

TRANSMISSION GULLY PROJECT

TECHNICAL REPORT #8

Avifauna & Bats:

Description & Values

August 2011



Boffa Miskell

Front Cover Photo:

Photo taken within podocarp forest at Wainui Saddle looking north down Te Puka Valley with kohekohe forest visible on right (eastern) slopes. These forests are the most important habitats for avifauna within the designation, with threatened species kaka and bush falcon (often associated with old growth forest, particular for breeding) both recorded here.

Bibliographic reference:

Boffa Miskell. 2011: Transmission Gully Project Technical Report 8 Avifauna & Bat: Description & Values. Prepared by Boffa Miskell Ltd for NZ Transport Agency and Porirua City Council. W09034C_003. 33 pp + App.

Prepared by:

Dr Leigh Bull
Associate Principal (Ecologist)
Boffa Miskell Limited

Released by:

Stephen Fuller
Associate-Director (Ecologist)
Boffa Miskell Limited

Document Status:**FINAL****Version:**

V.9

Issue Date:

1 August 2011

Internal Peer Review:

Dave Slaven
Director (Ecologist)
Boffa Miskell Limited

© Copyright:

This publication is copyright © NZ Transport Agency. Material in it may be reproduced for personal or in-house use without formal permission or charge, provided suitable acknowledgement is made to this publication and the NZ Transport Agency as the source. Requests and enquiries about the reproduction of material in this publication for any other purpose should be made to:

Manager, Information
NZ Transport Agency
PO Box 6995
Wellington 6141

CONTENTS

INTRODUCTION	1
AVIFAUNA	1
1. Habitat Context	2
1.1 Pauatahanui Inlet	2
1.2 Forest Remnants	2
1.3 Seral Forests and Native Shrublands	9
2. Methods and Search/Sampling Effort	9
2.1 Desktop	9
2.2 Site Selection	9
2.3 Point Counts	10
2.4 Additional Non-Standardised Observations	14
3. Survey Constraints	15
4. Results	15
4.1 Desktop Analysis	15
4.2 Field Study	16
5. Discussion	25
5.1 Species Associated with the Main Alignment	25
5.2 Habitats Associated with the Main Alignment	26
5.3 Pauatahanui Inlet	26
6. Conclusions	27
7. Recommendations	27
BATS	28
8. Methods and Search/Sampling Effort	28
9. Survey Constraints	29
10. Results	31
11. Discussion	31
12. Conclusions & Recommendations	31
ACKNOWLEDGEMENTS	31
REFERENCES	32

LIST OF APPENDICES

Appendix 8.A: Significant Ecological Areas	34
Appendix 8.B: Structure and Qualifiers of the NZ Threat Classification (Townsend <i>et al.</i> 2008)	37
Appendix 8.C: Habitat types occurring along the Transmission Gully Project	38
Appendix 8.D: Summary of species recorded in (1) the OSNZ atlas (1999-2004) within five 10 km x 10 km grid squares that encompass the Transmission Gully Project and surrounding area; (2) during the BML survey, and (3) at Pauatahanui Inlet (Todd <i>et al.</i> unpubl.). (Darker green cells indicate primary habitat)	42

LIST OF FIGURES

Figure 8-1: Current Vegetation (Landcover)	3
Figure 8-2 a-e: Significant Ecological Areas.....	4
Figure 8-3: Te Puka / Horokiri (TP) avifauna survey sites.....	11
Figure 8-4: Ration (R) avifauna survey sites.....	12
Figure 8-5: Porirua Park Bush (PPB) avifauna survey sites.....	13
Figure 8-6: Typical habitat used & conservation status of species recorded along the Main Alignment.....	17
Figure 8-7: Number of species and conservation status recorded during all point counts.	19
Figure 8-8: Proportion of species recorded during all point counts according to conservation status.	19
Figure 8-9: Proportion of birds recorded during all point counts according to conservation status.....	19
Figure 8-10: Mean number of species recorded per count at each of the three survey areas during 2010 point counts.....	24
Figure 8-11: Mean bird abundance recorded per count at each of the three survey areas during 2010 point counts.....	24
Figure 8-12: Bat survey sites	30

LIST OF TABLES

Table 8-1: Location of avifauna survey areas and habitat types present.	10
Table 8-2: Summary of point count stations and effort within three survey areas.....	14
Table 8-3: Avifauna species recorded in January, February and March 2010 along and adjacent to the Transmission Gully Main Alignment and the habitat types they are known to occur in. (Darker green cells indicate primary habitat).....	18
Table 8-4: Individual species abundance recorded during 218 point counts within the three survey areas. (Conservation Classification - Introduced, Native (Not Threatened), Threatened, At Risk)	20
Table 8-5: Individual species abundance recorded during 115 point counts within the Te Puka / Horokiri survey area (TP). (Conservation Classification - Introduced, Native (Not Threatened), Threatened, At Risk)	21
Table 8-6: Individual species abundance recorded during 55 point counts within the Ration Catchment survey area (R). (Conservation Classification - Introduced, Native (Not Threatened), Threatened, At Risk)	22
Table 8-7: Individual species abundance recorded during 48 point counts within the Porirua Park Bush survey area (PPB). (Conservation Classification - Introduced, Native (Not Threatened)).	23
Table 8-8: Summary of species diversity and bird abundance during the 2010 survey periods.....	23
Table 8-9: Primary habitat of species recorded in the OSNZ atlas (1999-2004) and by Boffa Miskell (Jan- March 2010).....	25

INTRODUCTION

This technical report is one of a series that report on ecological investigations being undertaken as part of the Transmission Gully Project (the “Project”), specifically in relation to NZTA 345PN Phase II Investigations, E&EA; work package WS-08 Ecological Assessment, Survey, Modelling, and Management. The purpose of Work Package 08 is to comprehensively map and describe the values of ecological systems that occur along this route, and to describe the distribution and abundance of native flora and fauna within or in close proximity to the Project footprint. From this work the potential environmental effects of both the construction and ongoing operation of the proposed Transmission Gully Project will be assessed in a subsequent report (i.e. the Ecological Impact Assessment (EIA) report; BML 2011a), and measures to mitigate potential or actual adverse effects be developed.

The Transmission Gully Main Alignment (the “Main Alignment”) is 27 km in length, running north between Wellington (Linden) and the Kapiti Coast (MacKays crossing). The Main Alignment traverses a wide range of habitats from improved pasture, plantation forestry, shrublands, and scrub to forest remnants (Figure 8-1). It ranges from sea level to 280m in altitude and crosses eight catchments, most of which discharge to Pauatahanui Inlet, a nationally significant estuary and wildlife refuge.

This report describes the results of the avifauna and bat field investigations undertaken along and adjacent to the Main Alignment from January – March 2010. These two taxonomic groups are dealt with separately in this report, with each having its own methods, results, discussion, and conclusion sections.

An assessment of potential adverse effects and a discussion of mitigation measures will be reported in a separate Ecological Impact Report.

AVIFAUNA

In developing the methodology to investigate the avifauna associated with the Main Alignment and surrounding area, the following potential effects (both direct and indirect) were considered:

- Direct loss of habitat within the Main Alignment (including that used for breeding and feeding);
- Relocation of power pylons (single pole vs lattice);
- Impact on food resources within the Pauatahanui estuary as a result of project earthworks within the catchment area;
- Collision with road barriers, other roading structures and vehicles.

The results of the avifauna investigations presented here provide the baseline study which will inform the subsequent Environmental Impact Assessment for the Project. Consequently, the objectives of the avifauna survey were:

- To confirm the presence of native species of avifauna and, if present, their distribution in relation to habitat that will be affected by the Main Alignment.
- To determine the significance of habitats along the Main Alignment for indigenous avifauna, particularly Threatened and At Risk species.

While the presence of Threatened and/or At Risk animals is one of the factors taken into consideration when undertaking ecological assessments, it is important to note that all native animals other than those outlined in Schedules 1-5 of the Act are protected under the Wildlife Act (1953).

1. Habitat Context

Figure 8-1 provides an overview of the current vegetation cover occurring both along the Main Alignment, and within the surrounding catchments. As shown, the vast majority of the Main Alignment lies within a largely rural landscape; a habitat type which is generally not conducive to providing breeding habitat or feeding resources to most native avifauna species. Nevertheless, there are a number of ecologically important sites scattered within or in areas surrounding the Main Alignment; these are shown in Figure 8-2 (a-e) and a list of details of each site is provided in Appendix 8.A. These sites include those identified by Kapiti City and Porirua City Council surveys, as well as the areas of High, Medium and Low Ecological Value as identified by Boffa Miskell in the 2010 vegetation surveys (BML 2011b) along the Main Alignment.

1.1 Pauatahanui Inlet

One significant site is the Pauatahanui Inlet, located approximately 1 km to the north-west of the Main Alignment. The Wellington Conservation Management Strategy (CMS) (DOC 1996) identifies as being the largest relatively unmodified estuary in the southern North Island, and DOC manages four areas within the Inlet: Pauatahanui Inlet Wildlife Management Reserve, Horokiri Wildlife reserves, Duck Creek Scenic Reserve and Pauatahanui Wildlife Refuge. The Pauatahanui inlet is a regionally important wetland containing the only large area of saltmarsh and seagrass in the Wellington region (Rosier 1993). The inlet contains many habitats including intertidal sand flats, salt marsh, rushlands and manuka shrubland.

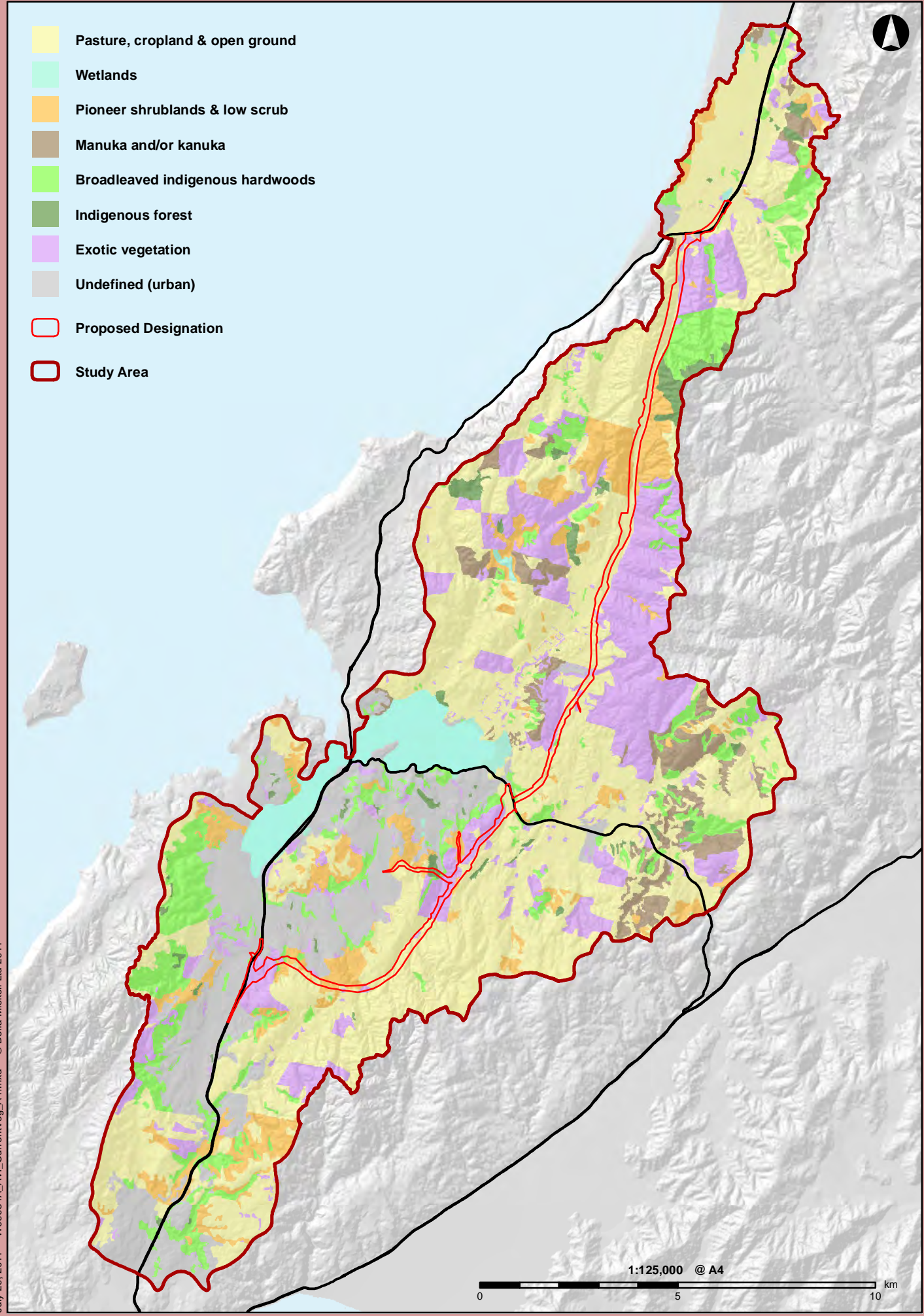
The inlet is a productive estuarine habitat and a site of national significance in the Sites of Special Wildlife Interest (SSWI) database, providing habitat for national and international migratory wading birds and indigenous waterfowl. The inlet itself is a dynamic natural system which is in a constant state of change. There are many processes that occur in the inlet and surrounding catchments that are necessary for the continued health of the ecosystem. These include daily tidal flows, fresh water and salt water mixing, storm events and natural sedimentation. Disruption of these processes will adversely affect the animals, plants and habitats which rely upon them. The key threats to the Pauatahanui Inlet identified in the CMS include siltation, eutrophication, pollution, road development, and depletion of fish stock (DOC 1996).

The PCC District Plan (PCC 1999) describes Duck Creek and the surrounding catchment within the Whitby Landscape Protection Area as having "high landscape and ecological values". The District Plan contains a range of objectives and policies that relate to the protection of ecosystems, rivers, indigenous vegetation, and landscape generally and Duck Creek specifically (Policy C9.1.5).

1.2 Forest Remnants

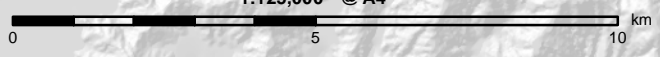
Irrespective of their size forest remnants are important for a wide range of reasons. They provide bird corridors and "steeping stones" linking larger forest areas; they often contain vegetation which typifies the area but may no longer occur as large forests; they provide a seed source for regeneration; contribute to the biodiversity of the area; they may contain rare or threatened species; and they contribute to the urban landscape.

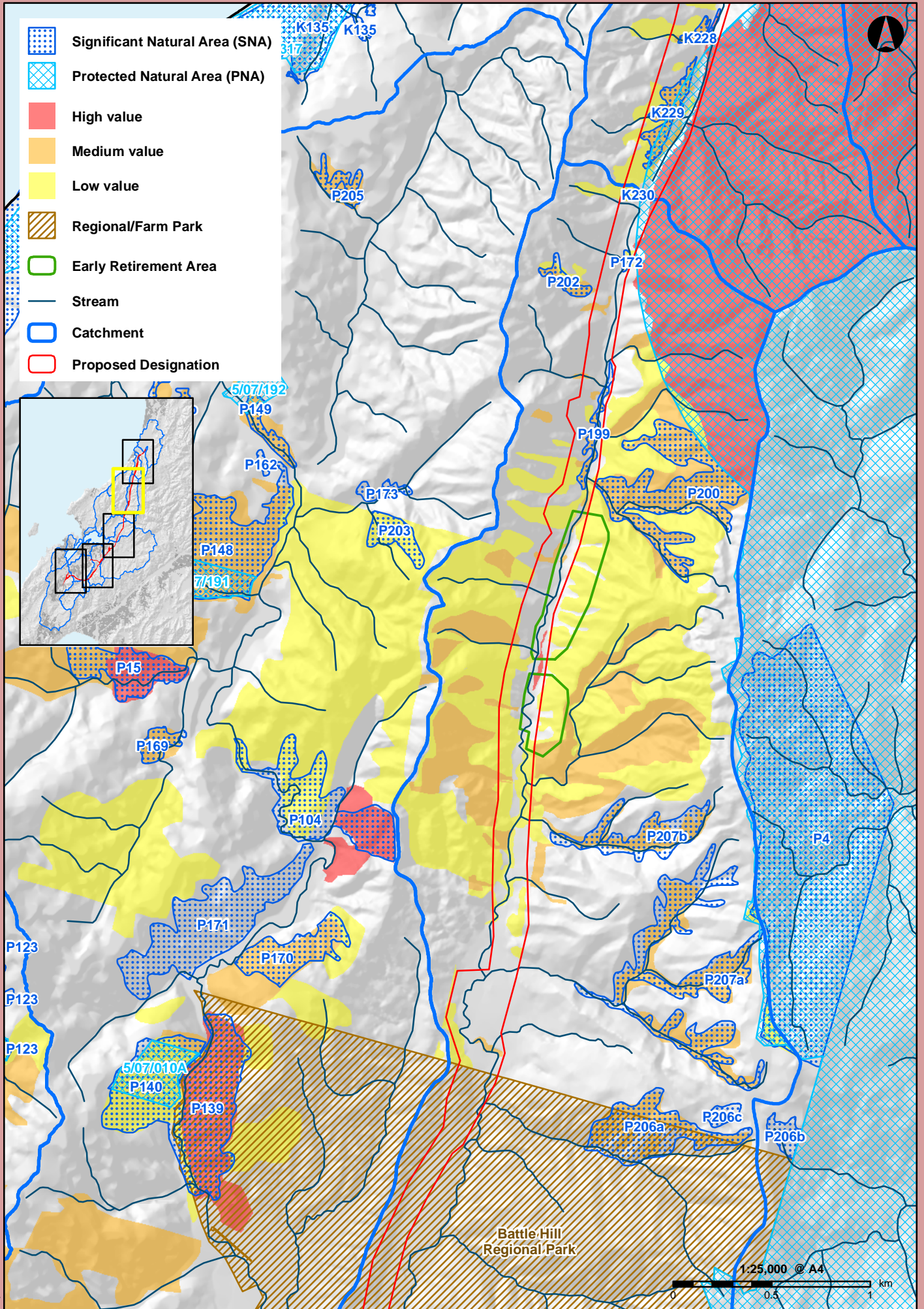
- Pasture, cropland & open ground
- Wetlands
- Pioneer shrublands & low scrub
- Manuka and/or kanuka
- Broadleaved indigenous hardwoods
- Indigenous forest
- Exotic vegetation
- Undefined (urban)
- Proposed Designation
- Study Area



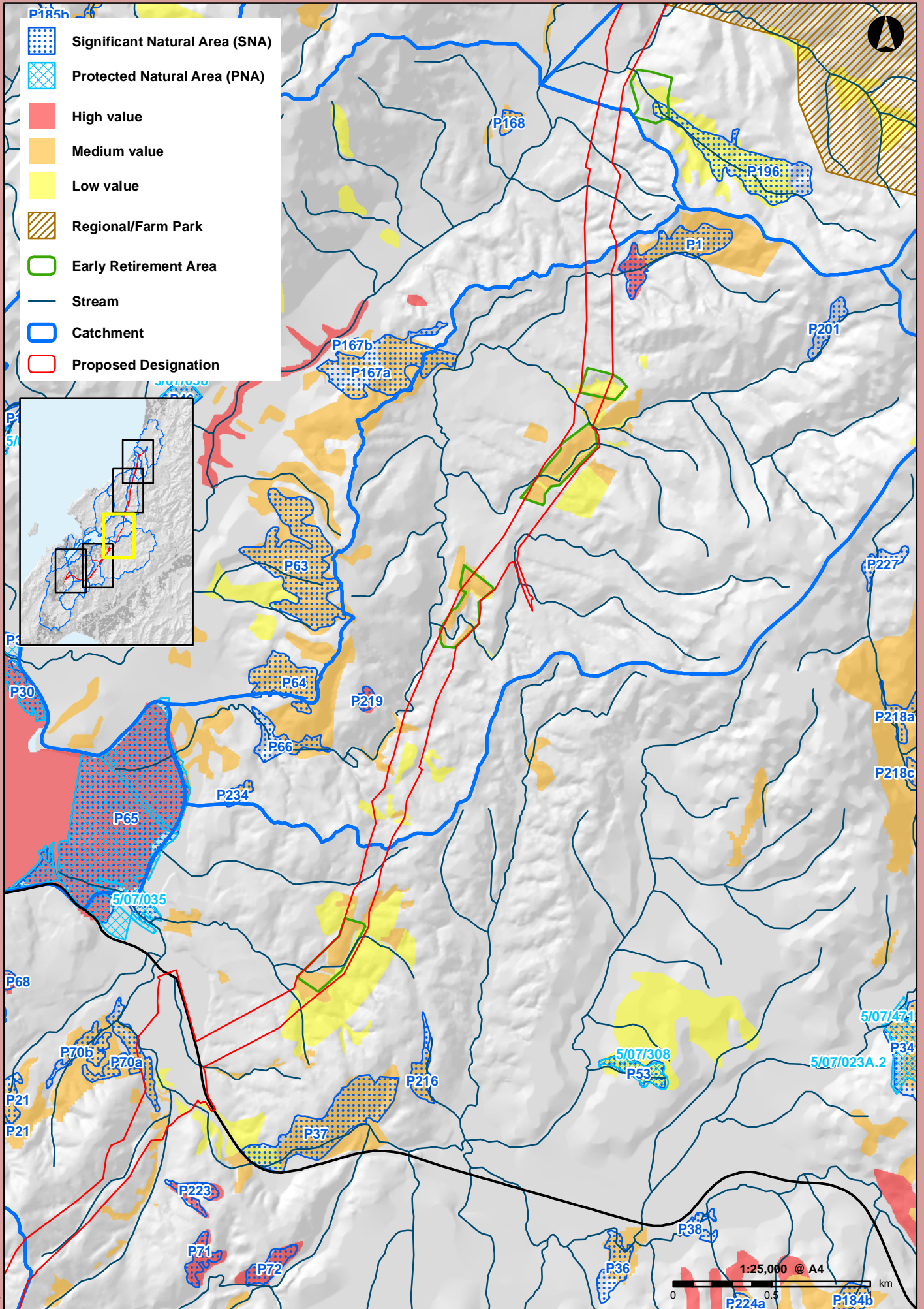
July 29, 2011 W09034A_AVI_CurrentVeg_A4.mxd © Boffa Miskell Ltd 2011

1:125,000 @ A4

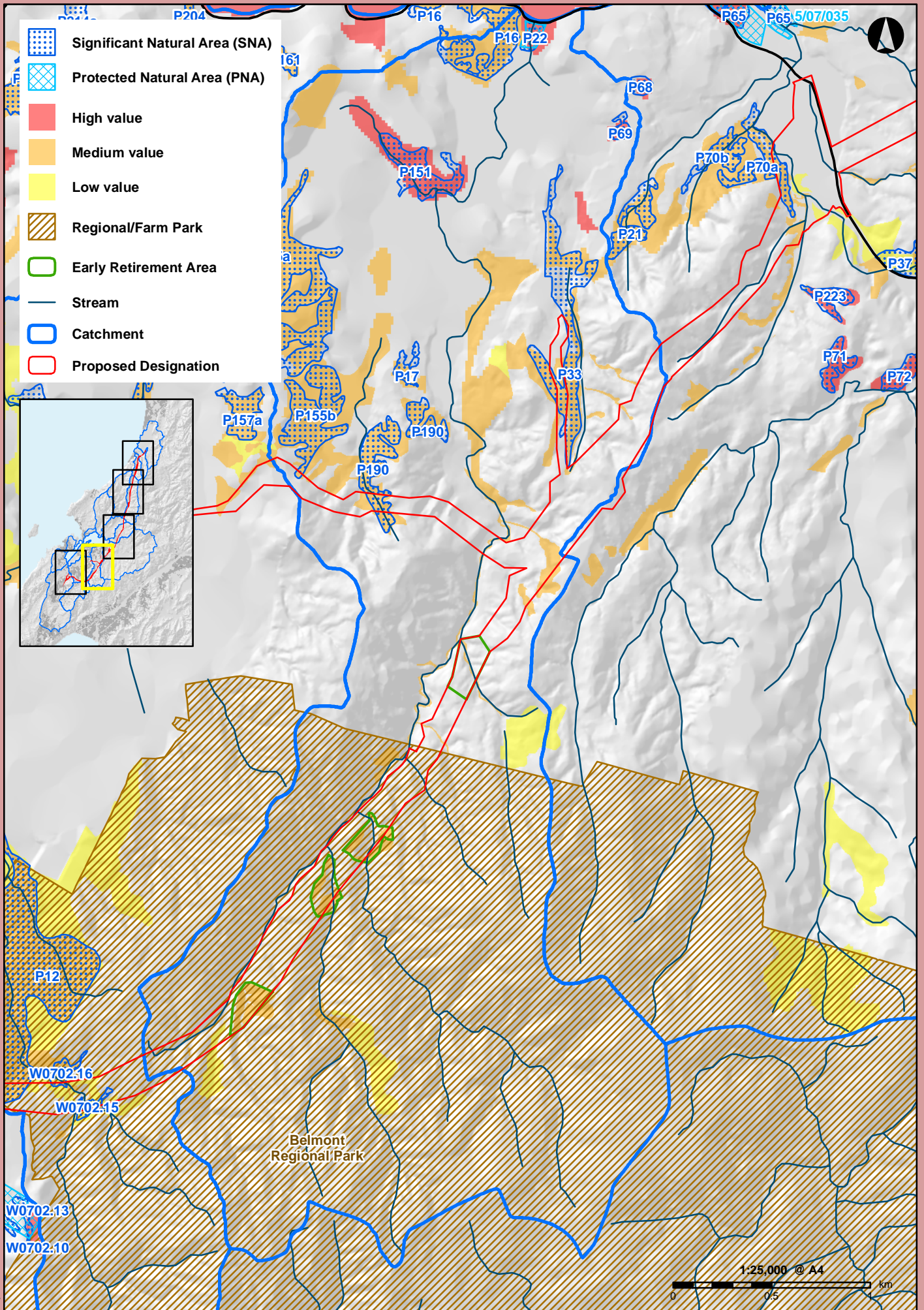




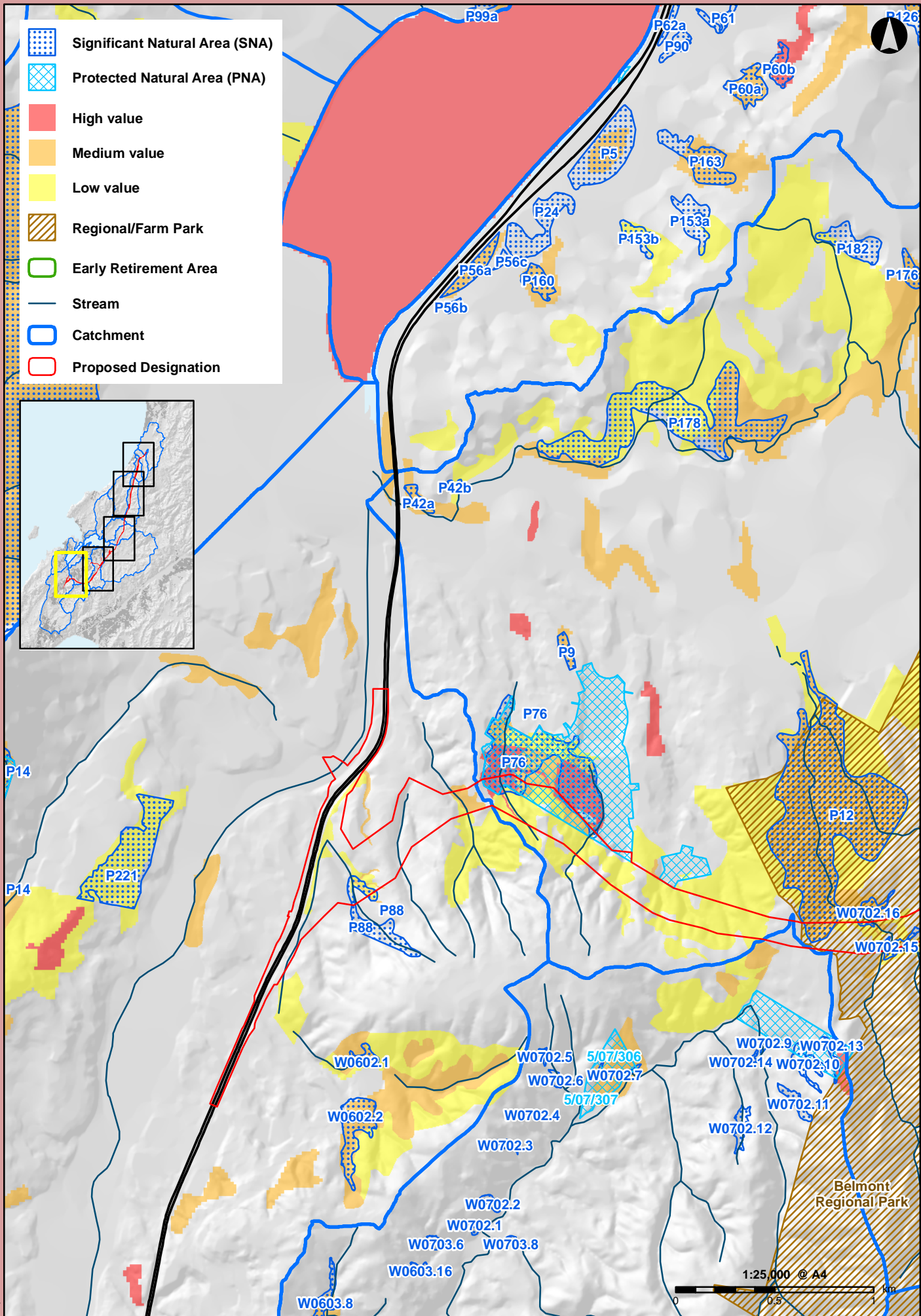
July 29, 2011 W09034A_AVI_ValuesSEAs_A4mb.mxd © Boffa Miskell Ltd 2011



July 29, 2011 W09034A_AVI_ValuesSEAs_A4mb.mxd © Boffa Miskell Ltd 2011



July 29, 2011 W09034A_AVI_ValuesSEAs_A4mb.mxd © Boffa Miskell Ltd 2011



July 29, 2011 W09034A_AVI_ValuesSEAs_A4mb.mxd © Boffa Miskell Ltd 2011

There are several forest remnants within the study area (see Figure 8-1), including the Akatarawa-Whakatikei block and other smaller remnants. They are predominantly lowland forests dominated by tawa and kohekohe with a range of other species that include hinau, matai, kahikatea, rewarewa, titoki.

1.3 Seral Forests and Native Shrublands

Regenerating native shrublands are found throughout the study area (see Figure 8-1). Successions in this area typically begin with gorse, manuka and kanuka at lower altitudes, and gorse-mahoe, or gorse-tauhinu-*Olearia solandri* at higher altitudes. These shrublands create a hospitable "nursery" allowing forest species that are less hardy to appear. Shrublands buffer forest remnants and provide important wildlife habitats for a range of birds and insects.

2. Methods and Search/Sampling Effort

A combination of desktop investigations and four field-based methods was used to assess the ecological value of avifauna communities and habitats within and adjacent to the Main Alignment. Details of the individual methodologies are provided below.

2.1 Desktop

Data from the recent Ornithological Society of New Zealand's atlas (Robertson *et al* 2007) were collated from the five 10 km x 10 km grid squares (266,600; 266,601; 267,600; 267,601; 267,602) that encompass the Main Alignment and surrounding area. The primary habitat for each of the species recorded within these five grid squares was then obtained from Heather & Robertson (2000), along with each species' New Zealand threat status according to Miskelly *et al.* (2008). Further explanation regarding the threat classification system (Townsend *et al.* 2008) is provided Appendix 8.B.

Further literature (published and unpublished) and websites searches were undertaken to obtain additional information regarding bird species occurring at Pauatahanui Inlet and Porirua Park Bush.

2.2 Site Selection

The avifauna was surveyed within three areas along and adjacent to the Main Alignment: (1) TP - Te Puka and Horokiri catchments (Figure 8-3); (2) R - Along Flighty's Road within the Ration catchment (Figure 8-4); and (3) PPB - Within and adjacent to Porirua Park Bush (Figure 8-5). These areas were chosen as they provide representative avifauna habitats occurring along the length of the alignment (Table 8-1). Representative photos of the different habitat types are provided in Appendix 8.C.

Table 8-1: Location of avifauna survey areas and habitat types present.




SURVEY AREA	GENERAL LOCATION	HABITAT PRESENT
TP	Te Puka & Horokiri	<ul style="list-style-type: none"> • Pasture • Regenerating shrubland • Scrub • Native forest remnants • Exotic plantation • Wetland, stream and riparian
R	Ration catchment	<ul style="list-style-type: none"> • Pasture • Regenerating shrubland • Rural/residential gardens • Exotic plantation forest
PPB	Porirua Park Bush	<ul style="list-style-type: none"> • Pasture • Native forest remnants • Regenerating shrubland • Mahoe / gorse scrub • Exotic plantation forest • Residential gardens

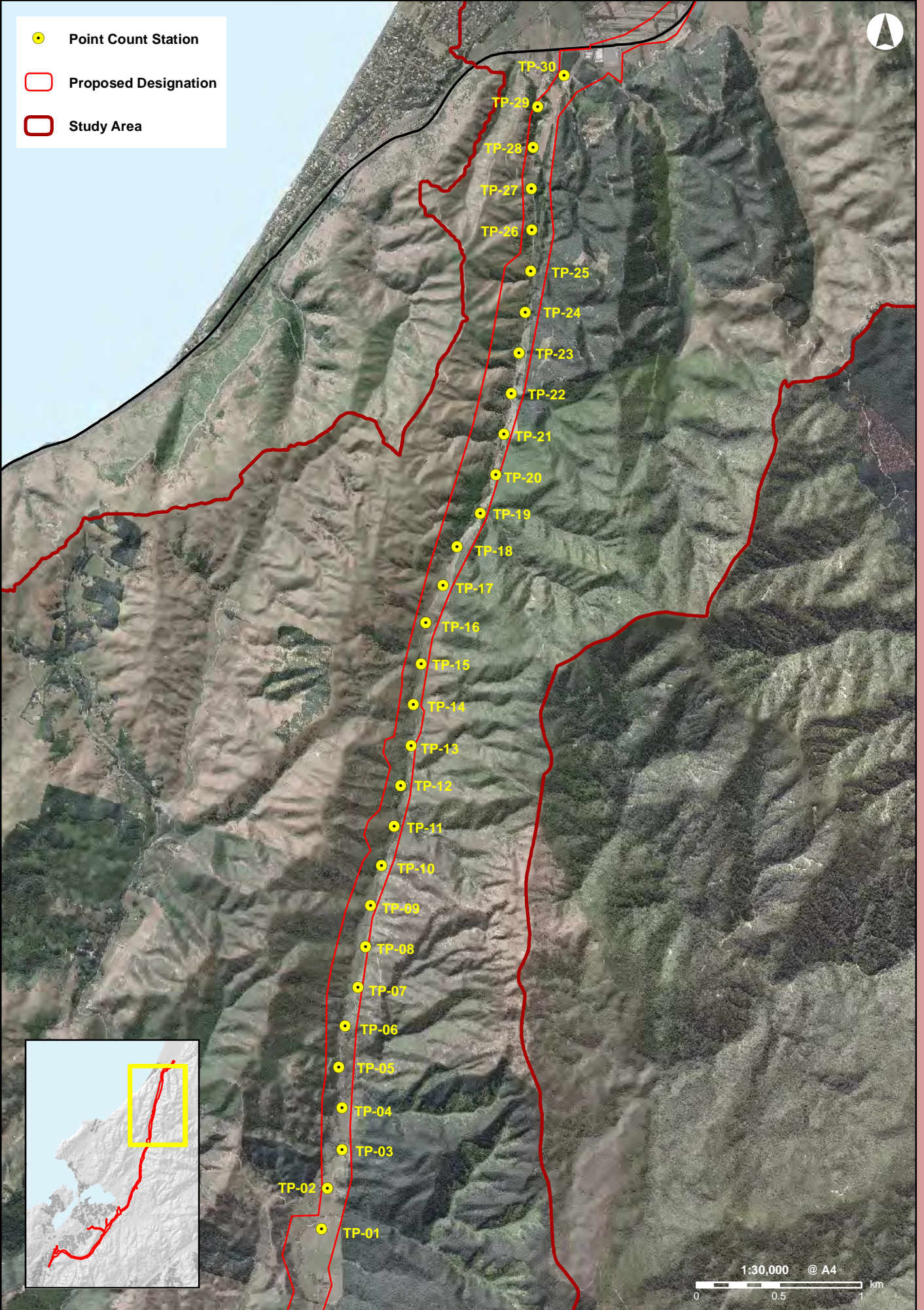
2.3 Point Counts

Five-minute point counts, whereby all avifauna species seen and heard during the count period were recorded (Dawson & Bull 1975), were undertaken within each of the three survey areas (TP, R and PPB; See Figure 8-3, Figure 8-4 and Figure 8-5 respectively). Each area was surveyed in summer (January/February) and autumn (March). For all but one survey session, counts were replicated by visiting the areas on two consecutive days; unsuitable weather conditions during the March Ration survey meant that counts were two days apart (16 & 18 March) rather than consecutive. Over the course of the two days of surveying within each area, the order of point count stations was reversed, thus undertaking a count at each station at a different time of the day.

Overall, each of the three areas (TP, R and PPB) was surveyed on four occasions: two days in January (TP and PPB), two days in February (R) and another two days in March (TP, R and PPB). A summary of the point count effort along the Main Alignment and weather conditions during the survey periods are provided in Table 8-2. A total of 44.5 hours were spent surveying the avifauna within the three areas, comprising 24.75 hours in Te Puka / Horokiri (TP), 12 hours in Ration (R) and 7.75 hours in the Porirua Park Bush (PPB). In all 218 point count surveys were undertaken.



-  Point Count Station
-  Proposed Designation
-  Study Area



July 29, 2011 W09034A_AVI_SurveyTP_A4.mxd © Boffa Miskell Ltd 2011

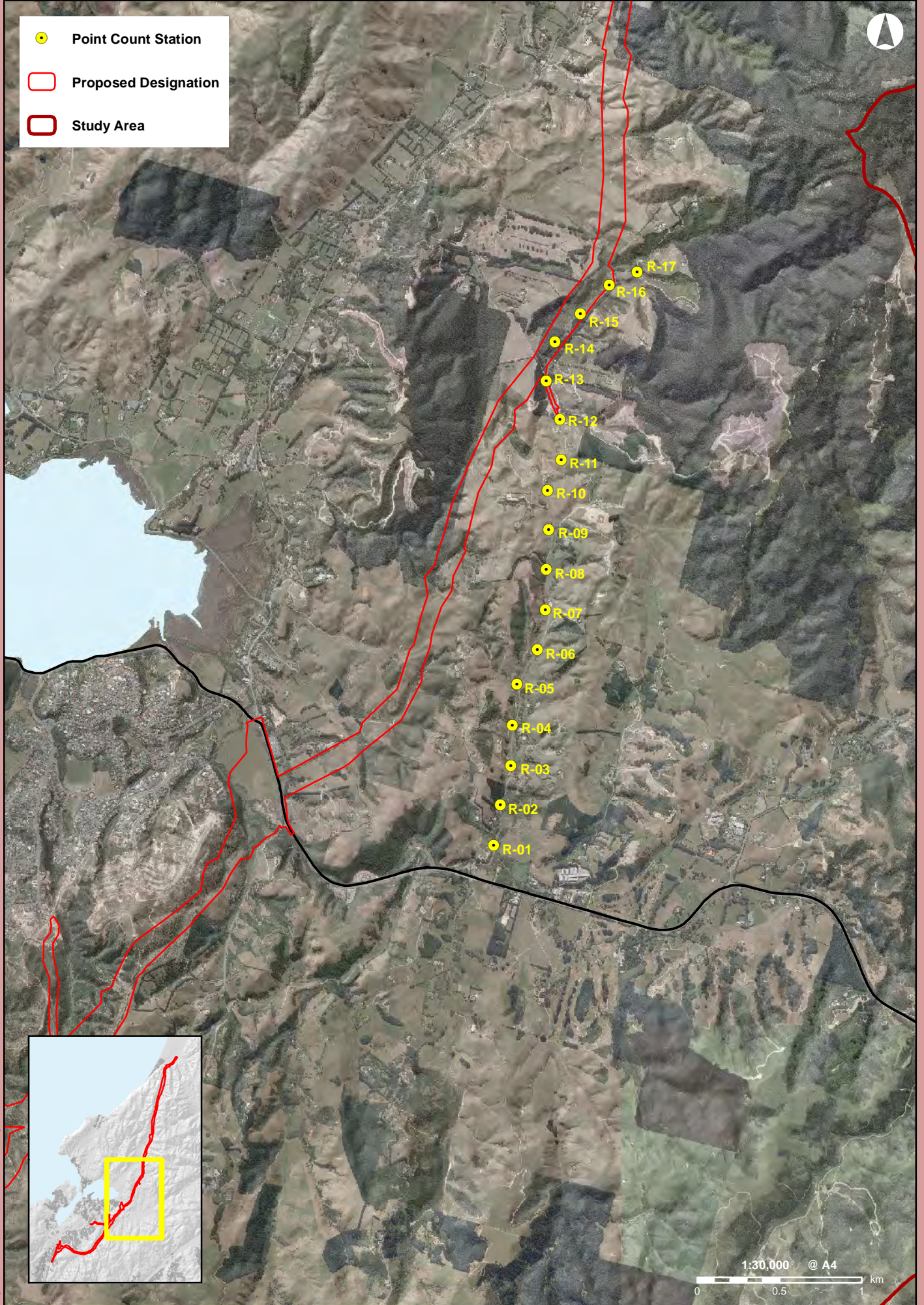
1:30,000 @ A4
0 0.5 1 km



TRANSMISSION GULLY TE PUKA/HOROKIRI (TP) AVIFAUNA SURVEY



- Point Count Station
- Proposed Designation
- Study Area

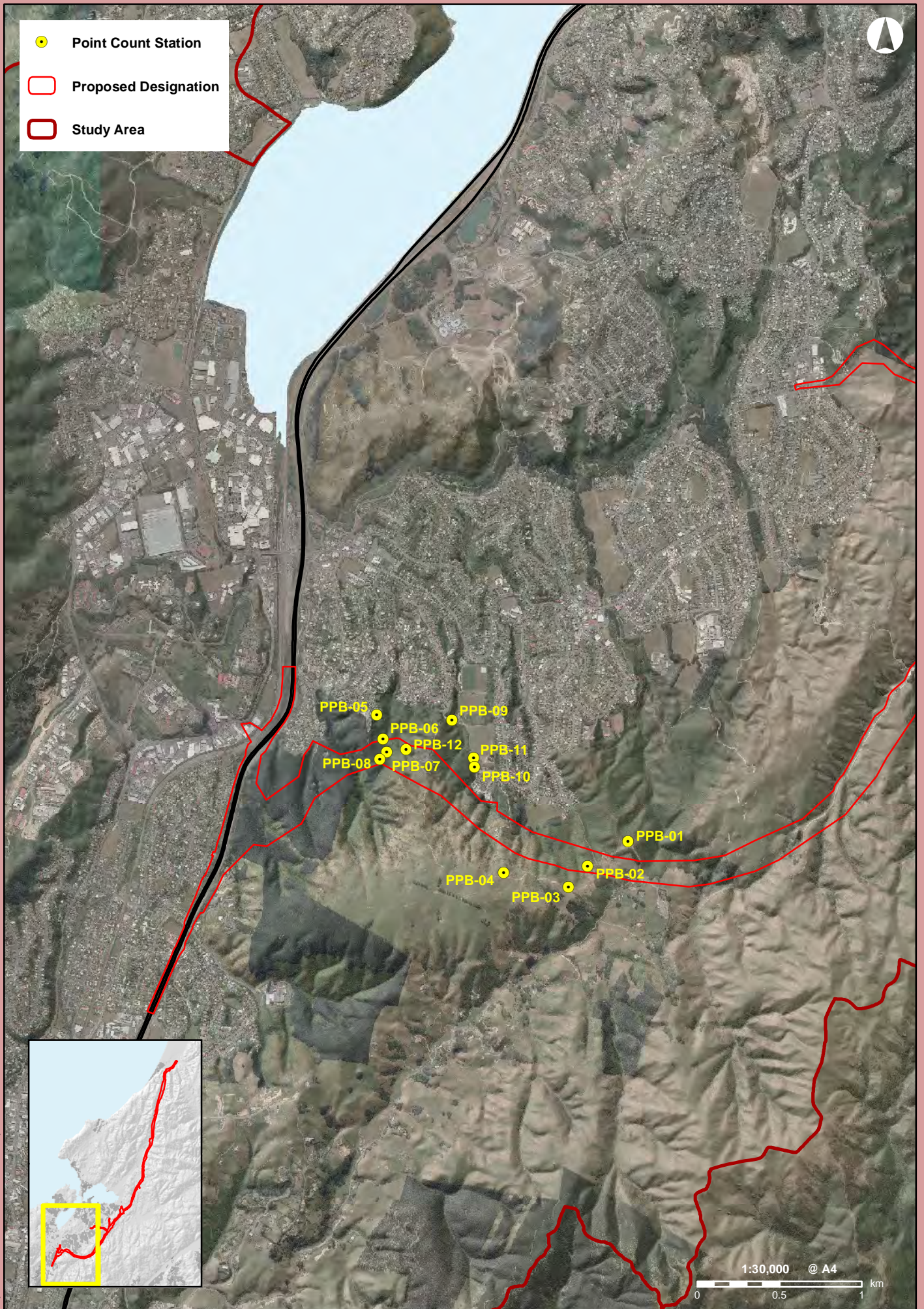


July 29, 2011 W09034A_AVI_SurveyR_A4.mxd © Boffa Miskell Ltd 2011

1:30,000 @ A4
0 0.5 1 km



- Point Count Station
- Proposed Designation
- Study Area



July 29, 2011 W09034A_AVI_Survey/PPB_A4.mxd © Boffa Miskell Ltd 2011

1:30,000 @ A4
0 0.5 1 km

Table 8-2: Summary of point count stations and effort within three survey areas.

DATE	SURVEY AREA	COUNT STATIONS	No. COUNTS	SURVEY TIME (Total hours)	WEATHER CONDITIONS
25/01/10	TP	TP_01 – TP_30	30	12:00-18:35 (6.5 hours)	Warm (16-22°C), light breeze.
26/01/10	TP	TP_30 – TP_01	30	10:13-16:43 (6.5 hours)	Warm-hot (>22°C), calm.
27/01/10	PPB	PPB_01 – PPB_12	12	10:53-11:45, 12:19-13:00, 13:24-14:03 (2.25 hours)	Warm-hot, calm.
28/01/10	PPB	PPB_12 – PPB_01	12	06:20-07:00, 07:34-08:14, 08:29-09:09 (2.25 hours)	Mild (11-15°C), light breeze.
22/02/10	R	R_01 – R_12	12	07:05-09:37 (2.5 hours)	Mild, light-moderate breeze.
23/02/10	R	R_12 – R_01	12	07:11-09:35 (2.5 hours)	Mild, light-moderate breeze.
9/03/10	TP	TP_03 – TP_30	28	07:56-14:15 (6.25 hours)	Mild-warm, calm.
10/03/10	TP	TP_30 – TP_04	27	07:20-12:55 (5.5 hours)	Mild-warm, calm.
11/03/10	PPB	PPB_01 – PPB_12	12	07:40-08:21, 08:47-09:23, 09:39-10:17 (1.5 hours)	Mild, moderate breeze.
12/03/10	PPB	PPB_12 – PPB_01	12	07:15-07:53, 08:15-08:52, 09:39-10:19 (1.75 hours)	Mild, light breeze.
16/03/10	R	R_01 – R_15	15	07:40-11:09 (3.5 hours)	Mild, light-moderate breeze.
18/03/10	R	R_16 – R_01	16	07:41-11:21 (3.5 hours)	Cool-mild, calm-light breeze.

2.4 Additional Non-Standardised Observations

2.4.1 Incidental Observations

In addition to the above mentioned counts, all incidental observations were recorded while walking between the point count stations. Such records consisted of any significant observations made outside of the formally defined methods of data collection and included observation of birds within or adjacent to the site, as well as unusually large numbers of a common or exotic bird species, or any unusual and noteworthy behaviour. Similar such notes were taken by other Boffa Miskell ecologists undertaking other ecological surveys along and adjacent to the Main Alignment at the same time as the avifauna surveys.

2.4.2 Nocturnal Observations

All birds heard vocalising at night while undertaking the bat surveys (see Section 8) were recorded. The nocturnal bat surveys were conducted on 25 January (21:10-22:15; full dark recorded at 21:51) along the forest margin and farmland on the Wainui Saddle, and on 26 January (21:00-22:10; full dark recorded at 21:30) along the forest margin and the access road adjacent to the Te Puka Stream.

3. Survey Constraints

Though a widely used and well-recognised method for surveying avifauna, one of the limitations of the 5-minute bird count method is that there is the potential to not detect species that may be present. This issue has attempted to be minimised in the present study by the recording of incidental observations outside of the standardised survey period, and by the replication of counts at each point count site over multiple days and in different months.

Difficulties were encountered obtaining landowner permission to access to the Te Puka / Horokiri section of the route, limiting the time (a total of two weeks) that could be spent there. Consequently, the avifauna surveys were confined to late summer and early autumn, thus missing the potential to detect any seasonal variability in the species present or their abundance. For instance, shining cuckoo overwinter in the Bismarck Archipelago and Solomon Islands, returning to New Zealand to breed in late September (Heather & Robertson 2000). These sorts of movements (and therefore species presence) would have been missed by the survey periods.

While the coastal hilltops adjacent to the northern section of the Main Alignment may potentially provide habitat for petrels, this area was not surveyed because this habitat will not be directly nor indirectly impacted upon by the Project.

4. Results

4.1 Desktop Analysis

According to the OSNZ atlas data (Robertson *et al.* 2007), a total of 77 bird species (57 native and 20 introduced species) were recorded over the period 1999-2004 within five 10 km x 10 km grid squares that encompass the Main Alignment and surrounding area (see Appendix 8.D for full list). The native avifauna comprised two international migrants, one vagrant, one coloniser, 26 Not Threatened, 15 At Risk and 12 Threatened species (Miskelly *et al.* 2008).

It should be noted that the coarse scale at which this data was collected (i.e. based on 10 x 10 km squares) means that it incorporates some sites and habitats away from the Project. For example, the presence of Mana Island within a grid square that overlaps part of the Project has resulted in species such as little spotted kiwi, brown teal and takahe being included in the species list. Such species have been translocated to Mana Island as part of the island restoration programme, and would never occur naturally along the Main Alignment. In addition, the inclusion of wader and shorebird species such as eastern bar-tailed godwit, pectoral sandpiper, oystercatchers and dotterels are indicative of freshwater, estuarine and coastal habitats which are largely absent from the Main Alignment.

Thus, the species list obtained from the OSNZ atlas should be viewed in the context of which the data was collected: over a five year period (1999-2004) and from an area of 500 km² encompassing a number of sites and habitats that are not represented along the Main Alignment. Consequently, this list contains a number of species that were not expected to be recorded as part of the Project avifauna surveys undertaken in 2010.

4.1.1 Porirua Park Bush

PCC (1992) provides a list of bird species that have been observed in Porirua Park Bush, but no formal detailed study was undertaken. The exotic species recorded there were black bird, starling, skylark, hedge sparrow, house sparrow, song thrush, yellow hammer, chaffinch, gold finch and magpie. Observed native species were grey warbler, fantail, welcome swallow, silvereye, black-backed gull, red-billed gull, paradise shelduck and Australasian harrier. It should be noted that all of these species (both exotic and native) were recorded in OSNZ database.

4.1.2 Pauatahanui Inlet

According to the local community group Guardians of Pauatahanui Inlet (GOPI), 50 bird species are known to occur in the Pauatahanui Inlet and its immediate terrestrial margin (GOPI 2010). Twenty-nine of these are associated directly with the inlet waters, fringing marshes and streams; of which 14 are regarded as 'resident' species. The remaining 21 of the 50 species are associated with the inlet's terrestrial margin, and 12 of these species are considered to be 'resident' (GOPI 2010). The following species are listed by GOPI as the most commonly seen birds in the inlet and its marshes: black-backed gull, red-billed gull, mallard, paradise shelduck, black swan, royal spoonbill, pied stilt, spur-winged plover, oystercatcher, little shag, black shag, white-faced heron and pukeko. Of these species, one is classified as Threatened and four At Risk (see Appendix 8.D for details regarding the individual conservation status).

Todd *et al.* (unpubl.) list 29 avian species occurring within the Pauatahanui Inlet, but provide no information regarding the survey effort associated with this work. The species listed by Todd *et al.* (unpubl.) are provided in Appendix 8.D of this report.

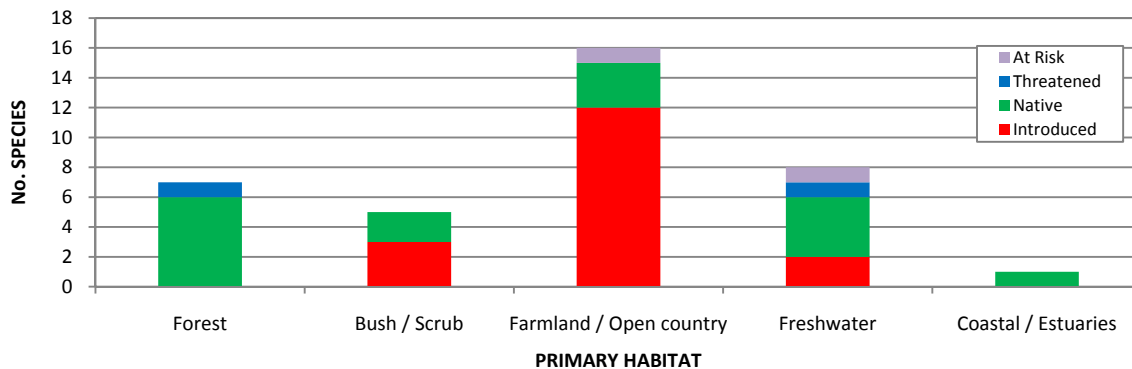
4.2 Field Study

4.2.1 All Observations – Standardised & Non-standardised

A list of all avifauna species recorded along and adjacent to the Main Alignment during the point counts, incidental and nocturnal observations is provided in Figure 8-6. Information regarding species' conservation status and habitats used is also provided. Overall, a total of 37 species were recorded along the Main Alignment by way of the three survey methods; comprising 17 introduced (exotic), 20 native but Not Threatened species, two Threatened and two At Risk species (Table 8-3).

In terms of habitat use, the primary habitats of species recorded along the Main Alignment are represented visually in Figure 8-6. It should be noted that this interpretation of primary habitat has been provided in order to present the data in a meaningful way, but does not suggest that these species confine their use to a single habitat type. Information regarding the variety of habitats used by each of the species is provided in Table 8-3. In this report, primary habitat refers to the habitat in which a species spends most of its time. Along the Main Alignment, the primary habitat of the majority of species that were recorded is farmland and open country (Figure 8-6). Furthermore, the majority of species for which this is primary habitat are introduced species. In comparison, while the forest provides primary habitat for fewer species, all of those species are native and include the threatened bush falcon (Figure 8-6). The freshwater habitat is utilised by introduced, native, Threatened and At Risk species.

Figure 8-6: Typical habitat used & conservation status of species recorded along the Main Alignment



4.2.2 Point Counts – Standardised Survey

A total of 3780 birds, comprising 33 species, were recorded during the 218 point count surveys undertaken along and adjacent to the Main Alignment (see Table 8-4). Sixteen of the 33 species are introduced (exotic) and 17 are native (including endemic species). Of the native species, 14 are classified as Not Threatened, two as Threatened (bush falcon and pied shag) and one as At Risk (New Zealand pipit) (Miskelly *et al.* 2008). With regard to the three point count survey areas sampled in 2010, a total of 30 species were recorded each in TP and R, while only 21 species were recorded in PPB (Figure 8-7). The proportion of introduced and native species recorded at the three survey sites (TP, R and PPB) was similar, approximately 50% of each (see Figure 8-8), however the overall abundance of introduced birds was consistently higher (Figure 8-9 and Table 8-4). While Threatened and At Risk species made up 6.1% and 3.0% of the species recorded in all of the point counts (Figure 8-8), the individual abundance of these birds were in such low numbers that they comprised only 0.8% and 0.16% respectively of all the birds recorded during the point counts. PPB was the only area where no Threatened and At Risk species were recorded (Figure 8-8).

Table 8-4 shows the total number of birds recorded (heard or seen) over the course of 218 point counts along the alignment within the three survey areas (TP, R and PPB), sorted from the most to least abundant. Of the 33 species recorded, five species (goldfinch, starling, silver-eye, chaffinch and magpie) contributed 50% of all observations, and 15 species contributed 90% of all observations. The most abundant native species recorded in the point counts was the silver-eye, contributing 9.1% of all observations. Threatened and At Risk species contributed only 0.24% of all point count records (Table 8-4 and Figure 8-9).

Goldfinch was the most abundant species recorded (heard or seen) during the 115 point counts undertaken within the TP survey area (Table 8-5). In total, 30 species were recorded here, with four species (goldfinch, silver-eye, chaffinch and yellowhammer) comprising 50% of all records. Within the TP area, silver-eye was the most abundant native species (13.2%) as well as the second most abundant species recorded overall (Table 8-5).

TRANSMISSION GULLY PROJECT
Technical Report #8: Avifauna & Bats

Table 8-3: Avifauna species recorded in January, February and March 2010 along and adjacent to the Transmission Gully Main Alignment and the habitat types they are known to occur in. (Darker green cells indicate primary habitat).

SPECIES		CONSERVATION STATUS		Native forest	Exotic Forest	Scrub \ Shrubland	Farmland \ Open country	Freshwater \ Wetland	Coastal \ Estuary	Urban \ Residential	POINT COUNTS	NON-STANDARDISED OBS
Bush falcon	<i>Falco novaeseelandiae</i> "bush"	Endemic	Nationally Vulnerable ^{DP St}	Dark Green	Light Green						✓	
Bellbird	<i>Anthornis m. melanura</i>	Endemic	Not Threatened	Dark Green							✓	
Kereru	<i>Hemiphaga novaeseelandiae</i>	Endemic	Not Threatened ^{CD Inc}	Dark Green							✓	
Pied tomtit	<i>Petroica macrocephala toitoi</i>	Endemic	Not Threatened	Dark Green	Light Green							✓
Tui	<i>Prothemadera n. novaeseelandiae</i>	Endemic	Not Threatened St	Dark Green							✓	
Fantail	<i>Rhipidura fuliginosa placabilis</i>	Endemic	Not Threatened	Dark Green							✓	
Morepork	<i>Ninox n. novaeseelandiae</i>	Native	Not Threatened				Light Green					✓
Grey warbler	<i>Gerygone igata</i>	Endemic	Not Threatened	Light Green		Dark Green					✓	
Silver-eye	<i>Zosterops l. lateralis</i>	Native	Not Threatened ^{SO}	Light Green		Dark Green					✓	
Californian quail	<i>Callipepla californica</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green	Light Green				✓	
Eastern rosella	<i>Platycercus eximius</i>	Introduced	Introduced & Naturalised ^{SO}	Light Green		Dark Green					✓	
Blackbird	<i>Turdus merula</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green					✓	
NZ Pipit	<i>Anthus n. novaeseelandiae</i>	Endemic	Declining			Dark Green		Light Green			✓	
Swamp harrier	<i>Circus approximans</i>	Native	Not Threatened ^{SO}			Dark Green					✓	
Welcome swallow	<i>Hirundo tahitica neoxena</i>	Native	Not Threatened ^{Inc SO}			Dark Green		Light Green			✓	
Spur-winged plover	<i>Vanellus miles novaehollandiae</i>	Naturalised	Not Threatened ^{SO}			Dark Green		Light Green			✓	
Skylark	<i>Alauda arvensis</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green					✓	
Gold finch	<i>Carduelis carduelis</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green			Light Green		✓	
Green finch	<i>Carduelis chloris</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green					✓	
Redpoll	<i>Carduelis flammea</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green					✓	
Rook	<i>Corvus frugilegus</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green						✓
Yellow hammer	<i>Emberiza citrinella</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green					✓	
Chaffinch	<i>Fringilla coelebs</i>	Introduced	Introduced & Naturalised ^{SO}	Light Green		Dark Green					✓	
Magpie	<i>Gymnorhina tibicen</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green					✓	
House sparrow	<i>Passer domesticus</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green					✓	
Dunnock	<i>Prunella modularis</i>	Introduced	Introduced & Naturalised ^{SO}	Light Green		Dark Green					✓	
Starling	<i>Sturnus vulgaris</i>	Introduced	Introduced & Naturalised ^{SO}	Light Green		Dark Green					✓	
Song thrush	<i>Turdus philomelos</i>	Introduced	Introduced & Naturalised ^{SO}	Light Green		Dark Green					✓	
Pied shag	<i>Phalacrocorax varius varius</i>	Native	Nationally Vulnerable					Dark Green	Light Green		✓	
Black shag	<i>Phalacrocorax carbo novaehollandiae</i>	Native	Naturally Uncommon ^{SO Sp}					Dark Green	Light Green			✓
Paradise shelduck	<i>Tadorna variegata</i>	Endemic	Not Threatened					Dark Green			✓	
White-faced heron	<i>Ardea novaehollandiae</i>	Native	Not Threatened ^{SO}					Dark Green	Light Green		✓	
Pukeko	<i>Porphyrio melanotus</i>	Native	Not Threatened ^{Inc SO}					Dark Green			✓	
Kingfisher	<i>Todiramphus sanctus vagans</i>	Native	Not Threatened			Light Green					✓	
Mallard	<i>Anas platyrhynchos</i>	Introduced	Introduced & Naturalised ^{SO}					Dark Green			✓	
Feral goose	<i>Anser anser</i>	Introduced	Introduced & Naturalised ^{SO}					Dark Green			✓	
Black-backed gull	<i>Larus d. dominicanus</i>	Native	Not Threatened ^{SO}					Dark Green			✓	

Figure 8-7: Number of species and conservation status recorded during all point counts.

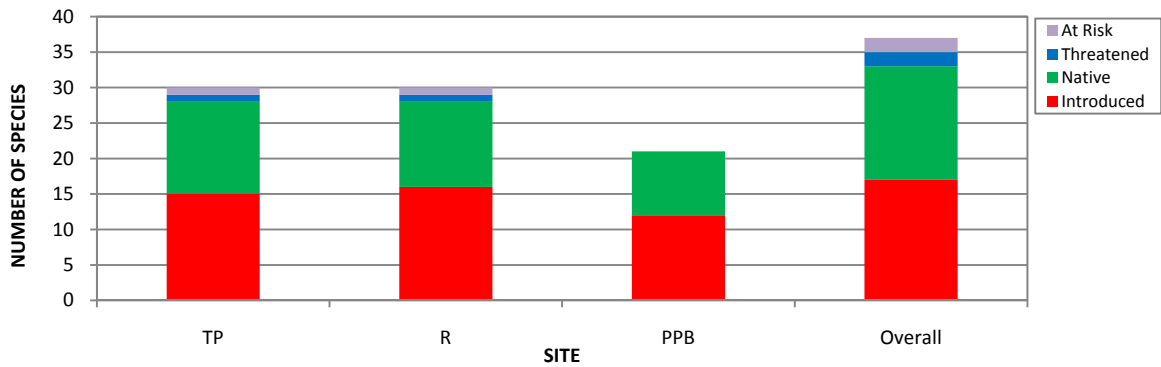


Figure 8-8: Proportion of species recorded during all point counts according to conservation status.

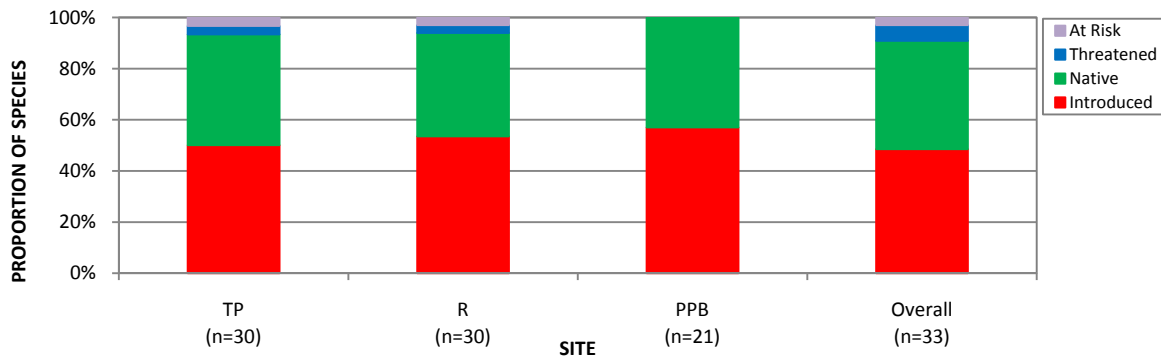
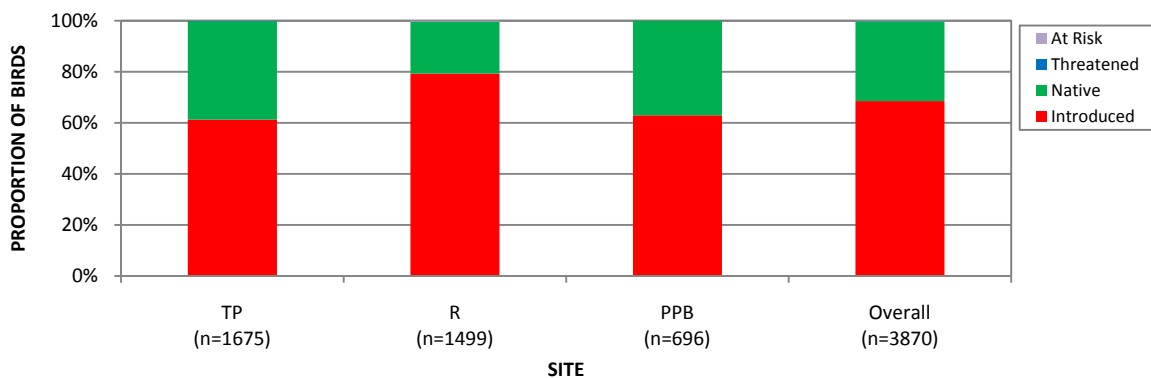


Figure 8-9: Proportion of birds recorded during all point counts according to conservation status.



Threatened and At Risk species comprised 0.2% of all point count records at TP (see Table 8-5). It should be noted that both records of the bush falcon were from the same day (25/1/10), with one bird being seen flying over TP_11 and one bird heard later at TP_22. It is not known if this was the same bird seen on both occasions. With regards to the single New Zealand pipit record, this bird was seen on 10/3/10 at TP_12.

TRANSMISSION GULLY PROJECT
 Technical Report #8: Avifauna & Bats

Table 8-4: Individual species abundance recorded during 218 point counts within the three survey areas.
 (Conservation Classification - **Introduced**, **Native (Not Threatened)**, **Threatened**, **At Risk**)

SPECIES	ALL OBS.	%	50%	75%	90%	95%
Goldfinch	703	18.17%				
Starling	466	12.04%				
Silver-eye	352	9.10%				
Chaffinch	329	8.50%				
Magpie	239	6.18%				
Yellowhammer	219	5.66%				
Grey warbler	214	5.53%				
Green finch	166	4.29%				
Redpoll	131	3.39%				
Blackbird	127	3.28%				
Spur-winged plover	124	3.20%				
House sparrow	119	3.07%				
Black-backed gull	117	3.02%				
Fantail	116	3.00%				
Eastern rosella	79	2.04%				
Tui	71	1.83%				
Swamp harrier	67	1.73%				
Pukeko	61	1.58%				
Kereru	32	0.83%				
Mallard	26	0.67%				
Paradise shelduck	21	0.54%				
Song thrush	20	0.52%				
Welcome swallow	20	0.52%				
Skylark	13	0.34%				
Hedge sparrow	11	0.28%				
Kingfisher	7	0.18%				
Pipit	6	0.16%				
Californian quail	4	0.10%				
White-faced heron	4	0.10%				
Bellbird	2	0.05%				
NZ falcon	2	0.05%				
Feral goose	1	0.03%				
Pied shag	1	0.03%				
TOTAL	3870	100%				

Table 8-5: Individual species abundance recorded during 115 point counts within the Te Puka / Horokiri survey area (TP). (Conservation Classification - **Introduced**, **Native (Not Threatened)**, **Threatened**, **At Risk**)

SPECIES	ALL OBS.	%	50%	75%	90%	95%
Goldfinch	342	20.4%				
Silver-eye	221	13.2%				
Chaffinch	169	10.1%				
Yellowhammer	158	9.4%				
Grey warbler	128	7.6%				
Magpie	80	4.8%				
Greenfinch	66	3.9%				
Fantail	63	3.8%				
Eastern rosella	59	3.5%				
Black-backed gull	57	3.4%				
Redpoll	53	3.2%				
Spur-winged plover	41	2.4%				
Swamp harrier	38	2.3%				
Starling	37	2.2%				
Tui	35	2.1%				
Blackbird	33	2.0%				
Kereru	24	1.4%				
Paradise shelduck	14	0.8%				
Skylark	11	0.7%				
Pukeko	11	0.7%				
Kingfisher	7	0.4%				
Welcome swallow	5	0.3%				
Mallard	5	0.3%				
Dunnock	4	0.2%				
Song thrush	4	0.2%				
House sparrow	3	0.2%				
Bellbird	2	0.1%				
Bush falcon	2	0.1%				
Californian quail	2	0.1%				
Pipit	1	0.1%				
TOTAL	1675	100%				

Goldfinch and starling were the most equally abundant species recorded (seen or heard) during the 55 point counts within the Ration survey area (Table 8-6). Four introduced species comprised 50% of the observations, with 13 species comprising 90% of the observations. As was the case at TP, the most abundant native species within the Ration area was silver-eye (4.2% of records).

Threatened (pied shag) and At Risk (New Zealand pipit) species in this survey area comprised 0.4% of the point count records (see Table 8-6). The five pipits were recorded over the course of three survey days: two birds on 22/2/10 (R_10), one bird on 23/2/10 (R_11), and two birds on 16/3/10 (R_10). On all of these occasions the pipits were observed utilising the site. In comparison, the single pied shag was observed traversing (i.e. not utilising) the site (R_03) on 16/3/10.

Table 8-6: Individual species abundance recorded during 55 point counts within the Ration Catchment survey area (R).
(Conservation Classification - **Introduced**, **Native (Not Threatened)**, **Threatened**, **At Risk**)

SPECIES	ALL OBS.	%	50%	75%	90%	95%
Goldfinch	311	20.7%				
Starling	311	20.7%				
Magpie	115	7.7%				
Chaffinch	97	6.5%				
Greenfinch	92	6.1%				
House sparrow	76	5.1%				
Silver-eye	64	4.3%				
Spur-winged plover	63	4.2%				
Redpoll	61	4.1%				
Blackbird	57	3.8%				
Pukeko	50	3.3%				
Grey warbler	38	2.5%				
Black-backed gull	28	1.9%				
Mallard	21	1.4%				
Fantail	20	1.3%				
Eastern rosella	17	1.1%				
Welcome swallow	15	1.0%				
Swamp harrier	14	0.9%				
Song thrush	11	0.7%				
Yellowhammer	9	0.6%				
Dunnock	6	0.4%				
Pipit	5	0.3%				
Paradise shelduck	4	0.3%				
White-faced heron	4	0.3%				
Tui	3	0.2%				
Skylark	2	0.1%				
Californian quail	2	0.1%				
Feral goose	1	0.1%				
Kereru	1	0.1%				
Pied shag	1	0.1%				
TOTAL	1499	100%				

The most abundant species recorded during the 48 point counts within the PPB survey area was the introduced starling, with silver-eye being the most abundant native species as well as the second most abundant species recorded overall (Table 8-7). Five species (starling, silver-eye, chaffinch, yellowhammer and goldfinch) comprised 50% of the observations, while 13 species comprised 90%. No Threatened or At Risk species were recorded during the PPB point counts.

Of the three survey areas, Ration recorded the highest mean bird abundance and species diversity per count during both survey sessions and over the entire survey period (Table 8-8, Figure 8-10 and Figure 8-11). With regard to diversity, the mean number of species recorded per count increased slightly at each site (TP, R and PPB) between the January/February and March survey periods (Table 8-8 and Figure 8-10). In comparison, mean bird abundance increased slightly between the two survey periods at TP and PPB, but decreased slightly at Ration (Table 8-8 and Figure 8-11).

TRANSMISSION GULLY PROJECT
Technical Report #8: Avifauna & Bats

Table 8-7: Individual species abundance recorded during 48 point counts within the Porirua Park Bush survey area (PPB). (Conservation Classification - **Introduced**, **Native (Not Threatened)**).

SPECIES	TOTAL	%	50%	75%	90%	95%
Starling	118	16.95%				
Silver-eye	67	9.63%				
Chaffinch	63	9.05%				
Yellowhammer	52	7.47%				
Goldfinch	50	7.18%				
Grey warbler	48	6.90%				
Magpie	44	6.32%				
House sparrow	40	5.75%				
Blackbird	37	5.32%				
Fantail	33	4.74%				
Tui	33	4.74%				
Black-backed gull	32	4.60%				
Spur-winged plover	20	2.87%				
Redpoll	17	2.44%				
Swamp harrier	15	2.16%				
Greenfinch	8	1.15%				
Kereru	7	1.01%				
Song thrush	5	0.72%				
Paradise shelduck	3	0.43%				
Eastern rosella	3	0.43%				
Dunnock	1	0.14%				
TOTAL	696	100%				

Table 8-8: Summary of species diversity and bird abundance during the 2010 survey periods.

SITE	SURVEY PERIOD	MEAN SPP PER COUNT (Total per count)	MEAN BIRDS PER COUNT (Total per count)
TP	Jan/Feb	6.12 (27)	12.53 (752)
	March	7.24 (25)	16.78 (923)
	Overall	6.65 (30)	14.57 (1675)
R	Jan/Feb	8.71 (28)	28.08 (674)
	March	8.81 (24)	26.61 (825)
	Overall	8.76 (30)	27.25 (1499)
PPB	Jan/Feb	5.46 (16)	11.25 (270)
	March	6.00 (21)	17.75 (426)
	Overall	5.73 (21)	14.50 (696)
TG	Jan/Feb	6.55 (31)	15.70 (1696)
	March	7.41 (29)	19.76 (2174)
	Overall	6.98 (33)	17.86 (3870)

Figure 8-10: Mean number of species recorded per count at each of the three survey areas during 2010 point counts

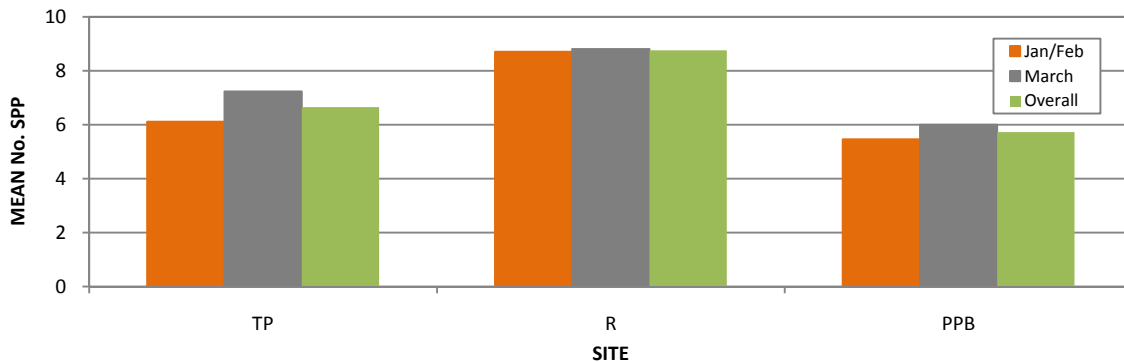
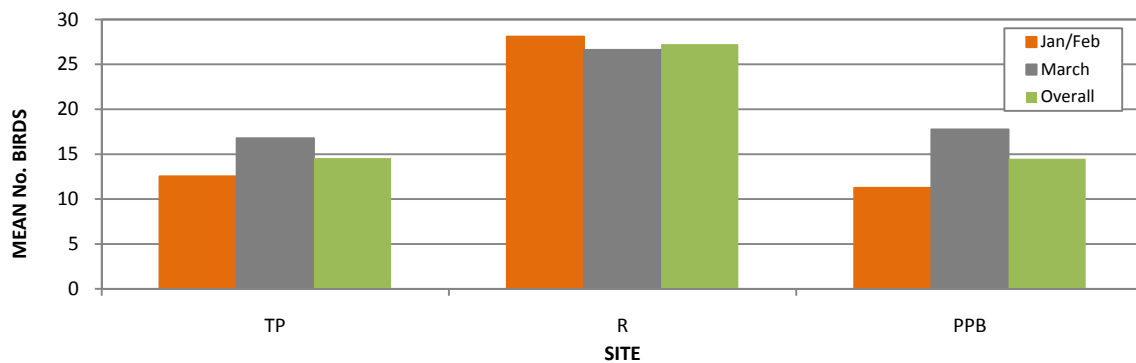


Figure 8-11: Mean bird abundance recorded per count at each of the three survey areas during 2010 point counts.



4.2.3 Non-Standardised Observations

Three species (one individual of each) were recorded as incidental observations which were not picked up in the point counts: black shag, tomtit and rook (see Table 8-3). All of these observations were made within the Te Puka / Horokiri survey area. The single black shag, an At Risk species, was observed on 25 January 2010 along the Horokiri stream, and the tomtit was recorded in the mahoe / pigeonwood forest on the Wainui Saddle on 10 March.

Other observations of note due to their size included a flock of approximately 50 starlings within the Te Puka / Horokiri area on 25 and 26 January. A similar sized flock of starlings was observed within the Ration survey area on 22 February, and a flock of approximately 30 greenfinch was observed there on 16 March. Flocks of six paradise shelduck, five Californian quail and 10 black-backed gulls (traversing the site) were also recorded within the Te Puka / Horokiri area.

Morepork was the only species recorded during the nocturnal survey which was not recorded during the point counts; being recorded on both nights. The first morepork call was heard at 20:46 hrs on 25 January and at 21:10 hrs on 26 January. Full dark occurred at 21:51 hrs and 21:30 hrs on 25 and 26 January respectively. Other birds recorded during the nocturnal survey included tui (20:46-21:08 hrs), kereru (20:46-21:00 hrs), magpie (21:23 hrs) and spur-winged plover (21:23 hrs). No petrel activity (either heard or seen) was recorded during the nocturnal surveys.

5. Discussion

5.1 Species Associated with the Main Alignment

The total of 37 species recorded in the current (2010) field surveys equates to only 48% of the species recorded in the OSNZ atlas data (Appendix 8.D). Rook was the only species recorded in the 2010 surveys which was not recorded in the OSNZ atlas for this area. Likely factors contributing to the difference in species diversity between the two data sets include the larger area (500 km²), greater diversity of habitats (i.e. offshore island, coastal and estuarine inlet), and much longer time frame (5 years) over which the OSNZ data was collected. A breakdown of the number of species recorded in the two data sets according to the primary habitat used by the species is provided in Table 8-9. Of note are the very similar species diversity recorded within the two data sets for farmland/open country and scrub/shrublands; these are the two habitats types that comprise the biggest proportion of the Main Alignment (and consequently the habitats surveyed by BML in 2010).

Table 8-9: Primary habitat of species recorded in the OSNZ atlas (1999-2004) and by Boffa Miskell (Jan-March 2010).

PRIMARY HABITAT	OSNZ (1999-2004)	BML (Jan-March 2010)
Native forest	14	7
Scrub / shrubland	6	5
Farmland / open country	16	16
Freshwater / wetland	20	7
Coastal / estuary	14	2
Urban / residential	1	0
Oceanic	5	0

Shining cuckoo, a native but Not Threatened species, were absent from the 2010 surveys but are nevertheless likely to occur there, as indicated by having been recorded in the OSNZ atlas. This species breeds in forested and scrub habitats where grey warblers, their main host species, live (Heather & Robertson 2000). Given the abundance of grey warblers recorded in the Te Puka / Horokiri section of the alignment during the 2010 surveys, shining cuckoo are also likely to occur here. However, the migratory habit of this species (returning to New Zealand in spring) is likely to account in part for it not being recorded in the 2010 surveys which were undertaken in late summer and autumn.

Also absent from the 2010 survey, but known to be present in the wider area, was the native whitehead (Not Threatened). This species, found in small flocks all year round, occurs in North Island scrub, native and exotic forests (Heather & Robertson 2000). If this species does occur along the Main Alignment, the most likely place would be within the forest in the Te Puka / Horokiri area. The 37 bird species recorded along the alignment in 2010 consisted of 17 introduced species and 20 native species. In terms of the conservation status of the native species, 16 are classified as Not Threatened, two as Threatened (bush falcon and pied shag) and two as At Risk (black shag and New Zealand pipit) (Miskelly *et al.* 2008). Thus, Threatened and At Risk species were present along the alignment but were recorded in very low numbers. In fact, no such species were recorded in the Porirua Park Bush survey area. Overall, introduced species were found to make up the greatest proportion (68.6%) of all birds recorded during the point counts along the alignment.

In terms of species use of the site, the bush falcon and pied shag were both observed traversing the site, however the black shag and New Zealand pipit were observed utilising the site for basking and feeding respectively. Based on the species habitat requirements and the size of their territorial and home ranges, the observed New Zealand pipit would be resident along and adjacent to the Main Alignment. Bush falcon may also be resident in the wider area. Black and pied shags are unlikely to be resident along the Main Alignment.

5.2 Habitats Associated with the Main Alignment

The bird species recorded in 2010 are considered to be representative of the habitats sampled. The majority of habitat along the Main Alignment is comprised of pasture and farmland, and while the greatest number of species (16) was recorded in this habitat type, these comprised 75% introduced species. In comparison, the forest provides primary habitat for fewer species, but all of these were native species and included the Threatened bush falcon. The freshwater habitats are utilised by introduced, native, Threatened and At Risk species.

Thus in terms of ecological values, the forest, scrub and freshwater habitats are of greater value than the farmland in terms of providing feeding and nesting resources for native species, including Threatened and At Risk species. These habitat types are poorly represented within the Main Alignment. Only one At Risk species recorded during the avifauna surveys utilises farmland as its primary habitat; that species being the New Zealand pipit.

The high mean bird abundances and species diversity per count recorded at the Ration survey area is likely to be due to the variety of land-uses within this area (rural residential, hobby farms, exotic plantation) rather than a reflection of high habitat quality. The habitat with the highest ecological value was found within the TP survey area, notably the forest remnants within the Te Puka catchment. The occurrence of large trees (including emergent podocarps) together with important fruiting species within these remnants provides suitable nesting and feeding habitat for a variety of native, Threatened and At Risk species. It should be noted that while no Threatened or At Risk species were recorded within the Porirua Park Bush survey area, a relatively high diversity of native species were recorded here, most notably in the older-growth forest which had a greater diversity in vegetation.

Given the lack of wetlands, streams constitute the main freshwater habitat along the Main Alignment. These streams are likely to provide some feeding opportunities for native bird species (especially shags and waterfowl), but are generally lacking in nesting habitat.

With regard to petrels, most breeding colonies are located on islands due to habitat loss and predation on the mainland. Those few populations that do persist on the mainland are largely confined to coastal forested hilltops, such as at the northern end of the Project. In this context, given the close proximity of shearwater and petrel colonies on Kapiti and Mana islands, the potential exists that petrels may occur at very northern section of the Main Alignment, but that habitat will not be directly nor indirectly impacted upon by the new highway.

5.3 Pauatahanui Inlet

The list of species recorded by OSNZ atlas database (Robertson *et al.* 2007), in GOPI (2010) and Todd *et al.* (unpubl.) included wader and shorebird species such as eastern bar-tailed godwit, pectoral sandpiper, oystercatchers, pied stilt and dotterels; all species indicative of estuarine and coastal habitats. None of these species were recorded during the 2010 field work, a reflection of the fact that estuarine and coastal

habitats are absent from the Main Alignment, the closest being Pauatahanui Inlet which is approximately 1 km to the north-west of the Main Alignment.

Black shag (1), pukeko (61) and white-faced heron (4) were the only waterbird species recorded during the 2010 field works along and adjacent to the Main Alignment which could potentially utilise Pauatahanui Inlet.

6. Conclusions

- The comparison with OSNZ atlas data confirm that species recorded during the 2010 avifauna fieldwork were those that were expected to be found in the habitat types surveyed (ie. those occurring along the Main Alignment).
- The avifauna along and adjacent to the Main Alignment were found to be dominated by introduced passerines; a reflection of extensive pastureland occurring along the route. This habitat type is considered to be of low ecological value.
- Avifauna associated primarily with freshwater were recorded in low numbers, though both a Threatened (pied shag) and At Risk (black shag) species were observed along or adjacent to the Main Alignment. In the case of the pied shag, a single bird was recorded traversing the site rather than utilising the stream. Thus, from an avifauna perspective, the stream along the alignment is considered to be of moderate ecological value.
- Though relatively limited in its extent, the native forest along the Main Alignment provides an important habitat for a number of native, Threatened and At Risk species. In particular, the forest occurring within the Te Puka catchment is considered to be the most ecologically valuable habitat for avifauna along the Main Alignment, providing both nesting and feeding.
- The majority of species recorded in the OSNZ atlas but not in the 2010 fieldwork were those that primarily occur in freshwater/wetland and coastal/estuarine habitats (see Table 8-9). While these habitat types are largely absent along the Main Alignment, the potential exists for the Project to impact indirectly downstream into such habitats, particularly the Pauatahanui Inlet, by way of increased stormwater runoff.
- While potential petrel habitat is located along the coastal hills at the northern end of the Main Alignment, the chances of birds breeding there are low. Furthermore, this habitat will not be impacted by the Project.

7. Recommendations

- The EIA report and detailed design of the Project must consider and address all issues that could potentially impact (both directly and indirectly) upon native birds known to occur within the footprint and within the wider surrounding area. With regards to shorebirds and waders utilising the Pauatahanui Inlet, this would include the consideration of the indirect effects on food supply by sediment deposition arising from construction earthworks.
- Bush falcon were recorded on two occasions on a single day of survey along the Main Alignment. Consequently, it is possible that this was a single individual observed twice. Further work would be required to determine if this species is breeding in any of the areas of potential habitat, namely the forest remnants along the Te Puka catchment.
- The assessment of effects and detailed design of the Project must consider all issues that could potentially impact (both directly and indirectly) the avifauna known to occur along the alignment and within the wider surrounding area.

BATS

New Zealand has three species of bats: the long-tailed bat (*Chalinolobus tuberculatus*), the lesser short-tailed bat (*Mystacina tuberculata*), and the presumed extinct greater short-tailed bat (*Mystacina robusta*) (Daniel 1998). Threats to both extant species include predation, habitat loss and disturbance of roosts (Molloy 1995, Lloyd 2001, O'Donnell 2001a, b). While previously both species were widely distributed throughout the New Zealand mainland and offshore islands, the reduction in distribution of the short-tailed bat has been more severe than that of the long-tailed, which is today the more common of the two species (Lloyd 2001, O'Donnell 2001a, b). A population of short-tailed bats discovered in the Waiohine Valley on the Wairarapa side of the ranges in 1999 is believed to be the last remaining population of short-tailed bats in the south of the North Island (Lloyd 2001). In comparison, the long-tailed bat is known to occur around Wellington and on Kapiti Island. Thus, given the difference in distribution of the two species, it was considered that long-tailed bats would be the more likely of the two species to potentially occur within or adjacent to the Transmission Gully Project.

Long-tailed bats inhabit forest edges, feeding above the forest canopy, along forest margins, over farmland, and streams and lakes (Daniel 1998). Roosts have been found in indigenous and exotic trees, caves, and occasionally in buildings (Daniel 1998). Long-tailed bats begin to leave their roosts within half an hour of dusk, and peak activity appears to be in the first two hours of twilight, with a smaller peak before dawn (Daniel 1998). Bat calls are loudest around 40 kHz, however long-tailed bats echolocation calls include a relatively low frequency (i.e. <20 kHz) component which can be heard by some people (Molloy 1995).

Most records of long-tailed bats are associated with a variety of indigenous forest types including pohutukawa, kauri, beech and podocarp hardwood forest. They also forage over regenerating kanuka- or manuka dominated indigenous shrublands and some pine forests (O'Donnell 2001b, c). However, most foraging occurs along forest-grassland edges and roads through forest, with little foraging within the forest interior (O'Donnell 2001b, c). The long-tailed bat is a moderately fast-flying, agile aerial insectivore, feeding on small moths, midges, mosquitoes, stoneflies, tipulids, caddis flies, beetles and sandflies (Daniel 1983).

In developing the methodology for investigating bats for the Project, the primary effect considered was the presence of bats within proximity of the Main Alignment and the loss of bat feeding and roosting habitat that would be associated with the Project. Consequently, the objectives of the bat survey were:

- To confirm the presence or absence of indigenous species of bat and, if present, their distribution in relation to habitat that will be affected by the Project; and
- To determine the significance of any affected habitats for indigenous bats.

8. Methods and Search/Sampling Effort

Long-tailed bats are much more active in spring and summer months (October–February) than they are in the winter (O'Donnell 2001c, O'Donnell & Sedgely 2001). January–February surveys sample populations once juveniles have begun flying. Bat activity varies significantly with temperature and weather conditions (O'Donnell 2001c, O'Donnell & Sedgely 2001). Surveys should ideally take place on fine warm nights, preferably above 10°C and definitely not when dusk temperature is less than 7°C (since both bat

activity and insect activity (food availability) decline considerably below these temperatures (O'Donnell 2001c, O'Donnell & Sedgely 2001).

Although long-tailed bats can be recorded at any time of the night, transects should be walked over 2–3 hours, commencing 30 minutes after official sunset time when peak long-tailed bat activity occurs (maximising the chance of recording the bats) and because activity decreases significantly after this time (O'Donnell & Sedgely 2001). In January 2010, two transects were surveyed on two consecutive nights, one on either side of the Wainui Saddle. O'Donnell & Sedgely (2001) recommend that transects should focus on forest edge habitats to maximise the chance of encountering long-tailed bats. As such, the first transect was conducted on 25 January (21:10-22:15) along the forest margin and farmland on the Wainui Saddle, while the second was conducted on 26 January (21:00-22:10) along the forest margin and the access road adjacent to the Te Puka Stream (see Figure 8-12). Each transect consisted of 10 points (50 paces apart). At each of the 10 transect points, two hand-held bat boxes set to 40 kHz were deployed for 5 minutes. Detectors are set on 40 kHz for long-tailed bat surveys, as this represents the peak loudness of their calls (Parsons 1997). Bat boxes are capable of detecting calls up to 50 m away (Molloy 1995).

The bat detector's sensitive microphones can pick up bat calls and convert them to a sound humans can hear through the detector speaker. These calls are heard on the detector as series of clicks as a bat flies into range (O'Donnell & Sedgely 2001). Observers were tasked with recording the number of bat passes heard while walking each transect. Number of bat passes provides an index of activity (e.g. passes per km per survey) rather than an actual measure of the number of bats in a population (O'Donnell & Sedgely 2001).





In March 2010, six automated bat boxes were left on site from 8-12 March 2010 (see Figure 8-12). The boxes were located from the Wainui Saddle down into the Te Puka catchment (situated at vegetation interfaces) and set to record at 28 and 40 kHz from 19:45 to 07:00 over the four consecutive nights. These two frequencies were recorded as they correspond to the peak amplitude of short- and long-tailed bats respectively (Parsons 1997).

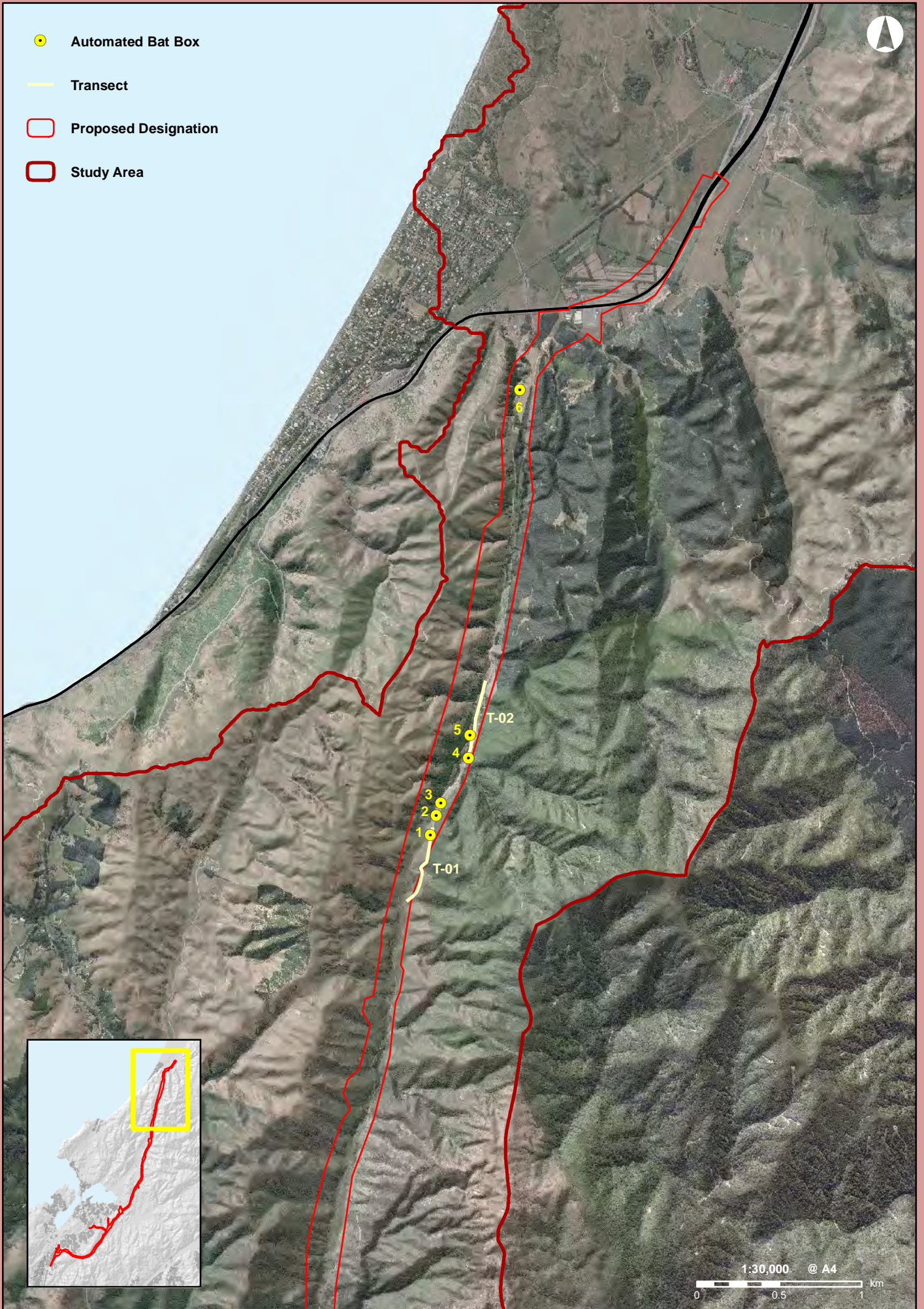
The climatic conditions during the bat surveys were ideal for such, being mild and calm. In addition to using the acoustic devices, opportunistic observations were made of any potential roosting trees encountered during the vegetation surveys. No dedicated bat roost search was undertaken.

9. Survey Constraints

Difficulties were encountered obtaining access to the Te Puka / Horokiri section of the Main Alignment, limiting the time (a total of two weeks) that could be spent undertaking field work there. Consequently, the bat surveys were confined to late summer (end of January) and early autumn (early March), which did capture the peak activity period, but missed the potential to detect any seasonal variability.



-  Automated Bat Box
-  Transect
-  Proposed Designation
-  Study Area



July 29, 2011 W09034A_AVI_SurveyBats_A4.mxd © Boffa Miskell Ltd 2011

1:30,000 @ A4
0 0.5 1 km



10. Results

No roosting trees were observed during the vegetation surveys.

No bats were recorded during the January surveys using the hand-held bat boxes.

Bat box 5, located at in the mid Te Puka under kohekohe forest, failed to record throughout the survey period. Each of the remaining five bat boxes (1, 2, 3, 4 and 6) successfully recorded for 11.25 hours per night over 4 consecutive nights (45 hours per box); producing a total of 225 recorded hours. From this, only one recording of interest was detected, potentially a short-tailed bat recorded at bat box 3 located in the upper Te Puka in kohekohe forest. The recording was sent to Dr Colin O'Donnell (DOC), who concluded that the sound detected was incredibly brief and was not confident in confirming it. Given the regularity of the pulses detected, Dr O'Donnell suggested that an alternative could be a very distant long-tailed bat.

11. Discussion

Bat surveys were concentrated around the Wainui Saddle as this is the only location along the Main Alignment that has habitat likely to contain the native long-tailed bat.

While there were no confirmed recordings of bats, one recording of interest was detected from the bat box (3) located in the upper Te Puka site in kohekohe forest, with this record potentially being a short- or long-tailed bat.

12. Conclusions & Recommendations

- Field work undertaken during January 2010 recorded no confirmed bat activity; however a possible recording of an unidentified bat species was detected in the upper Te Puka in kohekohe forest in March 2010.
- Further surveys using the automated bat boxes should be undertaken in winter and spring in order to more confidently determine if bats occur around the Wainui Saddle area.

ACKNOWLEDGEMENTS

- Field Support provided by Matiu Park (BML)
- Bat data analysis by Ben Hancock; confirmation of detected call by Dr Colin O'Donnell (DOC).
- GIS mapping by Martin Pecher (BML) & David Irvine (BML)

REFERENCES

- BML (2011a). Transmission Gully Project Technical Report 11, Assessment Of Ecological Effects. Prepared for New Zealand Transport Agency and Porirua City Council by Boffa Miskell Limited. *Report No: W09034E*. 183 p.
- BML (2011b). Transmission Gully Technical Report 6: Terrestrial vegetation and habitats, ecological survey, mapping and assessment of significance. Prepared by Boffa Miskell Ltd for NZ Transport Agency and Porirua City Council. *Report No: W09034A-009*.
- Daniel, M. (1998). NZ long-tailed bats. In *The Handbook of New Zealand Mammals*, Ed. C. King. Oxford University Press, Auckland. Pp. 117-122.
- Daniel, M. (1983). Observations of a cave colony of long-tailed bat (*Chalinolobus tuberculatus*) in the North Island, New Zealand. *Mammalia* 47: 71-80.
- Dawson, D.; Bull, P. (1975). Counting birds in New Zealand forests. *Notornis* 22: 101-109.
- DOC (1996). *Conservation Management Strategy for Wellington 1996-2005*. Wellington Conservancy Conservation Management Planning Series No. 2. Department of Conservation, Wellington.
- GOPI (2010). Guardians of Pauatahanui Inlet website, accessed September 2010. <http://www.gopi.org.nz/birds/>
- Heather, B.; Robertson, H. (2000). *The Field Guide to the Birds of New Zealand*. Viking, New Zealand.
- Lloyd, B.D. (2001). Advances in New Zealand mammalogy 1999-2000: Short-tailed bats. *Journal of the Royal Society of New Zealand* 31: 59-81.
- Miskelly, C.M.; Dowding, J.E.; Elliot, G.P.; Hitchmough, R.A.; Powlesland, R.G.; Robertson, H.A.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. (2008). Conservation status of New Zealand birds, 2008. *Notornis* 55: 117-135.
- Molloy, J. (1995). Bat (peka peka) Recovery Plan (*Mystacina*, *Chalinolobus*). *Threatened Species Recovery Plan 15*. Department of Conservation, New Zealand.
- O'Donnell, C.S. (2001a). Conservation status and cause of decline of the threatened long-tailed bat *Chalinolobus tuberculatus* (Chiroptera: Vespertilionidae). *Mammal Review* 30: 89-106.
- O'Donnell, C.S. (2001b). Advances in New Zealand mammalogy 1999-2000: Long-tailed bat. *Journal of the Royal Society of New Zealand* 31: 43-57.
- O'Donnell, C.S. (2001c). Influence of season, habitat, temperature and invertebrate availability on nocturnal activity by the New Zealand long-tailed bat (*Chalinolobus tuberculatus*). *New Zealand Journal of Zoology* 27: 207-221.
- O'Donnell, C.F.J.; Sedgely, J.A. 2001: Guidelines for surveying and monitoring long-tailed bat populations using line transects. *DOC Science Internal Series 12*. Department of Conservation, Wellington. 20 p.
- Parsons, S. (1997). Search phase echolocation calls of the New Zealand lesser short-tailed bat (*Mystacina tuberculata*) and long-tailed bat (*Chalinolobus tuberculatus*). *Canadian Journal of Zoology* 78: 1487-1494.
- PCC (1992). *Porirua Park & Environs: Recreation and Scenic Reserves Management Plan*. Porirua City Council.
- PCC (1999). *Porirua City District Plan*. Porirua City Council.
- Robertson, C.J.R.; Hyvonen, P.; Fraser, M.J.; Pickard, C.R. (2007). *Atlas of Bird Distribution in New Zealand 1999-2004*. The Ornithological Society of New Zealand, Wellington.
- Rosier, J. (1993). *Management of Pauatahanui Inlet: Discussion Document*. Wellington Regional Council Publication WRC/PP-T-93/67.

Todd, M.; Graeme, C.; Kettles, H.; Sawyer, J. (unpubl.). DRAFT – Estuaries in Wellington Hawke’s Bay Conservancy (excluding Hawke’s Bay and Chatham Islands Areas): Current status and future management. Department of Conservation, Wellington Hawke’s Bay Conservancy. Pp. 275.

Townsend, A.J.; de Lange, P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. (2008). *New Zealand Threat Classification System Manual*. Department of Conservation, Wellington. 35 p.

Appendix 8.A: Significant Ecological Areas

BML (2011b) undertook an assessment of the vegetation communities occurring along the Main Alignment and assigned an ecological value (Very High, High, Moderate, Low, Negligible) to these using the following four criteria (Shearer Swamp vs West Coast Regional Council):

- Ecological context;
- Representativeness;
- Rarity (species, communities, habitats); and
- Distinctiveness.

In determining these values consideration was given to the findings of other studies and the LENZ threat class for each landform upon which the community was located.

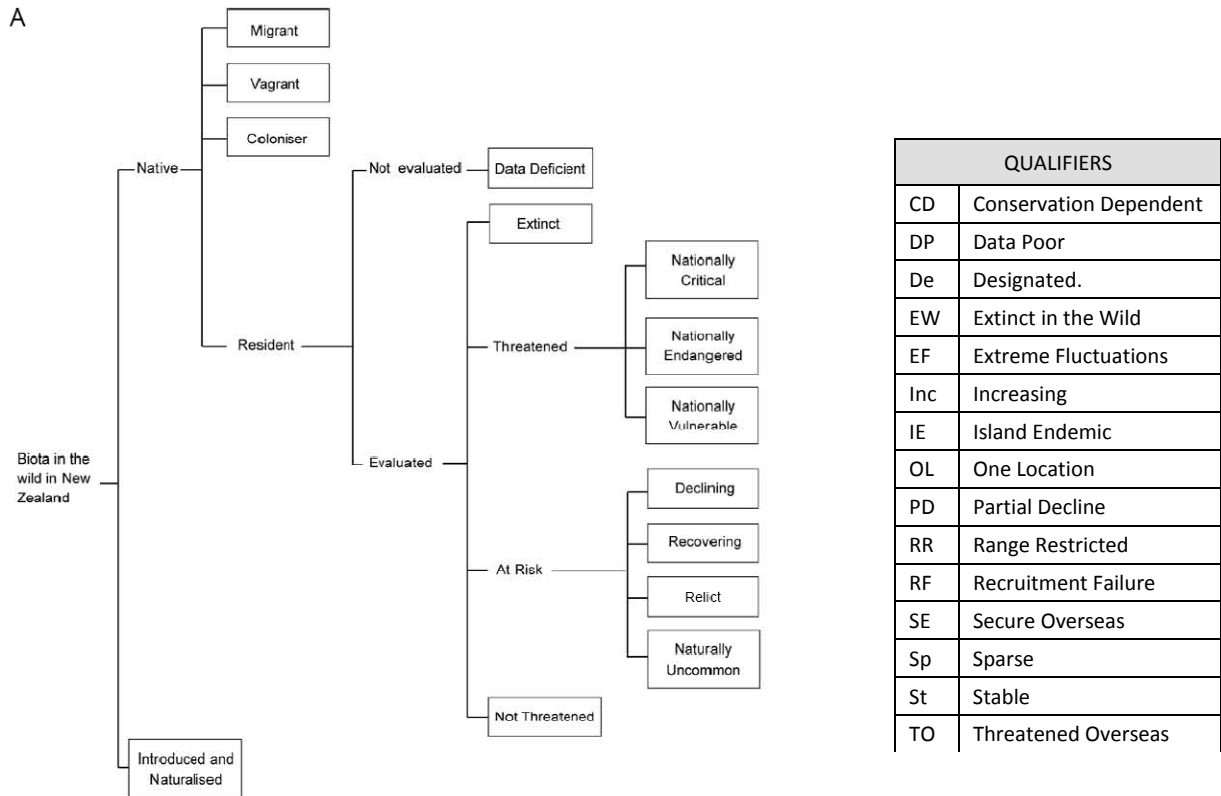
TRANSMISSION GULLY PROJECT
Technical Report #8: Avifauna & Bats

DESCRIPTION (listed North to South)	Site Status	LENZ Threat	Represent- ativeness	Significance Assessment			
				Context	Rarity	Distinctiveness	Overall Score
Whareroa Catchment							
Wetlands represented by							
1. K106 - McKays Crossing Wildlife Reserve	PNA	1	H	M	H	M	H
Wainui Catchment							
Indigenous forest represented by							
2. K139 - Rowans Bush	PNA	4	M	H	Nil	L	H
Te Puka Catchment							
Mature or maturing indigenous forest represented by							
3. Akatarawa/Whakatikei Forest Park	PNA	5	M	H	H	H	H
4. K223 - Paekakariki bush C	NR	1	L	L	nil	nil	L
5. K224 - Paekakariki bush D	NR	1	L	L	nil	nil	L
6. K225 - Paekakariki bush E	NR	4	L	L	nil	nil	L
7. K226 - Paekakariki bush F	NR	5	L	L	nil	nil	L
8. K227 - Paekakariki bush G	NR	5	L	L	nil	nil	L
9. K228 - Paekakariki bush H	NR	5	L	L	nil	nil	L
10. K229 - Paekakariki bush I	NR	5	M	M	nil	nil	M
11. K230 - Paekakariki bush J	NR	5	L	L	nil	nil	L
Regenerating indigenous forest represented by							
12. Seral / regenerating forest (mahoe)	-	5	L	L	nil	nil	L
Shrublands and scrub represented by							
13. Shrublands & scrub (tauhinu/gorse/mahoe)	-	5	nil	L	nil	nil	L
Horokiri East Catchment							
Wetlands represented by							
14. Horokiri Wildlife Management Reserve	PNA	1	H	H	H	M	H
15. Sphagnum / Juncus wetland on valley floor	-	4	nil	L	L	nil	L
Mature or maturing indigenous forest represented by							
16. PCC172 – Transmission Gully Saddle	SNA	5	L	L	nil	nil	L
Regenerating indigenous forest represented by							
17. PCC199 – TG Riparian Area	SNA	5	L	L	nil	nil	L
Shrublands and scrub represented by							
18. Shrublands & scrub (tauhinu/gorse/mahoe)	-	5	nil	L	nil	nil	L
Pasture							
19. Battle Hill Regional Park	PNA	1	nil	nil	nil	nil	Nil
Ration Catchment							
Wetlands represented by							
20. Ration Stream (Riparian Margins)	Listed	1	nil	L	nil	nil	L
Shrublands and scrub represented by							
21. Advanced Mitigation Planting - Sites 6 & 7	Mitigate	1	L	L	nil	nil	L
22. Shrublands & scrub (tauhinu/gorse/mahoe)	-	5	nil	L	nil	nil	Nil
Pauatahanui Catchment							
Wetlands represented by							

TRANSMISSION GULLY PROJECT
Technical Report #8: Avifauna & Bats

23. Pauatahanui Wildlife Management Reserve	PNA	1	H	H	H	H	VH
24. Pauatahanui Inlet Wildlife Refuge	PNA	1	H	H	H	H	VH
25. Pauatahanui Stream (Riparian Margins)	Listed	2	L	L	nil	Nil	L
Regenerating indigenous forest represented by							
26. PCC196 – Scoresby Grove Kanuka	PNA	1	L	M	nil	nil	M
Shrublands and scrub represented by							
27. Advanced Mitigation Planting - Sites 5	Mitigate	1	L	L	nil	nil	L
Duck Creek Catchment							
Wetlands represented by							
28. Duck Creek Scenic Reserve	PNA	1	H	H	L	L	H
29. Duck Creek Riparian Margins	Listed	4	L	nil	L	nil	L
Mature or maturing indigenous forest represented by							
30. PCC155b – Whitby West Bush	PNA	4	M	L	nil	nil	M
31. PCC33 – James Cook Drive Bush	SNA	1	M	L	M	M	M
Regenerating indigenous forest represented by							
32. PCC190 – Exploration Drive Kanuka	SNA	4	M	L	nil	nil	M
Shrublands and scrub represented by							
33. Advanced Mitigation Planting - Sites 1, 2, 3, 4	Mitigate	4	L	L	nil	nil	L
34. Shrublands & scrub (tauhinu/gorse/mahoe)	-	5	nil	L	nil	nil	L
Pasture							
35. Belmont Regional Park	PNA	4-5	nil	nil	nil	nil	Nil
Kenepuru Catchment							
Mature or maturing indigenous forest represented by							
36. WCC 0702.15 - Head of Cannons Creek	SNA	1	M	L	nil	nil	M
37. WCC 0702.16 - Head of Cannons Creek	SNA	1	M	L	nil	nil	M
Regenerating indigenous forest represented by							
38. Porirua Park Bush	PNA	4	H	H	M	M	H
39. PCC12 – Cannons Creek Bush	PNA	4	M	H	M	L	H
40. Seral forest on slopes above Porirua East	-	4	L	L	nil	nil	L
Shrublands and scrub represented by							
41. Shrublands & scrub (tauhinu/gorse/mahoe)	-	5	nil	L	nil	nil	L
Porirua Catchment							
Wetlands represented by							
42. Onepoto Arm of Porirua Harbour	-	1	L	H	H	M	H
Mature or maturing indigenous forest represented by							
43. PCC88 – Roberts Bush	SNA	4	L	L	nil	nil	L
44. Unnamed Site identified by BML surveys	-	4	L	L	nil	nil	L
Regenerating indigenous forest represented by							
45. Seral forest on slopes above Porirua East	-	4	L	L	nil	nil	L
Shrublands and scrub represented by							
46. Shrublands & scrub (tauhinu/gorse/mahoe)	-	5	nil	L	nil	nil	L

Appendix 8.B: Structure and Qualifiers of the NZ Threat Classification (Townsend *et al.* 2008)



All avifauna species occurring in the wild in New Zealand have been assigned one of the categories (boxed text) above, depending on its origin (native vs introduced), population size and trends. Full details of classification criteria for each of these categories are provided in Townsend *et al.* (2008). In addition to these threat categories, species may receive qualifiers as part of their classification. Qualifiers are an integral part of the New Zealand threat classification system as they provide additional information about a taxon's listing, status and management. For instance, Caspian tern is classified as Nationally Vulnerable^{SO}; this category indicates that the New Zealand population is small with a high ongoing or predicted decline, however the SO (Secure Overseas) qualifier provides information regarding populations found outside of New Zealand.

Appendix 8.C: Habitat types occurring along the Transmission Gully Project



Photo 1: Improved Pasture in Duck Creek



Photo 2: Rural Residential in the Lower Horokiri Valley



Photo 3: Regenerating shrub-grasslands and shrubland dominated by tauhinu and *Olearia solandri*. Horokiri Valley.



Photo 4: Mixed scrub dominated by gorse on slopes, and low forest dominated by mahoe (*Melicytus ramiflorus*) in the valley floor. Dissected hill country on the eastern side of the Horokiri Valley.



Photo 5: A mahoe monoculture overtopping gorse, above Cannons Creek.



Photo 6: Remnant indigenous forest at Wainui Saddle.



Photo 7: Riparian and wetland habitat in pasture, mid Horokiri Stream.



Photo 8: Plantation Forests at Battle Hill.

Appendix 8.D: Summary of species recorded in (1) the OSNZ atlas (1999-2004) within five 10 km x 10 km grid squares that encompass the Transmission Gully Project and surrounding area; (2) during the BML survey, and (3) at Pauatahanui Inlet (Todd *et al.* unpubl.). (Darker green cells indicate primary habitat)

SPECIES		CONSERVATION STATUS ¹		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Urban/Residential	Oceanic	OSNZ	BML	Pauatahanui
Bush falcon	<i>Falco novaeseelandiae</i> "bush"	Endemic	Nationally Vulnerable ^{DP St}	Dark Green	Light Green							✓	✓	
Little spotted kiwi	<i>Apteryx owenii</i>	Endemic	Recovering ^{CD Inc RR}	Dark Green								✓		
Red-crowned parakeet	<i>Cyanoramphus n. novaeseelandiae</i>	Endemic	Relict	Dark Green								✓		
Bellbird	<i>Anthornis m. melanura</i>	Endemic	Not Threatened	Dark Green	Light Green					Light Green		✓	✓	
Whitehead	<i>Mohoua albicilla</i>	Endemic	Not Threatened	Dark Green								✓		
Morepork	<i>Ninox n. novaeseelandiae</i>	Native	Not Threatened	Dark Green	Light Green		Light Green					✓	✓	
Pied tomtit	<i>Petroica macrocephala toitoi</i>	Endemic	Not Threatened	Dark Green	Light Green							✓	✓	
Fantail	<i>Rhipidura fuliginosa placabilis</i>	Endemic	Not Threatened	Dark Green	Light Green					Light Green		✓	✓	
Kereru	<i>Hemiphaga novaeseelandiae</i>	Endemic	Not Threatened ^{CD Inc}	Dark Green	Light Green							✓	✓	
Shining cuckoo	<i>Chrysococcyx l. lucidus</i>	Native	Not Threatened ^{DP}	Dark Green	Light Green							✓		
Yellow-crowned parakeet	<i>Cyanoramphus auriceps</i>	Endemic	Not Threatened ^{EF}	Dark Green								✓		
Tui	<i>Prothemadera n. novaeseelandiae</i>	Endemic	Not Threatened ^{OL St}	Dark Green	Light Green							✓	✓	✓
North Island robin	<i>Petroica longipes</i>	Endemic	Not Threatened St	Dark Green	Light Green							✓		
Sulphur crested cockatoo	<i>Cacatua galerita</i>	Introduced	Introduced & Naturalised ^{SO Sp}									✓		
Grey warbler	<i>Gerygone igata</i>	Endemic	Not Threatened	Dark Green	Light Green	Dark Green				Light Green		✓	✓	✓
Silvereeye	<i>Zosterops lateralis lateralis</i>	Native	Not Threatened ^{SO}	Dark Green	Light Green	Dark Green				Light Green		✓	✓	
California quail	<i>Callipepla californica</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green	Light Green					✓	✓	
Pheasant	<i>Phasianus colchicus</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green						✓		
Eastern rosella	<i>Platycercus eximius</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green						✓	✓	
Blackbird	<i>Turdus merula</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green	Light Green			Light Green		✓	✓	
NZ pipit	<i>Anthus n. novaeseelandiae</i>	Native	Declining			Dark Green	Light Green	Light Green				✓	✓	
Welcome swallow	<i>Hirundo tahitica neoxena</i>	Native	Not Threatened ^{Inc SO}			Dark Green	Light Green					✓	✓	✓
Swamp harrier	<i>Circus approximans</i>	Native	Not Threatened ^{SO}			Dark Green						✓	✓	
Spur-winged plover	<i>Vanellus miles novaehollandiae</i>	Native	Not Threatened ^{SO}			Dark Green	Light Green					✓	✓	✓
Skylark	<i>Alauda arvensis</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green						✓	✓	
Canada goose	<i>Branta canadensis</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green	Light Green					✓		✓
Goldfinch	<i>Carduelis carduelis</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green				Light Green		✓	✓	
Greenfinch	<i>Carduelis chloris</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green				Light Green		✓	✓	
Redpoll	<i>Carduelis flammea</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green				Light Green		✓	✓	
Rook	<i>Corvus frugilegus</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green							✓	
Yellowhammer	<i>Emberiza citrinella</i>	Introduced	Introduced & Naturalised ^{SO}			Dark Green						✓	✓	
Chaffinch	<i>Fringilla coelebs</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green				Light Green		✓	✓	
Magpie	<i>Gymnorhina tibicen</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green				Light Green		✓	✓	
House sparrow	<i>Passer domesticus</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green						✓	✓	
Dunnock	<i>Prunella modularis</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green						✓	✓	
Starling	<i>Sturnus vulgaris</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green						✓	✓	
Song thrush	<i>Turdus philomelos</i>	Introduced	Introduced & Naturalised ^{SO}		Light Green	Dark Green						✓	✓	

TRANSMISSION GULLY PROJECT
 Technical Report #8: Avifauna & Bats

SPECIES		CONSERVATION STATUS ¹		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Urban/Residential	Oceanic	OSNZ	BVL	Pauatahanui (DOC 2010)
Grey duck	<i>Anas s. superciliosa</i>	Native	Nationally Critical									✓		
Black-billed gull	<i>Larus bulleri</i>	Endemic	Nationally Endangered ^{De}									✓		
Pied shag	<i>Phalacrocorax v. varius</i>	Native	Nationally Vulnerable									✓	✓	✓
NZ dabchick	<i>Poliiocephalus rufopectus</i>	Endemic	Nationally Vulnerable									✓		
NZ pied oystercatcher	<i>Haematopus finschi</i>	Native	Declining									✓		✓
Pied stilt	<i>Himantopus h. leucocephalus</i>	Native	Declining ^{SO}									✓		✓
Brown teal	<i>Anas chlorotis</i> "North Island"	Endemic	Recovering ^{CD RR}									✓		
Little shag	<i>Phalacrocorax melanoleucos brevirostris</i>	Native	Naturally Uncommon ^{inc}									✓		✓
Little black shag	<i>Phalacrocorax sulcirostris</i>	Native	Naturally Uncommon ^{RR}									✓		✓
Black shag	<i>Phalacrocorax carbo novaehollandiae</i>	Native	Naturally Uncommon ^{SO Sp}									✓	✓	✓
NZ shoveler	<i>Anas rhynchotis variegata</i>	Native	Not Threatened									✓		✓
Paradise shelduck	<i>Tadorna variegata</i>	Endemic	Not Threatened									✓	✓	✓
Kingfisher	<i>Todiramphus sanctus vagans</i>	Native	Not Threatened									✓	✓	✓
NZ scaup	<i>Aythya novaeseelandiae</i>	Endemic	Not Threatened ^{inc}									✓		
Grey teal	<i>Anas gracilis</i>	Native	Not Threatened ^{inc SO}									✓		✓
Pukeko	<i>Porphyrio melanotus</i>	Native	Not Threatened ^{inc SO}									✓	✓	✓
Black swan	<i>Cygnus atratus</i>	Introduced	Not Threatened ^{SO}									✓		✓
Mallard	<i>Anas platyrhynchos</i>	Introduced	Introduced & Naturalised ^{SO}									✓	✓	✓
Feral goose	<i>Anser anser</i>	Introduced	Introduced & Naturalised ^{SO}									✓	✓	✓
Black-fronted dotterel	<i>Charadrius melanops</i>	Coloniser	Coloniser ^{SO Sp}									✓		
White heron	<i>Egretta alba modesta</i>	Native	Nationally Critical ^{OL SO St}									✓		
Red-billed gull	<i>Larus novaehollandiae scopulinus</i>	Native	Nationally Vulnerable									✓		✓
Wrybill	<i>Anarhynchus frontalis</i>	Native	Nationally Vulnerable ^{RR}											✓
Northern NZ dotterel	<i>Charadrius obscurus aquilonius</i>	Endemic	Nationally Vulnerable ^{CD}									✓		
Banded dotterel	<i>Charadrius b. bicinctus</i>	Endemic	Nationally Vulnerable ^{RR}									✓		✓
Caspian tern	<i>Hydroprogne caspia</i>	Native	Nationally Vulnerable ^{SO}									✓		✓
Reef heron	<i>Egretta sacra sacra</i>	Native	Nationally Vulnerable ^{SO St}									✓		
White-fronted tern	<i>Sterna s. striata</i>	Native	Declining ^{DP}									✓		
Variable oystercatcher	<i>Haematopus unicolor</i>	Endemic	Recovering									✓		✓
Royal spoonbill	<i>Platalea regia</i>	Native	Naturally Uncommon ^{inc RR SO Sp}									✓		✓
Spotted shag	<i>Stictocarbo p. punctatus</i>	Endemic	Not Threatened									✓		
White-faced heron	<i>Ardea novaehollandiae</i>	Native	Not Threatened ^{SO}									✓	✓	✓
Black-backed gull	<i>Larus d. dominicanus</i>	Native	Not Threatened ^{SO}									✓	✓	✓
Bar-tailed godwit	<i>Limosa lapponica baueri</i>	Migrant	Migrant ^{SO}									✓		✓
Pectoral sandpiper	<i>Calidris melanotos</i>	Vagrant	Vagrant ^{SO}									✓		
Rock pigeon	<i>Columba livia</i>	Introduced	Introduced & Naturalised ^{SO}									✓		
Blue penguin	<i>Eudyptula minor iredalei</i>	Native	Declining ^{DP EF}									✓		
Sooty shearwater	<i>Puffinus griseus</i>	Native	Declining ^{SO}									✓		
Fluttering shearwater	<i>Puffinus gavia</i>	Endemic	Relict ^{RR}									✓		
Australasian gannet	<i>Morus serrator</i>	Native	Not Threatened ^{De inc SO}									✓		✓
Arctic skua	<i>Stercorarius parasiticus</i>	Migrant	Migrant ^{SO}									✓		
Takahe	<i>Porphyrio hochstetteri</i>	Endemic	Nationally Critical ^{CD RR}									✓		