupu (Category B threatened species).

Significance

Its geological formation is of restricted distribution in Northland, hence all of the associated vegetation types are significant for their representativeness, particularly the puriri-taraire forest on limestone bluffs.

Habitat for threatened species.

This forest remnant is well placed to perform a linking function between the large block of Puketi Forest and the remnant mosaic extending to the east towards Opuia Forest.

A Queen Elizabeth II National Trust covenant protects 20 ha of this site in the vicinity of the limestone bluffs.

WAIHOANGA STREAM FOREST OUTLIER

Survey no.	P05/008
Survey date	31 May 1994
Grid reference	P05 775 585
Area	46.9 ha
Altitude	80–200 m asl

Ecological unit

- (a) Kahikatea forest on hillslope
- (b) Taraire-totara forest on hillslope
- (c) Puriri-kowhai forest on hillslope

Landform/geology

It is underlain by Te Kuiti Group glauconitic sandstone adjacent to the Waipapa horst, Mangakahia Complex micaceous sandstone on the upper slopes and Mangakahia Complex mudstones on the lower slopes.

Vegetation

A small forest outlier of Puketi Forest which lies within the separate Ecological District of Kaikohe. The forest is secondary and/or heavily cutover in nature with high stock and pig numbers occasionally present. Associated canopy species include:

Figure 22. Waiohanga Stream Forest Outlier, P05/008
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Type (a) Totara-kahikatea forest - towai and taraire with occasional rewarewa, rimu, northern rata, pukatea and puriri.

Type (b) Taraire-puriri-kahikatea forest - rewarewa, kowhai, *Griselinia lucida*, kanuka and nikau with occasional emergent rimu and pukatea, matai, northern rata, lacebark, tawa, titoki and tarata.

Fauna

Common forest birds.

Significance

These remnants may play a role in linking the large Puketi Forest to the north with the smaller Pukewharariki Forest to the south.

Representative example of type (b), which exhibits a diversity of other canopy species present.

An upper catchment/riparian protection function is implied.

Figure 23. Donaldsons Road Bush, P05/010

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Totara-kahikatea dominant type (b) has frequent taraire and nikau with occasional rewarewa, kowhai, puriri, rimu, towai, *Griselinia lucida* and pukatea.

The area has a severely grazed understorey.

Fauna

Kukupa (Category B threatened species) and moderate to high numbers of NI brown kiwi (Category A threatened species).

Significance

Habitat for threatened species.

Type (a) is the only example of its type in the Ecological District, and a representative site for type (b).

This site may perform a linking function due to its central position between two large forest blocks.

An upper catchment and riparian protection function is also implied.

OKORO STREAM BUSH

Survey no.	P05/012
Survey date	1 June 1994
Grid reference	P05 735 543
Area	68.9 ha
Altitude	40–200 m asl

Ecological unit

(a) Totara-kahikatea-kanuka forest on hillslope

(b) Totara-taraire-puriri forest on hillslope

Landform/geology

The upper catchment is of Kerikeri volcanics basalt flow remnants with basalt talus downslope underlain by Mangakahia Complex sandstone which extends into the dissected hills downslope.

Vegetation

A moderate-sized secondary forest outlier of a larger forest remnant which lies to the south-west.

Type (a) Totara-kahikatea-kanuka forest with puriri and tanekaha, and occasional northern rata, titoki, *Griselinia lucida*, pukatea, kohuhu and lacebark.

Approximately 5 ha of this type was cleared in 1997.

Type (b) Totara-taraire-puriri forest with tawa, titoki, kahikatea and occasional matai and rewarewa.

Possum and stock browse in both the canopy and the understorey/ground storey is severe.

Fauna

NI brown kiwi (Category A threatened species) reported and kukupa (Category B threatened species) and kauri snail (Category C threatened species) present.

Vegetation

A small secondary forest outlier of Puketi Forest (separate Ecological District), this site's value is greatly enhanced by its close and contiguous proximity to the large block.

Puriri is occasional within type (a) above and taraire, puriri, towai with occasional pukatea, kauri, rimu and northern rata in type (b).

It appears that approximately 20 ha of type (b) has been developed since survey, with the remaining area apparently fenced.

Fauna

Not surveyed but contiguity with Puketi Forest would suggest many faunal values will be shared.

Significance

Its main significance lies in its proximity and contiguity with Puketi Forest.

Type (a) is a representative site for the Ecological District.

Figure 26. Forest Road Bush, P05/013

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Representative site for types (a) and (g).

Type (b) is one of only two examples of a totara-kahikatea forest on alluvium.

Type (d) is one of only four examples in the Ecological District and type (f) - kauri forest, one of only two examples.

Figure 27. Te Toke Stream Shrubland, P05/014
Each grid is 1000 m × 1000 m and equals 100 ha.
s = shrubland; f = forest.

Species associated with type (b) include rimu and mamaku, with occasional emergent kauri and northern rata, towai, lacebark and kohuhu.

Fauna

Common forest birds utilise the site and NI brown kiwi (Category A threatened species) are likely to be present as they are reported from the adjoining Okoro Stream Bush (P05/012).

Significance

Type (a) is one of only four examples and type (b) is the only example of this vegetation type in the Ecological District.

Contiguous with other large forest remnants (P05/012 and P05/014) with a linkage and upper catchment protection function implied.

Likely to be habitat for kiwi.

COOKS ROAD BUSH NO. B

Survey no.	P05/016
Survey date	1 June 1994
Grid reference	P05 743 528
Area	25.3 ha
Altitude	90-200 m asl

Ecological unit

(a) Taraire-puriri forest on hillslope (90%)

(b) Kahikatea-totara forest on hillslope (10%)

Landform/geology

A steeply dissected upper catchment underlain by Mangakahia Complex sandstone.

COOKS AIRSTRIP BLOCK

Survey no.	P05/017
Survey date	1 June 1994
Grid reference	P05 735 520
Area	196.3 ha (forest 88.9 ha; shrubland 107.4 ha)
Altitude	80–270 m asl

Ecological unit

- (a) Manuka-towai-totara forest on hillslope (20%)
- (b) Totara-kahikatea forest on hillslope (20%)
- (c) Towai-taraire forest on hillslope (10%)
- (d) Manuka shrubland on hillslope (30%)
- (e) Kanuka-totara forest on hillslope (15%)
- (f) Tanekaha shrubland on hillslope (<5%)

Landform/geology

Underlain by Kerikeri volcanics and basalt talus on hillslopes and deeply dissected catchments cut into Mangakahia Complex siliceous mudstone.

Vegetation

A moderate sized cutover and secondary forest remnant with extensive adjoining shrubland and small outlier

Associated canopy species:

Type (a) Manuka-towai-totara forest includes tanekaha, kahikatea and rimu, with occasional emergent pukatea, kauri and puriri.

Type (b) Totara-kahikatea forest includes frequent nikau and occasional puriri and pukatea.

Type (c) Towai-taraire forest includes emergent old growth totara, kahikatea and rimu, puriri and tanekaha, with occasional pukatea, nikau, northern rata and matai.

Type (d) Manuka shrubland includes scattered totara, kahikatea and tanekaha. At least 15–20 ha of this has been cleared since the area was originally surveyed, and planted in pines. In the remaining shrubland, totara and tanekaha are locally frequent.

Type (e) Kanuka-totara secondary forest in which karaka is locally frequent and also includes frequent puriri, kahikatea, tanekaha and mamaku with occasional cabbage tree, nikau and mamaku tree fern.

On the upper slopes this type merges into a diverse canopy which is a mosaic of these species together with kahikatea, puriri, taraire and rimu.

(f) Tanekaha shrubland - vigorous secondary growth with frequent manuka/kanuka and totara.

Fauna

Kukupu (Category B threatened species), kauri snail (Category C threatened species) and NI brown kiwi (Category A threatened species). Additional survey, particularly for reptile fauna, is recommended.

PURIRI FARM BUSH

Survey no.	P05/018
Survey date	1 June 1994
Grid reference	P05 795 515
Area	61.8 ha
Altitude	200-250 m asl

Figure 31. Puriri Farm Bush, P05/018

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Figure 32. Okaka Road Wetland, P05/019

Each grid is 1000 m × 1000 m and equals 100 ha.

w = wetland.

Vegetation

Plants associated with type (a) above include *Juncus*, sedges and occasional swamp maire.

Type (b) contains manuka and cabbage tree occurring occasionally in the wetter raupo/*Carex* dominant portion.

Fauna

Not surveyed.

Significance

The only site in the Ecological District for these vegetation types, which are also not well-represented in the Ecological Region and nationally.

Further survey work is recommended to further assess the full significance of this site.

UTAKURA BUSH

Survey no.	P05/021
Survey date	2 June 1994
Grid reference	P05 710 500
Area	174.3 ha (forest 116.2 ha; shrubland 58.1 ha)
Altitude	40–140 m asl

Ecological unit

- (a) Manuka/kanuka-totara-kahikatea forest on hillslope
- (b) Manuka shrubland on hillslope

Landform/geology

Secondary forest and shrubland mosaic of predominantly Mangakahia Complex sandstone with an area of Mangakahia Complex siliceous mudstone near Horeke Road.

Figure 34. Utakura Bush, P05/021

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Figure 35. Waiohanga Bush, P05/023

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Fauna

Kukupā (Category B threatened species) and kauri snail (Category C threatened species). Reported to contain NI brown kiwi (Category A threatened species). NI kaka (Category B threatened species) were reported to DOC in 1994 but probably only utilise it seasonally.

Significance

Habitat for threatened fauna.

The site is significant for its riparian values as it covers a considerable portion of two sub-catchments of the Utakura River. The Imms Rd weir may be limiting fish access to upstream habitat.

It may also play a partial linking role between Pukewharariki and Puketi Forests.

Figure36. Pukewharariki Forest, O05/078

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest; w = wetland.

GUTHRIES BLOCK

Survey no.	P05/025
Survey date	18 May 1994
Grid reference	P05 715 420
Area	255.1 ha
Altitude	<80 m-238 m asl

Ecological unit

- (a) Towai-tanekaha forest on hillslope (50%)
- (b) Kahikatea forest on flats (5%)
- (c) Manuka shrubland on hillslope (20%)
- (d) Taraire forest on hillslope (25%)

Landform/geology

The steeply dissected hill country is underlain predominantly by Mangakahia Complex sandstone with some siliceous mudstone (Ngatuturi) to the north-east.

Vegetation

A large outlier of Pukewharariki Forest which is a mosaic of secondary and cutover forest with peripheral shrubland.

Associated canopy species include:

Type (a) Towai-tanekaha forest - frequent puriri, kohekohe, kauri and tawa, with kauri locally common and occasional totara, manuka, northern rata and rimu.

Type (b) Kahikatea forest - occasional puriri, totara and pukatea

Type (c) Manuka shrubland - frequent tanekaha, totara and towai, providing a narrow link to Pukewharariki (P05 024).

Type (d) Taraire forest - towai, puriri and tanekaha with occasional kohekohe, tawa, nikau and emergent pukatea, kauri, rimu and northern rata.

Fauna

NI brown kiwi (Category A threatened species) are known to be present in moderate densities (P. Miller pers. comm.).

Significance

One of only three examples in the Ecological District of type (a), and representative site for type (c).

The large size and close association with another larger forest block (Pukewharariki) adds to its value.

Habitat for threatened fauna.

An upper catchment/riparian protection function is implied.

This site includes approximately 201 ha of the Mangatoa Stewardship land administered by the Department of Conservation.

MANGATOA STREAM BUSH

Survey no.	P05/026
Survey date	18 May 1994
Grid reference	P05 764 420
Area	71.6 ha
Altitude	100-200 m asl

Figure 38. Mangatoa Stream Bush, P05/026

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Figure 39. Monument Bush, P05/027

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

WAIHOANGA ROAD BUSH

Survey no.	P05/028
Survey date	17 May 1994
Grid reference	P05 817 459
Area	32.2 ha
Altitude	260–300 m asl

Ecological unit

(a) Towai forest on hillslope

Landform/geology

Dissected hill country underlain by Mangakahia Complex sandstone possibly with some basalt talus on the south-eastern side of the valley.

Vegetation

A secondary and cutover forest remnant headwater in the catchment of the Utakura River.

Associated canopy species include frequent puriri, rewarewa and taraire with occasional pukatea, rimu and totara. Kauri is locally common on the ridge, where rimu is also emergent.

Figure 40. Waiohanga Road Bush, P05/028
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Figure 41. Reservoir Bush, P05/029

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Significance

Habitat for threatened fauna and contains a regionally significant plant species. This site includes the 50 ha Kaikohe Scenic Reserve administered by the Department of Conservation, 25 ha of waterworks reserve administered by the Far North District Council, and 5 ha of type (b) protected under a Queen Elizabeth II National Trust covenant.

RAKAUTAO BUSH

Survey no.	P05/031
Survey date	17 May 1994
Grid reference	P05 877 406
Area	368.9 ha (forest 242.3 ha; shrubland 126.6 ha)
Altitude	120–315 m asl

Ecological unit

- (a) Taraire-totara-kanuka forest on hillslope
- (b) Totara-towai-kanuka forest on hillslope
- (c) Manuka-mamangi-towai shrubland on hillslope
- (d) Towai-totara-rewarewa forest on hillslope
- (e) Manuka-*Gleichenia* shrubland on hillslope
- (f) Raupo-*Baumea* association in swamp

Landform/geology

On dissected hill country underlain by Mangakahia Complex siliceous mudstone.

Vegetation

Cutover and secondary forest with shrubland linkages, gumfield and wetland gully floors.

Associated canopy species:

Type (a) Taraire-totara-kanuka forest includes frequent puriri, northern rata and rewarewa with occasional pukatea and rimu.

Type (b) Totara-towai-kanuka forest includes kahikatea and tanekaha with occasional rimu, rewarewa, pukatea and puriri.

Type (c) Manuka-mamangi-towai shrubland contains occasional tanekaha.

Type (d) Towai-totara-rewarewa forest includes taraire, pukatea, tawa and kanuka with occasional kauri, rimu and puriri.

The gumlands of type (e) Manuka-*Gleichenia* shrubland cover about a third of the site and include *Dracophyllum* sp. with occasional *Hakea* sp., kumerahou, mingimingi and hangehange.

In Type (f) Raupo-*Baumea* association, swamp maire can be found associated with the freshwater wetland margin.

Fauna

Supports a high density of NI fernbird (regionally significant species). NI brown kiwi (Category A threatened species), although not recorded within this specific site, are known to be present in low numbers within this forest continuum.

Significance

An important representative site, including a gumland association which has become scarce as a result of land development practices.

It is the only example in the Ecological District for types (a), (b), (c), (d) and (e) and one of only two examples of type (f).

Large native forest enclaves within large pine plantations are important refuge areas for native species during logging.

Habitat for a regionally significant species.

Figure 43. Rakautao Bush, P05/031

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

TITIHUATAHU

Survey no.	P05/032
Survey date	11 May 1994
Grid reference	P05 910 430
Area	988.3 ha (forest 284.1; shrubland 701.2 ha, wetland 2.9 ha)
Altitude	140-283 m asl

Ecological unit

- (a) Towai-kauri forest on hillslope
- (b) Towai-taraire forest on hillslope
- (c) Manuka-cabbage tree forest in valley
- (d) Manuka-*Baumea-Gleichenia* shrubland on hillslope

Figure 44. (above and opposite) Titihuatahu, P05/032

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest; w = wetland.

Landform/geology

The site is largely underlain by Mangakahia Complex siliceous mudstone with a small area of alluvium near the northwestern edge and forms part of the upper catchment of the Waitangi and Kawakawa Rivers.

Vegetation

This site exists as two large mosaics of secondary/cutover forest remnants, often in gullies surrounded by plantation forestry and gum-related shrubland on the ridges and rolling hill country.

Type (a) Kauri emergent over towai includes frequent totara and manuka with occasional tawa, hinau, tanekaha, taraire, miro, rewarewa and northern rata.

Type (b) Towai-taraire forest includes totara, rewarewa and puriri, with occasional tawa, miro, kahikatea, nikau, rimu, pukatea and tanekaha. Occurs at P05 910 410 and P06 917 399.

Type (c) Manuka-cabbage tree forest includes frequent kahikatea.

Type (d) Manuka-*Baumea-Gleichenia* shrubland constitutes about 50% of the site. *Baumea rubiginosa* is co-dominant, with *Dracophyllum* sp., *Leucopogon* sp., *Lycopodiella cernua* and *Pomaderris* sp. Gorse and hakea are local.

Significant flora

Pittosporum pimeleoides ssp. *pimeleoides* (Naturally Uncommon-Sparse) known from an area under protective covenant but may be present throughout the forest in this area. The fern, *Todea barbara* (Vulnerable), and sedge *Baumea complanata* (Declining) are present.

Utricularia delicatula is a bladderwort of restricted distribution.

Fauna

NI brown kiwi (Category A threatened species) are known in low numbers within the forest remnants and probably extend into the shrubland. NI fernbird, a regionally significant species, are present in high numbers throughout the shrublands.

Significance

The gumlands are representative of a habitat type which once covered about one-quarter of the land north of Auckland (Esler & Rumball 1974), but has been reduced by land development practices to a few small remnants, most of which are still under considerable threat of development.

Type (d) manuka-*Baumea-Gleichenia* and type (a) towai-kauri are one of only two examples and type (c) manuka-cabbage tree is one of only three examples of its type in this Ecological District.

Habitat for threatened and regionally significant species.

Queen Elizabeth II National Trust covenants protect five separate areas of this site including a 116 ha and a 19.5 ha of forest, as well as 2340 m² to protect *Todea barbara*, 1.8 ha of *Baumea complanata* and 2970 m² covering the *Utricularia* site.

NGAWHA GEOTHERMAL FIELD

Survey no.	P05/033
Survey date	17 May 1994
Grid reference	P05 895 428
Area	181 ha (swamp shrubland 101.3 ha; wetland 66.4 ha; shrubland 13.1 ha)
Altitude	150–200 m asl

Ecological unit

- (a) Manuka shrubland on low ridges
- (b) *Baumea-Schoenus*-manuka association in bog
- (c) *Gleichenia* fernland on swampy and low-lying flats
- (d) Open water in small lakes
- (e) *Baumea* sedgeland in bog

Landform/geology

Podzol shrubland and bog vegetation on low siliceous mudstone ridges, depressions and swampy areas associated with an active geothermal field.

Vegetation

Manuka is dominant to 4.5 m (lower, to 1.5 m in the west), often with an open canopy. Gorse is scattered throughout, and locally frequent. Towai is occasional. Other species present include *Dracophyllum lessonianum*, mingimingi, *Dianella*, umbrella fern and *Schoenus tendo*. Bracken, kumeraho, small ponga, wheki, *Lepidosperma laterale*, *Gabnia* and the club mosses *Lycopodiella cernua* and *Lycopodium deuterodensum* are scattered.

Type (b) occurs on raised flats and gentle slopes. *Baumea teretifolia* and *Schoenus brevifolius* are intermixed with low manuka and *Dracophyllum*. Prickly hakea occurs on dry sites with abundant *Tetraria capillaris* and common *Lepidosperma australe*. *Epacris pauciflora* and umbrella fern are locally abundant. Mingimingi and *Dianella* are common. *Thelymitra* orchids and sundews are common in open areas, and the creeping club moss *Lycopodiella lateralis* is present.

Type (c) *Gleichenia* occurs in dense swards with *B. teretifolia* and *Dracophyllum*, with *Sphagnum* moss underneath.

Type (e) *Baumea complanata* forms dense monospecific swards on damp substrates in disturbed areas.

Significant flora

Includes one of only four known locations for the sedge *Baumea complanata* (Declining), the Vulnerable fern *Todea barbara*, the mistletoe *Korthalsella salicornioides* (Naturally Uncommon-Sparse) and the southernmost record of the orchid *Thelymitra malvina* (Range Restricted).

Fauna

Fauna includes a new species of mudfish, known only from three sites in Northland *Neochanna beletos* (Category A threatened species), Australasian bittern, (Category O threatened species), NI fernbird and spotless crane (regionally significant bird species).

Figure 45. Ngawha Geothermal Field, P05/033
Each grid is 1000 m × 1000 m and equals 100 ha.
s = shrubland; w = wetland.

NI brown kiwi (Category A threatened species) and brown teal (Category C threatened species) have also been reported within this site, but the continued presence of teal has not been confirmed for many years.

Significance

Types (b), (c) and (e) are the only examples of their type in the Ecological District, and type (a) is one of only two sites.

The associated “pipe clay” gumlands (as distinct from the “sand gumlands” of which the Ahipara gumfields are the best remaining example) have gained a significance approaching that of the geothermal field due to the extensive development of similar sites elsewhere in Northland.

Habitat for threatened species including flora and mudfish species which do not readily survive in other habitat types.

Lake Waiparaheka Scientific Reserve is an internationally important soil site of hydrothermally altered peat (Arand et al. 1993).

This site includes the 18 ha Lake Waiparaheka Scientific Reserve, established to protect the unique assemblage of geothermal flora and fauna, and 43 ha of contiguous stewardship land administered by the Department of Conservation.

Thirty five hectares of wetland habitat is protected under a Queen Elizabeth II National Trust covenant.

Source: Clunie 1983, Esler & Rumball 1974.

NGAWHA SWAMPS

Survey no.	P05/034
Survey date	14 February 1995
Grid reference	P05 885 460
Area	total 24.1 ha
Altitude	c. 220 m asl

Ecological unit

(a) Raupo reedland in swampy valleys (90%)

(b) Kahikatea-cabbage tree-swamp maire swamp forest on alluvium (10%)

Landform/geology

Hydrological system on the edge of a Kerikeri volcanics basalt flow which adjoins alluvium.

Vegetation

Five remnant wetlands and a small swamp forest remnant.

Type (a)

Apart from large areas of raupo monoculture, associated plants include crack willow, cabbage tree and occasional kahikatea.

Type (b)

An area of remnant swamp forest hydrologically linked to the wetlands but physically adjoining the large “pipe clay” gumlands to the south-east has been included within this site because of the closer physiographic links with the alluvial/wetland ecosystem.

Figure 46. Ngawha Swamps, P05/034

Each grid is 1000 m × 1000 m and equals 100 ha.

w = wetland.

This area has occasional pukatea as an associated species.

Significant flora

Thelypteris confluens, a swamp fern classified as Vulnerable.

Fauna

Habitat for Australasian bittern (Category O threatened species) and spotless crane (regionally significant species).

Significance

Representative of two rare and diminishing habitat types - mineralised freshwater wetland and swamp forest - the latter being one of only two examples of its type recorded in the Ecological District.

Habitat for threatened fauna and flora.

A water quality protection function is implied.

YOUNGS KAHIKATEA REMNANT

Survey no.	P05/035
Survey date	14 February 1995
Grid reference	P05 873 457
Area	12.1 ha
Altitude	230-240 m asl

Ecological unit

- (a) Kahikatea forest on toeslope (80%)
- (b) Swamp maire-kahikatea-cabbage tree swamp forest on volcanic flats (10%)
- (c) Manuka shrubland on volcanic flats (10%)

Landform/geology

Underlain by a recent Kerikeri volcanic basalt flow.

Vegetation

A small area of young swamp forest in the upper catchment of the Ngawha Stream which eventually flows into the Waitangi River.

Associated canopy species of type (a) include occasional totara and rimu. Type (b) includes occasional raupo and *Carex* sp.

Fauna

Not surveyed.

Significance

Representative of a rare and diminishing habitat type - swamp forest, with type (b) being one of only two examples in this Ecological District.

Figure 47. Youngs Kahikatea Remnant, P05/035

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

NGAWHA BUSH

Survey no. P05/037
Survey date 14 February 1995
Grid reference P05 878 468
Area 18 ha (forest 14.1 ha; shrubland 3.9 ha)
Altitude 260–340 m asl

Ecological unit

- (a) Taraire-puriri forest on hillslope (80%)
- (b) Mamaku-totara shrubland on hillslope (20%)

Landform/geology

Southern flank of a young Kerikeri volcanics basaltic volcano.

Figure 48. Ngawha Bush, P05/037

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Vegetation

Two small shrubland and cutover forest remnants.

The majority of the site is the cutover puriri-taraire forest which includes tawa and rewarewa with occasional kohekohe and totara.

The shrubland component helps link the two remnants and includes, as associated species, pate and gorse with occasional tobacco weed.

Fauna

Not surveyed.

Significance

The volcanic broadleaf component is representative of an increasingly rare forest type, and this site contains the largest example of taraire-puriri forest on young Kerikeri basaltic volcanics. It is the only site in the Ecological District where type (b) has been noted.

Further survey work would help to determine the full significance of this site.

REMUERA SETTLEMENT ROAD REMNANTS

Survey no.	P05/038
Survey date	18 February 1995
Grid reference	P05 863 485
Area	56.2 ha
Altitude	260-374 m asl

Ecological unit

- (a) Totara forest on hillslope (25%)
- (b) Towai forest on hillslope (40%)
- (c) Taraire forest in crater (20%)
- (d) Kahikatea forest in crater (10%)
- (e) Puriri forest on hillslope (5%)

Landform/geology

On the flanks and within the crater of an andesitic basalt volcano.

Vegetation

Fragmented secondary forest remnants.

Type (a) Totara forest includes occasional kahikatea, puriri and towai.

Type (b) Towai forest includes frequent puriri with occasional taraire, rewarewa, tawa, totara and pukatea.

Type (c) Taraire forest includes frequent pukatea with occasional rimu, kauri, tawa, totara and puriri.

Type (d) Kahikatea forest includes occasional pukatea, totara, kauri and rimu.

Type (e) Puriri forest includes frequent taraire with occasional totara.

Fauna

Not surveyed.

Figure 49. Remuera Settlement Road Remnants, P05/038

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Significance

As the only andesitic basalt volcano in this Ecological District, this site represents the only examples of these ecological units.

These remnants constitute virtually the only forest in the catchment of Lake Omapere and may play a role in limiting nutrient inflow into the lake system.

Classified as a geopreservation site of regional importance (Kenny & Hayward 1993).

Approximately 1.7 ha of riparian margin in the western block is administered by the Department of Conservation.

SOUTH OMAPERE KAHIKATEA REMNANT

Survey no. P05/039
Survey date 18 February 1995
Grid reference P05 844 491
Area 3.1 ha
Altitude 240 m asl

Ecological unit

- (a) Kahikatea forest on flats (90%)
- (b) Flax swamp on flats (10%)

Landform/geology

In a small depression on the edge of Lake Omapere near the top of a small Mangakahia Complex sandstone bluff.

Figure 50. South Omapere Kahikatea Remnant, P05/039

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest; w = wetland.

Vegetation

A small remnant of secondary kahikatea forest and mineralised wetland.

Unfortunately the freshwater wetland on the eastern margin is suffering from a lowered water table and will eventually be dry land.

Canopy species associated with the kahikatea forest include totara and occasional puriri.

Fauna

Not surveyed.

Significance

As well as being an under-represented vegetation type in the Ecological District and Region, (the only example of type (b) recorded in this Ecological District), this site constitutes one of the very few remaining forest remnants adjoining Lake Omapere.

WAINGARURU STREAM SWAMP

Survey no.	P05/040
Survey date	14 February 1995
Grid reference	P05 900 476
Area	7.5 ha (forest 1.7. ha; wetland 5.8 ha)
Altitude	c. 190 m asl

Ecological unit

- (a) Cabbage tree-raupo association in swamp (25%)
- (b) Toetoe-raupo association in swamp (40%)
- (c) Flax-raupo association in swamp (10%)
- (d) Kahikatea-pukatea swamp forest on volcanic flat (25%)

Landform/geology

On a young Kerikeri volcanic basalt flow.

Vegetation

A small remnant mineralised wetland with peripheral swamp forest remnant.

Associated plant species include for type (b) Toetoe-raupo association, occasional cabbage tree and *Coprosma tenuifolia*.

Type (c) Flax-raupo association includes cabbage tree and occasional swamp maire.

Type (d) Kahikatea-pukatea swamp forest includes occasional towai.

Fauna

Australasian bittern (Category O threatened species), and two regionally significant species, banded rail, a species not commonly found in freshwater wetlands, and spotless crane.

Figure 51. Waingaruru Stream Swamp, P05/040
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest; w = wetland.

Significance

Types (a), (b) and (c) are the only examples of their type recorded in this Ecological District during this survey, and type (d) kahikatea-pukatea dominant swamp forest, is one of only two examples although very small (c. 2 ha).

Habitat for threatened and regionally significant species.

WAITAHEKE ROAD BUSH

Survey no. P05/041
Survey date 14 February 1995
Grid reference P05 902 470
Area 9 ha
Altitude c. 190 m asl

Ecological unit

- (a) Puriri-taraire forest on hillslope (10%)
- (b) Kahikatea forest on volcanic flat (40%)
- (c) Towai forest on hillslope (5%)
- (d) Puriri-totara-kahikatea forest on volcanic flat (45%)
- (e) Raupo reedland in swampy valley (<1%)

Landform/geology

Situated on the surface of a young Kerikeri volcanic basalt flow.

Vegetation

A small secondary forest/wetland remnant.

Figure 52. Waitaheke Road Bush, P05/041
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

The dominant vegetation types are (b) and (d), with occasional rewarewa, matai, rimu, taraire and pukatea within the latter.

The wetland component is very small and modified by stock browse.

Fauna

Not surveyed.

Significance

Contains representation of podocarp and podocarp/broadleaf forest on volcanic flats - both uncommon associations, and a small mineralised freshwater wetland remnant. Type (d) is one of only three examples of its type recorded in the Ecological District during this survey.

TAUMATATARAIRE STREAM BUSH

Survey no.	P05/042
Survey date	13 February 1995
Grid reference	P05 940 475
Area	63.7 ha (forest 58.1 ha; shrubland 5.6 ha)
Altitude	60–117 m asl

Ecological unit

- (a) Kahikatea forest on volcanic flat (10%)
- (b) Totara forest on hillslope (5%)
- (c) Puriri-titoki-taraire forest on hillslope (75%)
- (d) Manuka shrubland on hillslope (<10%)

Landform/geology

Valleys cut through a young Kerikeri volcanic basalt flow with Mangakahia Complex mudstone in the Waiaruhe Stream valley and Motatau Complex glauconitic sandstone in the Taumataraire Stream valley.

Vegetation

Five forest remnants centred around the largest type (a) kahikatea forest, an area of diverse old growth broadleaf forest bordering the Waiaruhe River. The others are a mixture of broadleaf forest, secondary podocarp forest and shrubland.

Canopy species associated with type (b) totara forest includes occasional kahikatea.

Type (c) Puriri-titoki-taraire forest includes karaka, kohekohe and rewarewa with occasional tawa, kahikatea, *Griselinia lucida* and pukatea.

Type (d) Manuka shrubland includes gorse and totara with occasional kahikatea.

High goat and possums numbers have been noted, however.

Fauna

Common forest birds. Likely to be an important seasonal food source for kukupa (Category B threatened species).

Figure 53. Taumatataraire Stream Bush, P05/042

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Significance

Contains representation of a rare association - kahikatea forest on volcanic flats - and the puriri-taraire-titoki association is the only example of its type recorded in the Ecological District and is also regionally uncommon.

Further survey work would be an advantage as another similar forest in the area has high botanical values. Riparian protection values are implied.

WAIARUHE BUSH REMNANTS

Survey no.	P05/043
Survey date	14 February 1995
Grid reference	P05 955 498
Area	29.7 ha
Altitude	c. 60 m asl

Ecological unit

(a) Kahikatea forest on alluvium

Landform/geology

Alluvium ponded by a volcanic basalt flow.

Vegetation

Three secondary kahikatea remnants.

The strongly kahikatea dominant canopy is shared with occasional rimu, pukatea and taraire.

The southern area has been subjected to light selective logging and unrestricted stock access.

Figure 54. Waiaruhe Bush Remnants, P05/043
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Fauna

Common forest birds.

Significance

The scarcity of this forest type gives these remnants high representative significance. However, if these sites are to retain or improve their representative values, it is imperative that the water table not be altered and preferable that all three be protected from stock browse.

POUERUA CONE

Survey no.	P05/044
Survey date	13 February 1994
Grid reference	P05 953 473
Area	4.4 ha
Altitude	150-220 m asl

Ecological unit

- (a) Puriri-taraire forest in volcanic crater (90%)
- (b) Mamaku-hangehange shrubland in volcanic crater (10%)

Landform/geology

A small forest remnant within the crater of a basaltic volcanic cone (Pouerua).

Vegetation

The dominant vegetation of puriri-taraire forest includes frequent kohekohe and karaka with occasional totara and *Griselinia lucida*.

Stock have access to the site, and gorse forms the periphery.

Fauna

The site contains the Northland endemic snails *Liarea turriculata turriculata* and "Golden phenacohelix".

Significance

Constitutes a nationally rare ecological association of broadleaf forest and crater landform. Type (b) is also the only example of its type recorded in the Ecological District during this survey.

The Pouerua scoria cone is a distinctive volcanic centre with a well preserved crater and volcanic form, surrounded by the best preserved lava flow in Northland. It is the largest pa and stone fields prehistoric site remaining in New Zealand (Kenny & Hayward 1993).

Figure 55. Pouerua Cone, P05/044

Each grid is 1000 m × 1000 m and equals 100 ha. f = forest.

POUERUA BUSH

Survey no.	P05/045
Survey date	22 December 1995
Grid reference	P05 950 460
Area	71 ha
Altitude	120–160 m asl

Ecological unit

- (a) Puriri-titoki forest on volcanic flats
- (b) *Eucalyptus* sp. plantation on volcanic flats

Landform/geology

On the surface of a Kerikeri volcanic basalt flow with no soil cover.

Vegetation

A moderate-sized old growth volcanic broadleaf remnant.

Canopy species associated with the dominant (c. 90%) forest type (a), including frequent rewarewa, kohekohe and taraire, with occasional mangao, karaka, whau, totara, rimu, northern rata, kowhai and tawa. Stock have largely been excluded by the difficult rocky ground cover which supports a dense cover of *Asplenium lamprophyllum* and *Peperomia urvilleana*.

Figure 56. Pouerua Bush, P05/045

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Significant flora

The Vulnerable creeping twiner mawhai (*Sicyos australis*) now more or less confined to offshore islands and the nationally uncommon *Peperomia tetraphylla* (Naturally Uncommon-Sparse).

Other noteworthy species include the regionally uncommon mangaeo and whau, the later being a coastal species which, along with *Coprosma macrocarpa* and wharangi, give this site a coastal element not known elsewhere as far inland as this (c. 18 km to the closest tidal reaches of the Bay of Islands and c. 25 km to the open ocean).

It is also one of only a few Northland sites for stinging nettle (*Urtica ferox*).

Fauna

Common bush birds and kukupa (Category B threatened species).

Significance

A unique site within this Ecological District and Region, old growth broadleaf forest on a volcanic geomorphic base. It is similar to only one other site within the Kaikohe Ecological District (P05/050 Kahutoto Stream Remnant), but each site has its unique characteristics.

Outstanding botanical values, including threatened species.

Habitat for threatened fauna.

LAKE OWHAREITI AND JACKS LAKE

Survey no.	P05/046
Survey date	13 February 1995
Grid reference	P05 960 455
Area	124.4 ha
Altitude	c. 100 m asl

Ecological unit

- (a) *Eleocharis* sedgeland on margins
- (b) Raupo reedland on margins
- (c) Open water in lakes

Figure 57. Lake Owhareiti and Jacks Lake, P05/046

Each grid is 1000 m × 1000 m and equals 100 ha.

w = wetland.

Landform/geology

Two lakes ponded by Kerikeri volcanic basalt flows and banded in the upper catchments of Jacks Lake by Motatau Complex glauconitic sandstone and, for Lake Owhareiti, Mangakahia Complex mudstone.

Vegetation

Limited to marginal vegetation which is being grazed by stock. Occasional *Baumea articulata* is associated with type (a).

Fauna

As least 23 species of avifauna are known to use these lakes, including NZ dabchick (Category C threatened species), Australasian bittern (Category O threatened species), the regionally significant NI fernbird, and little black shag, NZ scaup, grey teal, Australian coot, Australian little grebe, NZ shoveler, Canada goose and cattle egret. It is an important site for moulting paradise shelduck, an endemic species, which can number up to 1000 during early summer, and, for black swan, these lakes support the major resident population for Northland. Both lakes exhibit similar waterfowl usage relative to their size.

Significance

Rare ecosystems in the regional context and the most important waterfowl habitat in the Ecological District, supporting threatened and regionally significant fauna as well as 20 other species.

It also contains one of only three examples of type (a) recorded in the Ecological District during this survey.

NGAWHITU BUSH

Survey no.	P05/047
Survey date	8 February 1995
Grid reference	P05 955 440
Area	125.2 ha (forest 92.7 ha; shrubland 32.5 ha)
Altitude	120–187 m asl

Ecological unit

- (a) Taraire forest on hillslope (50%)
- (b) Manuka shrubland on hillslope (15%)
- (c) Kahikatea forest on alluvial flats (30%)
- (d) Totara-kahikatea forest on hillslope (5%)

Landform/geology

On dissected hill country and alluvial flats underlain by Motatau Complex glauconitic sandstone and Mangakahia Complex mudstone.

Vegetation

Fragmented cutover and secondary forest remnants often linked by shrubland.

Canopy species associated with forest type (a) Taraire forest include tanekaha, totara, puriri and kahikatea with occasional matai, rimu, titoki, pukatea and tawa.

Mamaku is associated with type (b) Manuka shrubland, which links four pockets of forest.

Figure 58. Ngawhitu Bush, P05/047

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Type (d) Totara-kahikatea forest includes occasional rimu.

Fauna

Common forest birds and kauri snail (Category C threatened species).

Significance

Its representative significance, size and partial linkage function between the native/exotic mosaic of the Titihuatahu area and the Opuia-Moerewa Forest tract constitute its most significant known attributes.

Some 30% of this site is kahikatea dominant (type (c)) on flat to rolling country, a forest type which is now considered rare nationally and in Northland has been reduced to less than 1% of its original area. This site represents the only example of taraire forest on this geological base and is also a representative site for types (c) and (d).

Habitat for kauri snail.

KAHUTOTO STREAM REMNANT

Survey no.	P05/050
Survey date	20 February 1995
Grid reference	P05 970 497
Area	8 ha
Altitude	60–80 m asl

Ecological unit

- (a) Kahikatea on alluvial flats
- (b) Titoki-taraire-mahoe on volcanic flats
- (c) Titoki-karaka-mahoe on volcanic flats
- (d) Willow-*Carex* association in swamp
- (e) Raupo reedland in swamp
- (f) Mahoe-boxthorn-gorse-*Muehlenbeckia* shrubland on volcanic flats

Landform/geology

Sited on a Kerikeri volcanic basalt flow.

Vegetation

This site is an old growth and secondary forest remnant with peripheral wetland and shrubland. It contains jumbled rock piles similar to that found with Pouerua Bush c. 4 km to the south, but the forest types differ.

The secondary kahikatea stand of type (a) is very small and includes occasional totara and rewarewa.

The dominant vegetation type is type (b) Titoki-taraire-mahoe forest and includes matai and karaka with occasional emergent northern rata, kowhai, rewarewa and tawa.

Type (c) Titoki-karaka-mahoe forest, the second most common type includes red mapou.

Type (d) Willow-*Carex* association includes wheki with occasional raupo, kotukutuku, *Coprosma propinqua* and cabbage tree.

Figure 59. Kahutoto Stream Remnant, P05/050
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Type (e) Raupo reedland includes occasional cabbage tree and crack willow.

Type (f) Mahoe-boxthorn-gorse-*Muehlenbeckia* shrubland, a valuable buffer zone, includes bracken and mapou with occasional tobacco weed and cabbage tree.

Unfortunately, wandering willie (*Tradescantia fluminensis*) is well established in the northern half of this site, and stock are given access occasionally during winter, further aggravating the weed problem.

Significant flora

Its kawakawa dominant understorey with common *Peperomia urvilleana*, contains coastal species such as *Coprosma macrocarpa*, and wharangi, as well as three sparsely distributed divaricating species: milktree, kaikomako and extremely large *Lophomyrtus obcordata* (up to 250 mm through at the base).

Ground cover includes three fern species, which, while widespread, are not commonly found in most forest areas in the Far North: *Asplenium lamprophyllum*, *Arthropteris tenella* and *Pellaea rotundifolia*.

Fauna

An Australasian bittern (Category O threatened species) was noted just outside the boundary on swampy ground and it is possible that this site is utilised by them on occasions. Common forest birds are present.

Significance

Outstanding in representative terms as this remnant constitutes a unique assemblage of geomorphology and flora, being the only known examples in the Ecological District and region of types (b), (c) and (f). The most similar site recorded during this survey was the Pouerua Bush site, but this area has a greater diversity of habitat and vegetation types (including wetlands), as well as flora species.

PUKETOTARA/PATUKAUWAE/TE KEENE STREAM SWAMP

Survey no.	P05/064
Survey date	20 February 1995
Grid reference	P05 978 509
Area	25.3 ha (forest 5.7 ha; swamp forest 12.2 ha; wetland 7.4 ha)
Altitude	60–80 m asl

Ecological unit

- (a) Crack willow treeland in swamp
- (b) Kahikatea swamp forest on alluvial flats
- (c) Raupo reedland in swamp
- (d) Manuka-*Coprosma propinqua* swamp shrubland on alluvial flats

Landform/geology

A moderately large mineralised wetland on an alluvial floodplain associated with the Puketotara and Patukauwae Streams.

Vegetation

All identified vegetation types are close to monocultural in structure, with only type (d) having appreciable associated species which include cabbage tree, *Baumea articulata* and occasional kahikatea. Occurring in the understorey are an abundance of small-leaved coprosmas, *Carex* sp., flax, *Polygonum* sp., watercress and the introduced swamp grass *Glyceria maxima*.

The riparian ribbon of crack willow which extends up and downstream from this site, while having considerable waterfowl habitat value to species such as grey duck, are not included in this site due to crack willow's exotic invasive status.

Stock access is restricted by the river and the wet substrate.

Fauna

At least nine waterfowl or water-related bird species have been identified within this site, including Australasian bittern (Category O threatened species), spotless crane (regionally significant species), and grey duck. Common forest birds also utilise the site.

Significance

Contains representation of several threatened habitat types including mineralised wetland, swamp forest and swamp shrubland, and outside of the Kaipeha Swamp, is one of the largest wetlands in the Ecological District. It contains the only known examples in the Ecological District of types (b) and (d) and is a representative site for type (c).

Figure 60. Puketotara/Patukauwae/Te Keene Stream Swamp, P05/064

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest; w = wetland.

This site and another fertile wetland to the east may perform a linking function for the dispersal/movement of wetland species between the important Motatau-Pokapu wetland complex and those of the Waitangi Forest complex.

Habitat for threatened and regionally significant species.

WAIKARAMU ROAD BUSH

Survey no.	P05/066
Survey date	17 February 1995
Grid reference	P05 915 510
Area	251.2 ha
Altitude	80–232 m asl

Ecological unit

- (a) Totara-taraire-puriri forest on hillslope (30%)
- (b) Totara-rimu forest on hillslope (<5%)
- (c) Bracken-manuka shrubland on hillslope (60%)
- (d) Totara forest on hillslope (<5%)
- (e) Raupo reedland in swampy valley (<2%)

Landform/geology

Within steeply dissected Mangakahia Complex siliceous mudstone valleys below a basalt escarpment, probably with some talus in the valleys.

Vegetation

A large secondary forest, wetland and shrubland mosaic.

Type (a) Totara-taraire-puriri forest contains as associated canopy species, kahikatea and rewarewa and occasional karaka, titoki, rimu, pukatea and kohekohe.

Type (b) Totara-rimu forest, a minor component in terms of area, includes kahikatea and tanekaha with occasional rewarewa.

Type (c) Bracken-manuka shrubland is the dominant type, constituting c. 60% of the area, and contains hangehange and occasional gorse.

Type (d) Totara forest includes occasional kahikatea.

Type (e) Raupo reedland includes flax, *Carex* and cabbage tree.

Portions of the older growth element are fenced from stock.

Fauna

NI brown kiwi in high numbers (Category A threatened species) and kukupa (Category B threatened species, and kauri snail (Category C threatened species). A large native galaxiid which is likely to be banded kokopu (Category C threatened species) has been reported.

Significance

A representative site for type (a) and the only example known in the Ecological District of types (b) and (c).

Its large size enhances its importance as habitat for the threatened species, kiwi and kukupa.

Its central location between large forest blocks suggests a linking role for species with moderate powers of dispersal.

An upper catchment/riparian protection function is implied.

It includes 13 ha protected under covenant with the Queen Elizabeth II National Trust.

Figure 61. Waikaramu Road Bush, P05/066

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

WAIMATE BROADLEAF REMNANTS

Survey no.	P05/067
Survey date	17 February 1995
Grid reference	P05 904 524
Area	37.1 ha
Altitude	c. 200 m asl

Figure 62. Waimate Broadleaf Remnants, P05/067
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Ecological unit

(a) Puriri forest on volcanic flats

Landform/geology

Kerikeri volcanic basalt flow and eruptive centre remnants (Eruptive Centre - Pahangahanga Pa).

Vegetation

Nine fragmented old growth volcanic broadleaf forest remnants.

The strongly puriri dominant forest type has as associated canopy species occasional taraire, rewarewa, totara and rimu.

Unfortunately, many of these remnants are suffering from the symptoms of fragmentation, increased exposure to the effects of frost and wind, and this, in conjunction with a lack of regeneration as a result of stock browsing, has begun to manifest itself as early stages of canopy collapse. Without the regeneration afforded by ring fencing, these remnants will disappear and the process is already well under way. However, some remnants have been fenced and are showing good regeneration of canopy species.

Fauna

Kukupu (Category B threatened species).

Significance

Puriri dominant volcanic broadleaf forest is a nationally rare vegetation type unique to the North Island, and these remnants are some of the best remaining examples in this Ecological District and Region of a once common forest type which was associated with the basaltic lava flows in this area.

Habitat for threatened species.

Includes two Queen Elizabeth II National Trust covenants, one of 6 ha and the other of approximately 3 ha.

WAIKUKU ROAD BUSH

Survey no.	P05/068
Survey date	17 February 1995
Grid reference	P05 885 525
Area	174.4 ha (forest 94.4 ha; shrubland approx. 80 ha)
Altitude	100-260 m asl

Ecological unit

(a) Puriri forest on volcanic flats

(b) Taraire-puriri forest on hillslope

(c) Towai forest on hillslope

(d) Kahikatea-totara forest on hillslope

(e) Totara forest on hillslope

(f) Manuka shrubland on hillslope

Figure 63. Waikuku Road Bush, P05/068

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Landform/geology

It is underlain by Kerikeri volcanic basaltic plateau remnants in the east with Mangakahia Complex siliceous mudstone in the vicinity of Okuratope Pa and mudstone west of Waikuku Stream forming the dissected hill country of the valley system.

Vegetation

A large secondary forest and shrubland remnant with areas of cutover older growth forest in places.

Type (a) Puriri forest includes occasional taraire, kahikatea and rewarewa.

Type (b) Taraire-puriri forest includes rewarewa with occasional miro and rimu.

Type (c) Towai forest includes kahikatea, rimu and kauri with occasional northern rata, kanuka, pukatea and puriri.

Type (d) Kahikatea-totara forest includes rimu and occasional kauri, pukatea and puriri.

Type (e) Totara forest includes occasional rimu, puriri, taraire, kahikatea and towai.

The manuka shrubland of type (f) includes frequent towai, locally frequent tobacco weed and mamaku, and occasional pate. Stands of emergent kahikatea are local (Kingett-Mitchell).

An exotic plantation forest links some of the area.

Significant flora

The regionally uncommon black maire is present.

Fauna

NI brown kiwi (Category A threatened species) and kauri snail (Category C threatened species).

Significance

Contains one of only three examples of puriri forest on volcanic soils recorded in the Ecological District during this survey, and is a representative site for type (f).

It includes the 22.5 ha Okuratope Pa Historic reserve and four small areas of puriri forest totalling 2 ha protected under Queen Elizabeth II National Trust covenant.

Habitat for threatened and regionally significant species.

Its central location suggests a possible linking role between large forest blocks. The site also performs upper catchment and riparian protection functions.

BULLMAN ROAD BROADLEAF REMNANTS

Survey no.	P05/069
Survey date	17 February 1995
Grid reference	P05 858 517
Area	18.8 ha
Altitude	200-250 m asl

Ecological unit

- (a) Puriri forest on volcanic flats (95%)
- (b) Totara forest on volcanic flats (5%)

Figure 64. Bullman Road Broadleaf Remnants, P05/069

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Landform/geology

On a Kerikeri volcanic basalt flow.

Vegetation

Scattered remnants of mainly old growth volcanic broadleaf and secondary podocarp forest.

Canopy species associated with the dominant forest type (a) includes taraire with occasional rewarewa, kahikatea and karaka.

Type (b) includes puriri and occasional rewarewa.

The same situation of potential for canopy collapse exists for these remnants as is already described for the Waimate Broadleaf Remnants (P05/067). Without fencing there will be no opportunity for replacement of senescent canopy trees, and the complete loss of these remnants becomes inevitable.

Fauna

Not surveyed.

Significance

Representative of a rare ecological association - old growth volcanic broadleaf forest - being one of only three examples recorded in the Ecological District.

Potential for high usage by kukupa, particularly in the summer months is likely, making these remnants an important seasonal food source.

LAKE OMAPERE SWAMP FOREST REMNANT

Survey no.	P05/070
Survey date	18 February 1995
Grid reference	P05 845 511
Area	3.7 ha
Altitude	240 m asl

Ecological unit

(a) Kahikatea-pukatea swamp forest on alluvium

(b) Totara-kanuka forest on headland

Landform/geology

Underlain by basalt flows and alluvium on the lake edge.

Vegetation

A young secondary forest remnant adjoining Lake Omapere and a smaller older growth swamp forest remnant also on the lake margin.

Figure 65. Lake Omapere Swamp Forest Remnant, P05/070

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Associated species of type (a) include occasional swamp maire, cabbage tree, kiekie and totara, but the remnant is so small and degraded that no “canopy” structure exists. However, the complete lack of any other marginal swamp forest makes this remnant of importance as a potential seed source for any protected marginal land in the vicinity.

Type (b) includes rewarewa and the occasional puriri and towai.

Fauna

Important roosting and breeding sites for the large black shag colony which is centred around Lake Omapere.

Significance

Type (a) represents one of only two examples of this type recorded within the Ecological District and these sites are representative of riparian lake vegetation which now extends no more than 16–17 hectares in total. They are significant as seed sources and nuclei for any future restoration of lakeside vegetation.

Contains a significant black shag breeding colony.

WEHIRUA ROAD BUSH

Survey no.	P05/071
Survey date	17 February 1995
Grid reference	P05 846 536
Area	65.5 ha
Altitude	180–260 m asl

Ecological unit

- (a) Towai forest on hillslope (60%)
- (b) Totara forest on hillslope (c. 30%)
- (c) Taraire-puriri forest on hillslope (10%)
- (d) Totara-puriri forest on hillslope (<2%)

Figure 66. Wehirua Road Bush, P05/071

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Landform/geology

Secondary forest on Kerikeri volcanic basalt plateau remnant on the high ground with valleys of dissected Mangakahia Complex siliceous mudstone, probably with basalt talus below.

Vegetation

The dominant towai forest type (a) includes kahikatea and totara with occasional puriri, mamaku tree fern, kauri and rewarewa.

Type (b) Totara forest includes kahikatea with occasional towai, puriri and rewarewa.

Type (c) Taraire-puriri forest includes totara and rewarewa.

Type (d) Totara-puriri forest includes taraire and rimu with occasional kahikatea, towai and rewarewa.

Fauna

Its close proximity to a moderately large forest block to the north-east which is known to contain NI brown kiwi (Category A threatened species) suggests that it may also support kiwi.

Significance

Representative of type (a), being the largest area of this vegetation type on a variety of rock types.

A partial linkage role between the Upper Waitangi River Catchment and the Whakanekeneke/Aratoro catchments, as well as providing upper catchment/riparian protection functions.

Likely to contain a threatened species.

HUI TE WERAWERA STREAM BUSH

Survey no.	P05/073
Survey date	18 February 1995
Grid reference	P05 880 560
Area	987.6 ha (forest 487.6 ha; shrubland 500 ha)
Altitude	70–305 m asl

Ecological unit

- (a) Manuka/kanuka-totara forest on hillslope
- (b) Manuka/kanuka-towai forest on hillslope
- (c) Towai forest on hillslope
- (d) Totara-towai-taraire forest on hillslope
- (e) Totara-kahikatea forest on steep and rolling hillslopes
- (f) Manuka-gorse shrubland on gentle hillslopes

Landform/geology

Underlain in the north-west by a Kerikeri volcanic basalt flow. In the dissected valleys Mangakahia Complex sandstone, mudstone and siliceous mudstone underlie basalt talus which has eroded from the basalt escarpment.

Figure 67. Hui te Werawera Stream Bush, P05/073
Each grid is 1000 m × 1000 m and equals 100 ha.
s = shrubland; f = forest.

Vegetation

A large and increasingly fragmented secondary forest remnant in an early successional stage. Associated canopy species for type (a) includes mamaku and kahikatea with occasional puriri and rimu.

Type (c) includes totara with occasional rimu, rewarewa, tanekaha and kahikatea.

Type (d) Totara-towai-taraire forest (P05 876 575) with scattered rewarewa and kohekohe and sparse understorey. Northern rata saplings epiphytic on towai are present (Kingett-Mitchell.)

Type (e) Totara-kahikatea forest includes puriri, towai and rimu with scattered pole kauri, tanekaha and mamaku (Kingett-Mitchell).

Type (f) Manuka-gorse shrubland on gentle hillslopes includes occasional cabbage tree, mamaku, totara and kahikatea.

Fauna

NI brown kiwi (Category A threatened species), kukupa (Category B threatened species), kauri snail (Category C threatened species).

Significance

A representative site for types (a), (d) and (e), and one of only three examples of type (b) in the Ecological District.

An important habitat for threatened fauna.

Its large size and central location between other large forests makes it of considerable importance to the maintenance of species diversity in the area, and potentially important to the movement of species with limited powers of dispersal.

The large vegetated area of the upper catchment of the Waitangi River contributes considerably to protection of water and soil values.

D COOKS BUSH

Survey no.	P05/074
Survey date	18 February 1995
Grid reference	P05 925 567
Area	62.8 ha (forest 56.1 ha; shrubland 6.7 ha)
Altitude	60–100 m asl

Ecological unit

(a) Kahikatea-totara forest on hillslope

(b) Manuka/kanuka shrubland on hillslope

Landform/geology

On dissected Mangakahia Complex mudstone hill country with a Kerikeri volcanic basalt flow remnant in the north-west.

Vegetation

A secondary forest remnant (c. 70%) with advanced shrubland (c. 30%).

Associated canopy species of type (a) includes local pole kahikatea occasional puriri, rimu, emergent kahikatea, rimu and kauri.

Figure 68. D Cooks Bush, P05/074

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Type (b) includes totara with occasional puriri, taraire, towai, rimu, kahikatea and rewarewa. In the west, kahikatea occurs frequently.

Fauna

NI brown kiwi (Category A threatened species) in moderate numbers, and kukupa (Category B threatened species).

Significance

A representative example of type (a).

Its close proximity to and location between the large forest remnant of Hui te Werawera Stream and the forests of Opuia and Waitangi suggests potential for a linkage function and good viability for the site.

Habitat for threatened species.

ATKINS/OHAIO BUSH

Survey no.	P05/075
Survey date	18 February 1995
Grid reference	P05 936 560
Area	26.2 ha
Altitude	70–120 m asl

Ecological unit

- (a) Kahikatea forest on gentle hillslope
- (b) Totara forest on hillslope

Landform/geology

Underlain by a Kerikeri volcanic basalt flow forming an escarpment on the north side of Okokako Road with basalt talus overlying Mangakahia Complex mudstone in the lower valley slopes and alluvium forming the valley floor of the Waitangi River.

Vegetation

Two secondary forest remnants. Associated canopy species of Type (a) include frequent rimu, puriri and totara.

Type (b) includes frequent kahikatea and puriri with occasional kauri, tawa and rimu.

Figure 69. Atkins/Ohaio Bush, P05/075

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

As with many small forest remnants, stock browsing has reduced the understorey to a mere scattering of the less palatable species and regeneration of canopy species is not occurring.

Fauna

NI brown kiwi (Category A threatened species).

Significance

Habitat for threatened species.

A representative site for type (a) due to the conspicuous rimu component.

These remnants may perform a linking role between larger forest blocks to the east and west.

TAUANUI VOLCANIC LAKE AND ENVIRONS

Survey no.	P06/007
Survey date	14 July 1994
Grid reference	P06 890 330
Area	58 ha (forest 48.5; lake 10 ha)
Altitude	350–420 m asl

Ecological unit

- (a) Kahikatea forest in volcanic cone (<5%)
- (b) Taraire-towai forest in volcanic cone (c. 80%)
- (c) Taraire forest in volcanic cone (<5%)
- (d) Open water in lake (15%)

Landform/geology

A moderately sized forest remnant adjoining a small lake within a volcanic basalt cone. It is on moderately steep Tangihua complex and Taheke basalt, the lake being ponded by the basalt cone and lava flows.

Vegetation

The forest canopy appears to be quite intact with a substantial emergent element. Associated canopy species include:

Type (a) Kahikatea forest - occasional totara.

Type (b) Taraire-towai forest - puriri, tawa, kahikatea with occasional emergent northern rata, matai and rimu, pukatea, kohekohe, nikau, karaka, miro, totara, hinau and mangao (*Litsea calicaris*).

Type (c) Taraire forest - occasional karaka and puriri.

Unfortunately, stock have access to the entire block and the understorey is severely modified.

The lake contains the exotic water weeds *Elodea canadensis* and a small patch of *Lagarosiphon major* which should be eradicated.

Significant flora

Mangao (regionally significant) is a species of limited distribution in Northland.

Fauna

Wildlife usage is high due to the dual forest/lake ecosystems. Fauna include common forest birds and kukupa with waterfowl including black swan, little

Figure 70. Tauanui Volcanic Lake and Environs, P06/007

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest; w = wetland.

shag, mallard duck, NZ shoveler duck, paradise shelduck and black shag (breeding colony).

Invertebrate fauna includes kauri snail (Category C threatened species) and the endemic (to Northland) land snails *Liarea turriculata* and *Fectola charopiformis*. Perch (*Perca fluviatilis*) are present within the lake.

Significance

The site is one of the most important representative sites in the Ecological District and Region, being a unique assemblage of geomorphic and biological components - broadleaf-podocarp forest on a volcanic cone including a regionally significant plant species.

Important habitat for waterfowl, threatened and endemic fauna.

TAUANUI VOLCANIC BROADLEAF REMNANT

Survey no. P06/008
Survey date 14 July 1994
Grid reference P06 891 346
Area 14.9 ha
Altitude c. 170 m asl

Ecological unit

(a) Taraire-puriri on gentle hillslope

Landform/geology

Gently sloping Taheke Basalt lava flow which is underlain by Mangakahia Complex sand and mudstone.

Figure 71. Tauanui Volcanic Broadleaf Remnant, P06/008

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Vegetation

Seven scattered forest remnants between 2 and 5 ha each of volcanic broadleaf, which is now a rare forest type in Northland. None of the remnants is fenced and there is a resultant lack of understorey and regeneration. Possum damage is evident, especially on the highly palatable kohekohe.

Associated species include occasional rewarewa, karaka, totara and kohekohe.

This combination of small unfenced fragmented remnants on an exposed site which is under pressure from browsing and grazing animals will eventually result in total canopy collapse. Fencing is justified because of the scarcity of this forest type.

Fauna

Not surveyed.

Significance

Representative of the only example in this Ecological District of this forest type/geomorphic assemblage.

An important habitat type for kukupa.

PUNAKITERE VALLEY SWAMP FOREST

Survey no.	P06/010
Survey date	28 April 1994
Grid reference	P06 882 368
Area	138.7 ha (forest 22.7 ha; shrubland 116 ha)
Altitude	c. 130 m asl

Ecological unit

- (a) Kohuhu-manuka-putaputaweta shrubland on alluvium (<2%)
- (b) Kahikatea forest on alluvium (15%)
- (c) Manuka shrubland on low hills/alluvium (>80%)

Landform/geology

The manuka dominant shrubland is on either an alluvial or volcanic base. Both the alluvium and Taheke Basalt lava flow are underlain by Mangakahia Complex sandstone and mudstone.

Vegetation

Fragmented alluvial forest and shrubland remnants dominated by secondary kahikatea, manuka and kohuhu.

The area dominated by (a) Kohuhu-manuka-putaputaweta shrubland, above is very unusual, sharing the canopy with cabbage tree and kahikatea, but is also very small - less than 2 ha.

Type (b) Kahikatea forest contains frequent cabbage tree and manuka.

Type (c) Manuka shrubland - occasional gorse is present.

Fauna

Not surveyed.

Figure 72. Punakitere Valley Swamp Forest, O05/078

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Significance

Scarcity of forest/shrubland on these geological bases makes all of the vegetation types representative of a very uncommon association in the Ecological District and Region. It is the only example of type (a) known in the Ecological District, and is the largest area of type (b), and representative site for type (c).

KAIPEHA SWAMP

Survey no.	P06/018
Survey date	1 May 1994
Grid reference	P06 780 340
Area	872.8 ha (forest 85.9 ha; shrubland 469.3 ha; swamp forest 25.3 ha; wetland 292.3 ha)
Altitude	c. 50–120 m asl

Ecological unit

- (a) Raupo reedland in swamp
- (b) Manuka-flax association in swamp
- (c) *Baumea* sedgeland in swamp
- (d) Kanuka-kowhai forest on alluvium
- (e) Kanuka-kahikatea forest on alluvium
- (f) Kanuka-totara forest on gentle hillslope
- (g) Manuka-*Baumea* association in bog
- (h) Kahikatea-cabbage tree swamp forest on alluvium

Landform/geology

The valley swamps have been ponded by Taheke Basalt lava flow and the hill country catchment is underlain by Mangakahia Complex sedimentary rocks.

Vegetation

A large freshwater wetland with peripheral swamp forest and secondary hill forest. The boundary is shrinking from the north with the clearance of one of the rarest elements of this system - kahikatea dominant swamp forest - from the Punakitere River flood plain.

To the south of the river, access and drainage are more difficult to achieve, but modification through periodic burning and stock access have continued to impact on natural values. Fertility of wetland types varies considerably from highly mineralised raupo-cabbage tree swamp to acidic bog dominated by *Baumea* and manuka.

Associated canopy species include:

Type (a) Raupo reedland - occasional cabbage tree, kahikatea and manuka.

Type (b) Manuka-flax association - raupo with occasional cabbage tree.

Type (c) *Baumea* sedgeland - occasional manuka and cabbage tree.

Type (d) Kanuka-kowhai forest - kahikatea with occasional rimu, titoki, taraire, totara and rewarewa.

Type (e) Kanuka-kahikatea forest - occasional rimu.

Type (f) Kanuka-totara forest - kahikatea with occasional karaka, kowhai and rimu.

Type (g) Manuka-*Baumea* association - occasional puriri and swamp maire.

Fauna

NI brown kiwi (Category A threatened species), kukupa (Category B threatened species), Australasian bittern (Category O threatened species), NI fernbird and spotless crane (regionally significant species), and kauri snail (Category C threatened species).

Figure 73. Kaipēha Swamp, P06/018
Each grid is 1000 m × 1000 m and equals 100 ha.
s = shrubland; f = forest; w = wetland.

Significance

The largest freshwater wetland system in the Kaikohe Ecological District, and one of the largest in Northland, the Kaipēha Swamp and its associated forested and shrub-covered catchment constitute one of the most threatened, highly valued and poorly represented ecosystems in Northland.

The site exhibits a large range of fertility gradients and a diversity of vegetation associations with types (b), (c), (g) and (h) being the only examples of their types recorded in the Ecological District, and the site being representative of types (a), (e) and (f).

Habitat for several threatened species.

PUNAKITERE/NINIHI ROAD BUSH

Survey no. P06/019
Survey date 1 May 1994
Grid reference P06 753 350
Area 52.6 ha (forest 45.7; wetland 6.9 ha)
Altitude 50-116 m asl

Ecological unit

- (a) Totara-taraire forest on hillslope (70%)
- (b) Totara-kahikatea forest on hillslope (20%)
- (c) Raupo reedland in swamp (10%)

Figure 74. Punakitere/Ninihi Road Bush, P06/019
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest; w = wetland.

Landform/geology

Hill country and freshwater wetland associated with the larger Kaipeha wetland but separated from it by a narrow strip of semi-developed land. 90% of the site is underlain by Mangakahia Complex sandstone, the remainder being alluvium associated with the raupo dominant wetland at the north-eastern edge.

Vegetation

Associated canopy species include:

Type (a) Totara-taraire forest - puriri, pukatea, towai, rewarewa with occasional tanekaha and emergent rimu.

Type (b) Totara-kahikatea forest - towai, tanekaha with occasional rimu, taraire and rewarewa.

Fauna

Kauri snail (Category C threatened species).

Significance

Part of the Kaipeha Swamp biogeographic entity, and adds diversity of forest type to that site and provides a buffer to the larger area.

Type (a) is one of only four examples of its types recorded in the Ecological District.

Habitat for a threatened species.

KOROWHATA STREAM POND

Survey no.	P06/080
Survey date	29 April 1994
Grid reference	P06 828 371
Area	6.7 ha
Altitude	c. 100 m asl

Ecological unit

(a) Open water - pond (95%)

(b) Raupo reedland on pond margin (<5%)

Landform/geology

A low dam has been constructed across a swampy arm of the Korowhata Stream.

Vegetation

A shallow area of open water with shallow raupo dominant and herbfield margins. This situation, despite being artificially induced, has provided ideal waterfowl habitat.

Fauna

The landowner reports the presence of breeding NZ dabchick (Category C threatened species), Australasian bittern (Category O threatened species), with NZ shoveler duck and grey teal (both regionally uncommon) also utilising the site.

Figure 75. Korowhata Stream Pond, P06/080

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest; w = wetland.

Raupo is actively controlled because of the shallow water and resultant potential for invasion, therefore crane habitat is minimal.

Significance

Despite being an artificial habitat, the site offers excellent breeding and feeding sites for many waterfowl, some species of which are threatened and others regionally uncommon.

MANGATOA/PUNAKITERE RIVERINE

Survey no.	P06/086
Survey date	2 July 1995
Grid reference	P06 730 378
Area	135.4 ha
Altitude	20–80 m asl

Ecological unit

- (a) Totara forest on alluvium (c. 90%)
- (b) Manuka/kanuka-totara forest on hillslope (10%)
- (c) Manuka-gorse-totara shrubland on hillslope (<2%)

Figure 76. Mangatoa/Punakitere Riverine, P06/086
Each grid is 1000 m × 1000 m and equals 100 ha. f = forest.

Landform/geology

Secondary riverine forest and shrubland, with some low hill country adjoining the Mangatoa and Punakitere Rivers. Alluvial soils and Mangakahia Complex siliceous mudstone on the river banks.

Vegetation

Strongly totara and manuka/kanuka dominant vegetation. Associated canopy species include:

Type (a) Totara forest - occasional kauri, puriri, taraire, kahikatea, matai, rimu, kowhai.

Type (b) Manuka/kanuka-totara forest - occasional kohuhu.

Fauna

Not surveyed.

Significance

A representative site for type (a).

This site is important, along with any other remnant riparian forest, to the instream values of these rivers, which were once heavily wooded and are now devoid of most streamside cover, resulting in loss of soil (increased turbidity) and high summer temperatures affecting algal growth and oxygen availability.

TAUTORO WETLAND

Survey no. P06/088
Survey date 20 September 1995
Grid reference P06 868-352
Area 5.4 ha
Altitude 80-100 m asl

Ecological unit

- (a) *Eleocharis* sedgeland in swamp
- (b) *Carex secta* sedgeland in swamp
- (c) Open water in pond

Landform/geology

Swamp on small area of Mangakahia Complex mudstone exposed within an eroded area of Kerikeri volcanics basalt flow.

Vegetation

A small mineralised wetland remnant with substantial open water. Associated plants include:

Type (b) - occasional *Cyperus ustulatus*, *Juncus* sp. and *Baumea* sp.

Type (c) - occasional *Azolla filiculoides* and *Lemna* sp.

Figure 77. Tautoro Wetland, P06/088

Each grid is 1000 m × 1000 m and equals 100 ha.

w = wetland.

Fauna

Native water-related species include: grey duck, pukeko and welcome swallow. Spotless crane were not surveyed for, but are likely to be present.

Significance

Small, but diverse due to high water table and presence of open water. Representative of one of only three examples of type (a) known in the Ecological District and the only example of type (b). The *Carex secta* dominant type is rare in Northland.

Mangakahia Road and a stock race may be maintaining the high water table by impoundment.

WHAKARUANGANGANA GUMFIELD

Survey no.	P06/089
Survey date	21 September 1995
Grid reference	P06 800-395
Area	131.7 ha
Altitude	100–208 m asl

Ecological unit

- (a) *Gleichenia-Schoenus-Baumea* association on gentle hillslope
- (b) Manuka-*Hakea* sp. shrubland on gentle hillslope
- (c) *Baumea-Gleichenia*-manuka shrubland on gentle hillslope
- (d) *Acacia* sp.-manuka in gully

Landform/geology

Mangakahia Complex sandstone.

Vegetation

Type (a) consists of *Gleichenia dicarpa*, *Schoenus brevifolius*, and *Baumea teretifolia* with frequent *Epacris pauciflora* and *Tetraria capillaris*. Manuka and *Dracophyllum* are occasional.

Type (b) Manuka-*Hakea* sp. shrubland occurs on drier sites. Gorse and *Schoenus* are frequent with occasional kumerahou and bracken.

Type (c) *Baumea-Gleichenia*-manuka shrubland occurs in gullies. *Baumea rubiginosa* and *Gleichenia dicarpa* are abundant, with manuka common. Kiokio is frequent and gorse and bracken occasional.

Fauna

Not surveyed, but NI fernbird (regionally significant species) are usually associated with such sites.

Significance

Representative of a rare and diminishing vegetation type, this remnant gumfield is all that remains of a once-extensive vegetation type, which covered much of the less fertile land to the south and west of Kaikohe. Modern land development practices have destroyed all but the last vestiges of these “pipe clay” gumlands

Figure 78. Whakaruangangana, P06/089

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland.

which contain species such as orchids and sundews, which are often dependent on the harsh environmental conditions that prevail in such sites.

Type (a) is the only example of its type known in the Ecological District and type (c) is one of only two examples in the Ecological District, also being a nationally rare ecosystem type.

KARAKAMATAMATA SCENIC RESERVE

Survey no.	P06/091
Survey date	1982, 1997
Grid reference	P06 724 390
Area	12.6 ha
Altitude	40-80 m asl

Ecological unit

(a) Totara forest on hillslope

(b) Taraire forest on hillslope and gully

Figure 79. Karakamatamata Scenic Reserve, P06/091
Each grid is 1000 m × 1000 m and equals 100 ha.
f = forest.

Landform/geology

Steep southwest-facing gully on Taheke basalt.

Vegetation

Type (a) is secondary growth and occurs on the upper margins.

Type (b) constitutes the majority of the site, with frequent kanuka and occasional puriri, totara, kahikatea, towai, rimu, tawa and kauri rickers.

Pockets of exotic weed species, including hakea, gorse and tobacco weed, occur on the margins. The area has pine plantations on the south and east sides.

Fauna

Kukupa (Category B threatened species). Kiwi are present two kilometres to the north (Guthries Block).

Significance

Habitat for threatened species.

The site is a Scenic Reserve administered by the Department of Conservation.

4.2 LEVEL 2 SITES

SITE	SURVEY NO.	GRID REF.
Waiare Road Pond	P05/004	P05 828 540
Lamberg Road Bush	P05/009	P05 766 558
Harrison Road Bush	P05/022	P05 756 494
Kopenui Stream Remnants	P05/036	P05 867 460
Ngaungau Pa Bush	P05/065	P05 940 520
Scott Road Remnants	P05/072	P05 846 554
Okokako Road Remnant	P05/076	P05 930 543
Utakura River Bush	P05/101	P05 770 504

WAIARE ROAD POND

Survey no. P05/004
 Survey date 25 May 1994
 Grid reference P05 828 540
 Area 1 ha
 Altitude 260 m asl

Ecological unit

- (a) Open water (c. 80%) in pond
- (b) *Eleocharis* sedgeland in margin

Landform/geology

The pond lies on a basalt plateau remnant.

Vegetation

A small pond, possibly constructed, surrounded by pasture and with a margin of *Eleocharis sphacelata* which has broadened out on the northern side.

Fauna

Species known to utilise this pond include paradise shelduck, pied shag, white-faced heron and pukeko.

Significance

A small example of type (b), which is uncommon in the Ecological District, but its values are limited by the lack of marginal ecotones and adjoining forest/shrubland. However, it does have some value for waterfowl.

Figure 80. Waiare Road Pond, P05/004

Each grid is 1000 m × 1000 m and equals 100 ha. w = wetland.

LAMBERG ROAD BUSH

Survey no.	P05/009
Survey date	1 June 1994
Grid reference	P05 766 558
Area	14.2 ha
Altitude	70-110 m asl

Ecological unit

(a) Totara-kahikatea forest on hillslope

Landform/geology

A small secondary forest remnant on a north-facing hillside of Mangakahia Complex mudstone and Kerikeri volcanics.

Vegetation

Canopy diversity is low with only occasional species including kohuhu, kauri and rimu associating with the totara-kahikatea domination. The site is unfenced, but further survey work may increase its known values.

Fauna

Not surveyed.

Figure 81. Lamberg Road Bush, P05/009

Each grid is 1000 m × 1000 m and equals 100 ha. f = forest.

Significance

Part of a chain of forest remnants which form a stepping stone linkage site but representative of secondary podocarp forest, uncommon in the Ecological Region.

HARRISON ROAD BUSH

Survey no.	P05/022
Survey date	19 May 1994
Grid reference	P05 756 494
Area	30 ha
Altitude	80-240 m asl

Ecological unit

- (a) Taraire forest on steep hillslope
- (b) Totara forest on steep hillslope
- (c) Manuka-totara-towai forest on steep hillslope

Landform/geology

A steep hill country valley of secondary and cutover forest underlain by Mangakahia Complex sandstone.

Figure 82. Harrison Road Bush, P05/022

Each grid is 1000 m × 1000 m and equals 100 ha. f = forest.

Vegetation

This small forest remnant has as associated canopy species within type (a) rewarewa, towai and occasional puriri, totara, and *Griselinia lucida*. Emergent rimu is frequent.

Within type (b), associated species include puriri, kahikatea and towai, with occasional kauri, northern rata and rimu.

The abundance of rimu within type (a) above is noteworthy, especially considering the close proximity of Pukewharariki Forest - an area noted for the quality and diversity of its podocarp/kauri/hardwood forest.

Fauna

Not surveyed.

Significance

The emergent rimu element is uncommon in the Ecological District.

Its location implies a linking role between the large forests to the north and south. An upper catchment and riparian function is also implied.

KOPENUI STREAM REMNANTS

Survey no.	P05/036
Survey date	14 February 1995
Grid reference	P05 867 460
Area	18.6 ha
Altitude	c. 260 m asl

Ecological unit

- (a) Totara forest on hillslope (95%)
- (b) Taraire-puriri forest on hillslope (5%)

Landform/geology

Underlain by a young Kerikeri volcanic basalt lava flow.

Vegetation

Two fragmented secondary forest remnants.

Canopy species associated with Type (a) include frequent puriri and occasional kahikatea, taraire, rewarewa and towai.

Type (b) includes towai with occasional totara.

Fauna

Not surveyed.

Significance

The taraire-puriri dominant portion is representative of the volcanic broadleaf forest which was once typical of forests of the volcanic plateau east of Lake Omapere, but which is now rare. The smallness of the area of this ecological unit limits its significance.

Some riparian buffering function is implied.

Figure 83. Kopenui Stream Remnants, P05/036

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

NGAUNGAU PA BUSH

Survey no.	P05/065
Survey date	17 February 1995
Grid reference	P05 940 520
Area	13.3 ha
Altitude	70–100 m asl

Ecological unit

(a) Totara-kahikatea forest on hillslope

Landform/geology

Underlain by Mangakahia Complex mudstone.

Vegetation

A small, fragmented, secondary podocarp forest remnant.

Associated canopy species include occasional kauri, puriri, rimu and taraire.

Fauna

Not surveyed.

Significance

Shows vigorous podocarp regeneration and is potentially a seasonal food source for kukupa.

Its location provides for a linkage function which may exist between the large forest remnants to the north-east of Lake Omapere and the large Opua Forest to the east.

Figure 84. Ngaungau Pa Bush, P05/065

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

SCOTT ROAD REMNANTS

Survey no.	P05/072
Survey date	18 February 1995
Grid reference	P05 846 554
Area	18.3 ha
Altitude	280–300 m asl

Ecological unit

(a) Totara forest on volcanic flats

Landform/geology

Three secondary forest remnants on a Kerikeri volcanic basalt plateau remnant.

Figure 85. Scott Road Remnants, P05/072

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Vegetation

The strongly totara dominant forest type has as associated canopy species taraire and puriri, with occasional towai, swamp maire, kahikatea, rimu and rewarewa.

Fauna

Not surveyed.

Significance

Their location suggests that they may perform a linking function between the moderately large Hui te Werawera Stream Bush to the east and the large tract of Puketi Forest and its outliers to the north and west.

May provide a seasonal food source for kukupa.

OKOKAKO ROAD REMNANT

Survey no.	P05/076
Survey date	18 February 1995
Grid reference	P05 930 543
Area	8.4 ha
Altitude	130–180 m asl

Ecological unit

(a) Totara-kahikatea-puriri forest on hillslope (80%)

(b) Kahikatea forest on hillslope (20%)

Landform/geology

Underlain by Kerikeri volcanic basalt flows on the margin of an eruptive centre (trig HA No. 2).

Vegetation

Two small forest remnants which are unfenced and suffering badly from the effects of unrestricted stock browse.

Associated canopy species of type (a) include occasional rimu, taraire and wattle.

Type (b) (c. 20%) includes totara.

Figure 86. Okokako Road Remnant, P05/076

Each grid is 1000 m × 1000 m and equals 100 ha.

f = forest.

Fauna

Common forest birds.

Significance

May perform an upper catchment protection and linkage function and act as a seasonal food source for kukupā.

Kahikatea forest is an uncommon vegetation type in the Ecological District but small in area.

UTAKURA RIVER BUSH

Survey no.	P05/101
Survey date	3 May 1995
Grid reference	P05 770 504
Area	51.7 ha (forest 18.2 ha; shrubland 33.6 ha)
Altitude	80-250 m asl

Ecological unit

- (a) Totara-manuka forest on hillslope (50%)
- (b) Totara-taraire-puriri forest on hillslope (40%)
- (c) Kahikatea forest on toeslope (5%)
- (d) Manuka shrubland on hillslope (5%)

Figure 87. Utakura River Bush, P05/101

Each grid is 1000 m × 1000 m and equals 100 ha.

s = shrubland; f = forest.

Landform/geology

South-facing catchments of secondary forest and shrubland underlain on the upper slopes by Kerikeri volcanic basalt flow remnant and associated talus downslope with Mangakahia Complex siliceous mudstone underlying the lower slopes.

Vegetation

Canopy species associated with type (a) above include bracken with occasional kahikatea and towai.

Type (b) includes occasional towai.

Totara occasionally occurs within the types (c) and (d).

Fauna

Not surveyed.

Significance

It is part of a mosaic of remnants which form a stepping stone linkage between Puketi Forest and Pukewharariki Forest.

5. Summary and Conclusions

A list of ecological units recorded in the Kaikohe Ecological District and their current protection status is set out in Table 2 (page 176) and a summary of the site evaluations is given in Table 3 (page 188).

TABLE 1. PROTECTED NATURAL AREAS NETWORK IN THE KAIKOHE ECOLOGICAL DISTRICT (Area given in ha).

SITE	NO.	STATUS					TOTAL
		QEII	SL	SR	SciR	OTHER	
Pukewharariki	P05/024		817				817
Guthries	P05/025		201				201
Mangatoa	P05/026		71.6				71.6
Aratoro	P05/001		28.4 380.6	54.2			463.2
Scotts Rd Bush	P05/002		10				10
Lake Omapere	P05/006		5.5				5.5
Waikaraka Stream Bush	P05/007	20					20
Remuera Settlement Rd	P05/038		1.7				1.7
Reservoir Bush	P05/029	5		49.7		25	79.7
Titihuatahu	P05/032	137.83					137.83
Ngawha	P05/033	35.46	43		17.8		96.26
Waikaramu Rd Bush	P05/066	13					13
Waimate Broadleaf Remnants	P05/067	9					9
Waikuku Rd Bush	P05/068	2				22.5 HR	24.5
TOTAL		222.29	1558.8	103.9	17.8	47.5	1950.29

Key: QEII = Queen Elizabeth II National Trust covenant; SL = Stewardship Land; SR = Scenic Reserve; SciR = Scientific Reserve; HR = Historic Reserve.

Note that most of these sites are larger than the area currently protected. The total area covered by sites described in this report is 13,790 ha, only 14.14 % of which currently has legal protection.

5.1 PRIORITY NATURAL AREAS FOR PROTECTION IN THIS ECOLOGICAL DISTRICT

1. Nationally rare habitat types

- old growth podocarp/kauri forest
- gumlands at Ngawha (including Rakautoa and Titihuatahu), Aratoro and Whakaruangangana
- broadleaf forest on volcanic cones and substrates with unique plant assemblages (Pouerua Bush, Kahutoto Stream Bush and Tauanui Bush)
- puriri forest on volcanic soil (Waimate North, Bullman Road and Remuera Settlement Road)
- wetlands
 - Kaipeha Swamp (one of the largest wetlands in Northland)
 - rare mineralised swamp forest (Puketotara-Patukauwae-Te Keene, Waingaruru, Lake Omapere and Youngs Kahikatea Remnant)
 - swamp shrubland and riverine forest (Moehau, Rurunga Stream, Taheke River, Mareoroa Swamps, Mangatoa/Punakitere)
- volcanic lakes - Owhareiti, Jacks, Tauanui

2. Ecological Units not well represented in the Ecological District

Kaikohe Ecological District contains a large number of ecological units, with at least 100 different vegetation types being recorded. Many of the ecological units not well represented in the District occur within the habitat types considered a priority in (1) above, or within the sites identified as important for threatened plant and animal species in (3) below.

Additional sites which are a priority for protection because they contain ecological units not well represented in the Ecological District include:

- Broadleaf forest on uncommon landforms
 - Mihi Rd (karaka-taraire and kahikatea-totara forest on Te Kuiti Group & Akarana Group calcareous mudstone and sandstone)
 - Waikaraka Stream Bush (taraire-puriri and taraire-towai forest on limestone)
 - Otamarangi Bush (taraire-puriri-towai forest on Te Kuiti glauconitic sandstone)
- Containing a conspicuous titoki component
 - Taumataraire (also on an uncommon landform in the Ecological District, Motatau Complex glauconitic sandstone)
- Containing a conspicuous kowhai component
 - Horeke Rd East (also important for its nikau and puriri components)
 - Waihoanga Stream Forest Outlier

- Containing a conspicuous kauri component

Monument Bush, Waihoanga Rd Bush, Whitecliffs, Carrs/Waimahe Stream and Te Toke Stream.

3. Threatened species habitat

Fauna

Kiwi habitat, especially large sites such as Waikaramu Rd, Hui te Werawera, Scotts Rd, Whakanekeneke Bush, Aratoro, Whitecliffs, Motukiore and Wairere Stream.

Sites important for waterfowl include Lake Owhareiti and Jacks Lake, and Lake Tauanui, and Ngawha is important for mudfish.

Flora

Sites containing threatened plants include Titihuatahu, Ngawha Springs, Ngawha Swamps, Aratoro, and Pouerua Bush. In addition, Pouerua Cone, Kahutoto Stream and Waikuku Rd contain uncommon species or assemblages.

TABLE 2. ECOLOGICAL UNITS RECORDED IN THE KAIKOHE ECOLOGICAL DISTRICT AND PROTECTED STATUS.

Key: SR = Scenic Reserve; SL = Stewardship Land; ScR = Scientific Reserve; QEII = Queen Elizabeth II National Trust covenant; HR = Historic Reserve; Pt = Partly protected; Blank = Unprotected; 2 = Level 2 site.

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
<i>SHRUBLAND</i>						
Manuka shrubland	O05/076	Pt SL	Horeke Rd East		Mang. sand & mud	Yes
	O05/084		Carrs/Waimahe Stream Bush		Mang.sand	
	O05/088		Moehau Wetland and Forest Remnant		Mang.sand; estuarine	
	P05/007		Waikaraka Stream Bush		Te Kuiti calc.mud & bioclastic sandy limestone bluffs; Akarana supergroup calc. mud & sand	
	P05/021		Utakura Bush		Mang. sand & mud	
	P05/025		Guthrie's Block		Mang. sand & Ngatuturi mudstone	Yes
	P05/027		Monument Bush		Mang sand; alluvium in east	Yes
	P05/042		Taumatataraire Stream Bush	Kerikeri basalt flow	Motatau glau. sand	Yes
	P05/047		Ngawhitu Bush		Motatau glau. sand & Mang. mud	
	P06/010		Punakitere Valley Swamp Forest	Taheke basalt lava flow	Alluvium	Yes
	P05/014		Te Toke Stream Shrubland	Kerikeri basalt plateau (east) & talus	Mang. mud	Yes
	O06/005		Taheke River Wetlands	Taheke basalt flow (alluvium)	Mang. mud	
	P05/017		Cooks Airstrip Block	Kerikeri basalt talus		
	P05/035		Youngs Kahikatea Remnant	Kerikeri basalt flow		
	P05/101		Utakura River Bush	Kerikeri basalt flow remnant & talus	Mang. sil. mud lower slopes	
Manuka/kanuka shrubland	O05/080	Pt HR?	Wairere Stream Forest Mosaic	Kerikeri basalt; talus	Mang.mud Okakari Stm	Yes
	O05/083		Pukewhao Forest Mosaic	Kerikeri basalt - trig	Mang. mud	Yes
	O05/085		Motukioere Bush Association		Mang. sand	
	P05/068		Waikuku Rd Bush	Kerikeri basaltic plateau remnants (east)	Mang. mud (west)	
	P05/074		D Cooks Bush	Kerikeri basalt flow remnant in NW	Mang. mud	
Manuka/kanuka-mahoe shrubland	O05/085		Motukioere Bush Association		Mang. sand	Yes
Manuka-mamangi-towai shrubland	P05/031		Rakautao Bush		Mang. mud	Yes
Manuka/kanuka-totara shrubland	P05/023		Waihoanga Bush	Kerikeri basalt & talus	Mang. mud	
	P05/027		Monument Bush		Mang. sand	
Manuka-gorse-totara shrubland	P06/086		Mangatoa/Punakitere Riverine		Mang. sil. mud & alluvium	

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Manuka-gorse shrubland	P05/073		Hui te Werawera Stream Bush	Kerikeri basalt (NW)	Mang. sand & mud under basalt talus (valleys)	
Gorse scrub	O05/085		Motukiore Bush Association		Mang. sand	
Manuka- <i>Hakea</i>	P06/089		Whakarungangana Gumfield		Mang. sand	
<i>Acacia</i> -manuka	P06/089		Whakarungangana Gumfield		Mang. sand	
Cabbage tree-manuka forest	P05/024	Pt SL	Pukewharariki Forest		Mang. sand	Yes
	P05/027		Monument Bush		Mang. sand; alluvium in east	Yes
	P05/032	Pt QEII?	Titihuatahu		Mang. mud; alluvium NW	Yes
Mamaku-totara shrubland	P05/037		Ngawha Bush	young Kerikeri basalt flow		Yes
Mamaku-hangehange shrubland	P05/044		Pouerua Cone	crater of volcanic cone		Yes
Mahoe-boxthorn-gorse- <i>Muehlenbeckia</i> shrubland	P05/050		Kahutoto Stream remnants	Kerikeri basalt flow		
Bracken-manuka shrubland	P05/066		Waikaramu Rd Bush	basalt escarp; valley talus	Mang. mud	Yes
GUMLAND						
Manuka shrubland	P05/001	Pt SL, SR	Aratoro Stream Bush		Akarana supergroup calc. mudstone & sand Porotekoitiemo Stm; Mang. sand/mud N & S Aratoro Stm	Yes
	P05/033	ScR, SL	Ngawha			Yes
Manuka- <i>Gleichenia</i> shrubland	P05/031		Rakautao Bush		Mang. mud	Yes
<i>Gleichenia</i> fernland	P05/033	ScR, SL, Pt QEII	Ngawha Geothermal Field		mudstone	Yes
<i>Baumea-Schoenus</i> -manuka	P05/033	ScR, SL	Ngawha Geothermal Field		mudstone	Yes
<i>Gleichenia-Schoenus-Baumea</i>	P06/089		Whakarungangana Gumfield		Mang. sand	Yes
Manuka- <i>Baumea-Gleichenia</i> shrubland	P06/089		Whakarungangana Gumfield		Mang. sand	Yes
	P05/032	Pt QEII	Titihuatahu		Mang. mud; alluv. NW	Yes
<i>Baumea complanata</i> sedgeland	P05/033	ScR, SL	Ngawha Geothermal Field		mudstone	Yes

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
BROADLEAF FOREST						
Manuka/kanuka-towai forest	O05/079		Otautu Stream Headwaters		Mang. sand	Yes
	O05/080		Wairere Stream Forest Mosaic	Kerikeri basalt; talus	Mang. mud Okakari Stm	
	P05/073		Hui te Werawera Stream Bush	Kerikeri basalt (NW)	Mang. sand & mud under basalt talus (valleys)	Yes
	P05/022-2		Harrison Rd Bush		Mang. sand	
Kanuka-towai forest	P05/001	Pt SL, SR	Aratoro Stream Bush	Kerikeri basalt & talus on escarpments & slopes N of Aratoro Stm	Akarana supergroup calc. mudstone & sand Porotekoitiemo Stm; Mang. sand/mud N & S Aratoro Stm	Yes
Towai-kanuka-rewarewa forest	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus	Mang. sand & mud	Yes
Kanuka-tairare forest	O05/080 O05/085		Wairere Stream Forest Mosaic Motukiore Bush Association	Kerikeri basalt; talus	Mang. mud Okakari Stm Mang. sand	Yes Yes
Tairare forest	P05/005		Whakanekeneke River Bush	Kerikeri basalt plateau & talus	Te Kuiti bioclastic sand; limestone bluffs; Mang. sand/mud alluvium	Yes
	P05/024	Pt SL	Pukewharariki Forest		Mang. sand	
	P05/025	Pt SL	Guthrie's Block		Mang. sand & Ngatuturi mudstone (NE)	
	P05/026	Pt SL	Mangatoa Stream Bush	Kerikeri basalt flow (W)	Mang. sand; alluvium	Yes
	P05/027		Monument Bush		Mang. sand	
	P05/038		Remuera Settlement Rd Remnants	flanks/within andesitic basalt volcano		Yes
	P05/047		Ngawhitu Bush		Motatau glau. sand & Mang. mud	Yes
	P06/007 P05/022-2		Tauanui Volcanic Lake & Environs Harrison Rd Bush	Taheke basalt & Tangihua	Mang. sand	Yes
Karaka-tairare forest	P05/011		Mihi Rd Bush		Te Kuiti Group; Akarana Group calc. mud & sand (N); Mang. sand (S)	Yes
Tairare-puriri forest (12 sites)	O05/079		Otautu Stream Headwaters		Mang. sand	Yes
	P05/007	QEII	Waikaraka Stream Bush		Te Kuiti calc. mud & bioclastic sandy limestone bluffs	Yes
	P05/016		Cooks Rd Bush No. B		Mang. sand	
	P05/023		Waihoanga Bush	Kerikeri basalt escarpment	Mang. mud & sand	
	P05/068	Pt HR, QEII	Waikuku Rd Bush	Kerikeri basaltic plateau remnants (E)	Mang. mud (W)	
	P05/071		Wehirua Rd Bush	Kerikeri basalt plateau; basalt talus	Mang. mud	
	P06/008		Tauanui Volcanic Broadleaf Remnants	Taheke basalt lava flow	overlain by Mang. sand & mud	Yes

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
	P05/001	Pt SR, SL	Aratoro Stream Bush	Kerikeri basalt & talus N of Aratoro Stm		Yes
	P05/036		Kopenui Stream remnants	young Kerikeri basalt flow		
	P05/037		Ngawha Bush	young Kerikeri basalt flow		Yes
	P05/041		Waitaheke Rd Bush	young Kerikeri basalt flow		
	P05/044		Pouerua Cone	crater of volcanic cone		Yes
Taraire-puriri-towai forest	P05/003		Otamarangi Stream Bush		Te Kuiti glauconitic sand; Mang. sand/mud	Yes
Towai forest (10 sites)	O05/088	Pt SR; SL	Moehau Wetland and Forest Remnant		Mang. sand	
	P05/027		Monument Bush		Mang. sand; alluvium (E)	
	P05/001		Aratoro Stream Bush	Kerikeri basalt & talus on escarpments & slopes N of Aratoro Stm	Akarana supergroup calc. mudstone & sand Porotekoitiamo Stm; Mang. sand/mud N & S of Aratoro Stm	Yes
	P05/026	SL	Mangatoa Stream Bush	Kerikeri basalt flow (W)	Mang. sand; alluvium	Yes
	P05/027		Monument Bush		Mang. sand	Yes
	P05/028	Pt HR, QEII	Waihoanga Road Bush	basalt talus SE valley	Mang. sand	Yes
	P05/068		Waikuku Rd Bush	Kerikeri basaltic plateau remnants (E)	Mang. mud (W)	
	P05/071		Wehirua Rd Bush	Kerikeri basalt plateau; basalt talus	Mang. mud	
	P05/073		Hui te Werawera Stream Bush	Kerikeri basalt (NW)	Mang. sand & mud under basalt talus (valleys)	Yes
	P05/038		Remuera Settlement Rd Remnants	andesitic basalt volcano		Yes
	P05/041		Waitaheke Rd Bush	young Kerikeri basalt flow		
Towai-taraire forest (10 sites)	O05/077		Omao Bush	Kerikeri basalt; talus	Mang. sand; lower slopes	
	O05/080		Wairere Stream Forest Mosaic	Kerikeri basalt; talus	Mang. mud Okakari Stm	Yes
	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus	Mang. sand & mud	
	P05/007		Waikaraka Stream Bush		Te Kuiti calc. mud. & bioclastic sandy limestone bluffs; Akarana supergroup calc. mud & sand	Yes
	P05/014	Pt SL	Te Toke Stream Shrubland	Kerikeri basalt plateau (E) & talus	Mang. mud	
	P05/017		Cooks Airstrip Block	Kerikeri basalt talus	Mang. mud	
	P05/024		Pukewharariki Forest		Mang. sand	
	P05/029		Reservoir Bush	Kerikeri basaltic eroded volcano		
	P05/032	Pt QEII	Titihuatahu		Mang. mud; alluv. NW	
	P06/007		Tauanui Volcanic Lake & Environs	Taheke basalt & Tangihua		Yes
Towai-tawa forest	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus	Mang. sand & mud	Yes

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Towai-rewarewa forest	P05/024	Pt SL	Pukewharariki Forest		Mang. sand	Yes
Puriri forest	P05/038	Pt QEII Pt HR; QEII	Remuera Settlement Rd Remnants	andesitic basalt volcano	Mang. mud (W)	Yes
	P05/067		Waimate Broadleaf Remnants	Kerikeri basalt flow & eruptive centre remn.		Yes
	P05/068		Waikuku Rd Bush	Kerikeri basaltic plateau remnants (E)		Yes
	P05/069		Bullman Rd Broadleaf Remn.	Kerikeri basalt		Yes
Puriri-karaka-kowhai forest	O05/076		Horeke Road East Bush		Tang./Mang.	Yes
Puriri-kowhai forest	P05/008		Waihoanga Stream Forest Outlier		Te Kuiti glauconitic sand; Waipapa horst Mang. sand/mud	Yes
Kanuka-kowhai forest	O05/078		Rurunga Stream Forest		alluvium	Yes
Puriri-titoki-taraire forest	P05/042		Taumataraire Stream Bush	Kerikeri basalt flow	Mang. mud (Waiauru); Motatau glau. sand (Taumataraire)	Yes
Puriri-titoki forest	P05/045		Pouerua Bush	Kerikeri basalt flow; no soil		Yes
Titoki-taraire-mahoe forest	P05/050		Kahutoto Stream remnants	Kerikeri basalt flow		Yes
Titoki-karaka-mahoe forest	P05/050		Kahutoto Stream remnants	Kerikeri basalt flow		Yes
BROADLEAF-PODOCARP FOREST Manuka/kanuka-totara forest	O05/079 O05/078 P05/073 P06/086		Otautu Stream Headwaters Rurunga Stream Forest Hui te Werawera Stream Bush Mangatoa/Punakitere Riverine	Kerikeri basalt (NW)	Mang. sand Mang. sand Mang. sand & mud under basalt talus (valleys) Mang. sil. mud & alluvium	Yes
Totara-manuka forest	P05/024 P05/101	Pt SL	Pukewharariki Forest Utakura River Bush	Kerikeri basalt flow remnant & talus	Mang. sand Mang. sil. mud lower slopes	
Totara-kanuka forest	P05/070		Lake Omapere Swamp Forest Remnant	basalt flows & alluvium		
	P05/017		Cooks Airstrip Block	Kerikeri basalt talus	Mang. mud	Yes
	O06/005		Taheke River Wetlands	Taheke basalt alluvium		Yes
	P06/018		Kaipaha Swamp		Mang. sed.	Yes

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Manuka-kanuka-towai-totara forest	P05/017		Cooks Airstrip Block	Kerikeri basalt talus	Mang. mud	
Manuka/kanuka-tanekaha forest	O05/080 O05/083		Wairere Stream Forest Mosaic Pukewhao Forest Mosaic	Kerikeri basalt; talus Kerikeri basalt - trig	Mang. mud Okakari Stm Mang. mud.	Yes Yes
Manuka-totara-tanekaha forest	P05/001	Pt SR; SL	Aratoro Stream Bush	Kerikeri basalt & talus on escarpments & slopes N of Aratoro Stm	Akarana supergroup calc. mudstone & sand Porotekoitiemo Stm; Mang. sand/mud N & S of Aratoro Stm	Yes
Manuka-totara-tanekaha shrubland	P05/014 O05/076		Te Toke Stream Shrubland Horeke Road East Bush	Kerikeri basalt plateau (E) & talus	Mang. mud Mang. sand & mud	Yes Yes
Totara-tanekaha-manuka	P05/026	Pt SL	Mangatoa Stream Bush	Kerikeri basalt flow (W)	Mang sand; alluvium	
Kanuka-totara-tanekaha forest	O05/084 O05/085		Carrs/Waimahe Stream Bush Motukioere Bush Association		Mang. sand Mang. sand	
Kanuka-tanekaha-towai forest	O05/082		Whitecliffs Ltd Bush	Kerikeri basalt upper slopes	Mang. sand & talus downslope	Yes
Kanuka-totara-taraire forest	O05/084		Carrs/Waimahe Stream Bush		Mang. sand	Yes
Kahikatea-totara-manuka forest	O05/077 P05/013		Omao Bush Forest Rd Bush	Kerikeri basalt; talus	Mang. sand; lower slopes Akarana Supergroup sand & mud (N); Mang. mud (S)	Yes
Kanuka-totara-kahikatea forest	P05/021		Utakura Bush		Mang. sand & mud	Yes
Totara-kahikatea-kanuka	P05/012 P06/018		Okoro Stream Bush Kaipeha Swamp	Kerikeri basalt (upper) ponded by Taheke basalt lava flow	Mang. sand downslope Mang. sed.	Yes
Kanuka-kahikatea forest	P06/018		Kaipeha Swamp	ponded by Taheke basalt lava flow	Mang. sed.	Yes
Taraire-totara-kanuka forest	P05/031		Rakautao Bush		Mang. mud	Yes
Taraire-totara forest	P05/008 O05/076		Waihoanga Stream Forest Outlier Horeke Road East Bush		Te Kuiti glauconitic sand; Waipapa horst; Mang. sand/mud Tang./Mang.	

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Taraire-totara forest (continued)	P05/014		Te Toke Stream Shrubland	Kerikeri basalt plateau (E) & talus Kerikeri basalt plateau & talus (W)	Mang. mud	
	P05/015		Cooks TV Block		Mang. mud (E)	Yes
	P06/019		Punakitere/Ninihi Rd Bush		Mang. sand	Yes
Taraire-totara-kanuka forest	P05/031		Rakautao Bush		Mang. mud	
Kahikatea-taraire forest	O05/076		Horeke Road East Bush		Tang./Mang.	
Nikau-kahikatea-taraire forest	O05/076		Horeke Road East Bush		Tang./Mang.	Yes
Taraire-puriri-kahikatea forest	P05/010		Donaldsons Road Bush		Mang. sand & mud; Akarana Group calc. mud & sand	Yes
Taraire-totara-kahikatea forest	O05/085		Motukiore Bush Association	Kerikeri basalt lava plateau & talus	Mang. sand	Yes
	P05/002		Scotts Road Bush		Mang. sand & mud	Yes
Totara-taraire-puriri forest	O05/082		Whitecliffs Ltd Bush	Kerikeri basalt upper slopes	Mang. sand & talus downslope	
	P05/012		Okoro Stream Bush	Kerikeri basalt (upper)	Mang. sand downslope	
	P05/018		Puriri Farm Bush	Kerikeri basalt flow & talus		Yes
	P05/066	Pt QEII	Waikaramu Rd Bush	basalt escarpment; valley talus	Mang. mud	Yes
	P05/101-2		Utakura River Bush	Kerikeri basalt flow remnant & talus	Mang. sil. mud lower slopes	
Totara-puriri forest	P05/071		Wehirua Rd Bush	Kerikeri basalt plateau & talus	Mang. mud	
Puriri-totara-kahikatea forest	O05/076		Horeke Road East Bush	young Kerikeri basalt flow Kerikeri basalt flow	Tang./Mang.	Yes
	P05/041		Waitaheke Rd Bush			
	P05/076-2		Okokako Rd Remnant			
Towai-totara forest	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus	Mang. sand & mud	Yes
	P05/006		Lake Omapere and Environs	Kerikeri basalt	Mang. sand; alluvium	
Totara-manuka-towai forest	P05/014		Te Toke Stream Shrubland	Kerikeri basalt plateau (E) & talus	Mang. mud	
Totara-towai-kanuka forest	P05/031		Rakautao Bush		Mang. mud	Yes

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Towai-totara-rewarewa forest	P05/031		Rakautao Bush		Mang. mud	Yes
Totara-kahikatea-towai forest	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus	Mang. sand & mud	Yes
	P05/029	Pt SR	Reservoir Bush	Kerikeri basaltic eroded volcano		
Totara-towai-taraire forest	P05/073		Hui te Werawera Stream Bush	Kerikeri basalt (NW)	Mang. sand & mud under basalt talus (valleys)	Yes
Towai-tanekaha	O05/080		Wairere Stream Forest Mosaic	Kerikeri basalt; talus	Mang. mud Okakari Stm	Yes
	O05/083		Pukewhao Forest Mosaic	Kerikeri basalt - trig	Mang. mud	Yes
	P05/025	Pt SL	Guthrie's Block		Mang. sand & Ngatuturi mudstone (NE)	Yes
PODOCARP FOREST						
Totara forest (secondary)	P05/030		How Rd Bush	Kerikeri basalt flow		Yes
	P05/036		Kopenui Stream Remnants	young Kerikeri basalt		
	P05/038		Remuera Settlement Rd Remnants	andes. basalt volcano		Yes
	P05/042		Taumatataraire Stream Bush	Kerikeri basalt flow	Mang. mud (Waiauruhe); Motatau glau. sand (Taumatataraire)	
	P05/066	Pt QEII	Waikaramu Rd Bush	basalt escarpment; valley talus	Mang. mud	
	P05/068	Pt QEII HR	Waikuku Rd Bush	Kerikeri basaltic plateau remnants	Mang. mud (W)	
	P05/069		Bullman Rd Broadleaf Remnants	Kerikeri basalt		
	P05/071		Wehirua Rd Bush	Kerikeri basalt plateau & talus	Mang. mud	Yes
	P05/075		Atkins/Ohaio Bush	Kerikeri basalt & talus in north	Mang. mud valley & alluvium	
	P06/086		Mangatoa/Punakitere Riverine		Mang. sil. mud & alluvium	Yes
	P05/022-2		Harrison Rd Bush		Mang. sand	
	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus		
	P05/072-2		Scott Rd Remnants	Kerikeri basalt remnant plateau		
Kahikatea forest	O05/084		Carrs/Waimahe Stream Bush		alluvium	
	P05/006		Lake Omapere and Environs		alluvium	
	P05/024	Pt SL	Pukewharariki Forest		alluvium	
	P05/027		Monument Bush		Mang. sand; alluv. (E)	Yes
	P05/043		Waiauruhe Bush Remnants	alluvium ponded by basalt flow		Yes
	P06/010		Punakitere Valley Swamp Forest	Taheke basalt lava flow	alluvium underlain Mang. sand & mud	Yes
	P05/039		South Omapere Kahikatea Remn.		alluvium	
	O05/076		Horeke Road East Bush		Tang./Mang.	Yes
	P05/025	Pt SL	Guthrie's Block		Mang. sand	
	P05/007		Waikaraka Stream Bush		Akarana supergroup calc. mud & sand	

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Kahikatea forest (continued)	P05/008		Waihoanga Stream Forest Outlier		Te Kuiti glauconitic sand; Waipapa horst; Mang. sand/mud	Yes
	P05/013		Forest Rd Bush		Akarana Supergroup sand & mud (N) Mang. mud (S)	
	P05/023		Waihoanga Bush		Mang. mud & sand - toeslope	
	P05/047		Ngawhitu Bush		Motatau glau. sand & Mang. mud	Yes
	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus		Yes
	P05/018		Puriri Farm Bush	Kerikeri basalt flow & talus Waiharakeke	Mang. sand	
	P05/075		Atkins/Ohaio Bush	Kerikeri basalt & talus in north	Mang. mud valley & alluvium	Yes
	P05/101-2		Utakura River Bush	Kerikeri basalt & talus	Mang. sil mud lower slopes	
	P05/042		Taumatataraire Stream Bush	Kerikeri basalt flow	Mang. mud (Waiaruhe); Motatau glau. sand (Taumatataraire)	Yes
	P05/035		Youngs Kahikatea Remnant	Kerikeri basalt flow		Yes
	P05/038		Remuera Settlement Rd Remnants	andesitic basalt volcano		Yes
	P05/041		Waitaheke Rd Bush	young Kerikeri basalt flow		
	P05/050		Kahutoto Stream remnants	Kerikeri basalt flow		Yes
	P06/007		Tauanui Volcanic Lake & Environs	Taheke basalt & Tangihua		Yes
	P05/076-2		Okokako Rd Remnant	Kerikeri basalt flow/ eruptive remnant		
Kahikatea-totara forest	P05/003		Otamarangi Stream Bush		Te Kuiti glauc. sand; Mang. sand/mud	
	P05/005		Whakanekeneke River Bush	Kerikeri basalt plateau & talus	Te Kuiti bioclastic sand; limestone bluffs; Mang. sand & mud; alluvium	Yes
	P05/010		Donaldsons Road Bush		Mang. sand & mud; Akarana Group calc. mud & sand	
	P05/011		Mihi Rd Bush		Mang. sand (S)	Yes
	P05/014		Te Toke Stream Shrubland		alluvium	Yes
	P05/016		Cooks Rd Bush No. B		Mang. sand	
	P05/017		Cooks Airstrip Block	Kerikeri basalt talus	Mang. mud	
	P05/030		How Rd Bush	Kerikeri basalt flow		
	P05/047		Ngawhitu Bush		Motatau glau. sand & Mang. mud	Yes
	P05/068	? Pt HR; QEII	Waikuku Rd Bush	Kerikeri basaltic plateau remnants	Mang. mud (W)	
	P05/073		Hui te Werawera Stream Bush	Kerikeri basalt (NW)	Mang. sand & mud under basalt talus	Yes
	P05/074		D Cooks Bush	Kerikeri basalt flow (NW)	Mang. mud	Yes
	P06/019		Punakitere/Ninihi Rd Bush		Mang. sand	

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Kahikatea-totara forest (continued)	P05/009-2 P05/065-2		Lamberg Rd Bush Ngaungau Pa Bush	Kerikeri volcanics	Mang. mud Mang. mud	
Kahikatea-tanekaha-totara forest	P05/015		Cooks TV Block	Kerikeri basalt plateau & talus (W)	Mang. mud (E)	Yes
Rimu-totara-miro-kahikatea forest	P05/024	Pt SL	Pukewharariki Forest		Mang. sand	Yes
Totara-rimu forest	P05/066	Pt QEII?	Waikaramu Rd Bush	basalt escarpment; valley talus	Mang. mud	Yes
Tanekaha shrubland	P05/017		Cooks Airstrip Block	Kerikeri basalt & talus	Mang. mud.	Yes
KAURI Taraire-totara-kauri-tanekaha forest	O05/084		Carrs/Waimahe Stream Bush		Mang. sand	Yes
Kauri forest	P05/014		Te Toke Stream Shrubland	Kerikeri basalt plateau (E) & talus	Mang. mud	Yes
Kauri-towai forest	P05/032	Pt QEII?	Titihuatahu		Mang mud; alluv. (NW)	Yes
Manuka/kanuka-towai-kauri forest	O05/081		Whitecliffs		Mang. sand	Yes
Kauri-tanekaha forest	O05/088		Moehau Wetland and Forest Remnant		Mang. sand; estuarine	Yes
Kauri-rimu forest	P05/002		Scotts Road Bush	Kerikeri basalt lava plateau & talus		Yes
Kauri-kawaka forest	P05/024		Pukewharariki Forest		Mang. sand	Yes
WETLANDS Open water	P05/006 P05/046 P06/007 P06/080 P06/088 P05/004-2		Lake Omapere and Environs Lake Owhareiti Tauanui Volcanic Lake & Environs Korowhata Stream Pond Tautoro Wetland Waiare Rd Pond	Kerikeri basalt Lakes ponded by Kerikeri basalt flows Taheke basalt & Tangihua remnant basalt plateau	Mang.sand; alluvium Motatau Complex glau. sand (Jacks); Mang. mud (Owhareiti) alluvium Mang. mud	Yes Yes Yes Yes
Raupo reedland	O05/078 O05/086 O06/005 P05/024 P05/034 P05/041		Rurunga Stream Forest Maraeroa Swamps Taheke River Wetlands Pukewharariki Forest Ngawha Swamps Waitaheke Rd Bush	Taheke basalt flow Kerikeri basalt flow young Kerikeri basalt flow	Mang. sand alluvium/estuarine Mang. sand alluvium	Yes Yes Yes Yes

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
Raupo reedland (continued)	P05/046		Lake Owhareiti	Lakes ponded by Kerikeri basalt flows	Motatau Complex glau. sand (Jacks); Mang. mud (Owhareiti)	Yes
	P05/050		Kahutoto Stream remnants	Kerikeri basalt flow	alluvium	Yes
	P05/064		Puketotara/Patukauwae/ Te Keene Stream Swamp			
	P05/066		Waikaramu Rd Bush	basalt escarpment; valley talus	Mang. mud	
	P06/018		Kaipeha Swamp	ponded by Taheke basalt lava flow	Mang. sed.	Yes
	P06/019		Punakitere/Ninihi Rd Bush		alluvium	
	P06/080		Korowhata Stream Pond		alluvium	
Raupo- <i>Calystegia</i> sp. association	O05/085		Motukiore Bush Association		Mang. sand	
Raupo- <i>Carex</i> association	P05/019		Okaka Rd Wetland		Holocene alluvium	Yes
Raupo- <i>Baumea</i> association	P05/020		Horeke Rd Swamp		Holocene alluvium	Yes
	P05/031		Rakautao Bush		Mang. mud	Yes
<i>Baumea</i> sedgeland	P06/018		Kaipeha Swamp	ponded by Taheke basalt lava flow	Mang. sed.	Yes
<i>Baumea-Schoenus</i> -manuka bog assoc.	P05/033	Pt QEII	Ngawha Geothermal Field		mudstone	Yes
Toetoe-raupo	P05/040		Waingaruru Stream Swamp	young Kerikeri basalt flow		Yes
Cabbage tree-raupo	P05/040		Waingaruru Stream Swamp	young Kerikeri basalt flow		Yes
Flax-raupo	P05/040		Waingaruru Stream Swamp	young Kerikeri basalt flow		Yes
Flax	P05/039		South Omapere Kahikatea Remnant		Mang. sand	Yes
Manuka-flax	P06/018		Kaipeha Swamp	ponded by Taheke basalt lava flow	Mang. sed.	Yes
<i>Juncus</i> rushland	P05/006		Lake Omapere and Environs	Kerikeri basalt	Mang. sand; alluvium	Yes
<i>Eleocharis</i> sedgeland	P05/046		Lake Owhareiti	Lakes ponded by Kerikeri basalt flows	Motatau Complex glau. sand (Jacks); Mang. mud (Owhareiti)	Yes
	P06/088		Tautoro Wetland		Mang. mud	
	P05/004		Waiare Rd Pond	remnant basalt plateau		

VEGETATION	SITE NO.	STATUS	SITE NAME	VOLCANIC	SEDIMENTARY	REP. SITE
<i>Apodasmia</i> sedgeland	O05/086		Maraeroa Swamps		alluvium/estuarine	Yes
<i>Carex</i> sedgeland	P06/088		Tautoro Wetland		Mang. mud	Yes
Willow- <i>Carex</i> assoc.	P05/050		Kahutoto Stream remnants	Kerikeri basalt flow		
Crack willow treeland	P05/064		Puketotara/Patukauwae/ Te Keene Stream Swamp		alluvium	
SWAMP SHRUBLAND & FOREST						
Manuka swamp shrubland	P05/006		Lake Omapere and Environs	Kerikeri basalt	Mang. sand; alluvium	Yes but destroyed 1997
Manuka- <i>Baumea</i>	P06/018		Kaipeha Swamp	ponded by Taheke basalt lava flow	Mang. sed.	Yes
Manuka-cabbage tree- <i>Carex</i> assoc.	P05/019		Okaka Rd Wetland		Holocene alluvium	Yes
Manuka- <i>Coprosma propinqua</i> swamp shrubland	P05/064		Puketotara/Patukauwae/ Te Keene Stream Swamp		alluvium	Yes
Kohuhu-manuka-putaputaweta shrubland	P06/010		Punakitere Valley Swamp Forest		alluvium	Yes
<i>C. propinqua-C. rigida-Bolboschoenus</i> swamp shrubland	O05/088		Moehau Wetland and Forest Remnant		Mang. sand; estuarine	Yes
Kowhai- <i>C. propinqua-Gabnia</i> swamp forest	O05/088		Moehau Wetland and Forest Remnant		Mang. sand; estuarine	Yes
Kahikatea swamp forest	P05/064		Puketotara/Patukauwae/ Te Keene Stream Swamp		alluvium	Yes
Kahikatea-pukatea swamp forest	P05/070		Lake Omapere Swamp Forest Remnant	basalt flows	alluvium	Yes
	P05/040		Waingaruru Stream Swamp	young Kerikeri basalt flow		Yes
Kahikatea-cabbage tree swamp forest	P06/018		Kaipeha Swamp	ponded by Taheke basalt lava flow	Mang. sed.	Yes
Kahikatea-cabbage tree-swamp maire swamp forest	P05/034		Ngawha Swamps	Kerikeri basalt flow	alluvium	Yes
	P05/035		Youngs Kahikatea Remnant	Kerikeri basalt flow		Yes
Kahikatea-kanuka forest	O05/086		Maraeroa Swamps		alluvium/estuarine	Yes

TABLE 3. SUMMARY OF SITE EVALUATIONS (e.u.s = ecological units; regen. = regenerating).

SITE	SITE NO.	REPRESENTATIVENESS	RARITY/SPECIAL FEATURES	
<i>Level 1 sites</i>				
Horeke Road East Bush	O05/076	Rep. site for 4 e.u.s	Kiwi likely	
Omao Bush	O05/077		Species assemblage of bot. interest	
Rurunga Stream Forest	O05/078	Rep. site for 2 e.u.s	Wetland & alluvial forest; fernbird	
Otautu Stream Headwaters	O05/079	Rep. site for 2 e.u.s	Kukupa; emergents	
Wairere Stream Forest Mosaic	O05/080	Rep. site for 6 e.us	Kiwi, kukupa	
Whitecliffs	O05/081	Rep. site	Kiwi likely	
Whitecliffs Ltd Bush	O05/082	Rep. site for 1 e.u.	Kukupa, kiwi	
Pukewhao Forest Mosaic	O05/083	Rep. site for 2 e.u.s	Some coastal riparian values	
Carrs/ Waimahe Stream Bush	O05/084	Rep. site for 3 e.u.s	Kiwi, kauri snail	
Motukiore Bush Association	O05/085	Rep. site for 3 e.u.s	Kiwi, kukupa, spotless crane	
Maraeroa Swamps	O05/086	Rep. site for 3 e.u.s	Spotless crane; wetland & alluvial forest	
Moehau Wetland and Forest Mosaic	O05/088	Rep. site for 3 e.u.s	Rare swamp forest and shrubland	
Taheke River Wetlands	O06/005	Rep. site for 1 e.u.	Wetland	
Aratoro Stream Bush	P05/001	Rep. site for all 5 e.u.s	Kiwi, kukupa, fernbird, pied tit; 1 threatened plant sp.; national soil site; gumland	
Scotts Road Bush	P05/002	Rep. site for 5 e.u.s	Kiwi, kukupa	
Otamarangi Stream Bush	P05/003	Rep. site for 1 e.u.	Kukupa	
Whakanekeneke River Bush	P05/005	Rep. site for 2 e.u.s	Kiwi, kukupa	
Lake Omapere and Environs	P05/006	Largest lake in region; rep. site for 2 e.u.s	<i>Isoetes</i> aff. <i>kirkii</i> , bittern, fernbird	
Waikaraka Stream Bush	P05/007	Rep. site for 4 e.u.s	Kukupa	
Waihoanga Stream Forest Outlier	P05/008	Rep. site for 2 e.u.s		
Donaldsons Road Bush	P05/010	Rep site for 1 e.u.		

	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/CORRIDOR	SIZE & SHAPE
	7 e.u.s		Some riparian protection	c. 300 ha
		Regen.	Partial linkage	c. 50 ha
				46 ha
		40% regen.	Refuge	>160 ha
	6 e.u.s; kawaka, whau, n. rata emergent	70% regen.	Linked by pines to 2 other sites; refuge	>300 ha
	1 e.u.		Refuge; 2 areas linked by pines	70 ha
	2 e.u.s; some n. rata emergent		Linked by pines to 2 other sites; refuge	c. 50 ha
	3 e.u.s	Regen.	Close to O05/080; catchment protection	c. 240 ha
	emergent element	>50% regen.		c. 130 ha
	7 e.u.s including wetland	Linked by scrub	Some catchment protection	c. 400 ha
	3 e.u.s	2 sites; no weeds or grazing		6.5 ha
	5 e.u.s; grades from CMA to 155 m asl	Some drains & stop-banks; weeds		120 ha
	3 e.u.s	2 sites 1 km apart	adjacent CMA	9.5 ha
	diversity of rock types; > 10 sp. orchid	Intact		c. 670 ha
	9 e.u.s; river regionally significant		Catchment protection; partial linkage	200 ha
	3 e.u.s		Catchment protection; partial linkage	30 ha
	4 e.u.s; diversity of rock types	10 sites	Some riparian buffering	140 ha
	5 e.u.s			>1200 ha
	4 e.u.s		Partial linkage	c. 50 ha
	3 e.u.s	Heavily grazed	Partial linkage	c. 45 ha
	2 e.u.s	Several sites	Partial linkage	c. 70 ha

SITE	SITE NO.	REPRESENTATIVENESS	RARITY/SPECIAL FEATURES	
Mihi Road Bush	P05/011	Rep. site for 2 e.u.s	Kiwi, kukupa	
Okoro Stream Bush	P05/012		Kiwi, kukupa	
Forest Road Bush	P05/013	Rep. site for 2 e.u.s	Contiguous with Puketi	
Te Toke Stream Shrubland	P05/014	Rep. site for 5 e.u.s	Possibly kiwi	
Cooks TV Block	P05/015	Rep. site for 2 e.u.s	Kiwi likely	
Cooks Road Bush No. B	P05/016		Kiwi, kukupa	
Cooks Airstrip Block	P05/017	Rep. site for 2 e.u.s	Kiwi, kukupa, kauri snail	
Puriri Farm Bush	P05/018	Rep. site for 1 e.u.	Kukupa	
Okaka Road Wetland	P05/019	Rep. site for 2 e.u.s	Rare wetland types	
Horeke Road Swamp	P05/020	Rep. site for 1 e.u.	Wetland	
Utakura Bush	P05/021	Rep. site for 1 e.u.		
Waihoanga Bush	P05/023		Kiwi, kukupa, kauri snail	
Pukewharariki Forest	P05/024	Rep. site for 3 e.u.s largest forest in ED;	Kiwi, kukupa, pied tit, kauri snail; national soil site	
Guthries Block	P05/025	Rep. site for 2 e.u.s	Kiwi	
Mangatoa Stream Bush	P05/026		Possibly kiwi	
Monument Bush	P05/027	Rep. site for 4 e.u.s		
Waihoanga Road Bush	P05/028	Rep. site for 1 e.u.		
Reservoir Bush	P05/029		Kukupa, kauri snail, possibly kiwi	
How Road Bush	P05/030	Rep. site for 1 e.u.	Kauri snail	
Rakautao Bush	P05/031	Rep. site for 5 e.u.s	Fernbird, kiwi in adjacent site	
Titihuatahu	P05/032	Rep. site for 3 e.u.s	Kiwi, fernbird; 3 threatened plants gumland	
Ngawha Geothermal Field	P05/033	Rep. site for 4 e.u.s	Northland mudfish, fernbird, spotless crane, bittern; gumland 4 threatened plants	
Ngawha Swamps	P05/034	Rep. site for 2 e.u.s	Bittern, spotless crane; <i>Thelypteris confluens</i> record 1984; wetland/swamp forest	

	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/CORRIDOR	SIZE & SHAPE
	2 e.u.s		Partial linkage	160 ha
	2 e.u.s		Partial linkage	c. 70 ha
	2 e.u.s	Secondary forest		27 ha
	7 e.u.s		Some catchment protection; partial linkage	740 ha
	2 e.u.s		Linked to 2 other sites	27 ha
	2 e.u.s	Possum and stock damage	Some riparian protection	25 ha
	6 e.u.s			196 ha
	2 e.u.s		Some riparian values	c. 60 ha
	2 e.u.s			c. 7 ha
	1 e.u.			8 ha
	2 e.u.s	Gorse within shrubland	Partial linkage	c. 175 ha
	3 e.u.s	Possum and stock damage	Riparian values	c. 100 ha
	9 e.u.s; 10 sp. gymnosperm; uncommon plant sp.	Varies - some intact forest	Linked to other areas	c. 3000 ha
	4 e.u.s		Close to P05/024	255 ha
	3 e.u.s			c. 70 ha
	6 e.u.s		Some riparian values	c. 60 ha
	1 e.u.		Some riparian values	c. 30 ha
	2 e.u.s	Some stock and weed damage		>100 ha
	2 e.u.s	4 sites	Some riparian values	30 ha
	6 e.u.s		Refuges within pines	c. 370 ha
	4 e.u.s			c. 1000 ha
	4 e.u.s			181 ha
	2 e.u.s	Some crack willow		24 ha

SITE	SITE NO.	REPRESENTATIVENESS	RARITY/SPECIAL FEATURES PATTERN	
Youngs Kahikatea Remnant	P05/035	Rep. site for 2 e.u.s	Swamp forest and volcanic soils	
Ngawha Bush	P05/037	Rep. site for 2 e.u.s	Volcanic broadleaf forest	
Remuera Settlement Road Remnants	P05/038	Rep. site for 5 e.u.s	Andesitic basalt volcano	
South Omapere Kahikatea Remnant	P05/039	Rep site for 1 e.u.	Last sites adjoining lake	
Waingaruru Stream Swamp	P05/040	Rep. site for 4 e.u.s rare swamp and wetland types	Banded rail, bittern, spotless crane	
Waitaheke Road Bush	P05/041	Rep. site for 1 e.u.	Volcanic soils	
Taumatataraire Stream Bush	P05/042	Rep. site for 2 e.u.s	Uncommon forest type	
Waiaruhe Bush Remnants	P05/043	Rep. site	Secondary podocarp forest	
Pouerua Cone	P05/044	Rep. site for 2 e.u.s	Volcanic crater; endemic snails	
Pouerua Bush	P05/045	Rep. site for 1 e.u. Unique in ED plant sp.; coastal species; kukupa	Rare forest type; 2 threatened	
Lake Owhareiti and Jacks Lake	P05/046	Rep. site for 1 e.u.	Best waterfowl site in ED	
Ngawhitu Bush	P05/047	Rep. site for 3 e.u.s	Kauri snail	
Kahutoto Stream Remnant	P05/050	Rep. site for 3 e.u.s; unique in ED coastal species	Bittern; rare forest types on volcanic flats	
Puketotara/Patukauwae Te Keene Stream Swamp	P05/064	Rep. site for 3 e.u.s	Rare swamp forest and shrubland; 2 nd largest in ED; bittern, spotless crane	
Waikaramu Road Bush	P05/066	Rep. site for 3 e.u.s	Kiwi, kukupa; kauri snail	
Waimate Broadleaf Remnants	P05/067	Rep site for 1 e.u.	Puriri forest rare; kukupa	
Waikuku Road Bush	P05/068	Rep. site for 2 e.u.s uncommon plant species	Puriri forest rare; kiwi, kauri snail	
Bullman Road Broadleaf Remnants	P05/069	Rep. site for 1 e.u.	Puriri forest rare	
Lake Omapere Swamp Forest Remnant	P05/070	Rep. site for 1 e.u.	Rare swamp forest	
Wehirua Road Bush	P05/071	Rep. site for 1 e.u.	Kiwi likely	
Hui te Werawera Stream Bush	P05/073	Rep. site for 4 e.u.s	Kiwi, kukupa, kauri snail	

	DIVERSITY &	NATURALNESS	BUFFER/LINKAGE/CORRIDOR SHAPE	SIZE &
	3 e.u.s			12 ha
	2 e.u.s	2 sites		18 ha
	5 e.u.s	Fragmented		56 ha
	2 e.u.s	Fragments		tiny, 3.1 ha
	4 e.u.s	Much reduced		7.5 ha
	5 e.u.s	Stock damage		9 ha
	4 e.u.s	5 sites browsed	Some riparian values	c. 64 ha
	1 e.u.	Stock; logged		c. 30 ha
	2 e.u.s	Stock; gorse margin		> 4 ha
	1 e.u.	Exotics within site but no stock		71 ha
	3 e.u.s	Margins grazed		125 ha
	4 e.u.s	4 sites	Partial linkage	125 ha
	6 e.u.s	<i>Tradescantia</i> ; stock		8 ha
	4 e.u.s	Stock; crack willow, exotics		25 ha
	5 e.u.s mosaic	Gorse; some fenced	Some riparian values	c. 250 ha
	1 e.u.	9 sites		37 ha
	6 e.u.s	Exotic forest a linkage; weeds	Partial linkage; some catchment protection	c. 175 ha
	2 e.u.s	Fragments		c. 19 ha
	2 e.u.s	Degraded fragments		< 4 ha
	4 e.u.s		Partial linkage	65 ha
	6 e.u.s	Gorse	Partial linkage; catchment protection	c. 1000 ha

SITE	SITE NO.	REPRESENTATIVENESS	RARITY/SPECIAL FEATURES	
D Cooks Bush	P05/074	Rep. site for 1 e.u.	Kiwi, kukupa	
Atkins/Ohaio Bush	P05/075	Rep. site for 1 e.u.	Kiwi	
Tauanui Volcanic Lake & Environs	P06/007	rep. site for 3 e.u.s; unique in ED	Kauri snail endemic snails; waterfowl site	
Tauanui Volcanic Broadleaf Remnant	P06/008	Rep. site for 1 e.u.	Volcanic broadleaf forest	
Punakitere Valley Swamp Forest	P06/010	Rep. site for 3 e.u.s	Rare alluvial forest & shrubland	
Kaipuha Swamp	P06/018	Rep. sites for 7 e.u.s	Largest wetland in ED; bittern, spotless crane, fernbird, kiwi, kukupa; kauri snail	
Punakitere/Ninihi Road Bush	P06/019	Rep. site for 1 e.u.	Kauri snail; wetland	
Korowhata Stream Pond	P06/080		NZ dabchick, bittern	
Mangatoa/Punakitere Riverine	P06/086	Rep. site for 1 e.u.	Riverine	
Tautoro Wetland	P06/088	Rep. site for 2 e.u.s	Wetland	
Whakaruangangana Gumfield	P06/089	Rep. site for 2 e.u.s	Gumland	
Karakamatamata Scenic Reserve	P06/091		Kukupa; kiwi possible	
<i>Level 2 sites</i> Waiare Road Pond	P05/004			
Lamberg Road Bush	P05/009			
Harrison Road Bush	P05/022			
Kopenui Stream Remnants	P05/036		Volcanic broadleaf forest	
Ngaungau Pa Bush	P05/065			
Scott Road Remnants	P05/072			
Okokako Road Remnant	P05/076			
Utakura River Bush	P05/101			

	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/CORRIDOR	SIZE & SHAPE
	2 e.u.s		Partial linkage	c. 63 ha
	2 e.u.s	2 sites	Partial linkage	c. 26 ha
	4 e.u.s	2 aquatic weeds		58 ha
	1 e.u.	7 sites; possum & stock damage		c. 15 ha
	3 e.u.s	Fragmented		c. 140 ha
	8 e.u.s	Largely intact		c. 870 ha
	3 e.u.s		Buffer to Kaipheha	> 50 ha
	2 e.u.s	Constructed pond		c. 7 ha
	3 e.u.s		Buffer to river	c. 135 ha
	3 e.u.s			c. 5 ha
	4 e.u.s	Exotic species		c. 130 ha
	2 e.u.s	Weeds		c. 12 ha
	2 e.u.s	Farm pond		1 ha
	1 e.u.			c. 14 ha
	3 e.u.s			c. 30 ha
	2 e.u.s	2 sites		c. 19 ha
	1 e.u.	Fragmented	Partial linkage	c. 13 ha
	1 e.u.	3 sites	Partial linkage	c. 18 ha
	2 e.u.s	2 sites; stock		c. 8 ha
	4 e.u.s		Partial linkage	c. 50 ha

6. Acknowledgements

We thank the landowners who cooperated with this survey, in particular those who cheerfully provided field staff with transport around their properties, not to mention cups of tea and other refreshments.

Special acknowledgement is due to the following three members of the survey team, without whom this report would not have been completed. Peter Anderson was a constantly positive and encouraging team leader and had considerable input into the Introductory section. Geomorphological data were compiled and written by Fred Brook, who provided invaluable advice and guidance. Fraser Moors kept the paper, data analysis, and map production under control and contributed significantly to the compilation of the glossary.

Richard Parrish provided advice and assistance with regard to fauna distribution and status and Lisa Forester and Ewen Cameron were frequently called upon for plant identification and botanical advice. Neil Mitchell gave advice on methodology.

Further editorial comment was also provided by Peter Anderson, Lisa Forester, Wendy Holland and Ray Pierce.

Information on Queen Elizabeth II National Trust covenants was provided by Fenton Hamlin.

Some additional site information was provided by Kingett-Mitchell.

Barbara Lyford helped prepare the text for publication, and Terry Conaghan and Lorraine Wells have prepared the maps. Wendy Holland provided valuable assistance in getting the document to publication.

Some mapping services were carried out by Eric Dutton with financial assistance of the Far North District Council.

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8. Appendices

8.1 FIELD SURVEY FORM

DEPARTMENT OF CONSERVATION
PROTECTED NATURAL AREAS PROGRAMME

NAME OF HABITAT: **DATE:**

GRID REF.: SSBI NO.: PNA NO.:

HABITAT TYPE(S):

GEOMORPHOLOGICAL TYPE(S):.....

VEGETATION TYPE(S):

Vegetation Type	% of Total Habitat	Percentage of Cover Value (canopy)			
		Abundant (50-100)	Common (20-50)	Uncommon (5-20)	Rare (0-5)

8.2 LETTER TO RATEPAYERS/NEWS MEDIA ITEM



Department of Conservation
Te Papa Atawhai

Dear Landowner,

Department of Conservation officers are currently surveying significant natural areas, e.g. bush, wetlands, gumland etc within the Far North District. This has involved mapping natural areas from roadsides or (with the permission of landowners) from other viewpoints, and recording information on their type and condition.

You may well have already talked to staff working in your area. If not, at a later stage departmental staff may ask for permission to enter your land and gather more detailed information on your properties natural areas.

Why are we doing this survey? Northland's natural areas, especially bush pockets, contribute significantly to the character and quality of the region. Many of these areas are habitat for some of our increasingly rare native wildlife.

The Resource Management Act 1991 requires District Councils to consider the natural areas they administer when preparing the District Plan. The information compiled from this survey will be given to the Far North District Council to provide them with a "snapshot" of the distribution and condition of natural areas in the various parts of Northland at a single point in time. The information will be valuable as a reference point for assessing habitat changes over time.

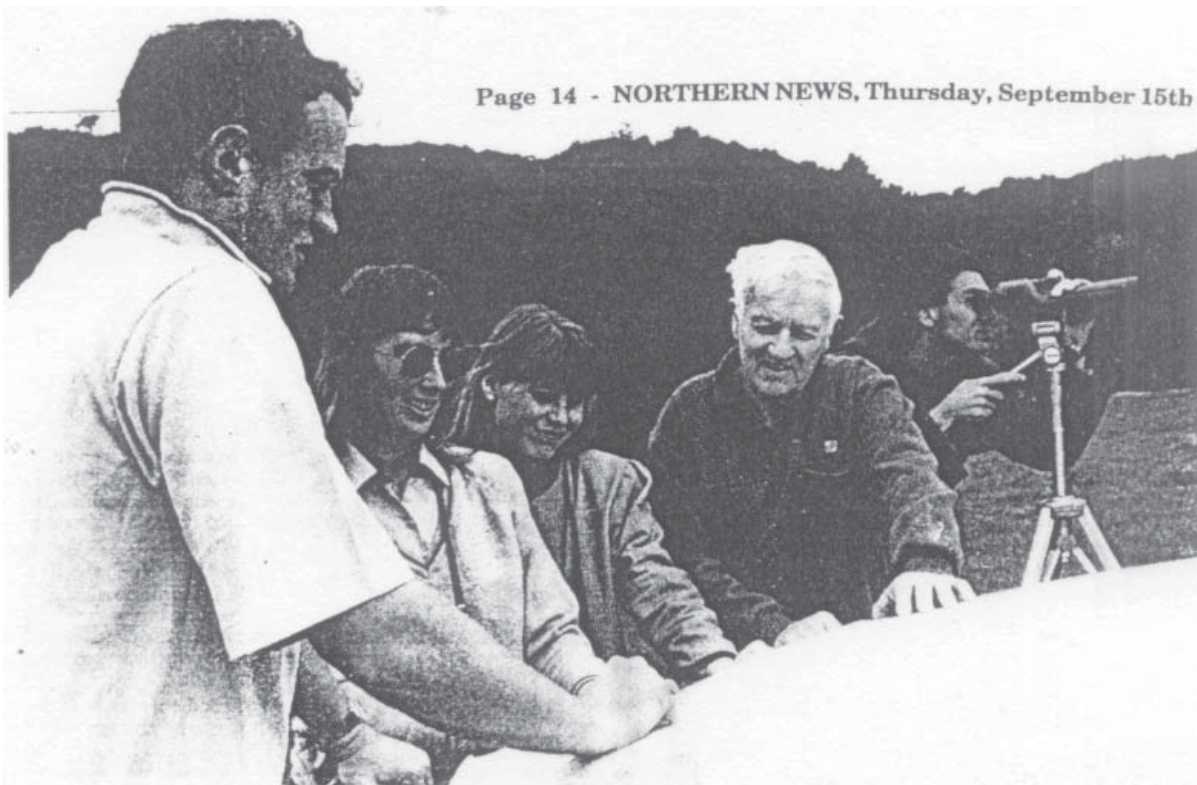
Perhaps the principal value of this survey will be to provide you, the landowners, with information on the significance and makeup of the natural areas that you have preserved on your property so you can better plan the way you wish to manage these areas.

If you have any questions or concerns about the survey process, please contact your local Department of Conservation Field Centre or ring **Peter Anderson, Fraser Moors** or **John Beachman** at our Whangarei Office, telephone (09) 438 0299, fax (09) 438 9886.

If you wish to contact the Far North District Council about this aspect of the District Plan, please phone Peggy Kilberg at the Kaikohe office, telephone (09) 401 2101.

A handwritten signature in black ink, appearing to read 'Gerry Rowan'.

Gerry Rowan
REGIONAL CONSERVATOR



Discussing natural habitats on Geoff Wightman's property at Waimate North are, from left, Department of Conservation officers Fraser Moors and Linda Winch, Far North District Council resource planner Kaylee Wilson, Mr Wightman and DOC officer Nigel Miller.

Natural sites studied in the Far North

Northland's most important natural habitats are being identified in a joint Department of Conservation and Far North District Council project.

Conservation officers have started working on the year-long project, which aims to identify significant habitat areas outside the department's protected land area.

The study is being done for a number of reasons, including the fact that many lowland forests, gumlands, dune lands, wetlands and sea coasts are under-represented in the existing reserve system.

There is also insufficient information about the location and extent of remnant

areas of native bush, wetlands, dune systems and other areas.

Conservation officers Nigel Miller, Fraser Moors and Linda Winch have begun gathering information by checking DOC's database and then looking at areas from the roadside.

Identification

Once the team has broadly noted the natural features and habitat types which exist in the district, the more important sites will be identified and permission asked from landowners to complete a more in-depth survey.

This will provide valuable information for the FNDC's district plan, which is required under the 1991 Re-

source Management Act to consider the environmental values of any proposed activity, and for DOC to advise and assist landowners to voluntarily manage and protect key sites.

It is the first time a Protected Natural Areas programme survey has been done in Northland. The last major Northland survey by the Wildlife Service in 1977-79 did not include observations of vegetation and landform types.

DOC officer Peter Anderson said that five years later it was found 40 per cent of all surveyed wildlife habitats had been modified in some way or totally lost through land development.

8.3 CATEGORIES OF THREAT

FLORA

In this report, categories of threat are taken from “Threatened and uncommon plants of New Zealand” (de Lange et al., 1999) which is a revision by the New Zealand Threatened Plant Committee of Cameron et al. (1995). The revised categories of threat are as proposed by de Lange & Norton (1998). These categories are as follows:

New Zealand threatened and uncommon vascular plants list

Presumed Extinct

Taxa that are no longer known to exist in the wild both within New Zealand and (if applicable) their overseas range, or in cultivation after repeated searches of known or likely localities.

Critically Endangered

Taxa whose extinction is considered inevitable within a stated time period (10 years) unless there is direct conservation intervention, or which persist as individuals or populations reduced to sufficiently critically low levels that extinction through stochastic events is a distinct possibility. Some critical taxa are now only known from cultivation.

Endangered

Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Vulnerable

Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating. Included are taxa of which most or all populations are decreasing because of over-exploitation, extensive destruction of habitat, or other environmental disturbance; and taxa with populations that continue to be seriously depleted and whose ultimate security is not yet assured.

Declining

Taxa that are numerically abundant but which are either under threat from serious adverse factors throughout their range, or occur as widely scattered, typically small populations of which are undergoing declines through loss of reproductive ability, recruitment failure, predation, or through other processes of often subtle habitat change. Declining taxa are listed to highlight their plight, for without some level of management they are destined to become the future threatened plants of New Zealand.

Recovering

Taxa whose populations are either: (1) naturally restricted to susceptible habitats (e.g. offshore islands), where their survival is utterly dependent on continual rigid conservation measures (e.g. rodent control), or (2) taxa whose populations were once under serious threat and, as a result of past conservation

intervention (e.g. goat eradication), have shown the capacity to recover naturally without further management measures.

(1) Conservation Dependent

Taxa whose survival is now dependent on the continuation of existing conservation measures.

(2) Natural Population Recovery

Taxa whose populations were once reduced to precariously low levels and still occur as small populations. As a result of past conservation intervention, the candidate taxa have demonstrated the ability to recover their former range through natural means, to such an extent that further conservation assistance is no longer required.

Naturally uncommon

Taxa that are not considered under immediate or obvious threat but which, for varying reasons, have the potential to become threatened. Three subheadings are recognised to accommodate the different situations whereby taxa can be naturally uncommon.

- **Sparse**

Taxa that, for largely undetermined reasons, occur within typically small and widely scattered populations. This distribution appears wholly natural and is not considered the result of past or recent anthropogenic disturbance. However, as the candidate taxa usually occur in small numbers at any given site, they are naturally susceptible to extirpations within parts of their range.

- **Vagrant**

Taxa whose presence within the New Zealand botanical region is naturally transitory. These are invariable taxa that have failed to establish themselves significantly beyond their point of introduction through reproductive failure or for quite specific ecological reasons. Many vagrants are able to reproduce only by vegetative means and, in such instance, when in suitable habitats, they can form extensive clonal populations.

- **Range Restricted**

Taxa whose distribution is naturally confined to specific substrates (e.g. ultramafic rock), habitats (e.g. high alpine fell field), or geographic areas (e.g. subantarctic islands). Typically Range Restricted taxa are under no obvious or immediate anthropogenic threat.

Insufficiently known

Taxa that are suspected but not definitely known to belong to any of the above categories because of a lack of information. It is hoped that listing a taxon as “Insufficiently Known” will stimulate studies to find out its true category of threat.

Taxonomically Indeterminate Taxa

This category includes described taxa about which there is doubt regarding taxonomic status and which require further investigation, and those recently discovered taxa whose taxonomic status has yet to be determined. In both instances, available information suggests that candidate taxa could be under some level of threat. A total of 92 taxa are included.

Molloy & Davis (1994) Categories of Threat

The Molloy & Davis categories were developed for the Department of Conservation to identify species which should be assessed for conservation action. It includes taxonomic groups not ranked under IUCN categories such as bryophytes and invertebrates.

The Categories are as follows:

Category A	Highest priority threatened species (score >47 out of a possible 83)
Category B	Second priority threatened species (score 39-47 inclusive)
Category C	Third priority threatened species (score 30-38 inclusive)
Category X	Species which have not been sighted for a number of years but which may still exist
Category I	Species about which little information exists, but based on existing evidence, are considered to be threatened
Category O	Species which are threatened in New Zealand, but which are known to be secure in other parts of their range outside New Zealand
Category M	Species that are rare or localised, and of cultural importance to Maori.

SOIL SITES

Ranking criteria for New Zealand soil sites of international, national, and regional significance, from Arand et al. (1993).

International

- Contains the best example of a soil (generally a soil group) or soil vegetation or soil-landform association that is unique to New Zealand (or these latitudes).
- Contains a soil that is naturally uncommon or greatly reduced in extent in other parts of the world.
- Contains a wide range of extensive soils with a relatively unmodified vegetation cover.
- Has been studied in detail and is known internationally.

National

- Contains the best or a “classic” example of a soil (either a soil group or a mapping unit) or a soil-vegetation or a soil-landform association in New Zealand.
- Contains a soil or a soil-vegetation or soil-landform association that is nationally uncommon or reduced in extent.
- Contains a moderate range of extensive soils with a relatively unmodified vegetation cover.
- Has been studied in detail and is known nationally.

Regional

- Contains the best regional examples of a soil (generally a mapping unit) or a soil-vegetation or soil-landform association.
- Contains a limited range of soils under vegetation that is relatively unmodified.

8.4 FAUNA

A. CHECKLIST OF BIRDS

NI brown kiwi	<i>Apteryx australis mantelli</i>
NZ dabchick	<i>Poliiocephalus rufopectus</i>
Australasian little grebe	<i>Tachybaptus novaehollandiae</i>
Black shag	<i>Phalacrocorax carbo novaehollandiae</i>
Pied shag	<i>P. varius varius</i>
Little shag	<i>P. melanoleucos brevirostris</i>
White-faced heron	<i>Ardea novaehollandiae novaehollandiae</i>
Cattle egret	<i>Bubulcus ibis coromandus</i>
Australasian bittern	<i>Botaurus poiciloptilus</i>
*Black swan	<i>Cygnus atratus</i>
*Canada goose	<i>Branta canadensis</i>
Paradise shelduck	<i>Tadorna variegata</i>
*Mallard	<i>Anas platyrhynchos platyrhynchos</i>
Grey duck	<i>A. superciliosa superciliosa</i>
Grey teal	<i>A. gibberifrons</i>
Brown teal	<i>A. aucklandica chlorotis</i>
NZ shoveler	<i>A. rhynchotis variegata</i>
Australasian harrier	<i>Circus approximans</i>
*Californian quail	<i>Callipela californica brunnescens</i>
*Brown quail	<i>Synoicus ypsilophorus</i>
*Pheasant	<i>Phasianus colchicus</i>
Banded rail	<i>Rallus philippensis assimilis</i>
Spotless crake	<i>Porzana tabuensis plumbea</i>
Pukeko	<i>Porphyrio porphyrio melanotus</i>
Australian coot	<i>Fulica atra</i>
Kukupa (NZ pigeon)	<i>Hemiphaga novaeseelandiae novaeseelandiae</i>
*Eastern rosella	<i>Platycercus eximius</i>
Shining cuckoo	<i>Chrysococcyx lucidus lucidus</i>
Morepork	<i>Ninox novaeseelandiae novaeseelandiae</i>
Kingfisher	<i>Halcyon sancta vagans</i>
*Skylark	<i>Alauda arvensis arvensis</i>
Welcome swallow	<i>Hirundo tabitica neoxena</i>
NZ pipit	<i>Anthus novaeseelandiae</i>
*Blackbird	<i>Turdus merula merula</i>
*Song thrush	<i>T. philomelos clarkei</i>
NI fernbird	<i>Bowdleria punctata vealeae</i>
NI fantail	<i>Rhipidura fuliginosa placabilis</i>
Grey warbler	<i>Gerygone igata</i>
Silvereye	<i>Zosterops lateralis lateralis</i>
Tui	<i>Prosthemadera novaeseelandiae novaeseelandiae</i>
*Yellowhammer	<i>Emberiza cintrinella caliginosa</i>
*Chaffinch	<i>Fringilla coelebs gengleri</i>
*Goldfinch	<i>Carduelis carduelis britannica</i>
Greenfinch	<i>C. chloris</i>
Redpoll	<i>C. flammea</i>
*House sparrow	<i>Passer domesticus domesticus</i>
*Starling	<i>Sturnus vulgaris vulgaris</i>
*Myna	<i>Acridotheres tristis</i>

* Introduced

B. OTHER FAUNA IN THE ECOLOGICAL DISTRICT

Lizards/geckos

Forest gecko	<i>Hoplodactylus granulatus</i>
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Aquatic fauna

* Introduced

Freshwater crayfish	<i>Paraneobrooks planifrons</i>
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Freshwater mussel	<i>Hyridella menziesii</i>
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Longfinned eel	<i>Anguilla dieffenbachii</i>
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Shortfinned eel	<i>A. australis</i>
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Torrentfish	<i>Cheimarrichthys fosteri</i>
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Banded kokopu	<i>Galaxias fasciatus</i>
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Inanga	<i>G. maculatus</i>
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Common smelt	<i>Retropinna retropinna</i>
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Red finned bully	<i>Gobiomorphus butoni</i>
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Common bully	<i>G. cotidianus</i>
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Northland mudfish	<i>Neochanna beletos</i>
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*Goldfish	<i>Carassius auratus</i>
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*Perch	<i>Perca fluviatilis</i>
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Introduced mammals

mouse	<i>Mus musculus</i>
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ship rat	<i>Rattus rattus rattus</i>
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Norway rat	<i>R. norvegicus</i>
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weasel	<i>Mustela nivalis</i>
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stoat	<i>M. erminea</i>
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ferret	<i>M. furo</i>
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feral cat	<i>Felis catus</i>
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feral dog	<i>Canis familiaris</i>
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cattle	<i>Bos taurus</i>
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goat	<i>Capra hircus</i>
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possum	<i>Trichosurus vulpecula</i>
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pig	<i>Sus scrofa</i>
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hedgehog	<i>Erinaceus europeus occidentalis</i>
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8.5 COMMON AND SCIENTIFIC PLANT NAMES USED IN THE TEXT

This is not a definitive list of common names used for plants from the Ecological District. Rather it is a guide to the reader as to exactly which species is referred to when the common name is used in the text.

Indigenous			
black maire	<i>Nestegis cunninghamii</i>	puriri	<i>Vitex lucens</i>
bracken	<i>Pteridium esculentum</i>	putaputaweta	<i>Carpodetus serratus</i>
broom	<i>Carmichaelia australis</i>	raupo	<i>Typha orientalis</i>
cabbage tree	<i>Cordyline australis</i>	rewarewa	<i>Knightia excelsa</i>
flax	<i>Phormium tenax</i>	rimu	<i>Dacrydium cupressinum</i>
Hall's totara	<i>Podocarpus hallii</i>	Smith's tree fern	<i>Cyathea smithii</i>
hangehange	<i>Gentostoma rupestre</i> var. <i>ligustrifolium</i>	sundew	<i>Drosera</i> sp.
hen and chicken fern	<i>Asplenium bulbiferum</i>	supplejack	<i>Ripogonum scandens</i>
hinau	<i>Elaeocarpus dentatus</i>	swamp maire	<i>Syzygium maire</i>
kaikomako	<i>Pennantia corymbosa</i>	tanekaha	<i>Phyllocladus trichomanoides</i>
kahikatea	<i>Dacrycarpus dacrydioides</i>	tangle fern	<i>Gleichenia dicarpa</i>
kanono	<i>Coprosma grandifolia</i>	taraire	<i>Beilschmiedia taratri</i>
kanuka	<i>Kunzea ericoides</i> s.l.	tarata	<i>Pittosporum eugenioides</i>
karaka	<i>Corynocarpus laevigatus</i>	tawa	<i>Beilschmiedia tawa</i>
kauri	<i>Agathis australis</i>	titoki	<i>Alectryon excelsus</i>
kauri grass	<i>Astelia trinervia</i>	toetoe	<i>Cortaderia fulvida</i>
kawaka	<i>Libocedrus plumosa</i>	totara	<i>Podocarpus totara</i>
kidney fern	<i>Trichomanes reniforme</i>	towai	<i>Weinmannia silvicola</i>
kiekie	<i>Freycinetia banksii</i>	umbrella fern	<i>Sticherus cunninghamii</i> or <i>S. flabellatus</i>
kiokio	<i>Blechnum novae-zelandiae</i>	umbrella sedge	<i>Cyperus ustulatus</i>
kohekohe	<i>Dysoxylum spectabile</i>	wharangi	<i>Melicope ternata</i>
kohuhu	<i>Pittosporum tenuifolium</i> var. <i>tenuifolium</i>	whau	<i>Entelea arborescens</i>
kotukutuku	<i>Fuchsia excorticata</i>	wheki	<i>Dicksonia squarrosa</i>
kowhai	<i>Sophora microphylla</i>	Adventives	
kumerahou	<i>Pomaderris kumerabo</i>	boxthorn	<i>Lycium ferocissimum</i>
lacebark	<i>Hobertia populnea</i>	Chinese privet	<i>Ligustrum sinense</i>
mahoe	<i>Melicytus ramiflorus</i>	crack willow	<i>Salix fragilis</i>
mamaku	<i>Cyathea medullaris</i>	gorse	<i>Ulex europaeus</i>
mamangi	<i>Coprosma arborea</i>	hakea	<i>H. sericea</i> or <i>H. salicifolia</i>
mangeao	<i>Litsea calicaris</i>	pampas	<i>Cortaderia selloana</i>
manuka	<i>Leptospermum scoparium</i>	pine	<i>Pinus radiata</i>
mapou	<i>Myrsine australis</i>	prickly hakea	<i>Hakea sericea</i>
matai	<i>Prumnopitys taxifolia</i>	tobacco weed	<i>Solanum mauritianum</i>
small-leaved milk tree	<i>Streblus heterophyllus</i>	watercress	<i>Rorippa nasturtium-aquaticum</i>
mingimingi	<i>Leucopogon fasciculatus</i>	wattle (black)	<i>Acacia mearnsii</i>
miro	<i>Prumnopitys ferruginea</i>	willow	<i>Salix</i> sp.
monoao	<i>Halocarpus kirkii</i>		
nikau	<i>Rhopalostylis sapida</i>		
northern rata	<i>Metrosideros robusta</i>		
NZ passion flower	<i>Passiflora tetrandra</i>		
pate	<i>Schefflera digitata</i>		
pigeonwood	<i>Hedycarya arborea</i>		
ponga	<i>Cyathea dealbata</i>		
pukatea	<i>Laurelia novae-zelandiae</i>		

8.6 GLOSSARY

Allochthonous

Geologic units that have been transported to their present position.

Biodiversity

The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (IUCN 1993)

Bog

Infertile/acid wetland. Usually characterised by a peat substrate, sedges, manuka and *Gleichenia* fern. Water arrives via rainfall rather than by streams and other run-off.

Buffer

A zone surrounding a natural area which reduces the effects of external influences on the natural area. For example shrubland, scrub and exotic trees around native forested areas provide a gradation of habitats from fully modified to a natural state. This effect also applies to waterways - riparian vegetation and wetlands protect both water quality and habitat from influences arising from the surrounding land.

Community

An association of populations of plants and animals which occur naturally together in a common environment.

Diversity and Pattern

Diversity is the variety and range of species of biological communities, ecosystems and landforms. Pattern refers to changes in species composition, communities and ecosystems along environmental gradients.

Ecological District

A local part of New Zealand where geological, topographical, climatic and biological features and processes, including the broad cultural pattern, interrelate to produce a characteristic landscape and range of biological communities.

Ecological Region

A group of adjacent Ecological Districts which have diverse but closely related characteristics, or in some cases a single very distinctive Ecological District.

Ecological unit

Vegetation type occurring on a particular landform or soil or rock type.

Ecosystem

Any inter-related and functioning assemblage of plants, animals and substrates (including air, water and soil) on any scale including the processes of energy flow and productivity. (Myers et al. 1987)

Endemic

Occurring naturally in, and restricted to, a particular country, region or locality.

Estuary

A sheltered embayment where streams and rivers enter tidal waters.

Exotic

Introduced from outside New Zealand.

Fernland

Dominated by ferns such as *Gleichenia*, bracken, tree ferns, with occasional woody plants.

Forest

A tall, predominantly closed canopy consisting mainly of tree species (a tree being a woody plant which attains a 10cm diameter at breast height - Atkinson 1985).

Much of Northland's forest consists of or includes secondary growth which has developed following disturbance or destruction of the original forest. This may include secondary manuka/kanuka forest where those species have reached tree size and may contain other canopy species.

Glaucconitic

Containing glauconite, a green-coloured hydrous potassium-iron-alumino silicate clay mineral.

Habitat

The part of the environment where a plant or animal lives. It includes both the living and non-living features of the area.

Igneous

Rocks which have crystallized from magma.

Indigenous

Native to and occurring naturally within the New Zealand Biogeographic region.

Landform

A part of the land's surface with distinctive naturally formed physical characteristics, e.g. a hill, valley etc.

Linkages/Corridors

Vegetated or aquatic areas (can be forest, shrubland, wetland, streams, beach or exotic vegetation such as pine) that link up two or more habitats. With a link between habitats the gene pool for a species is greater, which enhances the viability of that population. The corridor does not have to be continuous for many species to utilise it. Small remnants can act as stepping stones between two larger habitats so that birds such as kiwi can move from remnant to remnant up to 500 m apart.

Lithofacies

Rock noted for a distinctive group of characteristics, e.g. composition and grain size.

Natural Area

A tract of land which supports natural landforms and predominantly native vegetation or provides habitat for indigenous species; identified as a unit for evaluation of ecological quality and representativeness and has potential to be ecologically significant.

Naturalness

The degree to which a habitat is modified and disturbed by human activity or introduced plants and animals and what natural values are retained despite these factors, i.e. to what extent native species are functioning according to natural processes.

Podzol

Soil profile formed at an advanced stage of leaching.

Rarity

This is a measure of commonness and may apply to entire ecosystems through to single species. It may refer to the threatened status of a species (see Appendix 8.3) or habitat type in any one of the following ways: formerly common but now rare; rare elsewhere but common in the district; rare in the district but common elsewhere; confined to a limited geographic area; at the limit of its range; or with a contracting or fragmented range.

For example, old growth alluvial swamp forests are an extremely rare ecosystem type in Northland, and indeed nationally, even though they contain no species which are regarded as rare in themselves.

Reedland

A swampy area dominated by reeds such as raupo.

Refuge

Native bush enclaves in production pine forest become a refuge for some native species during the logging phase, e.g. allowing bird species, such as kiwi, a retreat from logged areas.

Representativeness

The extent to which an area represents or exemplifies the components of the natural diversity of the Ecological District. This implies consideration of the full range of natural ecosystems and landscapes that were originally found in the Ecological District, how well they are represented in today's environment, and the extent to which they are included in the protected areas network.

Riparian functions

Riparian vegetation performs important functions such as providing corridors linking habitats and providing shading to streams, which is important in Northland, with many streams having small catchments, the water temperature can rise depleting the available oxygen and leading to the death of aquatic life. Litter debris enters into the nutrient cycle with invertebrates like mayfly, caddisfly and stonefly feeding on it. Riparian vegetation acts as a buffer for non-point water discharges.

Riparian zone

An area of land immediately adjacent to a watercourse.

Riverine forest

Forest situated on a floodplain alongside a stream/river and subject to periodic inundation by floodwaters.

It is characterised by species such as cabbage tree, lowland ribbonwood (*Plagianthus regius*), kowhai (*Sophora microphylla*), kahikatea, pukatea, kaikomako (*Pennantia corymbosa*), titoki (*Alectryon excelsus*) and divaricating shrubs. On drier areas totara, taraire, kohekohe, matai and kanuka

may occur. It commonly occurs only as narrow strips due to the deforestation of flat land for pasture.

Rush/Sedgeland

Swampy areas dominated by rushes, sedges, rush-like sedges or restiads, e.g. *Baumea*, *Juncus* (rush), *Carex*, *Schoenus*, *Isolepis*, *Bolboschoenus*, *Empodisma* and *Apodasmia*.

Scrub

Refers to seral communities, often dominated by or with a large component of exotic species such as gorse, *Hakea*, tobacco weed etc and/or commonly lacking a closed canopy and in which an understorey is either absent or composed primarily of exotic species.

Secondary Vegetation

Native vegetation established after destruction or disturbance of the previous vegetation and which is essentially different from the original vegetation. (See Succession, below).

Seral

Describes a plant community in the process of succession.

Shrubland

Vegetation in which the canopy is dominated by woody plants less than 10cm diameter at breast height.

There are 2 main types:

- (i) Successional vegetation dominated by seral species such as manuka, kanuka, mahoe etc or shrubs such as hangehange, bracken, kumerahou.

As used in this report it implies a closed canopy and in more advanced stages contains an understorey of indigenous species.

- (ii) Seral vegetation where the rate of further succession is extremely slow, being limited by abiotic factors such as soil structure and fertility, wind shear etc., e.g. Gumland manuka shrubland, *Muehlenbeckia* shrubland on dunes.

Site

An area of habitat identified during the rapid field inventory phase of the PNAP. Its boundaries may be defined by the edge of the habitat (where discrete), catchment or other geographical feature, e.g. river, vegetation type or legal title.

Succession

The process of change in the appearance, composition and structure of a community, usually over a period of time. Change may be due to natural or human-induced factors, or both. For example the colonisation of bare rock, or soil by algae and lichens ending with a stable climax community in equilibrium with the environment. Secondary succession occurs where the original vegetation has been destroyed, e.g. by fire.

Survey No.

The identifier number given to each site. The first three figures refer to the NZMS 260 topographical map sheet that the habitat is on.

Sustainability

The longterm ecological viability of a natural area. This is related to the size and shape of the area as well as to threats from introduced pests.

Swamp

Fertile or eutrophic wetland, usually dominated by raupo, *Carex*, *Baumea articulata*, flax and cabbage tree.

Swamp forest

A forest type containing water tolerant trees and swamp species such as kahikatea, swamp maire, and pukatea. It may occur on alluvial valley areas but also occurs on poorly drained, semi-level sites within forests at higher altitudes.

Swamp shrubland

A transitional type in which woody species such as *Coprosma propinqua*-manuka-*Cordylne* with putaputaweta, *Coprosma tenuicaulis*, and other divaricating shrubs are usually dominant or may be co-dominant with monocotyledonous species such as rushes and sedges. This vegetation type is often found where conditions of winter water-logging and summer drought occur.

Toeslope

The area at the base of a slope where debris, topsoil and nutrients have accumulated and may be more fertile than higher up the slope.

Vegetation type

Defined by the dominant canopy species and the structure of the vegetation e.g. taraire forest, manuka shrubland

Viability

The ability of an area's natural communities to maintain themselves in the longterm in the absence of particular management efforts to achieve this. Regeneration and vigour of species within these communities and stability of communities and processes contribute to viability.

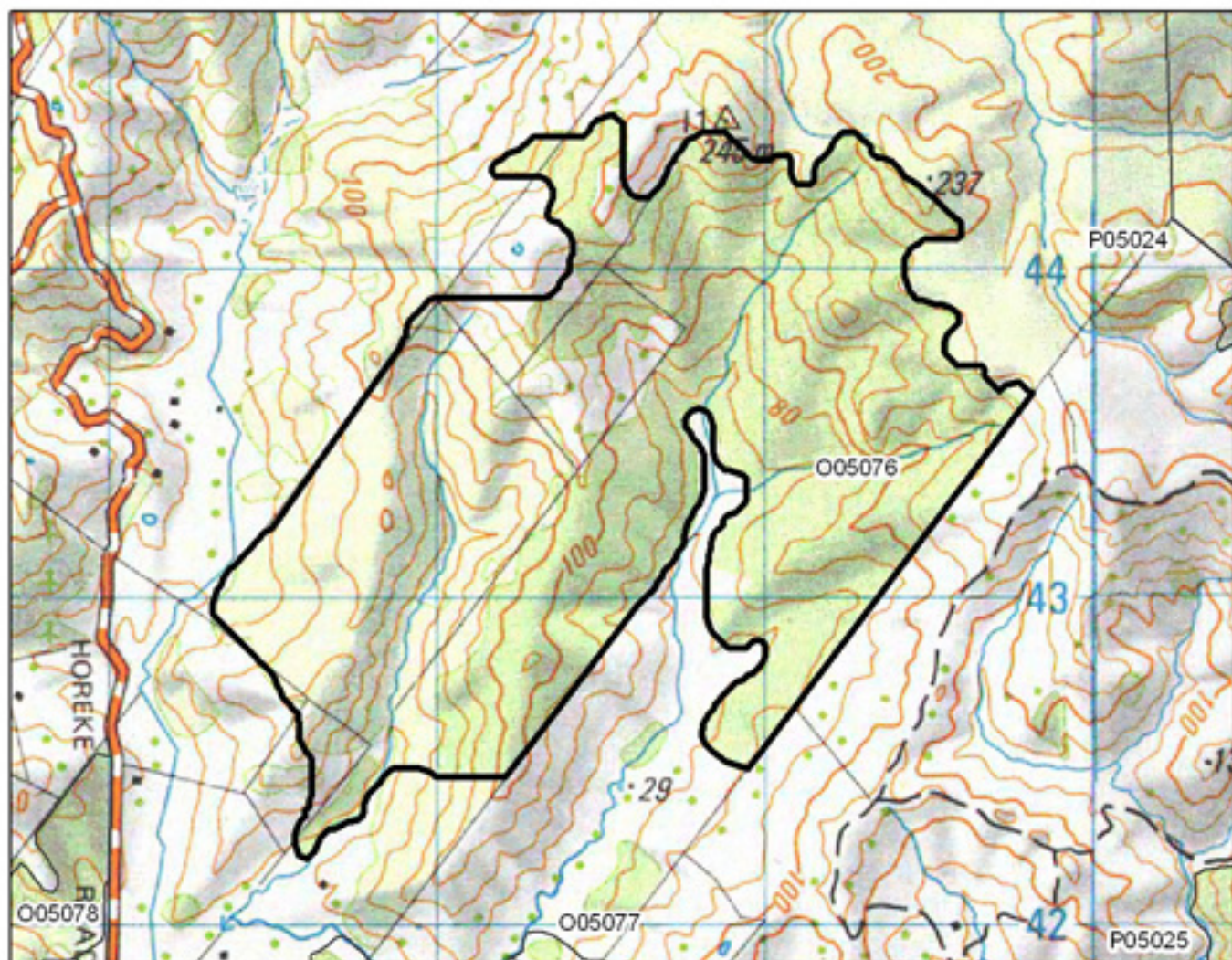
Wetland

An area of land that is permanently or intermittently waterlogged and supports flora and fauna adapted to wet conditions. Wetland is used as a broad definition for several types of aquatic systems, e.g. swamps, bogs and ephemerals.

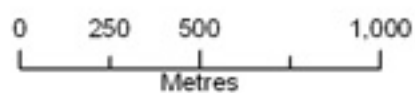
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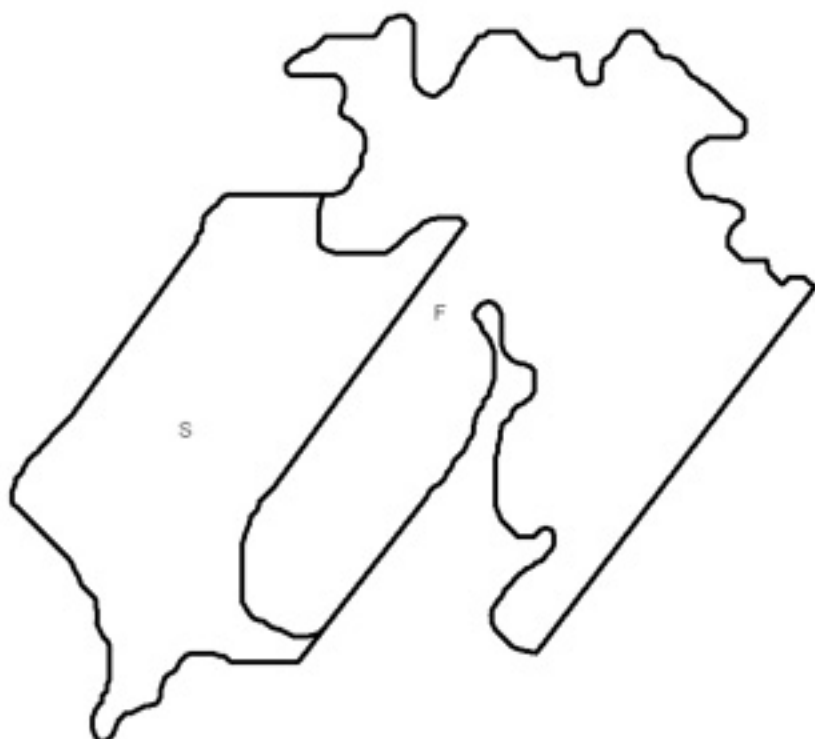
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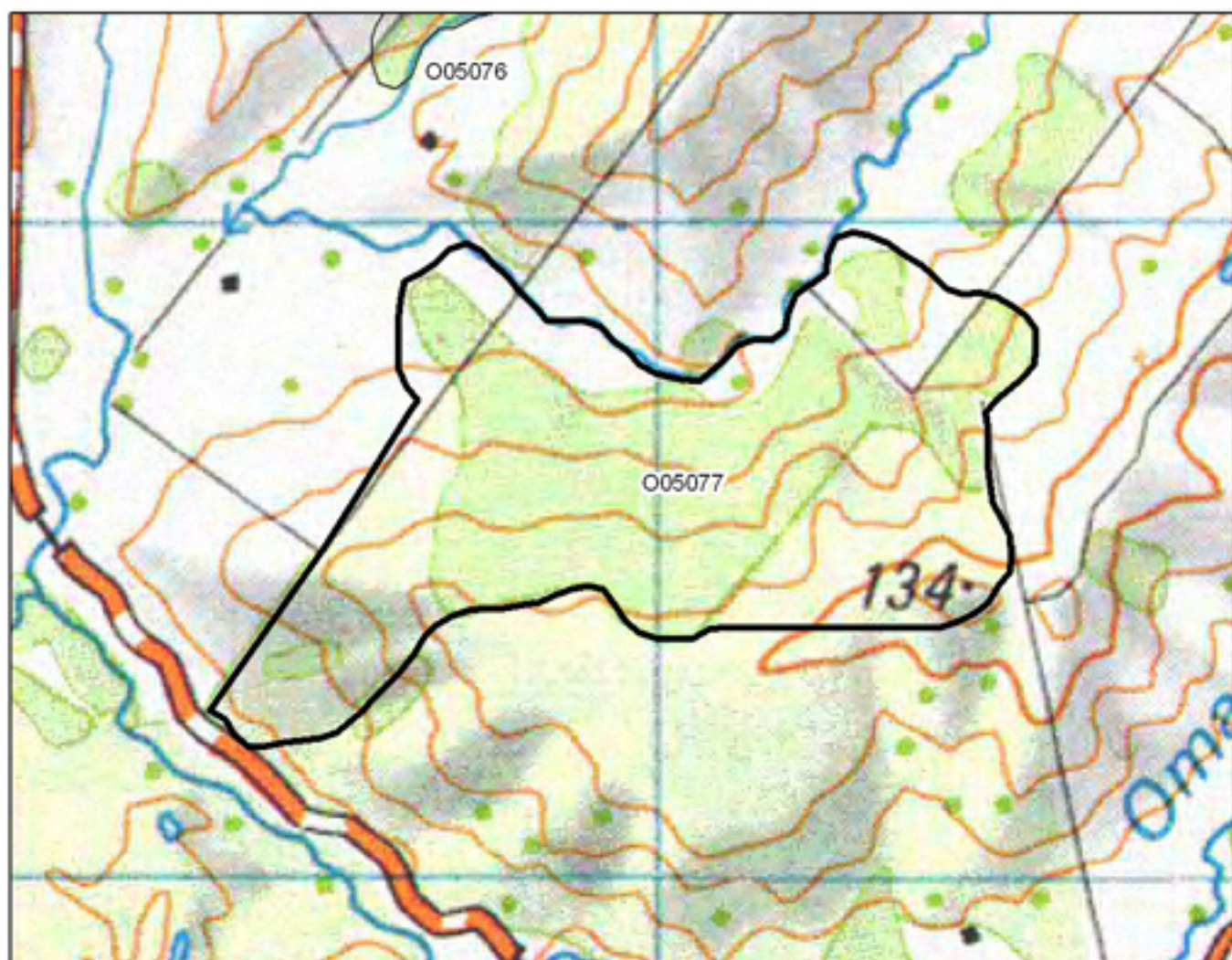


O05076 Horeke Road East Bush

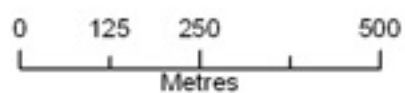


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

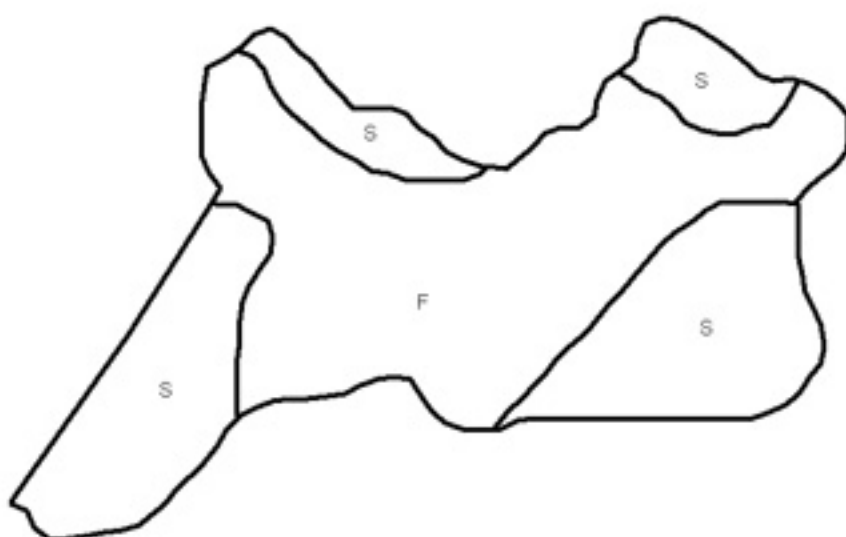


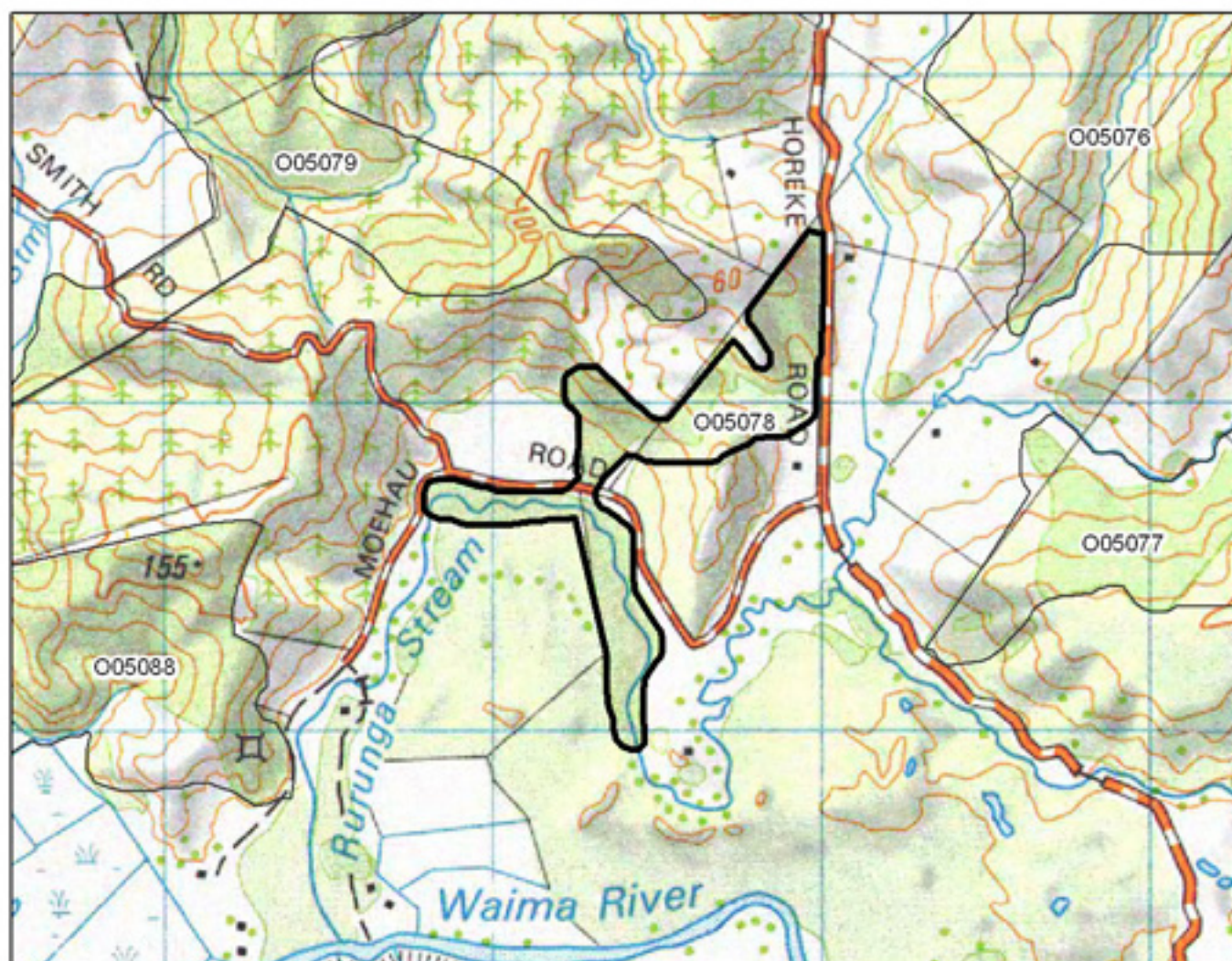


O05077 Omapo Bush

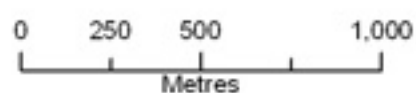


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 F= Forest
 W= Wetland
 E= Estuarine

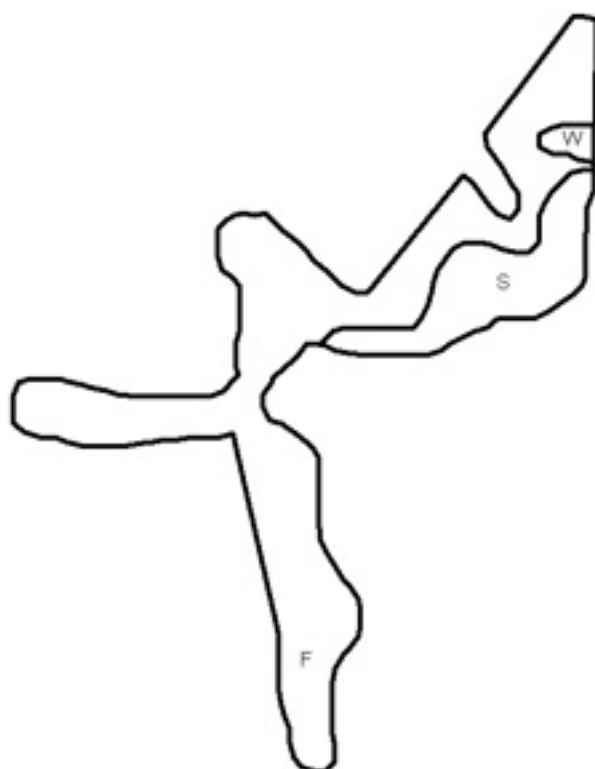


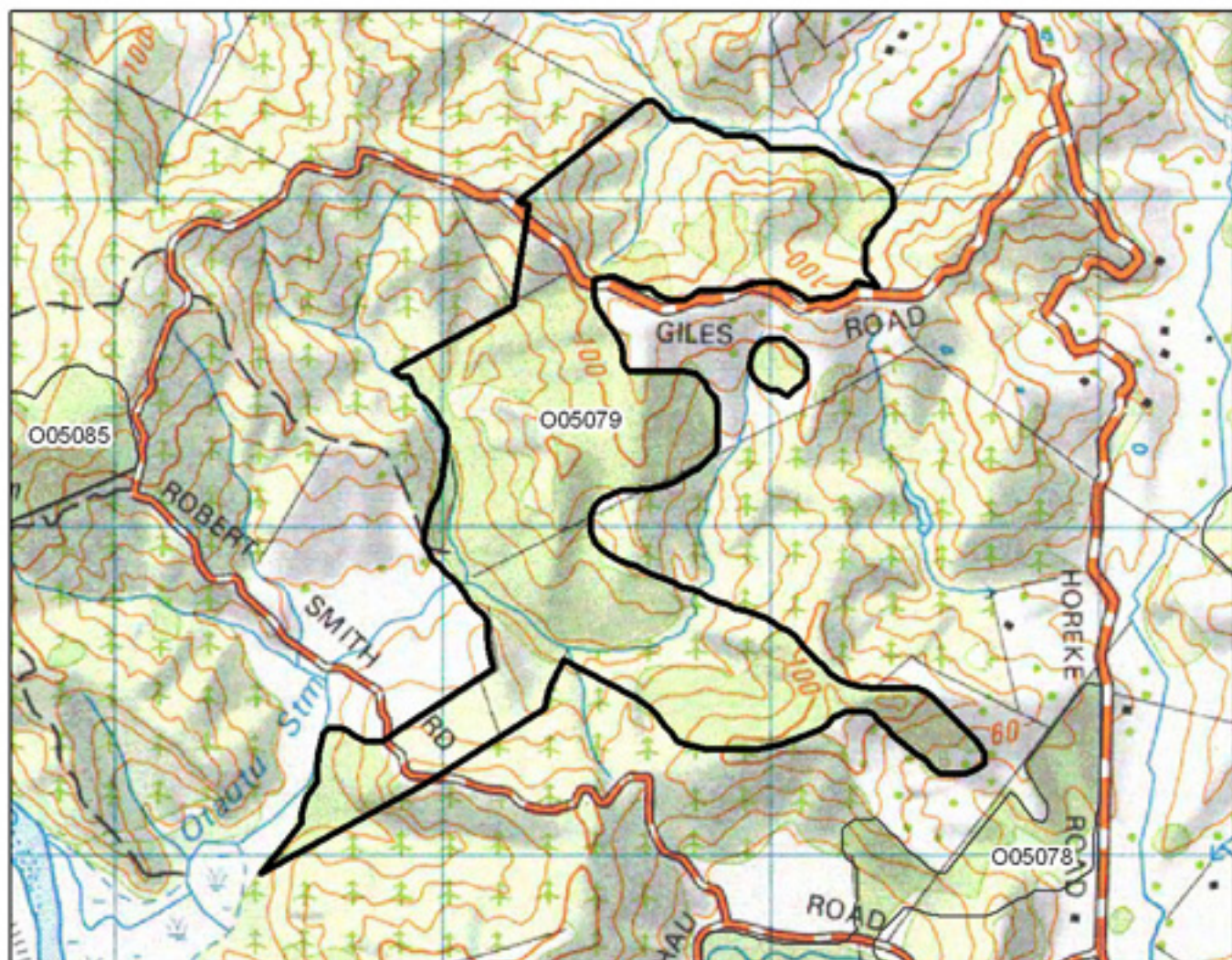


O05078 Rurunga Stream Forest

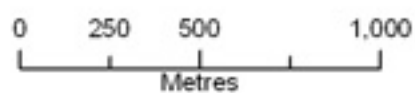


S= Shrubland
F= Forest
W= Wetland
E= Estuarine



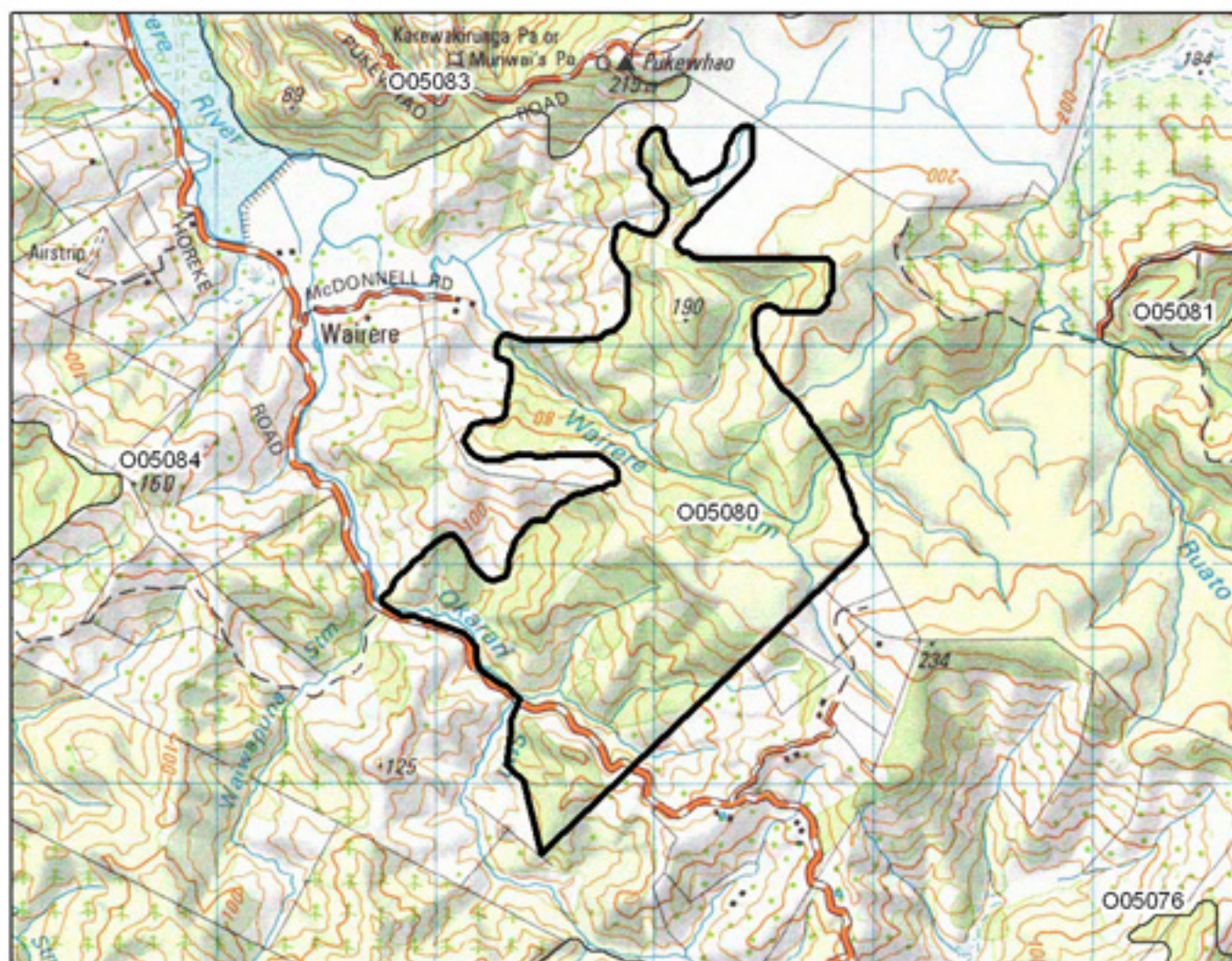


O05079 Otautu Stream Headwaters

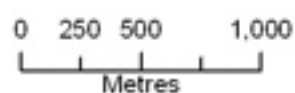


S= Shrubland
F= Forest
W= Wetland
E= Estuarine



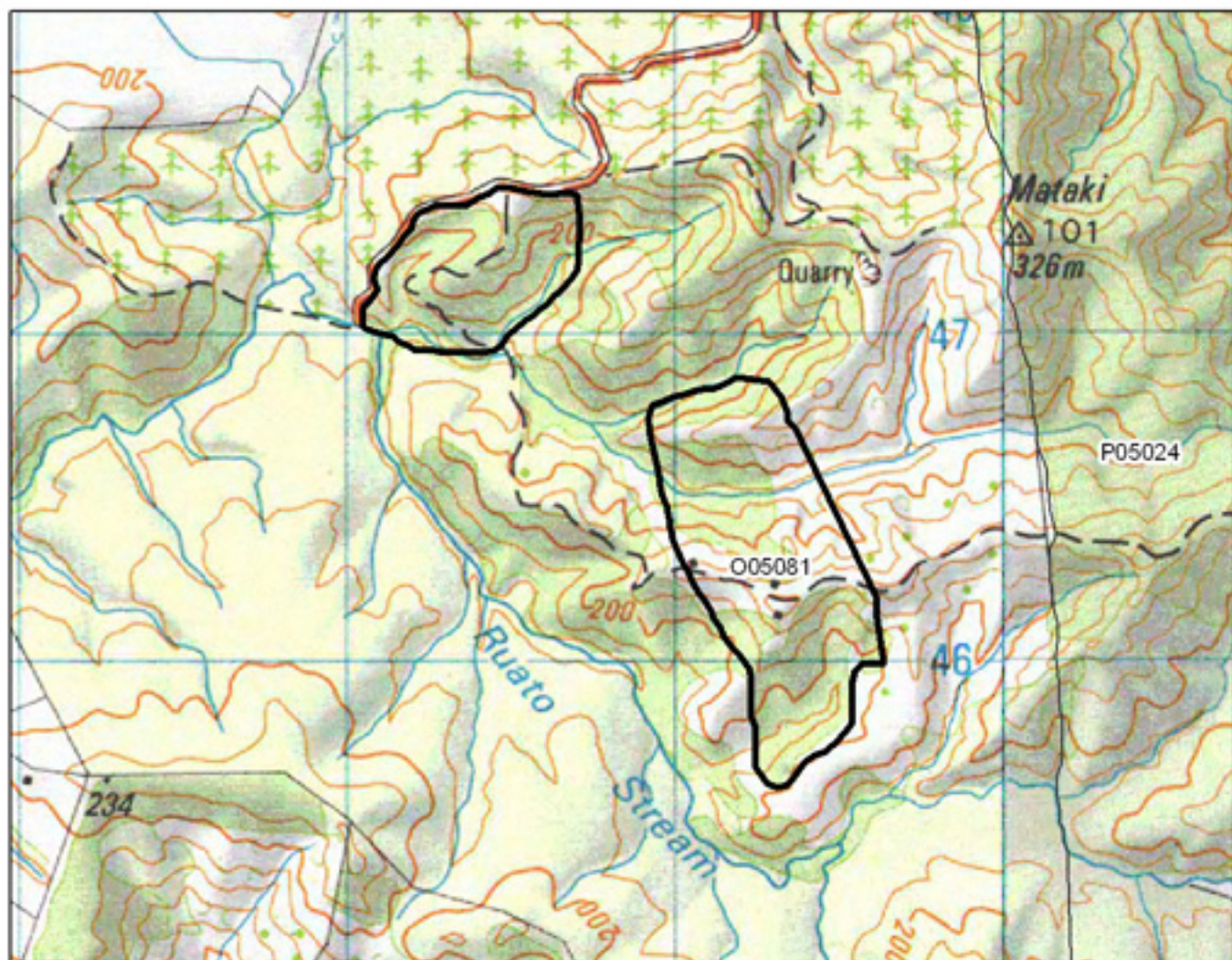


O05080 Wairere Stream Forest Mosaic

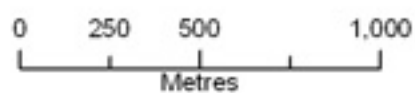


S= Shrubland
F= Forest
W= Wetland
E= Estuarine

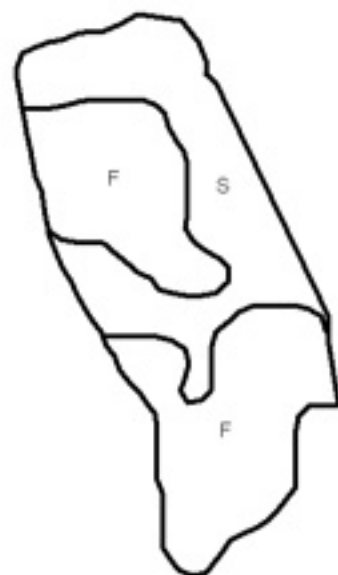


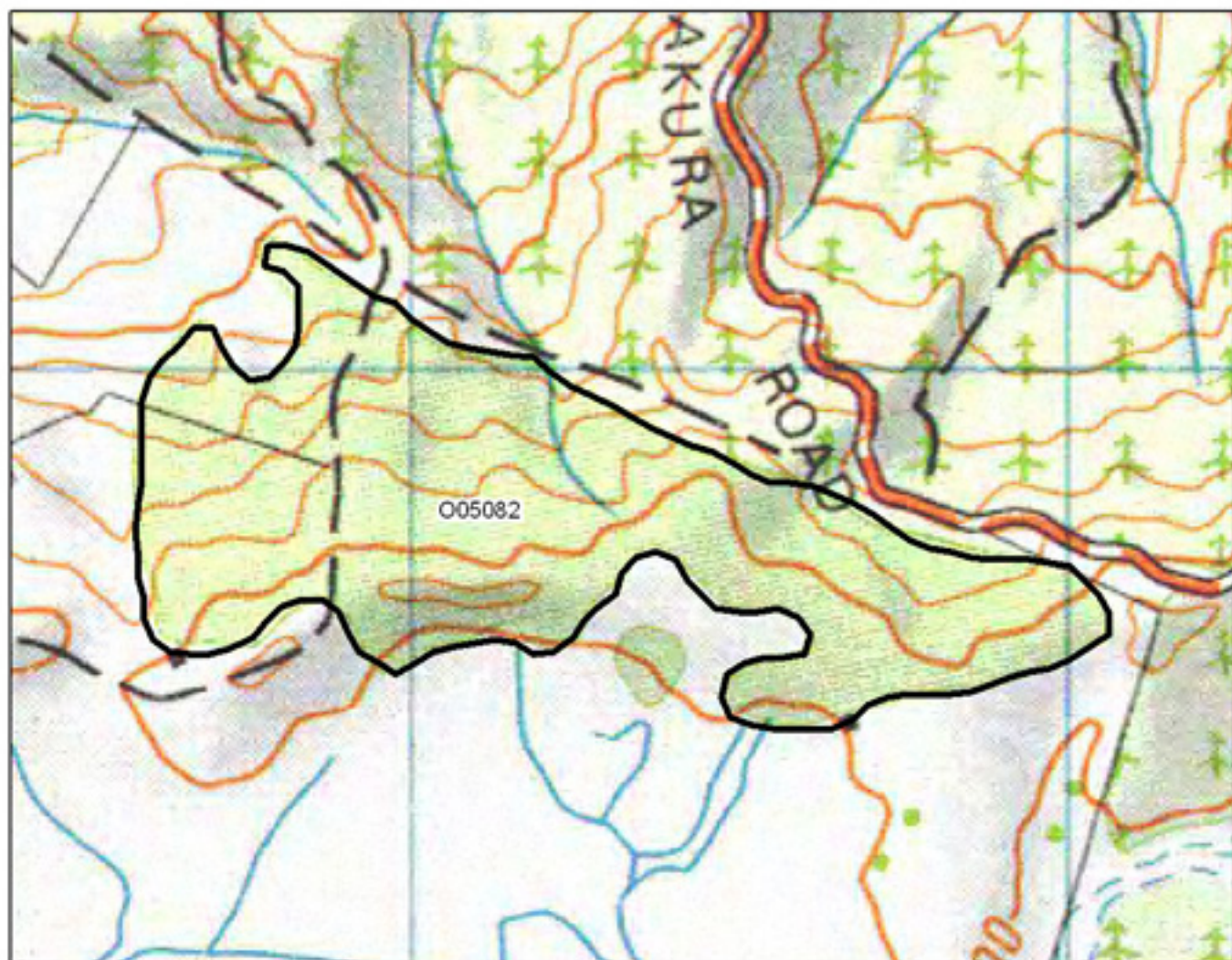


O05081 Whitecliffs

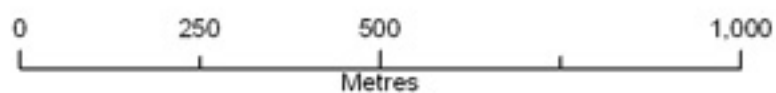


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

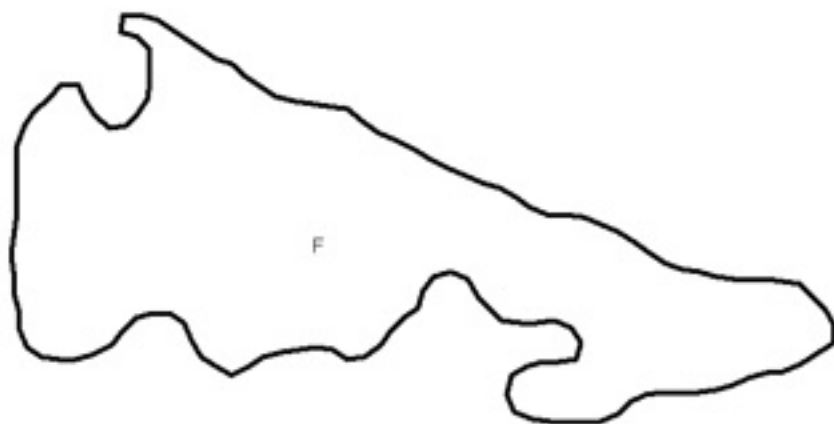




O05082 Whitecliffs Ltd Bush

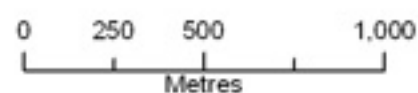


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

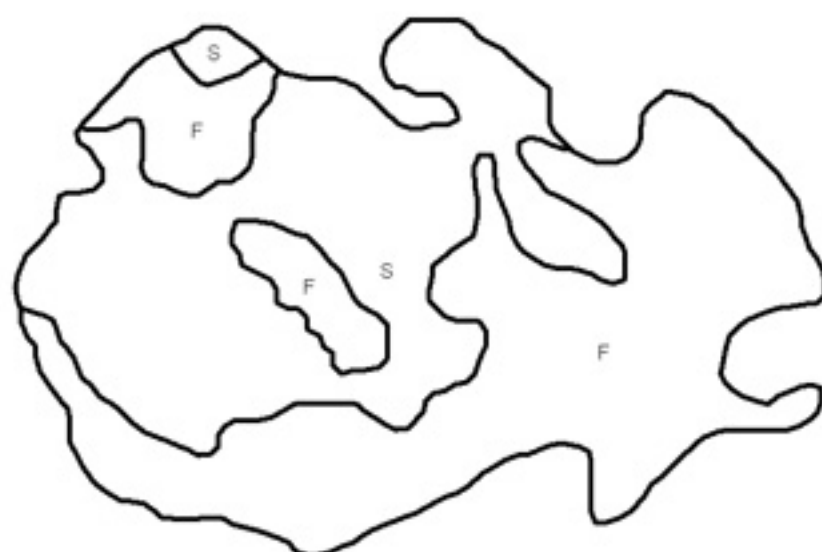


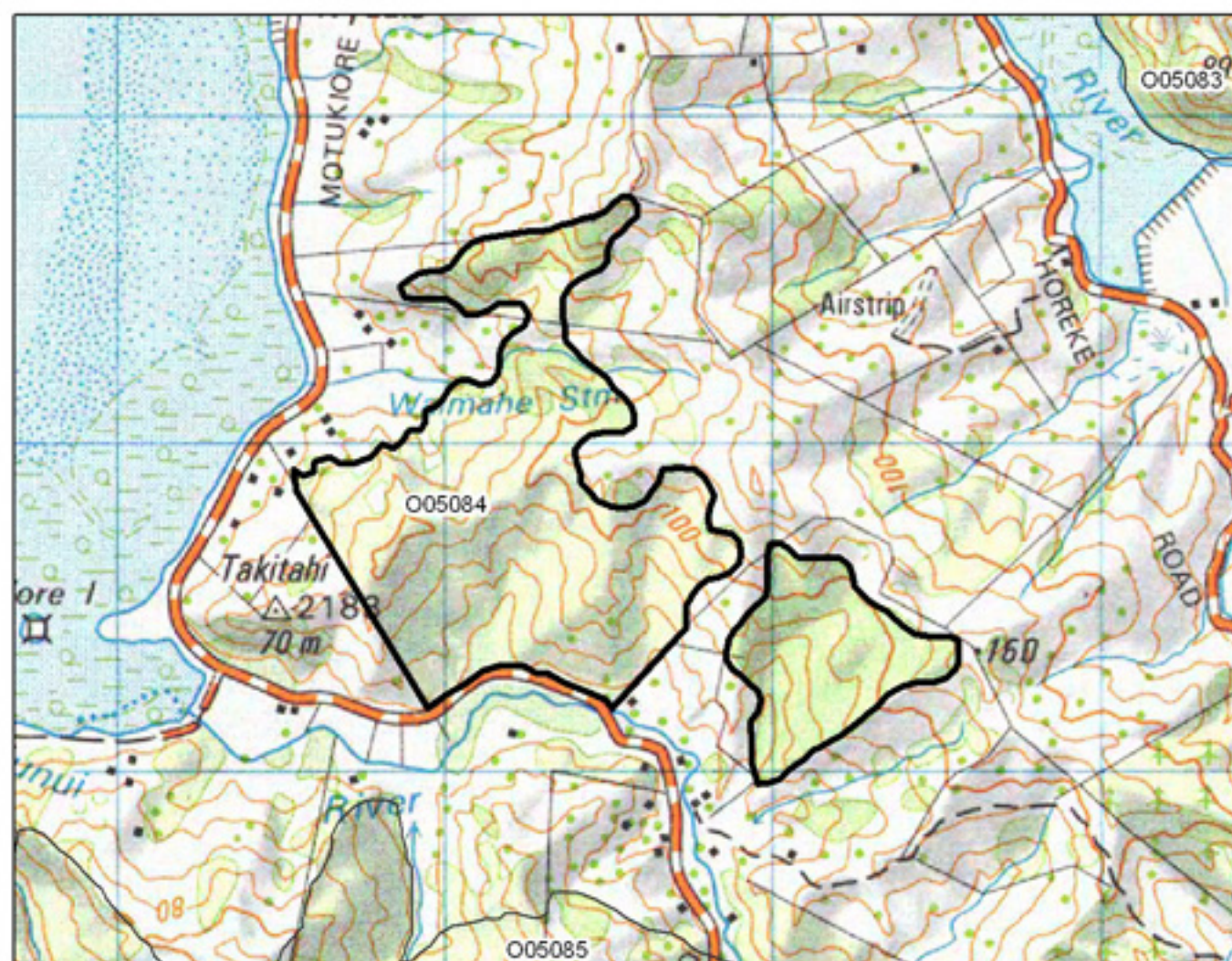


005083 Pukewhao Forest Mosaic

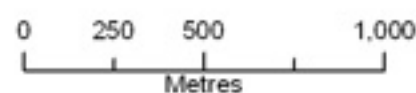


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F= Forest
W= Wetland
E= Estuarine

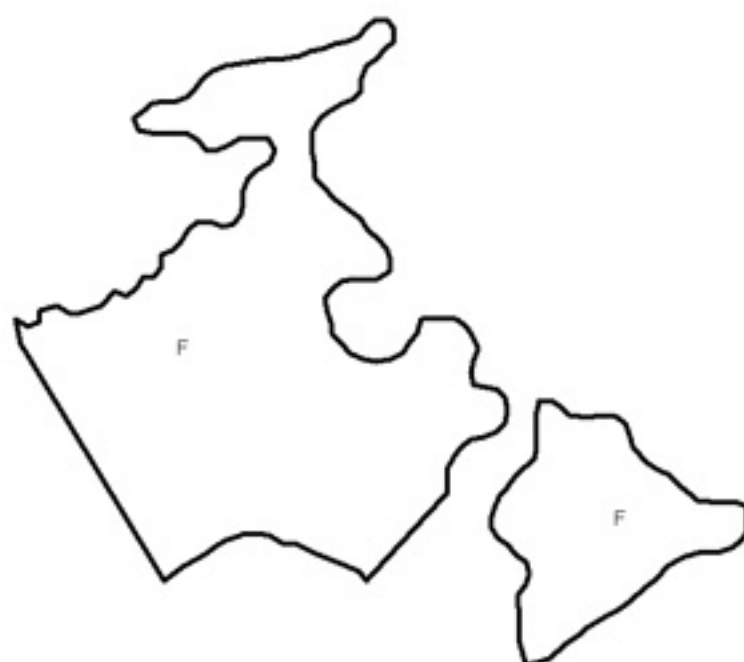


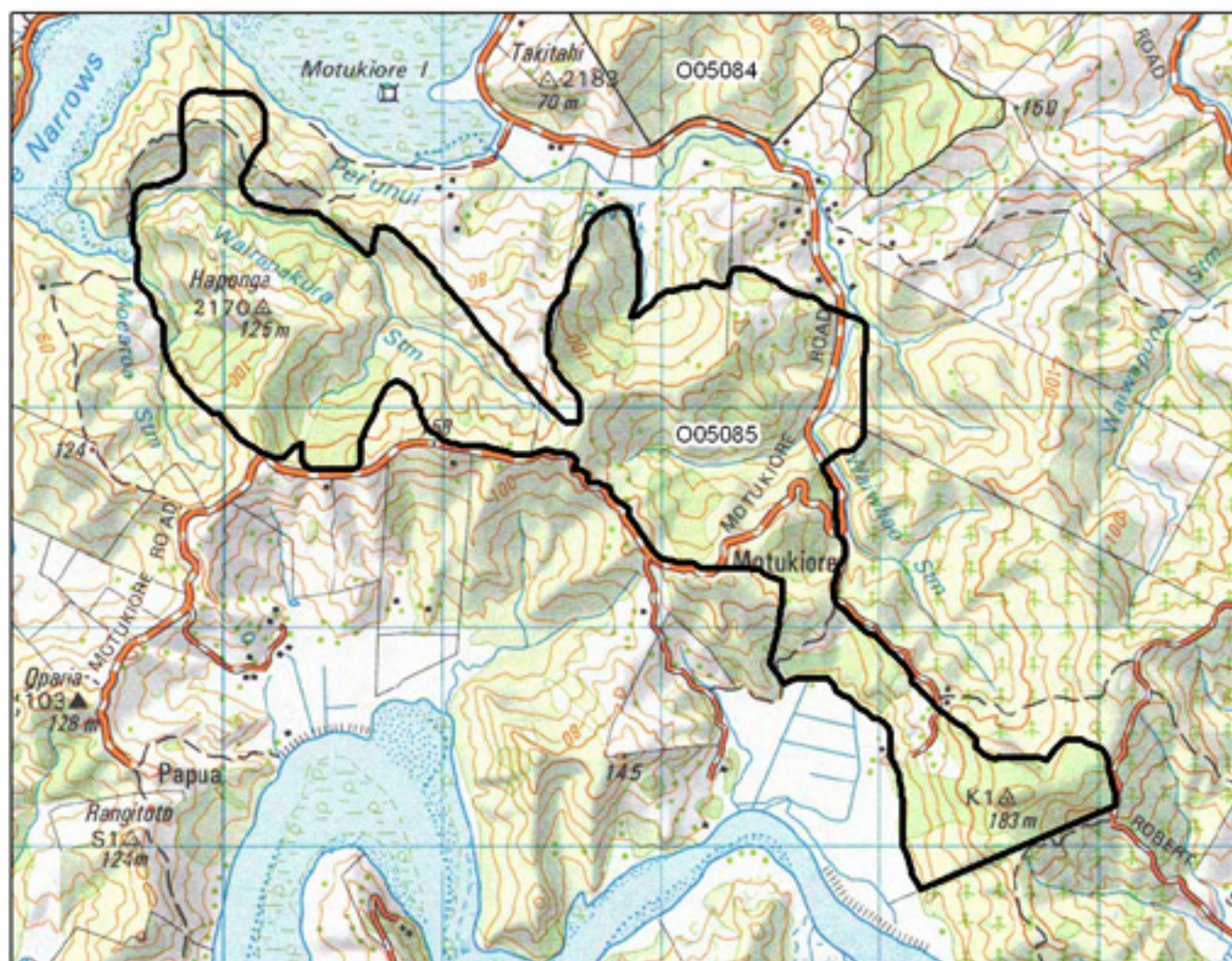


O05084 CarrsWaimahe Stream Bush

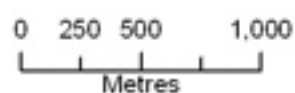


S= Shrubland
F= Forest
W= Wetland
E= Estuarine





O05085 Motukioi Bush Association

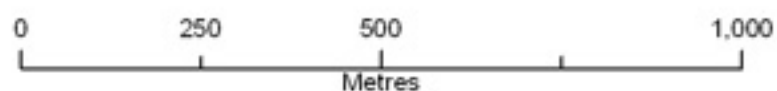


S= Shrubland
F= Forest
W= Wetland
E= Estuarine



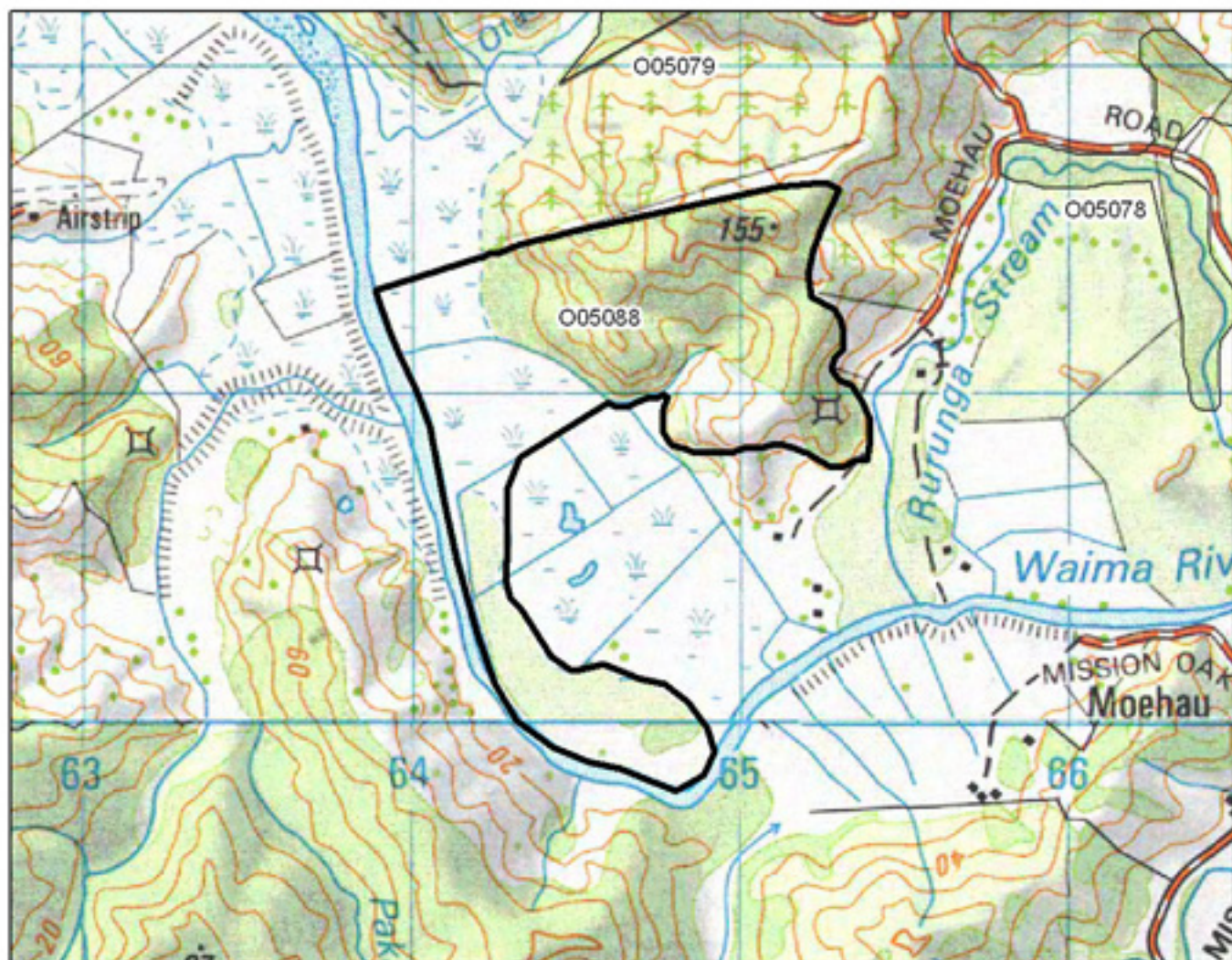


O05086 Maraeoa Swamps

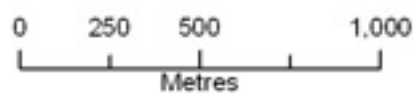


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

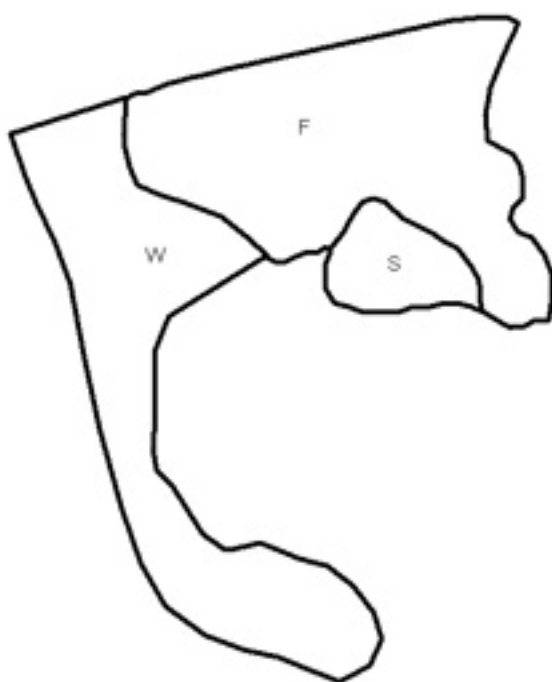


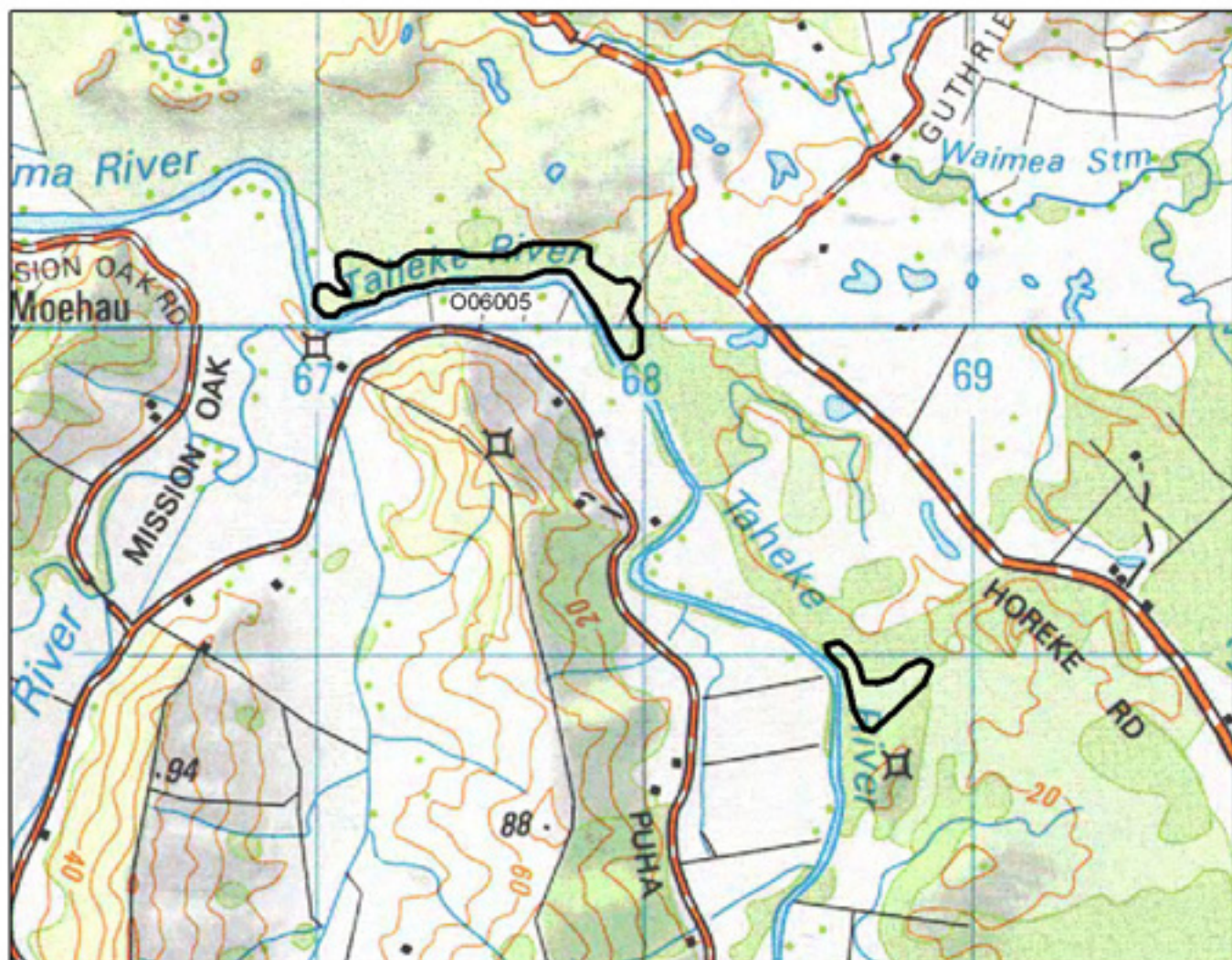


O05088 Moehau Wetland and Forest Mosaic

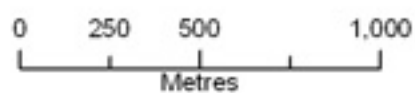


S= Shrubland
F= Forest
W= Wetland
E= Estuarine



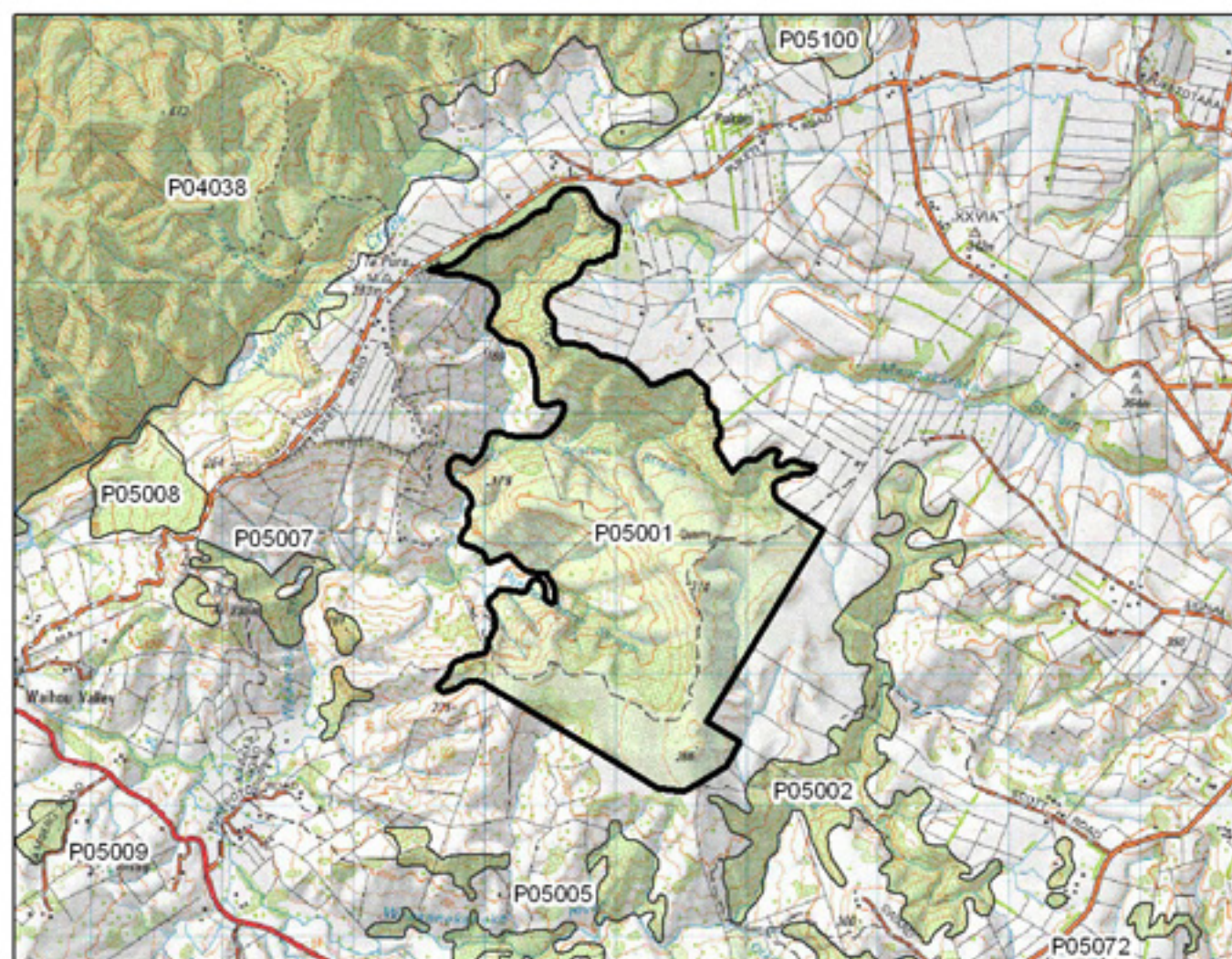


006005 Taheke River Wetlands



S= Shrubland
F= Forest
W= Wetland
E= Estuarine



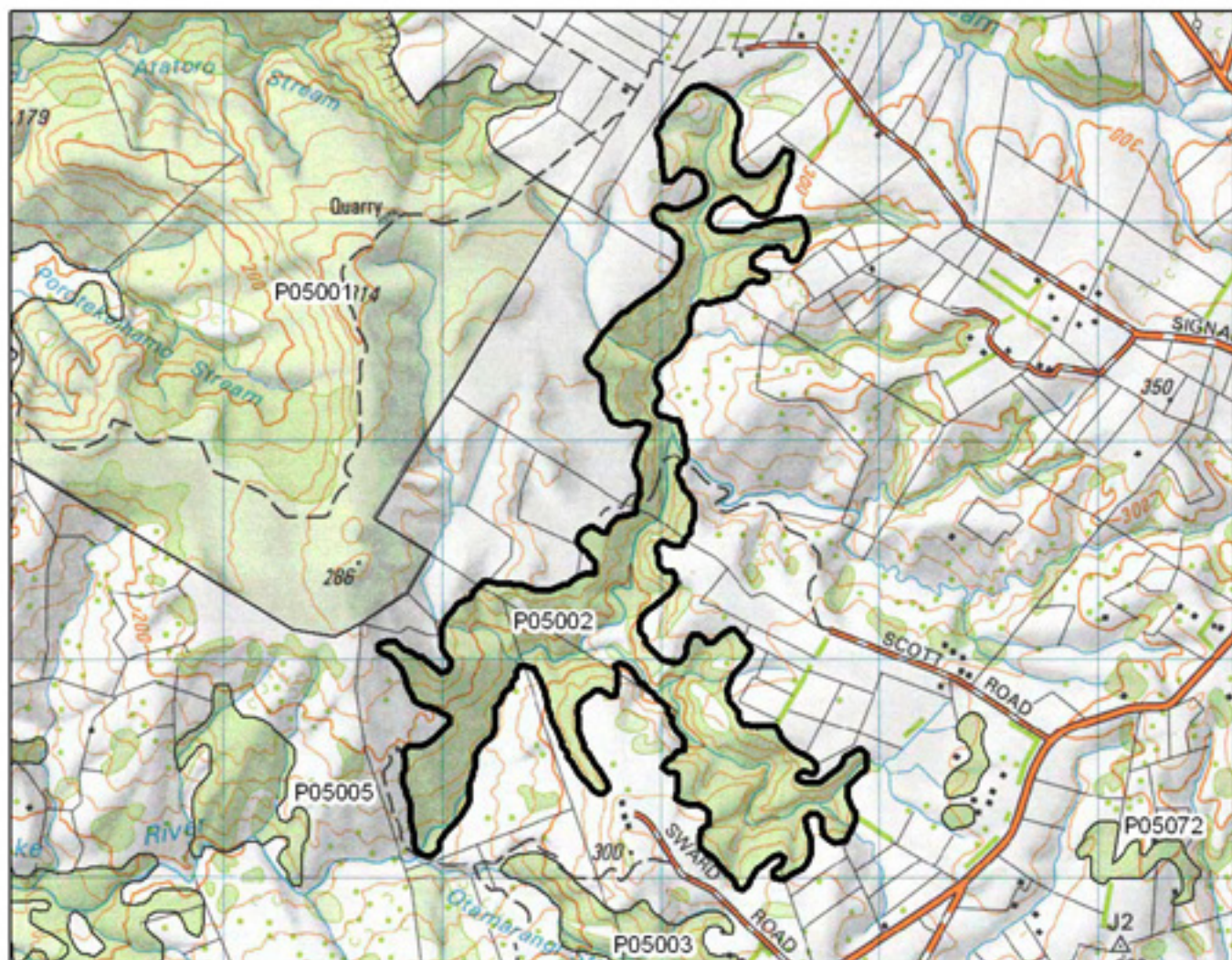


P05001 Aratoro Stream Bush

0 500 1,000 2,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



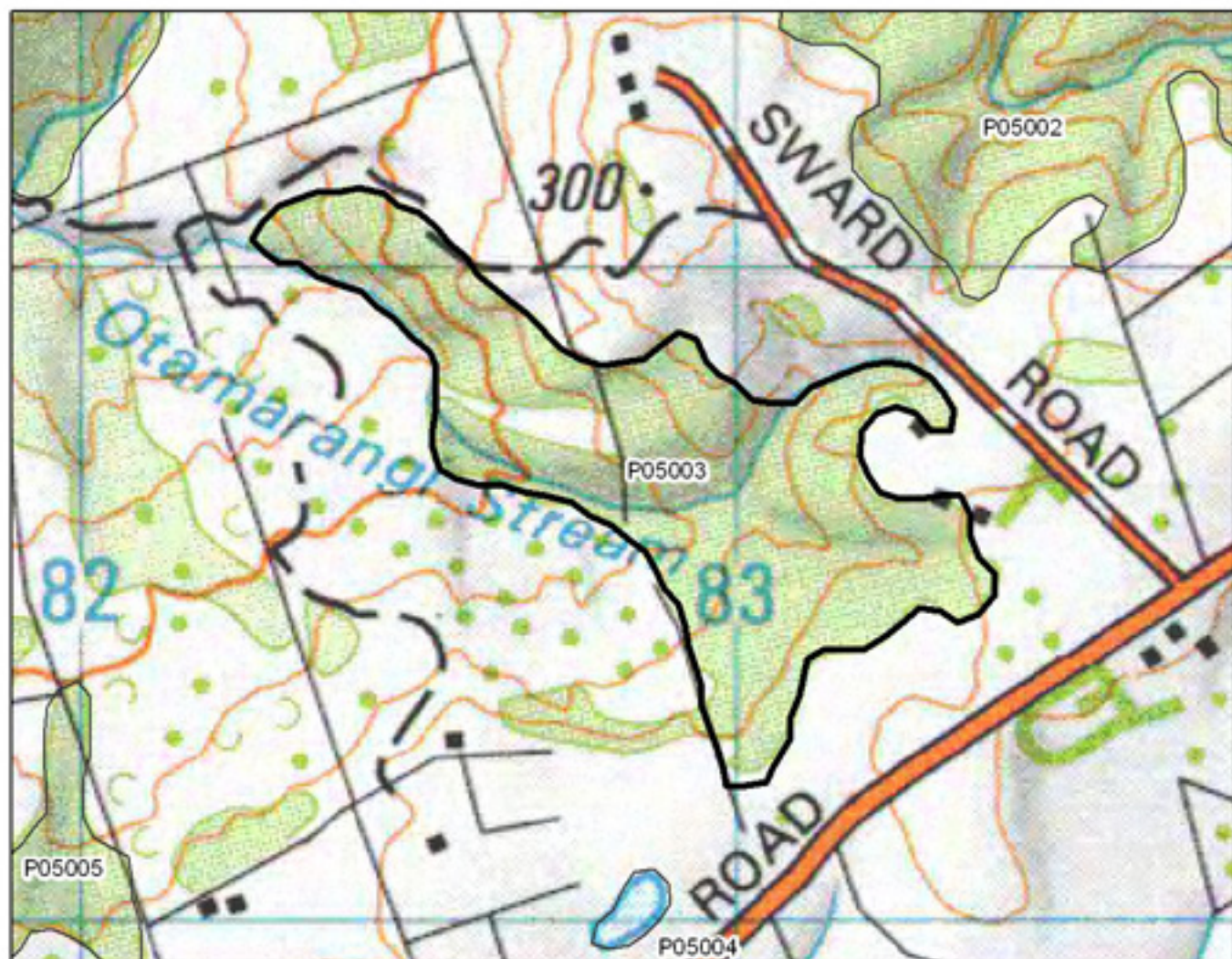


P05002 Scotts Road Bush

0 375 750 1,500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

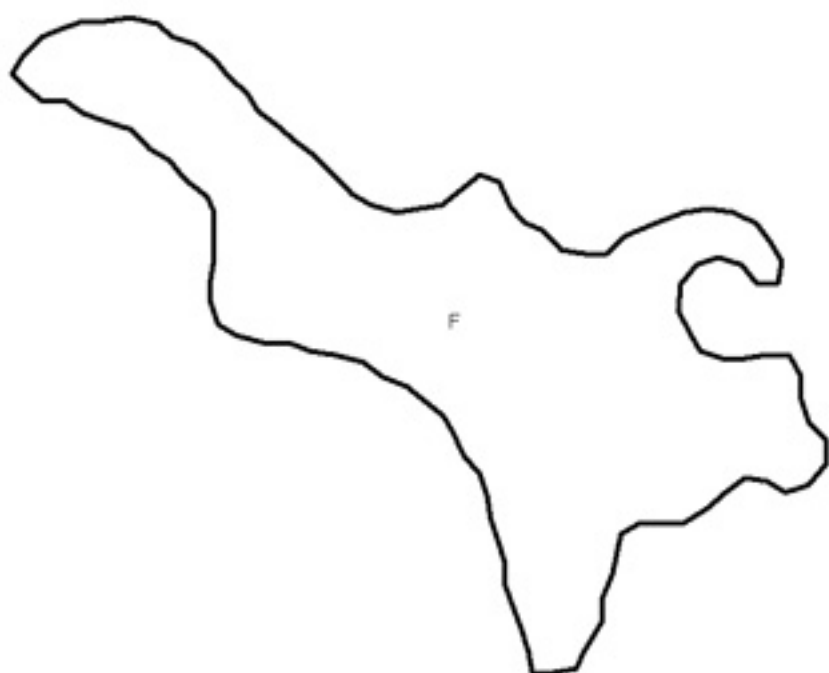


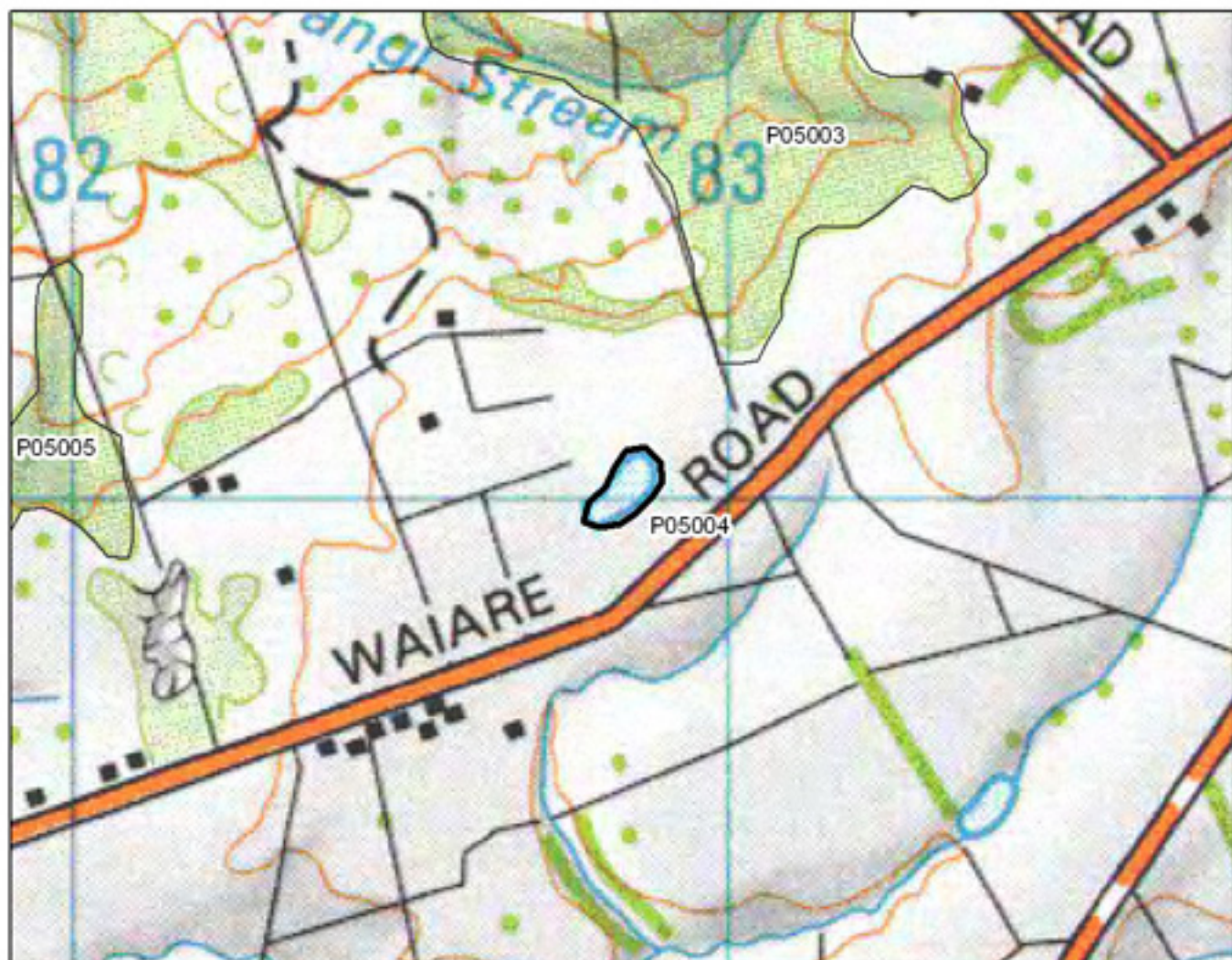


P05003 Otamarangi Stream Bush

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



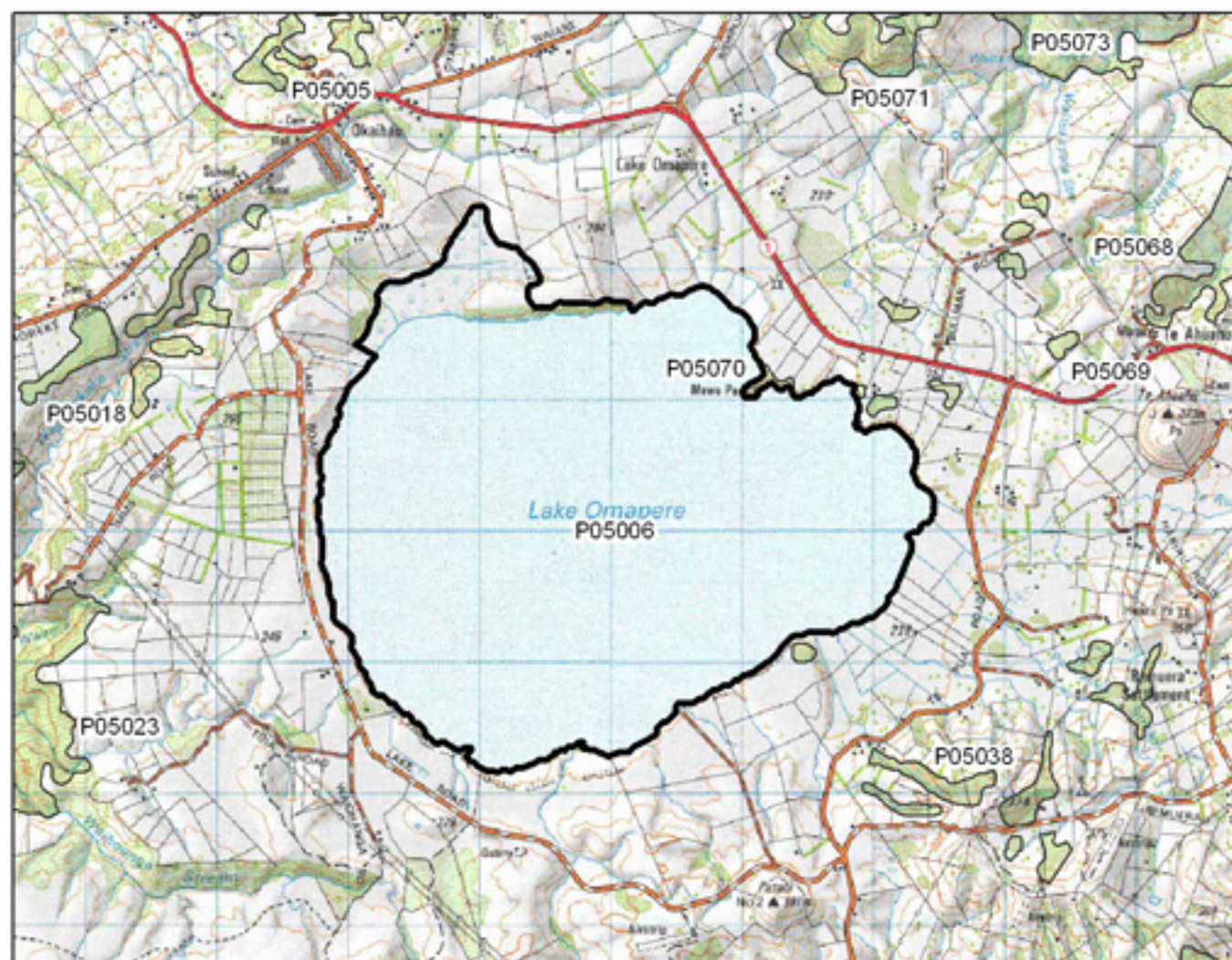


P05004 Waiare Road Pond

0 62.5 125 250 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



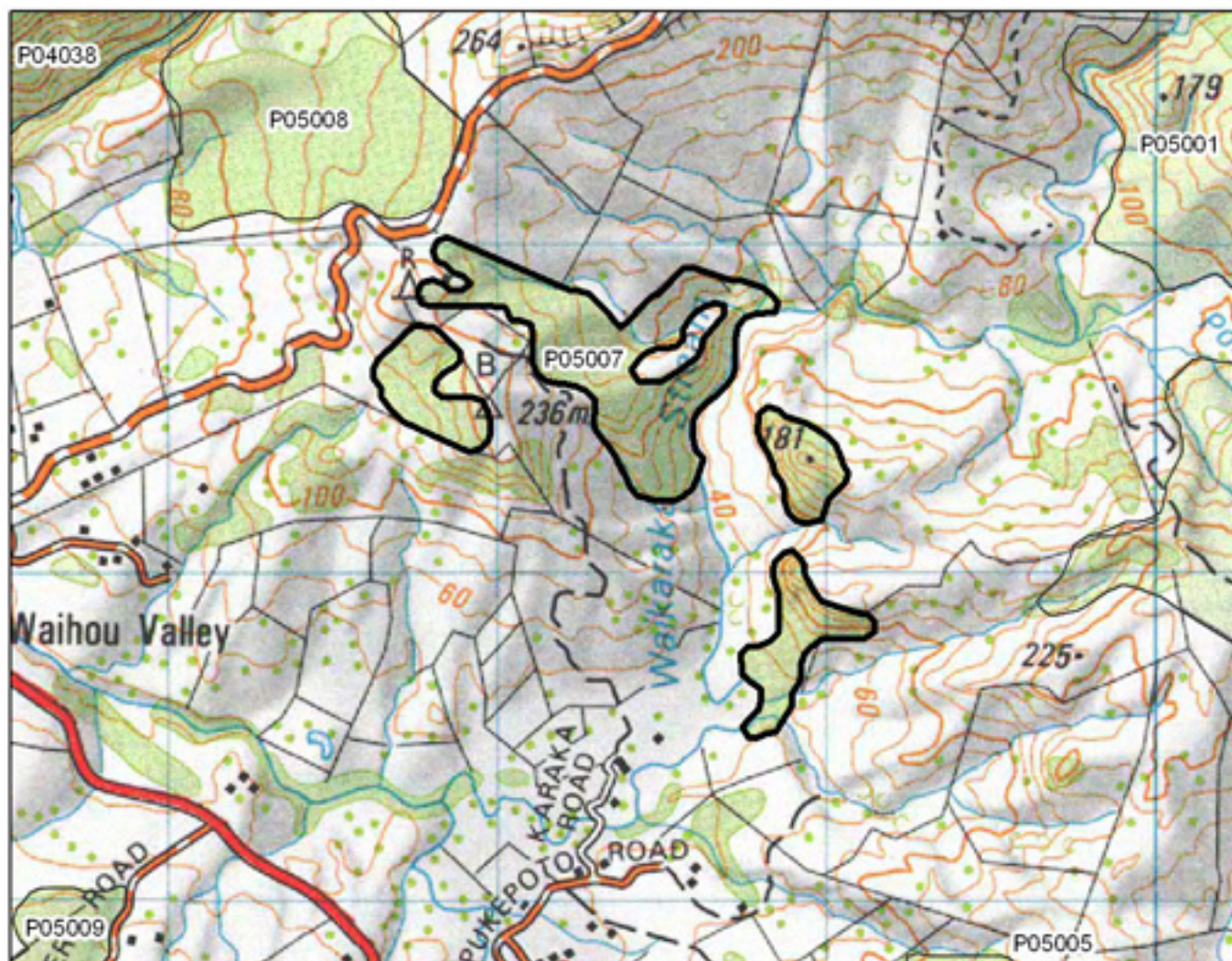


P05006 Lake Omapere and Environs

0 375 750 1,500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



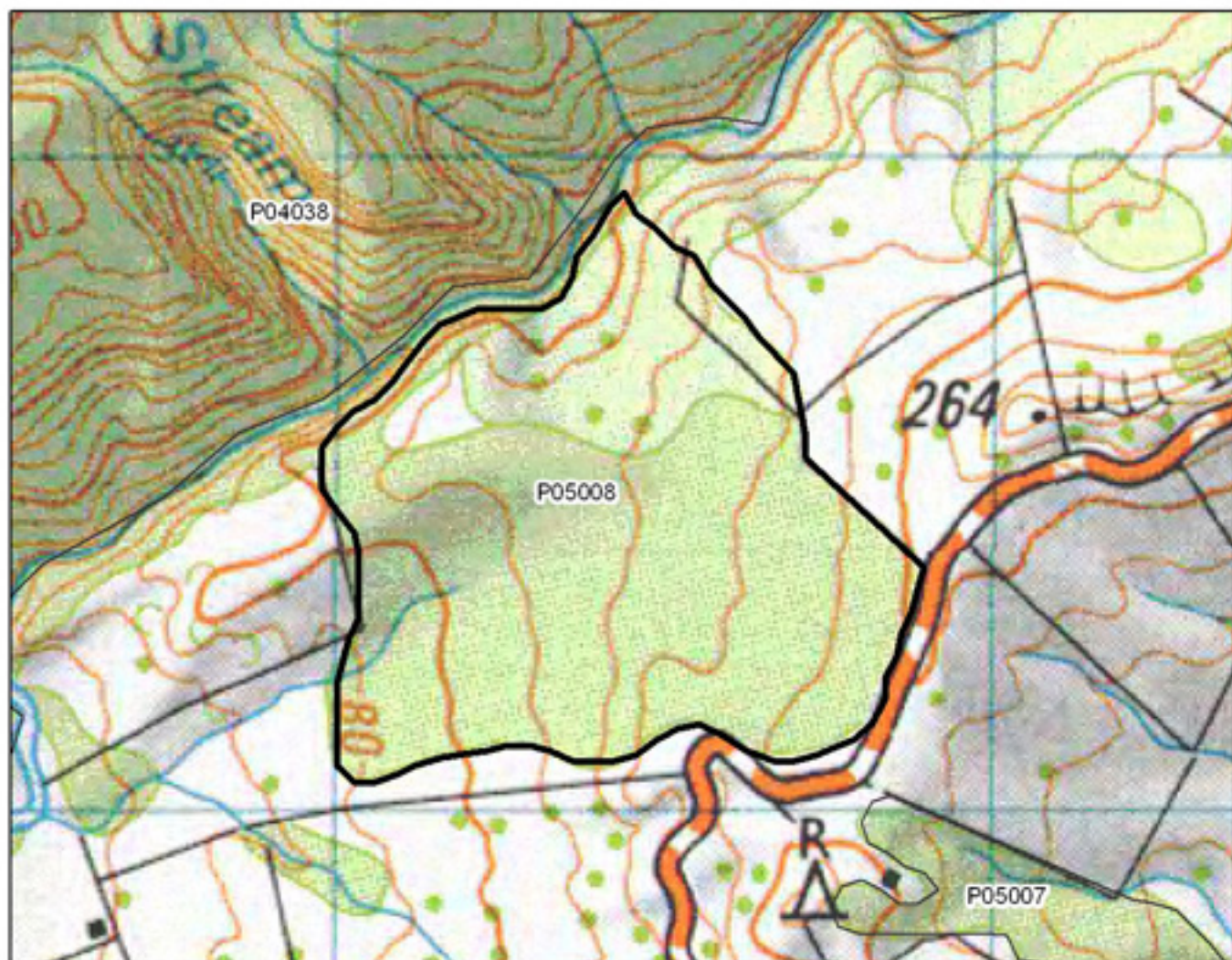


P05007 Waikaraka Stream Bush

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

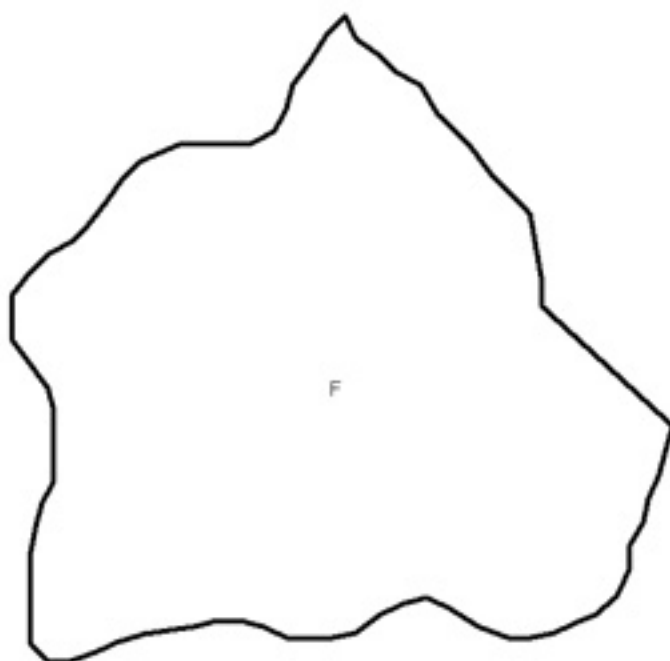


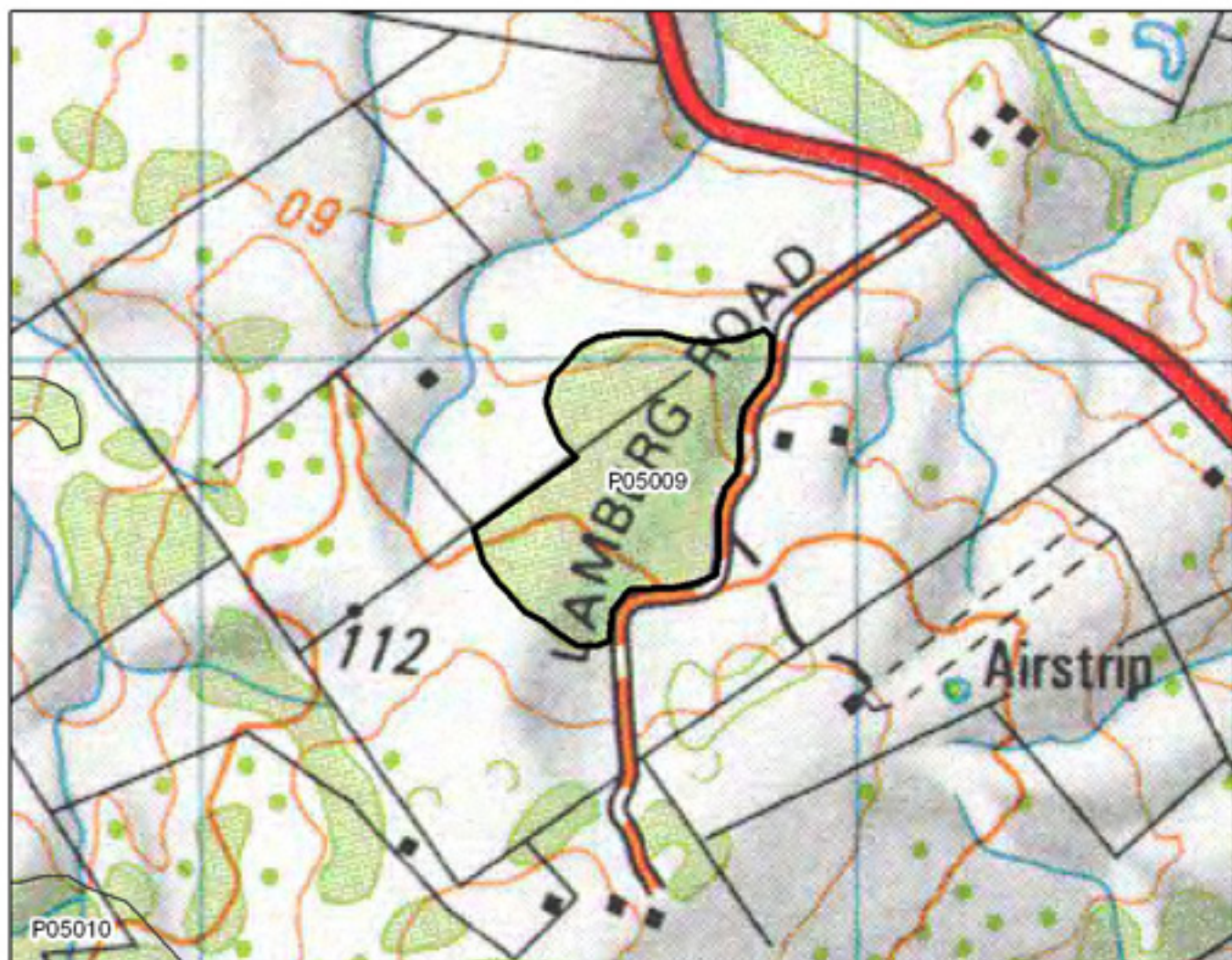


P05008 Waihoanga Stream Forest Outlier

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine





P05009 Lamberg Road Bush

0 125 250 500 Metres

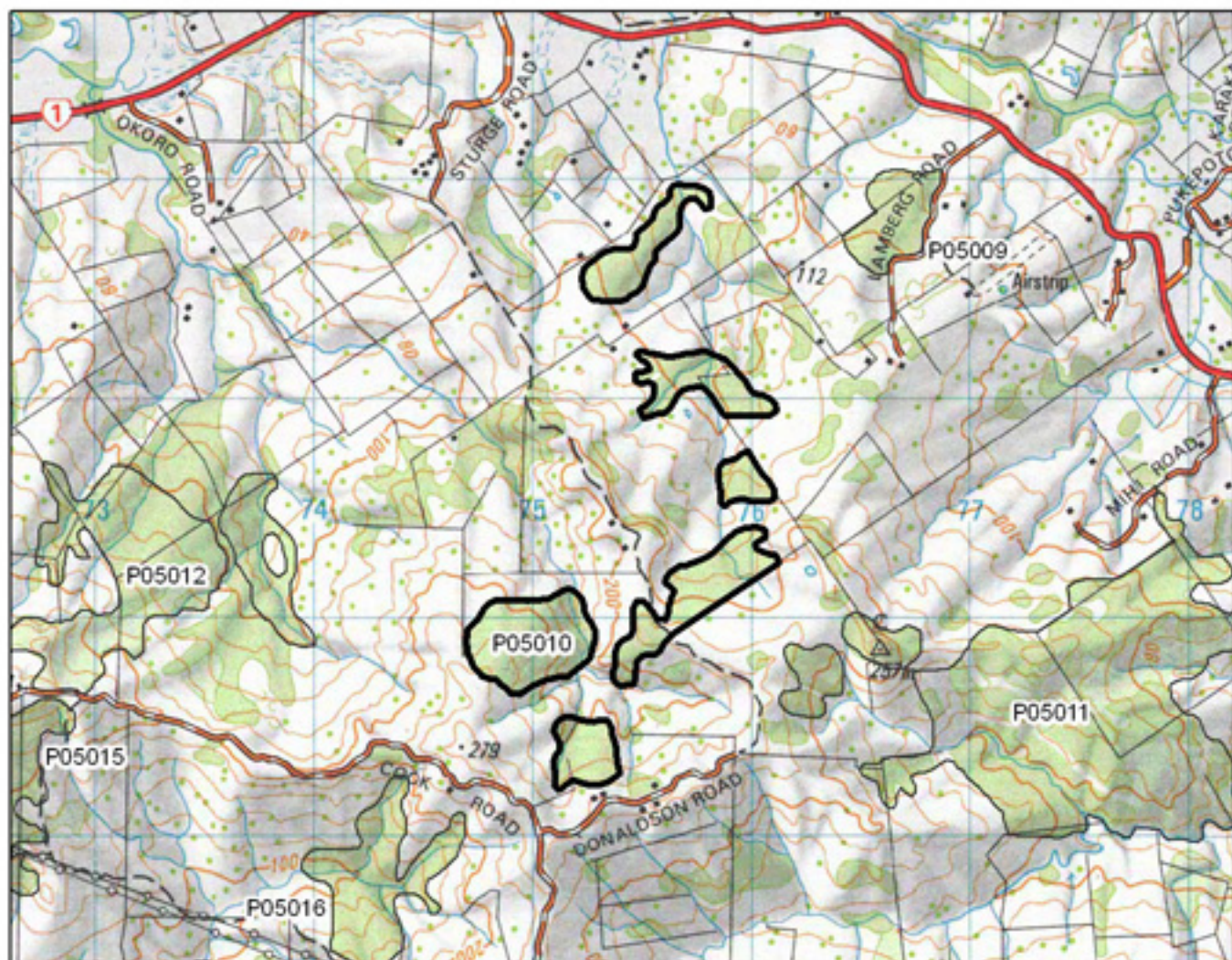
S= Shrubland

F= Forest

W= Wetland

E= Estuarine





P05010 Donaldsons Road Bush

0 250 500 1,000 Metres

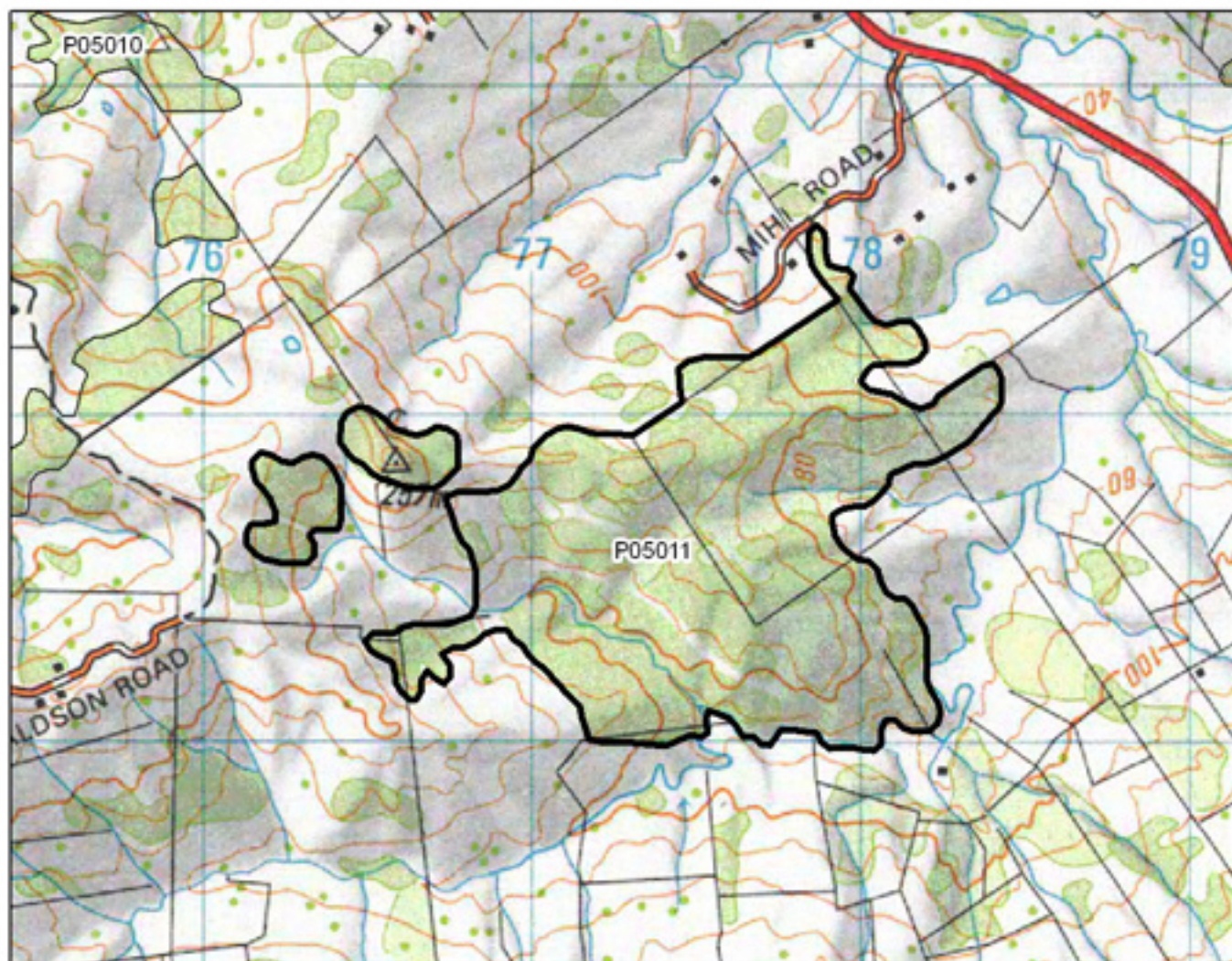
S= Shrubland

F= Forest

W= Wetland

E= Estuarine





P05011 Mihi Road Bush

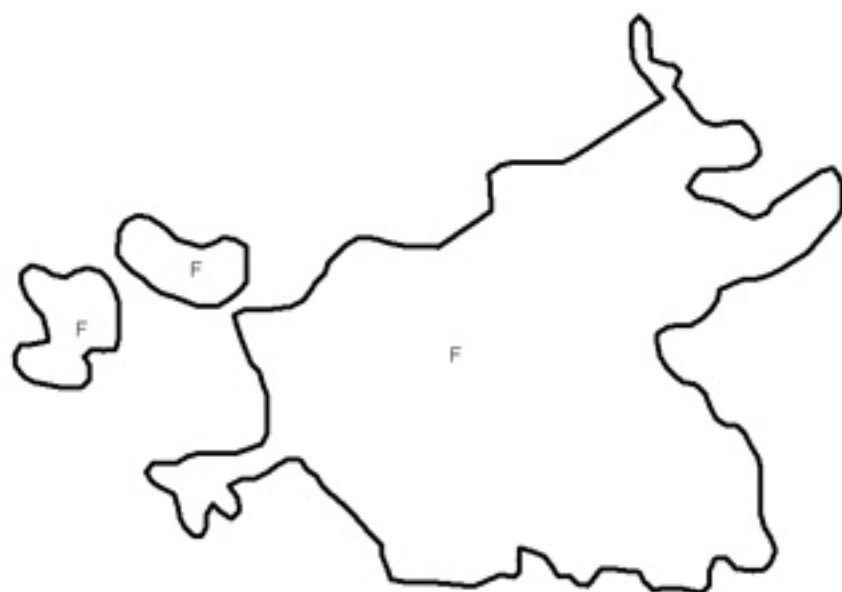
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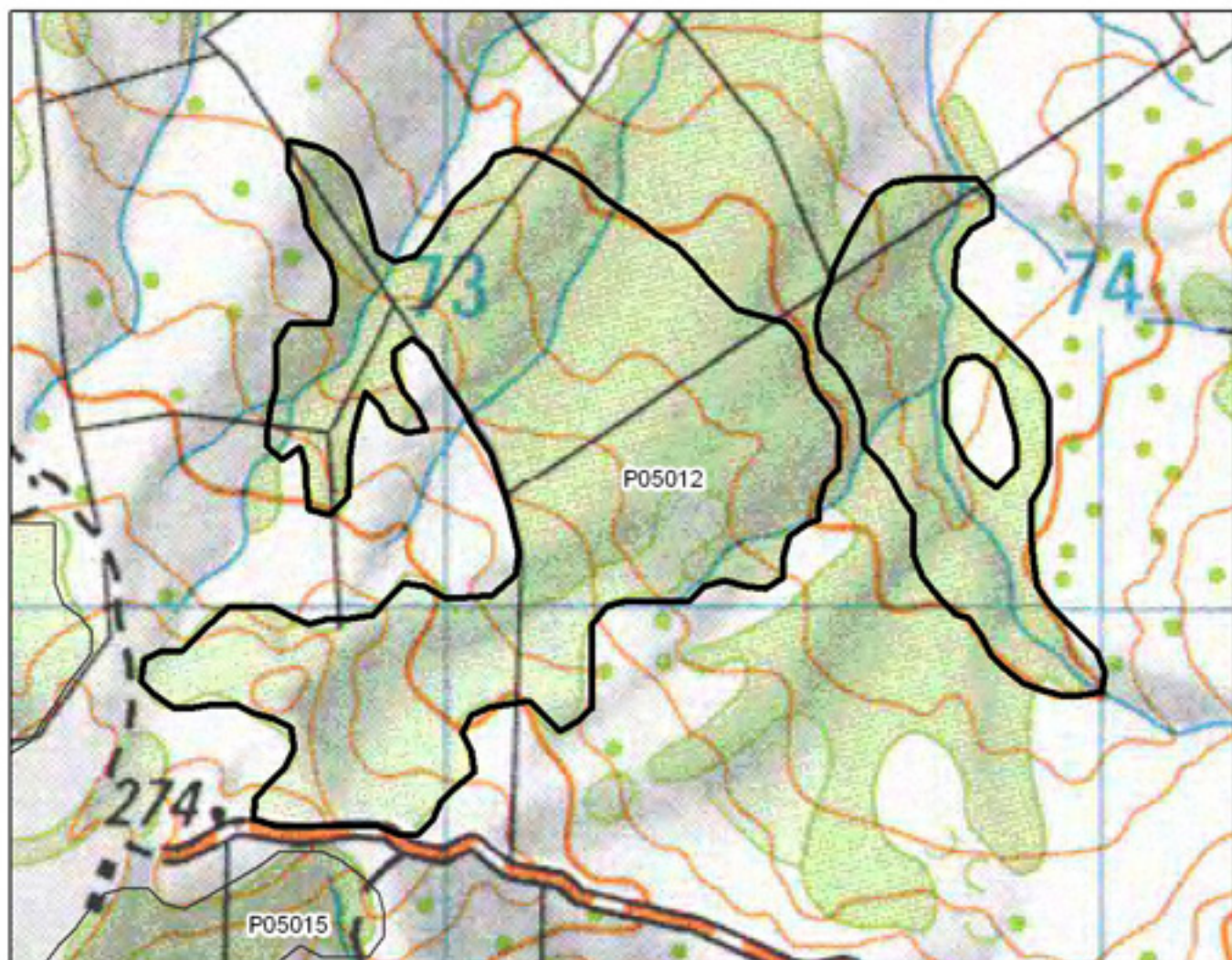
S= Shrubland

F= Forest

W= Wetland

E= Estuarine

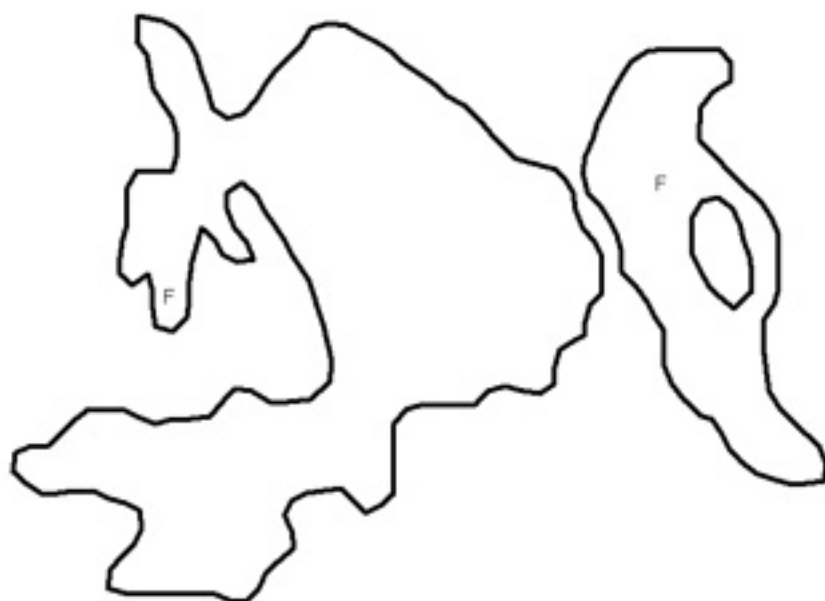


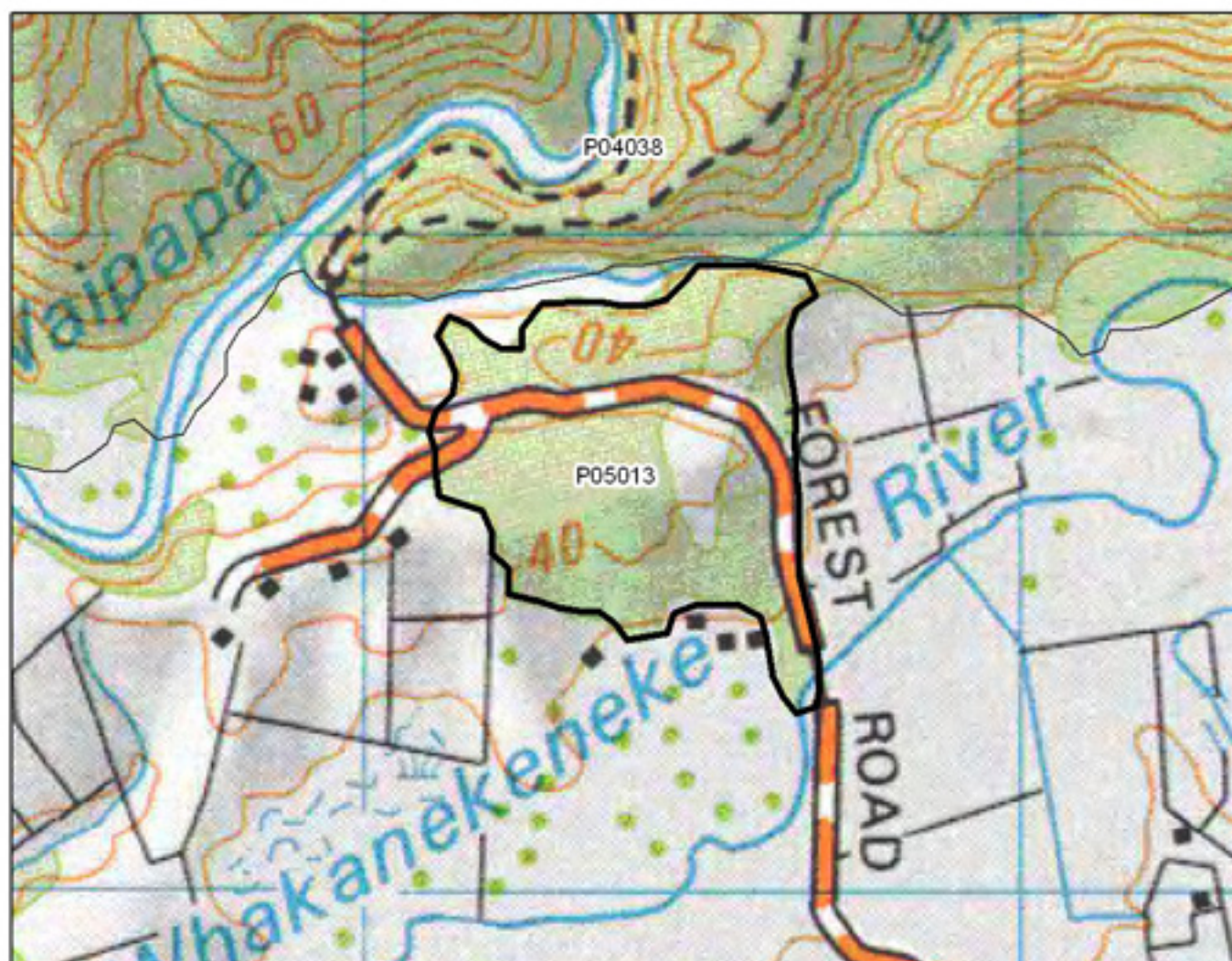


P05012 Okoro Stream Bush

0 125 250 500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

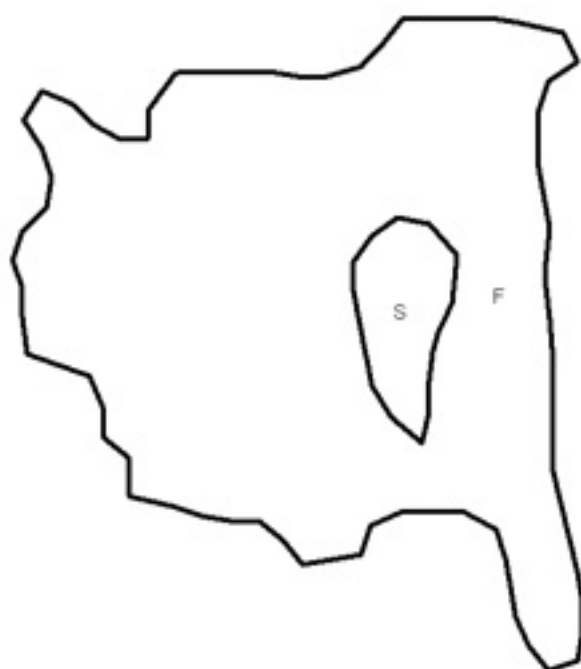


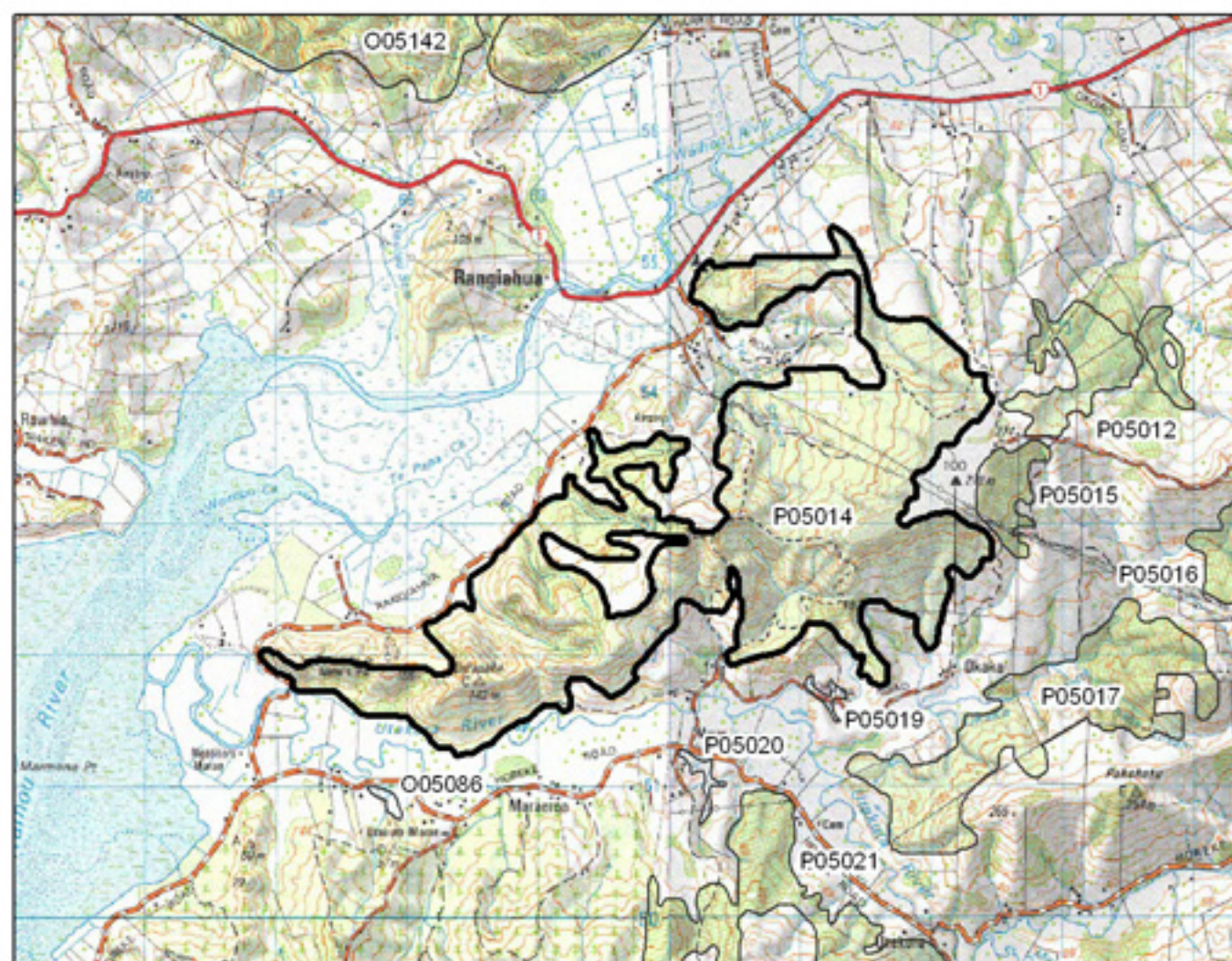


P05013 Forest Road Bush

0 75 150 300 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

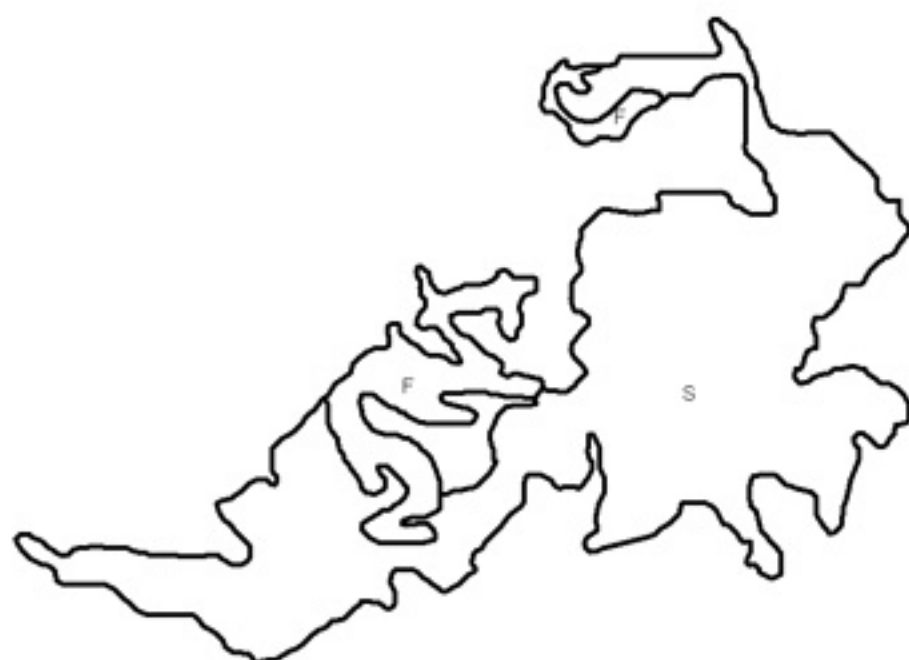


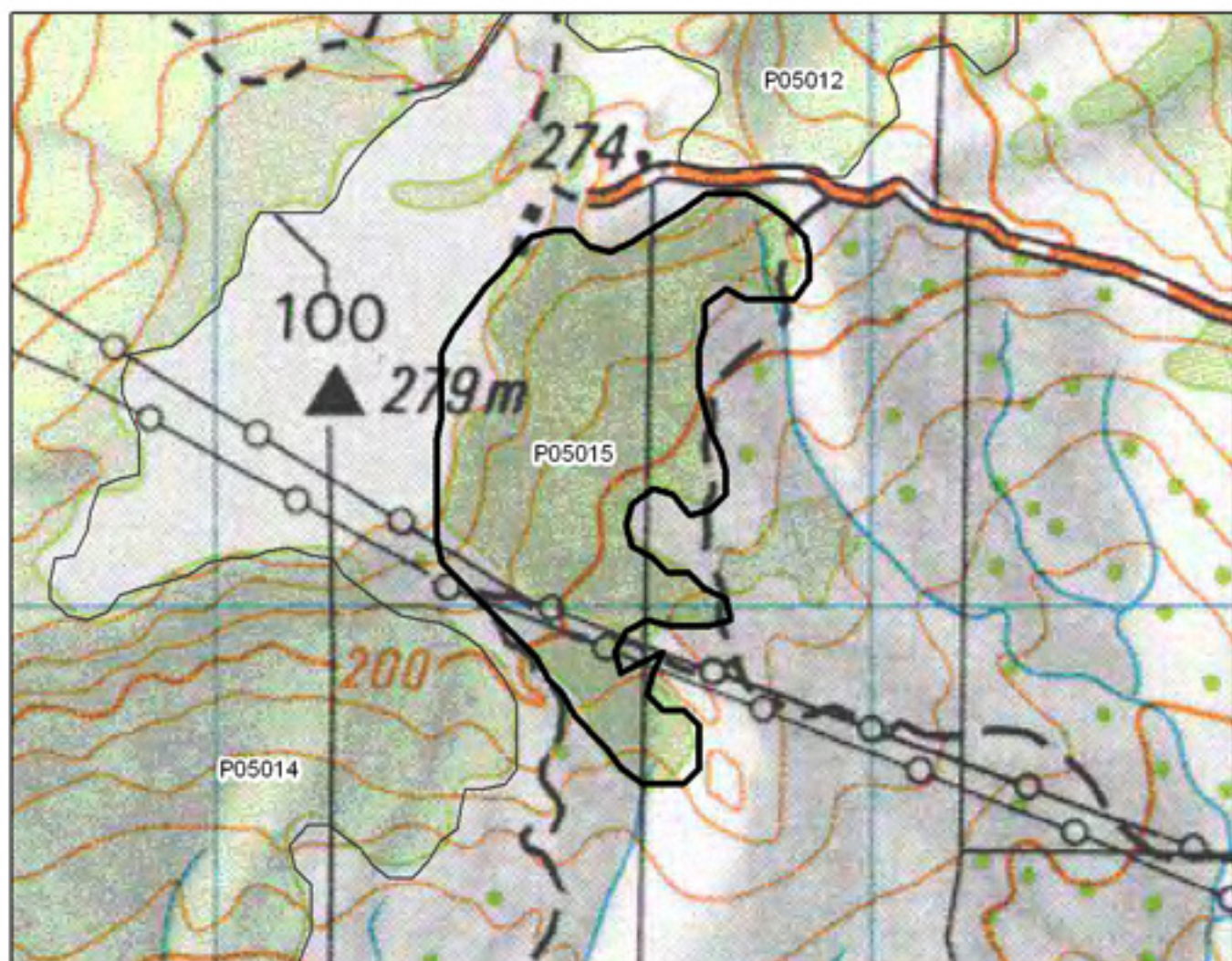


P05014 Te Toke Stream Shrubland

0 440 880 1,760 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



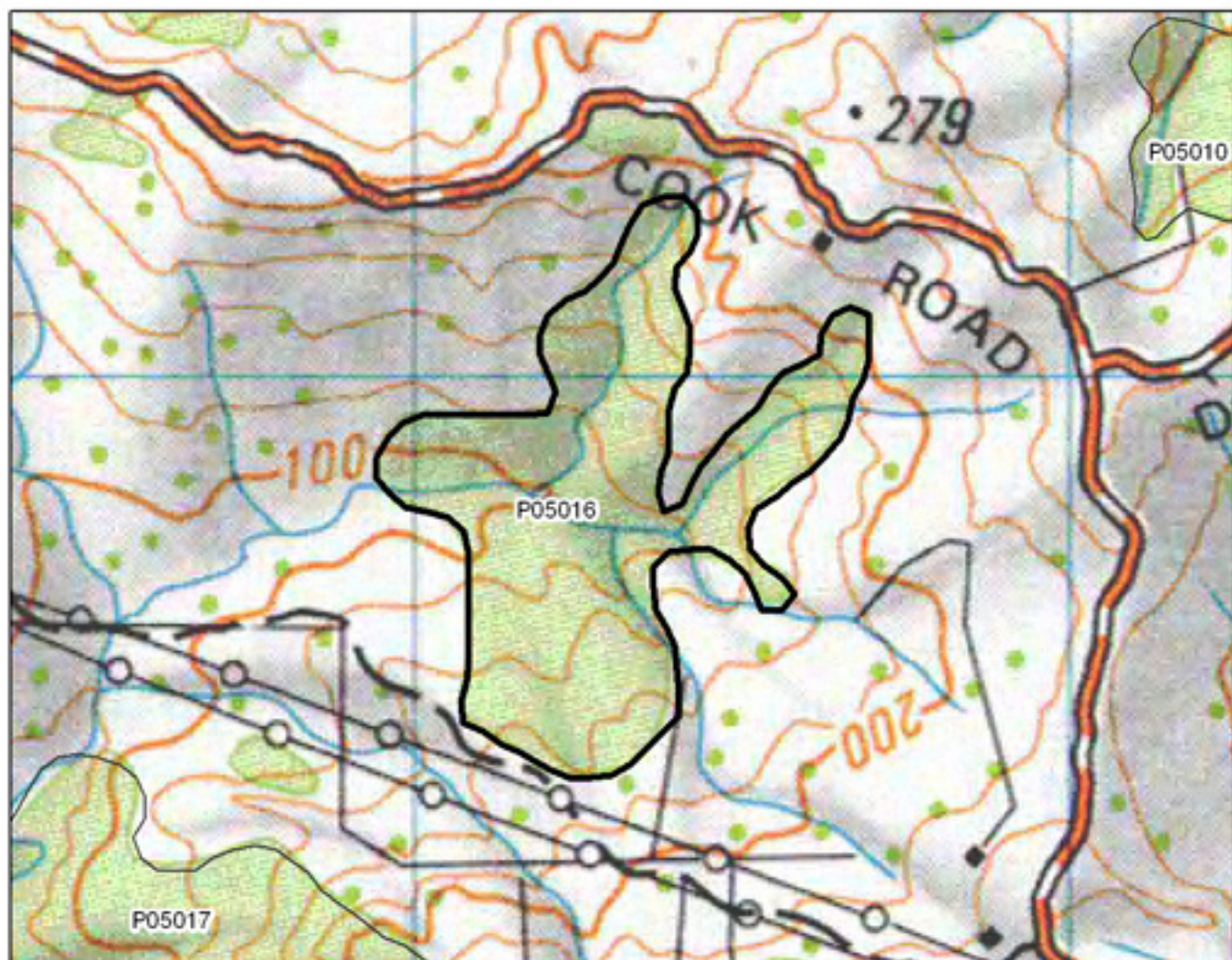


P05015 Cooks TV Block

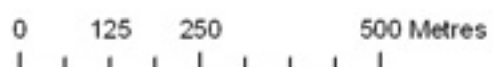
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S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

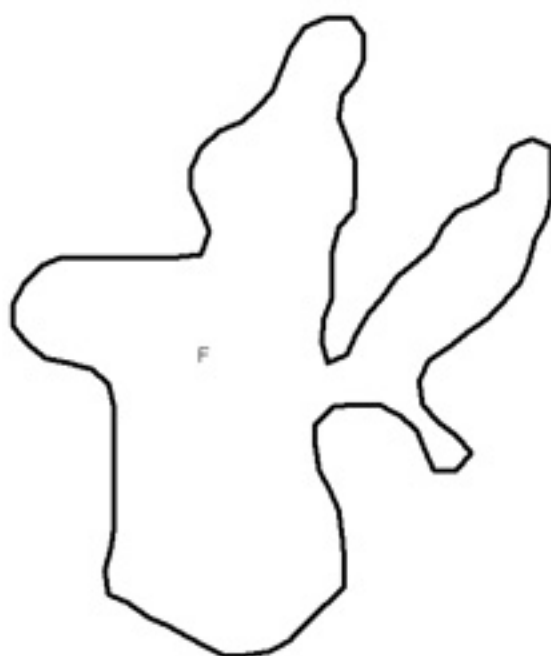


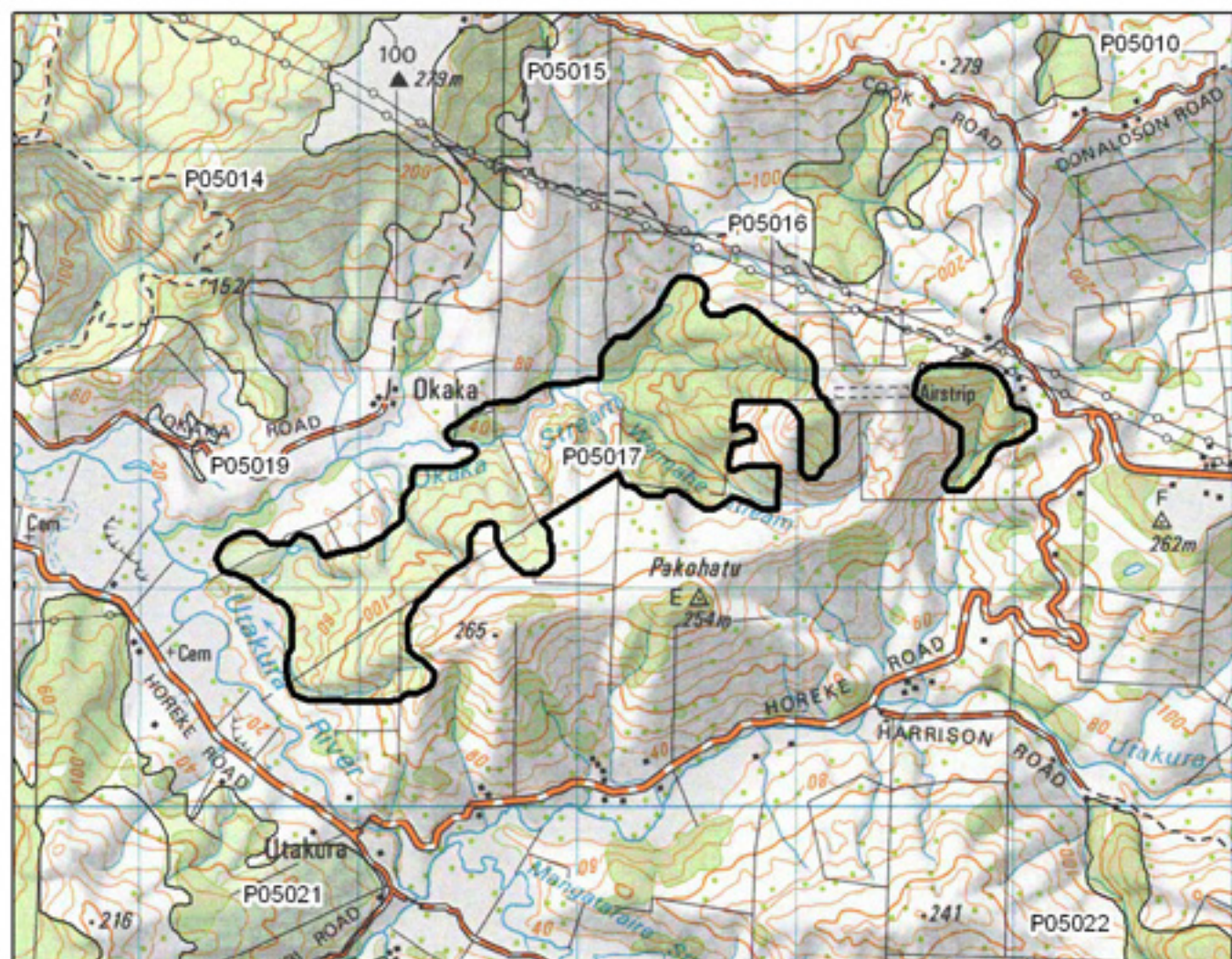


P05016 Cooks Road Bush No. B

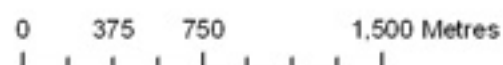


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



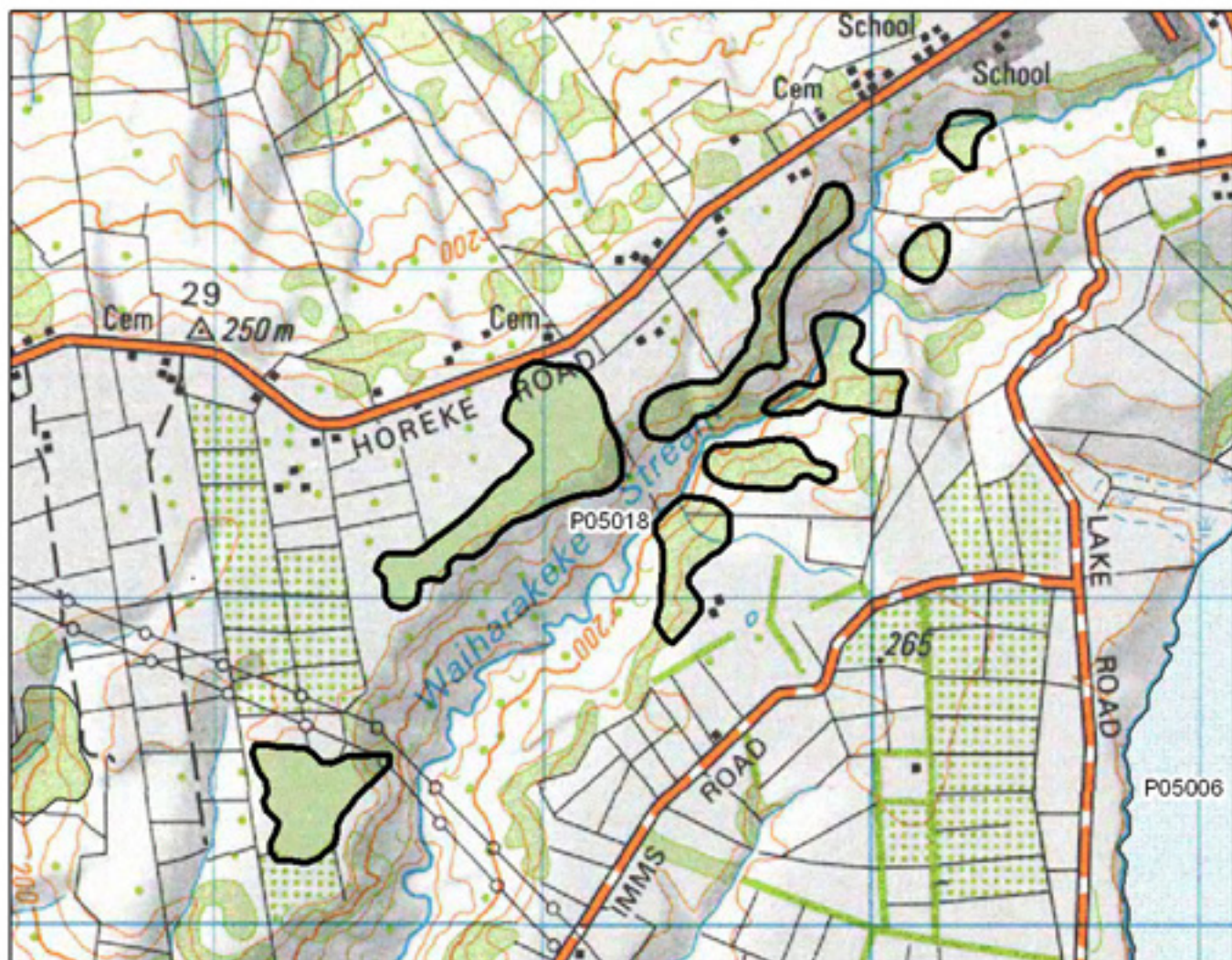


P05017 Cooks Airstrip Block



S= Shrubland
F= Forest
W= Wetland
E= Estuarine





P05018 Puriri Farm Bush

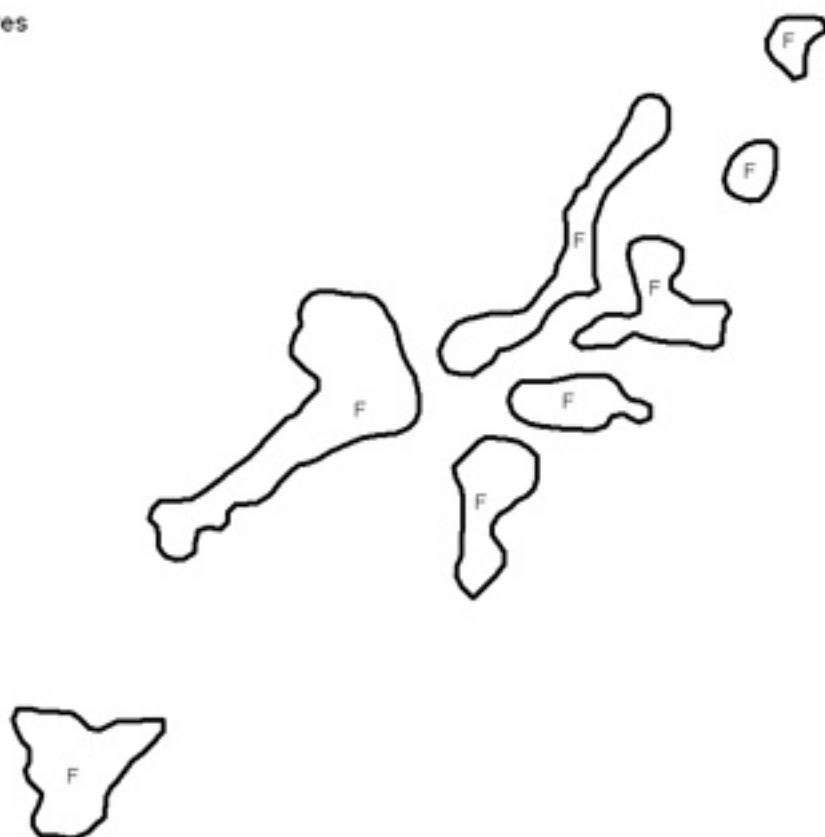
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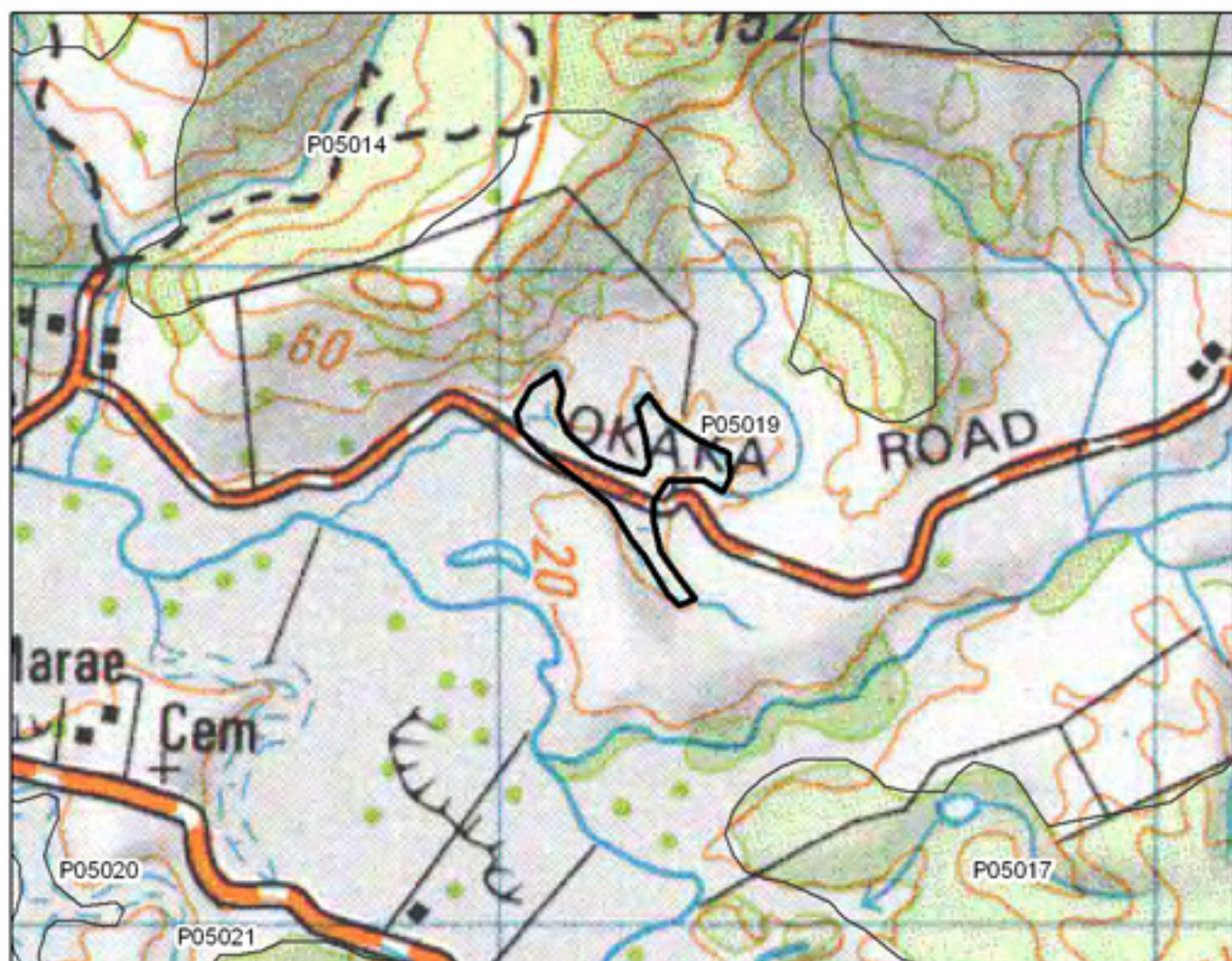
S= Shrubland

F= Forest

W= Wetland

E= Estuarine

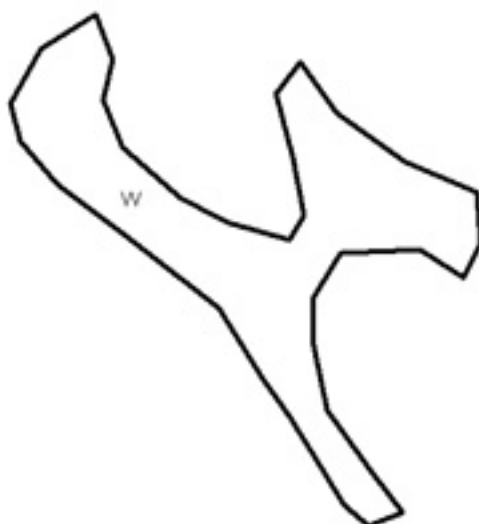


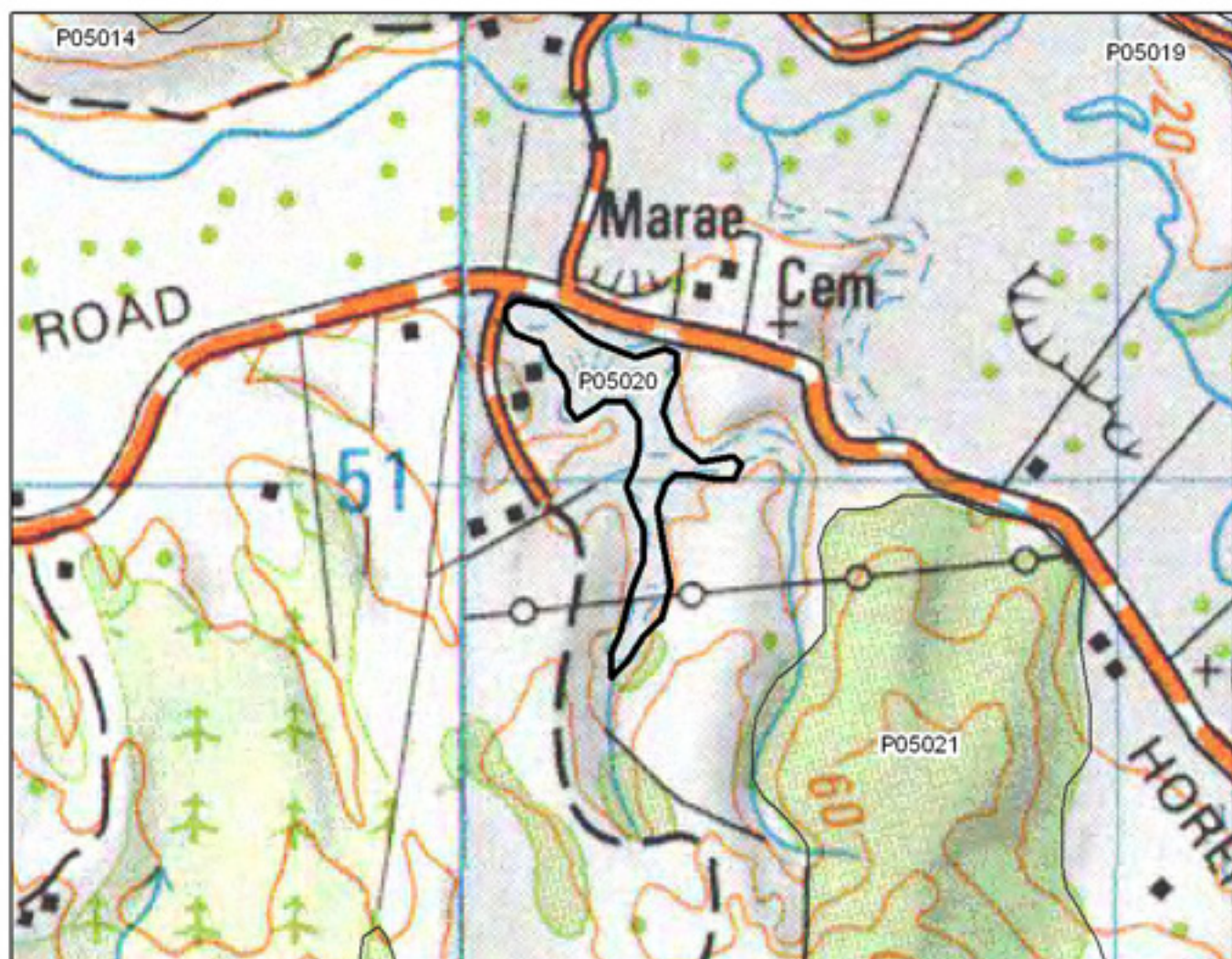


P05019 Okaka Road Wetland

0 62.5 125 250 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

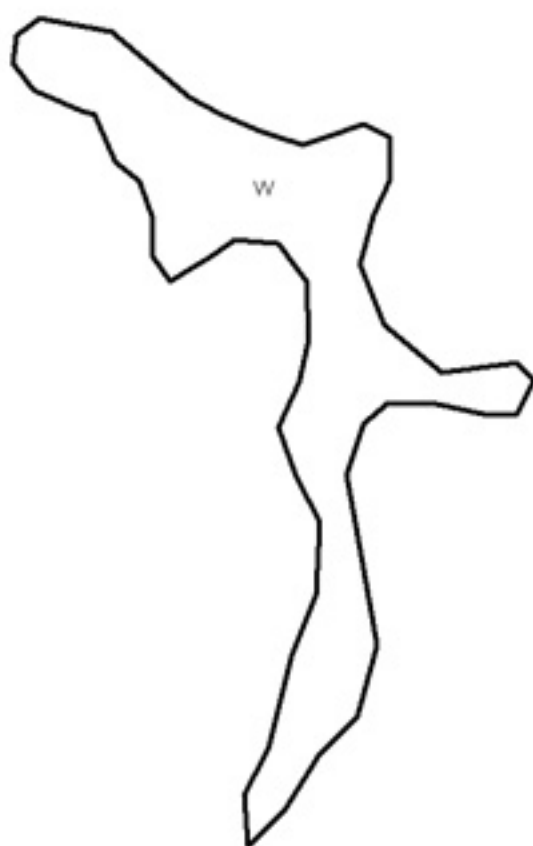


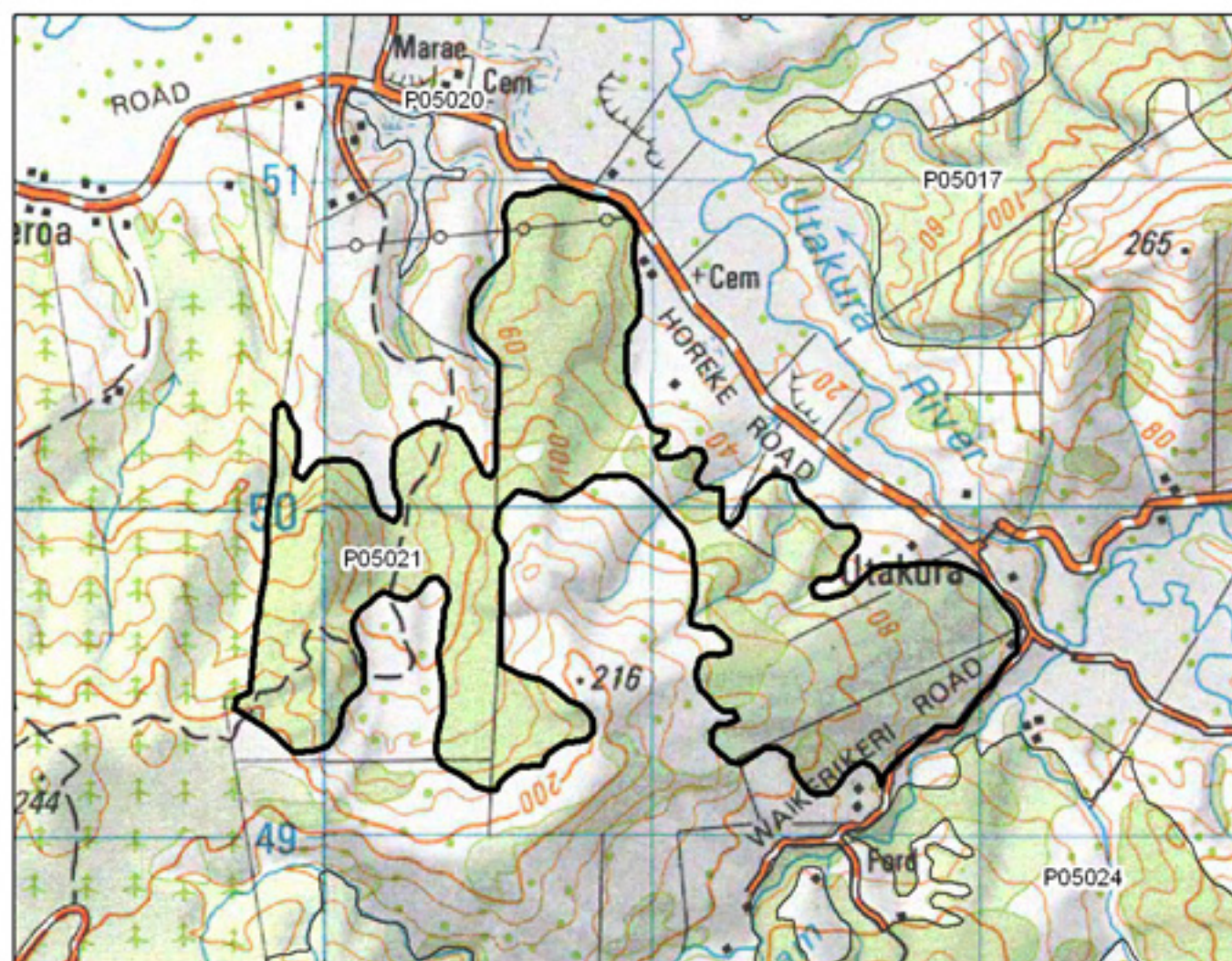


P05020 Horeke Road Swamp

0 62.5 125 250 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



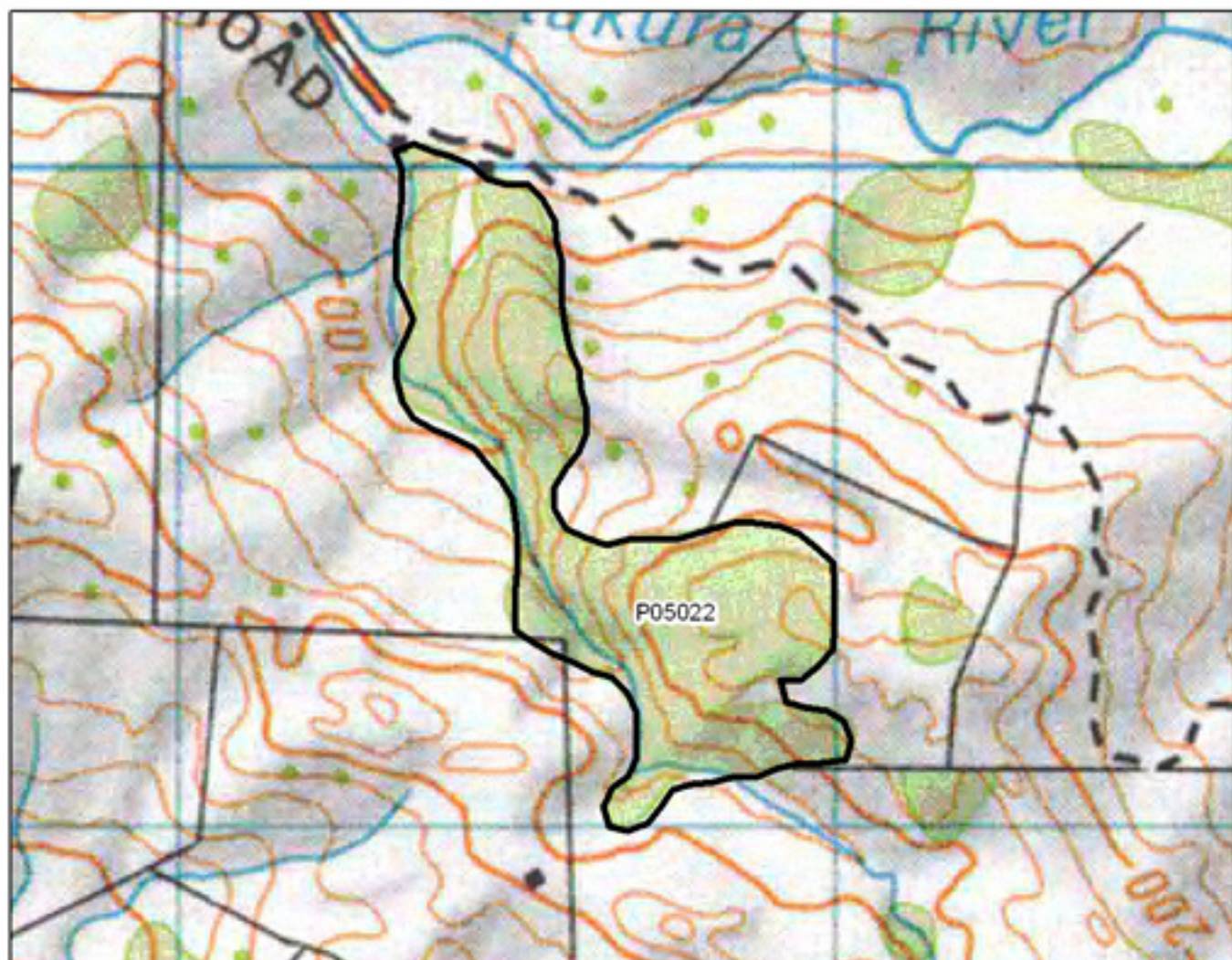


P05021 Utakura Bush

0 250 500 1,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

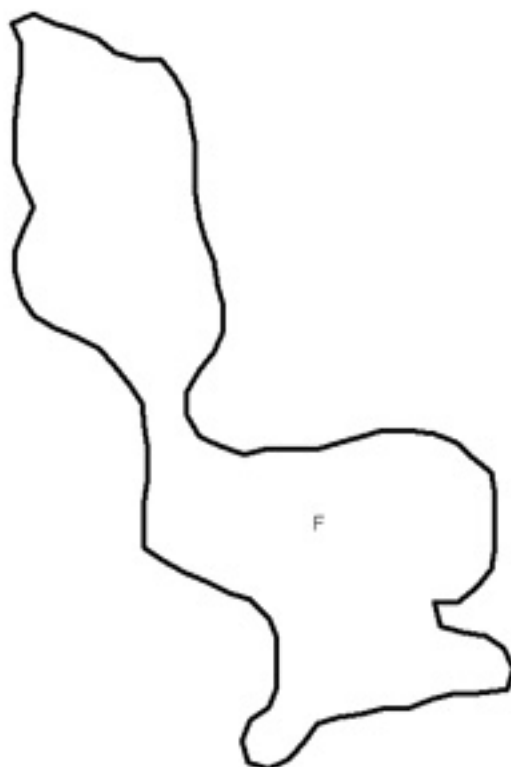


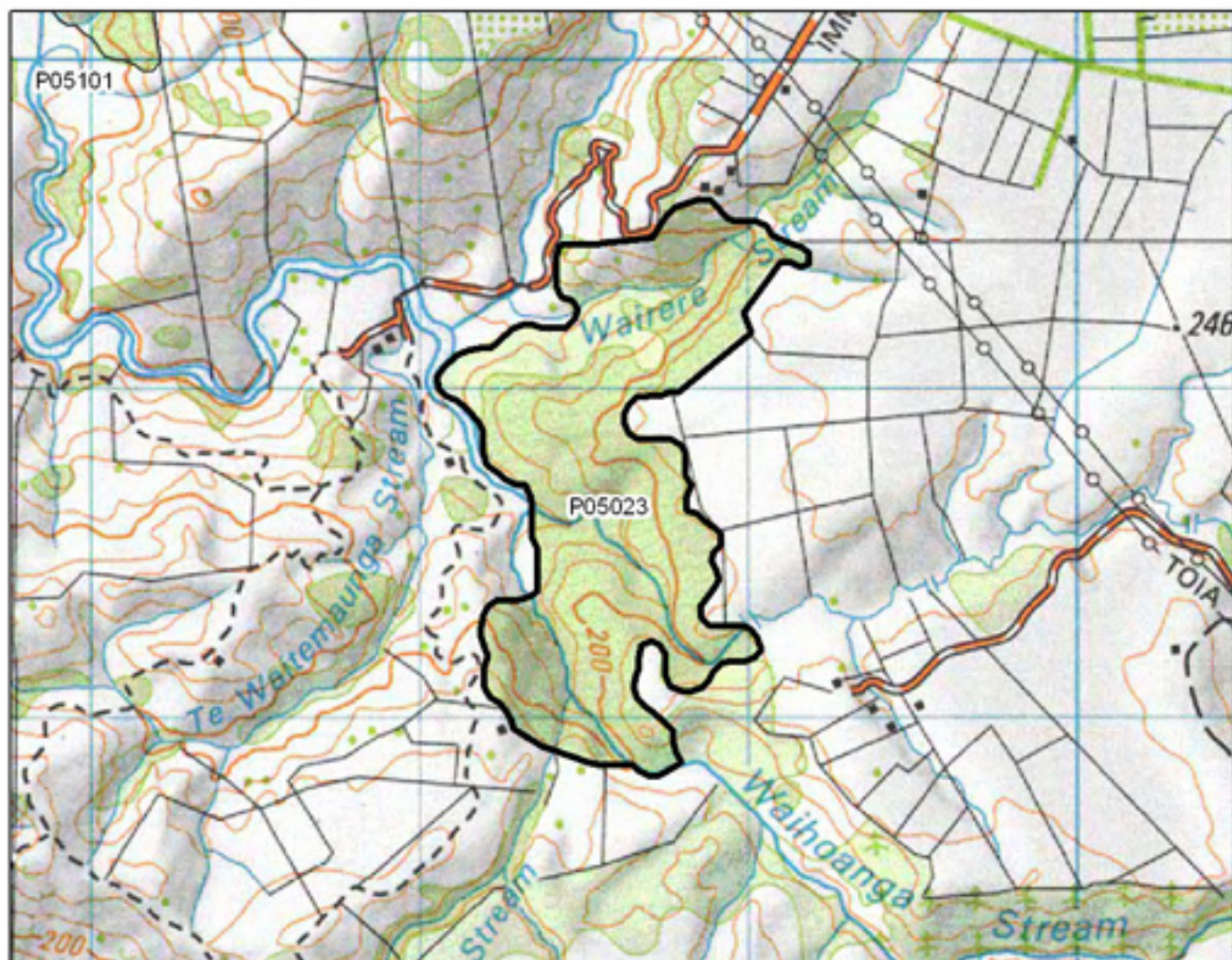


P05022 Harrison Road Bush

0 125 250 500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

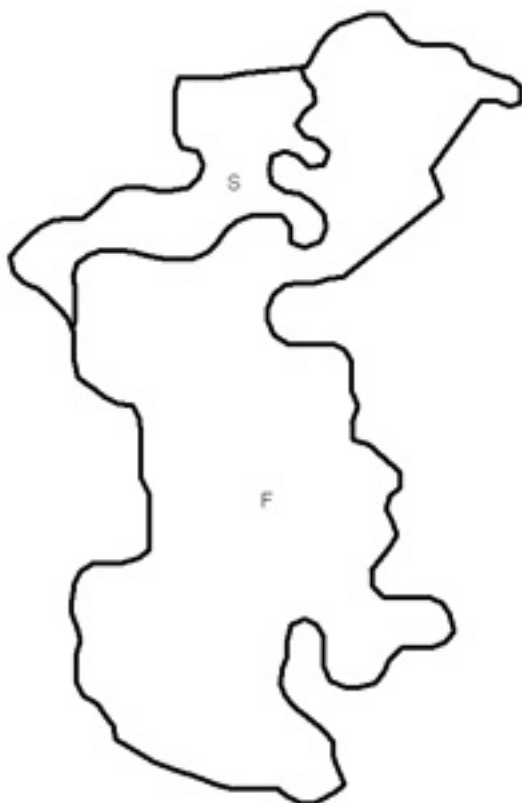


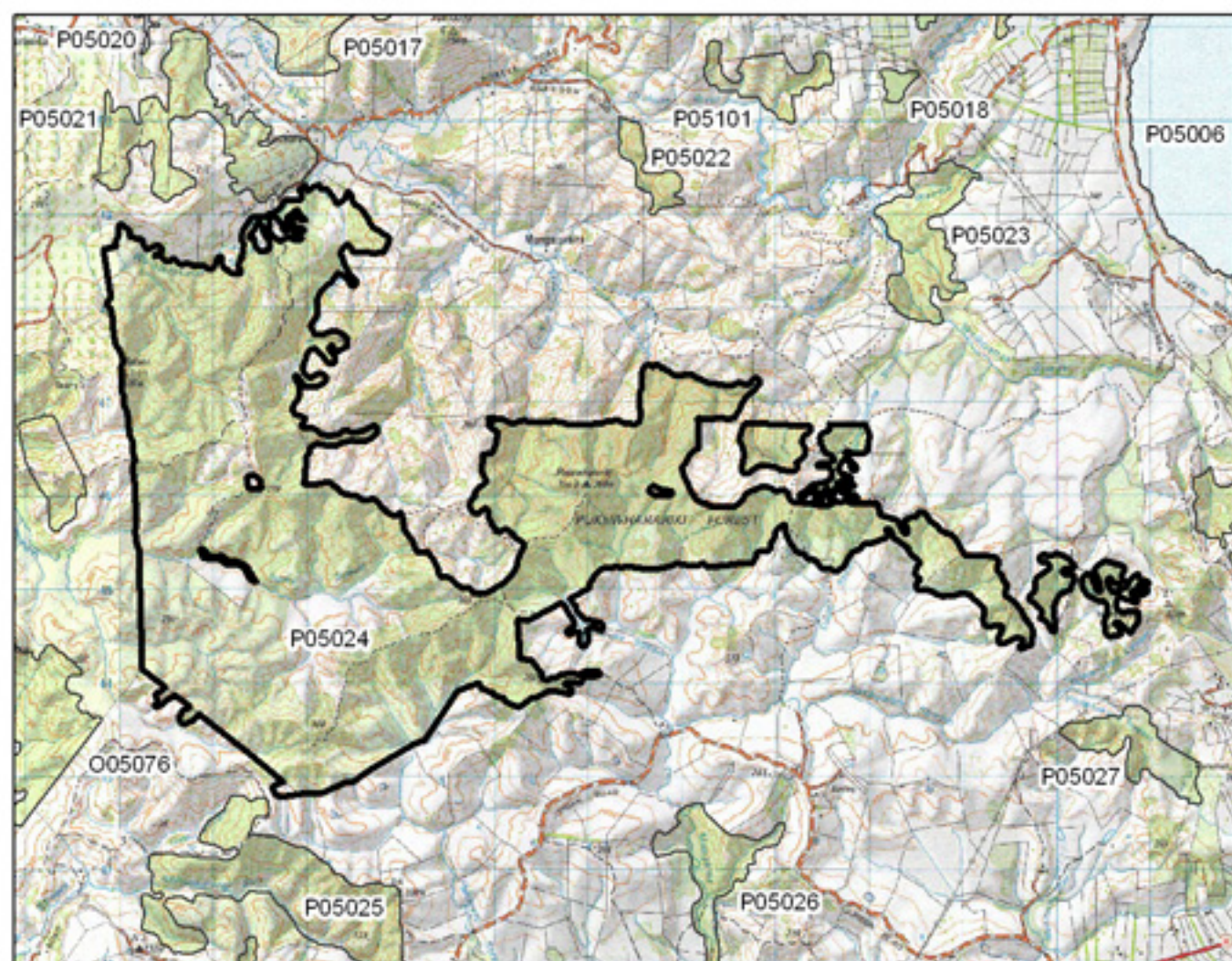


P05023 Waihoanga Bush

0 250 500 1,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

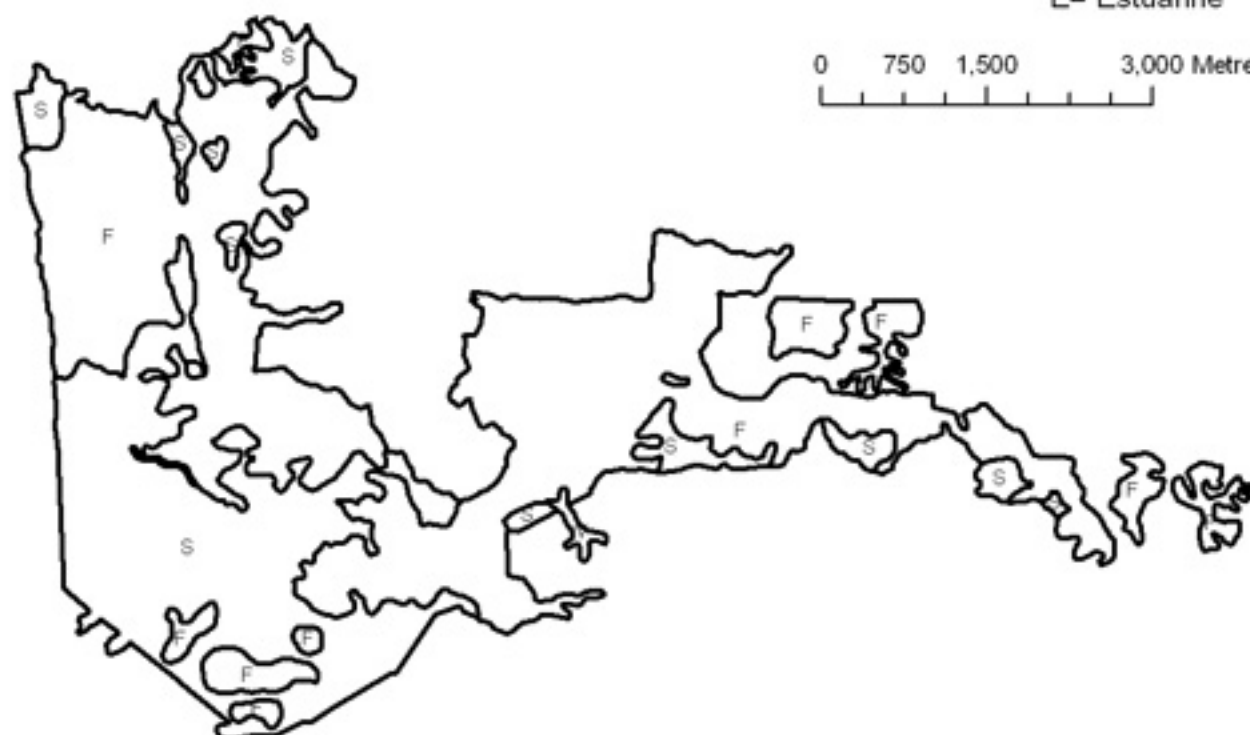


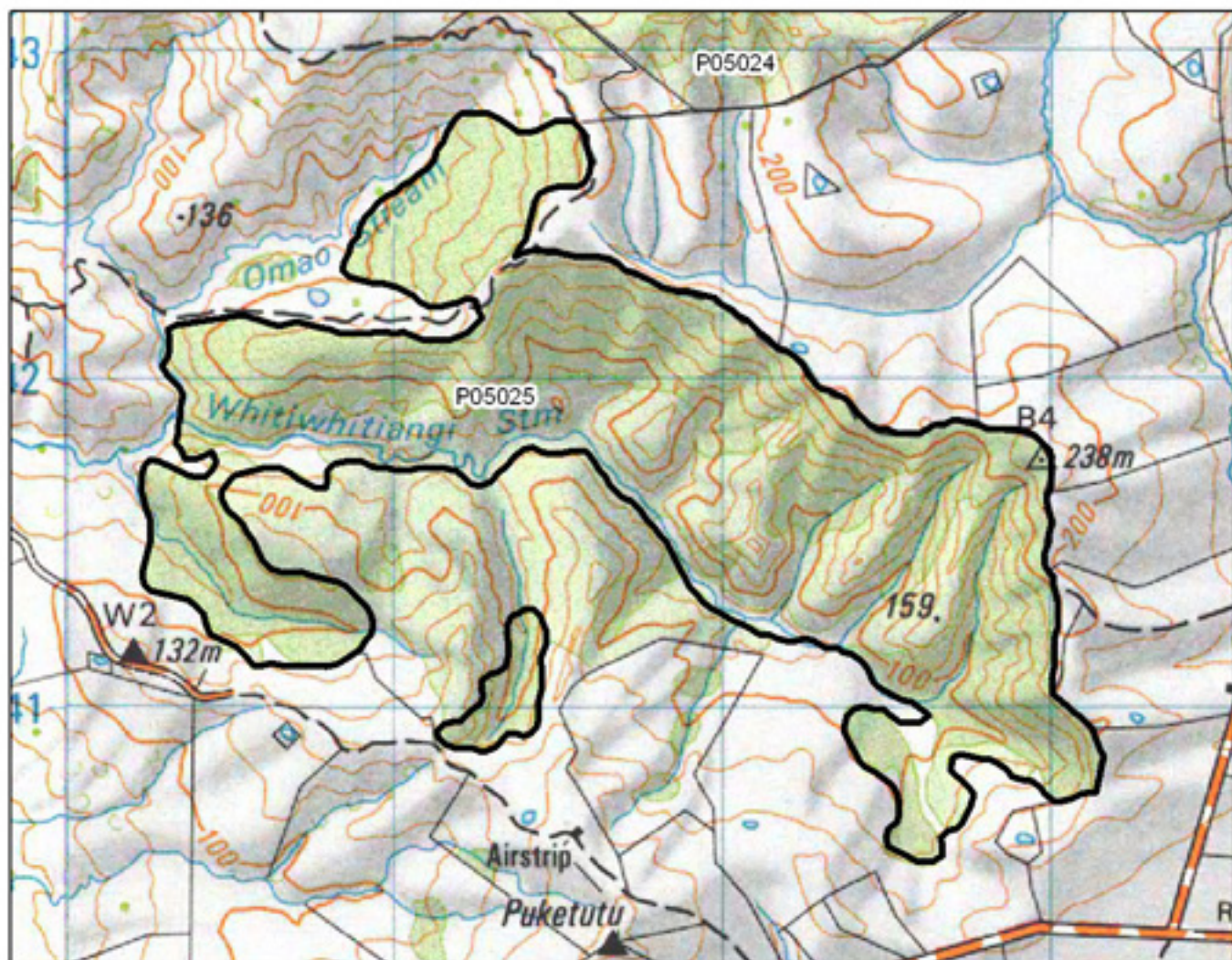


P05024 Pukewharariki Bush

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

0 750 1,500 3,000 Metres

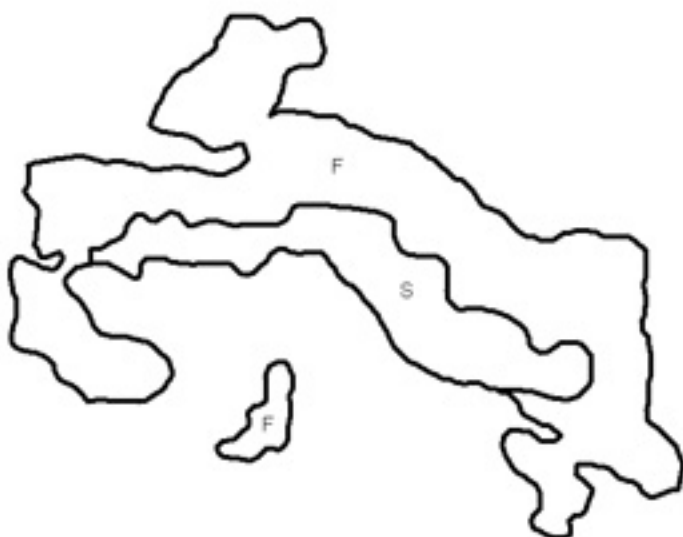


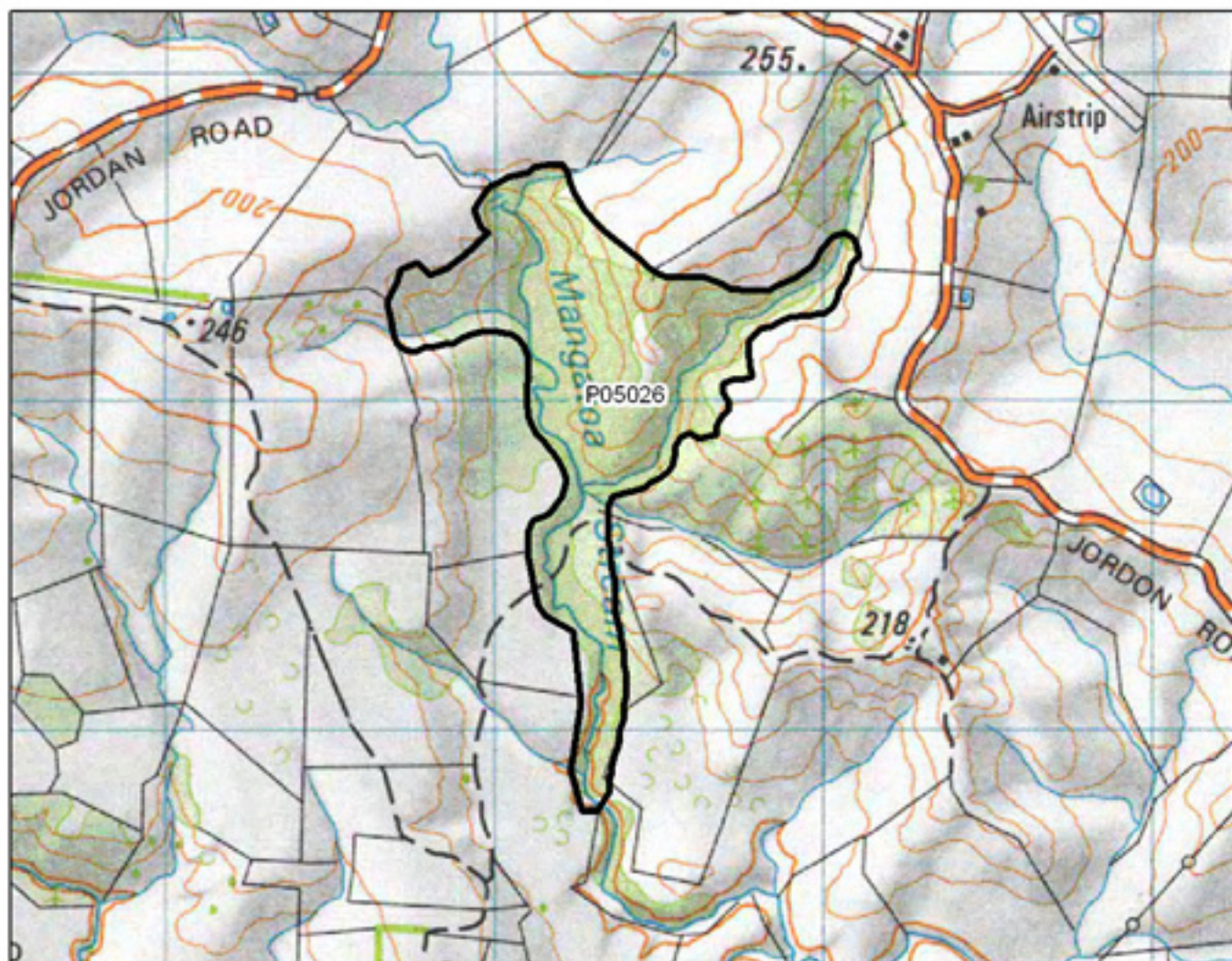


P05025 Guthrie's Block

0 375 750 1,500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



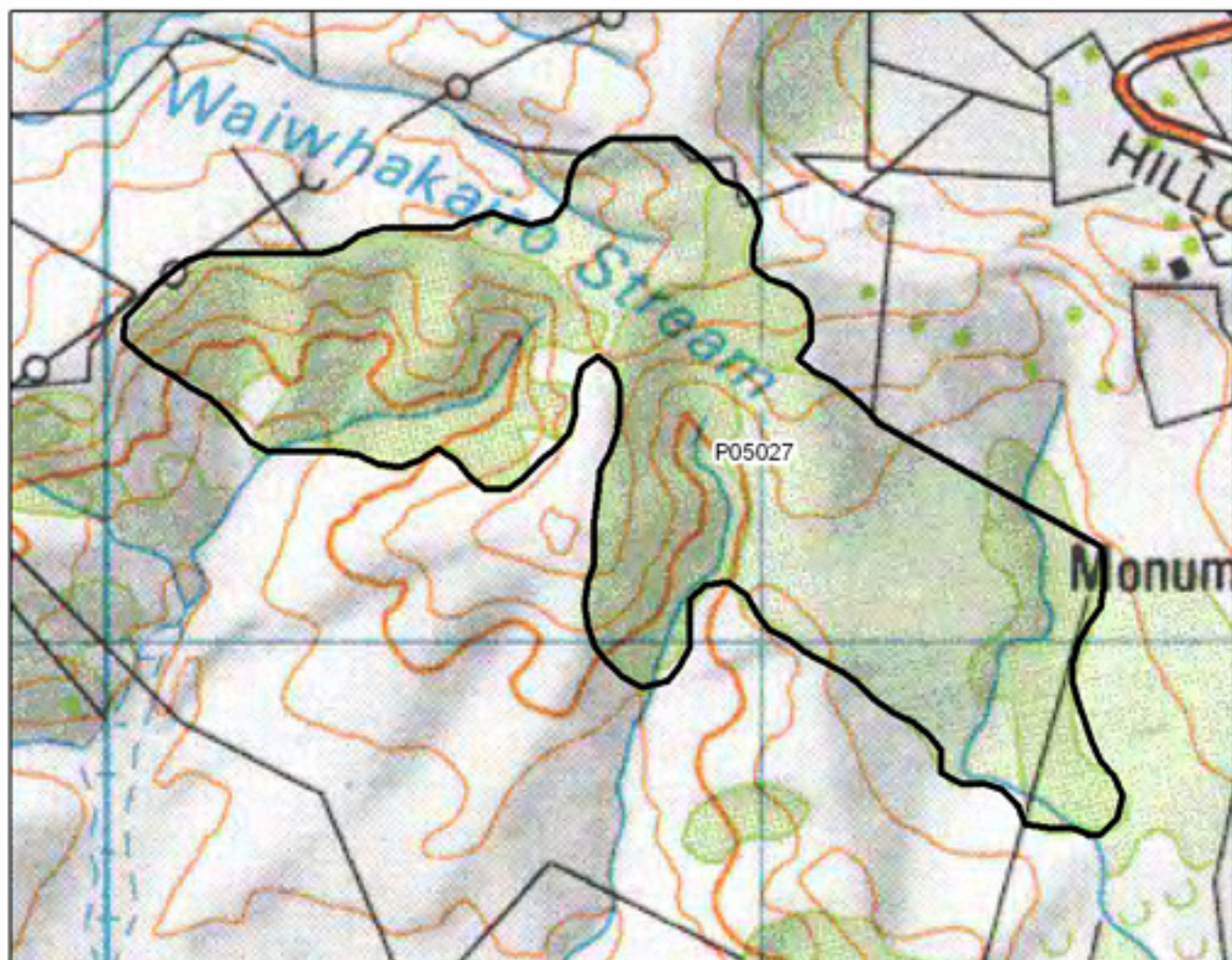


P05026 Mangatōa Stream Bush

0 250 500 1,000 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

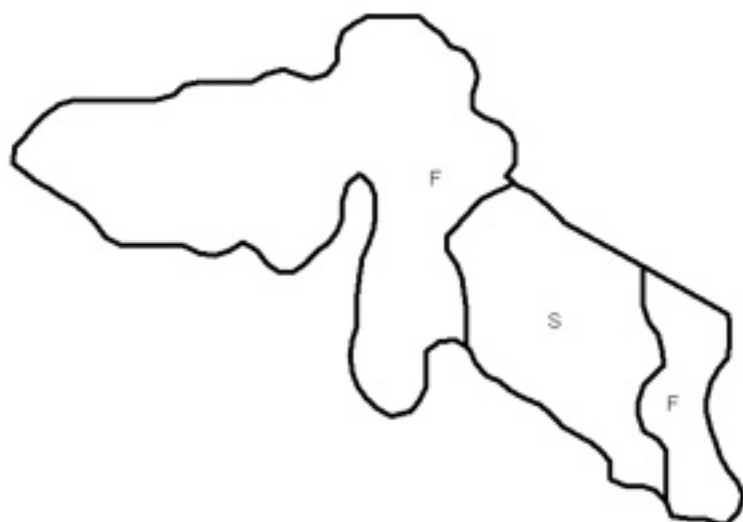


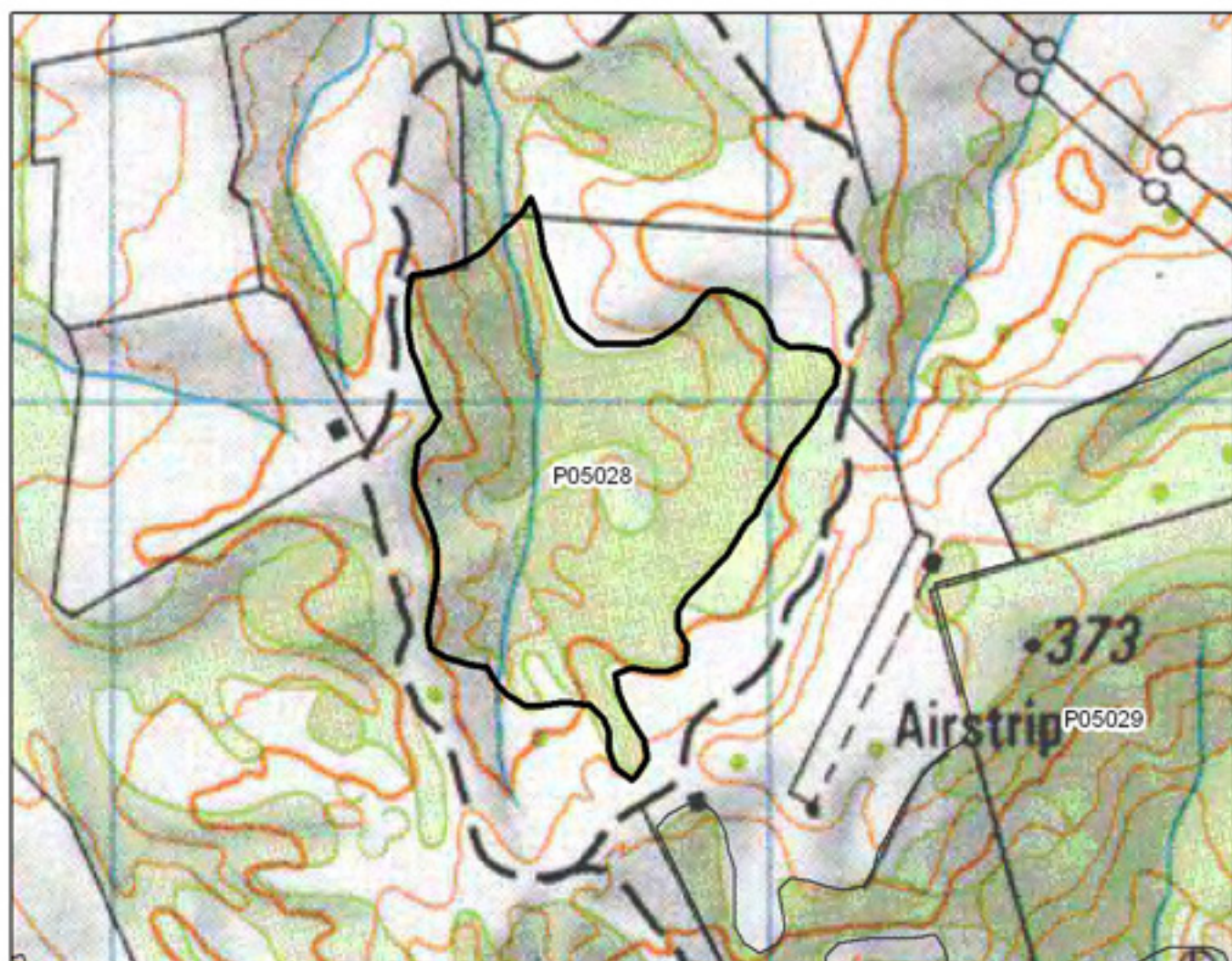


P05027 Monument Bush

0 187.5 375 750 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



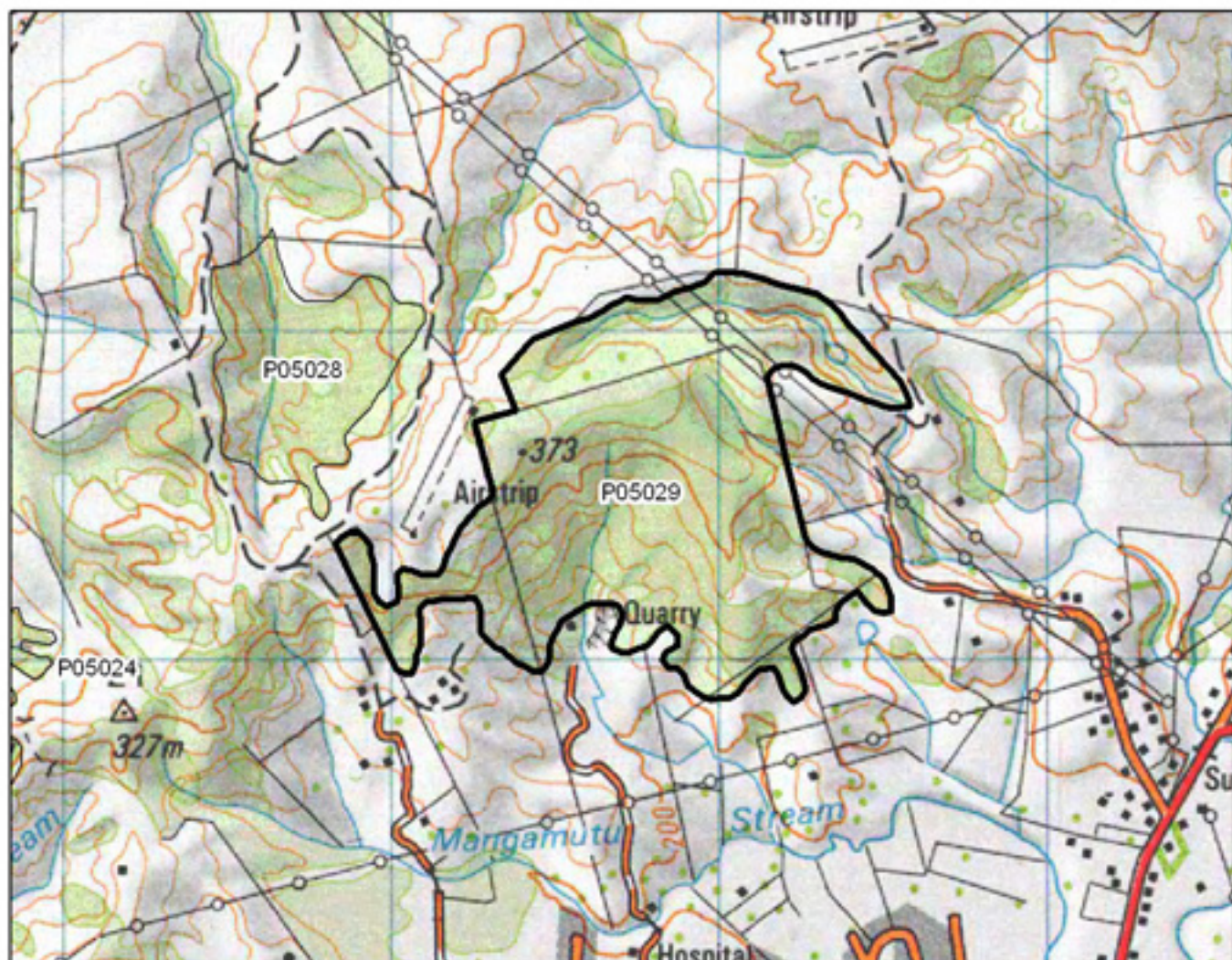


P05028 Waihoanga Road Bush

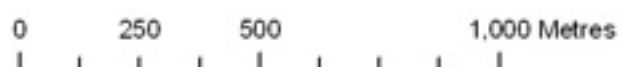
0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

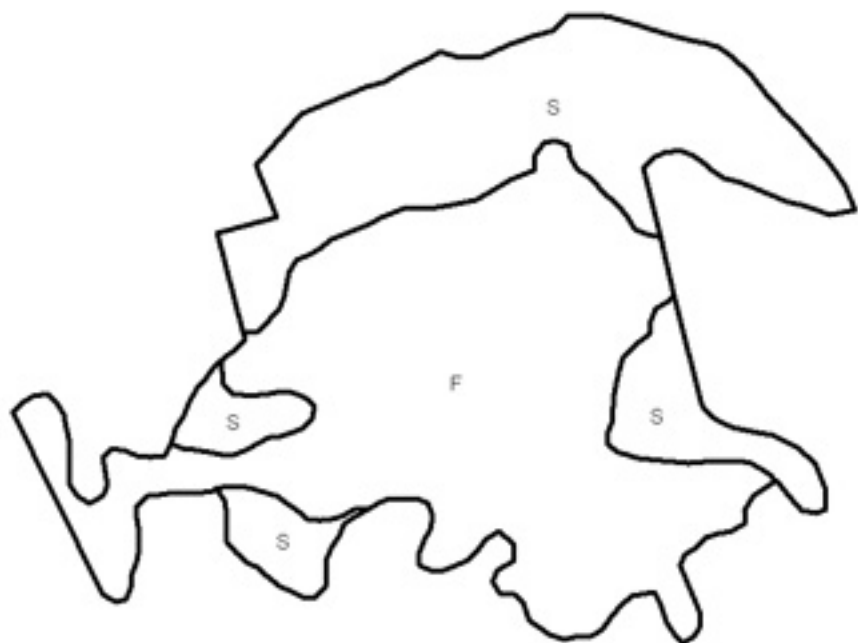




P05029 Reservoir Bush

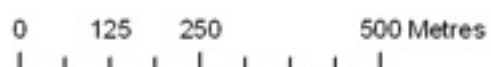


S= Shrubland
F= Forest
W= Wetland
E= Estuarine

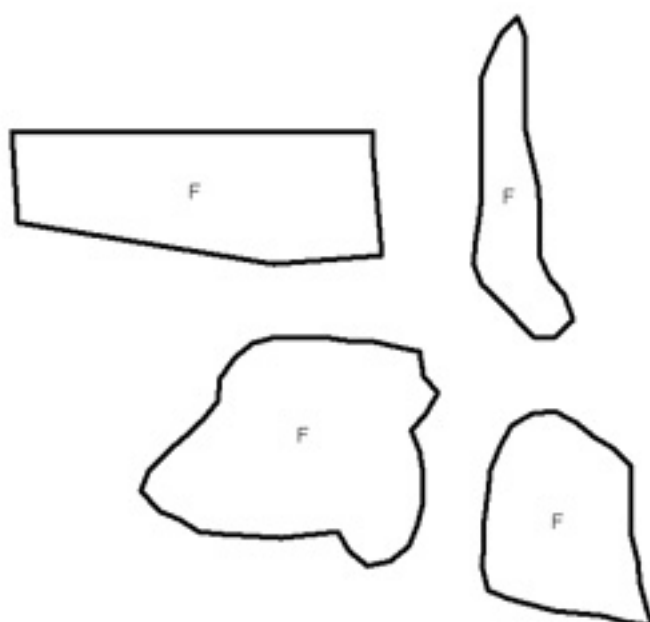


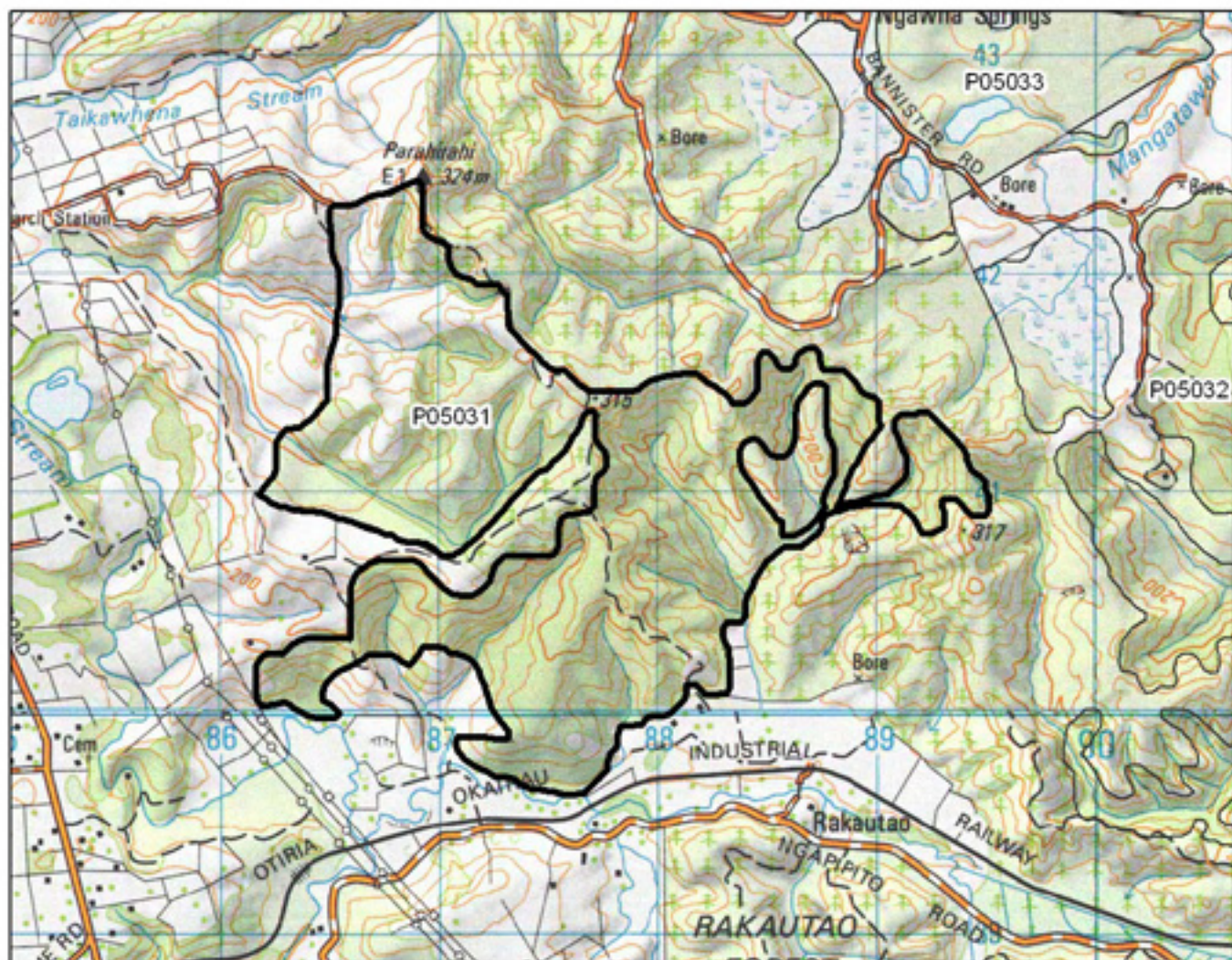


P05030 How Road Bush



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



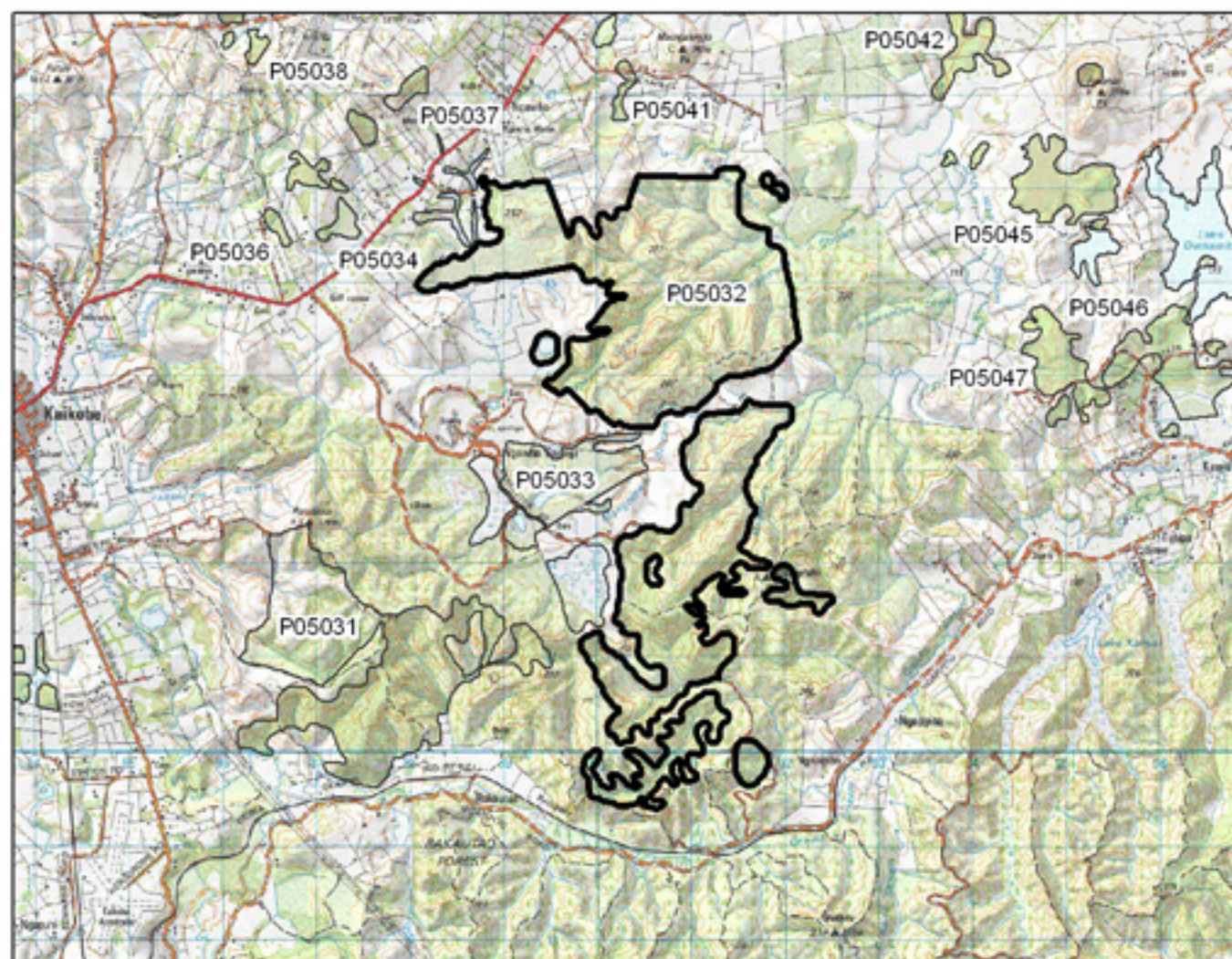


P05031 Rakautao Bush

0 375 750 1,500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



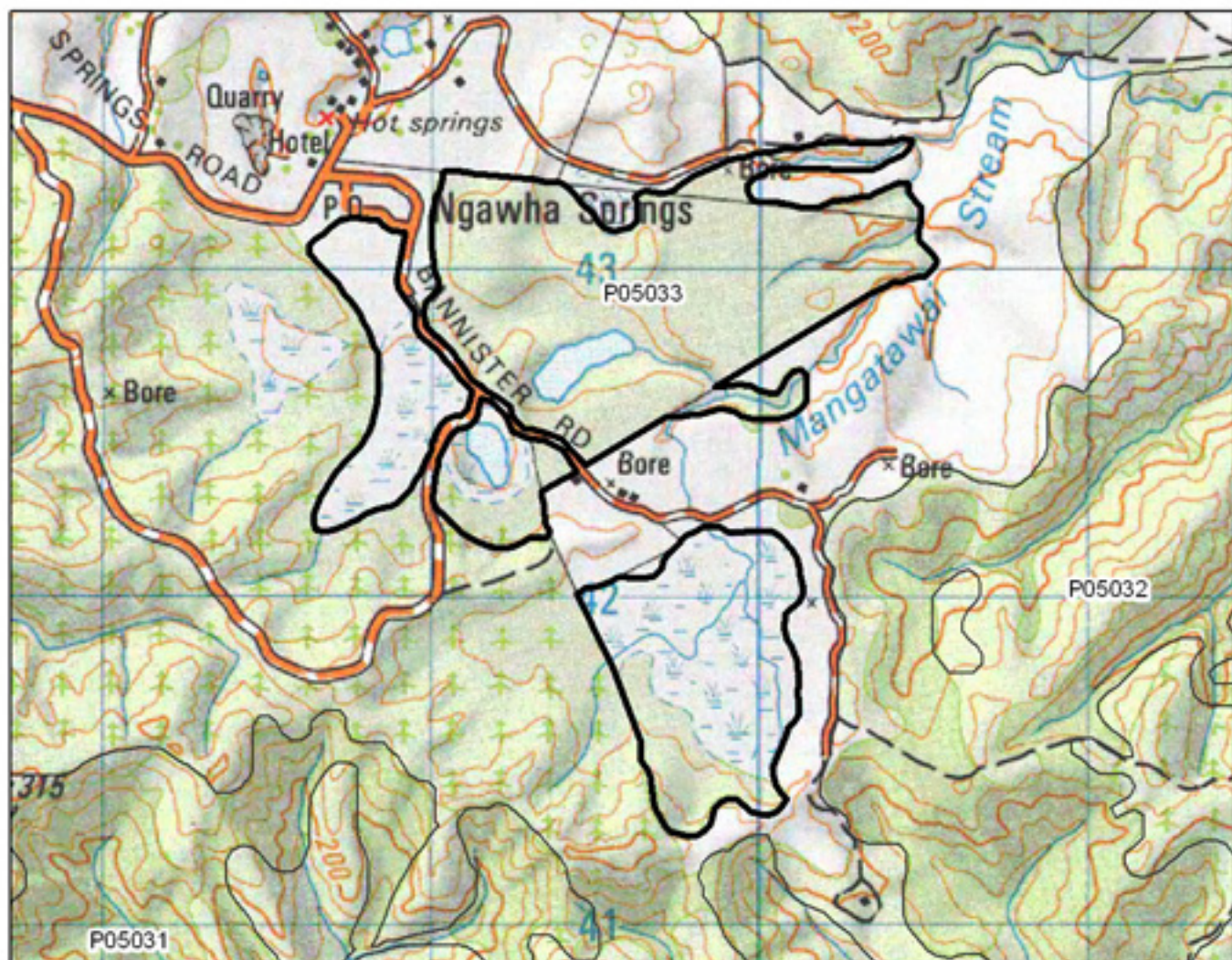


P05032 Titihuatahi

0 625 1,250 2,500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

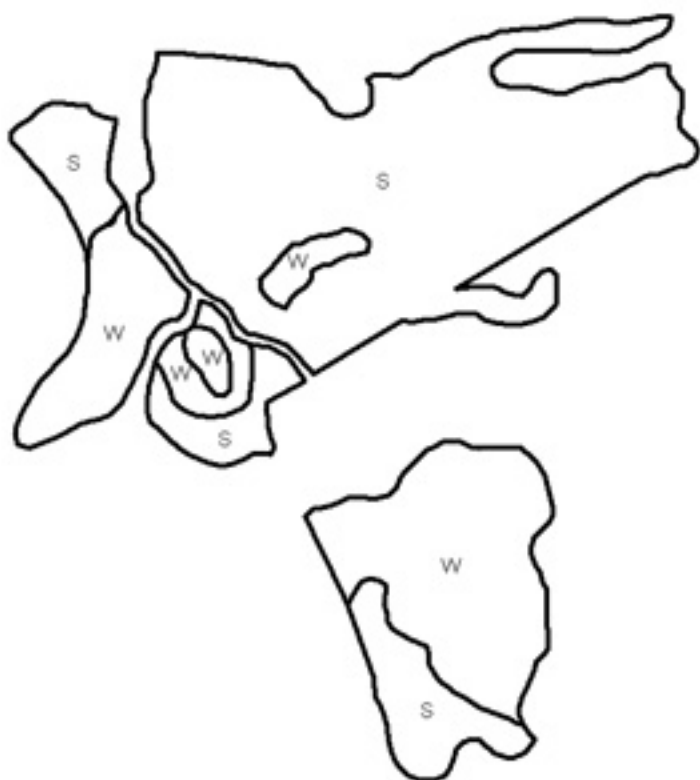


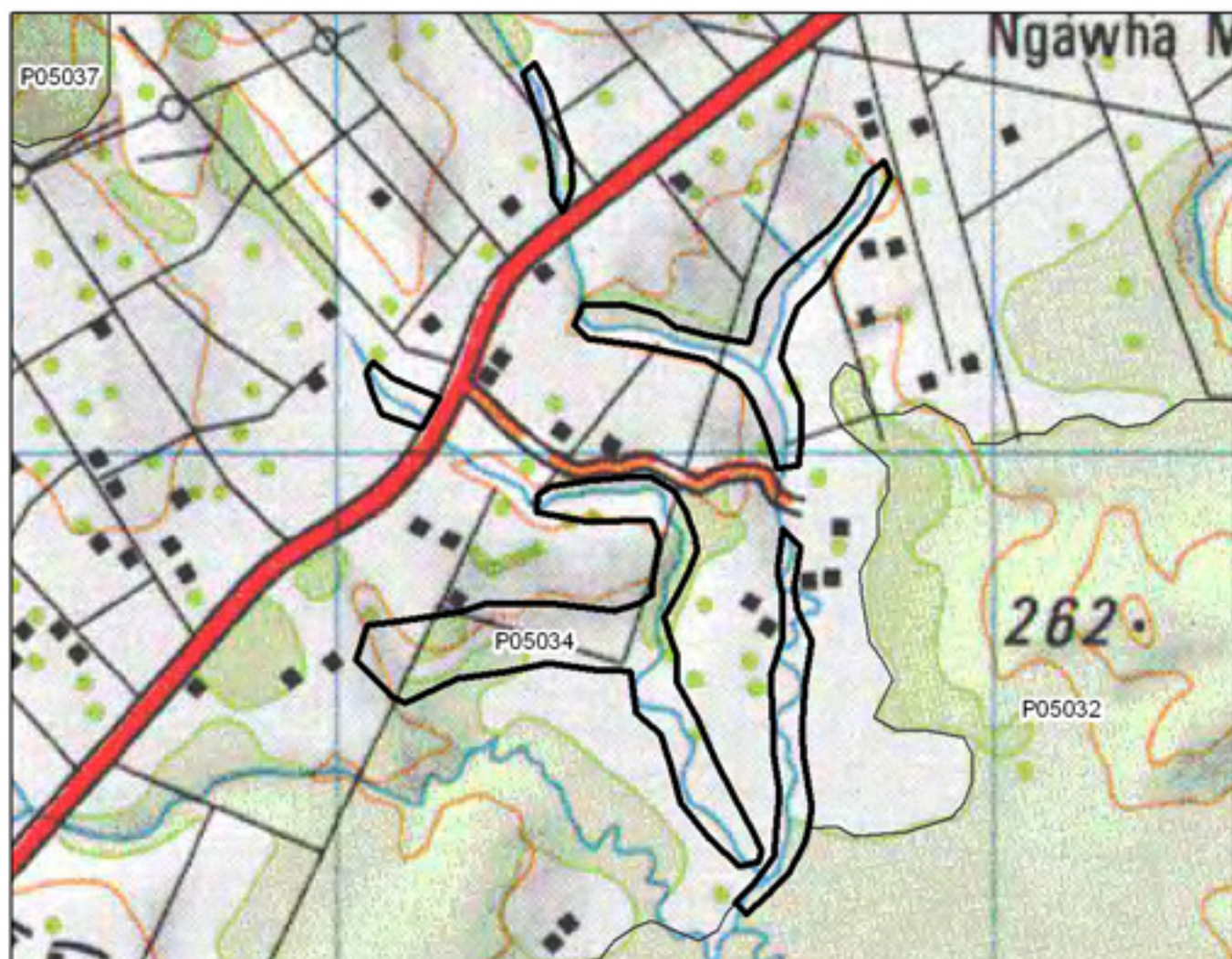


P05033 Ngawha Geothermal Field



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine





P05034 Ngawha Swamps

0 125 250 500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

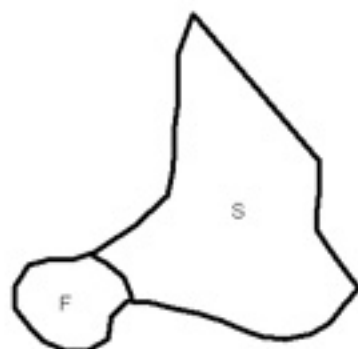




P05035 Youngs Kahikatea Remnant

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

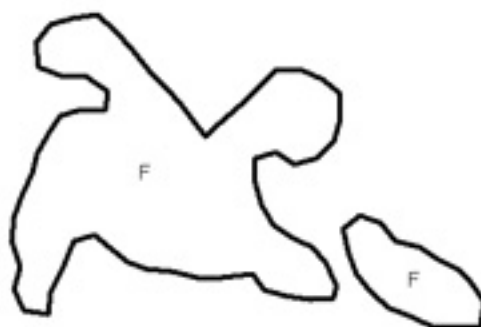


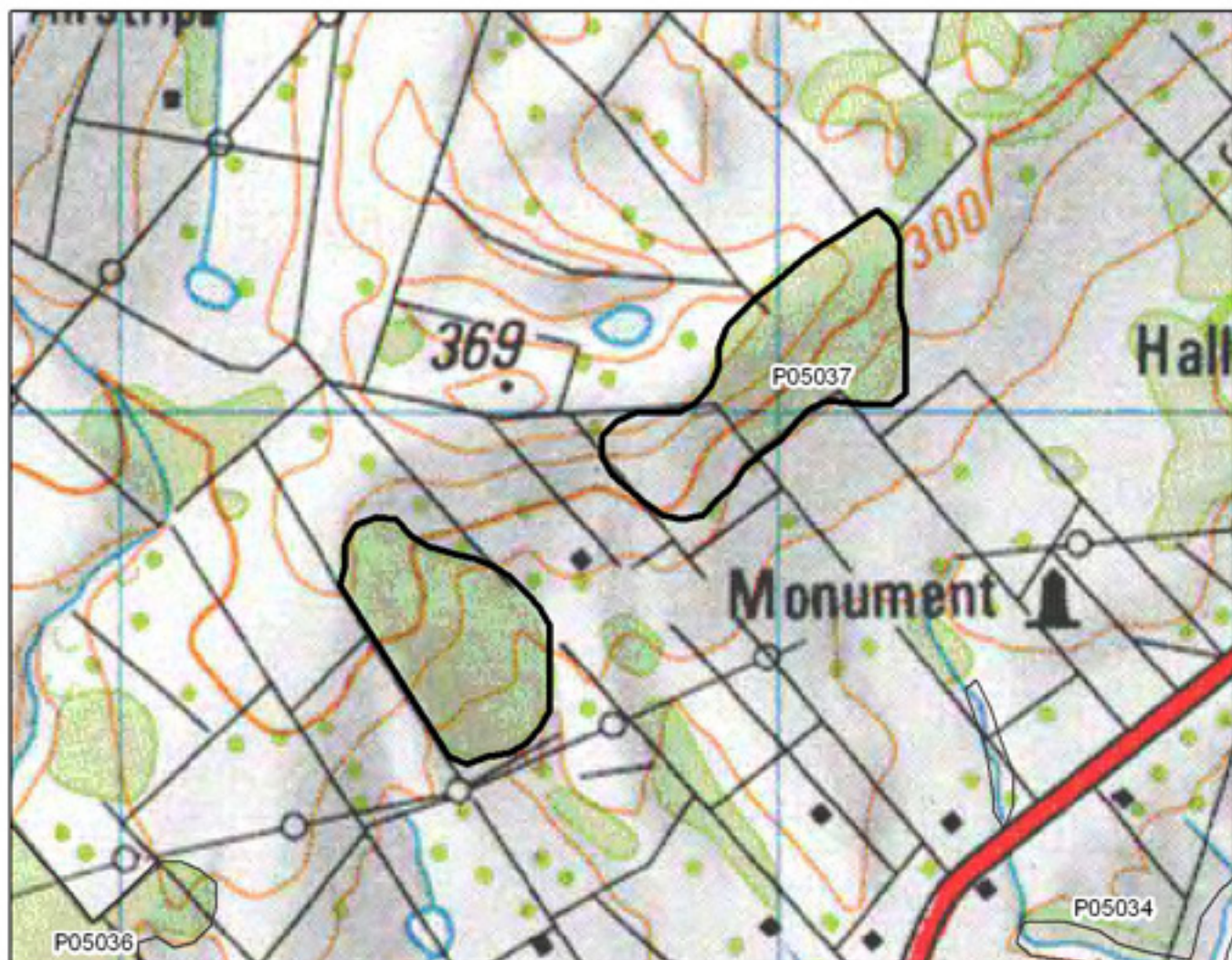


P05036 Kopenui Stream Remnants

0 125 250 500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

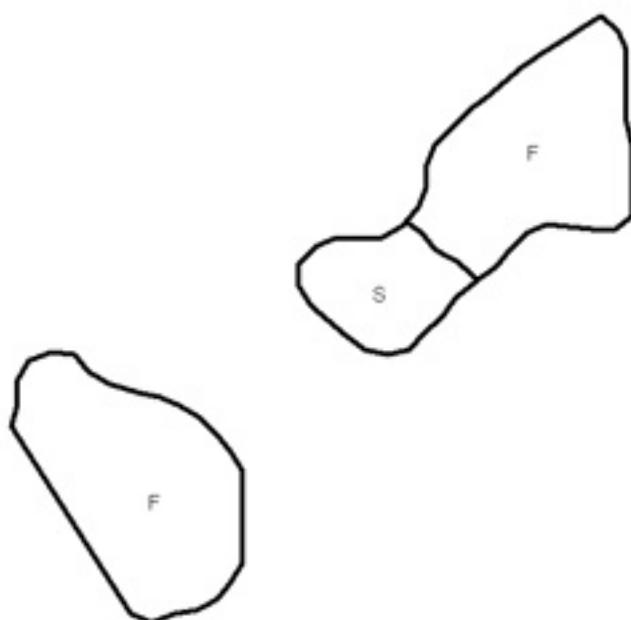


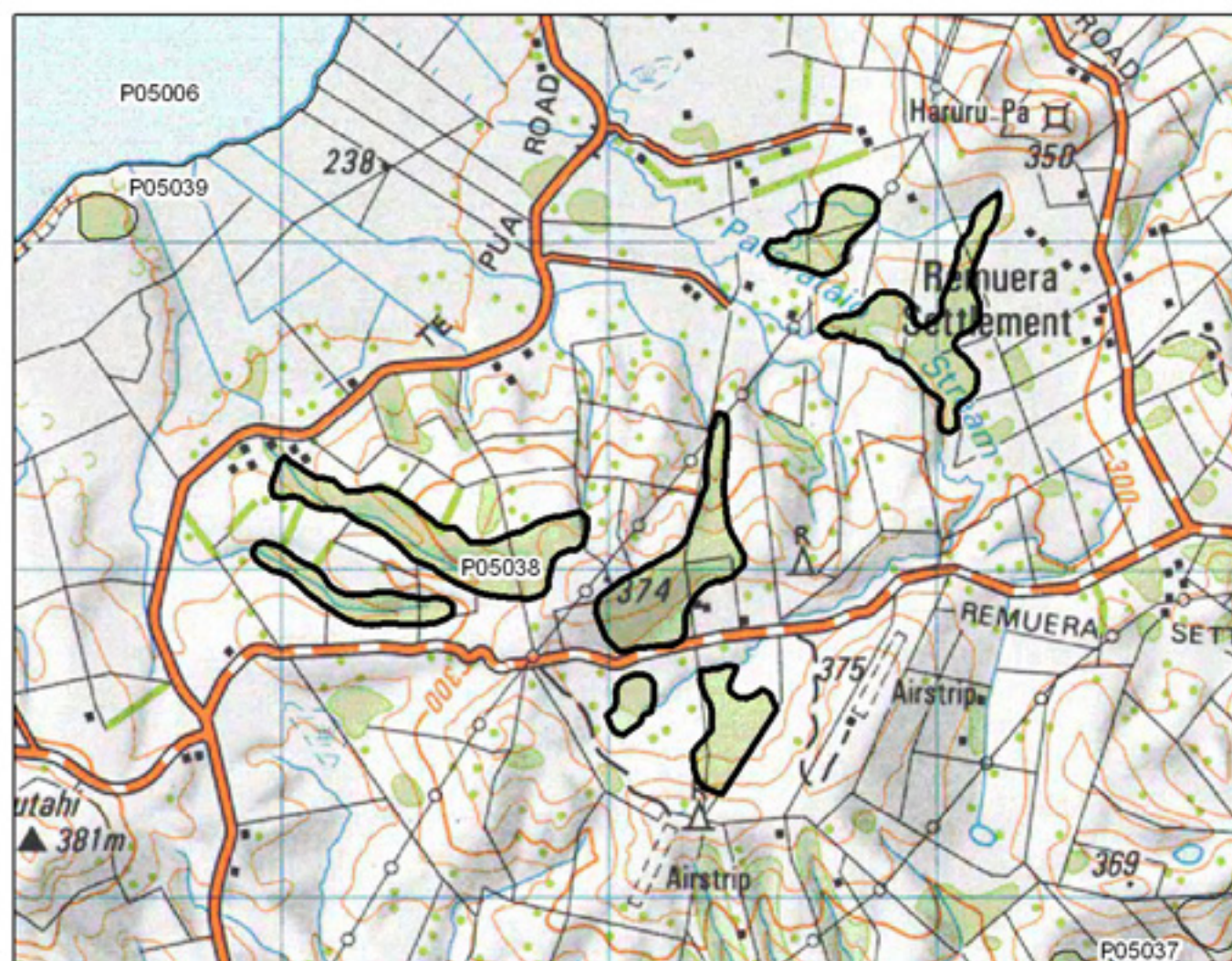


P05037 Ngawha Bush

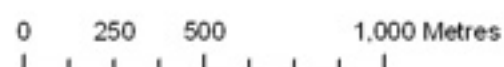
0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine





P05038 Remuera Settlement Road Remnants



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



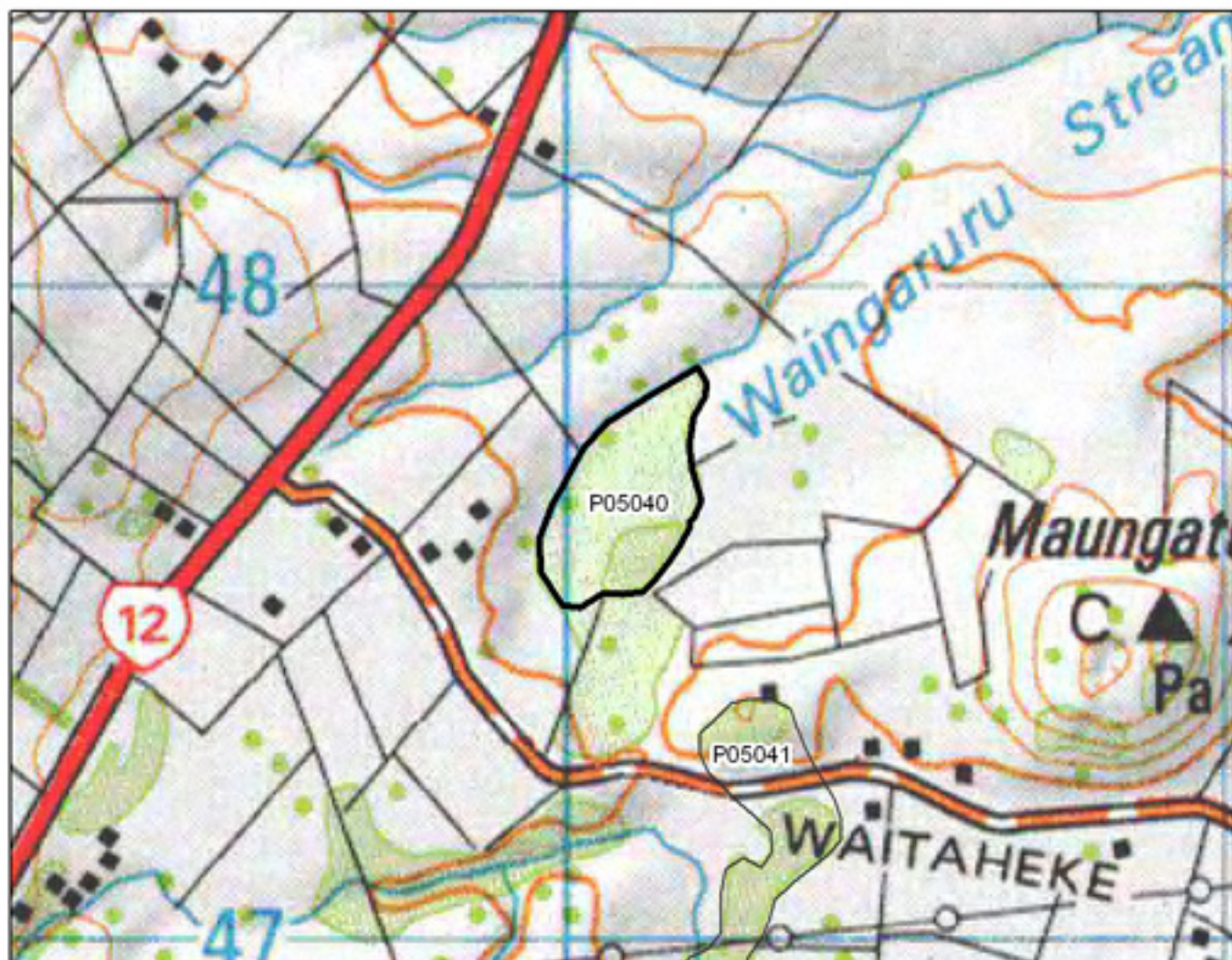


P05039 South Omapere Kahikatea Remnant

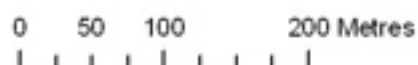
0 50 100 200 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



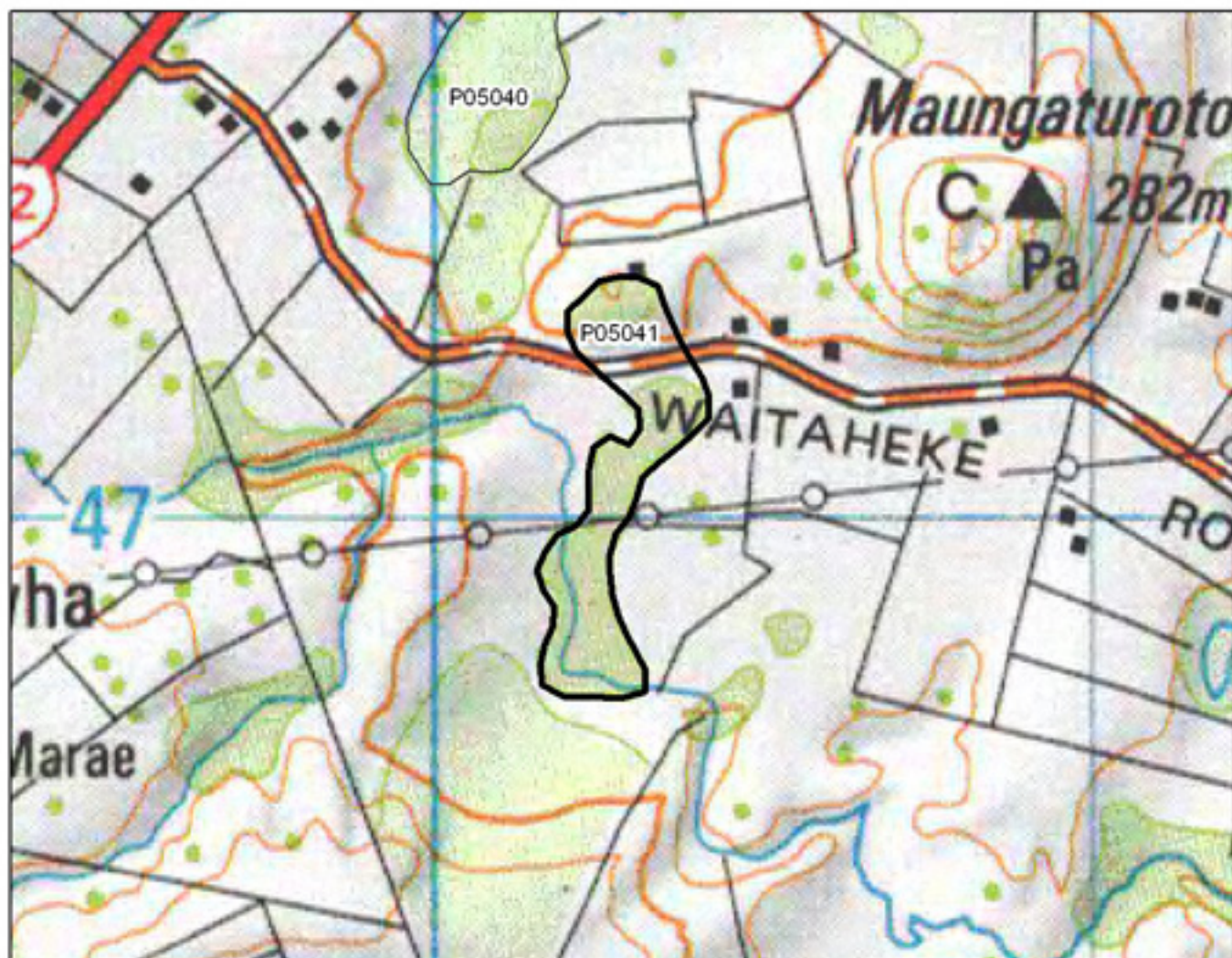


P05040 Waingaruru Stream Swamp

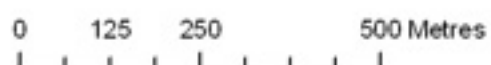


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



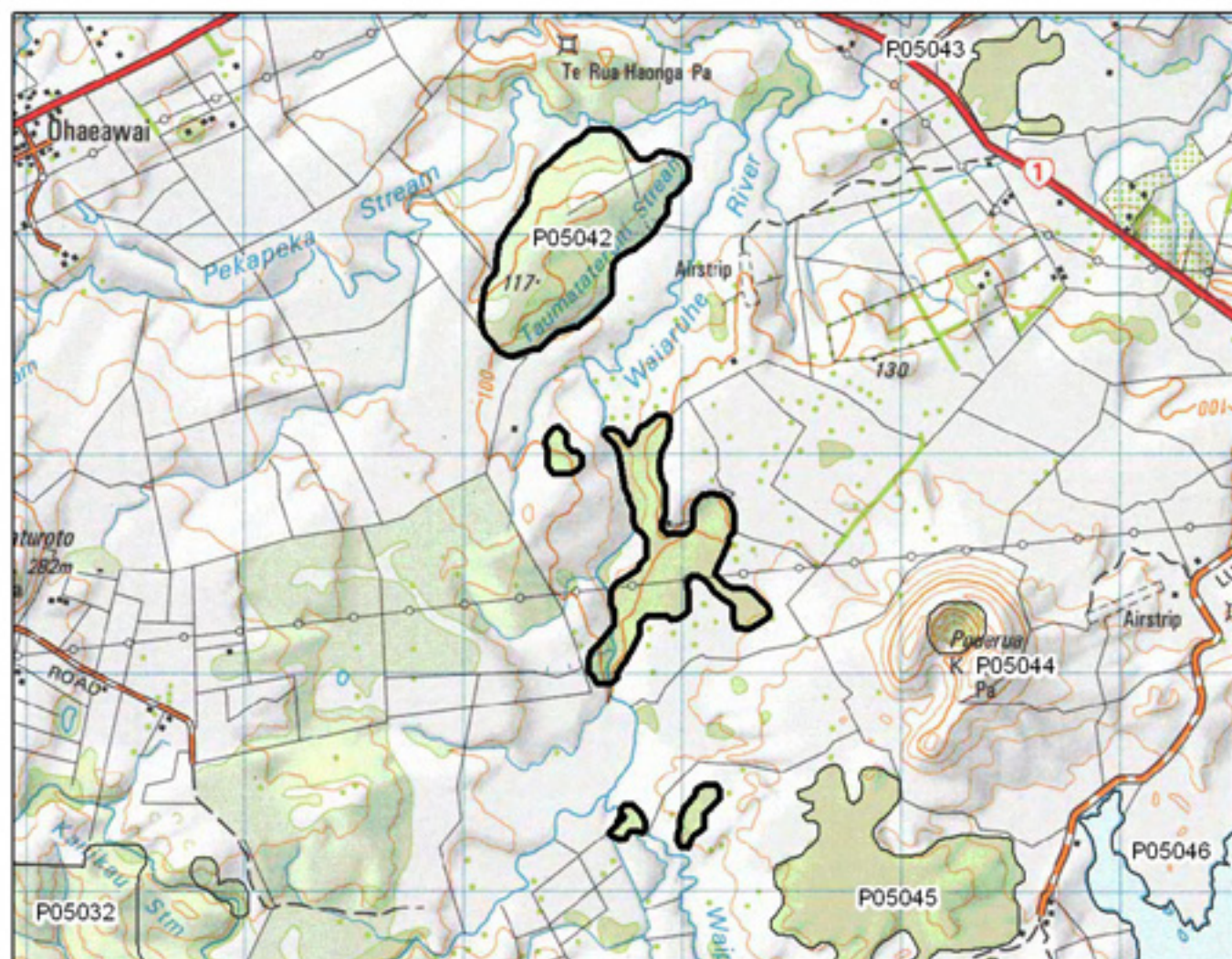


P05041 Waitaheke Road Bush



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



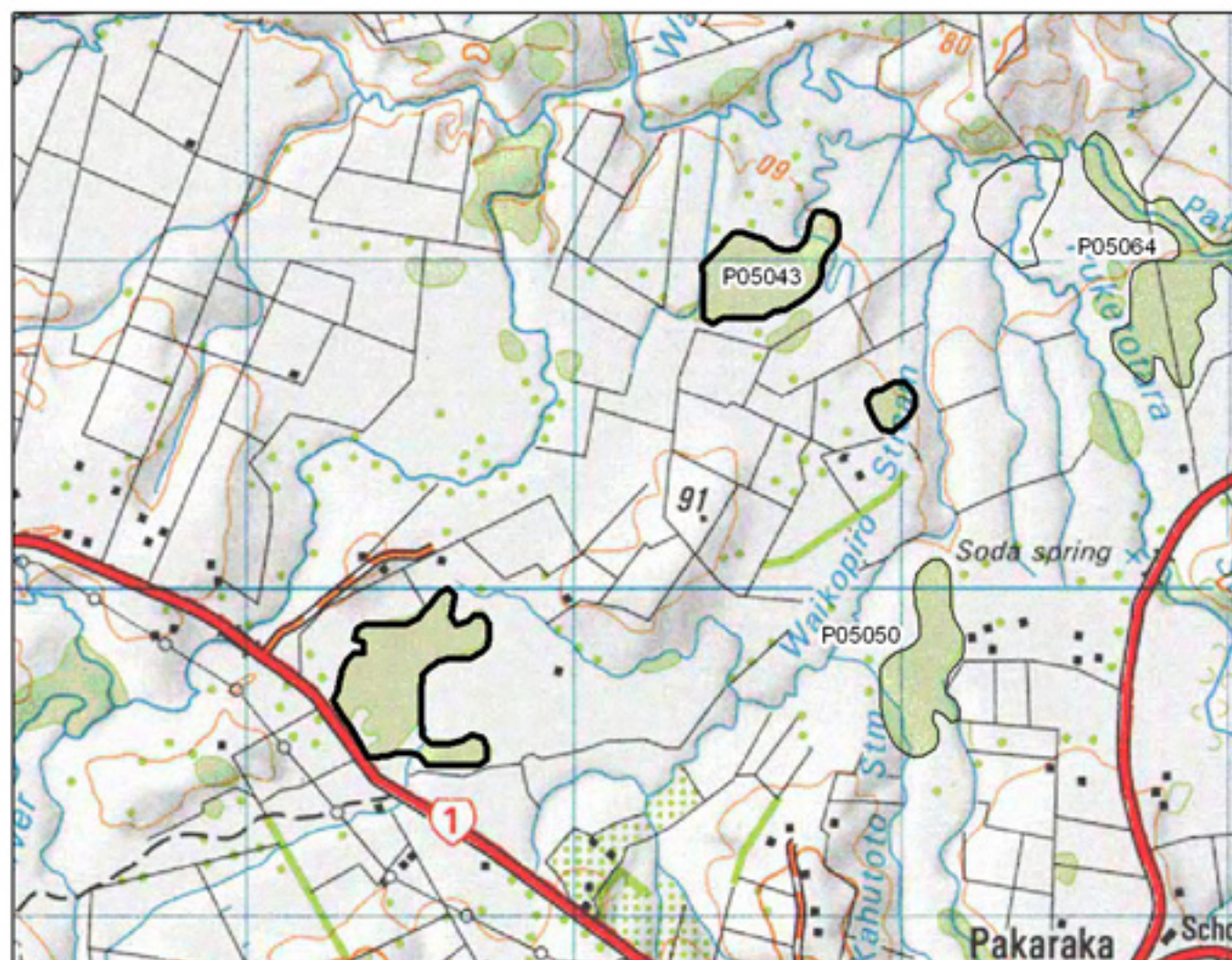


P05042 Taumatataraire Stream Bush

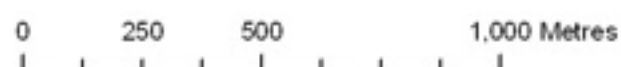
0 250 500 1,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine





P05043 Waiaruhe Bush Remnants



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

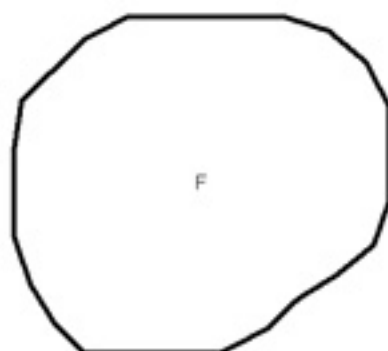


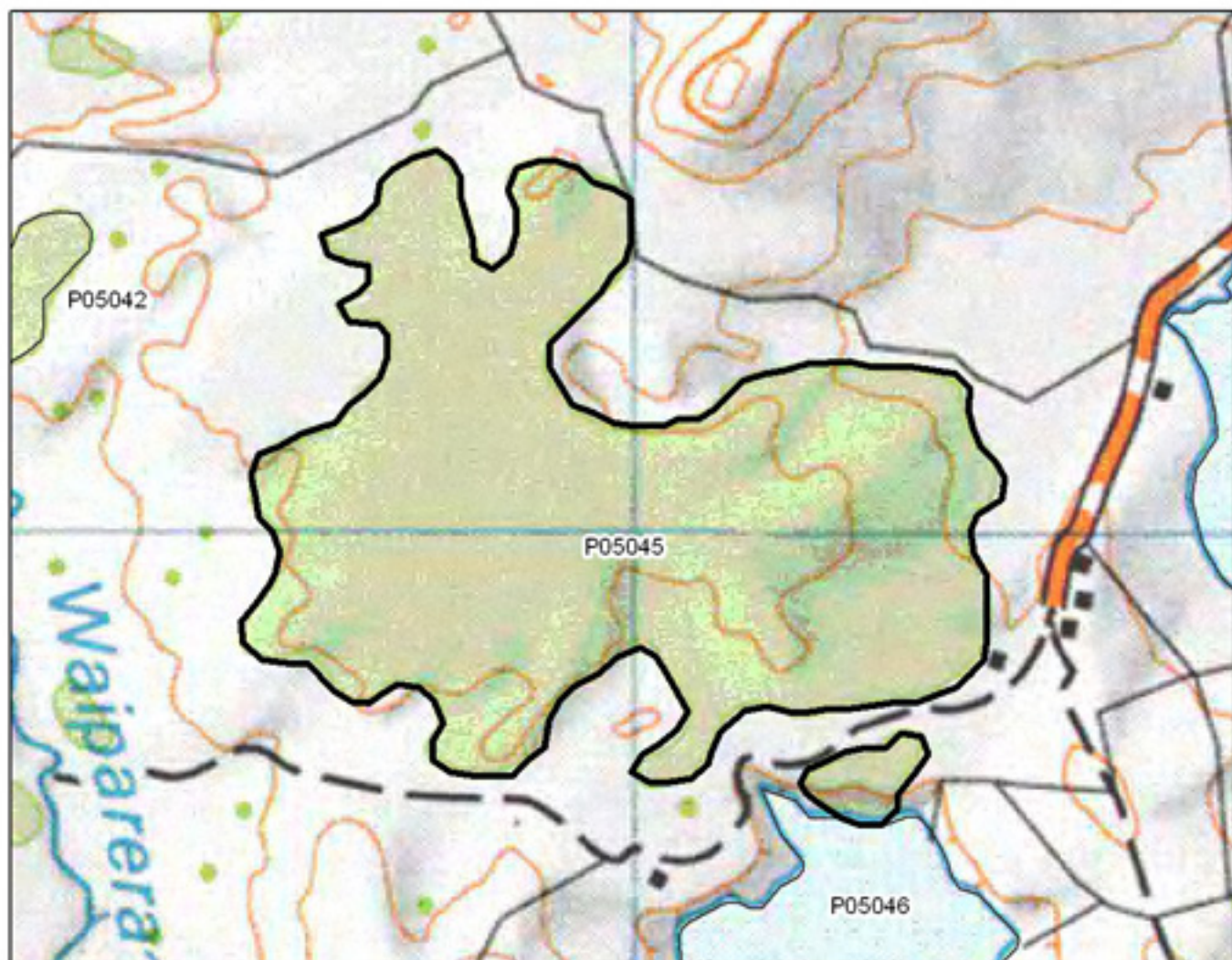


P05044 Pouerua Cone

0 62.5 125 250 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



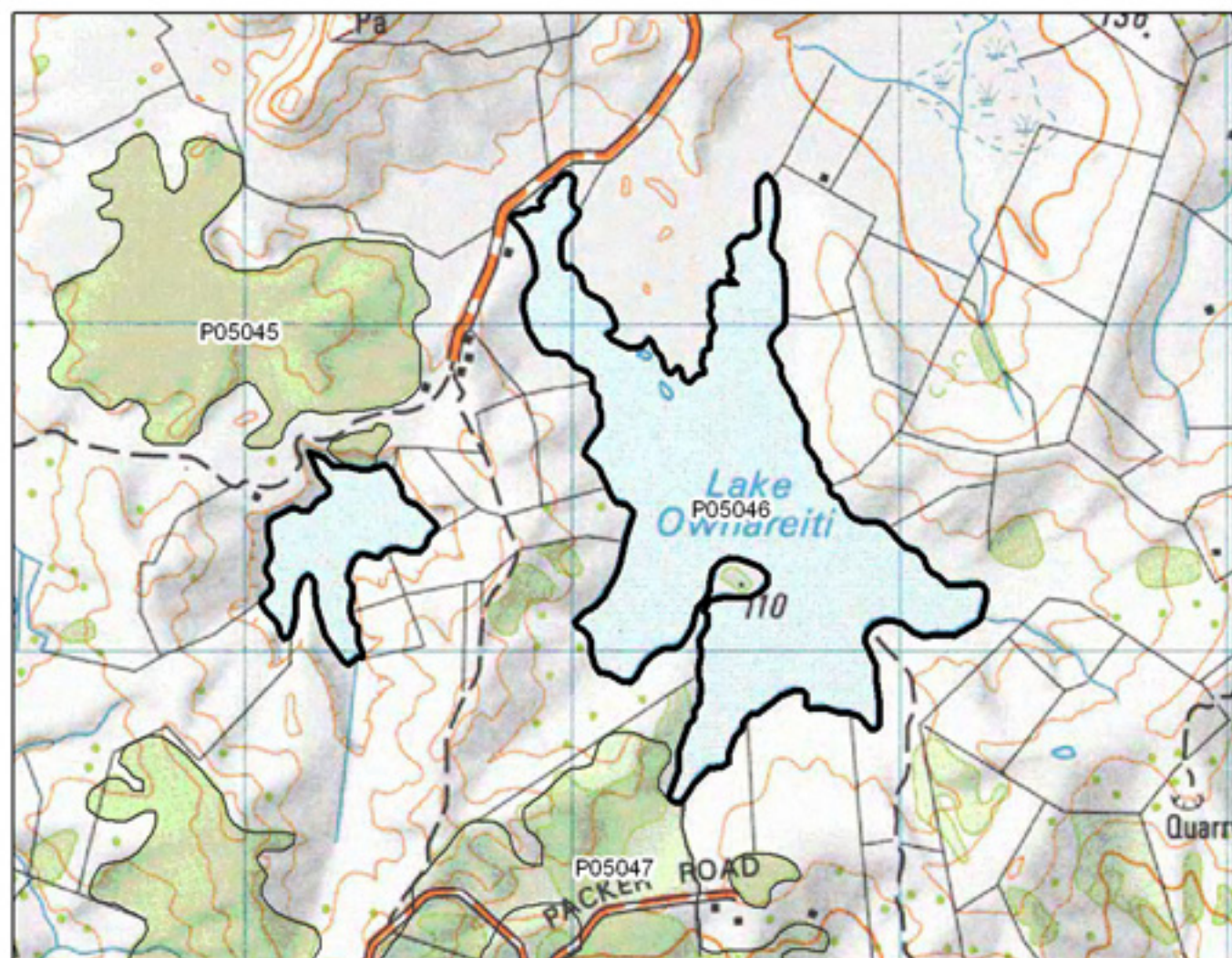


P05045 Pouerua Bush

0 250 500 1,000 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



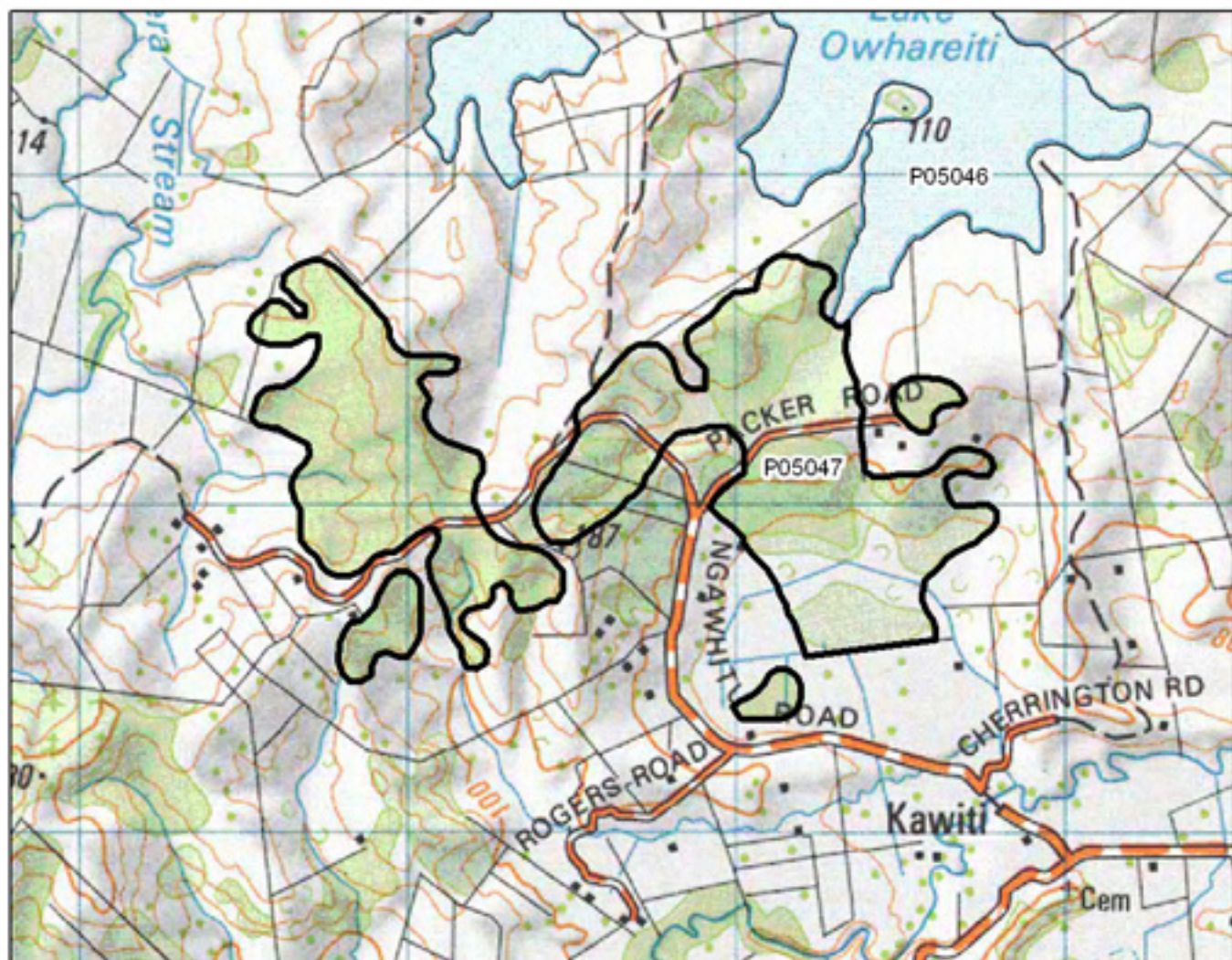


P05046 Lake Owhareiti and Jacks Lake

0 312.5 625 1,250 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



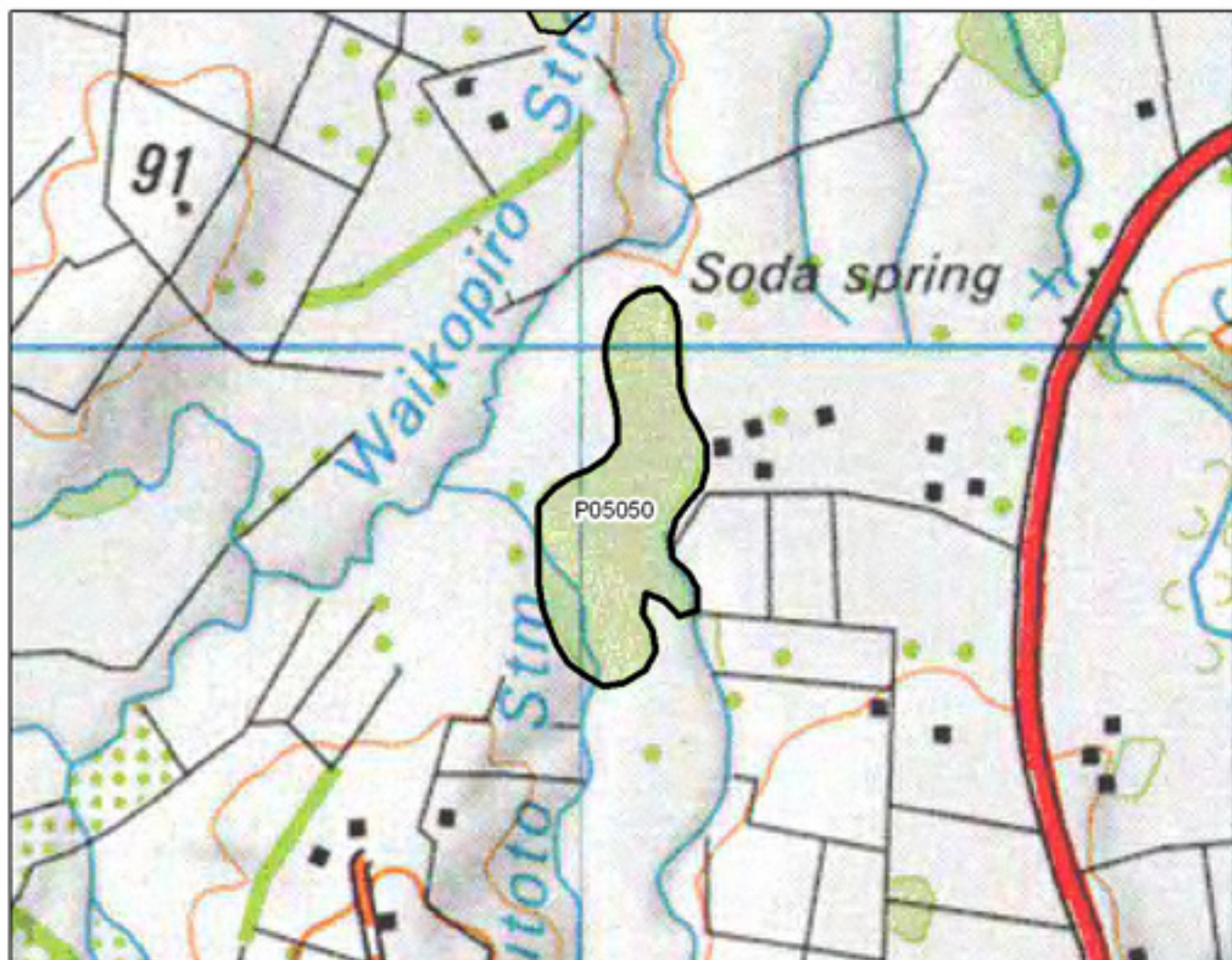


P05047 Ngawhitu Bush

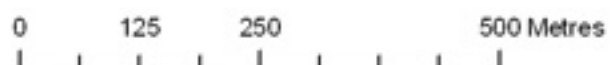


S= Shrubland
F= Forest
W= Wetland
E= Estuarine





P05050 Kahutoto Stream Remnant



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

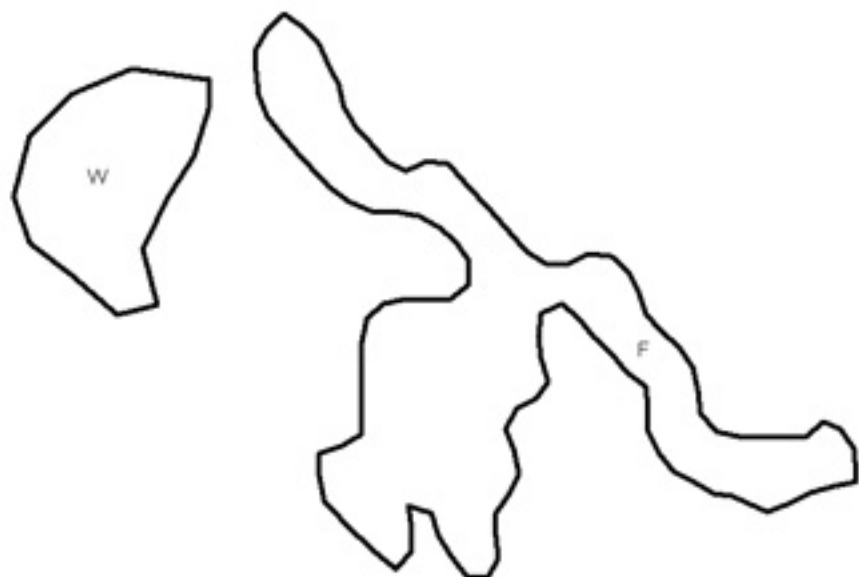


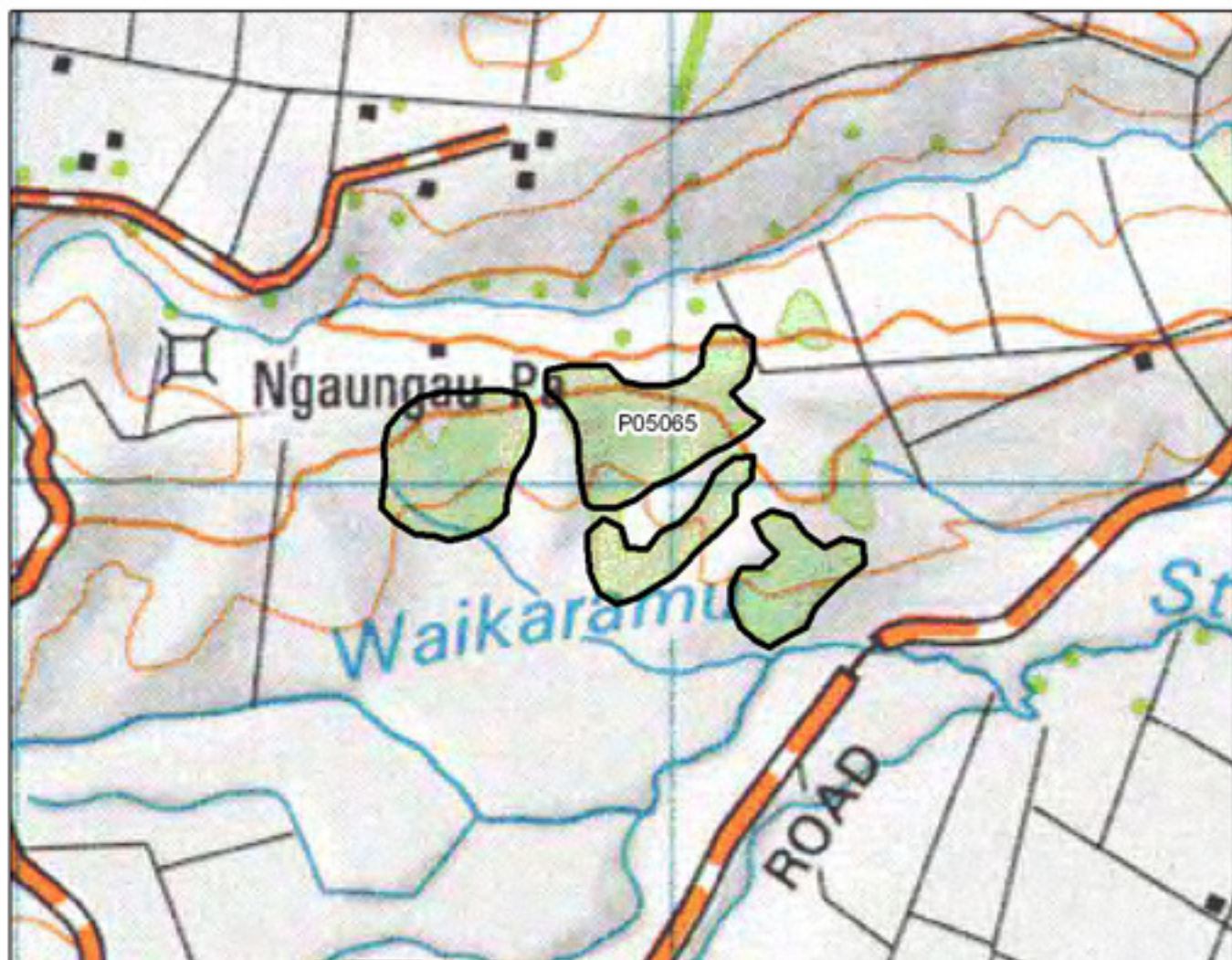


P05064 PuketotaraPatukauwaeTe Keene Stream Swamp

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

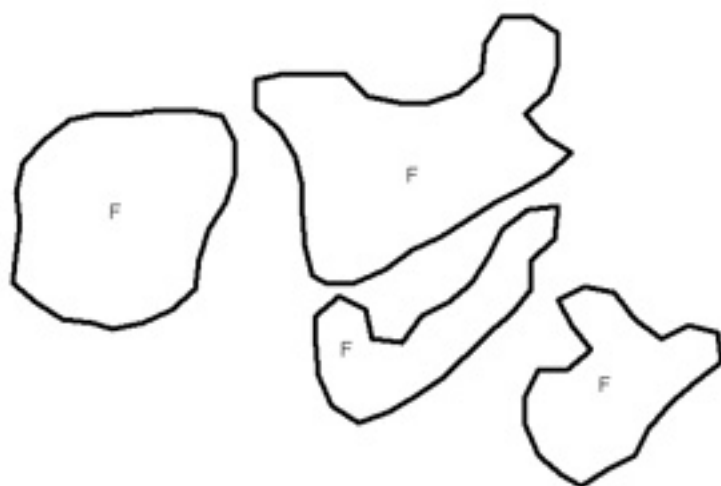


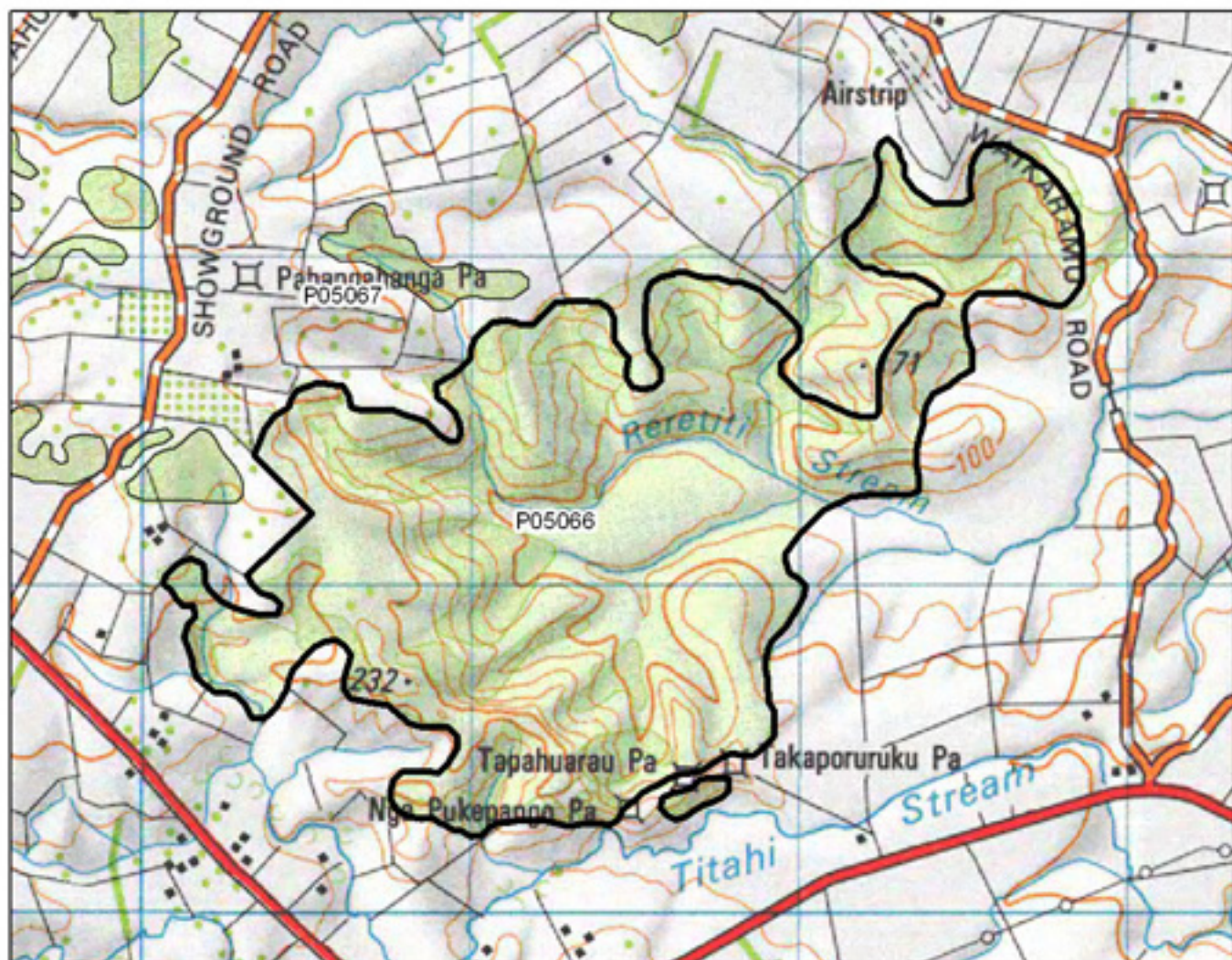


P05065 Ngaungau Pa Bush

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

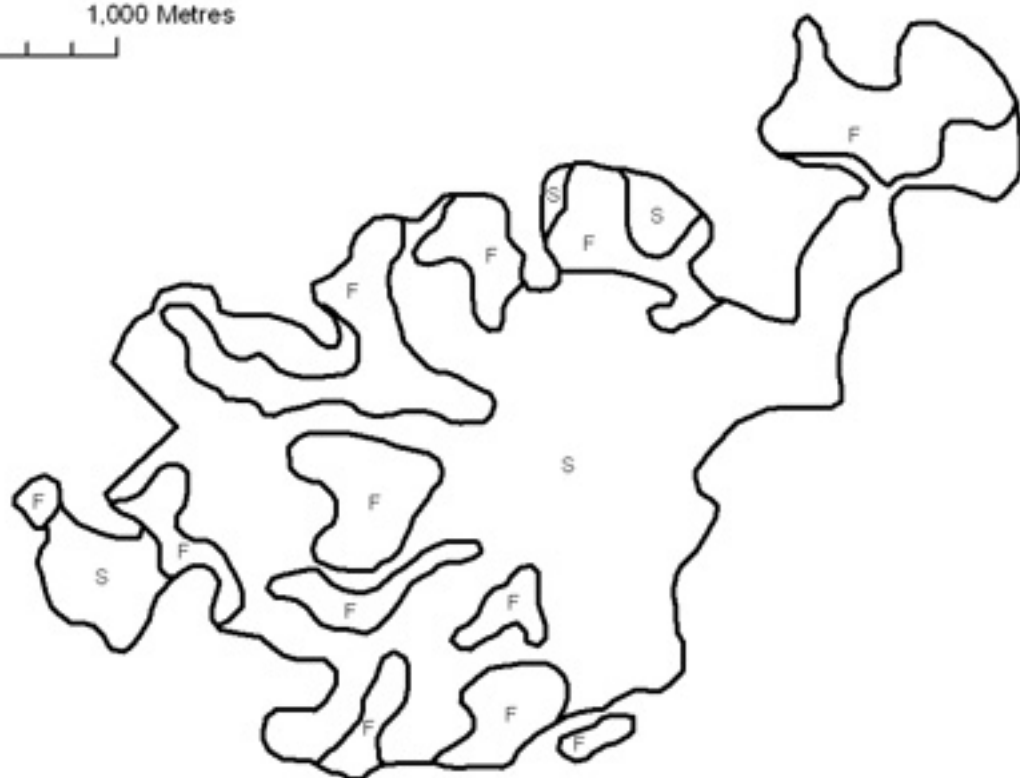


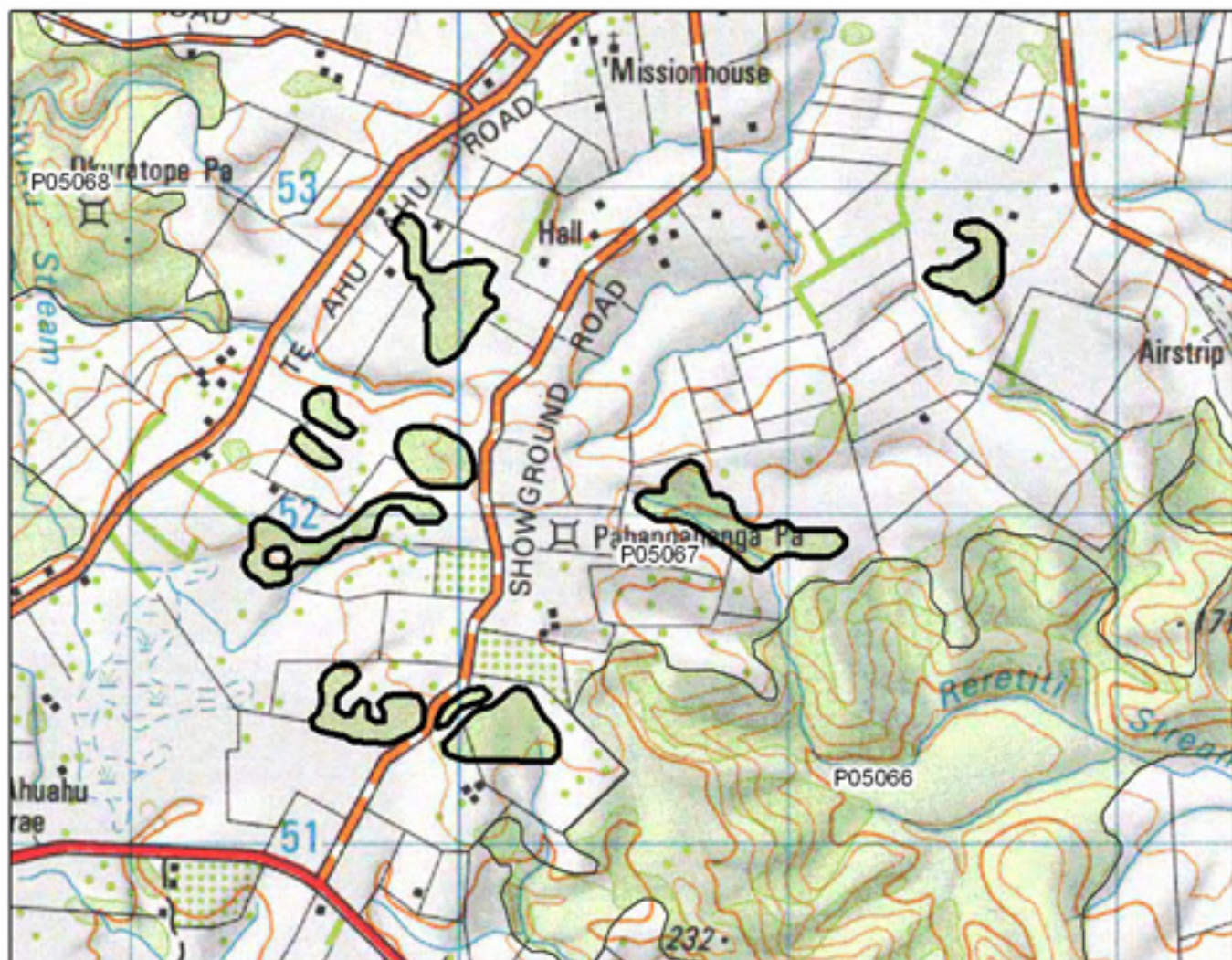


P05066 Waikaramu Road Bush

0 250 500 1,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

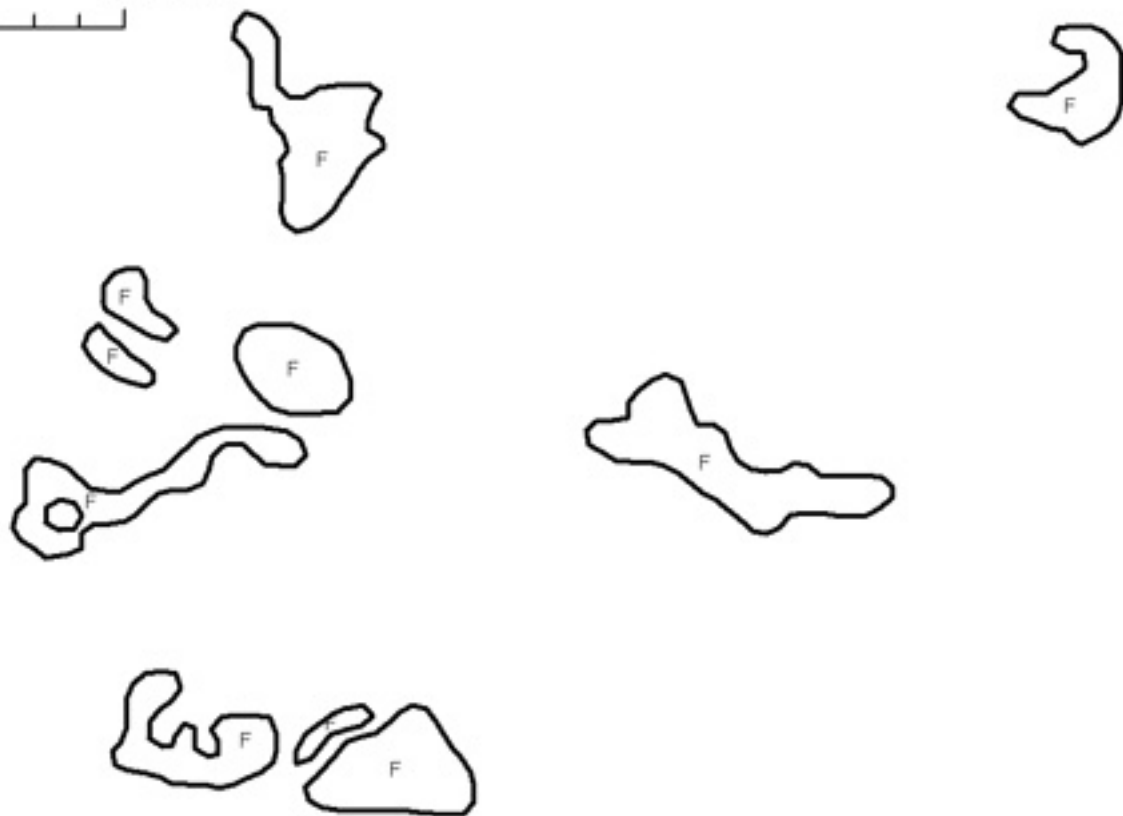


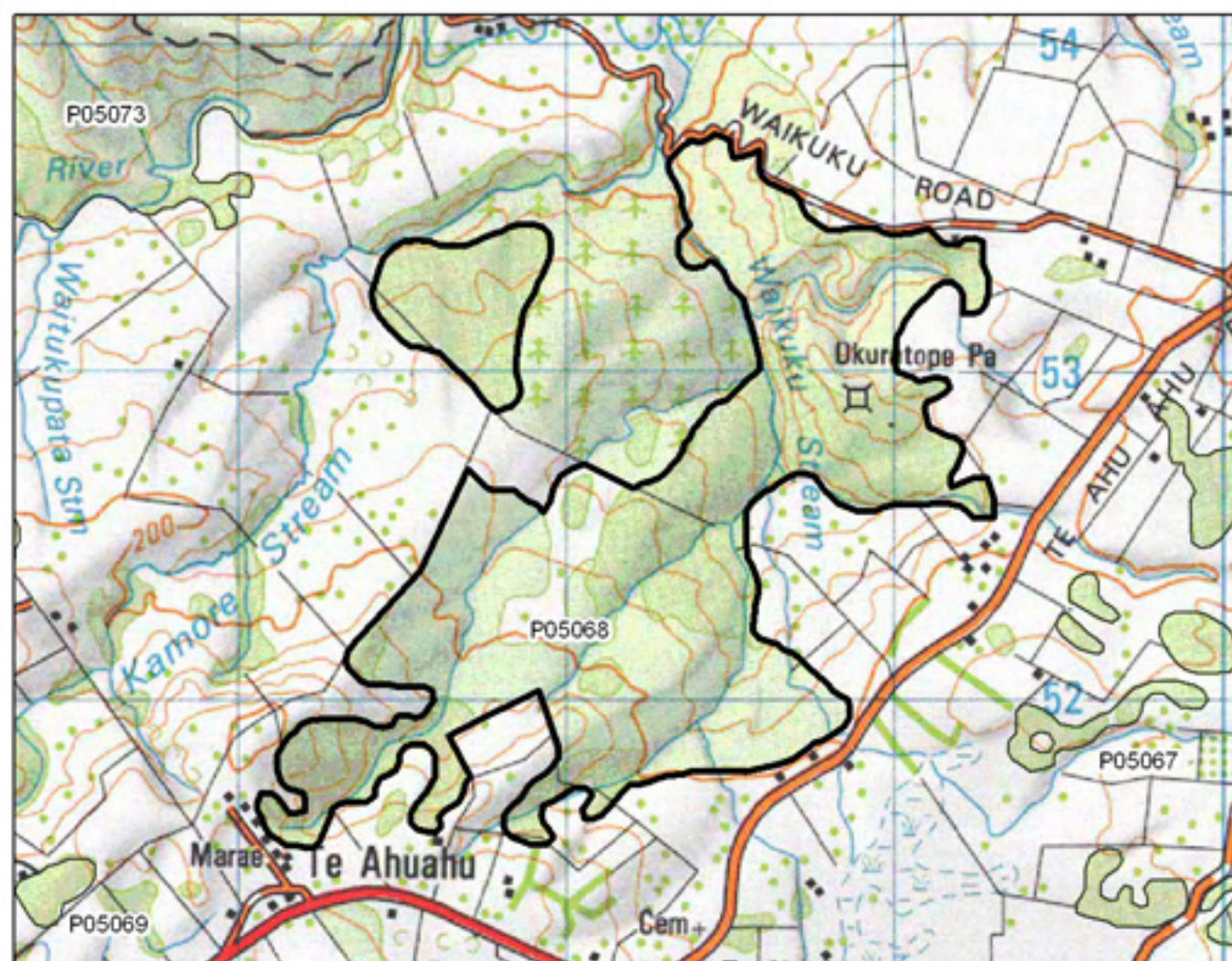


P05067 Waimate Broadleaf Remnants

0 187.5 375 750 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



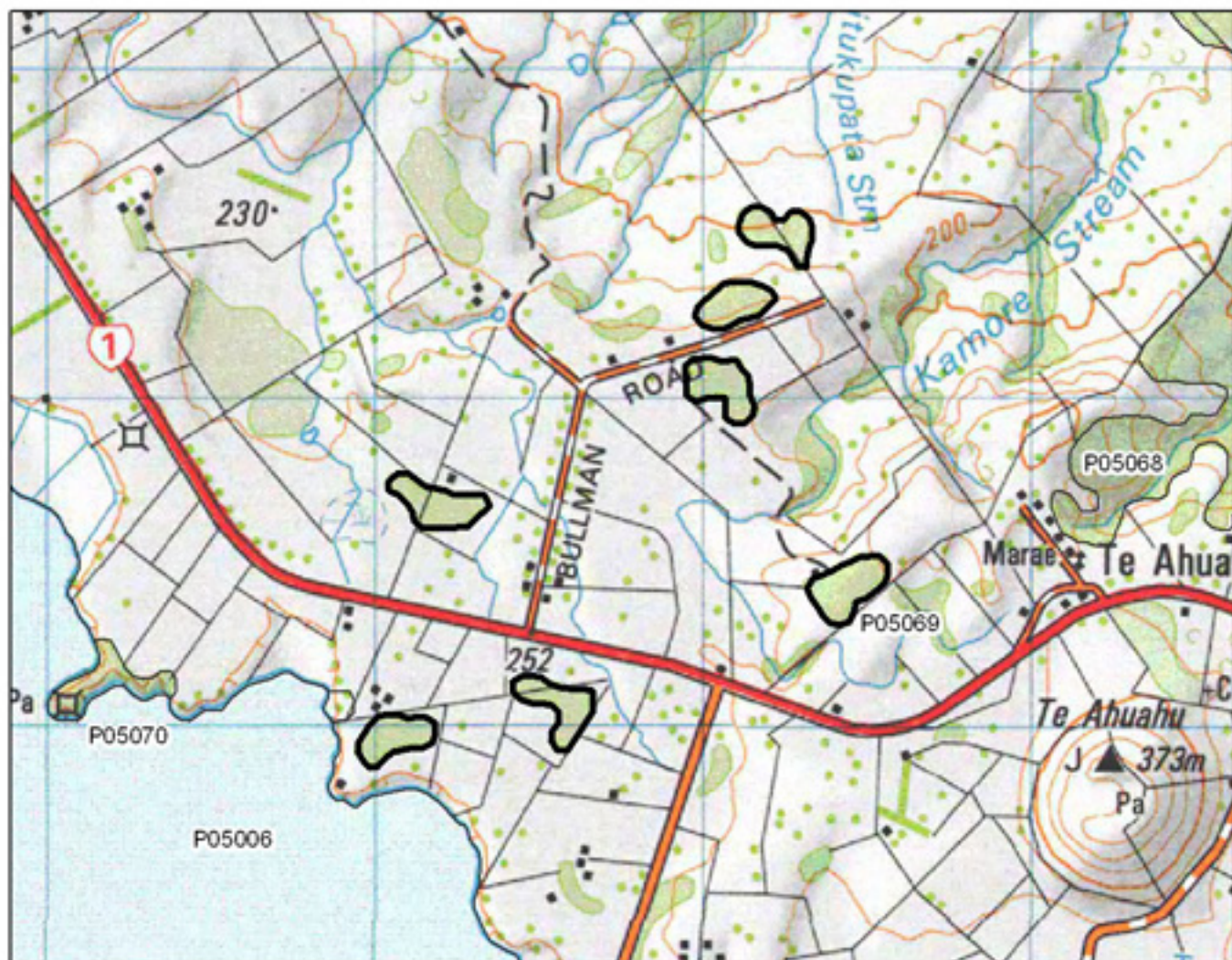


P05068 Waikuku Road Bush

0 250 500 1,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

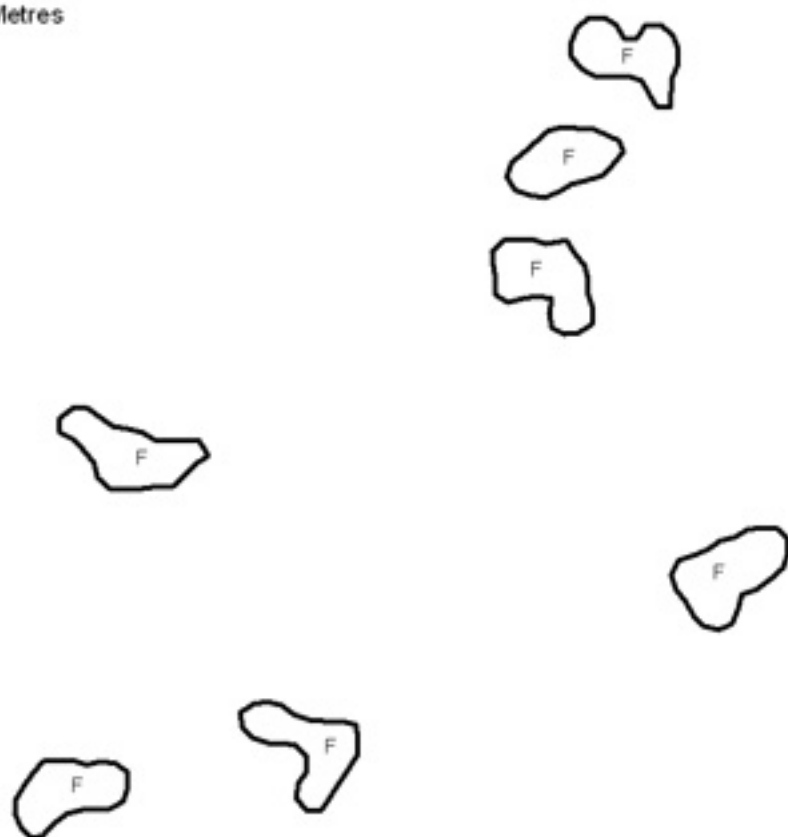


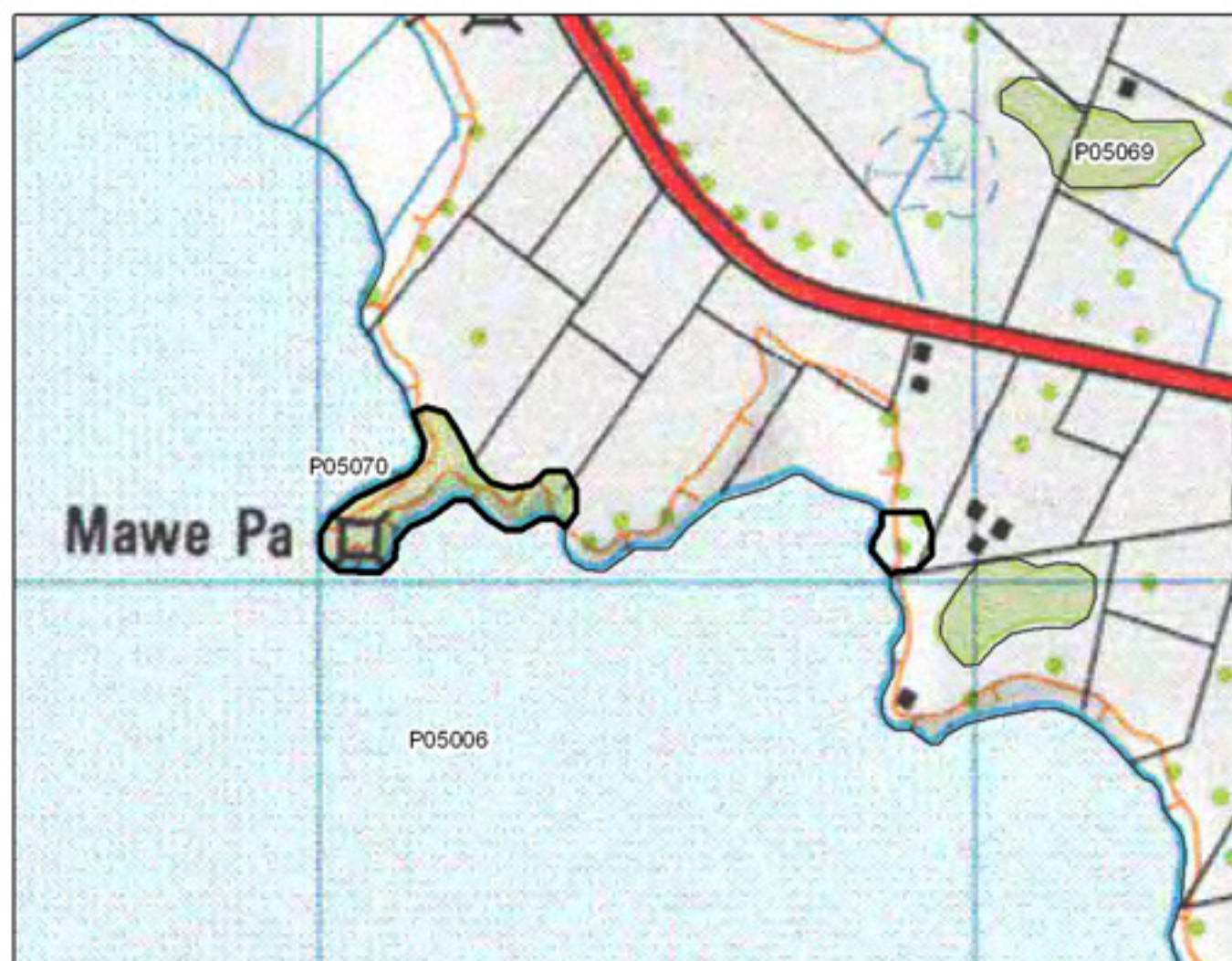


P05069 Bullman Road Broadleaf Remnants

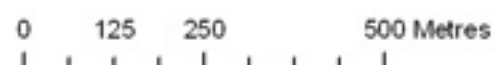
0 187.5 375 750 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



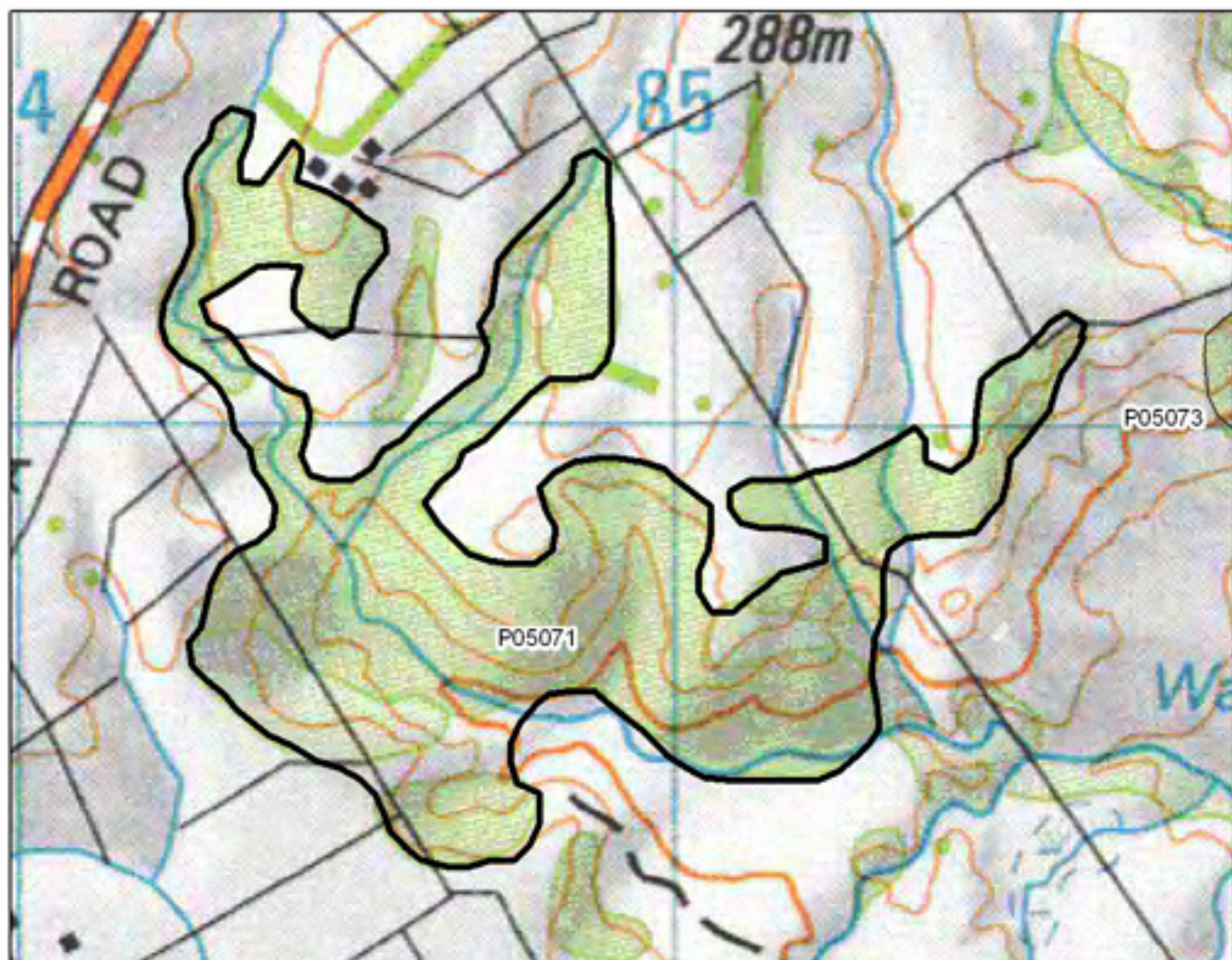


P05070 Lake Omapere Swamp Forest Remnant

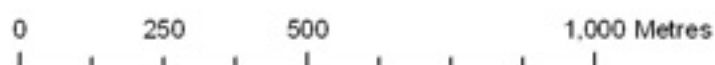


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

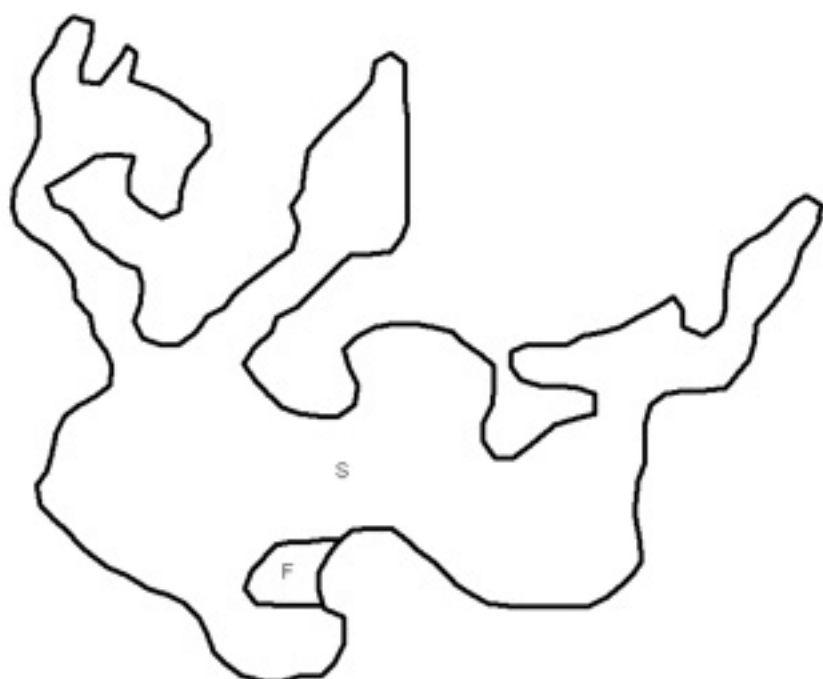




P05071 Wehirua Road Bush



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



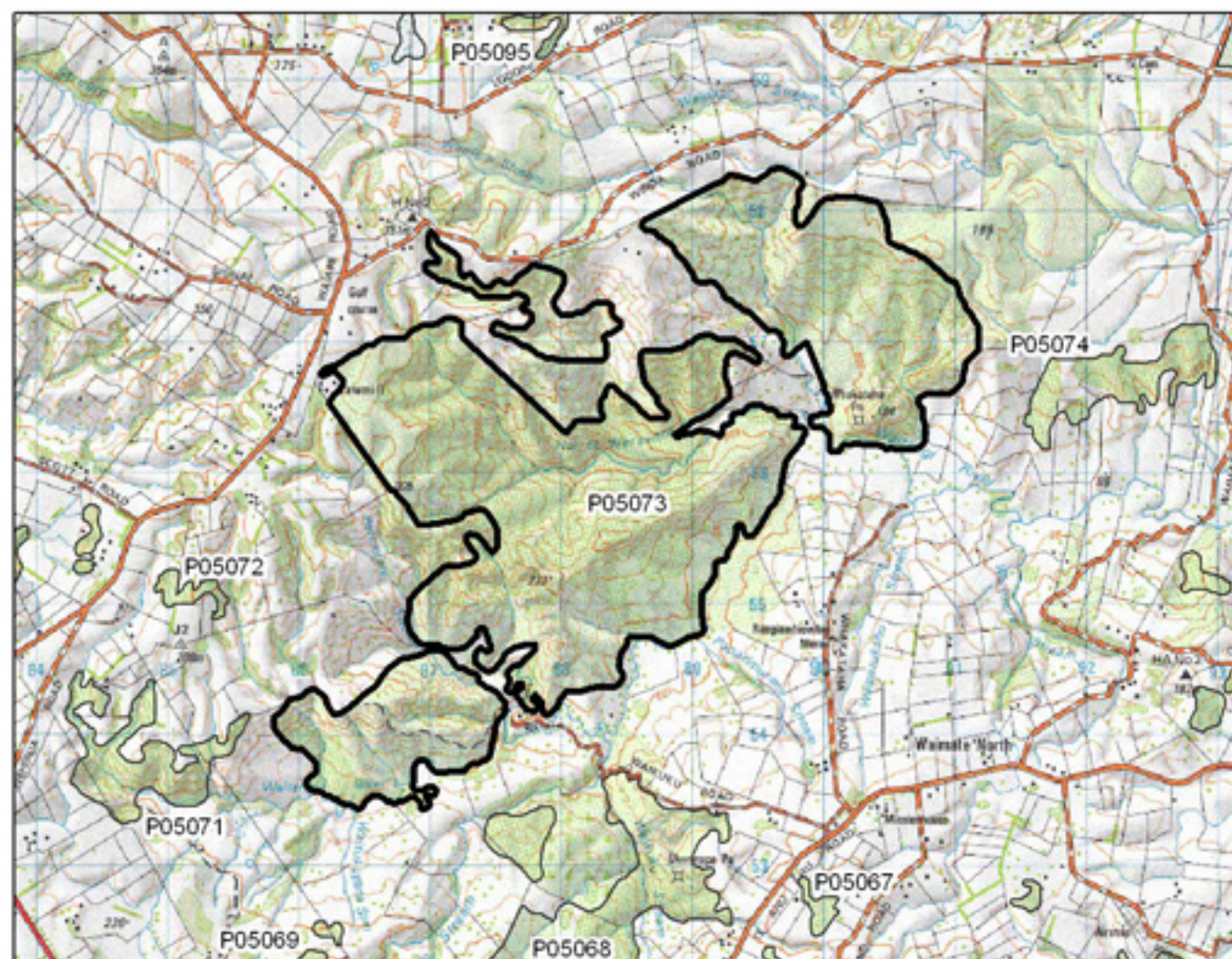


P05072 Scotts Road Remnants

0 187.5 375 750 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

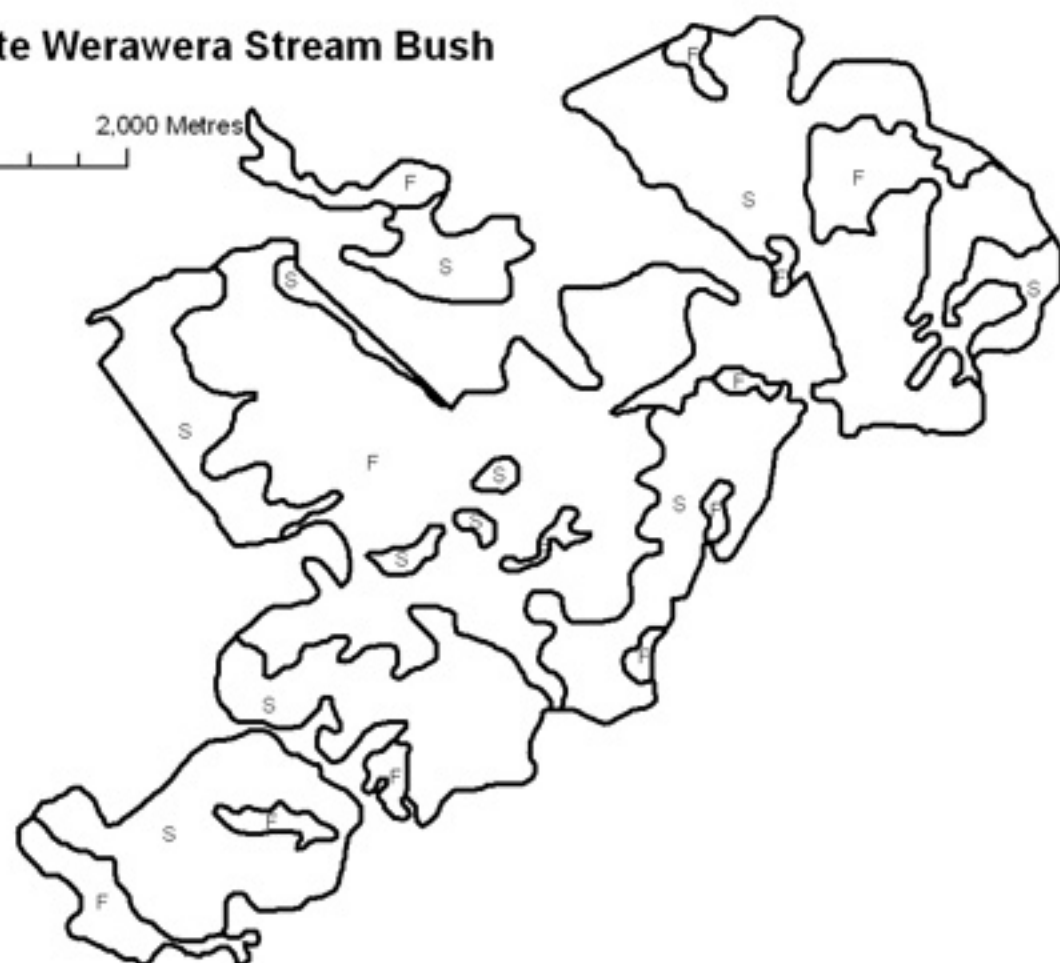


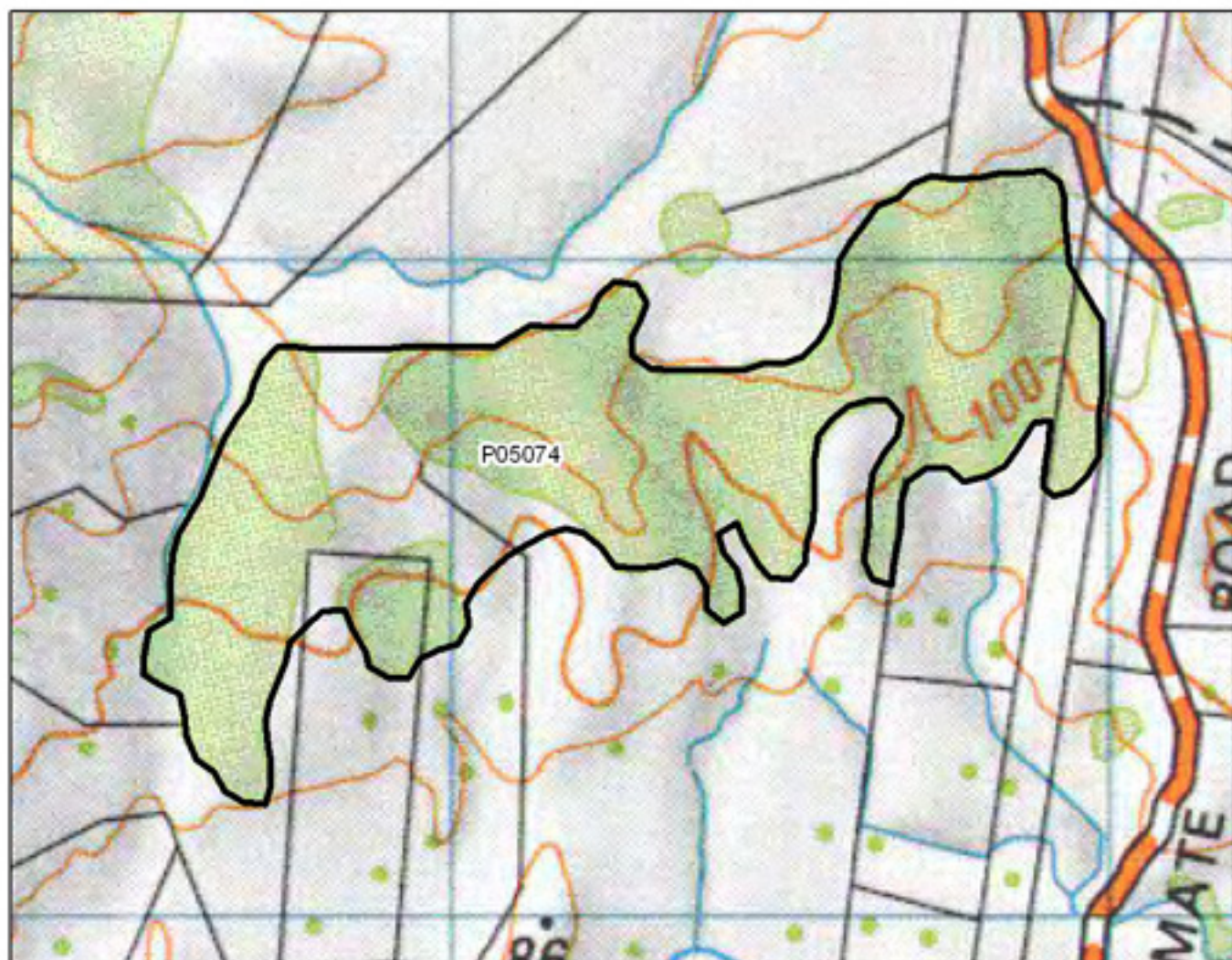


P05073 Hui te Werawera Stream Bush

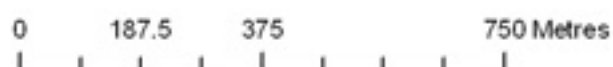
0 500 1,000 2,000 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

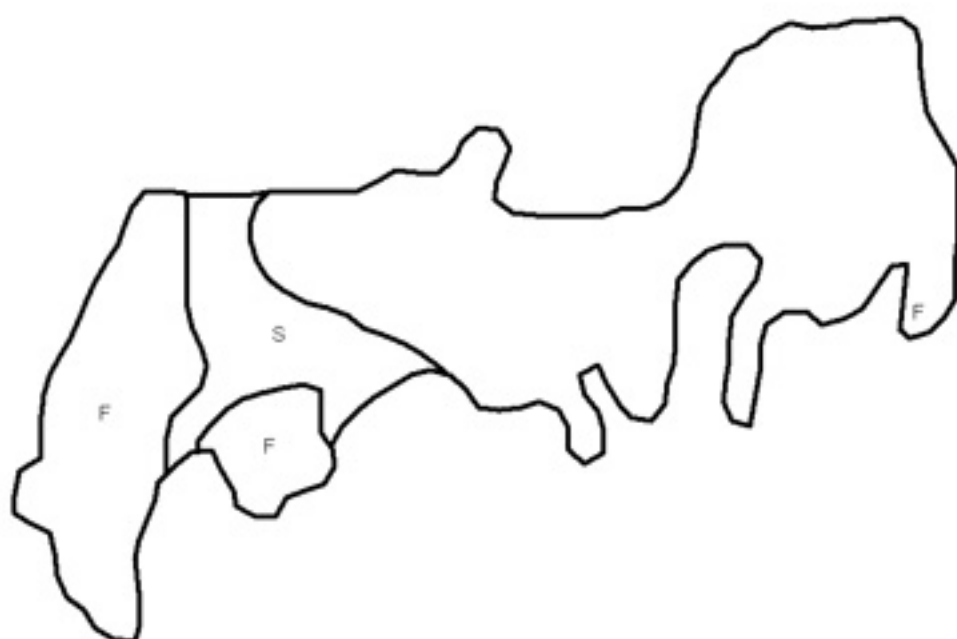


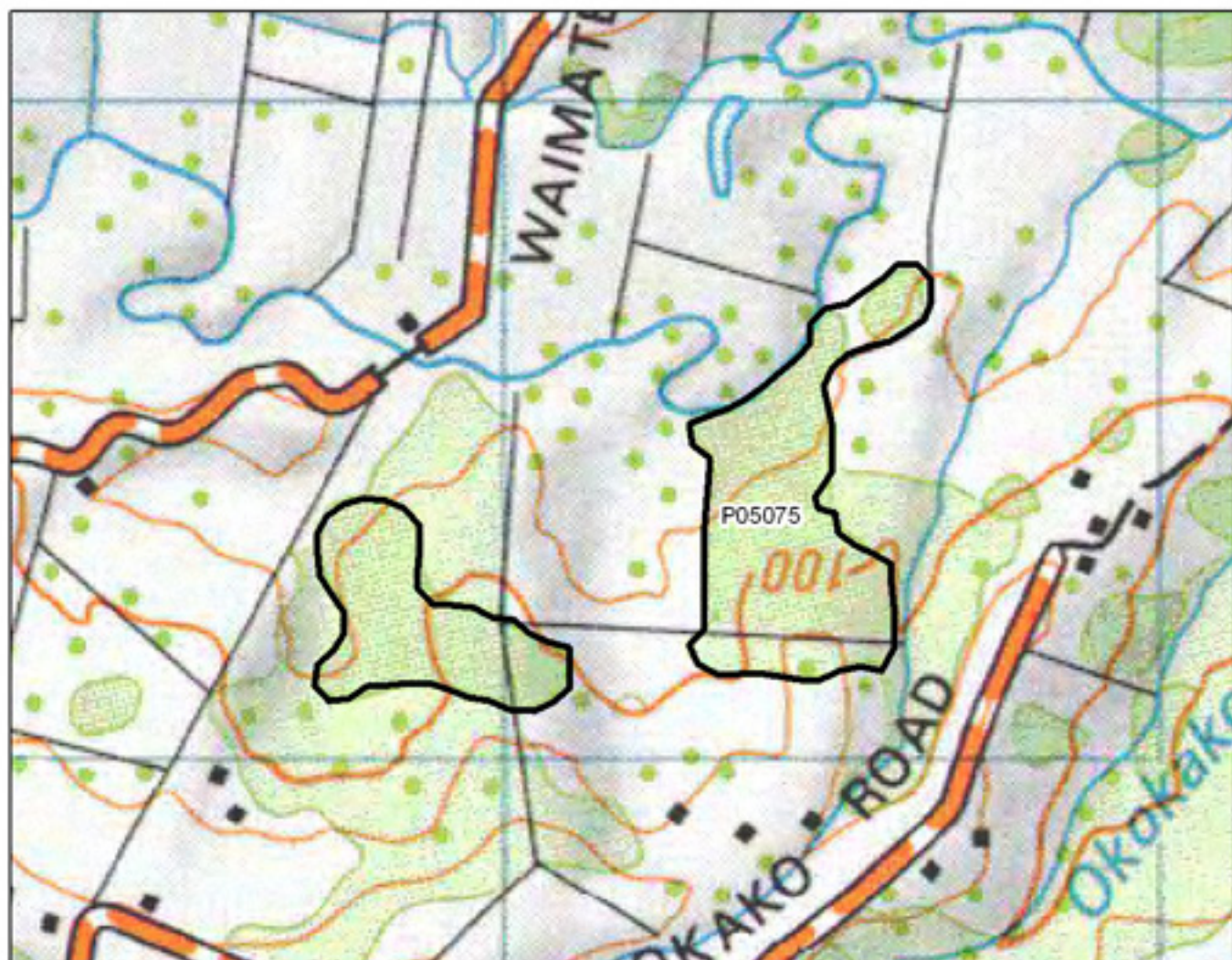


P05074 D Cooks Bush

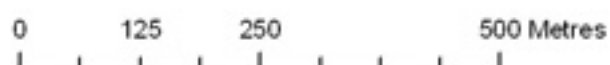


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

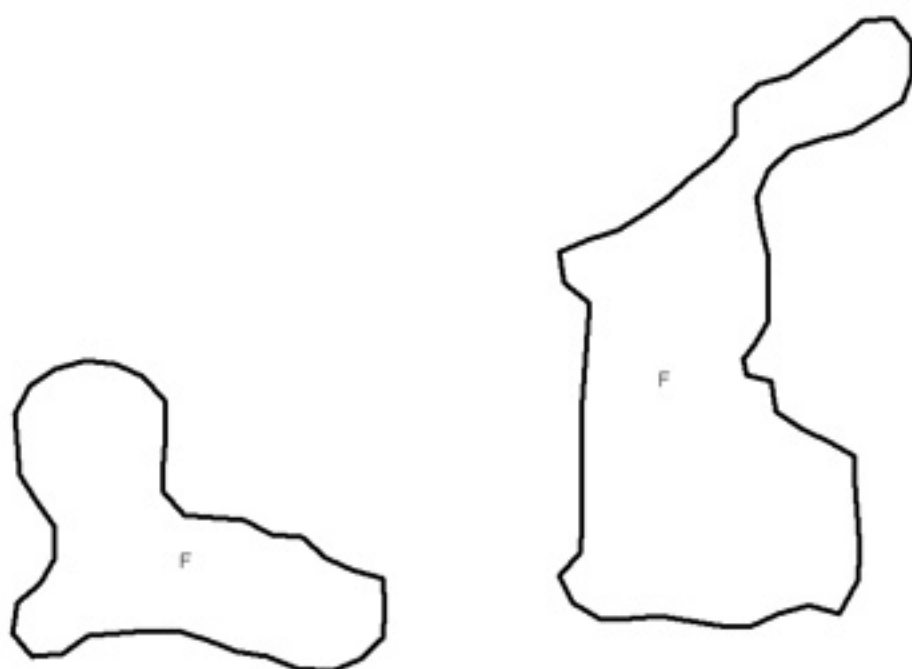


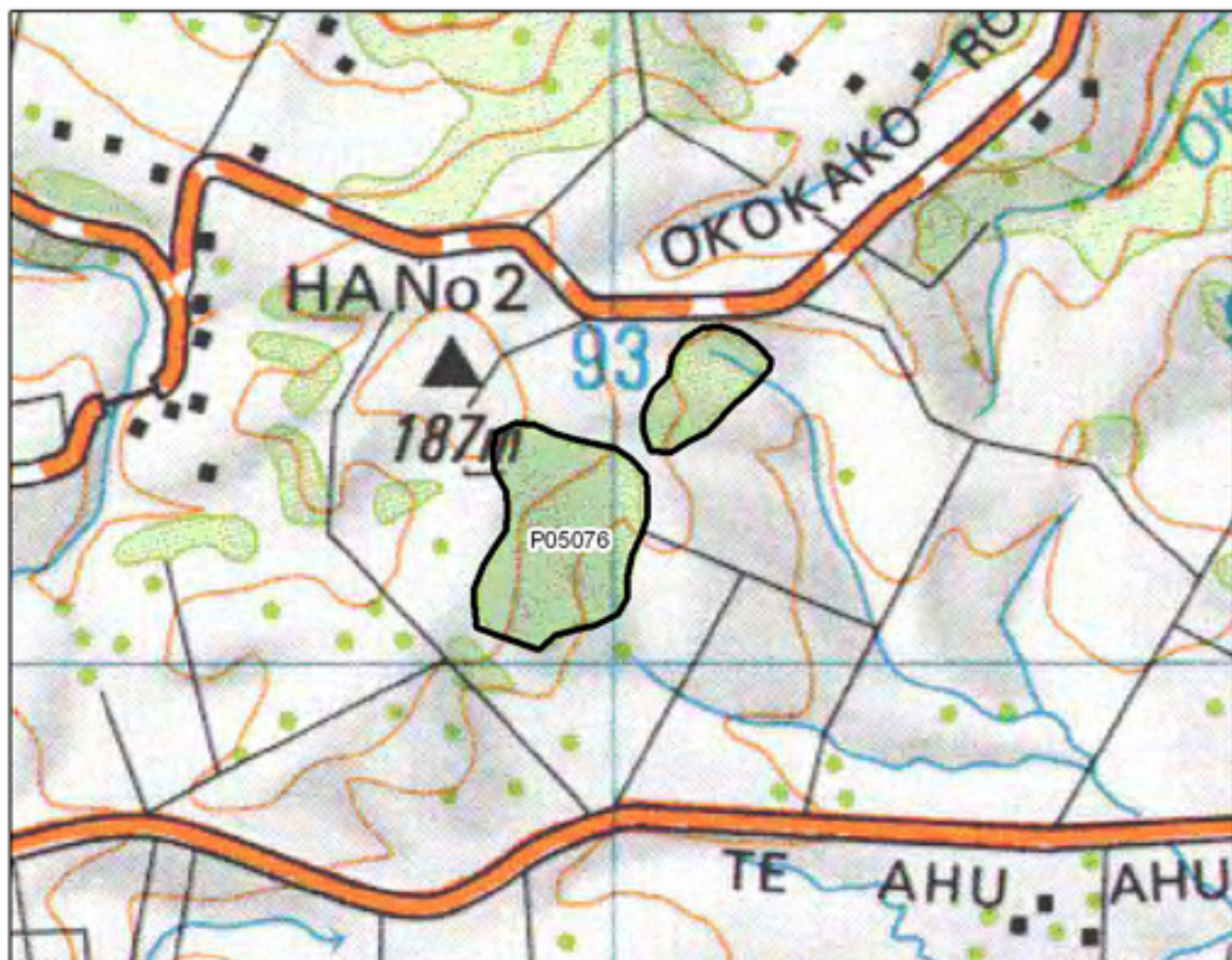


P05075 Atkins Ohaio Bush

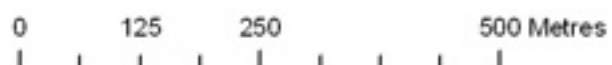


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

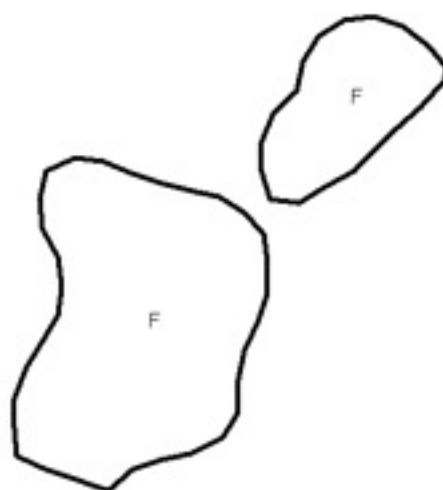


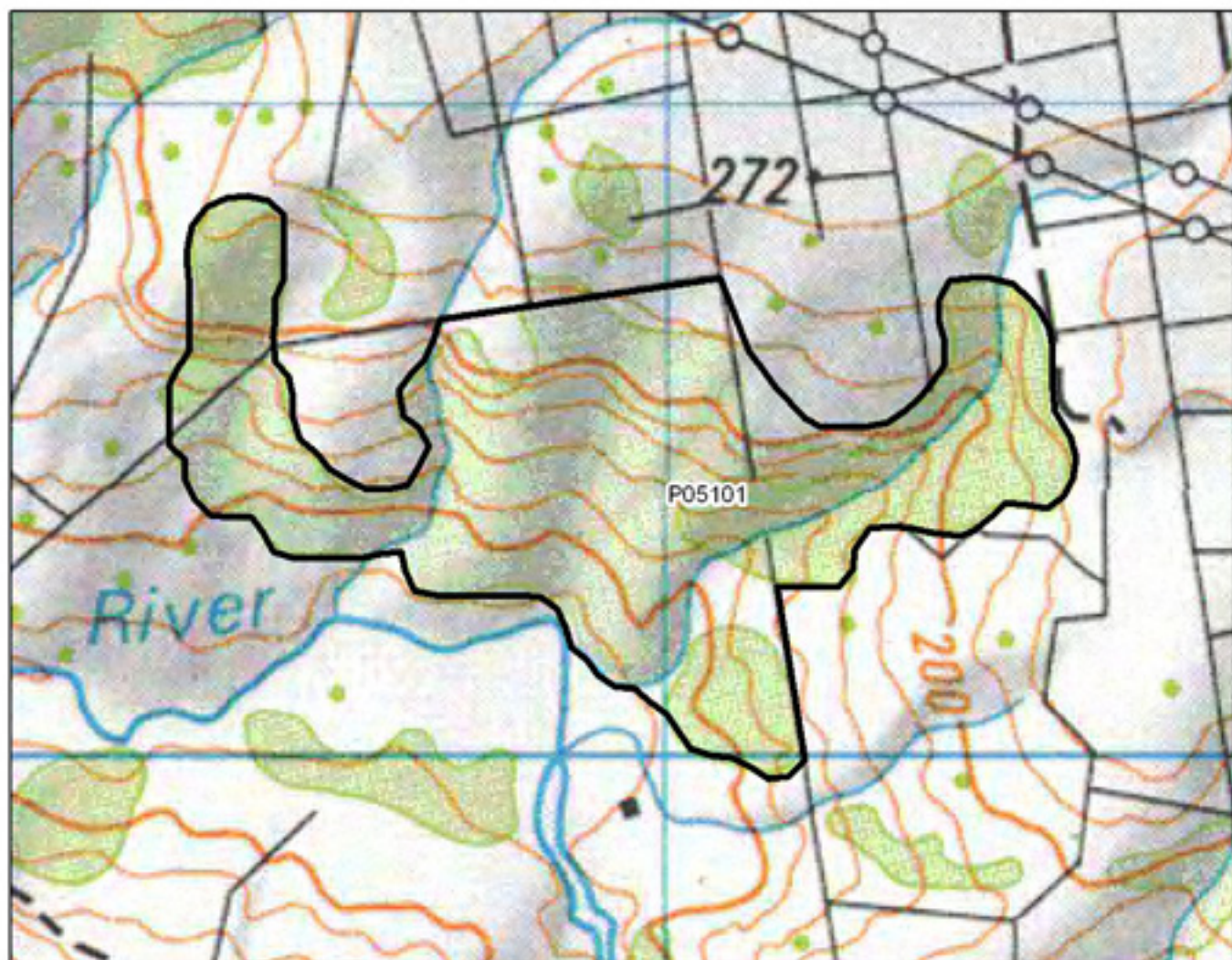


P05076 Okakako Road Remnant

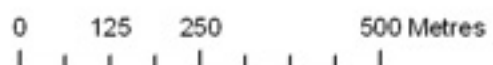


S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

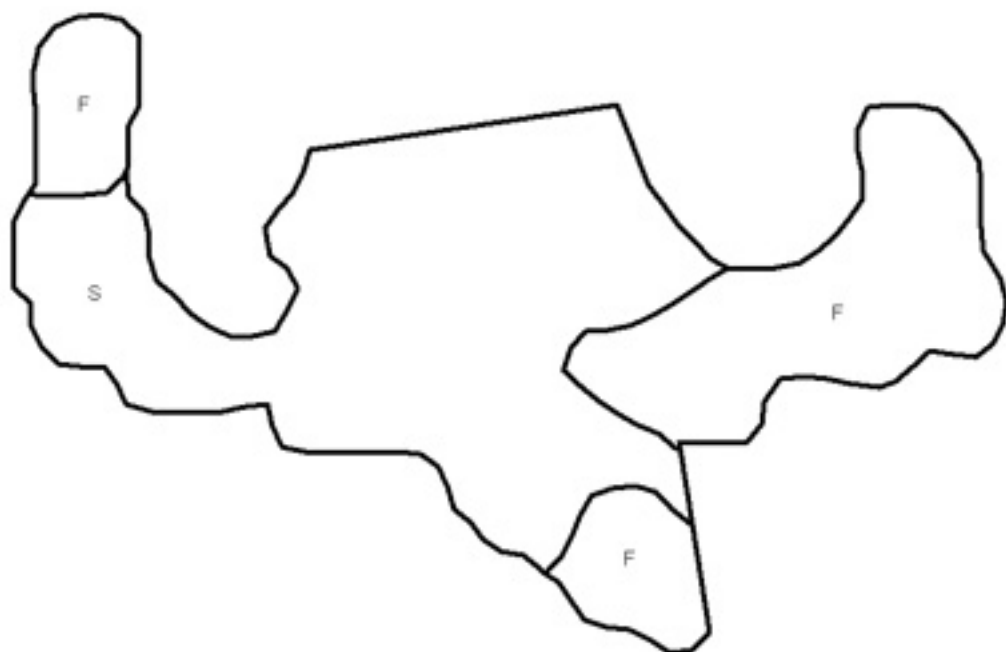


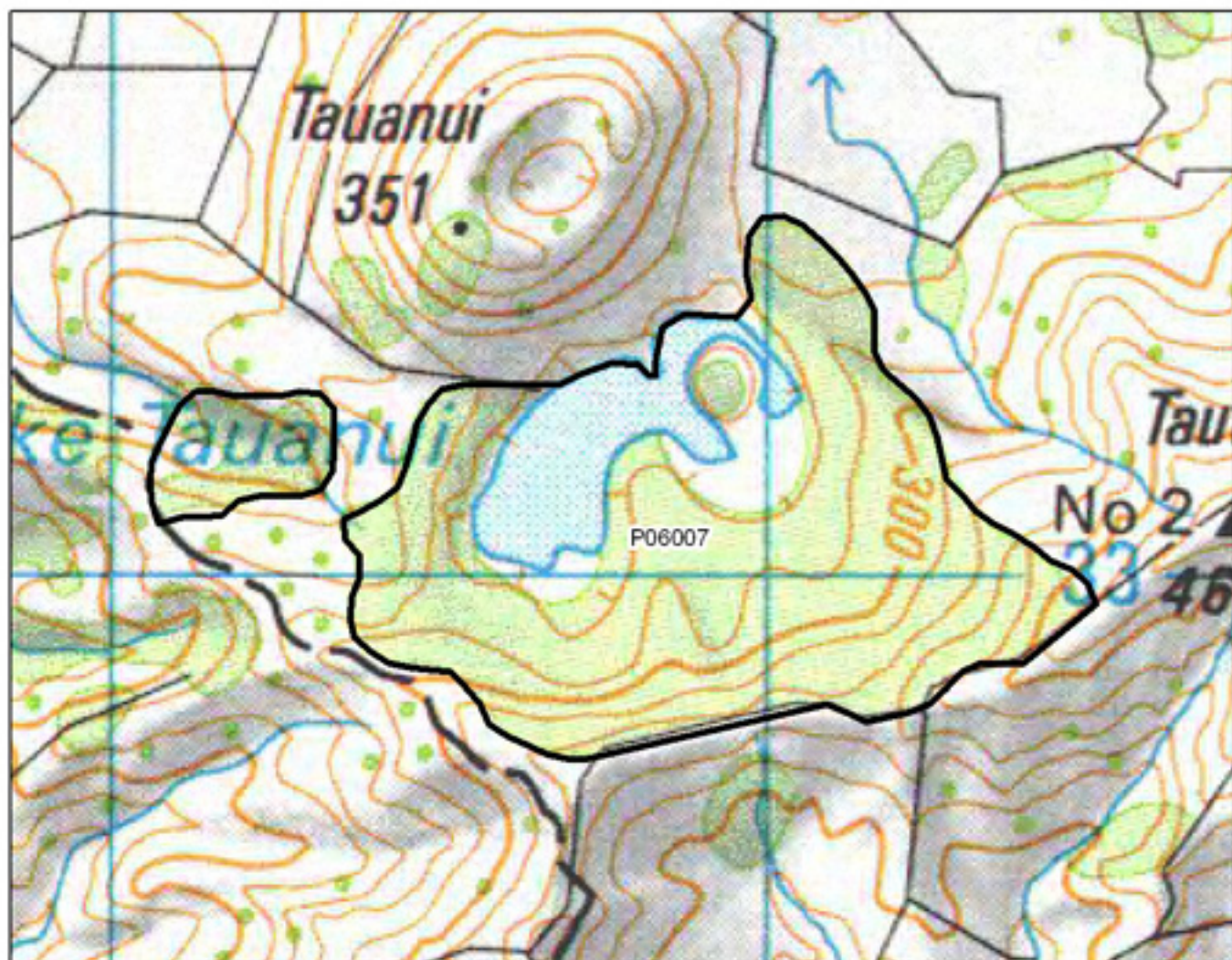


P05101 Utakura River Bush



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

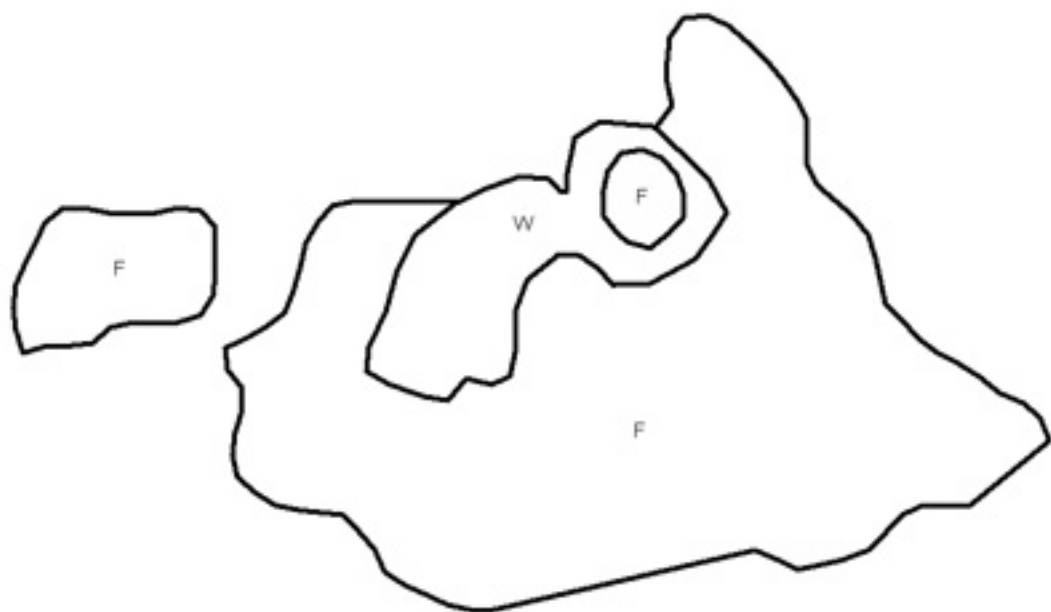


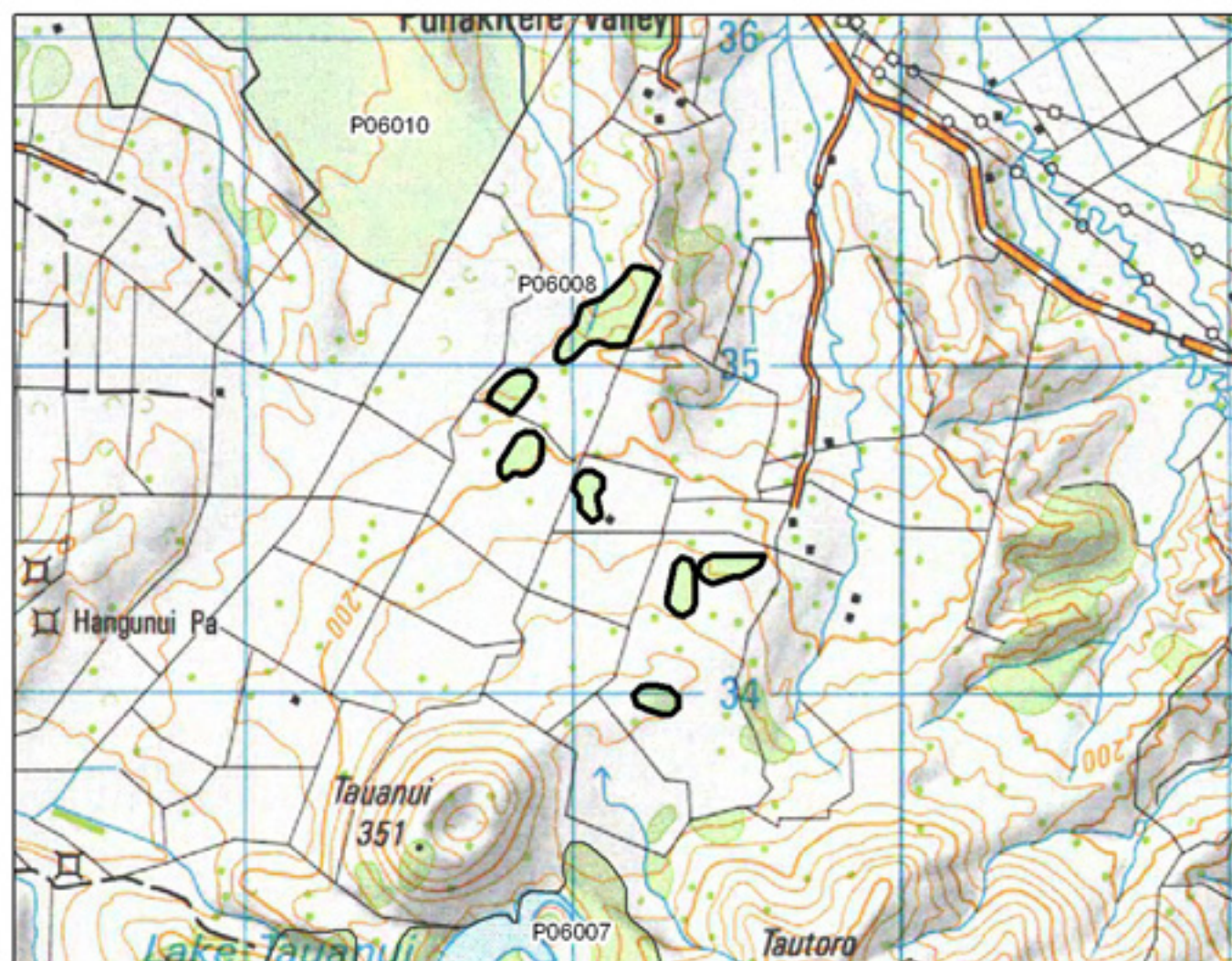


P06007 Tauanui Volcanic Lake and Environs

0 125 250 500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



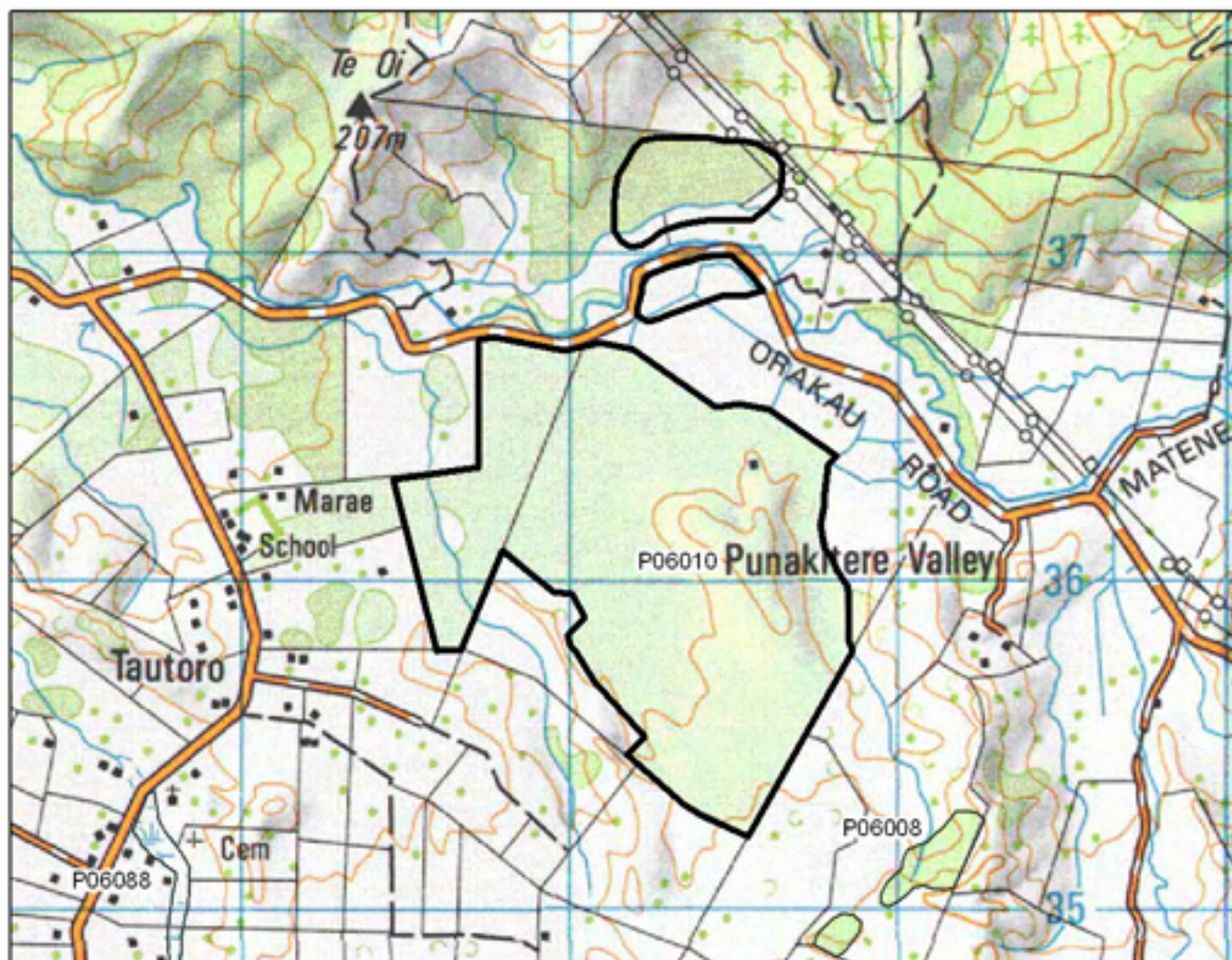


P06008 Tauanui Volcanic Broadleaf Remnant

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine

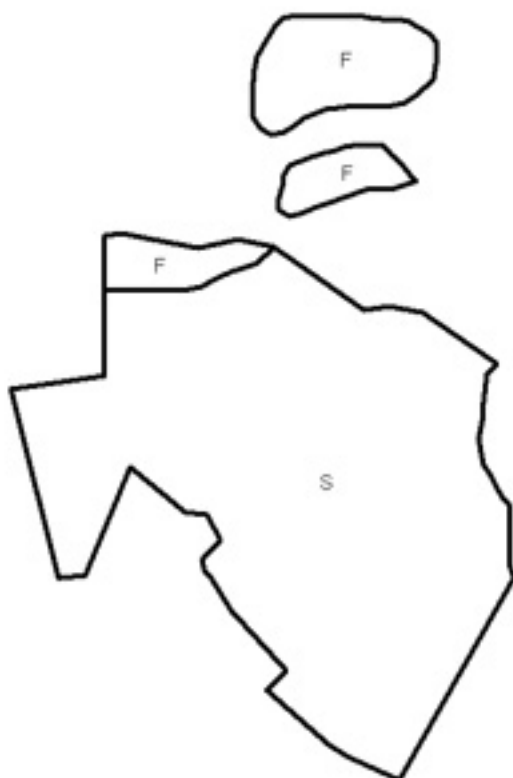


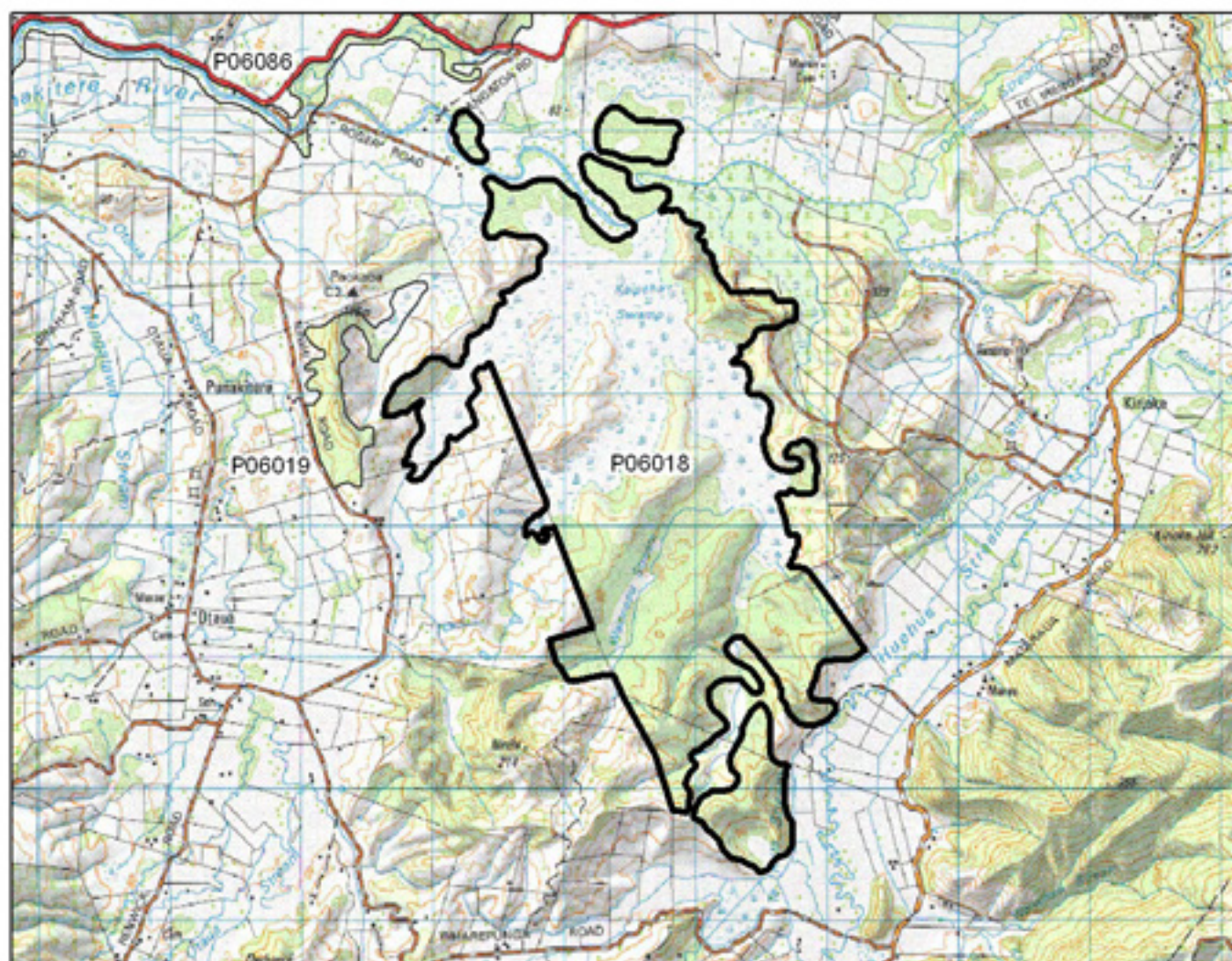


P06010 Punakitere Valley Swamp Forest

0 187.5 375 750 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



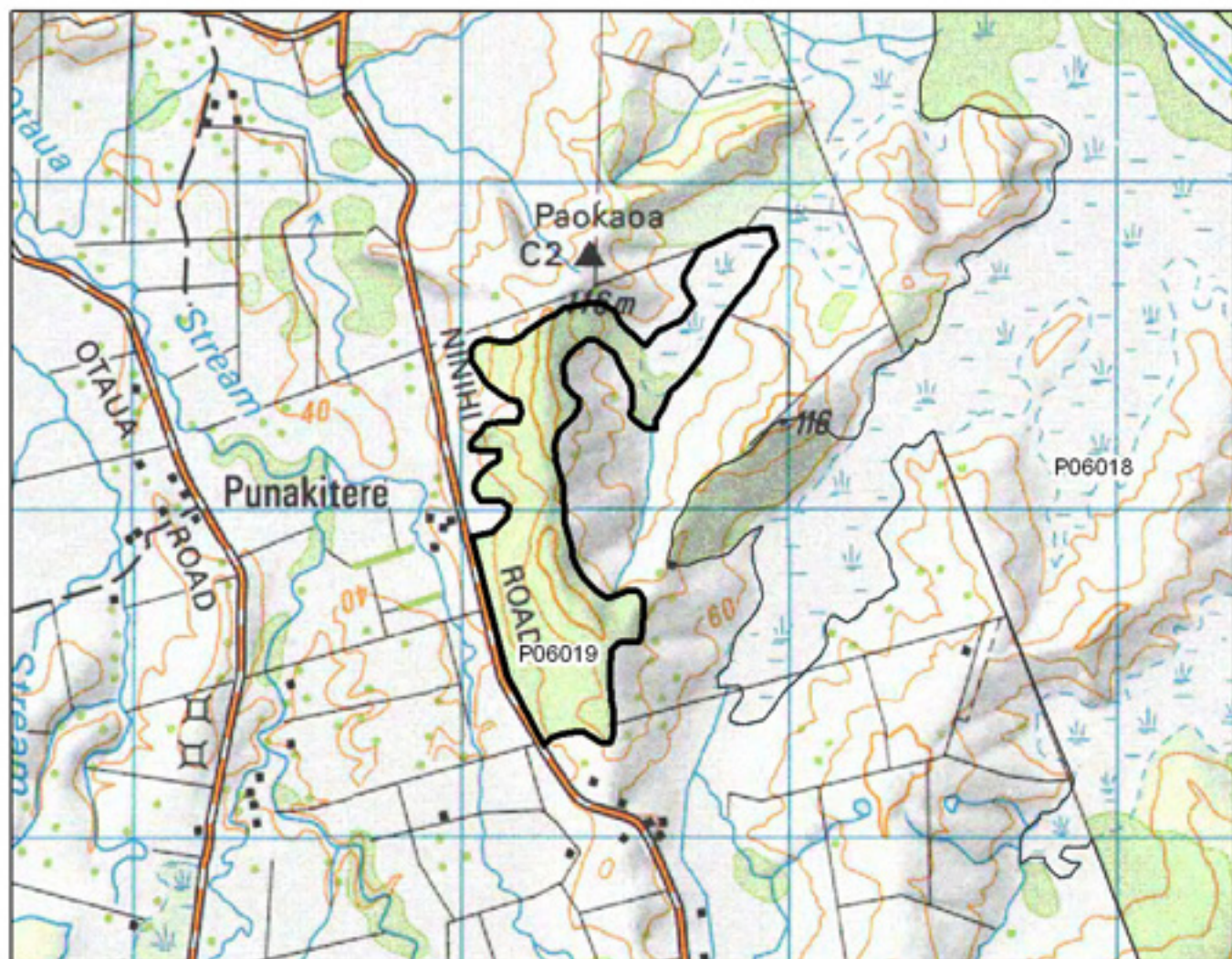


P06018 Kaipēha Swamp

0 375 750 1,500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine





P06019 PunakitereNinihi Road Bush

0 125 250 500 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



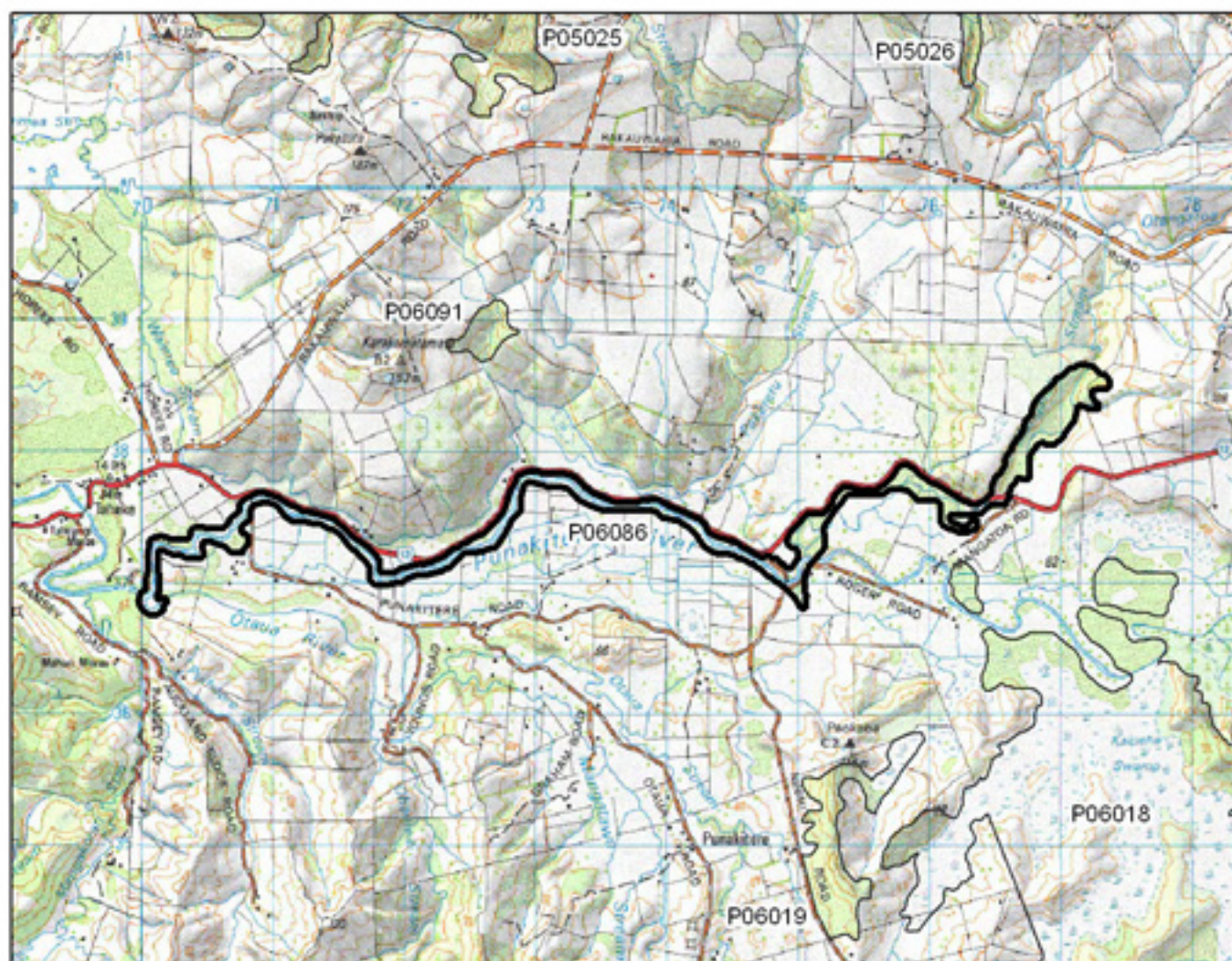


P06080 Korowhata Stream Pond

0 50 100 200 Metres

S= Shrubland
F= Forest
W= Wetland
E= Estuarine



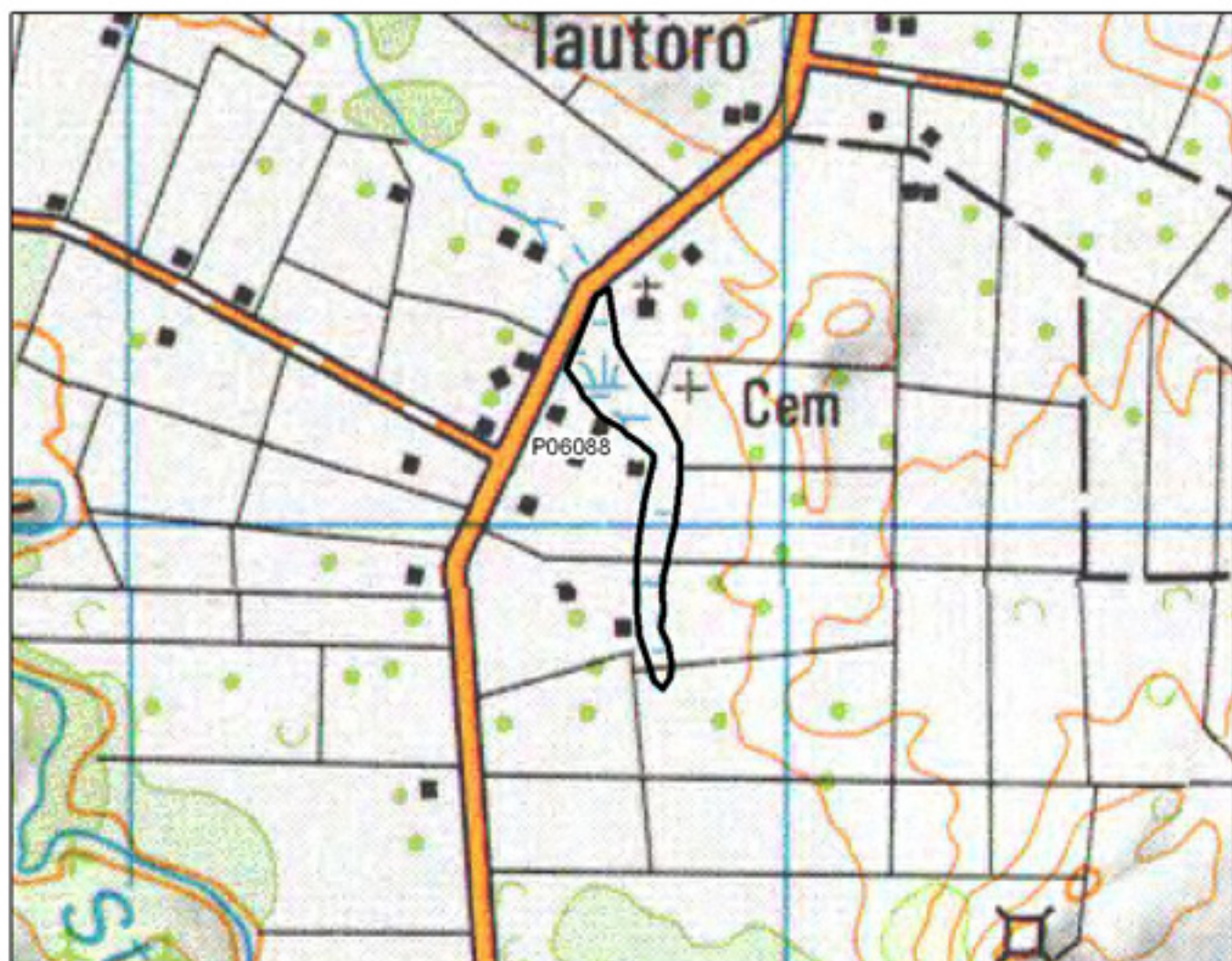


P06086 Mangatoa Punakitere Riverine

0 500 1,000 2,000 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



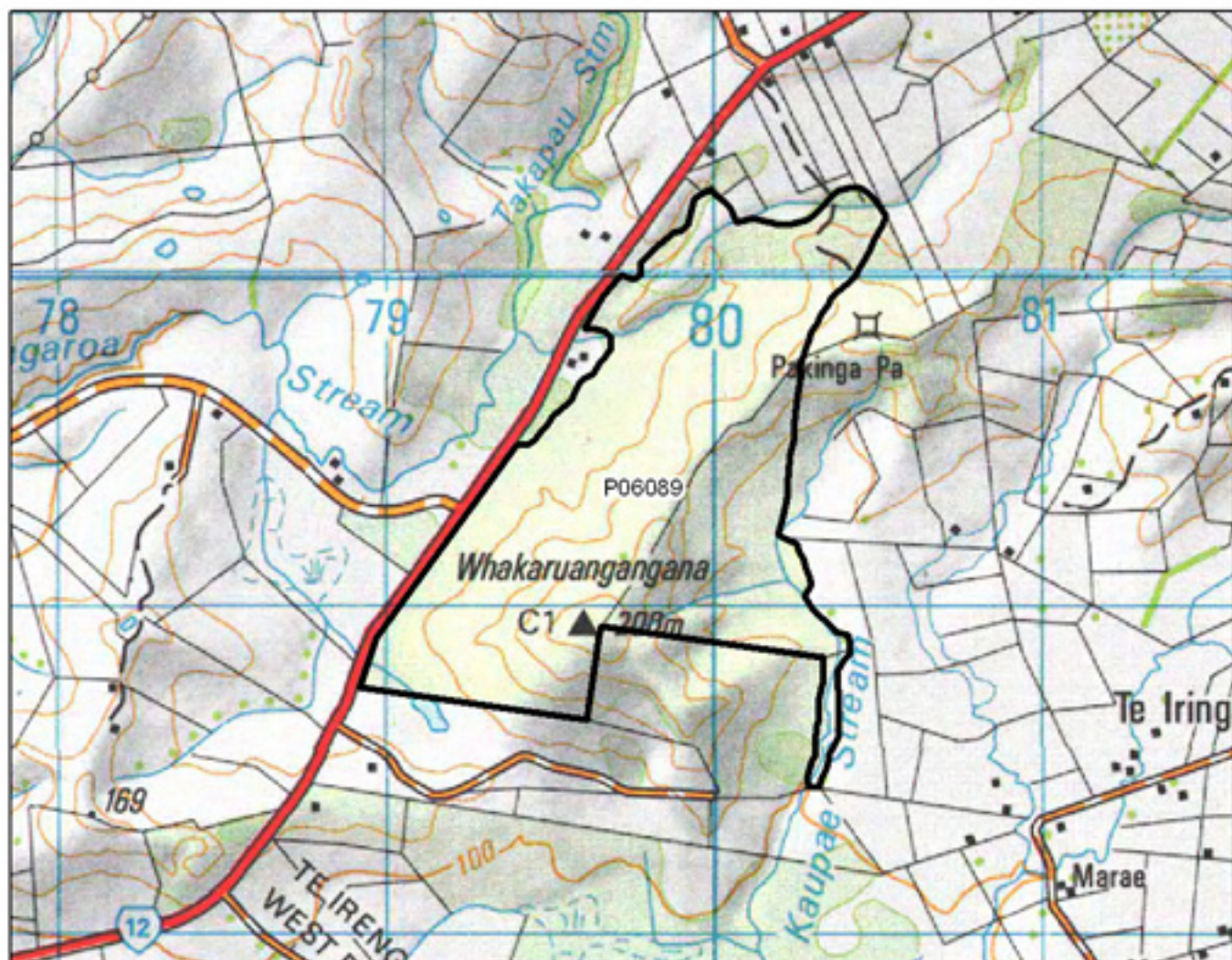


P06088 Tautoro Wetland

0 75 150 300 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine



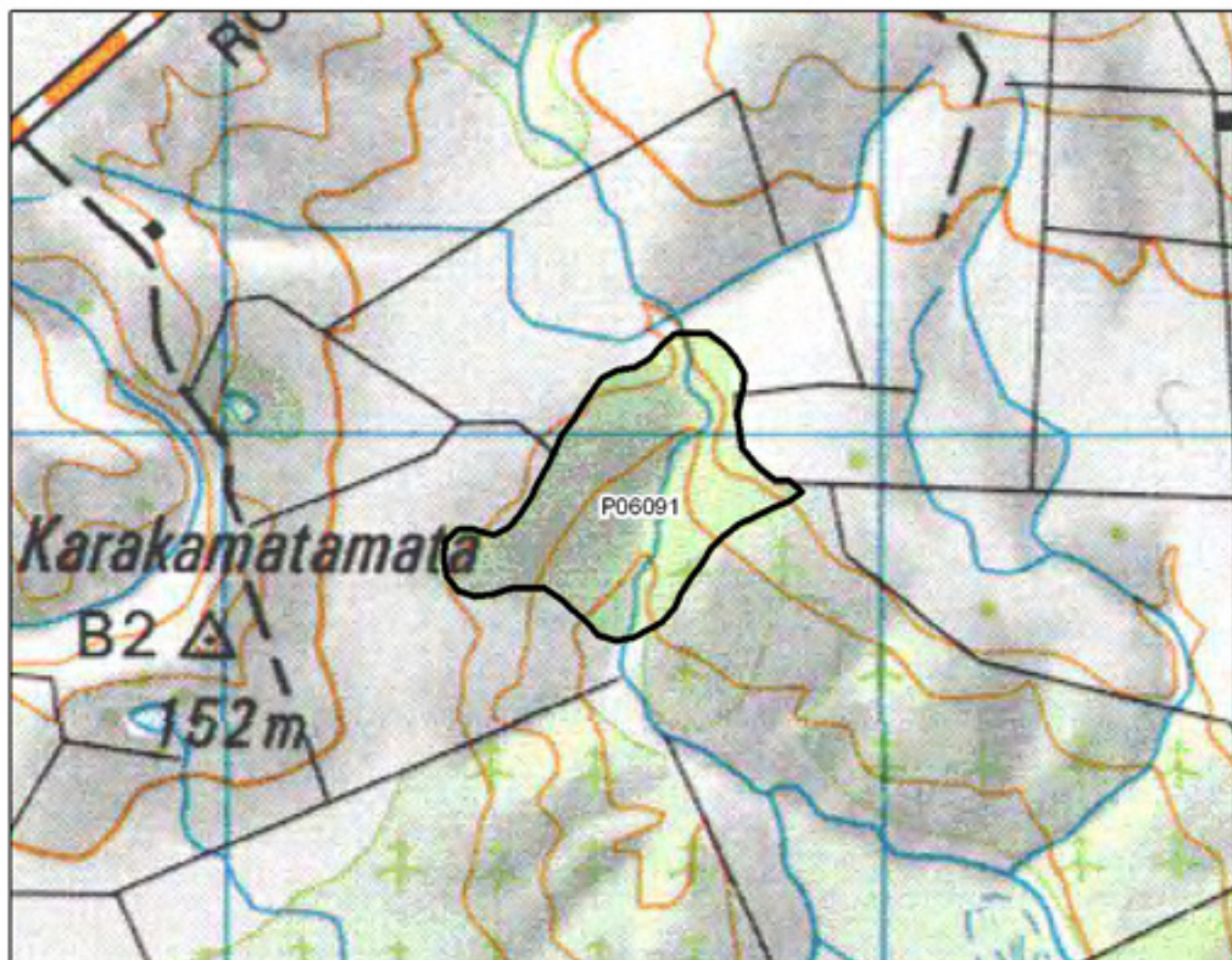


P06089 Whakaruangangana Gumfield

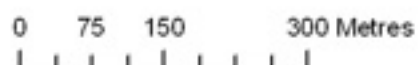
0 125 250 500 Metres

S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine





P06091 Karakamatamata Scenic Reserve



S= Shrubland
 F= Forest
 W= Wetland
 E= Estuarine

