

**SURVEY AND QUANTIFICATION OF
CLIFFTOP PŌHUTUKAWA FOREST IN
THE ŌRĀKEI WARD, AUCKLAND - EXTENSION
(ACHILLES POINT TO TAHUNA TOREA RESERVE)**



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Project Team:

Sarah Roth - Report author
Nick Goldwater - Project manager, peer review
Steve Rate - Peer review
Roger Bawden - GIS

Prepared for:

Tāmaki Drive Protection Society Inc
C/- Juliet Yates
11 Berowald Place
St Heliers 1071

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Reviewed and approved for release by:



Steve Rate
Senior Ecologist
Wildland Consultants Ltd

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1. EXECUTIVE SUMMARY

The Tāmaki Drive Protection Society (the Society) is a locally elected not-for-profit organisation whose main objective is to promote the protection and preservation of Tāmaki Drive and Ōrākei Ward for its amenity, ecological, economic and transport values. As part of their endeavour, the Society commissioned Wildland Consultants Ltd to carry out a survey of the coastal, clifftop pōhutukawa (*Metrosideros excelsa*) forest remnants within an extended area of the Tāmaki Drive/Ōrākei Ward area, from Achilles Point to Tahuna Torea Nature Reserve (excluding the reserve). The survey consisted of an initial desktop survey focussing on coastal vegetation, and was followed up by a field survey to ground-truth vegetation composition. Results indicate that the cover of indigenous-dominated vegetation and exotic-dominated vegetation is approximately equal (c.45% each) within the area surveyed, with mixed indigenous-exotic vegetation comprising the remaining 10%. Of the total indigenous-dominated vegetation, pōhutukawa forest makes up 40% (which is 18% or 5.5 ha of the c. 31 hectares of vegetation surveyed).

Most of the indigenous-dominated vegetation, including pōhutukawa forest, is regenerating (75-100 years) or has originated from recent restoration efforts. Much of the regenerating indigenous vegetation can be characterised as amenity planting, or hosts a range of exotic weeds in the understorey. Furthermore, much of the exposed coastal cliffs along the north-eastern extent of the area surveyed are dominated by exotic pest plants including pampas (*Cortaderia selloana*), tree privet (*Ligustrum lucidum*), Chinese privet (*L. sinense*), boneseed (*Chrysanthemoides monilifera*) and gorse (*Ulex europaeus*). A variety of palm species, particularly Phoenix palm (*Phoenix canariensis*), are also prevalent throughout the coastal margin. These species should be prioritised for control followed by additional revegetation of indigenous pōhutukawa forest. It is also recommended that pōhutukawa trees are added to the Schedule of Trees or Groups of Trees under the PAUP to protect a range of important ecological, social and economic services.

2. INTRODUCTION

The Tāmaki Drive Protection Society has made submissions to Auckland Council requesting amendments to the regulations that protect coastal vegetation within the Tāmaki Drive Masterplan (2012); however, more information is still needed on the current state of the environment in these areas. To this end, the client has commissioned Wildland Consultants Ltd to undertake an extension of the original desktop survey (Wildland Consultants Ltd 2016), followed by a ground-truth survey, of the area between Achilles Point and Tahuna Torea Nature Reserve (excluding the reserve).

This report includes the following:

- Review of relevant existing ecological information.
- Assessment of the protection status offered by the current schedule of trees and Significant Ecological Areas in the Proposed Auckland Unitary Plan (PAUP).
- Identification of exotic- and indigenous-dominant vegetation, and coastal pōhutukawa forest.

- Identification of trees of ecological significance that should receive protected status, particularly pōhutukawa.
- Review of threats to ecological viability, including pest plant infestations.
- Recommendations for further study.

Based on the information collated during the ground-truth and desktop surveys, broad management recommendations are outlined with the goal of maintaining and improving ecological integrity of natural and planted areas of the site.

3. BACKGROUND

The Tāmaki Drive Protection Society is a locally elected not-for-profit organisation whose main objective is to promote the protection and preservation of Tāmaki Drive for its amenity, ecological, economic and transport values. In 2012, the Ōrākei Local Board, with strong support from the Tāmaki Drive Protection Society, produced the first draft of the Tāmaki Drive Masterplan (henceforth referred to as ‘the Masterplan’), which was subsequently approved by the Auckland Council. The Masterplan focuses on preserving the unique environment of Tāmaki Drive, which extends west to east from Mechanics Bay to Glover Park, and north to south from Tāmaki Drive to St Heliers Bay Road. Also within the Masterplan area are Whenua Rangatira, a large cultural reserve, and Kepa Bush, a large conservation reserve.

This report focuses on an extension of the Masterplan area: the coastal margin starting south of Glover Park to the Tahuna Torea Nature Reserve. This area, along with much of urban Auckland, has been subject to policy changes resulting in reduced protection for vegetation.

Prior to the Resource Management (Simplifying and Streamlining) Amendment Act 2009, the coastal protection yard¹ required that the natural character of the coastal environment be retained by preventing the destruction of indigenous vegetation and exotic trees of a nominated size. Following the 2009 Amendment, protection of vegetation is limited to individual trees or groups of trees that have been scheduled under the Proposed Auckland Unitary Plan (PAUP), and vegetation within classified Significant Ecological Areas (SEAs). Ecologically, urban trees are a critically important component of the coastal margin of east Auckland, including their role in forming a wildlife corridor for indigenous fauna, yet the Society fears that many are not protected under any legislation.

4. METHODS

Information was collated primarily from digital databases and websites, particularly from Auckland Council. A desktop vegetation survey was carried out using Google Earth Pro (Version 7.1.5.1557) and Google Street View (imagery shot February 2012) to visually identify vegetation within the extension area. Where possible, vegetation

¹ Coastal protection yard is defined as a yard measured in a landward direction from mean high water springs (PAUP 2013).

was identified down to the species level and categorised as indigenous or exotic. Where species-level or individual specimen identification was not possible, the vegetation was categorised based on its habitat type (e.g. mixed indigenous-exotic scrub, indigenous restoration plantings).

A map of vegetation and habitat types was created, utilising coloured polygons to distinguish between exotic and indigenous vegetation (Figure 1). The area of canopy cover by the aerial view was estimated for both indigenous and exotic vegetation. A ground-truth survey was carried out on 17 June 2016 during fine weather and light south-westerly winds. The ground-truth survey involved a roadside survey in areas with vehicle access to quantify plant species diversity and density, especially of the understorey. In areas without vehicle access, such as the coastal area between Achilles Point and Tahuna Torea Nature Reserve, a survey on foot was carried out. Information from the ground-truth survey was collated with that collected during the desktop survey, resulting in habitat descriptions of canopy and sub-canopy vegetation. A list of all plant species identified in the extension area is presented in Appendix 1.

The most recent list of scheduled trees (updated: 16/10/2015) was sourced from Auckland Council Open Data¹. Significant Ecological Areas and public space identified under the PAUP were sourced from Land Information New Zealand (LINZ). These protected areas and individual trees are mapped in Figure 2.

The ecological values of vegetation within the project area were evaluated based on background research and surveys. The potential threats on those values were also assessed. Opportunities to manage threats to coastal vegetation were investigated.

5. ECOLOGICAL CONTEXT

The study site is located in the Tāmaki Ecological District, adjacent to the Waitemata Harbour. The Tāmaki Ecological District, which encompasses the heavily urbanised isthmus between the Manukau and Waitemata Harbours, is one of the most modified ecological districts in New Zealand (Lindsay *et al.* 2009). Few areas of indigenous vegetation remain, covering just 11.7% of the ecological district (Land Cover Database 3²).

Vegetation in the Tāmaki Ecological District was initially cleared during early Polynesian occupation and then by subsequent rural and urban development. Some kauri (*Agathis australis*) remnants with hard beech (*Fuscospora truncata*) remain on the North Shore and very small patches of volcanic boulderfield remain on volcanic cones. In city parks, there are remnants of lowland forest and fringes of pōhutukawa present on coastal cliffs. Mangroves (*Avicennia marina* subsp. *australasica*) have been reduced from their former extent, but are still present in estuaries and harbours (Lindsay *et al.* 2009). Most remaining areas of indigenous vegetation are heavily impacted by edge effects, invasion by introduced animal and plant pests, and their isolation from larger, more contiguous tracts of indigenous vegetation (Myers

¹ Website: www.aucklandcouncil.govt.nz/en/ratesbuildingproperty/propertyinformation/gis_maps/pages/opaendata.aspx

² LCDB3 - Landcare Research *Manaaki Whenua*, 2012.

2005). Reflecting this pattern of clearance, 32% of Tāmaki Ecological District lies on ‘Acutely Threatened’ Land Environments (land where <10% of indigenous vegetation cover remains; refer to Walker *et al.* 2007).

Prior to human settlement, Auckland’s eastern bays from Ōrākei Basin to West Tāmaki Point were probably dominated by pōhutukawa forming a contiguous belt of coastal forest along the steep cliffs and headlands of Tāmaki Drive. In the open areas, mixed coastal broadleaved species forest would have bordered brackish estuarine vegetation and freshwater wetlands in the low-lying areas that are now Mission Bay, Kohimarama and St Heliers Bay. Little of these vegetation types remain in the Tāmaki Ecological District, with coastal forest in particular reduced to *c.*2% of its original extent (Lindsay *et al.* 2009).

Today, vegetation along Tāmaki Drive and the east coast of Glendowie to the Tahuna Torea Reserve is characterised by planted pōhutukawa along coastal walkways and mixed indigenous-exotic vegetation. Coastal forest dominated by pōhutukawa with occasional karaka (*Corynocarpus laevigatus*), ngaio (*Myoporum laetum*), pūriri (*Vitex lucens*), tarata (*Pittosporum eugenoides*) and karamū (*Coprosma robusta*) still persists in small remnant forests along Tāmaki Drive, but are scarce between Glendowie and the reserve. Mixed exotic shrubland and scrub dominate the open coastal cliffs, while pōhutukawa form the dominant canopy along the seaward side of the road.

All saltmarsh and freshwater wetlands within the area have been drained and filled, and converted into parks and sports fields, with small streams now flowing directly into the Tamaki River.

6. VEGETATION ASSESSMENT

A desktop analysis of the *c.*31 ha of vegetation within the boundaries of the extension area revealed 40 indigenous species and 28 naturalised and exotic species. The vegetation comprised 20 distinct types (listed in Table 1). The areas covered by indigenous-dominated vegetation and exotic-dominated vegetation (as defined by canopy species) were almost equal, each comprising approximately 14 ha (45% of the total area surveyed). Indigenous dominated scrub was the most extensive indigenous vegetation type (57% of indigenous vegetation and 26% of vegetation surveyed) followed by pōhutukawa forest (40% of indigenous vegetation and 18% of total vegetation). Exotic vegetation was dominated by exotic grassland (78% of exotic cover and 35% of total), followed by privet forest (4%) and bamboo forest (4%). The reminding 10% of vegetation analysed comprised mixed indigenous-exotic vegetation (*c.*3 ha).

The extents of indigenous- and exotic-dominated vegetation, mixed indigenous-exotic- vegetation, and pōhutukawa forest are mapped I Figure 1.



Table 1: Summary of habitat types by area.

Habitat Type	Area (ha)	Percentage of Total Vegetation Surveyed
Exotic		
Agapanthus herbfield	0.05	0.2%
Bamboo forest	0.56	1.8%
Exotic deciduous treeland	0.46	1.5%
Exotic dominated forest	0.50	1.6%
Exotic dominated herbfield	0.01	0.01%
Exotic dominated scrub	0.07	0.2%
Exotic grassland	10.77	34.9%
Gorse-boneseed scrub	0.11	0.3%
Palm forest (Phoenix balm or bungalow palm)	0.21	0.7%
Pampas tussockland	0.14	0.5%
Pampas-gorse tussockland	0.04	0.1%
Pine treeland	0.30	1.0%
Privet forest	0.60	2.0%
Rank exotic grassland	0.03	0.1%
Wattle-privet forest	0.03	0.1%
Total Exotic	13.87	45.0%
Indigenous		
Flaxland	0.09	0.3%
Indigenous dominated scrub	7.98	25.9%
Mangrove scrub	0.38	1.2%
Pōhutukawa forest	5.54	18.0%
Total Indigenous	13.99	45.3%
Mixed		
Mixed indigenous-exotic scrub	3.00	9.7%
Total Mixed	3.00	9.7%
Total Surveyed	30.85	100.0%

6.1 Protected vegetation

6.1.1 Tahuna Torea Nature Reserve

The Tahuna Torea Nature Reserve comprises a small sand spit and estuarine habitats near the mouth of the Tamaki River. The Nature Reserve is co-managed by Auckland Council and the Tamaki Estuary Protection Society. The vegetation within the Nature Reserve is characterised by mangrove scrub in the deeper areas of the estuary, with regenerating saltmarsh closer to the inlets near the mainland. Species such as ngaio, pōhutukawa, karo (*Pittosporum crassifolium*) and harakeke occur along the coastal edge, with sedges and rushes, including wīwī (*Ficinia nodosa*), giant umbrella sedge (*Cyperus ustulatus*), oioi (*Apodasmia similis*), sea rush (*Juncus kraussii* var. *australiensis*), *Machaerina juncea*, needle grass (*Austrostipa stipoides*) in the saltmarsh area, and a few young saltmarsh ribbonwood (*Plagianthus divaricatus*) amongst the mangrove scrub. The 25 hectare reserve has been a site for restoration for the past 30 years. As the ecology of the Tahuna Torea Nature Reserve is under protection by Auckland Council and is actively managed by the Tamaki Estuary Protection Society, this report has not addressed vegetation within the cadastral boundaries of the Nature Reserve.

6.1.2 Churchill Park

Churchill Park is a large urban domain located approximately 200 m inland from the eastern coast of the extension area. The park is managed by Auckland Council and is currently being used for grazing in some areas with other parts designated for restoration and leisure activities. Much of the vegetation is exotic, with pine species dominating the canopy; however, indigenous restoration plantings are establishing well along the western margin of the park and along many of the waterways. Pest plant control is being actively managed by Auckland Council. As Churchill Park is set back from the immediate coastal margin, and is currently being managed by Auckland Council, this site is not considered further in this report.

6.1.3 Significant Ecological Areas

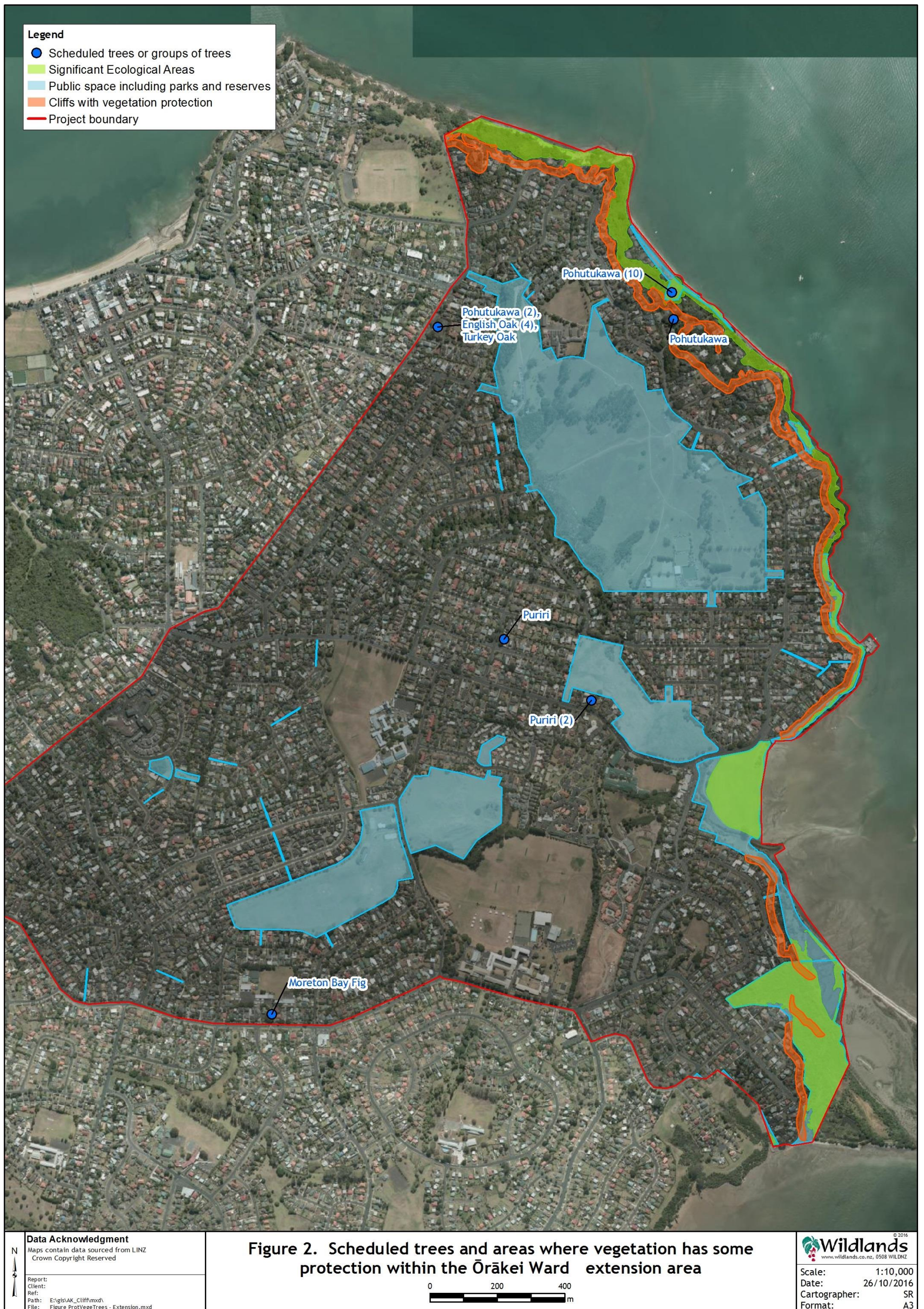
Much of the coastal vegetation within the extension area is within an SEA overlay (Figure 2) and is dominated by pōhutukawa. Also within many areas identified as SEA are exotic species including privet, gorse, pampas and a range of specimen trees. Under the PAUP, vegetation alteration or removal within an SEA requires resource consent (with certain exceptions¹). Vegetation removal of 300 m² or less within an SEA for the purpose of building a platform or access way for a dwelling is a Controlled activity. This means that consent is required but will always be granted, sometimes with certain conditions imposed to minimise adverse ecological impacts. This condition reduces the protection of indigenous vegetation within SEAs.

6.1.4 Scheduled trees and groups of trees

All scheduled trees within the extension area are mapped in Figure 2 (and listed in Appendix 2). The scheduled trees are a mix of indigenous and exotic species with few pōhutukawa relative to the number present within the project area; however, many of the pōhutukawa present within the project area sit within an SEA and/or on public land that is otherwise protected (Figure 2).

All pōhutukawa within the coastal margin of the extended area, from Achilles Point in the north to the Tahuna Torea Nature Reserve in the south, should be added to the scheduled trees/groups of trees under the Unitary Plan to ensure their protected status. These trees provide significant ecological, amenity and economic values (the latter due to their ability to reduce coastal erosion and stabilise cliffs).

¹ Vegetation management in SEAs is permitted in the following situations: biosecurity tree works; deadwood removal; vegetation alteration or removal for routine maintenance and repair of existing tracks, lawns, gardens, fences and other lawfully established activities; vegetation alteration or removal for customary use; emergency tree works; existing forestry and farming activities; pest plant removal; conservation planting; vegetation alteration or removal for routine maintenance within 3 m of existing dwelling; vegetation alteration or removal for routine maintenance within 3 m of existing buildings greater than 100 m²; tree trimming within 10 m of existing buildings.



6.1.5 Public space

Over twenty land parcels classified as ‘open public space’ under the PAUP are scattered throughout the project area. These include areas that range in use from sports and active recreation fields (Crossfields Reserve) to informal recreation (Roberta Park) and conservation areas (Heritage Rise Reserve). They also range in size from the large Churchill Park (41.6 ha) to the small un-named conservation reserve at Taylor Drive Pembroke Crescent (0.03 ha) which provides access to Churchill Park.

Most of the vegetation in these areas is exotic grassland, with some specimen trees, indigenous or exotic in origin. Some of the vegetation within these public places has been included in the desktop survey, but was also covered in the ground-truth survey due to their already protected status.

6.2 Unprotected vegetation

Private land accounts for the majority of the land in the extended area. No vegetation on private land is currently protected. Regardless of whether or not private properties extend to the coast, all indigenous vegetation within a few hundred metres of the coast provide important ecosystem services for the surrounding public spaces (i.e. beaches), including cliff stabilisation, buffering from storms, and habitat for indigenous flora and fauna. Furthermore, much of the vegetation on private land provides amenity values for people utilising public space along the coast or in reserves, parks and walkways.

Vegetation within private property is dominated by exotic species, with pōhutukawa being the most common indigenous species.

7. ECOLOGICAL VALUES

The vegetation within the extension area provides valuable habitat for indigenous fauna including birds and skinks. Pōhutukawa, pūriri and karaka that occur within the area provide valuable food sources for indigenous birds. The urban forests within the coastal margin of the extension area provide a refuge for indigenous flora and fauna within a predominantly urbanised landscape. The vegetation also contributes to community well-being, natural character and Māori customary values (Brown *et al.* 2015).

The ecological values of coastal vegetation throughout Auckland’s Eastern Bays are reflected by the fact that most of the coastal area is classified as an SEA. As such, vegetation in 15 separate parcels identified as SEAs has been deemed to meet one or more criterion of significance as per the PAUP. These are listed in Table 2; the SEAs are mapped in Figure 2.

Table 2: Sub-criterion met by one or more of the 15 SEAs within the Masterplan area.

Criteria Code	Criteria	Sub-criteria met
1	Representative sites	Representative of <10% natural extent within Ecological District
2	Threatened ecosystems	Threatened Ecosystems
3	Diversity	Habitat diversity
4	Stepping stones, migration pathways, and buffers	Buffer

Although some of the pōhutukawa are planted and/or are for amenity purpose, the coastal vegetation along the cliffs and parks of the extension area provide a wildlife corridor for indigenous flora and fauna. There is potential that the coastal vegetation in this area will recover enough to contribute to ‘stepping stone’ habitat for mobile fauna travelling across and throughout the Auckland isthmus.

Within a local context, the coastal cliffs dominated by pōhutukawa are considered to have relatively high ecological values. The indigenous vegetation in the extension area forms a significant portion of the largest area of coastal indigenous vegetation remaining in the eastern bays area. Like Tāmaki Drive, the extension area is characterised by a semi-contiguous, narrow band of coastal vegetation along the cliffs and headlands on the landward side of Glendowie. Interpretation of aerial photography indicates that vegetation was present along these cliffs and the coastal walkway in 1959 (Auckland GIS Viewer), which suggests that most of the larger trees are likely to be over 75 to 100 years old.

Due to their small size, forest and scrub habitats in urbanised Auckland area are essentially all ‘edge’ habitat. This means they do not contain true forest interior conditions such as elevated humidity, shade, and lower temperatures. Edge habitats are also more vulnerable to drying winds and pest plant infestations. Despite these conditions, much of the coastal forest canopy is comprised of pōhutukawa, with floristically diverse regeneration present in small pockets.

Aside from pōhutukawa forest, indigenous mangrove scrub and saltmarsh are present at the southern extent of the extension area. Prior to modification, this vegetation would have been common in the low-lying areas where freshwater meets the sea. This area, which borders the Tahuna Torea Nature Reserve, therefore has high ecological values for marine and terrestrial plant and animal species.

The extension area supports a range of common indigenous bird species, particularly nectar feeding birds such as tūī (*Prosthemadera novaeseelandiae novaeseelandiae*) which feed on flowering pōhutukawa and harakeke, and shags (*Phalacrocorax* spp.), which feed in intertidal areas. Coastal forest is also potential habitat for indigenous skinks such as copper skink (*Oligosoma aeneum*), while saltmarsh provides nursing grounds for juvenile fish such as snapper (*Centroberyx affinis*) and flounder (*Rhombosolea* spp.). As the coastal forest continues to mature, large-fruited species such as taraire (*Beilschmiedia tarairi*) and karaka are likely to attract kereru (*Hemiphaga novaeseelandiae*) on a seasonal basis.

8. THREATS

Natural areas within the Masterplan face a range of threats, both anthropogenic and natural in origin. As a coastal environment, the area is subject to flooding, erosion and inundation by rising sea levels, intense storms and king tide events. Increasing temperatures as a result of climate change also put vegetation at risk of disease and competition by introduced species that are more suited to warmer conditions.

Evidence of ecological degradation caused by slips is present along the cleared areas of coastal cliffs of Glendowie, although areas where mature pōhutukawa are present show little if any evidence of erosion or slips. Coastal wetlands and mangrove forests that likely dominated the low-lying basins would have provided buffering during large storm events and flooding.

In addition to natural threats, anthropogenic activities pose a significant threat to the survival of indigenous flora and fauna, particularly in urban environments. Green space is declining in Auckland as urban intensification drives the removal of vegetation and the proportional increase of impermeable surfaces (Wyse *et al.* 2015). The removal of vegetation, particularly indigenous trees, results in a loss of food and habitat resources for indigenous fauna and a reduction in ecosystem services and ecological integrity.

The introduction and spread of pest plants is also a serious threat. Pest plants are common throughout the project area (exotic tree species comprise *c.*12% of the canopy and were visually observed throughout the majority of the understorey), and some occur in locally abundant infestations, particularly where historical clearance of indigenous vegetation has occurred.

Lack of legal protection poses an ongoing threat to coastal vegetation, and could potentially affect much of the vegetation on private land within the study area. Recent changes in environmental regulation have substantially reduced the protection status of indigenous and exotic trees alike, particularly on private land.

9. RECOMMENDATIONS FOR FURTHER SURVEY

This report covers a relatively small coastal area of the Auckland region, which is becoming increasingly urbanised. Urban forests are becoming less abundant and more isolated within New Zealand and at a global scale. As such, the scope for a regional study of Auckland's urbanised coasts is necessary. It is acknowledged that this is an extensive undertaking, so focussing on the most urbanised environments is recommended. These areas include the cliffs around Hobson Bay and next to the Parnell cliffs in the Waitemata Ward. Including these areas in the study would provide a more complete understanding of the status of coastal vegetation along the full length of Tāmaki Drive, and around the coast to Glendowie. The value of coastal environments for amenity, ecological and recreational purposes, and their changes over time and threats of survival, are important to document so that we can determine the best ways to protect, enhance and restore them.

Given that pōhutukawa forests are an iconic part of the Auckland region, large-scale state of the environment studies on these ecosystems should be carried out by government agencies. However, such community-lead studies (usually supported by government funding) logically provide more benefit directly to the communities themselves due to the engagement of small-scale and locally-oriented organisation with their surrounding environments. Benefits extend to surrounding communities that witness neighbouring engagement, as well as to future generations who will benefit from base-line information being available within their environment. Therefore, increasing the capacity of community-engaged studies by increasing the funding pool for ecological, social and economic research within a local community is recommended to be provided by government agencies.

It is also recommended that, as far as practical, the locations of all pōhutukawa trees on private land within the Tamaki Drive and Glendowie coastline areas are recorded so that they can be submitted for inclusion in the Schedule of Trees or Groups of Trees under the PAUP. Inclusion in the Schedule will ensure they receive protected status.

10. CONCLUSIONS

A desktop survey was undertaken of clifftop coastal vegetation within an extended area of the Tāmaki Drive/Ōrākei Ward area, from Achilles Point to Tahuna Torea Nature Reserve (but excluding the reserve). The main purpose of the survey was to quantify the presence of pōhutukawa within the area. The cover of indigenous and exotic vegetation was quantified using aerial maps of the survey area, which covered c.31 ha. The cover of indigenous-dominated vegetation (c.45% of the study area) is approximately equal to the cover of exotic-dominated vegetation. Of the indigenous vegetation, c.40% is pōhutukawa forest. Mixed indigenous-exotic scrub comprises the remaining c.10% of the study area. Much of the exotic-dominated vegetation comprises mown grassland, which characterises coastal parks such as Roberta Reserve. Although pest plants and exotic vegetation within the understorey were not taken into account in this desktop assessment, large infestations of pest plant species are known to be present within the coastal margin.

Pōhutukawa, along with other broadleaved coastal forest species, provide a range of ecological services. Indigenous species such as pōhutukawa have adapted to extreme coastal conditions and are important in maintaining geological features and reducing coastal erosion (Bergin & Hosking 2006). The threats of coastal erosion are natural, but have been exacerbated by urbanisation throughout the study area. Furthermore, pest plant infestations that dominate open areas can contribute to the effects of erosion. Many of these coastal cliffs harbour pest plants which are wind-dispersed and therefore have the ability to colonise inner Hauraki Gulf Islands. Indigenous coastal vegetation, particularly pōhutukawa forest along the cliffs, can effectively prevent light-demanding pest plants from establishing. Furthermore, pōhutukawa along the coastal margin act as a wildlife corridor for indigenous fauna, forming a semi-contiguous band of vegetation around the coast. Pōhutukawa are also important for their amenity value throughout the Auckland region.

One of the most serious threats indigenous coastal forests face in Auckland is the lack of legal protection, particularly on private land. Due to the weakening of the Resource Management Act under the Streamlining and Simplification Amendment (2009), protection of trees has reduced to include only notable trees and groups of trees that were nominated in 2012. The current regulations regarding tree protection permit landowners to remove coastal forest for a multitude of reasons, making the coastline vulnerable to pest plant infestations and erosion, and resulting in a loss of amenity values.

Pest plant control is recommended throughout the coastal area identified in this report. Planting of pōhutukawa along clifftops where vegetation has been removed should also be a priority. This recommendation is regardless of whether the coastal area is within private or public land. Furthermore, it is recommended that protected status be granted to all pōhutukawa within the area surveyed, which are not otherwise protected under any legislation, as they provide a range of important ecological, social and economic services.

This report has quantified the cover of indigenous- and exotic-dominated vegetation within the Tāmaki Drive extension area. The Tāmaki Estuary Protection Society hopes to use this information as a baseline so that changes in vegetation type and cover can be monitored in the future. Further studies are recommended to extend the study area throughout the Eastern Bays. This recommendation has the support of the Society.

Additional studies are recommended to document and quantify coastal forest, with a focus on pōhutukawa, throughout the coastal area of central Auckland.

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VASCULAR PLANT SPECIES RECORDED WITHIN THE TĀMAKI DRIVE EXTENSION AREA

INDIGENOUS SPECIES

Gymnosperms

<i>Agathis australis</i>	kauri
<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Dacrydium cupressinum</i>	rimu
<i>Podocarpus totara</i> var. <i>totara</i>	tōtara

Monocot. trees and shrubs

<i>Cordyline australis</i>	tī kōuka, cabbage tree
<i>Rhopalostylis sapida</i>	nīkau

Dicot. trees and shrubs

<i>Ackama rosifolia</i>	makamaka
<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	tītoki
<i>Avicennia marina</i> subsp. <i>australasica</i>	mānawa, mangrove
<i>Coprosma macrocarpa</i> subsp. <i>minor</i>	karamū, kāramuramu
<i>Coprosma repens</i>	taupata
<i>Coprosma robusta</i>	karamū, kāramuramu
<i>Corynocarpus laevigatus</i>	karaka
<i>Hebe</i> sp.	hebe
<i>Hoheria populnea</i>	houhere, lacebark
<i>Leptospermum scoparium</i> agg.	mānuka
<i>Melicytus ramiflorus</i> subsp. <i>ramiflorus</i>	māhoe
<i>Meryta sinclairii</i>	puka
<i>Metrosideros excelsa</i>	pōhutukawa
<i>Myoporum laetum</i>	ngaio
<i>Myrsine australis</i>	māpou, matipou, māpau
<i>Olearia solandri</i>	
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa
<i>Pittosporum crassifolium</i>	karo
<i>Pittosporum eugeniioides</i>	tarata; lemonwood
<i>Pittosporum tenuifolium</i>	kōhūhū, rautāhiri, rautāwhiri
<i>Plagianthus divaricatus</i>	marsh ribbonwood mākaka
<i>Pomaderris apetala</i> subsp. <i>maritima</i>	tainui
<i>Pseudopanax arboreus</i>	whauwhaupaku, five finger
<i>Pseudopanax lessonii</i>	houpara
<i>Solanum aviculare</i> var. <i>aviculare</i>	poroporo
<i>Vitex lucens</i>	pūriri

Ferns

Cyathea dealbata ponga, silver fern

Sedges

Gahnia setifolia māpere
Machaerina juncea

Monocot. herbs (other than orchids, grasses, sedges, and rushes)

Astelia banksii kakaha, pūwharawhara
Phormium tenax harakeke, flax

Composite herbs

Pseudognaphalium luteoalbum agg. pukatea

Dicot. herbs (other than composites)

Haloragis erecta subsp. *erecta* toatoa
Sarcocornia quinqueflora ureure, glasswort

NATURALISED AND EXOTIC SPECIES

Gymnosperms

Araucaria araucana monkey puzzle
Pinus pinaster maritime pine
Pinus radiata radiata pine

Monocot. trees and shrubs

Phoenix canariensis Phoenix palm

Dicot. trees and shrubs

Acacia longifolia Sydney golden wattle
Acer pseudoplatanus sycamore maple
Banksia integrifolia banksia
Chrysanthemoides monilifera boneseed
Erythrina ×sykesii coral tree
Eucalyptus globulus blue gum
Eucalyptus sp. eucalyptus
Ligustrum lucidum tree privet
Ligustrum sinense Chinese privet
Myoporum insulare Australian ngaio
Paraserianthes lophantha brush wattle
Populus sp. poplar
Quercus palustris pin oak

Quercus robur

Salix sp.

Solanum mauritianum

Ulex europaeus

English oak

willow

woolly nightshade

gorse

Dicot. lianes

Vinca major

periwinkle

Ferns

Nephrolepis cordifolia

tuber ladder fern

Grasses

Cortaderia selloana

Phyllostachys aurea

pampas

walking stick bamboo

Monocot. herbs (other than orchids, grasses, sedges, and rushes)

Agapanthus praecox

Hedychium gardnerianum

agapanthus

kahili ginger, wild ginger

Dicot. herbs (other than composites)

Nasturtium officinale

watercress

SCHEDULED TREES WITHIN THE TĀMAKI DRIVE EXTENSION AREA

ID	Common name	Botanical name	Auckland District	Number	Location/street address	Legal description	Easting	Northing
201	Pōhutukawa (2), English Oak (4), Turkey Oak (1)	<i>Metrosideros excelsa</i> <i>Quercus robur</i> <i>Quercus cerris</i>	Isthmus	7	Riddell Road 510, Glendowie (Redemptorist Fathers Monastery and Church)	Isthmus 7 LOT 1 DP 157604 87	174.869075°	-36.851242°
123	Pōhutukawa	<i>Metrosideros excelsa</i>	Isthmus	10	10 Karaka Bay, Glendowie (at the end of Peacock Street)	n/a 88	174.876838°	-36.850186°
202	Pōhutukawa	<i>Metrosideros excelsa</i>	Isthmus	1	Peacock Street 17, Glendowie	1 Pt Lot 7 DP 34047 903m290	174.876910°	-36.850909°
711	Pūriri	<i>Vitex lucens</i>	Isthmus	1	Colchester Avenue 24 Glendowie	Lot 284 DP 20612	174.871486°	-36.859555°
712	Pūriri	<i>Vitex lucens</i>	Isthmus	2	Riddell Road 138 Glendowie	Lot 168 DP 18160	174.874432°	-36.861149°
240	Moreton Bay Fig	<i>Ficus macrophylla</i>	Isthmus	1	West Tamaki Road 172, Glen Innes (Glen Taylor Primary School)	Lot 20 DP 36176	174.863998°	-36.869713°



Call Free 0508 WILDNZ
Ph: +64 7 343 9017
Fax: +64 7 3439018
ecology@wildlands.co.nz

99 Sala Street
PO Box 7137, Te Ngae
Rotorua 3042,
New Zealand

Regional Offices located in
Auckland, Hamilton, Tauranga,
Whakatane, Wellington,
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