

cattle and have harakeke in the understorey. A brief description of the forest types based on canopy composition is present below:

(a) The largest of the remnants (in the centre of the site) is totara forest, in which kahikatea is common and kanuka, titoki, and kowhai are occasional.

(b) The southern remnant is a grazed stand of kahikatea with occasional ti kouka and totara.

(c) The northeastern remnant comprises abundant totara and occasional kowhai.

(d) The western remnant comprises titoki, kowhai and totara with occasional manatu.

(e) The smallest remnant overall, between ecological units (a) and (c), comprises titoki and totara with occasional karaka, rewarewa, kowhai, ti kouka, and pukatea.

#### **Significant flora**

Manatu (regionally significant).

#### ***Fauna***

Australasian harrier was recorded in this survey.

#### ***Significance***

The site contains two representative ecological units not known from elsewhere in Waipu ED: (d) titoki-kowhai-totara forest on alluvium, and (e) titoki-totara forest on alluvium. Manatu, a regionally significant plant species, is present. All of the remnants are small, and with the exception of (d) and (e), are grazed with a sparse understorey. The remnants are isolated from other indigenous remnants on alluvium, with the majority of riverine forest in the area now being dominated by crack willow.

### **WAIOTIRA STREAM FOREST REMNANTS**

Survey no.	Q07/148
Survey date	10 November 2006
Grid reference	Q07 259873 (19 remnants)
Area	24.7 ha
Altitude	80-205 m asl

#### ***Ecological units***

(a) Totara forest on alluvium (60%)

(b) Totara-kahikatea forest on alluvium (25%)

(c) Kahikatea-totara forest on gentle hillslope (10%)

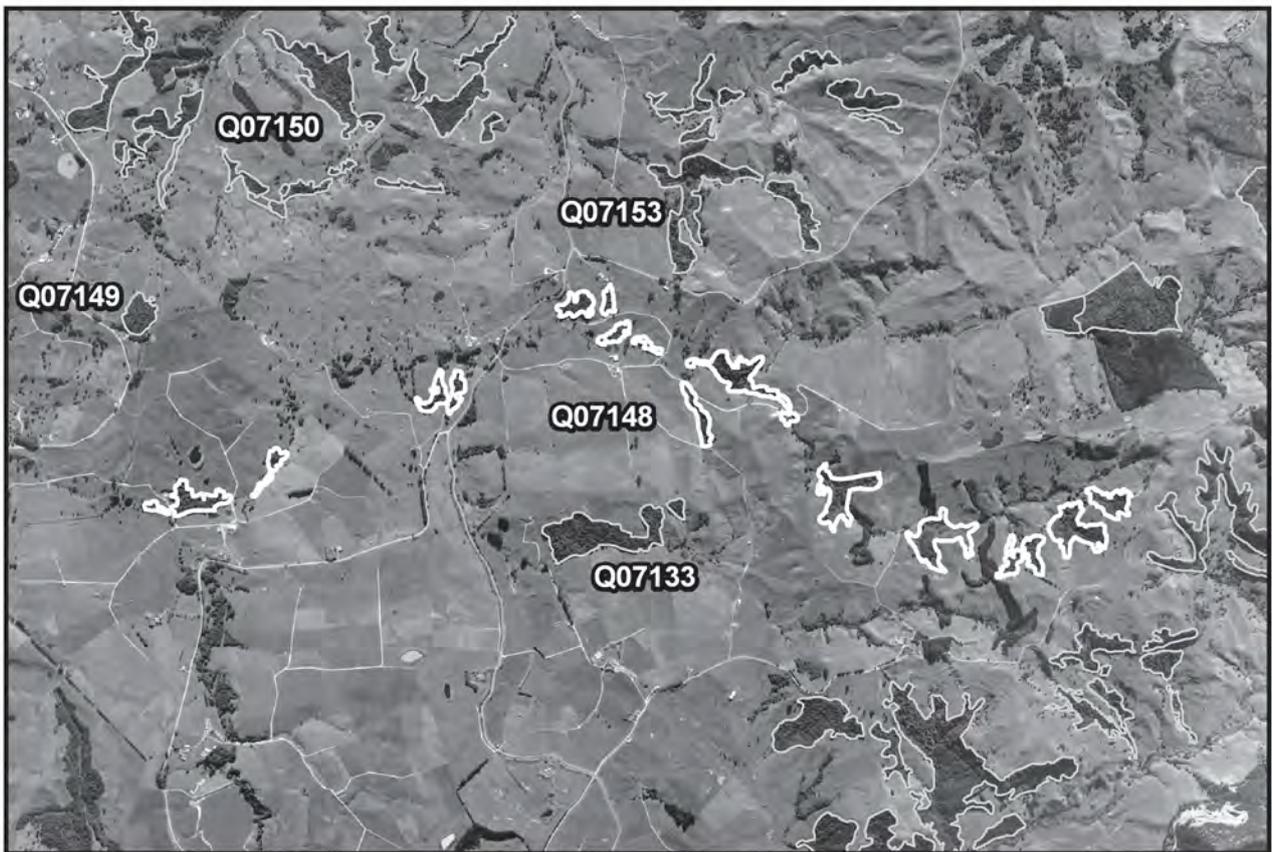
(d) Kauri forest on alluvium (5%)

#### ***Landform/geology***

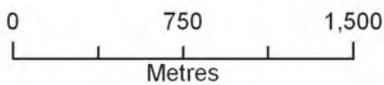
Predominantly gullies and hillslopes on melange (undifferentiated Mangakahia and Motatau Complex lithologies), and Miocene sandy mudstone and bluff-forming sandstone (Waitemata Group), with Holocene valley floor alluvium present locally.

#### ***Vegetation***

This site comprises 19 small riparian forest remnants in the headwaters of the Waiotira Stream. Totara forest (a), with common or frequent kahikatea and kauri, is the most common vegetation type, followed by totara-kahikatea forest (b), and kahikatea-totara forest (c). Rimu, kowhai, kanuka, ti kouka, and rewarewa are occasional. The site is unusual in that it contains kauri forest (d) on alluvium. No

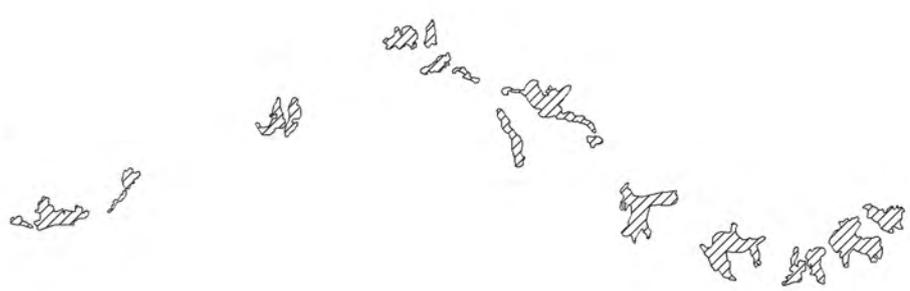


**Q07/148 Waiotira Stream Forest Remnants**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



fences to exclude stock were visible from the road and most if not all of the remnants are probably grazed.

***Fauna***

Not surveyed.

***Significance***

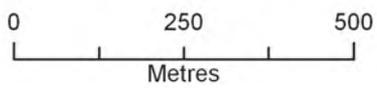
The site is representative for two ecological units: (d) kauri forest on alluvium, which is the only example of this ecological unit in Waipu ED, and (c) kahikatea-totara forest on gentle hillslope. The remnants, which are grazed and generally narrow, provide some riparian protection to the upper reaches of the Waiotira Stream.

## RUSSEK ROAD NATURAL AREA 1

Survey no. Q07/149  
Survey date 10 November 2006  
Grid reference Q07 232880  
Area 1.9 ha  
Altitude 118-134 m asl

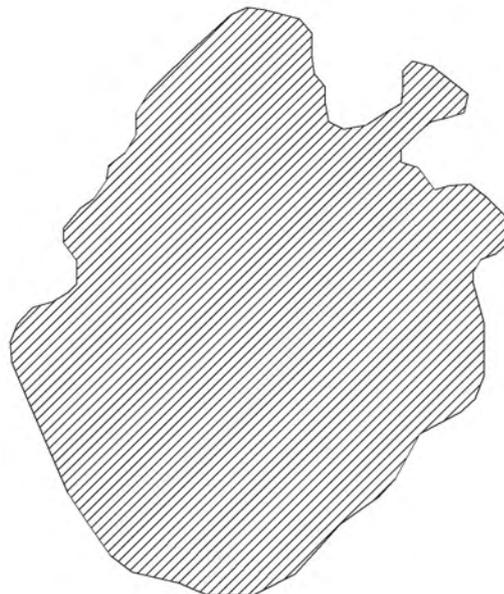


### Q07/149 Russek Road Natural Area 1



#### Habitat Type

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



### ***Ecological units***

(a) Kahikatea-totara forest on gentle hillslope (60%)

(b) Totara-rimu forest on moderate hillslope (40%)

### ***Landform/geology***

Knoll underlain by Oligocene muddy limestone (Mahurangi Limestone, Motatau Complex).

### ***Vegetation***

This site is an isolated, podocarp-dominated remnant adjacent to Russek Road. Kahikatea-totara forest (a) is on the lower slopes of the remnant, with frequent rimu, and occasional ti kouka, kauri, and kanuka. On the upper slopes is totara-rimu forest (b) with occasional kanuka. No mature emergent podocarps are present, suggesting that the forest is secondary. The remnant may have recently been fenced; a fence bounds the upper part of the remnant and tall pasture grasses have grown up between the remnant and the fence.

### ***Fauna***

Not surveyed.

### ***Significance***

This remnant occurs on an uncommon geological unit (Oligocene muddy limestone) and both ecological units, (a) kahikatea-totara forest on gentle hillslope, and (b) totara-rimu forest on moderate hillslope, are representative of their types. The remnant has a sparse understorey but has been fenced recently. Limestone geology and the vegetation it supports is regionally distinctive.

## **RUSSEK ROAD NATURAL AREA 2**

Survey no.	Q07/150
Survey date	10 November 2006
Grid reference	Q07 238889 (14 remnants)
Area	30.3 ha (29.0 ha forest, 0.5 ha shrubland, 0.9 ha wetland)
Altitude	80-140 m asl

### ***Ecological units***

(a) Totara forest on moderate hillslope (47%)

(b) Kanuka-totara forest on moderate hillslope and in gully (17%)

(c) Kahikatea-rimu-totara forest on moderate hillslope (10%)

(d) Totara-kanuka-kahikatea forest in gully (10%)

(e) Kanuka forest in gully (5%)

(f) Raupo reedland in gully (5%)

(g) Manuka shrubland in gully (4%)

(h) Kahikatea-totara treeland in gully (1%)

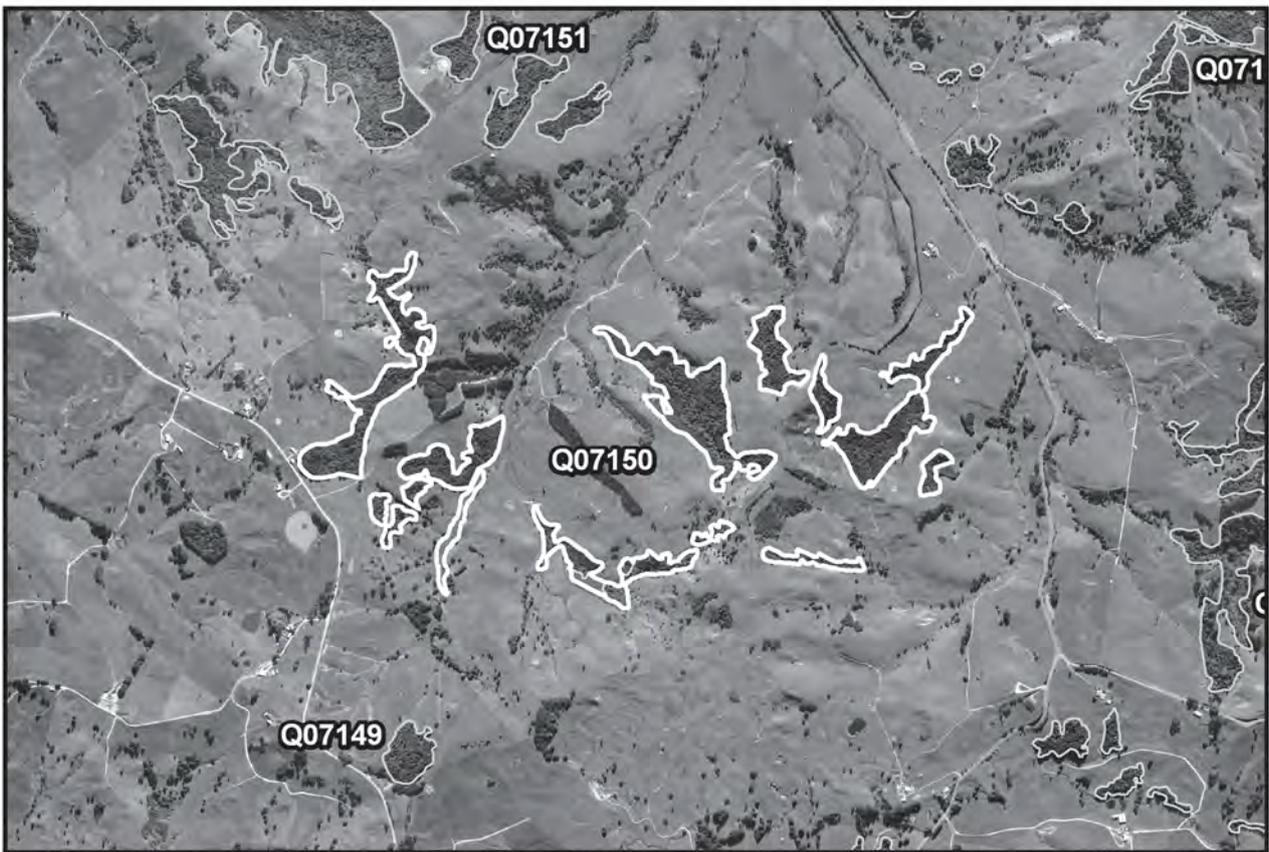
(i) Kauri forest in gully (1%)

### ***Landform/geology***

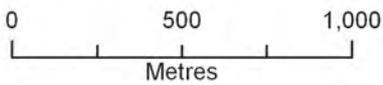
Hillslopes and gullies underlain by Mangakahia Complex mudstone.

### ***Vegetation***

This site comprises a group of small forest and shrubland remnants in gullies and on hillslopes between Russek Road and Paparoa Road. Totara, kanuka, and kahikatea

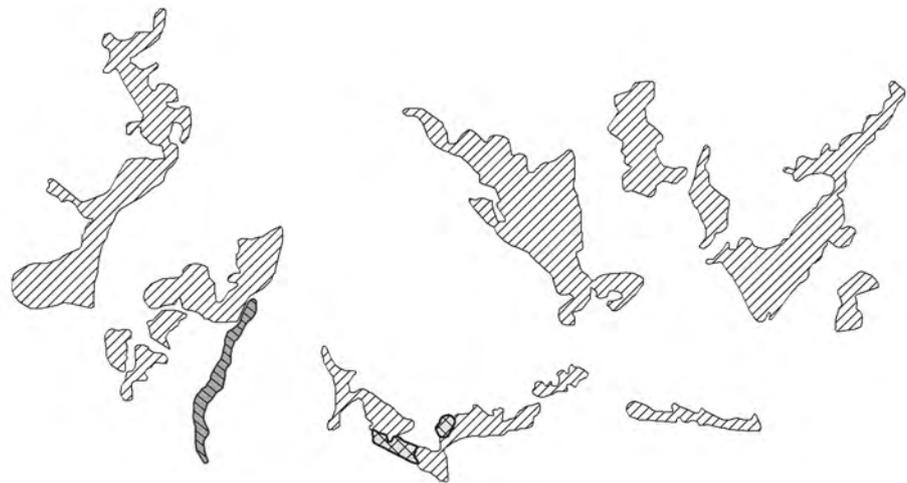


### Q07/150 Russek Road Natural Area 2



#### Habitat Type

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



are the most common species in the forest remnants, with manuka abundant or common in shrubland remnants. Totara forest (a) or kanuka-totara forest (b) is common on the hillslopes. On the upper slopes of the largest remnant, in a north-east facing gully adjacent to Russek Road, is kahikatea-rimu-totara forest (c) with occasional kauri, kanuka, ti kouka, miro, mapou, and tawa. Lower in the gully is totara-kanuka-kahikatea forest (d) with frequent tanekaha, and small areas of kanuka forest (e), kanuka-totara forest (b) and kauri forest (i). A diverse range of other indigenous species occurs occasionally in the gullies including pukatea,

mamaku, mahoe, rewarewa, manuka, titoki, karaka, and lancewood. This remnant is in the process of being fenced as funds become available to the landowner and is currently grazed by young cattle to reduce the impacts on regeneration (Jeremy White pers. comm.). The understorey in the lower gully has localised regeneration of a diverse range of species including houhere, pate, hangehange, nikau, kiekie, gully fern, mamangi, wheki, and ponga.

Visibility of wetlands was poor due to distance from roads or obscuration by taller vegetation. Some of the manuka shrubland (g) may be wetland, and the adjacent wetland is likely to be raupo-reedland (f), based on interpretation of the aerial photography. The kahikatea-totara treeland (h), which has occasional ti kouka and manuka, is grazed and may also be a wetland.

### ***Fauna***

Grey warbler, North Island fantail, shining cuckoo, and Australasian harrier were recorded in this survey.

### ***Significance***

This site has a diverse, healthy canopy and where only lightly grazed an established understorey. The site is representative for all of its ecological units except for (i) kahikatea-totara treeland in gully, which is heavily grazed and has an understorey dominated by pasture species. The small freshwater wetland is significant because natural freshwater wetlands have been greatly reduced in extent in the ED and now only approximately 45 ha of natural or semi-natural wetlands remain.

## **PAPAROA ROAD RIPARIAN FOREST REMNANTS**

Survey no.	Q07/152
Survey date	10 November 2006
Grid reference	Q07 246901 (8 remnants)
Area	5.5 ha
Altitude	60-88 m asl

### ***Ecological units***

- (a) Totara forest on alluvium (45%)
- (b) Kahikatea-totara forest on alluvium (45%)
- (c) Kahikatea forest on alluvium (10%)

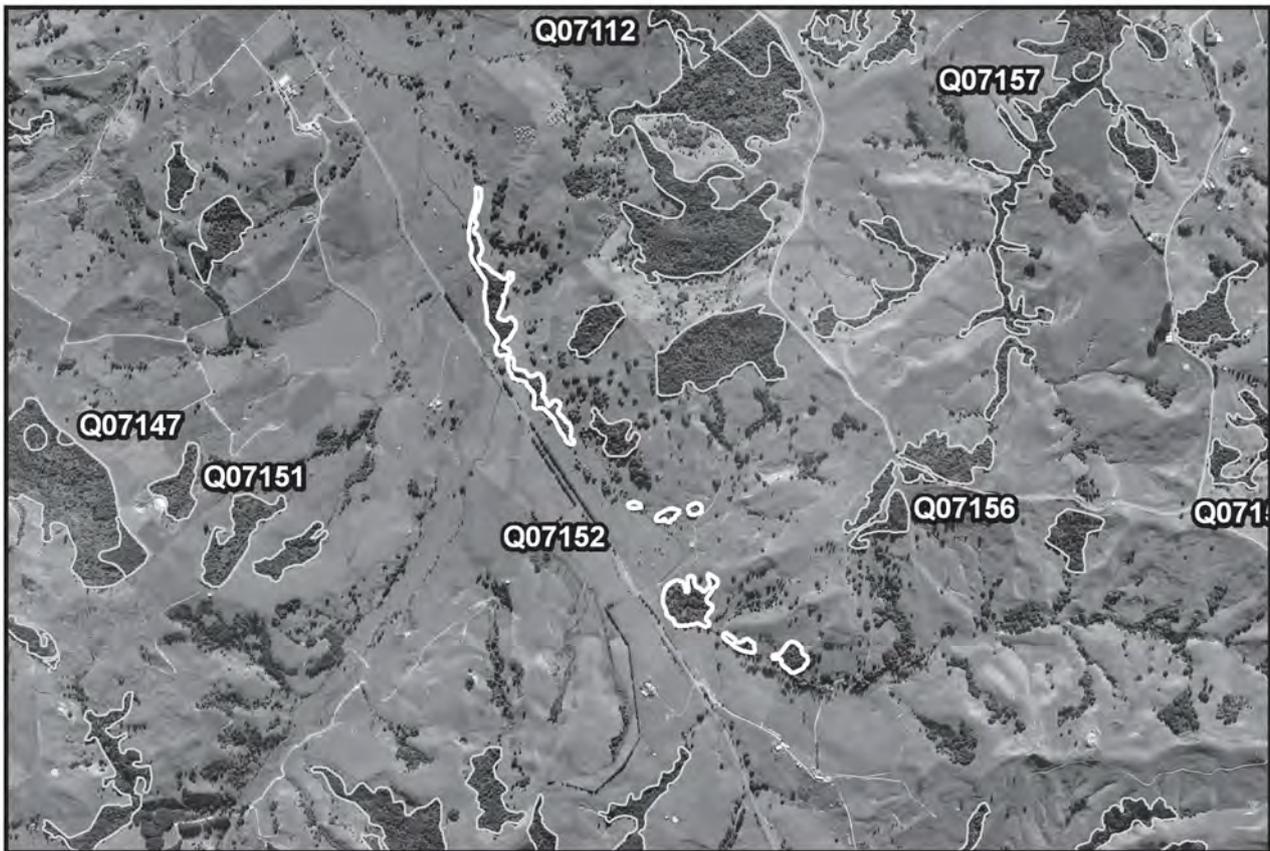
### ***Landform/geology***

Hillslope of Miocene sandy mudstone (Waitemata Group), and valley floor Holocene alluvium.

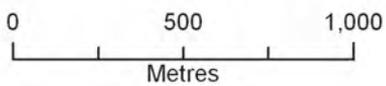
### ***Vegetation***

This site comprises eight small riparian remnants on the banks of a northerly-flowing tributary of the Tauraroa River. The largest and northernmost remnant is a thin band of totara forest approximately 500 m long by 10-80 m wide. Smaller kahikatea-dominated remnants are scattered along the next 1.2 km upstream. The surrounding land use is grazed alluvial flats with scattered kahikatea and totara.

- (a) The largest and northernmost remnant has abundant totara with frequent kahikatea. Matai, ti kouka, kowhai, and titoki are occasional. The remnant is partly fenced with a single wire electric fence and in places has an understorey dominated by nikau, harakeke, and *Coprosma* species.

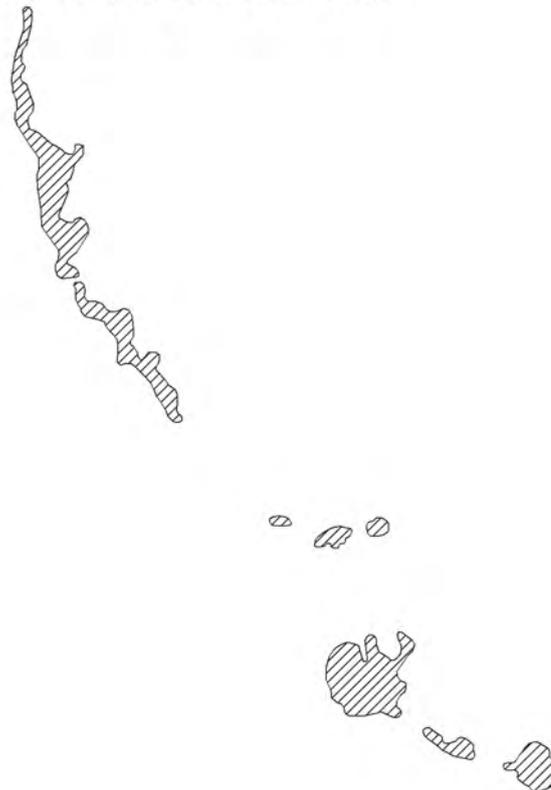


**Q07/152 Paparoa Road Riparian Forest Remnants**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



(b) The three tiny remnants in the central part of the site are dominated by kahikatea with occasional totara. The remnants are heavily grazed with no understorey.

(c) The southernmost remnants are dominated by kahikatea, totara is common, and rimu, titoki, ti kouka, and kanuka are occasional. One flowering kaikomako was seen

on the edge of the remnant closest to the road. The remnants are grazed and arum lily was present in the understorey. Some of the oldest kahikatea probably established prior to human clearance.

#### **Significant flora**

Kaikomako (regionally significant) were recorded in this survey.

#### **Fauna**

Spur-winged plover and Australasian harrier were recorded in this survey.

#### **Significance**

The site is representative for (c) kahikatea on alluvium. One regionally significant plant species (kaikomako) was seen on the edge of one of the kahikatea remnants. This species is very uncommon in Waipu ED. The remnants are all grazed and have a sparse understorey and localised weed infestation. The vegetation provides riparian protection for a tributary of the Tauraroa River.

### **NGATOKA FOREST AND SHRUBLAND**

Survey no.	Q07/158
Survey date	11 November 2006
Grid reference	Q07 278883 (2 remnants)
Area	30.1 ha (27.5 ha forest, 2.6 ha shrubland)
Altitude	120–171 m asl

#### **Ecological units**

- (a) Kanuka forest on gentle to moderate hillslope (92%)
- (b) Manuka-kanuka-ponga shrubland on gentle hillslope (8%)

#### **Landform/geology**

Hillslopes and gullies underlain by Miocene sandy mudstone (Waitemata Group).

#### **Vegetation**

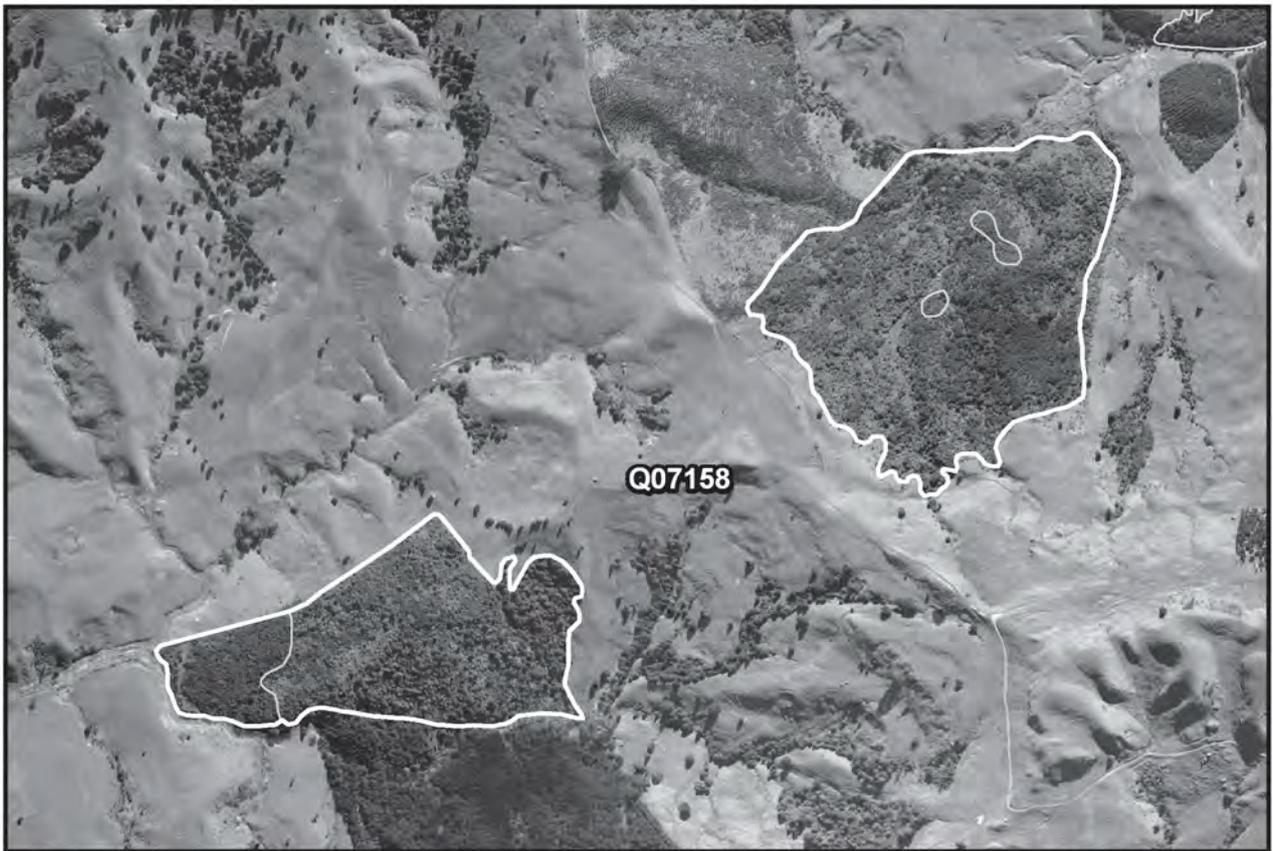
This site comprises of two forest and shrubland remnants approximately 400 m apart. The intervening and surrounding land is covered in pasture, except for the southern edge of the western remnant and the north-western edge of the northern remnant, which adjoin radiata pine forest. Comparison of the aerial photographs with the NZMS 260 Q07 map, produced in 1988, suggests that both of the adjoining forestry areas were formerly indigenous vegetation, and that the area remaining in indigenous vegetation has been reduced by over 50%. From Ruarangi Road a fence is visible adjacent to the northern edge of the western remnant and undergrowth is present; this area of the western remnant is therefore probably either partially fenced or only lightly grazed. No fences were seen adjacent to the eastern remnant and the lack of undergrowth suggests that this remnant is grazed.

(a) Kanuka forest on gentle to moderate hillslopes covers most of the two remnants. Manuka and ponga are frequent, and gorse, totara, pate, mamaku, maritime pine and radiata pine are occasional.

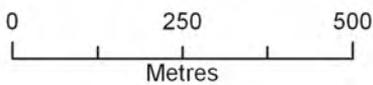
(b) The western edge of the western remnant, and two small patches near the centre of the eastern remnant, is manuka-kanuka-ponga shrubland. Totara is frequent, and kahikatea, mahoe, and ti kouka are occasional.

#### **Fauna**

Not surveyed.

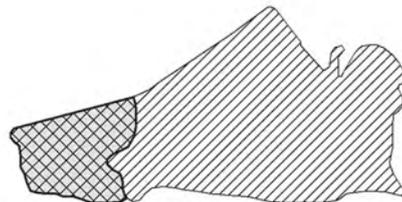
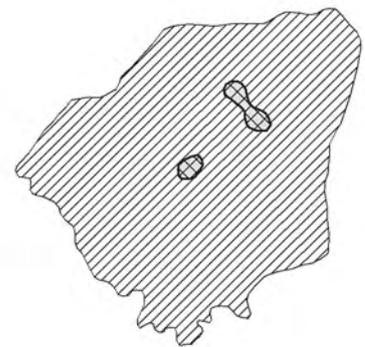


**Q07/158 Ngatoka Forest and Shrubland**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



***Significance***

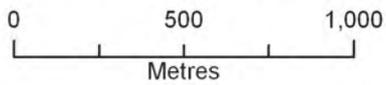
This site contains a small but relatively good quality, weed-free example of an ecological unit which was not recorded elsewhere in Waipu ED and is therefore representative: (b) manuka-kanuka-ponga shrubland. The forest and shrubland remnants provide riparian protection to the upper reaches of two streams. Each remnant is contiguous with pine plantations which would provide some buffering from negative impacts.

## PARRY ROAD FOREST REMNANTS

Survey no. Q07/162  
Survey date 13 November 2006  
Grid reference Q07 289911 (8 remnants)  
Area 30.9 ha  
Altitude 100-145 m asl



### Q07/162 Parry Road Forest Remnants



#### Habitat Type

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



### ***Ecological units***

- (a) Totara forest on moderate hillslope (80%)
- (b) Totara-taraire-kanuka forest on moderate hillslope (15%)
- (c) Kauri forest on ridge (5%)

### ***Landform/geology***

Hillslopes and gullies underlain by Miocene sandy mudstone (Waitemata Group).

### ***Vegetation***

This site comprises a group of forest remnants adjacent to a tributary of the Tauraroa River. At the southern end of the largest remnant there is no roadside fence and the forest is only lightly grazed. At this location the understorey includes small-leaved milktree, putaputaweta, pate, hangehange, mahoe, nikau, ponga, kiekie, hen and chicken fern, gully fern, and tradescantia.

- (a) The majority of the remnants are totara forest. Kanuka is common, kahikatea is frequent, and a diverse range of species are occasional including rewarewa, tanekaha, kauri, ti kouka, puriri, pukatea, mahoe, ponga, taraire, tawa, nikau, and radiata pine.
- (b) Near the southern end of the largest remnant the hillslope supports a diverse podocarp-broadleaf forest with totara, taraire, and kanuka more or less equally common and frequent kahikatea and rewarewa. Occasional species include tanekaha, titoki, kauri, mamaku, ponga, nikau, tawa, puka, lancewood, ti kouka, kohekohe, mapou, pate, and mahoe.
- (c) On a ridge above forest type (b) is a small kauri ricker stand with frequent kanuka and occasional rewarewa, totara, ponga, and kiekie.

### ***Fauna***

Kukupu (Gradual Decline), shining cuckoo, tui, North Island fantail, and Australasian harrier were recorded during this survey.

### ***Significance***

The vegetation in this site has a diverse, healthy canopy, and at the southern end, has an established understorey. There is an infestation of tradescantia within part of the largest remnant. The remnants provide riparian protection to a tributary of the Tauraroa River, and link Q07/114 with Q07/137 and Q07/116. The remnants provide habitat for one threatened bird species (kukupu).

## **POHUENUI RIVER FOREST REMNANTS**

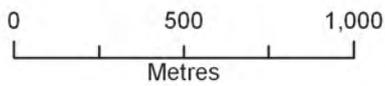
Survey no.	Q07/163
Survey date	15 November 2006
Grid reference	Q07 389830 (21 remnants)
Area	49.1 ha
Altitude	20-40 m asl

### ***Ecological units***

- (a) Totara treeland on alluvium (88%)
- (b) Totara-kanuka forest on alluvium (8%)
- (c) Totara-taraire-kanuka treeland on alluvium (2%)
- (d) Puriri-totara treeland on alluvium (2%)



**Q07/163 Pohuenui River Forest Remnants**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



***Landform/geology***

Stream channels containing Holocene alluvium, cut into Late Pleistocene (last interglacial) constructional terrace on alluvial and/or estuarine deposits.

***Vegetation***

This site comprises a group of riparian forest remnants in the Pohuenui River and North River catchments. The remnants are typically narrow and linear in shape with a grazed understorey dominated by exotic pasture grasses and herbaceous weeds.

(a) Most of the remnants are treeland with abundant totara and frequent kanuka. A diverse range of indigenous species are occasional including titoki, manatu, kowhai, ti kouka, puriri, karaka, *Haloragis erecta*, and karaka. Occasional exotic species present include hawthorn, Chinese privet, crack willow, poplar, radiata pine, Kahili ginger and elephant's ear. On the edges of this forest type, or where the canopy is sparse, wild carrot, creeping buttercup, tall fescue, and kikuyu grass are frequent. One small area of this forest type is fenced to exclude cattle.

(b) To the south of McKay Road is a small remnant of totara-kanuka forest with occasional ponga.

(c) A small area is totara-taraire-kanuka treeland with occasional manatu, poplar, karaka, and puriri. Perennial ryegrass is common in well-lit areas.

(d) The northern edge of the southernmost remnant grades into a thin band of indigenous treeland. Mature puriri are abundant, totara is common, and kohekohe, karaka, ti kouka, and coral tree are occasional.

#### **Significant flora**

Manatu (regionally significant).

#### **Fauna**

Not surveyed.

#### **Significance**

The remnants are mostly grazed and narrow, resulting in an understorey dominated by pasture grasses and herbaceous weeds. Localised infestations of exotic weeds such as hawthorn, crack willow, poplar, and kahili ginger occur throughout the site, however forest on alluvium is a rare habitat type in this ED. The remnants are habitat for one regionally significant plant species (manatu). A small area of one remnant (0.2 ha) is included within an esplanade reserve (WDC-administered).

### **NORTHLAND PORT CORPORATION PONDS**

Survey no.	Q07/164
Survey date	17 November 2006
Grid reference	Q07 443945
Area	3.8 ha
Altitude	sea level

#### **Ecological units**

(a) Lake clubrush reedland in constructed pond (85%)

(b) *Juncus pallidus* rushland in constructed pond (10%)

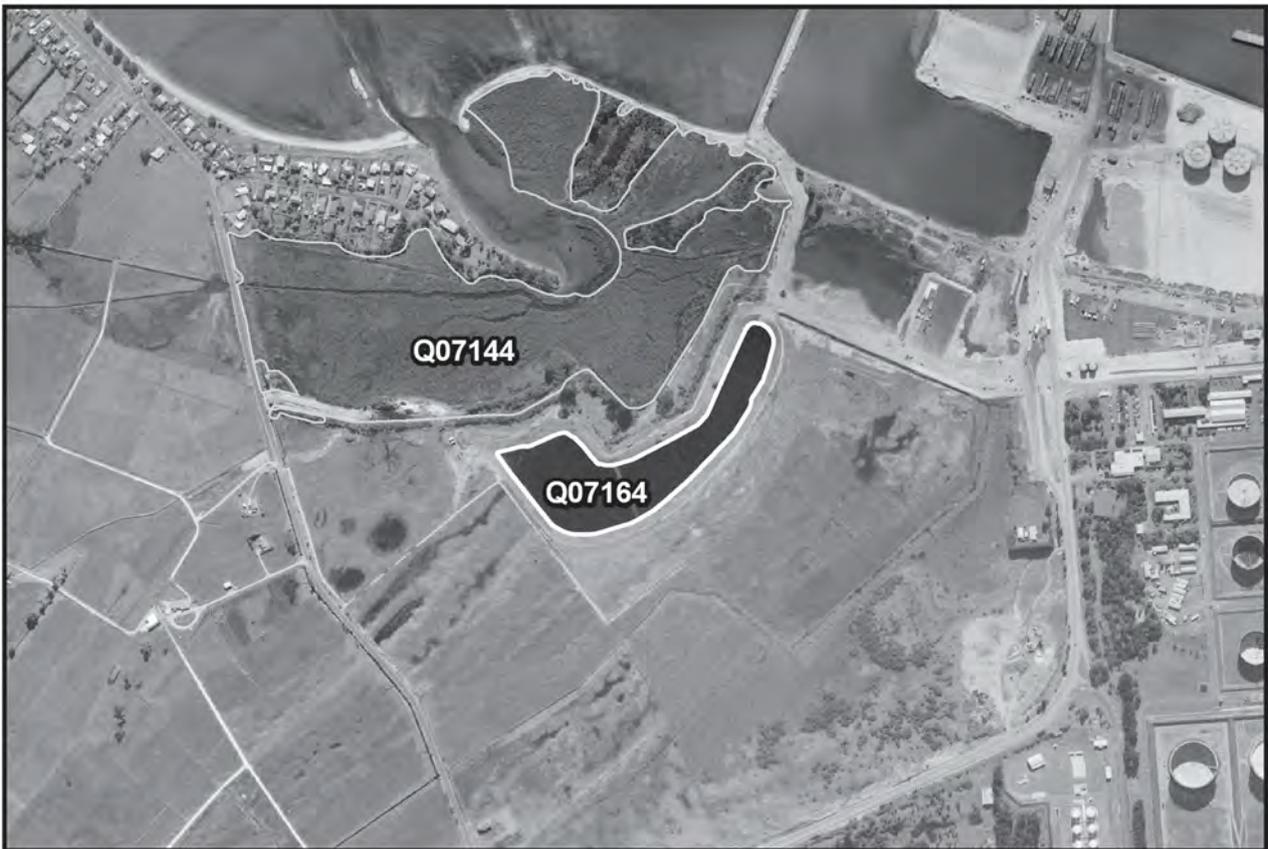
(c) Open water in constructed pond (5%)

#### **Landform/geology**

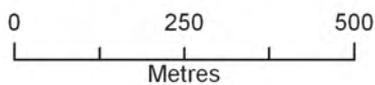
Human-made (on Holocene coastal dunefield).

#### **Vegetation**

This site is a recently constructed pond built for the treatment of stormwater from the adjacent port facilities. The surrounding land is mown grassland and a recreational reserve with mown lawns and recent plantings of indigenous trees and shrubs. Water levels in the pond were low at the time of survey and only a small area was open water. Comparison of the site at the time of survey with the aerial photographs flown in

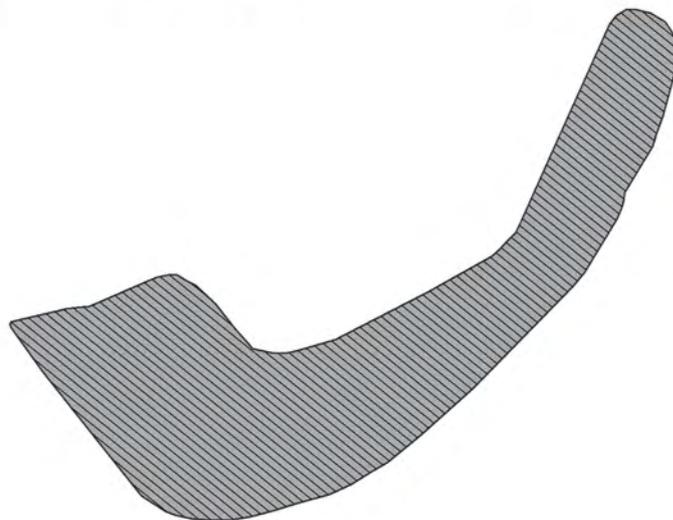


### Q07/164 Northland Port Corporation Ponds



#### Habitat Type

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



January 2004 indicates that the water levels of the site fluctuate significantly, and when the pond is full of water all of the vegetation types recorded in this survey would be submerged. The site was surveyed from the adjacent reserve; additional species are likely to be recorded by a detailed, walk-through survey.

(a) The majority of the pond is covered in lake clubrush reedland, with frequent or occasional *Juncus pallidus* and occasional *Eleocharis acuta*. Recently established manuka less than 1 m tall are present on the higher margins.

(b) *Juncus pallidus* rushland with occasional tarweed occurs within a small area of the pond.

(c) Near the western end of the pond is a small area of open water (a black-backed gull standing in the water indicated that the water was very shallow).

### ***Fauna***

Black shag (Sparse), black-backed gull, welcome swallow, white-faced heron and Australasian harrier were recorded during this survey. Two Australasian bitterns (Nationally Endangered) were observed here in 2006 (Margaret Hicks pers. comm.). Flocks of up to 68 grey teal (regionally significant) have been seen on these ponds (Beauchamp and Parrish 1999).

### ***Significance***

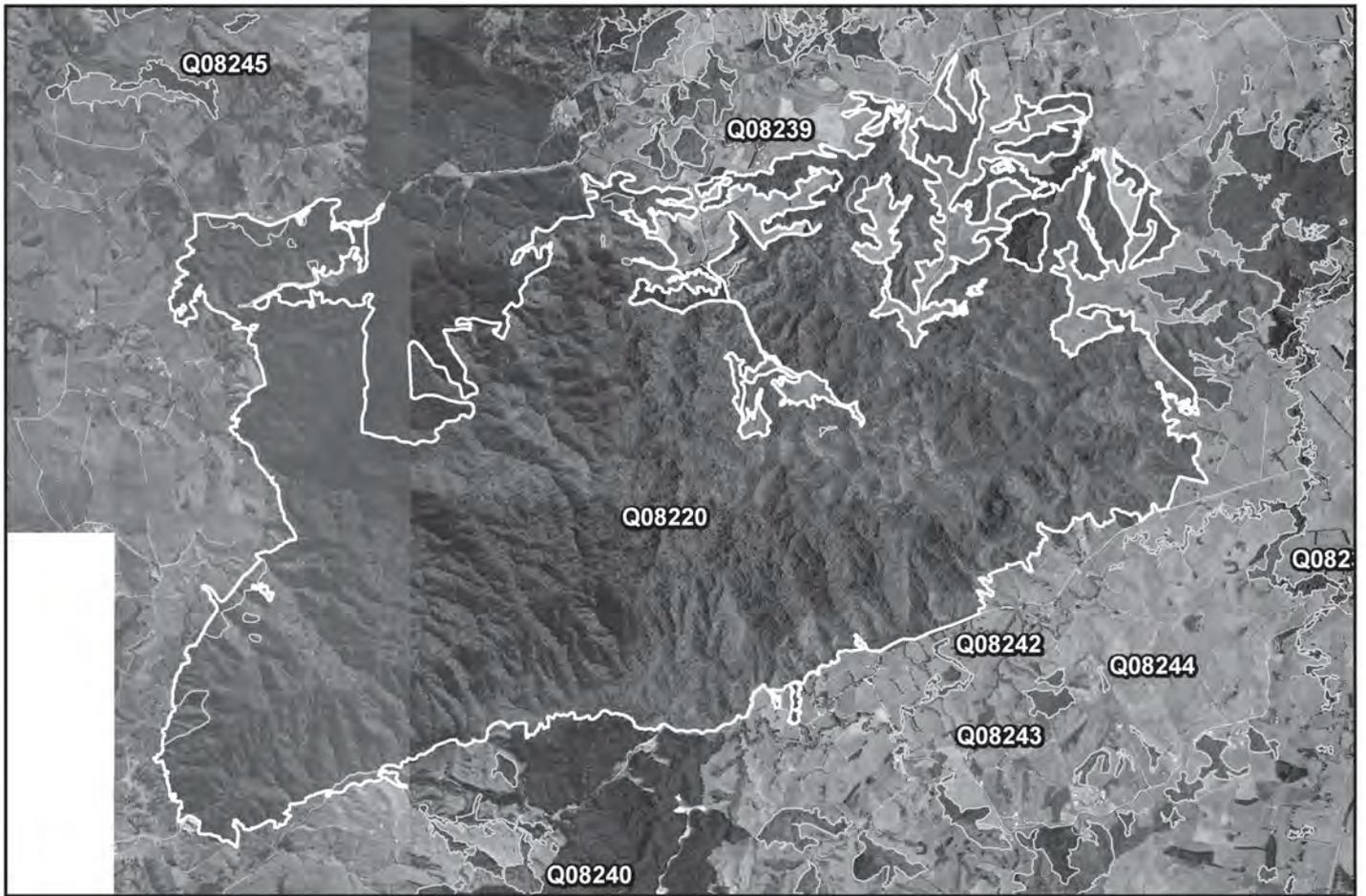
The site provides important habitat for three threatened bird species (Australasian bittern, black shag, and grey duck). The ponds have been recently constructed and are subject to extreme fluctuations in water level. However, the vegetation is dominated by indigenous species, and is representative for the ecological unit (a) lake clubrush reedland in constructed pond.

## **MARERETU FOREST**

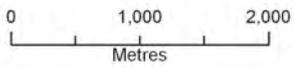
Survey no.	Q08/220
Survey date	8/14 November 2006
Grid reference	Q08 326767 (10 remnants)
Area	2,820.3 ha (2,779.1 ha forest, 41.2 shrubland, 0.1 ha wetland)
Altitude	26–280 m asl

### ***Ecological units***

- (a) Kanuka forest on moderate hillslope (35%)
- (b) Rimu forest on ridge (20%)
- (c) Taraire–mamaku–rimu–rewarewa–totara forest on steep to moderate hillslope (20%)
- (d) Kauri–kanuka forest on moderate hillslope (4%)
- (e) Mamaku–mahoe shrubland in gully (3%)
- (f) Taraire forest on moderate hillslope and in gully (3%)
- (g) Tanekaha forest on moderate hillslope (2%)
- (h) Mapou–mingimingi–ponga shrubland on ridge (2%)
- (i) Manuka shrubland on ridge (2%)
- (j) Totara forest on moderate hillslope (2%)
- (k) Taraire–totara forest on moderate hillslope (2%)
- (l) Towai forest on gentle hillslope (2%)
- (m) Mamaku forest on moderate hillslope (1%)
- (n) Kanuka–manuka shrubland on ridge (<1%)
- (o) Mapou–manuka shrubland on steep hillslope (<1%)
- (p) Kahikatea forest on alluvium (<1%)
- (q) Raupo reedland on alluvium (<1%)

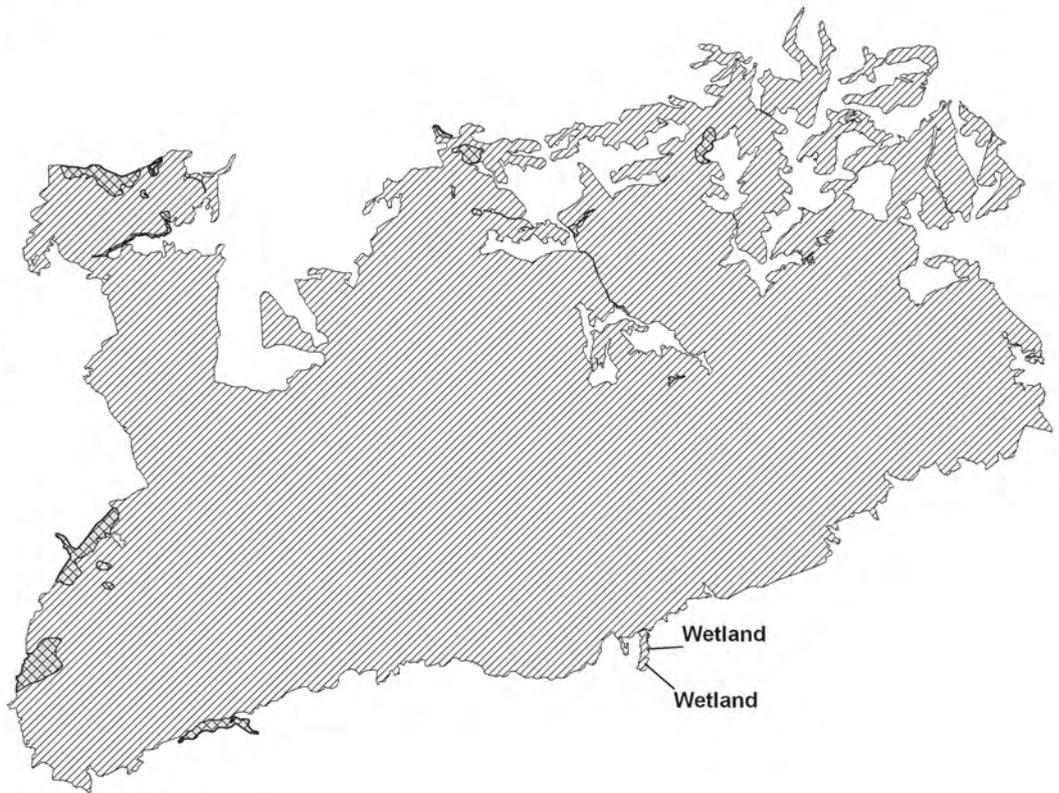


**Q08/220 Mareretu Forest**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



### ***Landform/geology***

Dissected hill country predominantly underlain by Mesozoic greywacke (Waipapa Terrane), with Eocene glauconitic sandstone (Ruatangata Sandstone, Te Kuiti Group) and Miocene sandy mudstone (Waitemata Group) present locally. Small areas of Holocene alluvium are present in this site at the base of a prominent fault scarp running along the northern side of Finlayson's Brook and Kaikowhiti Stream (e.g., Q08 338748, Q08 301741).

### ***Vegetation***

This site is the largest contiguous area of indigenous vegetation remaining in Waipu ED.\* The eastern side of the forest where it adjoins Ahuroa Road Forest, and the northern side of the forest, between the 350 and 338 m highpoints and Millbrook Road, is primarily kanuka forest (a) with frequent mamaku and occasional kauri, puriri, rimu, mapou, tanekaha, totara, kahikatea, pate, and kohuhu. This vegetation type probably regenerated following attempts to farm the area. Interspersed throughout the northern and eastern areas of the forest, on steeper slopes or in gullies, are patches of kauri-kanuka forest (d), tanekaha forest (g), and taraire forest (f), and adjacent to the roads or on ridges there are areas of kanuka-manuka shrubland (n), mapou-mingimingi-ponga shrubland (h) and manuka shrubland (i). The highest altitude ridges, particularly along the tops of the southern face, often comprise remnants of the original forest cover, typically rimu forest (b) with frequent kauri, totara, and kahikatea. Taraire, mamaku, rewarewa, pate, and large emergent northern rata are occasional. The rimu are also large emergent trees.

On the western and north western slopes of Mareretu Forest are patches of secondary totara forest (j) with occasional kahikatea, rewarewa, nikau, and ponga, and on the steep south-western slopes are patches of mapou-manuka shrubland (o) with frequent mamaku and totara and occasional kanuka, ti kouka, rewarewa, and tanekaha. On the lower south-western slopes are small areas of taraire-totara forest (k) with frequent rewarewa and tanekaha, and occasional miro, nikau, mamaku, rimu, and kauri.

The moderate to steep hillslope of the southern face, between the 350 and 338 m high points and Finlayson's Brook Road, is mostly covered in diverse podocarp-broadleaf forest (c). Taraire, mamaku, rewarewa, rimu and totara are frequent, and northern rata, nikau, kauri, pate, puka, towai, pukatea, kohekohe, and ponga are occasional. The southern face also has small areas of mamaku forest (m) and taraire forest (f). Towai forest (l) with frequent kahikatea or mamaku-mahoe shrubland (e) is present on the gentler lower slopes adjacent to Finlayson's Brook Road. On the alluvial flats adjacent to Finlayson's Brook, and sometimes contiguous with the larger forest remnant, are small areas of raupo reedland (q) and kahikatea forest (p).

### ***Significant flora***

Northern rata (regionally significant) was recorded during the present survey. Mida (Gradual Decline), kawaka (Sparse), *Nematoceras rivulare* (Data Deficient), gully tree fern (regionally significant), and *Coprosma rigida* (regionally significant) were recorded in 2001 (SSBI Q08/H001). *Hebe macrocarpa* var. *macrocarpa* (regionally significant) was recorded in 1999 (AK 248072). There are also reports of hard beech (regionally significant) in this area (Lisa Forester, NRC, pers. comm.).

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\* Whilst the Brynderwyn Hills Forest Complex (Q08/225) is slightly larger (3,278.1 ha), it comprises many separate areas of indigenous vegetation linked by pine plantations.

### ***Fauna***

Kukupa (Gradual Decline), Australasian harrier, grey warbler, silvereye, and tui were recorded during this survey. Tomtit (regionally significant), NZ kingfisher, North Island fantail, kauri snail (Gradual Decline), longfin eel (Gradual Decline), banded kokopu (regionally significant), common bully, torrentfish, koura, freshwater limpet, Hochstetter's frog (Sparse) and cave weta were recorded in 2000/2001 (SSBI Q08/H001). Pukeko, morepork, welcome swallow, the beetle *Uloma tenebrionoides*, carabid beetles, tree weta, the spider *Cambridgea* sp., and the land snails *Liarea turriculata*, *Therapsiella* sp. (*T. celinde* or *T. tamora*), *Cytora torquilla*, and *Cytora cytora* were recorded in 1992 (SSBI Q08/H001). Grey duck (Nationally Endangered) were present in 1978 (SSBI Q08/H001) but have not been recorded since. There are recent records of the land snails *Schizoglossa worthyae* (Serious Decline) (Brook 2002) and *Amborhytida dunniae* (Gradual Decline) (Fred Brook pers. comm. 2007).

Surveys of Hochstetter's frog in Mareretu Forest in 1992 and 1994, found frogs at 25 sites (up to 16 frogs present at each site) (DOC 2007). Hochstetter's frog was most abundant in a tributary of Finlayson's Brook draining a steep, southern-east facing slope and at this site four frogs were found per 100 m of stream (Parrish 1993b).

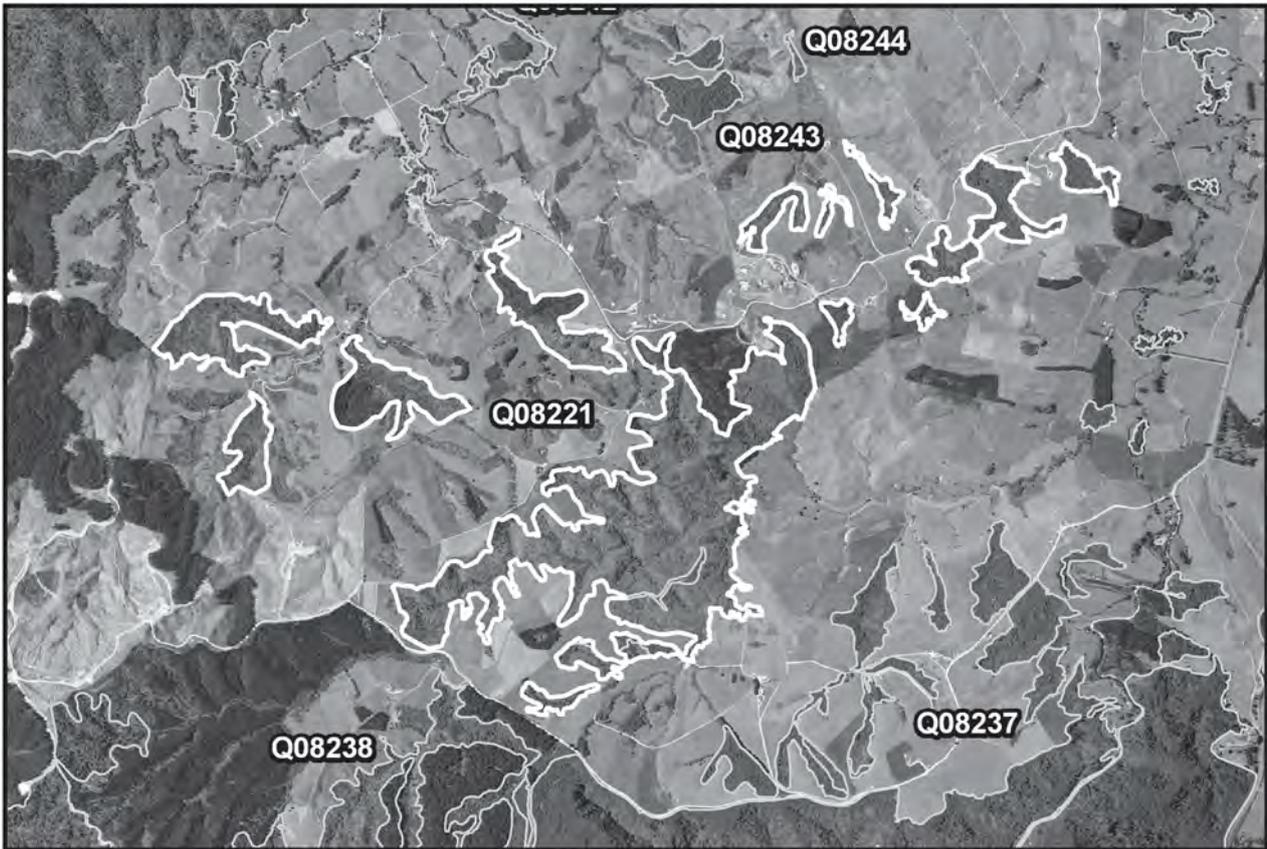
Longfin eel (Gradual Decline) and koura have been recorded in streams throughout Mareretu Forest between 1981 and 2004. Common bully was present in a tributary of Mill Brook in 1994, and Cran's bully and redfin bully were present in a tributary of Finlayson's Brook in 1992 and 2004 respectively (NIWA 2007).

### ***Significance***

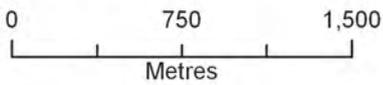
Mareretu Forest contains the largest area of indigenous forest and the third largest area of indigenous shrubland in Waipu ED. The site has a diverse, healthy canopy, and includes areas of mature forest with emergent podocarps. Grazing by stock appears to be restricted to the edges of the remnant adjacent to pasture. The site is representative for all of its ecological units except (p) kahikatea forest on alluvium. This ecological unit was on the edge of the site, was very small in extent, and grazed by stock. The site is habitat for seven threatened fauna species (kukupa, kauri snail, longfin eel, Hochstetter's frog, grey duck, *Schizoglossa worthyae*, *Amborhytida dunniae*), two regionally significant fauna species (tomtit, banded kokopu), three threatened plant species (mida, kawaka, *Nematoceras rivulare*), and five regionally significant plant species (northern rata, gully tree fern, *Coprosma rigida*, *Hebe macrocarpa* var. *macrocarpa*, and hard beech). Mareretu Forest provides linkages between many smaller remnants around its periphery, and provides catchment protection for several rivers and streams. 1321.3 ha of this site is within the Mareretu Conservation Area (DOC-administered) and 0.8 ha is within a Marginal Strip (DOC-administered).

## **BROOKS ROAD FOREST AND SHRUBLAND**

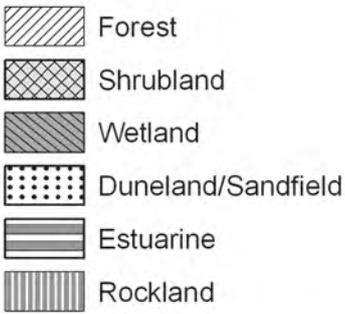
Survey no.	Q08/221
Survey date	12 November 2006
Grid reference	Q08 355733 (18 remnants)
Area	168.8 ha (165.6 ha forest, 3.2 ha shrubland)
Altitude	40-160 m asl



**Q08/221 Brooks Road Forest and Shrubland**



**Habitat Type**



***Ecological units***

- (a) Mamaku forest on moderate hillslope (66%)
- (b) Totara-mamaku forest on moderate hillslope (10%)
- (c) Totara-kahikatea forest on moderate hillslope (10%)
- (d) Kanuka forest on moderate hillslope (8%)
- (e) Kanuka-rimu forest on moderate hillslope (3%)

- (f) Manuka shrubland on moderate hillslope (2%)
- (g) Ti kouka-putaputaweta-manuka shrubland in gully (<1%)
- (h) Raupo reedland in gully (<1%)

### ***Landform/geology***

Hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane) and Miocene sandstone and mudstone (Waitemata Group).

### ***Vegetation***

This site comprises one large and many small forest and shrubland remnants in the Ahuroa River catchment. The majority of the site is secondary forest with extensive areas of mamaku forest (a), and smaller patches of totara mamaku forest (b), totara-kahikatea forest (c), kanuka forest (d), and kanuka-rimu forest (e). Occasional taraire, puriri, nikau, rimu, kahikatea and rewarewa scattered throughout the younger forest are presumably survivors from the former vegetation. A small area of manuka shrubland (f) has frequent ponga and totara, and occasional kanuka, kahikatea, rimu, to kouka, and mamaku. In a gully in the easternmost remnant is a small raupo reedland (h) with occasional kahikatea and gorse. Adjacent to this wetland is a small area of ti kouka-putaputaweta-manuka shrubland (g) with occasional kahikatea and wheki. Most of the remnants appear to be grazed.

### ***Fauna***

Shining cuckoo was recorded during this survey. This site is located between Mareretu Forest (Q08/220), Waipu Gorge Forest Remnants (Q08/222), and the Brynderwyn Hills Forest Complex (Q08/225), which are all important Hochstetter's frog habitats, and it may contain Hochstetter's frogs in the more unmodified parts of the Ahuroa River catchment (Peter Anderson, DOC, pers. comm.).

### ***Significance***

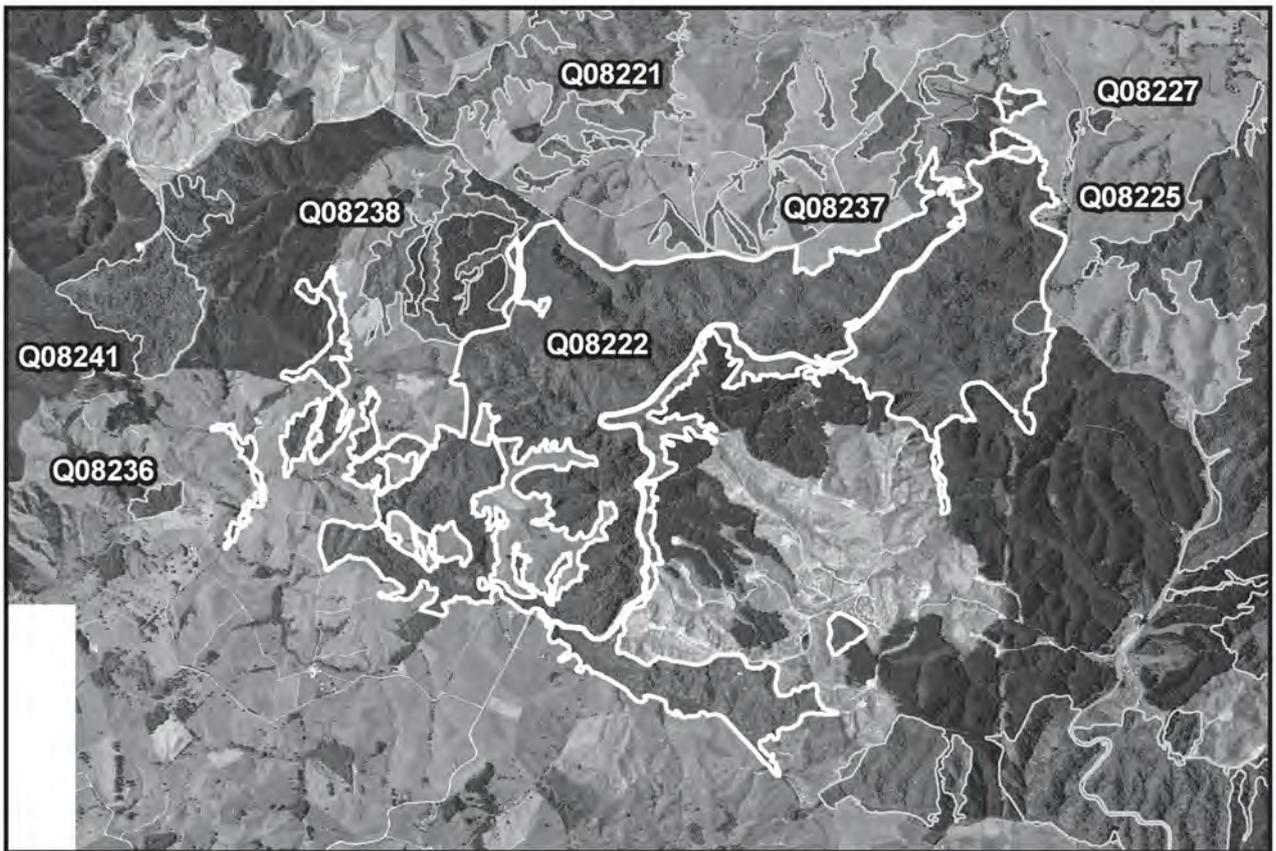
This site is representative for three ecological units: (a) mamaku forest on moderate hillslope, which covered the majority of the site, (c) totara-kahikatea forest on moderate hillslope, and (g) ti kouka-putaputaweta-manuka shrubland in gully, which has not been recorded elsewhere in Waipu ED. Most of the remnants are grazed and there are localised infestations of gorse on the edges. The remnants provide riparian protection to the upper reaches of streams in the Ahuroa River catchment.

## **WAIPU GORGE FOREST REMNANTS**

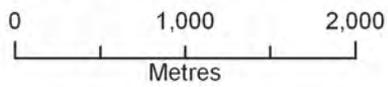
Survey no.	Q08/222
Survey date	12 November 2006
Grid reference	Q08 361708 (15 remnants)
Area	543.7 ha (539.1 ha forest, 4.5 ha shrubland, 0.1 ha wetland)
Altitude	40-280 m asl

### ***Ecological units***

- (a) Kanuka-mamaku forest on moderate hillslope (25%)
- (b) Taraire forest on moderate hillslope and in gully (25%)
- (c) Mamaku-mapou forest on moderate hillslope and in gully (10%)
- (d) Kanuka-rimu forest on ridge (10%)
- (e) Totara forest on moderate hillslope (8%)
- (f) Kauri-tanekaha forest on moderate hillslope (5%)

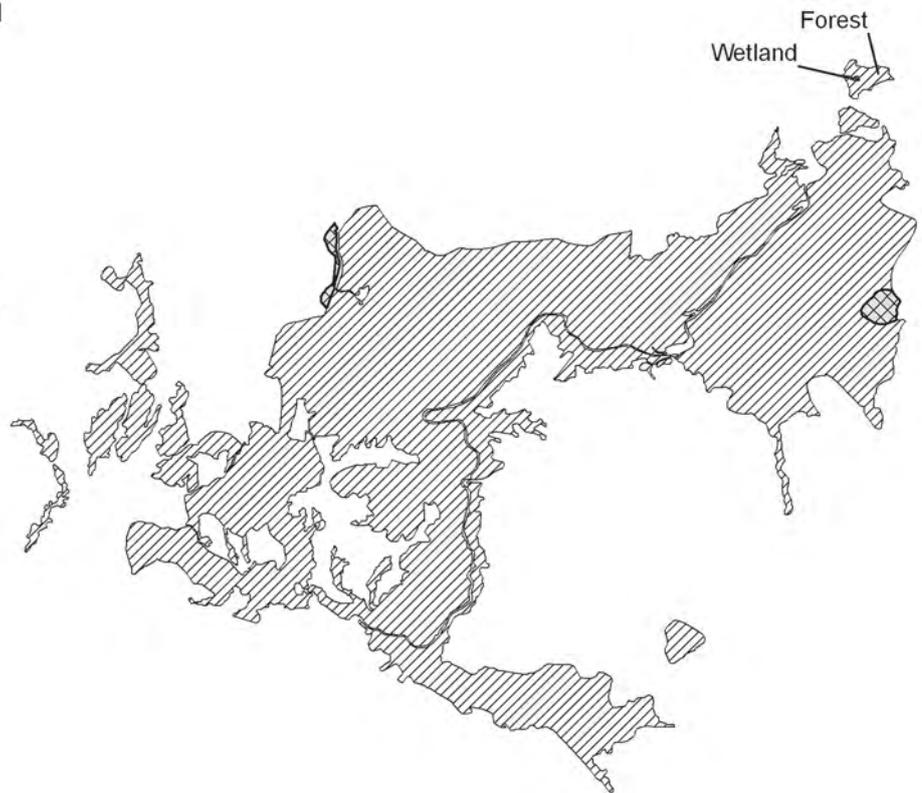


**Q08/222 Waipu Gorge Forest Remnants**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



- (g) Mahoe-mamaku forest in gully (5%)
- (h) Kanuka-tanekaha forest on gentle hillslope (5%)
- (i) Kanuka-tanekaha-rewarewa forest on moderate hillslope (2%)
- (j) Kauri forest on gentle hillslope (2%)
- (k) Manuka shrubland on ridge (2%)
- (l) Nikau forest on alluvium (<1%)
- (m) *Carex lessoniana*-kahikatea sedgeland on alluvium (<1%)

### **Landform/geology**

Hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane) and Miocene sandstone and mudstone (Waitemata Group), with Holocene alluvium on the valley floor in the lower part of Waipu Gorge.

### **Vegetation**

This site comprises forest and shrubland remnants in the upper Ahuroa River catchment in the area known as Waipu Gorge. The site contains many vegetation types, according to topography, aspect and disturbance history. The remnants are connected by radiata pine forest to the Brynderwyn Hills Forest Complex (Q08/225) to the east.

Most of the vegetation is secondary, with kanuka-rimu forest (d) or manuka shrubland (k) often occurring on ridges or hillslopes, and mamaku-mapou forest (c) in gullies or where the forest adjoins radiata pine forestry. On the south and east facing slopes to the west of Waipu Gorge Road are areas of kanuka-mamaku forest (a), kauri-tanekaha forest (f), and taraire forest (b). Taraire forest (b), with frequent pukatea, rewarewa, tawa and nikau, is also common on the banks of the Ahuroa River; and disturbed areas beside the river and road are often mahoe-mamaku forest (g), with frequent pate and kanuka. Nikau-forest (l), with frequent pigeonwood, pate, ponga, and mahoe, occurs in places on the small alluvial flats that are adjacent to the river. The northern most remnant is mostly kanuka dominated forest, but the flat-bottomed gully floor is *Carex geminata*-kahikatea sedgeland (m). Wheki is frequent, and occasional species include mamaku, pate, ti kouka, kiekie, kanuka, tree fuchsia, tradescantia, and arum lily. The wetland and forest is fenced to exclude stock and has a dense understorey.

### **Significant flora**

Kawaka (Sparse), *Brachyglottis kirkii* var. *angustior* (regionally significant), tree fuchsia (regionally significant), and *Hebe macrocarpa* var. *macrocarpa* (regionally significant) recorded in 1997 (DOC internal files 1997). Northern rata (regionally significant) recorded in 1992 (SSBI Q08/H020), *Doodia mollis* (Sparse) recorded in 1985 (AK 175781), *Halocarpus kirkii* (Sparse) in 2006 (AK 295324), *Loxsonoma cunninghamii* (regionally significant) in 1985 (AK 176354), carmine rata (regionally significant) in 1933 (AK 102216), and *Epacris pauciflora* var. *pauciflora* (regionally significant) in 2006 (AK 295325). *Oxalis magellanica* (regionally significant) was recorded in the current survey (AK 297992).

### **Fauna**

Kukupu (Gradual Decline), morepork, NZ kingfisher, grey warbler, North Island fantail, silvereye, tui, Hochstetter's frog (Sparse), banded kokopu (regionally significant), *Peripatus* sp. (Range Restricted), giraffe weevil, giant cave weta, tree weta, green chafer beetle, carabid beetles, spiders (*Aranea* sp. and *Cambridgea* sp.),

common bully and koura were recorded in 1992 (SSBI Q08/H020). Additionally, Australasian harrier was recorded in 1997 (DOC internal files 1997). *Schizoglossa worthyae* (Serious Decline) and *Punctidae* sp. 164 (Range Restricted) recorded by Brook (2002), and *Amborhytida dunniiae* (Gradual Decline) has also been recorded (Fred Brook pers. comm. 2007). Auckland green gecko (Gradual Decline) recently seen by road workers while clearing vegetation (DOC internal files 1997). Surveys for Hochstetter's frog in 1992 and 1993 found frogs at 13 sites in Waipu Gorge (up to 7 frogs at each site) (DOC 2007).

Banded kokopu (regionally significant), koura, and unidentified eel and bully species were recorded in an eastern tributary of Ahuroa River in 1992 and 1993 (NIWA 2007).

### **Significance**

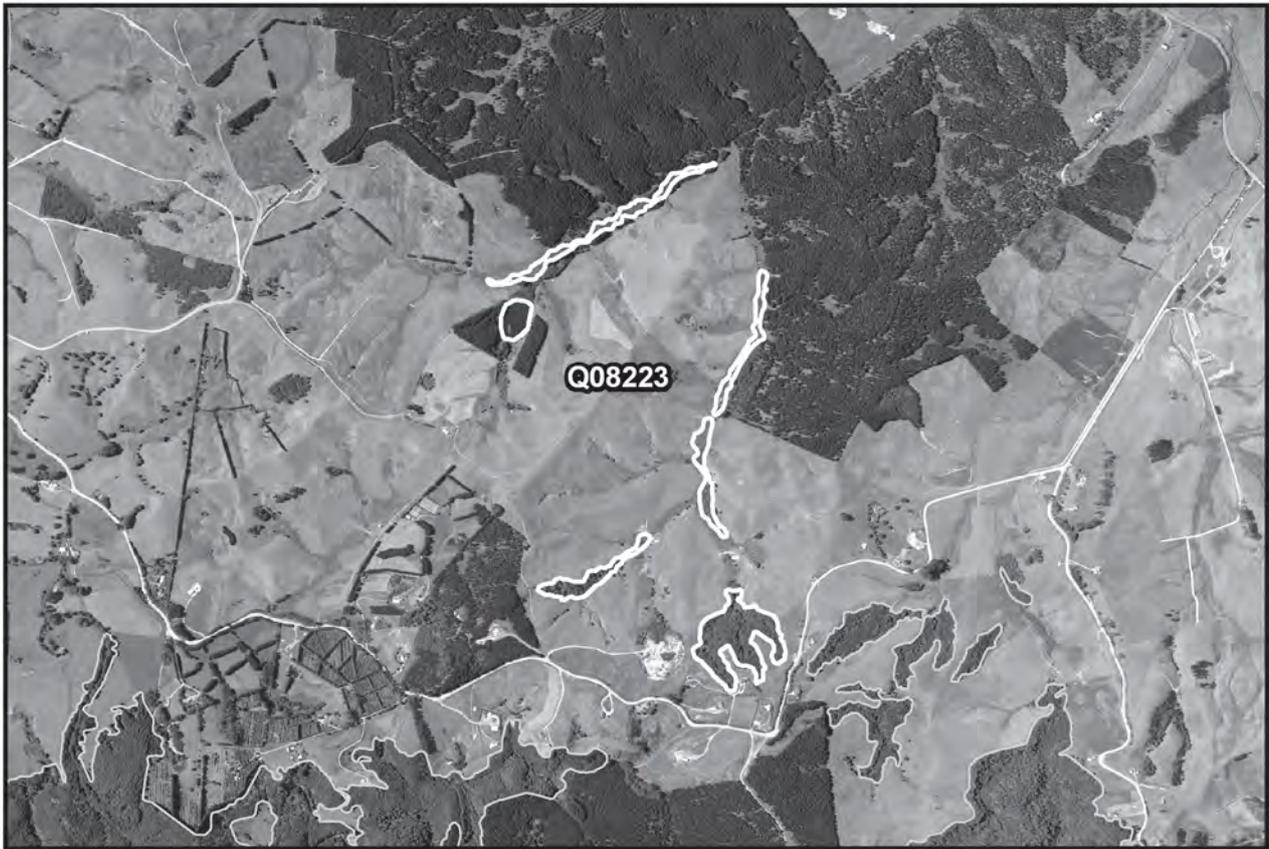
The site is representative for nine ecological units: (a) kanuka-mamaku forest on moderate hillslope, (c) mamaku-mapou forest on moderate hillslope and in gully, (d) kanuka-rimu forest on ridge, (f) kauri-tanekaha forest on moderate hillslope, (g) mahoe-mamaku forest in gully (h) kanuka-tanekaha forest on gentle hillslope, (i) kanuka-tanekaha-rewarewa forest on moderate hillslope, (l) nikau forest on alluvium, and (m) *Carex lessoniana*-kahikatea sedgeland on alluvium. Natural freshwater wetlands which were present in the ED have been drained or modified, and now only approximately 45 ha of natural or semi-natural wetland remains. The remnants have a diverse, healthy canopy, and the remnants appear to only be grazed where the edges adjoin pasture. The site provides catchment protection for the upper reaches of the Ahuroa River, and links many smaller natural area remnants around its periphery. Waipu Gorge is habitat for seven threatened fauna species (kukupu, Hochstetter's frog, *Peripatus* sp., *Schizoglossa worthyae*, *Punctidae* sp. 164, *Amborhytida dunniiae*, Auckland green gecko), one regionally significant fauna species (banded kokopu), three threatened plant species (kawaka, *Doodia mollis*, *Halocarpus kirkii*), and eight regionally significant plant species (*Brachyglottis kirkii* var. *angustior*, tree fuchsia, *Hebe macrocarpa* var. *macrocarpa*, northern rata, *Loxsonia cunninghamii*, carmine rata, *Oxalis magellanica*, and *Epacris pauciflora* var. *pauciflora*). Approximately 45% of the site is formally protected: 145.2 ha is in the Waipu Gorge Conservation Area (DOC-administered), 85.7 ha is in the Waipu Gorge Scenic Reserve (DOC-administered), 12.8 ha is in Queen Elizabeth II Open Space Covenants, 1.2 ha is within Marginal Strips (DOC-administered), and 0.02 ha is within a local purpose reserve (WDC-administered).

### **GLENMOHR ROAD WETLAND**

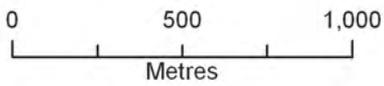
Survey no.	Q08/223
Survey date	15 November 2006
Grid reference	Q08 411731 (6 remnants)
Area	9.3 ha (5.0 ha forest, 4.4 ha wetland)
Altitude	20-100 m asl

### **Ecological units**

- (a) Raupo reedland in gully (68%)
- (b) Kanuka forest in gully head (20%)
- (c) Kanuka-totara treeland in gully head (7%)
- (d) Open water (constructed pond) (5%)

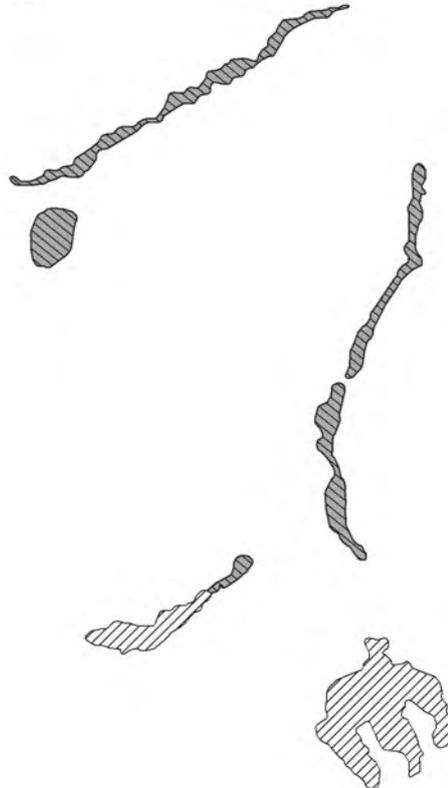


**Q08/223 Glenmohr Road Wetland**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



***Landform/geology***

Valley floor on Holocene alluvium, with Miocene sandstone and mudstone (Waitemata Group) in the headwater gully.

### ***Vegetation***

This site comprises a narrow, northeast-draining wetland gully system to the north of Glenmohr Road, which is surrounded by grazed pasture, and radiata pine and eucalyptus plantations (which appear to provide some shelter). The principal vegetation type within the gully is raupo reedland (a), which occurs scattered along the waterway, interspersed with stretches of Yorkshire fog grassland (which are generally excluded from the site). The total length of the gullies in the site is approximately 2 km, making this one of the largest raupo reedlands in the Ecological District. There is a small constructed pond (d) at the head of the westernmost gully. At the head of another gully there is a tiny area of kanuka-totara treeland (c) with frequent kahikatea and occasional karaka, mahoe, ti kouka, mamaku, ponga, tanekaha, and nikau. Finally, in the southernmost gully head there is a small, fenced stand of kanuka forest (b) with frequent rimu, tanekaha and kahikatea, and occasional rewarewa.

### ***Fauna***

Pukeko.

### ***Significance***

This site contains the third largest area of natural freshwater wetland remaining in Waipu ED, although it is recognised that some damming of the waterway has occurred. Freshwater wetlands have been greatly reduced in extent throughout New Zealand, and only approximately 45 ha of natural or semi-natural wetland remains in Waipu ED. It has the best representative and largest area of (a) raupo reedland in gully in the ED.

## **AHURUA ROAD FOREST REMNANTS**

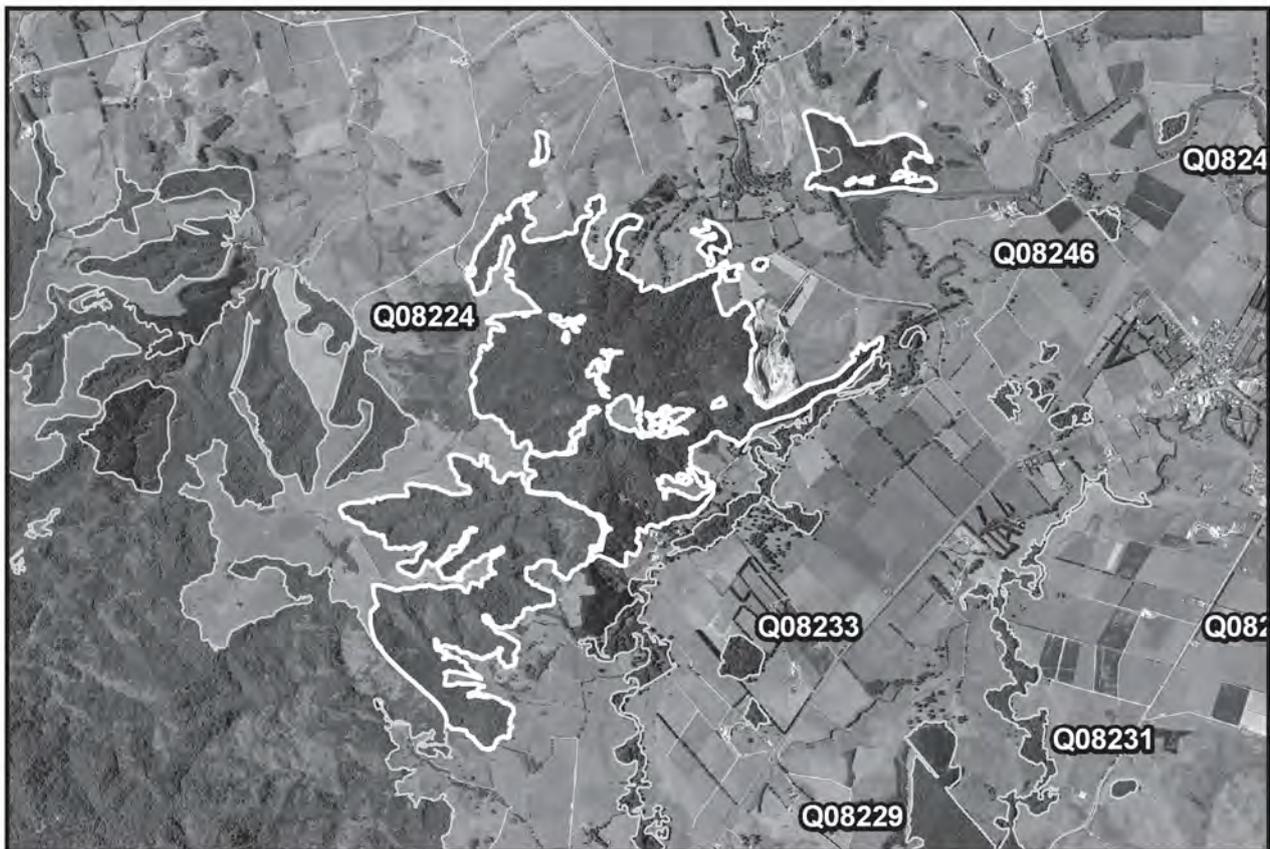
Survey no.	Q08/224
Survey date	15 November 2006
Grid reference	Q08 376786 (8 remnants)
Area	198.9 ha (197.3 ha forest, 1.6 ha shrubland)
Altitude	18-160 m asl

### ***Ecological units***

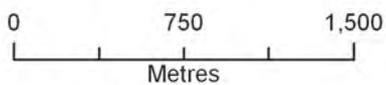
- (a) Kanuka forest on gentle to moderate hillslope (80%)
- (b) Kanuka-tanekaha forest on gentle to moderate hillslope (10%)
- (c) Tanekaha forest on ridge (5%)
- (d) Taraire forest on steep hillslope (2%)
- (e) Kahikatea forest on alluvium (<1%)
- (f) Manuka-kanuka shrubland in gully (2%)
- (g) Kohekohe forest in gully head (<1%)

### ***Landform/geology***

Hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane) and Miocene sandstone and mudstone (Waitemata Group); with a small area of Late Pleistocene (last interglacial) alluvial and/or estuarine deposits in the vicinity of Q08/384794.



**Q08/224 Ahuroa Road Forest Remnants**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



***Vegetation***

This site comprises eight forest remnants. The large, western remnant is on gentle to moderate hillslopes to the north of Ahuroa Road and forms an eastern extension of

the much larger Mareretu Forest (Q08/220). The small, eastern remnant is on a moderate hillslope beside the Ahuroa River. All of the remnants are mostly secondary, with small areas of mature broadleaf forest in the gullies. The remnants have an established understorey where stock are excluded, such as on roadsides, and a depleted understorey where stock regularly graze.

The eastern remnant is either kanuka forest (a) with frequent tanekaha, or kanuka-tanekaha forest (b). Totara is frequent in both of these forest types, along with occasional rewarewa, kauri, kahikatea, rimu, puriri, karaka, towai, tarata, pate, mamaku, and ponga. On some of the steeper ridges of the largest remnant are areas of tanekaha forest (c), with frequent kanuka and occasional rewarewa and kauri. Adjacent to Ahuroa Road on a south-facing steep hillslope, is a patch of mature taraire forest (d) with frequent kohekohe and ponga, and occasional puriri, rewarewa, kanuka, totara, and karaka. The taraire are up to c. 1 m diameter and nikau and ponga are common in the subcanopy. In one of the gully heads on the southern side is a tiny remnant of mature kohekohe forest (g) with frequent taraire and occasional tawa and pate. This area is heavily grazed and has no understorey. On the forest edge below the kohekohe forest there is a small area of pasture reverting to kanuka forest and a group of manatu trees growing beside a seepage.

The northern and eastern edges of the western remnant, visible from Millbrook Road and Walters Road, are mostly grazed kanuka forest, with a small area of manuka-kanuka shrubland (f) near Walters Road with frequent pampas and gorse, and occasional radiata pine. A small patch of secondary kahikatea forest (e) near the Millbrook Road quarry is fenced to exclude stock.

The smaller eastern remnant is grazed kanuka forest except for a small area of manuka-kanuka shrubland on its western edge.

#### **Significant flora**

Manatu (regionally significant) is present.

#### ***Fauna***

Shining cuckoo, NZ kingfisher, grey warbler, tui, and North Island fantail recorded in this survey.

#### ***Significance***

The remnants are almost entirely secondary, and except for steeper, more remote areas or adjacent to Ahuroa Road are grazed with a sparse understorey. Localised infestations of pampas, gorse, and radiata pine occur on the edges of the remnants. The larger western remnant is contiguous with the extensive Mareretu Forest (Q08/220) and provides riparian protection for a small tributary of the Ahuroa River. The site is habitat for one regionally significant plant species (manatu).

## BRYNDERWYN HILLS FOREST COMPLEX

On the Brynderwyn Hills there is a complex mosaic of indigenous forest and radiata pine plantations spread over approximately 8,300 ha, of which approximately 5,600 ha is in Waipu ED and 2,700 ha is in Rodney ED (around Cattlemount and out to Pukeareinga). The Waipu ED portion comprises 3,278.1 ha of indigenous forest and shrubland, linked by approximately 2,300 ha radiata pine plantations and pasture. The indigenous vegetation in Waipu ED is described here. Currently plantation forest plays an important role in this area by providing connectivity between indigenous forest remnants.

The indigenous vegetation was divided into ten sub-sites (labelled A to J from west to east) for field survey, and a separate description of ecological units and representativeness is provided for each of these. Significant flora and fauna is discussed for the whole complex (page 167), followed by an assessment of the overall significance (page 169).

### BRYNDERWYN HILLS FOREST COMPLEX – PART A

Survey no.	Q08/225a
Survey date	16 November 2006
Grid reference	Q08 393684 (7 remnants)
Area	236.0 ha (229.6 ha forest, 6.2 ha shrubland, 0.2 ha wetland)
Altitude	100–320 m asl

#### *Ecological units\**

- (a) Taraire–tawa forest on steep hillslope
- (b) Taraire–tawa–rewarewa–mamaku<sup>†</sup> forest on steep hillslope
- (c) Taraire–kanuka<sup>‡</sup> forest on steep hillslope
- (d) Tanekaha–rewarewa–kanuka forest on steep hillslope
- (e) Mapou–ponga–mamaku forest on steep hillslope
- (f) Mapou–mamaku forest on steep hillslope
- (g) Rimu–rewarewa–tanekaha forest on ridge
- (h) Tanekaha–kanuka forest on ridge
- (i) Kahikatea forest on ridge
- (j) Kanuka forest on steep hillslope and ridge
- (k) Mamaku forest on steep hillslope
- (l) Taraire forest on alluvium
- (m) Kahikatea forest on alluvium
- (n) Mamaku–kanuka–gorse shrubland on steep hillslope
- (o) Pate–mamaku shrubland on steep hillslope and in gully head

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\* Percentage cover for each type could not be determined because of the steepness of the terrain and the size of the site.

<sup>†</sup> These species individually comprise less than 20% of the canopy each, however they are most frequently occurring species in this diverse forest type.

<sup>‡</sup> Taraire and kanuka individually comprise less than 20% of the canopy each, however they are most frequently occurring species in this diverse forest type.

(p) Kanuka–manuka shrubland on steep hillslope and ridge

(q) Open water (constructed pond)

### ***Landform/geology***

Hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane), with an area of Holocene alluvium at the base of a fault scarp at Q08/375683.

### ***Vegetation***

Part A comprises several remnants of mostly mature secondary indigenous forest on the steep southern side of the Brynderwyn Hills, and within the Piroa Stream catchment. The Piroa Stream follows the southern boundary of the site. State Highway 1 (SH1) winds up through the middle of the largest forest remnant. Adjacent land uses/land covers include a large stone quarrying operation, extensive radiata pine plantations, pastoral farming and valleys with indigenous forest.

This site is characterised by a high diversity of forest types and high plant species richness. Overall, taraire is the most common tree species in mature forest on hillslopes, although it is never solely dominant, and associated species change subtly depending on topographic position and factors such as disturbance and local seed dispersal. Tanekaha and rimu tend to be more frequent associates on upper slopes, while kohekohe and nikau are frequent on lower slopes. Most of the eastern part of the site was not visible and is therefore not described here. The following detailed ecological units were recorded:

(a) Taraire–tawa forest includes common to frequent taraire and tawa in various proportions with frequent rimu, nikau, and rewarewa, and occasional tanekaha, miro, kahikatea, mamaku, kanuka, puka, kahakaha, kohekohe, five-finger, totara, puriri, and hinau. Rimu and miro are often emergent trees.

(b) Taraire–tawa–rewarewa–mamaku forest includes occasional nikau, kauri, lancewood, miro, and kahikatea.

(c) Taraire–kanuka forest was recorded on a steep, disturbed, colluvial hillslope above the Piroa Stream. It has many occasional associates including rimu, rewarewa, five-finger, kohekohe, putaputaweta, akepiro, houhere, lancewood, heketara, mapou, kohuhu, totara, and radiata pine.

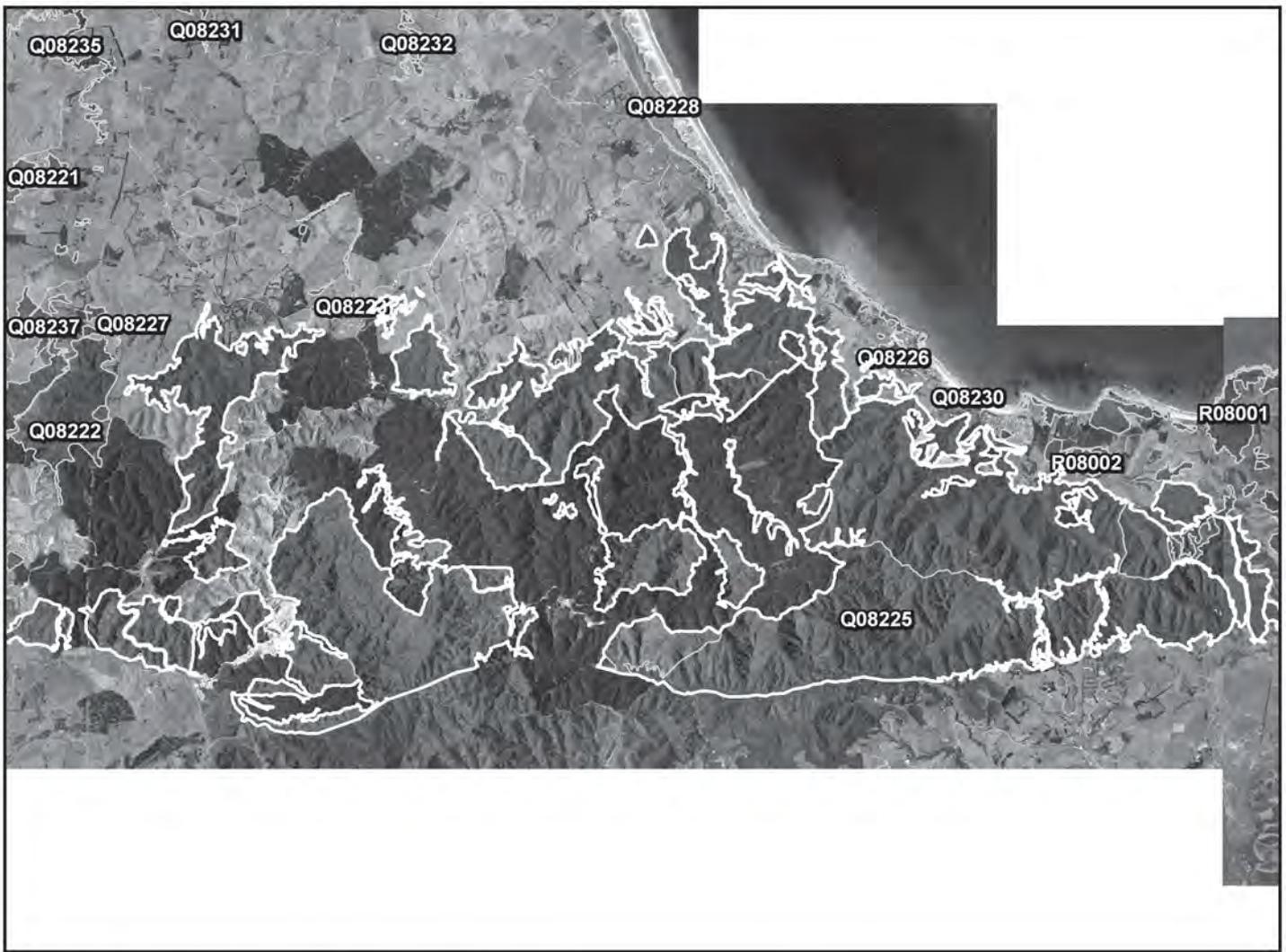
(d) Tanekaha–rewarewa–kanuka forest occurs on steep hillslopes above SH1, where it is associated with frequent kohuhu and mapou, and occasional ti kouka, lancewood, five-finger, manuka, akepiro, kauri, and pohutukawa (this single tree may have been planted as it was immediately adjacent to the highway, and was not seen elsewhere at this site).

(e) Mapou–ponga–mamaku forest occupies a similar position to (d) above, and has very similar associated species, along with kahikatea, kauri, and rimu. Young northern rata can be observed regenerating on the ground within this forest type.

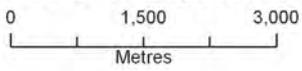
(f) Mapou–mamaku forest occurs on very steep hillslopes near the open pit. This type includes frequent rewarewa, mahoe, and kohuhu, and occasional pigeonwood, ti kouka, pate, rimu, *Metrosideros fulgens*, and large-leaved mahoe.

(g) Rimu–rewarewa–tanekaha forest occurs on some ridges, with frequent lancewood, and occasional ti kouka and mapou.

(h) Tanekaha–kanuka forest is a younger forest type that is present on ridges within the westernmost remnant. It also contains frequent rewarewa and totara, and occasional miro and mamaku.

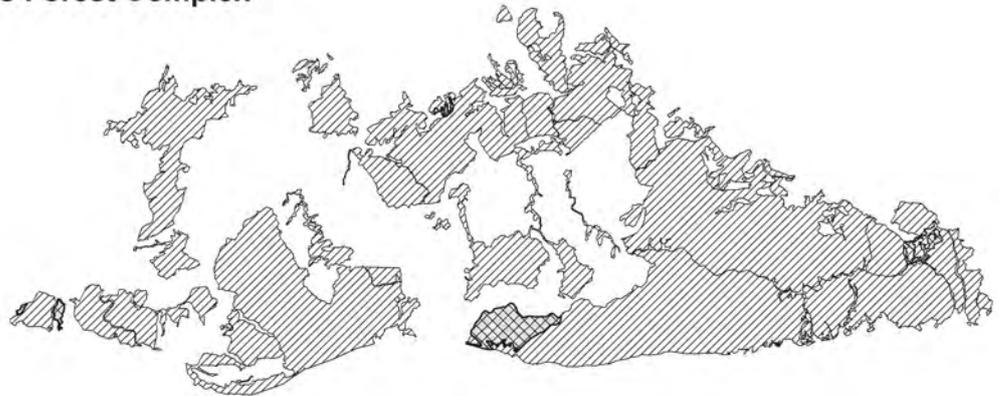


**Q08/225 Brynderwyn Hills Forest Complex**



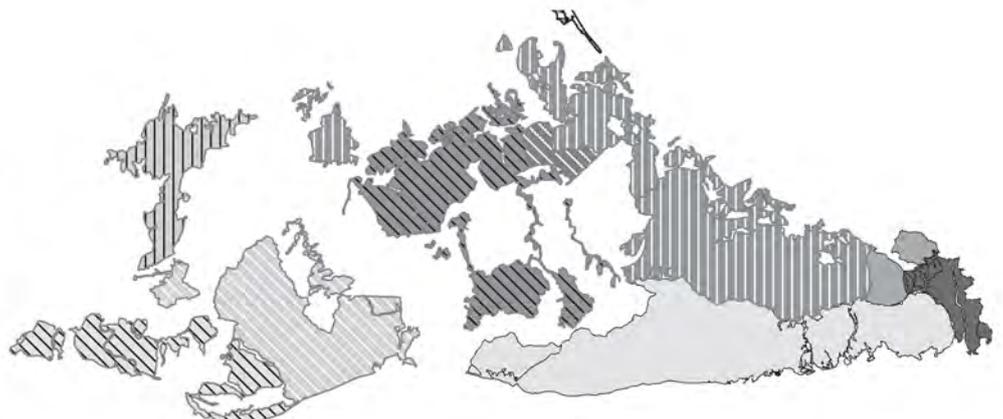
**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



**Brynderwyn Hills Forest Complex Components**

-  Q08/225a
-  Q08/225b
-  Q08/225c
-  Q08/225d
-  Q08/225e
-  Q08/225f
-  Q08/225g
-  Q08/225h
-  Q08/225i
-  Q08/225j



- (i) Kahikatea forest occurs on a ridge in the westernmost remnant. Its most frequent associates are rimu and mamaku, and it also has occasional miro, ti kouka and taraire.
- (j) Kanuka forest is present on some disturbed slopes and ridges, mainly in the west of the site. Tanekaha is a frequent associate.
- (k) Mamaku forest occurs in small patches on recently disturbed hillslopes. Frequent hangehange and mahoe, and occasional karamu, kahikatea, tanekaha, mapou, and ti kouka are present.
- (l) On the Piroa Stream alluvial terrace there is a small stand of taraire trees, some of which have very large diameter trunks, with occasional rewarewa, totara, and large-leaved mahoe. The subcanopy has scattered nikau and mapou, and tradescantia dominates the ground cover.
- (m) A small stand of kahikatea forest, with frequent supplejack, tanekaha, totara, and rewarewa, also occurs on the alluvium of the Piroa Stream.
- (n) Mamaku-kanuka-gorse shrubland, with frequent mahoe, occurs at the extreme western end of the site.
- (o) Pate-mamaku shrubland with frequent mahoe and occasional ti kouka, manuka, kanuka, and lancewood, is present in steep, wet gully heads at the disturbed western end of the site.
- (p) Kanuka-manuka shrubland with occasional totara, pate, and mamaku, is contiguous with the previous shrubland type, but on drier terrain.
- (q) There is a small constructed pond on the southern side of the State Highway which may provide quite good habitat for water birds. It is currently used by the owners for duck shooting (Lisa Forester, NRC, pers. comm.).

### ***Representative ecological units***

Nine units are considered representative: (a), (b), (c), (d), (e), (f), (g), (l), and (o).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART B**

Survey no.	Q08/225b
Survey date	15 November 2006
Grid reference	Q08 395715 (3 remnants)
Area	189.1 ha
Altitude	40-260 m asl

### ***Ecological units***

- (a) Kanuka forest on moderate to steep hillslope and ridge (50%)
- (b) Unknown forest type on steep hillslope and in gully (20%)
- (c) Kauri forest on ridge (7%)
- (d) Kauri-tanekaha-rimu-kanuka forest on steep hillslope (5%)
- (e) Totara forest on moderate hillslope (5%)
- (f) Taraire-nikau forest in gully (5%)
- (g) Rimu forest on ridge (3%)
- (h) Tanekaha forest on ridge (3%)
- (i) Taraire-totara-rimu\* forest in gully head (2%)

### ***Landform/geology***

Hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane), with Holocene valley floor alluvium present in the eastern headwater of Waihoihoi River.

### ***Vegetation***

Part B is located in the steeply sloping upper to mid-headwaters of the Waihoihoi River, on the northern side of the Brynderwyn Hills, east of State Highway 1 and south of Glenmohr Road. It is a relatively compact forest remnant, surrounded by pasture and radiata pine plantations, and is part of the larger Brynderwyn Hills indigenous forest mosaic. Some indigenous forest on the eastern boundary of the site was clear-felled around 1977 to make way for the plantations (SSBI Q08/H021). Due to the steepness of the valley and lack of access, not all forest types could be seen from vantage points. Some of the forest types and percentage cover were estimated from aerial photography flown in January 2004.

The principal vegetation type on ridges and hillslopes is young kanuka forest (a), which has frequent mamaku and occasional tanekaha and totara. Within the matrix of kanuka forest there are localised stands of regenerating podocarps and kauri. For example, near Glenmohr Road, at the lower end of the remnant, there is a striking sequence from totara forest (e) on the edge, through rimu forest (g) on the hillslope to kauri forest (c) on the ridge. Some of the finest stands of young kauri in the Brynderwyn Hills can be found on ridges within this site. Pure tanekaha forest (h) and kauri-tanekaha-rimu-kanuka forest (d) are variations of this pattern.

In the depths of the upper Waihoihoi River valley only two forest types were observed: taraire-nikau forest (f) with frequent rewarewa and occasional pukatea and mamaku, and a particularly diverse forest type comprising frequent taraire, totara, and rimu (i), none of which exceeded 20% canopy cover, mixed with smaller amounts of nikau, ponga, mamaku, kohekohe, lancewood, kahikatea, ti kouka, kohuhu, mapou, and mahoe. Another possibly similar broadleaf forest type (b), probably dominated by taraire, is present in the upper valley, however this was not visible.

### ***Representative ecological units***

Five ecological units are considered representative: (c), (d), (f), (g) and (i).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART C**

Survey no.	Q08/225c
Survey date	17 November 2006
Grid reference	Q08 416690 (4 remnants)
Area	481.9 ha
Altitude	90–340 m asl

### ***Ecological units***<sup>†</sup>

- (a) Tawa-taraire forest on steep hillslope
- (b) Tawa-nikau forest on steep hillslope
- (c) Taraire forest on steep hillslope

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\* Taraire, totara, and rimu individually comprise less than 20% canopy cover, however they are the most frequent species in this diverse forest type.

† Percentage cover for each type could not be determined because of the steepness of the terrain and the size of the site.

- (d) Rewarewa-mamaku-tarata forest on ridge
- (e) Totara-mamaku-puriri forest on steep hillslope
- (f) Rimu-totara-kanuka forest on steep hillslope
- (g) Totara forest on steep hillslope
- (h) Totara-kauri-kanuka forest on ridge
- (i) Kanuka forest on ridge
- (j) Nikau-mamaku forest in gully head
- (k) Mamaku-pate shrubland in gully head
- (l) Miro-tawa-rewarewa forest on steep hillslope
- (m) Kohekohe forest in gully
- (n) Kauri-rimu forest on ridge
- (o) Kohuhu forest on hillslope

### ***Landform/geology***

Steep, dissected hill country underlain by Mesozoic greywacke (Waipapa Terrane).

### ***Vegetation***

Part C comprises relatively old indigenous forest in the Waihoihoi Stream catchment of the Brynderwyn Hills, which flows into the Waihoihoi River on the northern side. The site is contiguous with similar indigenous forest in the Waionehu and Piroa Stream catchments, but is also bordered by an open-cast stone quarry in the southwest and radiata pine plantations at various stages of harvest. The terrain is deeply dissected and difficult to access, therefore only parts of the site were visible, some of which were viewed from a considerable distance. As a result, all the diversity in the forest composition many not have been recorded, particularly for the deepest parts of the gullies. The forest types described below are some of the most diverse that were observed in Waipu ED. This is probably due to their relative maturity, which is at least 100 hundred years older than the typical kanuka-dominant forest types in much of the lower Brynderwyn Hills. Occasional very old, mature kahikatea are present in gully heads. Some old northern rata are present also, but dead limbs and some lack of foliage indicate possum browse is taking a toll. A distinctive feature of the site is the high occurrence of large tarata.

The main forest type on steep hillslopes appears to be tawa-taraire forest (a) with frequent hinau, rewarewa, and nikau, and occasional tarata, karaka, puka, pigeonwood, supplejack, rimu, *Metrosideros perforata*, and *M. fulgens*. Another common forest type is taraire forest (c) which has frequent tawa, puriri, and rewarewa, and occasional kohekohe, mamaku, puka, and kanuka. On steep hillslopes there are also the following types: tawa-nikau forest (b) with frequent totara and mamaku, and occasional miro, tarata, kohekohe, rewarewa, pigeonwood and rimu; totara-mamaku-puriri forest (e) with frequent nikau and occasional rimu and tarata; rimu-totara-kanuka forest (f) with frequent rewarewa and occasional kauri and lancewood; and totara forest (g) with frequent tarata, rewarewa, tawa, and occasional kanuka, kauri, tanekaha and mamaku.

Ridges within this site support very diverse communities. For example, a type was recorded in which no species exceeds 20% of the canopy cover, but in which rewarewa, mamaku, and tarata were the most frequent species (d). At this location large akepiro and kanuka are also frequent, with occasional mahoe, lancewood, tanekaha, rimu, kauri, mapou, and ti kouka. Also recorded on a nearby ridge was

totara-kauri-kanuka forest (h) with occasional miro, kahikatea, and rewarewa. On disturbed edges (often next to pine plantations) there are small examples of young kanuka forest on ridges (i).

Nikau-mamaku forest (j) with occasional pukatea, and mamaku-pate shrubland (k) with frequent tarata, mahoe, and akepiro were recorded in some of the steep gully heads near the quarry.

In addition to the types described above, the following forest types within the extreme eastern part of the catchment are described in a 1997 DOC internal report (SSBI Q08/H021):

(l) Miro-tawa-rewarewa forest occurs at the top of the headwaters, with frequent rimu and mamaku, and occasional taraire, northern rata, kawaka, hinau, puka, and nikau. (m) Kohekohe forest is common in side gullies, associated with frequent karaka and nikau, with occasional pigeonwood.

(n) Semi-mature or ricker kauri-rimu forest was recorded on ridges.

(o) Young, secondary kohuhu forest with frequent wheki and occasional ti kouka, mamaku, manuka, mingimingi, mahoe, hangehange, and heketara.

### ***Representative ecological units***

Nine ecological units are considered representative: (a), (b), (d), (f), (j), (k), (l), (m), and (o).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART D**

Survey no.	Q08/225d
Survey date	15 November 2006
Grid reference	Q08 421721 (6 remnants)
Area	56.5 ha
Altitude	40-160 m asl

### ***Ecological units***

- (a) Kanuka forest on moderate to steep hillslope (60%)
- (b) Kauri forest on ridge (15%)
- (c) Kauri-rimu forest on ridge (10%)
- (d) Kanuka-rimu-tanekaha forest on moderate hillslope (8%)
- (e) Taraire-puriri forest in gully (5%)
- (f) Kahikatea-puriri forest in gully (2%)

### ***Landform/geology***

The main remnant comprises hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane); the northern outlying sites are underlain by Miocene sandstone and mudstone (Waitemata Group).

### ***Vegetation***

Part D, also known as 'Matheson's Forest', is situated around one of the headwater tributaries of the Waionehu Stream, on the northern side of the Brynderwyn Hills, between Massey Road and Glenmohr Road. It is surrounded by pasture and radiata pine plantations, and lies just to the northwest of Part E (Q08/225e).

This site includes one main forest remnant and several smaller ones along the same tributary. Secondary kanuka forest (a) with occasional tanekaha and rimu is the main

forest type throughout. Nestled within the kanuka forest (especially on ridges) are patches of young kauri forest (b), kauri-rimu forest (c) and kanuka-rimu-tanekaha forest (d). Around waterways, the forest is dominated by taraire, with puriri common (e), and frequent rewarewa, kanuka, and totara, and occasional matai. In one of the smaller remnants, a gully forest type with common kahikatea and puriri (f) was recorded.

## **BRYNDERWYN HILLS FOREST COMPLEX – PART E**

Survey no.	Q08/225e
Survey date	15 November 2006
Grid reference	Q08 444709 (12 remnants)
Area	481.3 ha (478.7 ha forest, 2.6 ha shrubland)
Altitude	40–339 m asl

### ***Ecological units\****

- (a) Kanuka forest on moderate to steep hillslope and ridge
- (b) Kanuka-mamaku forest on steep hillslope and ridge
- (c) Kanuka-mamaku-puriri forest in gully head
- (d) Kanuka-totara forest on moderate hillslope
- (e) Kauri forest on steep hillslope and ridge
- (f) Tanekaha-rewarewa forest on steep hillslope
- (g) Puriri-nikau forest in gully
- (h) Mamaku-ponga shrubland in gully head

### ***Landform/geology***

Steep, dissected hill country predominantly underlain by Mesozoic greywacke (Waipapa Terrane), with Miocene sandstone and mudstone (Waitemata Group) present in the vicinity of Q07 450727.

### ***Vegetation***

This site encompasses indigenous forest and shrubland within the upper Waionehu Stream catchment, on the northern side of the Brynderwyn Hills. The lower, northern end of the site between Cullen and Massey Roads has been reduced in size through roading, and pastoral and residential development. The upper, southern end of the site is surrounded by radiata pine plantations, and extends almost to the crest of the hills. Many narrow stream corridors between pine plantations are included. None of the uppermost areas could be seen during the present survey, however some information exists from surveys carried out in 1992 (SSBI Q08/H021) and in 2002 (Wildland Consultants 2004b), and general vegetation patterns could be described using aerial photography flown in January 2004.

Kanuka forest (a) appears to be the main forest type, especially in the lower remnants. This varies from very young kanuka forest (bordering on shrubland) with occasional mahoe and manuka in the canopy (including a densely regenerating understorey of ponga, mamaku, mapou, hangehange, tarata, pigeonwood, and *Metrosideros perforata*) to slightly older kanuka forest with occasional mamaku,

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\* Percentage cover for each type could not be determined because of the steepness of the terrain and the size of the site.

totara, rewarewa, kauri, rimu, and tanekaha in the canopy. On the sides of steep road cuttings through kanuka forest there is *Hebe macrocarpa* var. *macrocarpa*, akepiro, kiokio, large-leaved mahoe, mingimingi, ti ngahere, heketara, *Gaultheria antipoda*, *Dracophyllum latifolium*, and tawheowheo. Other species previously recorded as associates of kanuka forest in this area include pate, *Rubus cissioides*, lancewood, karamu, wheki, ti kouka, mingimingi, makamaka, *Gabnia* sp., rangiora, *Blechnum discolor*, and koromiko (Wildland Consultants 2004b, 'Massey Road 1' – WP432). Variations of this type include kanuka–mamaku forest (b) on steep, eroding hillslopes, kanuka–mamaku–puriri forest (c) in the heads of gullies, and kanuka–totara forest (d) on moderate hillslopes. Stands of young kauri (e) occur locally on ridges and steep hillslopes. Small areas of young mamaku–ponga shrubland (h) with occasional mahoe, tanekaha, kanuka, and totara are present in gully heads.

One example of more mature podocarp–broadleaf secondary forest is visible from Massey Road. The upper hillslope and ridge supports tanekaha–rewarewa forest (f) with frequent nikau, kahikatea, totara, kanuka, ponga, and mamaku, and occasional tawa, ti kouka, kohekohe, rimu and kauri. The gully below has puriri–nikau forest (g) with frequent rewarewa, and occasional kiekie, supplejack, lancewood and tanekaha. It is obvious that species diversity is high within older secondary forest on steep, dissected terrain. It appears that forest remnants on the upper slopes are similar in age and structure to these two types described.

### ***Representative ecological units***

Three ecological units are considered representative: (f), (g) and (h).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART F**

Survey no.	Q08/225f
Survey date	14 November 2006
Grid reference	Q08 458718 (2 remnants)
Area	55.3 ha
Altitude	60–180 m asl

### ***Ecological units***

- (a) Unknown indigenous forest types on steep hillslope and in gully (45%)
- (b) Kanuka forest on moderate to steep hillslope and ridge (25%)
- (c) Rimu–kanuka forest on ridge (10%)
- (d) Rewarewa–tanekaha forest on steep hillslope (10%)
- (e) Nikau–rewarewa forest on steep hillslope and in gully (10%)

Landform/geology

Hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane).

### ***Vegetation***

Part F comprises two gullies covered in secondary indigenous forest at the end of Cullen Road on the northern side of the Brynderwyn Hills. The western gully is in the headwaters of the Waionehu Stream, and the eastern gully drains out to Waipu Cove. These gullies have slightly older secondary indigenous forest than the surrounding areas, i.e. >100 years old, vs. approximately 50 years old for adjoining parts of the same site (Q08/225g and Q08/225e).

Around 45% of this part was not entirely visible during the survey; therefore some of the forest types present could not be described. However it is clear that the site supports very diverse secondary podocarp-broadleaf forest, as well as younger kanuka forest (b), which is typical of ridges in the lower Brynderwyn Hills. Three distinctive forest types recorded in the present survey were:

(c) Forest with abundant rimu, common kanuka, frequent tanekaha and occasional northern rata, miro, puka, and rewarewa, occurs on one of the central ridges in the western part.

(d) Just below this ridge, on a steep upper hillslope, there is rewarewa-tanekaha forest with frequent puriri, kanuka, mamaku, and mapou, and occasional northern rata, tarata, lancewood, supplejack, puka, totara, towai, kolekohe, and *Metrosideros perforata*.

(e) In the gully below (d) and (c) there is forest with common nikau and rewarewa, frequent puriri, supplejack, and mamaku, and occasional kahikatea, kahakaha, kiekie and ponga.

The western part of this site has previously been described as secondary forest with a mixed canopy of tanekaha, rimu, kahikatea, totara, taraire, tawa, rewarewa, and northern rata, and dense understorey composed of ponga, mamaku, pigeonwood, mahoe, mapou, lancewood, kanuka, manuka, pate, kolekohe, towai, puriri, tutu, tarata, puka, kohuhu, ti kouka, *Rubus cissoides*, *Clematis paniculata*, *Metrosideros fulgens*, *Metrosideros perforata*, hangehange, bracken, gorse, and *Gabnia* sp. (Wildland Consultants 2004b; 'Cullen Road Forest' - WP423).

### ***Representative ecological units***

Three ecological units are considered representative: (c), (d), and (e).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART G**

Survey no.	Q08/225g
Survey date	14 November 2006
Grid reference	Q08 482708 (13 remnants)
Area	813.0 ha
Altitude	15-280 m asl

### ***Ecological units***

- (a) Kanuka forest on ridge, moderate to steep hillslope and in gully (82%)
- (b) Kanuka-mamaku forest on gentle, moderate and steep hillslope (5%)
- (c) Taraire-puriri forest in gully (3%)
- (d) Totara forest on moderate to steep hillslope (2%)
- (e) Kanuka-rimu-tanekaha forest on ridge (2%)
- (f) Kanuka-rimu forest on ridge (1%)
- (g) Kanuka-kauri forest on ridge (1%)
- (h) Totara-kanuka forest on moderate hillslope (1%)

### ***Landform/geology***

Steep, dissected hill country predominantly underlain by Mesozoic greywacke (Waipapa Terrane), with Miocene sandstone and mudstone (Waitemata Group) in the vicinity of Q07 453733.

### **Vegetation**

This site comprises indigenous forest and shrubland remnants in the catchment around Lang's Beach (Q08/230), on the northern side of the Brynderwyn Hills. It includes a series of small, forested northeast-draining streams, and extends out to the steep, rocky coastline north and south of Lang's Beach. In the lower catchment the indigenous vegetation is dissected by residential dwellings and pastoral land, and in the upper catchment areas of indigenous vegetation are interspersed with small radiata pine and eucalyptus plantations, disturbed dirt clearings, new private roads, and new dwellings.

The main vegetation type is kanuka forest (a), which spans the topographic range from gully to hillslope to ridge. This forest is young, even-aged (perhaps 50 years old) and vigorously regenerating. Its associates change depending on the amount of moisture in the soil. Species such as mamaku, puriri, rewarewa, nikau, houhere, putaputaweta, pate, and karaka are present in kanuka forest on gullies, while on hillslopes and ridges kauri, totara, rimu, tanekaha, pohutukawa, miro, mahoe, mamangi, mingimingi, ponga, akepiro, and radiata pine are more likely to be present. Road cuttings provide habitat for light-loving species such as bracken, akepiro, *Clematis paniculata*, *Paesia scaberula*, karamu, shining karamu, and *Coprosma parviflora*. Kanuka-mamaku forest (b) occurs on some steep hillslopes which are prone to slipping and also on more gentle terrain with greater moisture. On ridges there are local patches of kanuka-rimu-tanekaha forest (e), kanuka-rimu forest (f), and kanuka-kauri forest (g), which stand out against the skyline.

Small remnants and disturbed forest edges, especially in the lower catchment, often comprise totara forest (d) associated with frequent puriri and kanuka, and occasional nikau, kahikatea, and taraire. Totara-kanuka forest (h) occupies a similar niche.

### **Representative ecological units**

Two ecological units are considered representative: (a) and (c).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART H**

Survey no.	Q08/225h
Survey date	14 November 2006
Grid reference	Q08 484686 (4 remnants)
Area	796.4 ha (733.5 ha forest, 62.9 ha shrubland)
Altitude	20-380 m asl

### **Ecological units**

- (a) Kanuka forest on moderate to steep hillslope and ridge (35%)
- (b) Taraire-puriri forest on steep hillslope (20%)
- (c) Puriri-taraire-rewarewa-totara-nikau-mamaku forest on steep hillslope (15%)
- (d) Mamaku-mahoe-kanuka-hangechange shrubland on steep hillslope (10%)
- (e) Puriri forest in gully (5%)
- (f) Totara-tanekaha-rewarewa forest on steep hillslope and ridge (3%)
- (g) Mamaku forest in gully (3%)
- (h) Tanekaha-kanuka forest on moderate hillslope (3%)
- (i) Kauri-kanuka forest on ridge (3%)
- (j) Kauri-tanekaha forest on steep hillslope (2%)

(k) Tawa-rewarewa-mamaku-ponga-nikau-kohekohe forest in gully head (1%)

### ***Landform/geology***

Steep, dissected hill country underlain by Mesozoic greywacke (Waipapa Terrane).

### ***Vegetation***

Part H comprises a large, diverse tract of secondary indigenous forest and shrubland on the steep, deeply dissected south-facing slopes of the southeastern Brynderwyn Hills. This part of the site is approximately 8 km wide, and extends from the northern side of the Hakaru River catchment (draining into the Kaipara Harbour) in the west, across headwaters of the Tara Creek (draining into the Mangawhai Harbour), to the boundary of the Part J (Q08/225) in the east. The southern boundary is formed by the Waipu ED boundary (except where forest has been cleared further up into the hills). At the crest of the hills this sub-site is contiguous with Part G (Q08/225g).

The pattern of vegetation type, age, and stature varies with levels of recent disturbance and types of land management. Probably the oldest, most diverse and healthiest vegetation exists within the Marunui Queen Elizabeth II Open Space Covenant, a c. 432 ha area of forest (with approximately half in Waipu ED) in which threats to flora and fauna are actively managed (Wildland Consultants 2003). Brynderwyn Hills Scenic Reserve has younger, less diverse forest, and the remaining privately owned areas of indigenous vegetation tend to be more modified, with a mosaic of vegetation ages and condition.

Due to the rapid survey methods used and the large and complex nature of the site, many parts of the site could not be seen. For these areas, vegetation types and percentage cover were estimated using 2004 aerial photographs. The following general patterns occur:

Kanuka-dominant forest (a) is the most common vegetation type. This tends to occur on ridges and steep hillslopes but not in gullies, and probably varies between 30 and 80 years old. Mamaku is a frequent associate, and several future canopy species are starting to emerge through the kanuka, including puriri, rewarewa, totara, kauri, tanekaha, and rimu. The sub-canopy and shrub tiers in such areas are dense with regenerating trees and shrubs, e.g. kanono, *Coprosma rhamnoides*, ti kouka, lancewood, mamangi, mapou, mingimingi, mahoe, kohuhu, harakeke, hangehange, kiokio, ponga, makomako, *Gabnia lacera*, tree fuchsia, large-leaved mahoe, rangiora, and pigeonwood. On some ridges kanuka forest merges into various combinations of kanuka with young kauri, tanekaha and rimu, e.g. tanekaha-kanuka forest (h), kauri-kanuka forest (i), and kauri-tanekaha forest (j).

Next in extent is a species-rich secondary podocarp-broadleaf forest, which has been recorded variously as taraire-puriri forest (b) or puriri-taraire-rewarewa-totara-nikau-mamaku forest (c). Many variations in canopy composition along these lines are possible. For example in the upper Marunui Queen Elizabeth II Open Space Covenant an area of tawa-rewarewa-mamaku-ponga-nikau-kohekohe forest (k) was recorded in the gully head, and directly adjacent on the ridge there was totara-tanekaha-rewarewa forest (f) with mature emergent northern rata. No species in either of these types comprised more than 20% of the canopy cover. Totara includes both *Podocarpus totara* and *P. hallii*. Large northern rata and miro are scattered throughout the Marunui Queen Elizabeth II Open Space Covenant.

On the western end of the site there is a distinct diagonal line of vegetation change between tall forest (on the Marunui block to the east) and mamaku-mahoe-kanuka-hangehange shrubland (d), which is an early stage of regeneration following

clearance of radiata pines. Currently mamaku is the dominant cover (with frequent mahoe and hangehange, and occasional mapou), but kanuka is beginning to break through, along with young rewarewa and kauri. A local landowner commented that this area was previously covered in gorse and pampas.

Lower altitude gullies often have forest with common puriri (e), frequent taraire, kohekohe, karaka, nikau, rewarewa, and mahoe, and occasional totara and puka. Gullies in the upper reaches of the catchment, which may suffer frequent slips, often contain forest with a high proportion of mamaku (g) along with frequent puriri, nikau, mahoe, rewarewa, and kanuka, and occasional kiekie, lancewood, and karaka.

### ***Representative ecological units***

Four ecological units are considered representative: (b), (c), (d), and (f).

## **BRYNDERWYN HILLS FOREST COMPLEX – PART I**

Survey no.	Q08/225i
Survey date	14 November 2006
Grid reference	Q08 514699 (2 remnants)
Area	73.5 ha
Altitude	60–220 m asl

### ***Ecological units***

- (a) Kanuka forest on moderate to steep hillslope and ridge (85%)
- (b) Taraire–puriri forest in gully (15%)

### ***Landform/geology***

Hillslopes and gullies predominantly underlain by Mesozoic greywacke (Waipapa Terrane), with Miocene sandy mudstone (Waitemata Group) in the northernmost part.

### ***Vegetation***

Part I comprises indigenous forest within the Bream Tail Scenic Reserve and small areas of forest immediately outside the reserve boundaries. The reserve is divided into two remnants separated by Cove Road and a narrow strip of private land covered in young kanuka forest, residential areas and pasture. The southern part of the reserve extends up steep, rugged slopes to the crest of the main Brynderwyn Hills and is mainly north-facing, while the northern part is on moderately sloping terrain. Only limited areas of the reserve were visible during this survey because of persistent inclement weather, therefore the vegetation description may overlook some of the diversity in forest types.

Most of this part is covered in young kanuka forest (a) (probably no older than 50 years) with frequent emergent kauri rickers and occasional emergent rimu and tanekaha poles. This is the most widespread community on the Brynderwyn Hills, which usually has frequent mamaku, and a dense, regenerating understorey of species such as mamangi, hangehange, ponga, mapou, mingimingi, putaputaweta, ti kouka, akepiro, houhere, *Coprosma rhamnoides*, *Metrosideros perforata*, bracken, pate and kohuhu. Gullies and gully heads draining northwards from crest of the range support mature taraire–puriri forest (b) with frequent mamaku and ti kouka, and occasional very large puka.

### ***Representative ecological units***

Ecological unit (b) is considered representative.

## **BRYNDERWYN HILLS FOREST COMPLEX – PART J**

Survey no.	Q08/225j
Survey date	14 November 2006
Grid reference	Q08 523694 (3 remnants)
Area	95.0 ha (82.9 ha forest, 12.1 ha shrubland)
Altitude	20–200 m asl

### ***Ecological units***

(a) Kanuka-tanekaha-kauri forest on steep hillslope and in gully (85%)

(b) Manuka-kanuka shrubland on ridge (15%)

### ***Landform/geology***

Steep hillslopes and gullies underlain by Mesozoic greywacke (Waipapa Terrane).

### ***Vegetation***

Part J comprises indigenous forest and shrubland within and adjacent to the Robert Hastie Memorial Scenic Reserve in the south-eastern Brynderwyn Hills. The site is dissected by Cove Road, which is cut into steep banks above a narrow, winding gully, with permanently flowing water that drains towards the south. There is no stock access to the scenic reserve, but forest on more gentle terrain on adjoining private land appears to be grazed.

Most of the area is covered by secondary kanuka-tanekaha-kauri forest (a), which includes occasional rewarewa, ti kouka, mamaku, towai, miro, rimu, taraire, puriri, totara, mapou, rangiora, five-finger, and several mature emergent kauri (especially on ridge lines), mature emergent northern rata and radiata pine. This forest type, whilst similar to many others areas of kanuka forest in the Brynderwyn Hills, is clearly more mature and more diverse than neighbouring Part I (Q08/225i) and Part G (Q08/225g). Ridges in the west of the site, both within and outside the reserve support a younger community of manuka-kanuka shrubland with occasional tanekaha (b), indicating burning or another form of clearance within the last few decades. Some ecological units are likely to have been omitted from this description, as not all areas were visible during the field survey.

### ***Representative ecological units***

Both ecological units are considered representative.

### ***Significant flora of the Brynderwyn Hills Forest Complex***

The following table presents a summary of the three threatened and 11 regionally significant plant species recorded in different parts of the Brynderwyn Hills Forest Complex (Q08/225a - Q08/225j). Background information on these records is provided below the table.

Significant plant species	Parts of Brynderwyn Hills Forest Complex (Q08/225)									
	A	B	C	D	E	F	G	H	I	J
Mida (Gradual Decline)	✓		✓	✓				✓		
Kawaka (Sparse)	✓			✓	✓		✓			
<i>Anzybas rotundifolius</i> (Sparse)									✓	
<i>Brachyglottis kirkii</i> var. <i>angustior</i> (reg. sig.)				✓						
Carminata (reg. sig.)	✓									
<i>Coprosma parviflora</i> (reg. sig.)				✓						
<i>Grammitis cilata</i> (reg. sig.)										✓
Gully tree fern (reg. sig.)	✓		✓							
<i>Hebe macrocarpa</i> var. <i>macrocarpa</i> (reg. sig.)				✓	✓					✓
Northern rata (reg. sig.)	✓		✓			✓		✓		
<i>Pelargonium inodorum</i> (reg. sig.)									✓	
<i>Pratia angulata</i> (reg. sig.)				✓						
<i>Schizaea bifida</i> (reg. sig.)									✓	
Tree fuchsia (reg. sig.)			✓		✓			✓		

#### **Notes on significant flora**

Q08/225a: Single kawaka and several northern rata noted (current survey). Mida, carmine rata and gully tree fern noted in 1993 (SSBI Q08/H021).

Q08/225c: Northern rata in average to poor condition (current survey). Mida, kawaka, tree fuchsia, and gully tree fern recorded in 1997 (SSBI Q07/H021).

Q08/225d: Mida, kawaka, *Brachyglottis kirkii* var. *angustior*, *Pratia angulata*, *Coprosma parviflora* and possibly *Hebe macrocarpa* var. *macrocarpa* recorded in 2006 (Kendrick and Young 2006).

Q08/225e: Kawaka present (Peter Anderson, DOC, pers. comm.). Tree fuchsia (SSBI Q08/H021) and *Hebe macrocarpa* var. *macrocarpa* present (AK 298338, current survey).

Q08/225f: One mature northern rata and several juveniles noted (current survey).

Q08/225g: Kawaka recorded in 1992 (SSBI Q08/H053). *Coprosma parviflora* (current survey).

Q08/225h: Jones (1991) recorded 135 indigenous plant species in part of Marunui Queen Elizabeth II Open Space Covenant, including mida, *Anzybas rotundifolius*, and tree fuchsia (regionally significant). Northern rata noted in the Marunui QEII Covenant (current survey).

Q08/225i: *Pelargonium inodorum* recorded in Bream Tail Scenic Reserve in 1993 (DOC Bioweb 2007). *Schizaea bifida* collected in 1999 (AK 244703).

Q08/225j: *Grammitis ciliata* (AK 121745) and *Hebe macrocarpa* var. *macrocarpa* (AK 121839) collected in 1965.

### ***Fauna of the Brynderwyn Hills Forest Complex***

Non-threatened fauna species recorded in this site include the following: North Island fantail, grey warbler, tui, paradise shelduck, NZ kingfisher, Australasian harrier, pukeko, silvereve, shining cuckoo, morepork, welcome swallow, forest gecko, copper skink, shortfin eel, Cran's bully, redfin bully, common bully, inanga, torrentfish, *Cambridgea* spider species, and species of weta and stick insect.

The following table presents a summary of the ten threatened and five regionally significant fauna species recorded in different parts of the Brynderwyn Hills Forest Complex (Q08/225a - Q08/225j). Background information on these records is provided below the table.

Significant fauna species	Parts of Brynderwyn Hills Forest Complex (Q08/225)									
	A	B	C	D	E	F	G	H	I	J
Grey duck (Nationally Endangered)	✓									
North Island kaka (Nationally Endangered)								✓		
North Island long-tailed bat (Nationally Vulnerable)								✓		
Bush falcon (Nationally Vulnerable)							✓			
Auckland green gecko (Gradual Decline)			✓						✓	✓
<i>Amborbytida dunniae</i> (Gradual Decline)	✓						✓			
Long-tailed cuckoo (Gradual Decline)							✓			
Longfin eel (Gradual Decline)		✓	✓				✓			✓
Kukupu (Gradual Decline)	✓		✓	✓	✓	✓	✓	✓		
Hochstetter's frog (Sparse)	✓	✓	✓		✓	✓	✓	✓		✓
Banded kokopu (reg. sig.)		✓	✓				✓	✓		✓
Tomtit (reg. sig.)			✓		✓	✓	✓	✓		
Giant bully (reg. sig.)							✓			
Bellbird (reg. sig.)								✓		
Red-crowned kakariki (reg. sig.)								✓		

### Notes on significant fauna

Q08/225a: Hochstetter's frog populations recorded in 17 of 19 creeks within Piroa Stream catchment, totalling 111 individuals (Parrish 1993). From 1993 to 2003, frogs were regularly recorded in relatively high numbers (e.g. 1–24 individual per stream) by various surveyors (DOC Bioweb 2007). Kukupu recorded 1993 (SSBI Q08/H021). Grey duck seen on Piroa Stream (current survey). The land snail *Amborbytida dunniae* has been recorded at this site (Fred Brook pers. comm.).

Q08/225b: Hochstetter's frog present in every surveyed stream in 1977 (SSBI Q08/H021); 12 frogs in the upper Waihoihoi River in 1993 (Parrish 1993). Longfin eel and banded kokopu recorded at various points along the Waihoihoi River between 1999 and 2003 (NIWA 2007).

Q08/225c: Kukupu and tomtit (regionally significant) recorded recently (Wildland Consultants 2004b; SSBI Q08/H021). Hochstetter's frog recorded on numerous occasions between 1977 and 2001, generally in the upper catchment, with counts of up to 16 individuals in one location (Parrish 1993; Q08/H021; DOC Bioweb 2007). Longfin eel and banded kokopu recorded in 1998 (NIWA 2007). Unconfirmed reports of Auckland green gecko in the vicinity (SSBI Q08/H021).

Q08/225d: Kukupu recorded in 1992 (SSBI Q08/H052). A specific search for Hochstetter's frog in the stream in 1993 was unsuccessful (Parrish 1993).

Q08/225e: Kukupu and tomtit recorded during current survey. North Island kaka reported in 1989 (SSBI Q08/H021). Hochstetter's frog populations present; surveyed in 1977, 1992, 1993, and 1997, with counts reaching 19–21 individuals (Parrish 1993; SSBI Q08/H021; DOC Bioweb 2007).

Q08/225f: Kukupu and Hochstetter's frog recorded in 1986 (SSBI Q08/H019). Kukupu and tomtit recorded in 2002 (Wildland Consultants 2004b). Hochstetter's frogs are still likely to be present (Peter Anderson, DOC, pers. comm.).

Q08/225g: Kukupu, Hochstetter's frog, long-tailed cuckoo, banded kokopu and the snail *Amborbytida dunniae* recorded in 1992 (SSBI Q08/H053). Hochstetter's frog records from 1992, 1993, and 2004, each with low numbers (1–2 individuals) in the upper catchment (Parrish 1993; DOC Bioweb 2007). Tomtit and bush falcon reported (date unknown) (SSBI Q08/H053). Recent (1992–2006) records for longfin eel, banded kokopu, and giant bully in lower reaches of small streams entering Lang's Beach and Waipu Cove (southern end) (NIWA 2007).

Q08/225h: Kukupu and tomtit are resident; North Island kaka, bellbird, and red-crowned kakariki are occasional visitors (Wildland Consultants 2003). Increased numbers of resident tomtit and tui were reported in the Marunui Queen Elizabeth II Open Space Covenant in 2002 (Catherine Hawley pers. comm.). Hochstetter's frog (Sparse) known from four streams in this part (13 individuals recorded), however four other streams searched had no frogs (Parrish 1993). Hochstetter's frog re-recorded in 2004 (DOC Bioweb 2007). Wide range of freshwater fish species is present (Wildland Consultants 2003). Bats have been sighted at Marunui Queen

Elizabeth II Open Space Covenant recently and are likely to be North Island long-tailed bats, which have been reported from Mangawhai (Wildland Consultants 2003).

Q08/225i: Female Auckland green gecko with two offspring recorded in a mingimingi bush on edge of Cove Road in 1980 (DOC Bioweb 2007).

Q08/225j: Hochstetter's frog recorded in 1982 (SSBI R08/H001). Probable record of Auckland green gecko from private land just outside Robert Hastie Memorial Scenic Reserve (Desmond Hetherington pers. comm. 2006). Longfin eel, banded kokopu, Cran's bully, inanga, redfin bully, and koura recorded in 1993 (NIWA 2007).

### ***Significance of the Brynderwyn Hills Forest Complex***

Collectively all the parts of this site form the largest indigenous forest area in Waipu ED. In terms of forest and shrubland diversity, this site is the most ecologically diverse in Waipu ED, with 60 different ecological units recorded, of which 38 are considered representative of their types. The ten parts of the site are currently linked together by plantation forest, which plays an important role in this area by providing wildlife habitat and connectivity between indigenous forest remnants (e.g. for Hochstetter's frog, tomtit, invertebrates). Ten threatened fauna species (grey duck, North Island kaka, North Island long-tailed bat, bush falcon, Auckland green gecko, the land snail *Amborhytida dunni*, long-tailed cuckoo, longfin eel, kukupa, and Hochstetter's frog) and five regionally significant fauna species (banded kokopu, giant bully, tomtit, bellbird, and red-crowned kakariki) have been recorded in this site. The Brynderwyn Hills are considered to be the northern stronghold for Hochstetter's frog (Avi Holzzapfel pers. comm.). Three threatened plant species (mida, kawaka, and *Anzbas rotundifolius*) and 11 regionally significant plant species (*Brachyglottis kirkii* var. *angustior*, carmine rata, *Coprosma parviflora*, *Grammitis cilata*, gully tree fern, *Hebe macrocarpa* var. *macrocarpa*, northern rata, *Pelargonium inodorum*, *Pratia angulata*, *Schizaea bifida*, and tree fuchsia) have been recorded in this site. This site is contiguous with a large area of indigenous forest and radiata pine plantations to the south, within Rodney ED (c.2,700 ha). Approximately 22.2% (726.0 ha) of the site has some form of legal protection as follows: Brynderwyn Hills Scenic Reserve (c.251.5 ha), Bream Tail Scenic Reserve (c.68.6 ha), Robert Hastie Memorial Scenic Reserve (c.28.3 ha), and Brynderwyn (Purchase) Scenic Reserve (61.9 ha), Waionehu Stream Marginal Strip (c.1.8 ha), WDC Reserve (c.21.8 ha), WDC local purpose reserve (c.0.9 ha), recreation reserve (c.2.4 ha), and QEII Covenant (c.289.6 ha).

### **LANG'S BEACH COASTAL FOREST AND SHRUBLAND**

Survey no.	Q08/226
Survey date	14 November 2006
Grid reference	Q08 484723
Area	29.7 ha (29.2 ha forest, 0.5 ha shrubland)
Altitude	0–50 m asl

#### ***Ecological units***

- (a) Pohutukawa–rimu forest on ridge (50%)
- (b) Pohutukawa forest on steep hillslope and cliff (25%)
- (c) Pohutukawa treeland on steep hillslope and cliff (13%)
- (d) Kanuka forest on moderate hillslope (10%)
- (e) Kanuka shrubland on steep hillslope (2%)

### ***Landform/geology***

Steep coastal hillslopes predominantly underlain by Mesozoic greywacke (Waipapa Terrane), with Oligocene flaggy limestone (Whangarei Limestone, Te Kuiti Group) along the coast northwest of Lang's Beach.

### ***Vegetation***

This site comprises small remnants of indigenous coastal forest, treeland, and shrubland spread along Lang's Beach and the rocky coast to the north, extending to the southern end of Waipu Cove.

The largest piece of forest in the site is in a Queen Elizabeth II Open Space Covenant on a ridge extending 500 m inland northwest of the road into Lang's Beach. It comprises distinctive forest type unrecorded elsewhere in Waipu ED. Pohutukawa and rimu are common in the canopy, with frequent totara and puriri, and occasional kauri, kowhai, kahikatea, and rewarewa (a).

The majority of the rest of the site comprises small, narrow remnants of pohutukawa forest (b) or grazed pohutukawa treeland (c) along the steep rocky coastline. To the northwest of Lang's Beach these remnants are often on 'spectacular limestone rock formations running down to the sea' (Forester 2007). A detailed survey of one part of this site has been undertaken (Q07 475731) and the forest was noted to be vigorously regenerating, with no environmental weeds of concern (Forester 2007). Indigenous trees planted here include karaka, karo, totara, and taupata, and part of the site had been fenced (Forester 2007). It was noted that grazing had probably eliminated some palatable species which would have grown there previously, e.g. taraire, coastal maire, and wharangi (Forester 2007). Pohutukawa forest on limestone at the northern end of Lang's Beach is particularly lush, with an understorey of kohekohe, houpara, nikau, mamaku, kawakawa, hangehange, and kiekie, however dense infestations of many weed species, including ginger, garden nasturtium, cotoneaster, agapanthus, tuber ladder fern, arum lily, and hydrangea are also present.

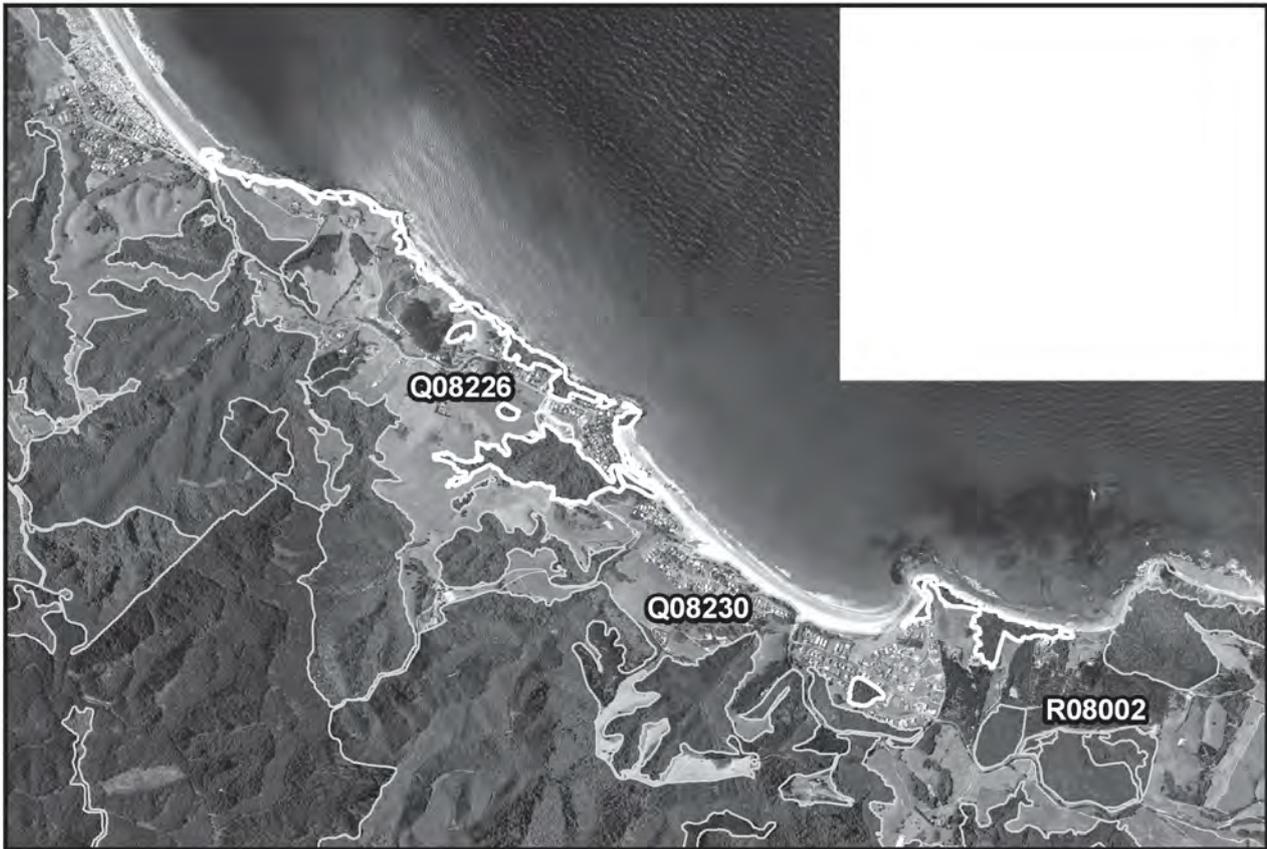
On the southern side of Lang's Beach there are small areas of pohutukawa forest, kanuka forest (d), and in a recently disturbed part, kanuka shrubland (e) with frequent karaka and pampas, and occasional ti kouka and pohutukawa. Large tracts of young kanuka forest extend down to this site from the Brynderwyn Hills Forest Complex (Q08/225).

### ***Fauna***

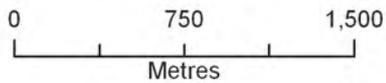
During the current survey an Australasian gannet was seen flying out of pohutukawa forest on the headland at the southern end of Waipu Cove to fish at sea.

### ***Significance***

This site contains small examples of coastal forest in variable condition. Parts of the site are ungrazed with a closed canopy with few weeds, while others have a relatively sparse canopy, and are weed-infested and grazed. Ecological unit (a), pohutukawa-rimu forest on ridge, was not recorded elsewhere in the ED and is a good quality, representative type. Two representative examples of coastal vegetation on limestone, (b) pohutukawa forest on steep hillslope cliff and (c) pohutukawa treeland on steep hillslope and cliff, occur on the coast north of Lang's Beach. Kenny and Hayward (1996) ranked the geology of this coast (which they named Waipu Cove Oligocene-Miocene sediments) as regionally important because it 'shows the clear relationship between Waitemata flysch, Te Kuiti Group limestone and basement.' Approximately a third of this site is formally protected: 9.9 ha is protected within three different Queen Elizabeth II Trust Open Space Covenants and 0.3 ha is within a recreation reserve administered by WDC at the southern edge of Waipu Cove.

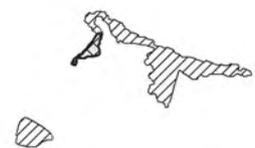


**Q08/226 Lang's Beach Coastal Forest and Shrubland**



**Habitat Type**

-  Forest
-  Shrubland
-  Wetland
-  Duneland/Sandfield
-  Estuarine
-  Rockland



**WAIPU RIVER ESTUARY AND SANDSPIT**

Survey no.	Q08/228
Survey date	13 November 2006
Grid reference	Q08 447762
Area	220.5 ha (73.9 ha duneland, 144.6 ha estuary, 2.1 ha forest)
Altitude	0-10 m asl