

NGAA HAU O MAANGERE NGAHERE PLANTING GUIDE



MIHI

Whakarongo ki ngaa hau maangere e pupuhi ana
Ko te hau tonga
Ko te hau raki
Ko ngaa hau katoa aa Taawhiri
E kawe nei i te au oo mihi o te pootiki ki ngaa tuaakana o te taiao
Tuuturu e rangi
Tuuturu e papa
Tuuturu ko ngaa tuu tohu whenua o Mataaooho e tuu nei
Whakamaua kia tina, tina!
Haumi ee! Hui ee! Taaiki ee!

Listen to the soft breezes
The winds from the north
The winds from the south
Acknowledging all the winds of our of the wind Taawhiri
Our elders of our environment here the acknowledgement of the youngest of our environment
Our sky father
Our earth mother
The land marks of our tuupuna Mataaooho
Bless us

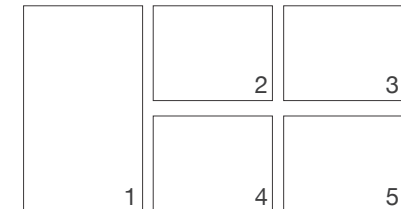
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*Te Ahiwaru
Te Aakitai Waiohua*

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Ngāti Paoa Trust Board*

*Ngāi Tai ki Tāmaki
Ngāti Whātua Ōrākei*



Cover page images:

1. Te Pane o Mataaooho / Te Ara Pueru
2. Te Ara Rata
3. Ara hiikoi through puuriri forest
4. Mokimoki
5. Puuriri street trees



URU WHAKAARO



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MAANGERE NGAHERE PROJECT

This guide is one part of the wider Maangere Ngahere Project, which aims to grow and restore the ngahere. The Maangere Ngahere Project is the pilot for the wider Kāinga Ora Ngahere Project, occurring across the Maangere-Ootaahuhu Local Board area. With only eight per cent canopy cover in this area, and a large scale redevelopment programme underway to transform nine neighbourhoods over the next 20 years the pilot provides opportunity to make a difference both within Kāinga Ora developments and across the wider community.

The aim of the project is to catalyse a collaborative and integrated place-based approach to understanding and restoring ngahere in Ngaa Hau o Maangere. Connecting taangata (people), whenua (land), wai (water) and te taiao (environment) and recognising the interconnection of health and wellbeing of all.

The project is underpinned by mana whenua guidance, te tikanga rere ki uta, rere ki tai, and takes a whole of landscape approach. It invites us to work in ways that uplift Ngaa Hau o Maangere; the whenua and its people.

The Maangere Ngahere Team is a collaboration between:

- Kāinga Ora
- Mana whenua - Te Ahiwaru and Te Aakitai Waiohua
- ME Family Services (local community organisation)
- Uru Whakaaro (Maaori specialists in ecological restoration and ecoscapes)

The Maangere Ngahere Project includes:

- Coordinating the Maangere Taiao community coming together
- Tiny Forests in Schools Project
- Ashgrove Community Orchard
- Advisory to Ngaa Hau o Maangere Kāinga Ora development planning
- Ngaa Hau o Maangere Ngahere Planting Guide



Maatuku

1 NGAA HAU O MAANGERE

CULTURAL VALUES & PRINCIPLES

To be able to incorporate maatauranga Maaori throughout work for the Maangere Ngahere Project, first requires understanding what is important to iwi.

The following cultural values and principles have been provided by Te Ahiwaru and Te Aakitai Waiohua to guide the restoration of ngahere for Ngaa Hau o Maangere.

Values

Recognition of cultural and spiritual connection

Kaitiakitanga Manaakitanga

Regenerative mahinga kai

Rere ki uta, rere ki tai



Kootare

Principles

- Catchment based, eco/cultural system approach
- Creating connectivity for fragmented and sensitive areas
- Protection of all ngahere and trees of significance
- Significantly increase the area's tree canopy to at least fifteen per cent through planting in public places
- Natural environment is integrated with any new development
- Encouraging planting and the retention of existing trees on private land
- Restoring native vegetation along awa and takutai
- Look for opportunities to regenerate and restore repo within the historic footprint
- Rongoaa provision planting with the purpose of harvesting areas
- Maaori place names are supported and increased use is ensured
- All portage routes are recognised and celebrated
- Bringing identity back from where in the landscape it stems and rejuvenating maatauranga Maaori – e.g. planting rata as a tohu marker in the appropriate environment
- Provision within parks and reserves for our wider Pasifika communities, such as materials for akutu (used in times of celebration)
- Environmental plant pest and animal pest management with preferred methodology being a non-agrichemical approach
- Appropriate procurement of kaitiaki for field works, facilitation of community volunteers, cultural safety support, nurseries, planting design, preparation and maintenance of plantings

CULTURAL LANDSCAPE

*"Whatungarongaro te tangata, toituu te whenua."
"As people disappear from sight the land remains."*

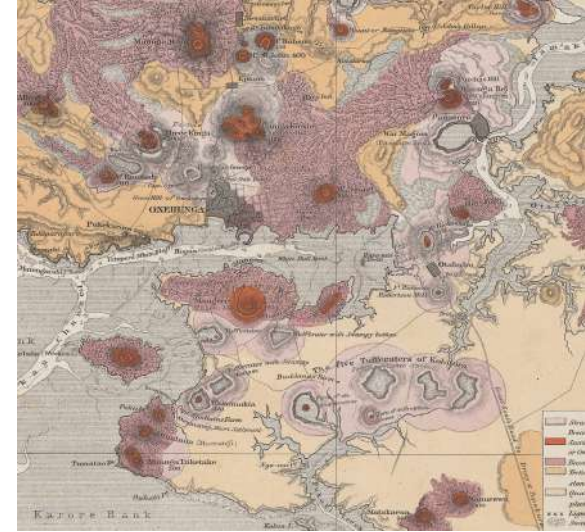
Places throughout Ngaa Hau o Maangere contain mahinga kai, waahi tapu and waahi tupuna such as Tauranga Waka/Haupapa, paa tawhito, ngaa hauhake tipu, rawa taiao sites. Only through guidance, collaboration and relationship with mana whenua can the long term preservation, protection and where appropriate regeneration of these sites take place. The following pages cover the key cultural landscape features that sit within this landscape.

"Natural resources are ngaa taonga tuku iho, treasures inherited from our ancestors. The mauri, or life force, of the natural world is what connects people with freshwater, coastal, air, land, and indigenous biodiversity. It is the responsibility of this current generation, as kaitiaki, to protect and sustain ourselves and the taonga for which we are responsible for future generations... Our whakapapa connects us to our maunga, our awa and our moana. Our people recognise the importance of a healthy and sustainable environment to our tribal identity." - Te Ahiwaru

"As kaitiaki, Te Aakitai Waiohau has responsibilities to protect the mauri of resources within their rohe and to ensure that the spiritual and cultural aspects of resources are maintained for future generations. Of particular importance to Te Aakitai is the belief that we all descend from the union of Ranginui and Papatuaanuku. Therefore everything is interconnected and we don't see things in silo so we need to consider the wider consequences of projects and the environment" - Te Aakitai Waiohau



Re-creation of view from papakainga at Te Pane oo Mataaoho looking towards Te Maanukanuka oo Hoturoa & Te Waonui-a-Tiriwa



Historical volcanic landscape of Ngaa Hau o Maangere

MAUNGA

“We need to normalise cultural landscape into everyone’s thinking.”
- Edith Tuhimata, Ngaati Tamaoho / Ngaati Te Ata



TE PANE O MATAAOHO / TE ARA PUERU



NGAA KAPUA KOHUORA



TE PUUKAKITAPU O POUTUKEKA



TE PANE O MATAAOHO / TE ARA PUERU

Te Pane o Mataaoho / Te Ara Pueru is the largest and best preserved of the volcanic features in the southern part of Taamaki Makaurau. Its geology is outlined here by the Tuupuna Maunga Authority:

“The eruption of this Maunga has been dated to around 50,000 years ago, making it one of the oldest volcanoes in the region. Fire fountaining from the large main crater produced a scoria cone standing 105 metres tall. A second smaller crater sits on the northern rim of the larger crater. A third U-shaped breached crater was removed by quarrying in the 1950s - 60s... Large volumes of lava flowed from around the base of the volcano during the eruption, spanning out approximately 500 hectares.”

Te Pane o Mataaoho / Te Ara Pueru was an important defensive paa with an extensive paa kaainga. The Tuupuna Maunga Authority expands:

“The high slopes along the south and northwest sides were heavily terraced... The eastern rim of the smaller crater was a main kai store for the paa, and the rows of rectangular storage pits [are still evident]..”

Ootuataua stonefields is the historic maara kai that is located on the fertile soils of the Ihumaatao volcanic landscape. Like Te Pane o Mataaoho / Te Ara Pueru, signs of ancient occupation are still visible. Ootuataua stonefields feature soils that are highly valued for cultivation as well as for the stone boundaries of gardens that date back to the time of initial Maaori settlement. Ootuataua contains many waahi tapu and cultural sites of significance. Other historic maara kai include those located on Point Farm (now Ambury Regional Park). Ngaa Hau o Maangere also has a strong history of market gardening due to its fertile volcanic soils.

There are a number of other highly significant craters and maunga that sit within the cultural landscape of Ngaa Hau o Maangere, including Maangere Lagoon, Te Puukakitapu o Poutukeka, Ngaa Kapua Kohuora, Te Tapuwae o Mataaoho, Kohuora, Te Puketapapatanga a Hape (or Pukeiti), Ootuataua, Maungataketake, Waitomokia and Te Motu a Hiaroa (Puketutu). Majority of the cones have been quarried for their scoria, although Maungataketake, Waitomokia and Te Motu a Hiaroa have been completely quarried away, leading to degradation to the cultural landscape.

“The volcanic craters in northern Manukau are collectively known as Ngaa Tapuwae o Mataaoho (the footprints of Mataaoho) and include Maangere Lagoon, Te Puukakitapu o Poutukeka, Ngaa Kapua Kohuora, Te Tapuwae o Mataaoho and Kohuora. The western point of Ihumaatao overlooking the Manukau harbour, which includes Ootuataua, is known as Te Ihu Mataaoho (the nose of Mataaoho).” - Te Aakitai Waiohua

“Te Motu a Hiaroa is a highly sacred island named after Hiaroa, the sister of Hape, is associated with the deity Mataaoho, and contains many waahi tapuu and taonga. Maungataketake is a sacred maunga, former paa site and battle ground where historic Te Tiki paa was located to the south. Te Puketapapatanga a Hape is translated as ‘the flat resting place of Hape’ (also called Pukeiti) and is the maunga which gave name to the papakaainga. Ootuataua maunga is associated with the deities Mataaoho and Atua-Taua. Waitomokia maunga also held Oruru kaainga that sat within the Waitomokia crater.” - Te Ahiwaru



OOTUATAUA

AWA & REPO

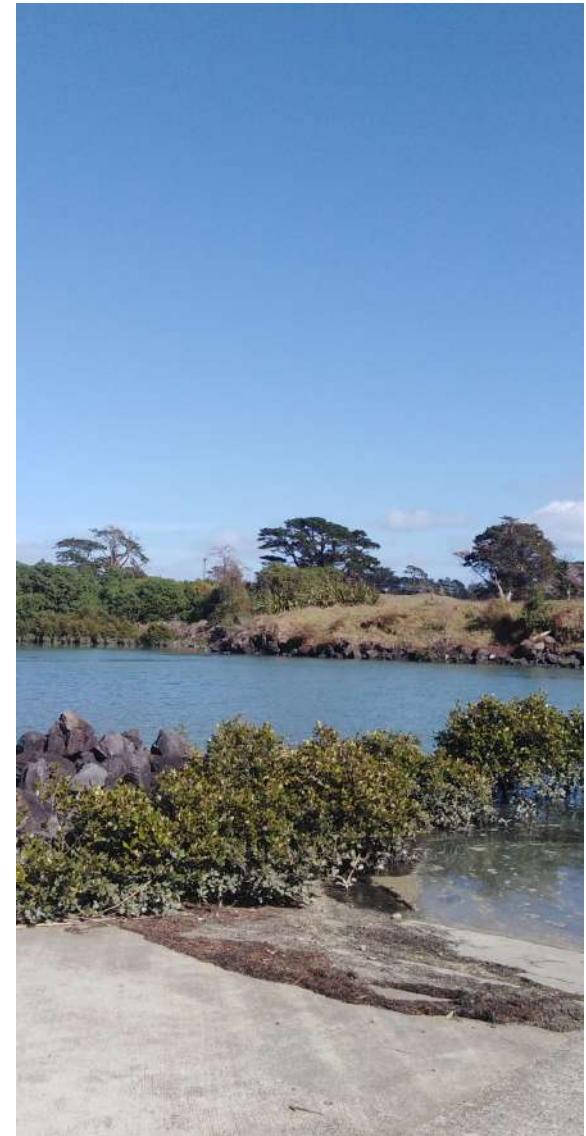
"I used to play in the Harania stream as a child, go eeling and swimming. I want our local children to be able to enjoy doing these things as well." - Vern Togiatau, ME Family Services



TE ARA RATA



HARANIA



OORUARANGI

Awa are recognised as ancestral waterbodies. They are highly valued places of provision, prized for their rauemi taiao such as plant and dye sources and kaimoana. Many awa were associated with repo, which also provided resources such as kai. Seasonal camps were often situated along awa. The key awa of Ngaa Hau o Maangere are Te Ara Rata, Harania, Ooruarangi, Puukaki, Awataotaoroa, Otaimako and Waokauri.

Wai maaori are important freshwater areas, which include repo and puna. In Ngaa Hau o Maangere, they provide significant sites for gathering resources (i.e. harakeke, raupoo, and other weaving materials), and kai such as, freshwater eels, puha and can be spawning areas for fish such as mullet, inanga, and galaxids.

Repo are culturally significant, being an important source of kai and resources, and for tuupuna, a source of economic stability through historic trading, and spiritual importance for ritual and ceremonial purposes. Despite this significance more than 90% of repo throughout Aotearoa have been destroyed. Repo are an important part of the whakapapa of our awa, they are the kidneys for our whenua, they cleanse and filter the toxins before entering our tuupuna awa and provide nourishment and habitat for biodiversity.

Te Ara Rata awa or 'the preferred route' takes its name as a favoured stopping point for waka travelling along the southern side of Te Maanukanuka oo Hoturoa / Te Waimokoia area. Te Ara Rata awa was originally a swampy headwater for a large river that ran into Te Waimokoia. The repo

provided many resources including kai. The head of Te Ara Rata awa is located near Hinau Road and Molesworth Place. This was formerly the northern outlet of an extensive wetland located across the Bader Drive area.

Ooruarangi awa was used as a key passage for navigation and is acknowledged as an ipu kai for many generations. The awa is a source of rauemi taiao and provided abundant kaimoana. Waitomokia awa is a branch from the main Ooruarangi awa.

Within the explosion crater of Waitomokia, the crater lake and swamp were given the name Waitomokia, meaning water seeping into the ground. This talks to the significance of the waters collected here and feeding the wider landscape and being a matapuna (spring source).

Puukaki and Waokauri awa are connected to Te Wai o Taiki via one of the three portages in Ngaa Hau o Maangere. The Puukaki portage is the southernmost of the three portages connecting the Te Maanukanuka oo Hoturoa to Te Wai o Taiki. The portage connected the Waokauri awa to the Te Wai o Taiki via Papatoetoe and Middlemore. Access to Puukaki awa is now difficult and sporadic with most of the surrounding land being privately owned farm - agriculture and industrial. The Puukaki lagoon flows out to Puukaki awa. Puukaki Marae and papakaainga are found at the meeting of Puukaki and Waokauri awa. Two other awa flow in this area - Otaimako and Awataotaoroa or 'river of the extensive plain.' Taotaoroa is the 'extensive plain' that makes up Maangere Central immediately to the north of Awataotaoroa.



WAOKAURI



PUUKAKI

TAKUTAI



TE MAANUKANUKA OO HOTUROA MEETING OOTUATAUA



TE MAANUKANUKA OO HOTUROA



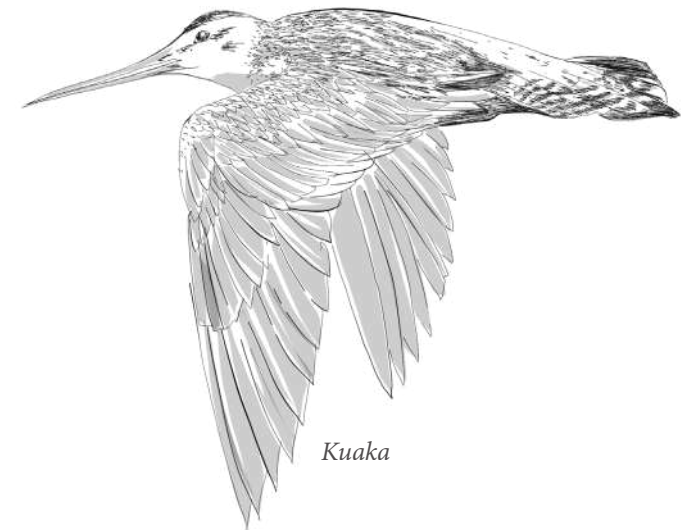
OOTUATAUA

Ngaa Hau o Maangere sits within the wider receiving environment for Te Maanukanuka oo Hoturoa. The harbour's name recalls the travels of our tupuna of the Tainui waka through these waters. Specifically, it speaks of the dangers encountered by Tainui commander Hoturoa at the harbour heads. More generally it speaks of the traditional history of the descendants of the crew of the Tainui who remain here today including Waiohua hapuu. All wai that flows across Ngaa Hau o Maangere enters Te Maanukanuka oo Hoturoa; thus the whenua and takutai environments of Ngaa Hau o Maangere are intrinsically linked. Similarly many important sites lay along the coastline of Te Maanuka, or were easily accessible by means of its tributary awa. Therefore Te Maanukanuka oo Hoturoa binds people together by connecting the rohe together as one.

Te Maanukanuka is one of the most significant sites in Aotearoa for migratory wading manu. The harbour features vast mudflats that support thousands of kuaka and many other communities of manu.

“[Te Maanukanuka oo Hoturoa] was the ancestral passage to Ihumaatao and the Maangere-Ootaahuhu areas for Te Waiohua people, and the passage which the eponymous ancestor Hape travelled on Kaiwhare (the taniwha). Multiple settlements were established along the coastline of Te Maanukanuka oo Hoturoa, whereby the traditional knowledge of the environment saw Te Waiohua people move [sic] through seasonal fishing villages. Te Maanukanuka oo Hoturoa is still a primary mahinga kai and ipu kai, and kaimoana collected from the area includes paatiki, taamure, kahawai, tuuna, kanae raukura, tio, pipi, tungangi and puupuu.” - Te Ahiwaru

“The harbour is a traditional food source with access to fish, shellfish and coastal birdlife, and was and continues to be a vital transport route facilitating travel, exploration, communication and trade throughout Taamaki Makaurau... The waters of the Coastal Area are also seen as a living entity with its own mauri and mana... The life sustaining waters of the Coastal Area are a sacred resource with cleansing, purifying and healing properties that must be nurtured and protected. The various bodies of water have their own taniwha or spiritual guardians associated with them. As kaitiaki, these taniwha protect the waters and natural resources along with iwi associated with the area. As a result, the Coastal Area is seen as a taonga of great cultural and spiritual significance to Te Aakitai Waiohua.” - Te Aakitai Waiohua Coastal Statutory Acknowledgment



Kuaka

NGAHERE

Ngahere is the mutually beneficial, mutually dependent interwoven and interconnected relationships that are able to sustain the diversity of life.

Across Ngaa Hau o Maangere ngahere, there is potential for multiple ecosystems that would naturally occur. Indigenous Terrestrial and Wetland Ecosystems of Auckland describes an ecosystem as:

“... a biological community of interacting organisms and their physical environment... Ecosystems are defined by a degree of uniqueness in composition and processes (involving the biota and the environment) and a spatial boundary. In this regard they are synonymous with ‘ecological communities’, ‘habitats’, ‘biotopes’ and ‘vegetation types’. Ecosystems may vary in size from small ephemeral wetlands to large tracts of forest.”

There are two forest ecosystems and one coastal saline ecosystem identified as the historically occurring indigenous ecosystems within this cultural landscape. These are the predominant ecosystem types of Ngaa Hau o Maangere to be protected and restored.

Forest ecosystems

- Puuriri forest (WF7) - which includes two variants
- Taraire, tawa, podocarp forest (WF9)

Coastal saline ecosystem

- Mangrove forest and scrub (SA1) - which includes multiple variants of salt water and saline coastal ecosystems

The regional IUCN threat status* for each of these ecosystems is:

- Puuriri forest (WF7): Critically Endangered
- Taraire, tawa, podocarp forest (WF9): Endangered
- Mangrove forest and scrub(SA1): Least Concern†

There are a number of other ecosystems in Ngaa Hau o Maangere that are currently present. These include:

- Forest ecosystem: Poohutukawa treeland/flaxland/rockland (CL1)
- Regenerating ecosystem: Broadleaved species scrub/forest (VS5).
- Wetland ecosystem: Raupoo reedland (WL19)
- Wetland ecosystem: Flaxland (WL18)
- Wetland ecosystem: Machaerina sedgeland (WL11)

Kaanuka scrub/forest (VS2) is currently not present but is a potential regenerating ecosystem for Ngaa Hau o Maangere. This is a natural regenerating ecosystem found on cleared pasture sites that establishes by itself, so will not be part of any planned restoration work.

The following pages summarise the three key ecosystem types of Ngaa Hau o Maangere. Note that in Ngaa Hau o Maangere, few remnants of the two forest ecosystems remain, such as old puuriri and taraire trees dotted throughout the area. Hence, the photos shown to demonstrate these two ecosystems were taken further afield in Epsom and Papakura.

** The International Union for the Conservation of Nature (IUCN) has created a system for assessing the status of ecosystems, applicable at local, regional, national and global levels. The system evaluates the severity and impact of multiple symptoms of risk produced by different processes of ecosystem degradation, including changes in the distribution and extent of an ecosystem, degradation of the physical environment and changes to its characteristic species, all of which contribute to risk of decline.*

† The regional threat status of individual variants of this ecosystem has not been assessed, but it is worth noting that locally, this ecosystem may contain historically rare or threatened ecosystems.

NGAA HAU O MAANGERE NGAHERE

Scale: 1_50 000@A3



5KM



KEY

- Crater
- Maunga
- Wetland
- Significant Ecological Area
- Kāinga Ora Development Area
- Kāinga Ora Neighbourhood

MAANGERE POTENTIAL ECOSYSTEMS

- Puuriri forest [WF7]
- Taraire, tawa, podocarp forest [WF9]
- Mangrove forest and scrub [SA1]
- Reclaimed
- Swamp Mosaic

PUURIRI FOREST (WF7)

REGIONAL IUCN THREAT STATUS: CRITICALLY ENDANGERED



Pathway through Withiel Thomas Reserve



Ngahere layering

This critically endangered, variable ecosystem occurs on the most fertile soils of alluvial and volcanic origin within the warm climatic zone. Three variants occur, determined primarily by landform and soil type.

Distribution: In predominantly frost-free, warm and sub-humid areas. In the Auckland region, this forest ecosystem was originally widespread on alluvial terraces and on the volcanic soils of the isthmus, but is now reduced to small, scattered remnants. Examples of WF7.2 occur at Withiel Thomas Reserve in Epsom and Sylvan Park Reserve at Lake Pupuke.

Characteristic native flora: Broadleaved forest with abundant puuriri, and composition corresponding to the variants as follows:

- WF7.1: Puuriri with occasional tootara, mataii, kahikatea and tiitoki, locally with koowhai and taraire.
- WF7.2: Mixed broadleaved forest typically dominated by puuriri, karaka, kohekohe and, locally, taraire and kohekohe. Also present are occasional tootara, mataii, pukatea, rewarewa, tawa, tiitoki and northern raataa, and locally, abundant niikau. Composition is strongly related to landform and soil development. On more exposed lava with skeletal soils, mangeao, tiitoki, karaka, maahoe, houpara and occasional puuriri occur, colloquially referred to as 'rock forest'. Secondary successional examples are often dominated by maahoe, puka, akeake and rangiora; having an abundance of puka and akeake they still maintain some character of 'rock forest'.
- WF7.3: Puuriri with occasional kahikatea, kohekohe and niikau.

Secondary successions are often dominated by podocarp trees, with tootara and kahikatea most abundant, especially in Auckland.

Characteristic native fauna: Pre-human era - Puuriri forest would have supported a diverse range of invertebrates, amphibians, moko, manu and pekapeka. In some places, forest productivity would have been enhanced by the nutrients brought ashore by burrowing and surface-nesting seabirds. Several species of moa, adzebill, brown and little spotted kiwi were probably present, along with forest-inhabiting ducks, raptors, haakuai and flightless rails. Abundant fruit and nectar would have favoured species such as kaakaapoo, kaakaa, kereruu, huia, tieke, kookako and piopio, while nectivorous moko and manu would have benefited from an almost year-round nectar supply. Insectivores would have included tuatara, moko, small rails, haakuai, ruru, ruru hinapoo, wrens, toutouwai, miromiro, poopokotea, tiirairaka, riroriro, tieke, huia, piopio and bats. Large cavities in puuriri provided shelter, roosting and nesting sites for moko, kaakaa, kaakaariki, hihi, huia, tieke and pekapeka. Present - These forests provide fruit and nectar for kereruu and tuui, and habitat for the more common native bush birds, e.g. ruru, kootare, piipiiwharauoa, tiirairaka, riroriro and tauhou. Tree cavities in species such as puuriri and poohutukawa in places free of mammalian predators provide shelter, roosting and nesting sites for moko, kaakaa, kaakaariki, hihi, tieke and pekapeka.

Key processes and interactions: Our understanding of the composition of this forest is lacking, because only fragments remain. Mixed puuriri-dominant broadleaved forest occurs on alluvial and marine terraces. It also occurs on recent basaltic volcanoes,

or neighbouring land, where ash fall has significantly increased fertility. The seedlings of puuriri and other broadleaved trees are shade-tolerant, so are capable of regenerating beneath existing relatively closed canopy forest and consequently, podocarp trees are infrequent. Puuriri is very long-lived and may dominate over hundreds to thousands of years. Vegetation succession on recent volcanic lava fields during the warm Holocene period has initially been dominated by *Metrosideros* forest (including the poohutukawa/northern raataa and hybrids of VS1), e.g. the contemporary forest on Rangitoto Island. Over several thousand years, forest diversity increases with soil development, especially on tuff, ash and scoria landforms. Eventually, a mixed broadleaved forest dominates, within which puuriri, kohekohe, karaka, mangeao and tiitoki are common. Forest succession was likely to have been more complex, with intermediate stages where species such as mangeao, rewarewa and tiitoki dominated for periods of time or in specific situations, such as on drier lava flows and relicts of 'rock forest' on Maungawhau.

Threats: As it occurs on highly fertile soils, most of this forest type was cleared for horticulture and agriculture. Remaining examples are small and highly fragmented, and suffer from edge effects, weed invasion and locally, stock grazing. Pest mammals, especially possums and rats, are also significant threats, depleting palatable species and eating fruits and seeds, as well as preying on vulnerable fauna, including pollinators and seed dispersers. Canopy species composition has probably been altered through logging of highly sought after podocarp and puuriri trees, resulting in limited recruitment and replacement by species such as taraire, tawa and kohekohe.



Kawakawa



Puuriri canopy



Wharanui



Puuriri

All photos taken at Withiel Thomas Reserve, Epsom

TARAIRE, TAWA, PODOCARP FOREST (WF9)

REGIONAL IUCN THREAT STATUS: ENDANGERED



Forest floor nursery matrix at Kirks Bush



Natural succession

This endangered ecosystem type occurs on moderately fertile soils. The topography where it occurs is variable, with shallow to steep hill-slopes interspersed with ridges. Species composition is strongly related to landform and moisture availability, and is variable between gullies, hill-slopes and ridges.

Distribution: In predominantly frost-free areas below 450m. Found throughout Auckland region with some of the best and most extensive examples remaining in the Hunua Ranges. Kirks Bush in Papakura is a small, but easily accessible example of this ecosystem type.

Characteristic native flora: Three major variants of this forest type occur, two of which occur in the Auckland region. The most common and extensive variant (WF9.1) is characterised by large emergent rimu and northern raataa, with kahikatea in gullies emerging over a broadleaved canopy of abundant taraire and kohekohe, with toowai and tawa becoming more common at higher altitudes. Other associated species include occasional hiinau, rewarewa and pukatea, and locally, miro, puuriri and karaka in lowland areas. In the sub-canopy, niikau and tree ferns (especially mamaku) are locally abundant. On ridges, rimu, miro, rewarewa and mangeao are dominant, while pukatea is most numerous in gullies. In the third variant (WF9.3), taraire is less abundant, while kohekohe, rewarewa, puuriri, tawa and hiinau are comparatively more common.

Characteristic native fauna: Pre-human era - As with other forest ecosystems, taraire, tawa, podocarp forest would have supported a diverse range of invertebrates, amphibians, moko, manu and pekapeka. Several species of moa, adzebill and brown and little spotted kiwi were probably present, along with forest-

inhabiting ducks, raptors, haakuai and flightless rails. Large fruiting rimu and abundant taraire, tawa and kohekohe would have supported good populations of kereruu and kookako. Flowering kohekohe would have attracted large numbers of hihi, tuuii and korimako in early winter. Insectivores would have included tuatara, moko, small rails, haakuai, ruru, ruru hinapoo, wrens, toutouwai, miromiro, poopokotea, tiirairaka, riroriro, tieke, huia, piopio & pekapeka. Present - Taraire, tawa, podocarp forests in the Hunua Ranges support the last natural kookako population in the Auckland region, along with relict populations of kaarearea, kaakaa, korimako, miromiro and long-tailed pekapeka. This forest type supports the usual range of other native bush birds, such as ruru, korimako, piipiiwharauoa, tiirairaka, riroriro, tuuii and tauhou. Pepeketua are common in the numerous small streams, but moko are scarce.

Key processes and interactions: The most important factor influencing the composition of this forest is the variable landforms it occupies. Native birds, especially kereruu and tuuii, are important for the pollination and seed dispersal of canopy and sub-canopy species.

Threats: As it occurred on moderately fertile soils, most of this forest type on easy slopes was cleared for agriculture, and it is now largely restricted to steep lands. Animal pests are significant threats, with possums, goats and rats especially, causing the decline of palatable flora and vulnerable fauna. In combination, possums and goats have the potential to cause mortality and regeneration failure of palatable canopy and sub-canopy species. Intact, closed canopy examples are relatively resistant to weed invasion, though shade-tolerant ground covers, trees and shrubs readily invade.

Text drawn from [Indigenous Terrestrial and Wetland Ecosystems of Auckland](#) (Auckland Council, 2017).



Koowaowao and wharanui



Taraire forest floor nutrient cycling



Raataa



Pekepeke kiore



Raataa on pukatea



Mokimoki and taraire

All photos taken at Kirks Bush, Papakura

MANGROVE FOREST & SCRUB (SA1)

REGIONAL IUCN THREAT STATUS: LEAST CONCERN*

This ecosystem occurs in Te Waimokoia, Ambury Regional Park coastline, the intertidal flats of Te Manukunuka o Hoturoa, Ihumaatao coastline and Ooruarangi Stream, all of which are terrestrial or marine [Significant Ecological Areas](#)†.

This variable ecosystem occupies frost-free estuarine systems to mean low-water springs (within tidal estuaries, inlets, rivers and streams) and is associated with tides with salinity >5 per cent. There are seven variants, with Te Waimokoia being Mangrove forest and scrub (SA1.2) occurring in areas of frequent tidal inundation with abundant silt deposition, particularly near stream and river mouths. The Ambury Regional Park area includes one of just three sites in Taamaki Makaurau mainland of oioi-coastal needle grass on saline margins of lava flows (SA1.7). There are small patches of saltmarsh, saltmeadow and a band of broadleaved scrub along part of the coastal margin, as well as scattered original poohutukawa, taupata and karo.

Distribution: In the Auckland region, widely distributed throughout the region's harbours and estuaries.

Characteristic native flora: This ecosystem has at least seven species-poor but distinct communities along a zone of tidal inundation.

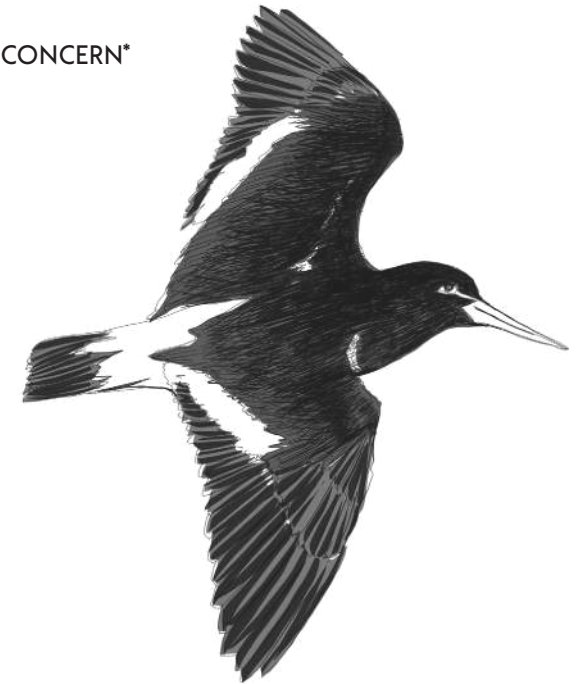
Characteristic native fauna: Pre-human era: There is little information on what fauna might have formerly occurred in mangrove forest and scrub, However, this ecosystem, in addition to the native species we still see today, could have been used by a

number of now-extinct birds that would have come from adjacent terrestrial habitats. These species could have included the stout-legged moa, adzebill and flightless goose, which occurred in coastal and open habitats, as well as swan, various parera, rails, haakuai and passerines. Insectivores could have included small rails, ruru, poopokotea, maataataa, tiirairaka, riroriro, tiieke and pekapeka.

Present: This ecosystem, which contains a mosaic of different habitats, supports a wide range of bird species.

Key processes and interactions: This ecosystem contains up to seven distinct communities, largely related to the duration of tidal inundation, elevation and salinity. Sea grass within estuaries is important for capturing and stabilising sediment, buffering the estuarine environment from wave damage, nutrient cycling and increasing productivity. It provides foraging habitats for swans and a wide range of non-migratory and migratory wading manu, and is a nursery for various species of ika.

Threats: The major threats to this ecosystem are primarily abiotic and include eutrophication and increased sedimentation rates as a result of changing land use in surrounding catchments. Increased sedimentation has resulted in an expansion of mangrove communities. Pollution and reclamation also threaten this ecosystem. The halophytic conditions mean there are few invasive weeds; however, several salt-tolerant grasses can over-top and displace indigenous salt-marsh vegetation and wading-bird habitat.



Toorea

*The regional threat status of individual variants of this ecosystem has not been assessed, but it is worth noting that locally, this ecosystem may contain historically rare or threatened ecosystems.

† Significant Ecological Areas are areas that make up a regulatory overlay as part of the Auckland Unitary Plan. Terrestrial and marine Significant Ecological Areas have been identified to protect and better provide for the management of areas that contribute significantly to Auckland's indigenous biodiversity.

Text drawn from [Indigenous Terrestrial and Wetland Ecosystems of Auckland](#) (Auckland Council, 2017).



Maakaka



Wiiwii



Rimurehia and tungangi



Manawa



Ureure



Layers of vegetation at different depths of water

2 TUKANGA AUAHATANGA; RERE KI UTA RERE KI TAI

GUIDING CONCEPTS

This section of the guide outlines guiding concepts and process for any plantings and restoration work across Ngaa Hau o Maangere, as well as an overview of the community and current landscape.

Rere ki uta, rere ki tai

Rere ki uta rere ki tai is the flow of connection in whakapapa from maunga to moana. The guide is laid out in a way that reflects this connection and the work required throughout Ngaa Hau o Maangere.

Maramataka

Planting best practice can occur through observation of natural world cycles in concurrence with the phases of marama and appearance of ngaa whetuu. Maramataka can guide the timing of planting practice such as planting times, both animal and plant pest control, and seed harvest by tohu.

Maramataka has elements that are rohe specific and will need to be ground truthed or at the very least, refined for specific planting sites across Ngaa Hau o Maangere. Observations or adjustments of the suggested time frames for activities within the maramataka guides provided (p. 76) are to be recorded for use in consecutive years.

Whenua

“Te toto o te tangata he kai, te oranga o te tangata, he whenua, he oneone.”

“While food provides the blood in our veins, our health is drawn from the land and soils”

The foundation of all ngahere begins with soils.

Whenua is a living medium with an ebb and flow of water and nutrients, micro and macro biota associated with the mineral and moisture content. All whenua has a mauri that can be impacted through action on it positively and negatively. Whenua has been lost through quarry activity throughout significant sites, levelling, scraping off as past practice for development, through erosion and sediment run off. Direct contamination has also greatly impacted the whenua. Preservation protection regeneration of soils are the foundation of restoration of ngahere.

The volcanic soil properties of Ngaa Hau o Maangere are free draining and mineral rich. It is important to look at soil profiles and consider how your actions can support protection and preservation while contributing to the building of soils.

Soils and soil health are vulnerable to loss through removal for development, stockpiling, building of impermeable surfaces, buildings and roading. These actions erode function and structure as well as reduce organic matter. Avoid levelling and flattening restoration sites as this creates pooling of water on flat areas and the inability to retain leaf litter. The placement of logs to create leaf litter captures and runoff disruptors prevents erosion sediment entering Te Manukanuka oo Hoturoa.

Practical guidance on composting to preserve soils and soil health can be found on p. 78.

Ecosystem connectivity

Continuity and connection to ancient landscapes is achieved through understanding the whakapapa of plant source (see p. 33 for guidance on plant supply).

Ecosystems are functionally interdependent with the surrounding landscape. Reconstructing native habitat through planting and establishing connectivity between habitat patches ensures that native species, such as birds, lizards and insects, can move freely through urban ecosystems, whilst facilitating seed dispersal, pollination, gene flow and nutrient cycling. Corridors also exist within a site. Create localised networks within planting sites for micro and macro invertebrates and lizards.

Sustainable practice

For any planting project across the different planting typologies, from supply to delivery, avoid materials and work practices that negatively impact on the environment and counter our efforts in healing the whenua, awa and moana.

Use reusable, recycled and recyclable materials. Look for innovation in plant supply and delivery to reduce plastics and additional transport and handling.

Practise integrated pest & weed management and prevention that includes implementation of [myrtle rust](#) and [kauri dieback](#) hygiene protocols. Kauri dieback is not limited to kauri, and can also infect other native species such as taanekaha and rewarewa.

Continuity of knowledge requires a culture of open sharing. Providing opportunities for both kaitiaki and experienced volunteers to have a platform to pass on knowledge to each new wave of community that engages with growing the ngahere in Ngaa Hau o Maangere, as support and capacity increases. Keep records and develop systems so practices and adaptive management improvements may be repeated.

PROCESS

1. Whakawhanaungatanga

The first step in any plantings or restoration work is to bring people together. Through building strong and enduring relationships with mana whenua, community and agencies, understand the values, aspirations and current work that any new work should align with and connect to.

2. Understand the cultural landscape and ecosystem potential

Understanding the place in which we are working. What are the historically occurring and therefore potential ecosystems of the area that we are working to restore? Understanding the cultural landscape also means learning the values and stories of mana whenua associated within the place we are working in. How can the ecosystem restoration uplift the mana of these?

3. Understand the current landscape and scope of project

Understanding the current state of the landscape and the scope of the project. What are the issues and opportunities of the site and its surrounding landscape? What is the scale of the project and its goals?

4. Design from cultural and ecological values

Designing from a cultural and ecological lens, specific to place. For any work in public spaces seek landowner approval and community and local board buy-in from concept design phase. Refine design accordingly.

5. Intergenerational planning

Create a staged programme that recognises the restoration will be intergenerational and identify sufficient resources and funding to commence work and maintain programmes through to establishment of plantings.

6. Communicate with nurseries, select plants & source seed

Build and nurture relationships with nurseries, community and providers. Work with nurseries, communicating early to ensure seed is harvested on time (up to 18 months before planting) from an authentic source.

COMMUNITY

“Protect the stream, build a forest” - Julia Tu’ineau, Te Ara Rata Stream Team



Maangere Ngahere Project community workshop



Yvonne, Irohia & Debbie, Old School Teaching Gardens



Raquel & Justine, ME Family Services



Waiata at Papatuuuanuku Kookiri Marae maara kai

The Maangere Ngahere Project has been developed in collaboration with a range of people, groups and organisations working to regenerate te taiao in this area. A series of hui were held over 2021 and 2022 to bring this group together for whakawhanaungatanga, to learn about the geology, ecology and human history of life in Ngaa Hau o Maangere, to explore the potential that is here, to identify what is needed for this potential to be realised, and to think about the contribution the Maangere Ngahere Project could make.

This process has enabled us to create connections, learn from each other, and generate shared vision for the work we are all doing. It has provided the framework for weaving together the principles and values developed by the mana whenua working group, the ideas and energy of the community, and the resourcing and support of Auckland Council and Kāinga Ora. We are grateful for the input of a wide range of groups across and beyond our community, whose time, energy and vision have helped to prepare the soil and sow the seeds to grow this project.

The Maangere Ngahere Project has provided a catalyst for growing this Maangere Taiao Network “in motion”. It is a reflection of what’s already happening as well as an aspirational vision for what could be.

CURRENT LANDSCAPE



Te Waimokia walkway



Te Puukakitanga o Poutukeka



Maangere West development



Market garden



Berm in Norana Ave



Harania off Gatsby Road



Abandoned greenhouse



Maangere Bridge Community Orchard



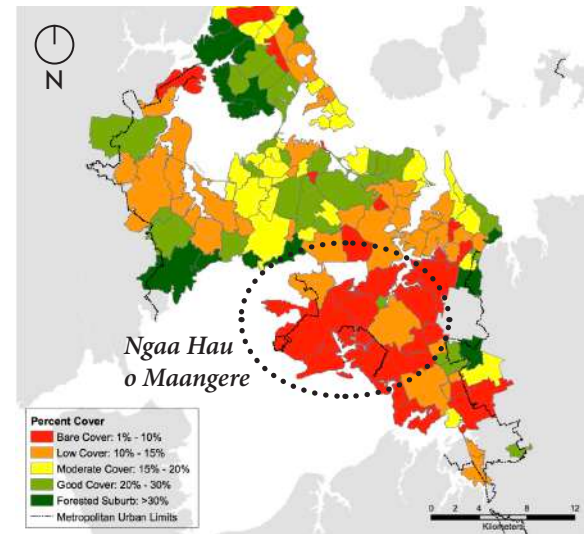
Te Tiki Road berm



Looking towards Ootuaataua



Ihumaatao Road looking South.



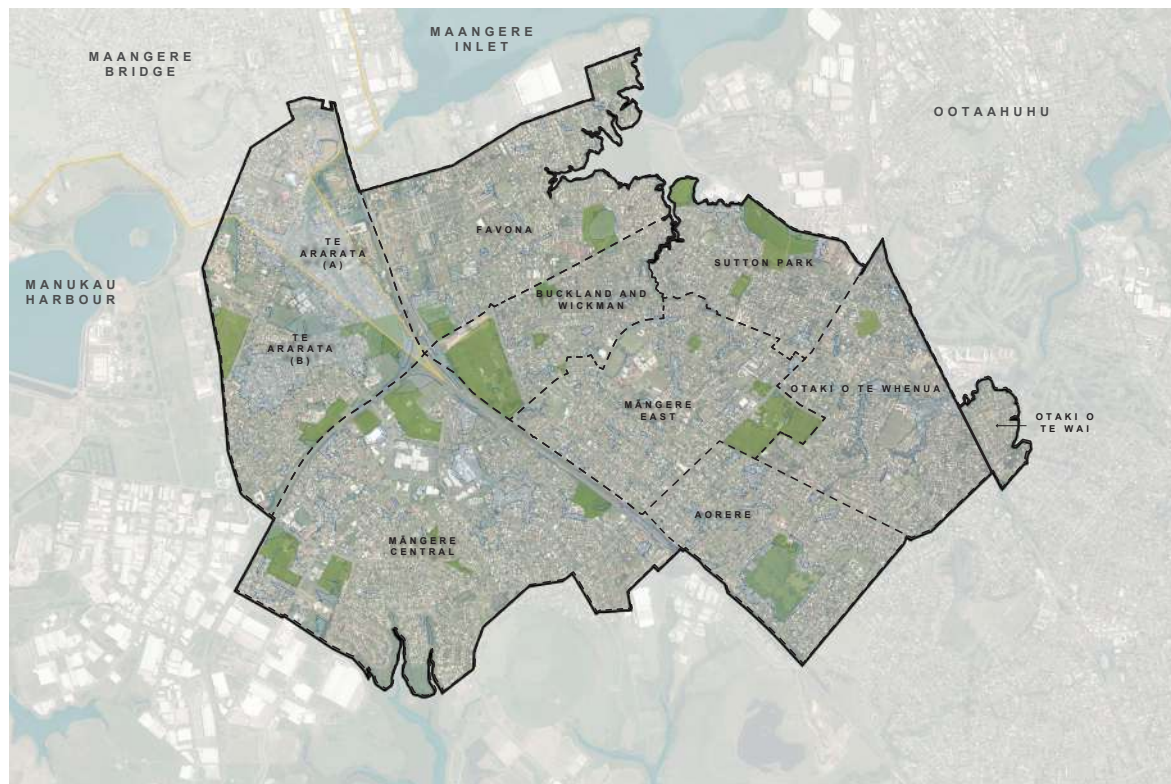
Average percentage canopy cover of ngahere (3m+ height) in Auckland suburbs

The current landscape of Ngaa Hau o Maangere consists of a wide range of public/community and private spaces. Public/community spaces include: sites of cultural and ecological significance, open spaces, regional parks, coastal walkways, community gardens, residential streets and streetscapes, city centres, cycleways, community space hubs, open spaces with open and conditional entry e.g. marae, education leased land and churches. Private spaces include: private residences, urban farms, industrial sites, reclaimed land, waste treatment plants, developments with streams running through, market gardens. There is currently increasing housing development occurring through Kāinga Ora & other developers in Favona, Maangere West, Maangere Central, Maangere East, Middlemore and Aorere.

Ngaa Hau o Maangere currently has a canopy cover of eight per cent. The photo essay on the previous pages shows the various character areas of Ngaa Hau o Maangere and the current lack of canopy cover across all of them.

This lack of canopy cover has negative implications across social, cultural and environmental spheres, and also contributes to greater inequities in the face of climate change and related weather events.

The current vegetation types across Ngaa Hau o Maangere consist of some bush remnants and rebo being few and far between, with few remaining coastal fringe areas of ecological significance. The vegetation is dominated by exotics with some fruit/food production. There are extensive weed issues throughout the area.



Development area for the Kāinga Ora Maangere Precinct

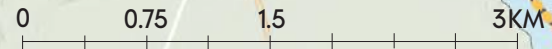
Further investigation by Greenscene in 2022 looked at the make-up of canopy cover within the Kāinga Ora development areas, including potential ecological connections (see page opposite). This work of investigating the make-up and quality of canopy cover should be continued in order to build upon what's existing.

ECOLOGICAL CONNECTIONS FOR MAANGERE PRECINCT



Legend

- Trees
- ▭ Māngere Precinct
- ▭ Neighbourhoods
- ▭ SEA Terrestrial
- ▭ Public Open Space
- ▭ Manawa / Mangroves
- ▲ Maunga
- Maunga to Moana
- Portage Routes
- Indicative Ecological Corridors



3 NGAA TAKIWAA

This section of the guide offers guidance for planting across the different takiwaa (planting typologies) in Ngaa Hau o Maangere. These are:

- *Maunga*
- *Awa*
- *Repo*
- *Takutai*
- *Parks & Reserves*
- *Community Gardens & Orchards*
- *Streetscapes*
- *Kura*
- *Kaalinga*

These takiwaa are specific to Ngaa Hau o Maangere. As outlined in the first section of this guide, the maunga, awa, repo and takutai that form the cultural landscape are fundamental to our understanding of the place in which we are working, as well as *how* to work here. An overview of each takiwaa in Ngaa Hau o Maangere is provided, as well as a planting provision 'menu' which lists appropriate species to plant. The following gives guidance on how to select and also source plants.

Plant selection

For every planting opportunity in Ngaa Hau o Maangere, this is a chance to put in practice a 'right plant, right place' approach. Consider carefully both where and who the planting is for and how these plantings will be used. Look for opportunities to have a diverse selection of species from large trees to mid-story to ground cover layers with climbers woven throughout.

A restoration approach to plant selection should be taken where appropriate, e.g. for all restoration

planting across maunga, awa, repo, takutai and parks & reserves takiwaa. First survey existing native vegetation and take note of plants that are thriving under current conditions. Encourage their regeneration and expansion. Then identify gaps in the biodiversity and select plants that are unlikely to return without assistance (refer to Ngaa Hau o Maangere Plant Provision p. 61). Consider native forest regeneration and succession in your planning - incorporate a selection of species from all layers of the ngahere and build a leaf litter layer for future direct seeding.

Across all takiwaa, consider the following criteria when selecting plants:

- Potential for natural occurrence within the planting areas
- Raakau whenua (selecting species that are able to have their whakapapa traced) which includes eco-sourced species
- Tolerant of present micro-climatic conditions within the planting areas
- Increases structural and functional diversity
- Contributes to habitat enhancement (e.g. food source for manu)
- Fulfilling opportunities for restoration (e.g. rare plant species such as para)
- Plant species must be matched with their optimum plant grade

When developing plant lists include the source (where the plant or seeds are available) and plant grades appropriate for species and terrain. For any restoration planting ensure plant lists identify best revegetation planting methodology, e.g. planting and/or direct seeding.

Plant supply

Raakau whenua is an understanding of where seeds originate from. This tracing the whakapapa of plant material also encompasses eco-sourcing. Collecting from local native plant populations ensures the continuation of the genetic diversity of our native plants. This can be achieved by collecting seeds from a larger number of parent plants from healthy local populations.

Source of seed

Prioritise sourcing seed from similar habitats in the same eco-district (Taamaki). If sources are unavailable, look to the wider eco-region (Auckland).

Seed collection

Where available, seed should be harvested with kaitiaki and recorded with name, date, collector and assigned a batch number. Seeds will then be processed by local iwi or community-based nurseries.

Integrity of seed source can be maintained through careful management of batch coding and nursery production practices. This ensures that information recorded during collection remains accurate and this allows for traceability from source material to planting site.

Plants should arrive on site well-watered, healthy, disease free, in natural form, not root bound, firm within pots and labelled with correct names. A record should be held with the nursery and project manager and should include the source of parent material.

MAUNGA RESTORATION



Restoration of Te Puukakitapu o Poutukeka



Restoration of Te Pane o Mataaoho / Te Ara Pueru

Te Pane o Mataaoho/Te Ara Pueru restoration*

Ngahere restoration of Te Pane o Mataaoho/ Te Ara Pueru is actively managed by the [Tūpuna Maunga Authority](#). The current restoration plan was developed for the Tuupuna Maunga Authority by Te Ngahere. The plan focuses on the restoration of highly modified areas on the maunga through revegetation of a puuriri forest (WF7) ecosystem, and the development of suitable habitat to protect and preserve native fauna present at the site.

The aims of revegetation / restoration as outlined in the existing restoration plan are:

- Use methods and species appropriate for archaeologically sensitive areas.
- Enhance the quality of habitat used by native fauna including skinks, ngaa manu (birds) and native invertebrates.
- Prevent the re-establishment of weed species.
- Protect sites by reducing foot traffic through some areas.
- Promote species of appropriate heights to maintain historic defence sightlines where needed.
- Assist and promote natural ecological processes.

Revegetation should follow best practice ecological restoration planting principles, including:

- Ensure plants and/or methodologies are appropriate for the site and location considering substrate, sightlines, archaeology and slope.
- Ensure all planting material is eco-sourced from naturally occurring indigenous stock growing

within the Taamaki Ecological District or culturally appropriate.

- Plant size should be appropriate to location. 1.5L and 2L (PB3 equivalent) are recommended wherever possible. These allow for quick establishment minimising need for ongoing follow up. Smaller sizes such as 0.5L/root trainer grade are appropriate for very rocky slopes or sensitive areas where approved.
- Plant spacing of 1m for tree species is ideal for achieving rapid establishment of native vegetation cover, which in turn reduces competition from weed species. For lower growing species 0.5m to 0.75m spacing should be used. Larger tree species such as puuriri should be at 5m spacing.
- Planting should ideally take place during the months of May to August as long as soil conditions are suitable.
- Living mulch such as rye clover seed can be used around plantings if required to suppress weeds and cover the ground.

Proposed restoration works over the next 5 years include establishing puuriri forest and ngaarara/ mokomoko habitat, as well as enrichment and extension of existing habitat range. Puuranga/mound poohuehue planting along with amenity trees have also been scheduled across identified sites.

Further considerations when selecting and placing plant species:

- Avoid flammable species/use fire adverse species
- Mahinga kai - provision of species associated with traditional materials used to harvest and store kai

*Text drawn from *Te Ara Pueru/Te Pane o Mataaoho Planting Plan* (Prepared on behalf of Tuupuna Maunga Authority by Te Ngahere, 2019).

MAUNGA PROVISION

Te Pane o Mataaoho/Te Ara Pueru halo programme

An ecological halo is a community living around an area or areas with significant ecological value. The community works together to protect and restore the area/s. The overarching vision for the Te Pane o Mataaoho/Te Ara Pueru halo programme is to restore lost ecological corridors connecting Te Pane o Mataaoho/Te Ara Pueru to the wider Tūpuna Maunga o Taamaki Makaurau. This will reduce reinvasion of mammalian predators to improve biodiversity outcomes such as restoration of taonga species. The programme will support recovery of cultural values through education and community engagement opportunities as well as support the reintroduction of remnant ecosystem features on the maunga and adjacent properties.

The project will run in collaboration with the Tūpuna Maunga Authority and local community, businesses and governmental agencies to achieve a shared goal of allowing native regeneration of biodiversity to be established.

Key environmental pest plants and animals of high concern will be targeted; replacement native trees will be given in exchange for removing pest species. Tūpuna Maunga Authority facilitators will run training workshops across the maunga halo/ neighbourhoods. Core working groups will be established and a bespoke programme developed that is suited to local maunga communities.

Trees

Akapuka *Griselinia lucida*
Akeake *Dodonea viscosa*
Horoeka *Pseudopanax crassifolium*
Houpara *Pseudopanax lessonii*
Kaanuka *Kunzea robusta*
Karaka *Corynocarpus laevigatus*
Kaaramuramu *Coprosma robusta*
Kauri *Agathis australis*
Kohekohe *Dysoxylum spectabile* (2)
Kooahuu *Pittosporum tenuifolium*
Koowhai *Sophora microphylla*
Maamaangi *Coprosma arborea*
Maamaku *Cyathea medullaris* (2)
Maanuka *Leptospermum scoparium*
Maahoe *Melicytus ramiflorus*
Maire rauriki *Nestegis lanceolata* (2)
Mangeao *Litsea calicaris* (2)
Maapou *Myrsine australis*
Poohutukawa *Metrosideros excelsa*
Ponga *Cyathea dealbata* (2)
Puuriri *Vitex lucens*
Rangiora *Brachyglottis repanda*
Raataa *Metrosideros robusta* (2)
Rewarewa *Knightia excelsa*
Taanekaha *Phyllocladus trichomanoides* (2)
Tarata *Pittosporum eugenoides*
Tii koouka *Cordyline australis*
Tiitoki *Alectryon excelsus* (2)
Tootara *Podocarpus totara*
Wharangi *Melicope ternata*
Whau *Entelea arborescens*
Whauwhaupaku *Pseudopanax arboreus* (2)

2 Enrichment planting

● See Ngaa Hau o Maangere Plant Provision p. 61

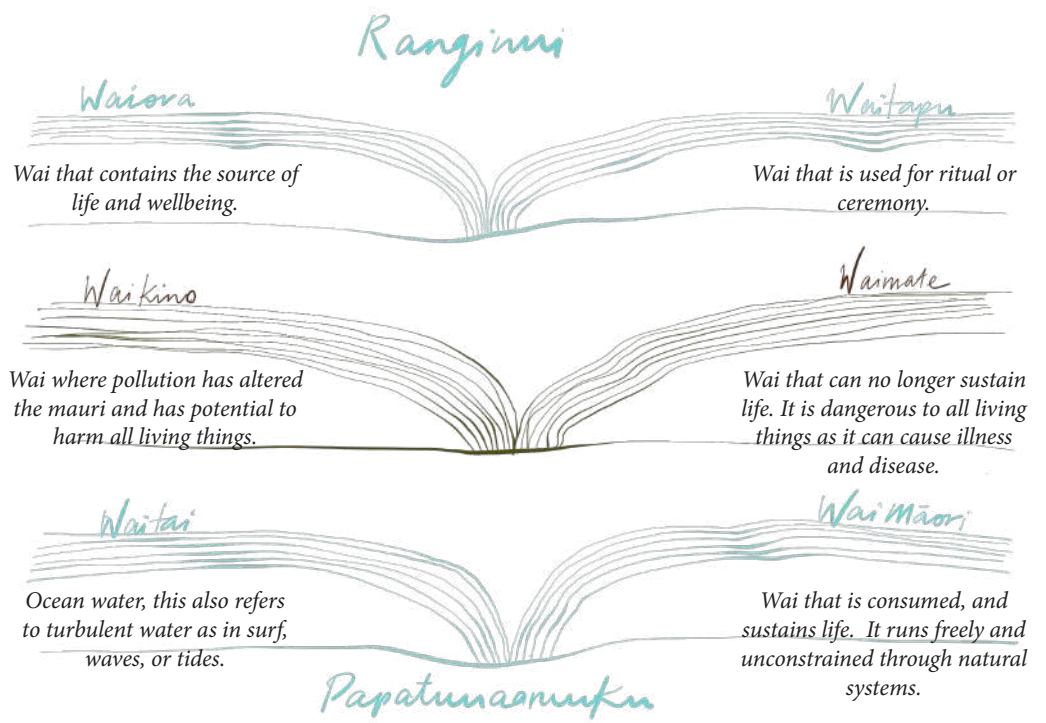
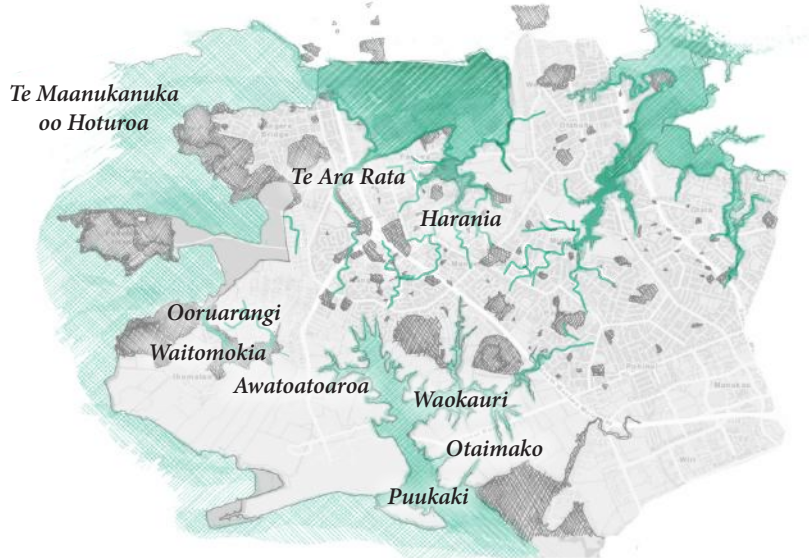
Shrubs & climbers

Akakura *Metrosideros carminea*
Akatea *Metrosideros perforata*
Hangehange *Geniostoma ligustrifolium* (2)
Harakeke *Phormium tenax*
Karo *Pittosporum crassifolium*
Kawakawa *Macropiper excelsum* (2)
Korokio *Corokia cotoneaster*
Koromiko *Hebe stricta* var. *stricta*
Koromiko *Veronica macrocarpa* var. *macrocarpa*
Taataramoia *Rubus cissoides* (2)
Taawhiri karo *Pittosporum cornifolium*
Tauhinu *Ozothamnus leptophyllus*
Coprosma areolata (2)
Coprosma crassifolia
Olearia solandri
Wharariki *Phormium cookianum* subsp. *hookeri*

Groundcovers

Kiokio *Parablechnum novae-zelandiae*
Koowharawhara *Astelia banksii*
Miikoikoi *Libertia ixioides*
Miikoikoi *Libertia peregrinans*
Paakauroharoha *Pneumatopteris pennigera* (2)
Pinaatoro *Pimelea prostrata*
Piripiri *Acaena anserinifolia*
Piupiu *Blechnum discolor* (2)
Poohuehue *Muehlenbeckia complexa*
Puawaananga *Clematis paniculata* (2)
Pukupuku *Doodia australis*
Rengarenga *Arthropodium cirratum*
Tii rauriki *Cordyline pumilio* (2)
Toatoa *Haloragis erecta*
Totara *Fuchsia procumbens*
Tuurutu *Dianella nigra* (2)
Carex testacea

AWA RESTORATION



Healthy regenerating awa require shaded streams, good water clarity and provision of fish passage upstream and downstream. Te Ara Rata, Ooruarangi and Harania awa all have active mana whenua and community groups engaged in restoration. Planting and pest control have been undertaken with some areas now 20 years on with self-regenerating habitat. Sections along each awa remain piped, have open concrete channels, steep eroding banks, limited shade or have remained in pasture grass. These areas present restoration opportunities which may include:

- Daylighting of streams in those areas currently piped and re-naturalisation and removal of open concrete channels
- Assessment for and realigning to the appropriate flow path location, in cases where it has been diverted from the original path
- Revegetation of open sites and continuation of

- existing planted areas
- Planting of riparian species for the protection of existing and creation of new tuna and kookopu habitat as well as stabilisation of stream banks and shading of water
- Identification of inanga spawning sites where saltwater meets freshwater (known as the salt water or saline wedge). These areas are critical for the breeding of inanga and require planting with appropriate overhanging native grasses
- Riparian planting where stabilisation of banks is needed to reduce erosion and sediment loss to moana
- Enrichment planting of long term canopy species where existing planting is mature enough to provide shelter from prevailing winds and shade from direct sun
- Integrated pest management programme for pest animal and plant species

The first action for any planting or restoration works along awa is to achieve para kore through rubbish removal of inorganic rubbish that may be historic, illegally dumped and/or loose litter debris. This can be undertaken well before areas are ready or have the budget to be planted. Pest management can occur in tandem with para kore action - together these two programmes are a bare minimum for restoration across awa.



AWA PROVISION

"Strong consideration needs to be given to waterways, waterways are key... When planting, if we're going to allow people to harvest, then planting needs to happen in areas of good quality water to produce good quality kai." - Kowhai Olsen, Te Ahiwaru



Kookopu

Trees

- Akeake *Dodonaea viscosa* (MZ-D)
- Houhere *Hoheria populnea* (MZ-D)
- Kahikatea *Dacrycarpus dacrydioides* (M-MZ)
- Kaikomako *Pennantia corymbosa* (MZ-D)
- Karaka *Corynocarpus laevigatus* (MZ-D)
- Kohekohe *Dysoxylum spectabile* (MZ-D, 2)
- Kootukutuku *Fuchsia excorticata* (M) 2
- Koowhai *Sophora microphylla* (MZ-D)
- Koowhai *Sophora chathamica* (MZ-D)
- Maahoe *Melicytus ramiflorus* (MZ-D)
- Maire tawake *Syzygium maire* (S-M)
- Makomako *Aristolelia serrata* (MZ-D)
- Maamaku *Cyathea medullaris* (MZ, 2)
- Mangeao *Litsea calicaris* (M-MZ, 2)
- Maanuka *Leptospermum scoparium* (S-MZ)
- Maapou *Myrsine australis* (MZ-D)
- Mataii *Prumnopitys taxifolia* (M-MZ, 2)
- Miro *Pectinopitys ferruginea* (M-MZ, 2)
- Niikau *Rhopalostylis sapida* (M-MZ)
- Paateetee *Schefflera digitata* (M, 2)
- Porokaiwhiri *Hedycarya arborea* (M-MZ, 2)
- Pukatea *Laurelia novae-zelandiae* (M-MZ)
- Putaputaweetaa *Carpodetus serratus* (M)
- Puuriri *Vitex lucens* (MZ-D)
- Rimu *Dacrydium cupressinum* (MZ, 2)
- Taawari *Ixerba brexioides* (M-MZ, 2)
- Tarata *Pittosporum eugenioides* (MZ-D)
- Tii koouka *Cordyline australis* (S-D)
- Tiitoki *Alectryon excelsa* (MZ-D, 2)
- Tootara *Podocarpus totara* (MZ-D)
- Toro *Myrsine salicina* (MZ-D, 2)
- Whau *Entelea arborescens* (MZ-D)
- Whauwhaupaku *Pseudopanax arboreus* (MZ-D, 2)
- Whēkii *Dicksonia squarrosa* (M-MZ)

Shrubs & climbers

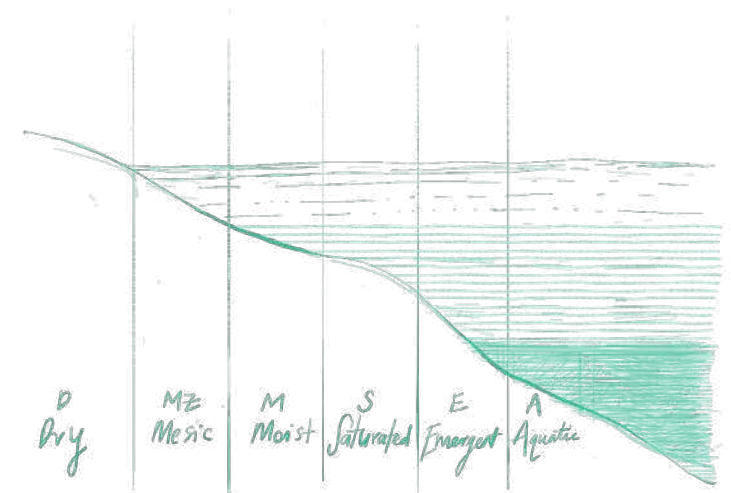
- Hangehange *Geniostoma ligustrifolium* (MZ-D, 2)
- Harakeke *Phormium tenax* (S-D)
- Hukihuki *Coprosma tenuicaulis* (S-M)
- Kaaramuramu *Coprosma robusta* (M-D)
- Kawakawa *Macropiper excelsum* (M-D, 2)
- Korokio *Corokia cotoneaster* (MZ-D)
- Koromiko *Veronica stricta* var. *stricta* (MZ-D)
- Manono, kanono *Coprosma grandifolia* (M, 2)
- Mingimingi *Coprosma propinqua* var. *propinqua* (S-MZ)
- Tainoka *Carmichaelia australis* (MZ-D)
- Taurepo *Rhabdothermus solandri* (M, 2)
- Toetoe *Austroderia fulvida* (M-D)
- Tutu *Coriaria arborea* (M-D)
- Tuurepo *Streblus heterophyllus* (MZ-D, 2)
 - Coprosma crassifolia*
 - Coprosma rhamnoides* (MZ-D)
- Akakura *Metrosideros carminea* (MZ-D)
- Kaihua *Parsonia heterophylla* (MZ-D, 2)
- Kareao *Ripogonum scandens* (S-MZ, 2)
- Kiekie *Freycinetia banksii* (S-MZ, 2)
- Kohia *Passiflora tetrandra* (MZ-D, 2)
- Mangemange *Lygodium articulatum* (MZ-D, 2)
- Puawaananga *Clematis paniculata* (MZ-D, 2)
- Taataramoa *Rubus cissoides* (MZ-D, 2)

Key

- D Dry: dry upland slopes
- MZ Mesic: soils are saturated for short periods
- M Moist: soils are saturated seasonally, dry in summer
- S Saturated: soils are saturated most of the year
- E Emergent: plants are partially submerged in water
- A Aquatic: plants are submerged entirely
- 2 Enrichment planting

Groundcovers

- Kiokio *Parablechnum minus* (S-MZ)
- Parablechnum novae-zelandiae* (S-D)
- Kuta *Eleocharis acuta* (S)
- Kuawa *Schoenoplectus tabernaemontani* (E)
- Maanihi *Potamogeton cheesemanii* (A)
- Miikoikoi *Libertia ixioides* (M-D)
- Libertia grandiflora* (M-D, 2)
- Paakauroharoha *Pakau pennigera* (M, 2)
- Parataniwha *Elatostema rugosum* (M, 2)
- Pikopiko, mouku *Asplenium bulbiferum* (M-MZ, 2)
- Piupiu *Lomaria discolor* (M)
- Puukio *Carex virgata* (S-MZ)
- Puurei *Carex dissita* (M-MZ)
- Carex secta* (S-M)
- Rautahi *Carex geminata* (S-M)
- Carex lessoniana* (S-M)
- Toatoa *Haloragis erecta* (S-D)
- Tuurutu *Dianella nigra* (MZ-D, 2)
- Tuuhara, peepepe *Machaerina sinclairii* (S-MZ)



● See Ngaa Hau o Maangere Plant Provision p. 61

REPO RESTORATION

Restoration of repo is key to restoring the health of our awa and takutai. Restoring functioning repo at appropriate locations across Ngaa Hau o Maangere will be critical to addressing the increasing major flooding issues that the area has experienced.

Any developments across public and private landscapes occurring within the historic footprint of repo should look for opportunities to restore repo ecological systems.

Repo are the most challenging and complex of habitats to regenerate. Where sites are identified as potential repo restoration opportunities, specialised help across multiple disciplines may be required to produce a comprehensive restoration programme.

A first step will be to determine the type and composition of the potential repo ecosystem. This will in part be determined by location, proximity to saline environment, the size of the site and

*“One of my favourites is macrocarpa, I like to watch matuku moana nesting in the top of that tree.”
- Justine Skilling, ME Family Services*

quality of the receiving environment, along with frequency and volume of water flow. The potential site's current function and capacity will help inform what requirements will be needed for hydrological engineering. It would be good to map out seed sources of wetland species in neighbouring catchments for those species no longer found within Ngaa Hau o Maangere.

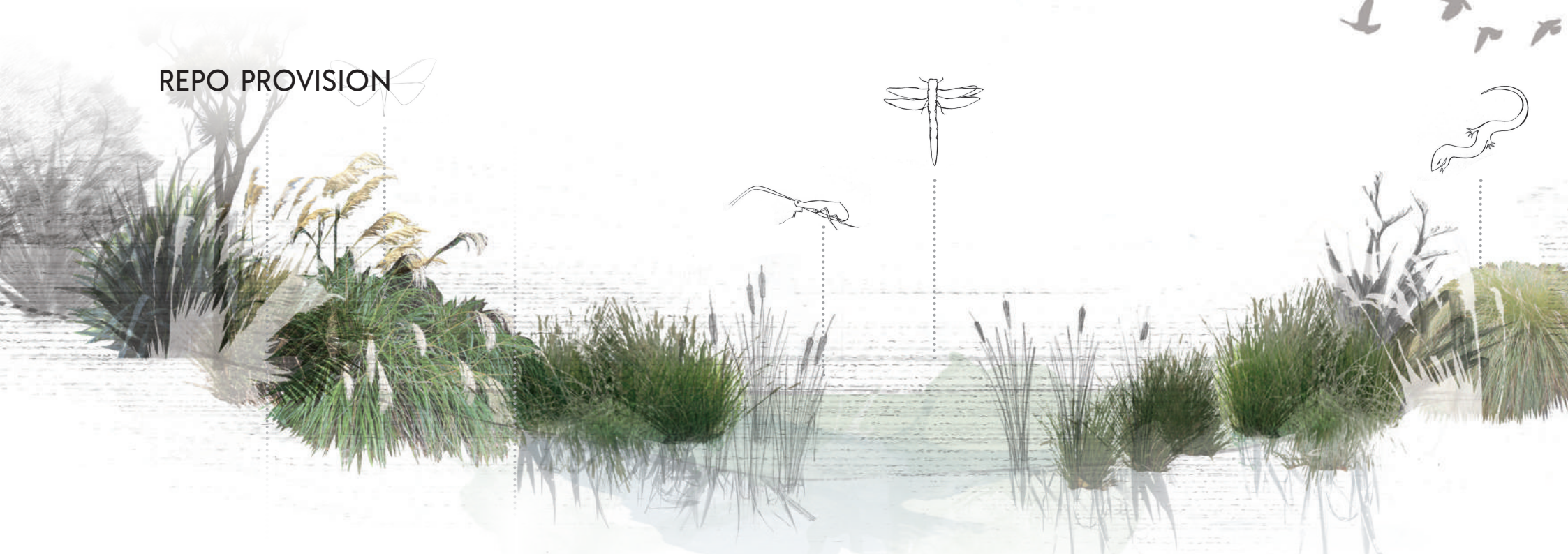


Matuku moana

Key

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- A Aquatic: plants are submerged entirely
- 2 Enrichment planting

REPO PROVISION



Trees

Houhere *Hoheria populnea* (MZ-D)
Kahikatea *Dacrycarpus dacrydioides* (M-MZ)
Karamuu *Coprosma robusta* (M-D)
Koowhai *Sophora microphylla* (MZ-D)
Maahoe *Meliclytus ramiflorus* (MZ-D)
Maire tawake *Syzygium maire* (S-M)
Maamaku *Cyathea medullaris* (MZ, 2)
Maanuka *Leptospermum scoparium* (S-MZ)
Maapou *Myrsine australis* (MZ-D)
Niikau *Rhopalostylis sapida* (M-MZ, 2)
Patee *Schefflera digitata* (M, 2)
Pukatea *Laurelia novae-zelandiae* (M-MZ)
Putaputaweetaa *Carpodetus serratus* (M)
Rimu *Dacrydium cupressinum* (MZ, 2)
Tii koouka *Cordyline australis* (S-D)
Taawari *Ixerba brexioides* (M-MZ, 2)
Whekii *Dicksonia squarrosa* (M-MZ)

Shrubs & climbers

Harakeke *Phormium tenax* (S-D)
Hukihuki *Coprosma tenuicaulis* (S-M)
Kareao *Ripogonum scandens* (S-MZ, 2)
Kawakawa *Macropiper excelsum* (M-D, 2)
Kiekie *Freycinetia banksii* (S-MZ, 2)
Koromiko *Hebe stricta* var. *stricta* (MZ-D)
Mingimingi *Coprosma propinqua* var. *propinqua* (S-MZ)
Tainoka *Carmichaelia australis* (MZ-D)
Taataramoia *Rubus australis* (S-MZ)

Ferns & herbs

Kiokio *Parablechnum minus* (S-MZ)
Kiokio *Parablechnum novae-zelandiae* (S-D)
Koowhitiwhiti *Rorippa palustris*
R. divaricata (M-MZ)
Maanihi *Potamogeton cheesemanii* (A)
Miiikoikoi *Libertia peregrinans* (M-D)
Piupiu *Blechnum discolor* (M, 2)

Grasses & sedges

Kuawa *Schoenoplectus tabernaemontani* (E)
Kukuraho *Bolboschoenus fluviatilis* (E-S)
Kuta *Eleocharis acuta* (S)
Kutakuta *Eleocharis sphacelata* (E)
Mokuaototo *Machaerina rubiginosa* (S)
Puukio *Carex virgata* (S-MZ)
Puurei *Carex dissita* (M-MZ)
Puurei *Carex secta* (S-M)
Raupoo *Typha orientalis* (E)
Rautahi *Carex geminata* (S-M)
Rautahi *Carex lessoniana* (S-M)
Toetoe *Austroderia fulvida* (M-D)
Uupokotangata *Cyperus ustulatus* (S-M)
Wiiwii *Juncus edgariae* (S-M)
Wiiwii *Machaerina articulata* (E)
Wiiwii *Machaerina juncea* (E-S)
Machaerina tenax (S-MZ)

● See *Ngaa Hau o Maangere Plant Provision* p. 61

TAKUTAI RESTORATION



Takutai layering



Manawa along Puukaki awa



Ihumaatao takutai with ancient fossilised kauri



Ambury Regional Park

Climate change, moving shoreline, sea level rise, coastal erosion and pest control are all major issues impacting takutai. Sediment entering the moana and waste pollution are some of the key impacting issues occurring along Te Maanukanuka oo Hoturoa coastline.

Regeneration of quality habitat along the coastal environment first requires the remediation or removal of historic buried inorganics, collection of litter and removal of the layers of plastic waste from macro to micro particles.

The open nature of coastal sites exposes them to opportunistic weeds such as kikuyu, gorse, pampas, boneseed, spike grass, which are all able to establish on full sun, dry, salt wind sites.

To support natural regeneration of indigenous biodiversity and protection of coastal habitats for shore wading birds, a high level of weed control and animal pest management is required. Passive regeneration can then take place with indigenous plant species regenerating across their natural patterning and range, whilst maintaining bird roost habitat for Te Maanukanuka oo Hoturoa.

Key

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- S Saturated: soils are saturated most of the year
- E Emergent: plants are partially submerged in shallow water
- A Aquatic: plants are submerged entirely
- 2 Enrichment planting
- * Rare; use where appropriate within a managed programme

TAKUTAI PROVISION

Maakaka / saltmarsh

Maanuka *Leptospermum scoparium* var. *scoparium*
 Ngaio *Myoporum laetum*
 Tii koouka *Cordyline australis*
 Harakeke *Phormium tenax*
 Maakaka *Plagianthus divaricatus*
 Taataraheke *Coprosma acerosa*
 Mingimingi *Coprosma propinqua* var. *propinqua*
 Poohuehue *Muehlenbeckia complexa*
 Tauhinu *Ozothamnus leptophyllus*
 Olearia solandri
 Totara *Fuchsia procumbens*
 Kukuraho *Bolboschoenus fluviatilis*
 Miikoikoi *Libertia peregrinans*
 Oioi *Apodasmia similis*
 Pinaatoro *Pimelea prostrata*
 Remuremu *Selliera radicans*
 Waiuu atua *Euphorbia glauca*
 Wiiwii *Machaerina juncea*
 Wiiwii *Ficinia nodosa*
 Wiiwii *Juncus kraussi* subsp. *australiensis*
 Austrostipa stipoides
 Carex litorosa

Coastal repo

Karamuu *Coprosma robusta* (M-D)
 Maanuka *Leptospermum scoparium* var. *scoparium*
 (S-MZ)
 Maire tawake *Syzygium maire* (S-M)
 Putaputaweetaa *Carpodetus serratus* (M)
 Tii koouka *Cordyline australis* (S-D)
 Harakeke *Phormium tenax* (S-D)
 Mingimingi *Coprosma propinqua* var. *propinqua*
 (S-MZ)
 Kiokio *Parablechnum minus* (S-MZ)

Kiokio *Parablechnum novae-zelandiae* (S-D)
 Koromiko *Veronica stricta* var. *stricta* (MZ-D)
 Tainoka *Carmichaelia australis* (MZ-D)
 Mokuautoto *Machaerina rubiginosa* (E-S)
 Kuawa *Schoenoplectus tabernaemontani* (E)
 Kukuraho *Bolboschoenus fluviatilis* (E-S)
 Kuta *Eleocharis acuta* (S)
 Kuta *Eleocharis sphacelata* (E)
 Oioi *Apodasmia similis* (S-MZ)
 Puukio *Carex virgata* (S-MZ)
 Puurei *Carex secta* (S-M)
 Rautahi *Carex lessoniana* (S-M)
 Toetoe *Austroderia fulvida* (M-D)
 Upokotangata *Cyperus ustulatus* (S-M)
 Wiiwii *Machaerina articulata* (E)
 Wiiwii *Machaerina juncea* (E-S)
 Wiiwii *Machaerina tenax* (S-MZ)
*Epilobium hirtigerum** (M-D)
*Thyridia repens** (S)

Dry coastal forest

Akapuka *Griselinia lucida*
 Akeake *Dodonea viscosa*
 Horoeka *Pseudopanax crassifolius*
 Houhere *Hoheria populnea*
 Houpara *Pseudopanax lessonii*
 Kaanuka *Kunzea robusta*
 Karaka *Corynocarpus laevigatus*
 Kaaramuramu *Coprosma robusta*
 Karamuu *Coprosma lucida*
 Karo *Pittosporum crassifolium*
 Kohekohe *Dysoxylum spectabile* (2)
 Koohuuhuu *Pittosporum tenuifolium*
 Koowhai *Sophora microphylla*
 Koowhai *Sophora chathamica*
 Maahoe *Meliclytus ramiflorus*

Maapou *Myrsine australis*
 Ngaio *Myoporum laetum*
 Niikau *Rhopalostylis sapida* (2)
 Poohutukawa *Metrosideros excelsa*
 Puuriri *Vitex lucens*
 Rangiora *Brachyglottis repanda*
 Tarata *Pittosporum eugenioides*
 Taupata *Coprosma repens*
 Tii koouka *Cordyline australis*
 Tiitoki *Alectryon excelsa* (2)
 Tootara *Podocarpus totara*
 Wharangi *Melicope ternata*
 Whau *Entelea arborescens*
 Whauwhaupaku *Pseudopanax arboreum*
 Akakura *Metrosideros carminea*
 Akatea *Metrosideros perforata*
 Hangehange *Geniostoma ligustrifolium*
 Harakeke *Phormium tenax*
 Kaihua *Parsonia heterophylla* (2)
 Kareao *Ripogonum scandens* (2)
 Kawakawa *Macropiper excelsum* (2)
 Kiokio *Parablechnum novae-zelandiae* (2)
 Koromiko *Veronica macrocarpa* var. *macrocarpa*
 Koromiko *Veronica stricta* var. *stricta*
 Koowhai ngutukaakaa *Clianthus puniceus*
 Koowharawhara *Astelia banksii*
 Tainoka *Carmichaelia australis*
 Coprosma rhamnoides (2)
 Miikoikoi *Libertia ixioides* (2)
 Pukupuku *Doodia australis* (2)
 Rengarenga *Arthropodium cirratum*
 Tii Rauriki *Cordyline pumilio* (2)
 Toatoa *Haloragis erecta*
 Tuuhara, peepepe *Machaerina sinclairii* (2)
 Miikoikoi *Libertia grandiflora* (2)
 Tuurutu *Dianella nigra* (2)
 Carex testacea



PARKS & RESERVES

Aute

Parks and reserves offer the biggest potential across all of Ngaa Hau o Maangere to implement the large-scale restoration planting that is required for ecological function across the region. Habitat patches of both ≥ 1.6 ha and ≥ 6 ha are needed across Ngaa Hau o Maangere, with connecting corridors to be established across takiwaa such as Streetscapes and Awa. While the provision menu for Parks & Reserves is extensive, planting in this takiwaa still requires the 'right plant, right place' approach.

When planning planting areas, considerations are:

- Kaitiaki leading and working alongside community umbrella organisations such as 'Friends of' groups.
- Ecosystem potential with a whole systems approach.
- Looking for opportunities to connect spaces within the park and the wider park network.
- Consider the context for which trees are isolated, such as providing shade in open pasture areas and reason for any disconnected blocks such as shelter belts along road frontage to Regional Park.
- Existing restoration areas - any new planting within these areas should be guided by a restoration plan.
- Opportunities to establish 1-6 ha habitat patches within 1-2 km and 5 km spacings, respectively.
- Identify opportunities for community provision, including for but not limited to mahi toi, mahinga kai and rongoa.
- Integrated pest management and halo programmes linking to those being undertaken by the Tūpuna Maunga Authority and community.
- Maara huupara - encouraging tamariki to re-engage with the natural environment and reawaken their sense of history and place. E.g. Te

Pane o Mataaoho maara huupara that integrates the wider cultural landscape and utilises the natural environment to create opportunities for exploration, daring, imagination and play.

- Paa harakeke - could be planted in Parks & Reserves, Awa and Repo takiwaa. Considerations for kairaranga include access, natural varieties of harakeke, spacing and position.

While we do need planting at scale, changing practice is also required. Identify opportunities to innovate and improve practices including:

- Integrating traditional play elements into projects with concepts and signage overtly making reference to this to educate tamariki/residents.
- Reduced mowing and increasing no mow areas, providing community mulch piles, increasing the productivity of community food provision within the footprint of existing food gardens.
- Implementation and ongoing care of specimen trees, e.g. staking and trunk protection along with annual mulching of underplanting. How can we improve on the current survival rate of our existing tree canopy?

Landowner approval

All work being undertaken in public parks and reserves requires landowner approval. Application for landowner approval includes an assessment fee and is processed by the [Land Advisory Services Team \(LAS\)](#). Approval is required for a variety of reasons including conducting research on a park and creating or installing something, e.g. fencing, plants, playgrounds, small buildings, sports facilities. Application will first be assessed by a land use advisor, who will consult with our other specialists. This will then go to mana whenua and Local Board for approval.



Piipiiwharaurua

PARKS & RESERVES PROVISION

Trees

Akapuka *Griselinia lucida*
Hiinau *Elaeocarpus dentatus*
Horoeke *Pseudopanax crassifolius*
Houhere *Hoheria populnea*
Houpara *Pseudopanax lessonii*
Kaanuka *Kunzea robusta*
Kahikatea *Dacrycarpus dacrydioides*
Kaikomako *Pennantia corymbosa*
Karaka *Corynocarpus laevigatus*
Kauri *Agathis australis*
Kohekohe *Dysoxylum spectabile* (2)
Kooahuu *Pittosporum tenuifolium*
Kootukutuku *Fuchsia excorticata* (2)
Koowhai *Sophora microphylla*
Koowhai *Sophora chathamica*
Maahoe *Meliclytus ramiflorus*
Maire rauriki *Nestegis lanceolata* (2)
Maire kootae *Nestegis montana*
Makomako *Aristolelia serrata*
Maamaangi *Coprosma arborea*
Maamaku *Cyathea medullaris* (2)
Mangeao *Litsea calicaris* (2)
Maanuka *Leptospermum scoparium*
Maapou, maapau *Myrsine australis*
Mataii *Prumnopitys taxifolia* (2)
Miro *Prumnopitys ferruginea* (2)
Niikau *Rhopalostylis sapida* (2)
Paateetee *Schefflera digitata* (2)
Poohutukawa *Metrosideros excelsa*
Ponga *Cyathea dealbata* (2)
Porokaiwhiri *Hedycarya arborea* (2)
Puuriri *Vitex lucens*
Raataa *Metrosideros robusta* (2)

Rewarewa *Knightsia excelsa*
Rimu *Dacrydium cupressinum* (2)
Taanekaha *Phyllocladus trichomanoides*
Taawai *Nothofagus truncata* (2)
Taawari *Ixerba brexioides* (2)
Taraire *Beilschmiedia tarairi* (2)
Tarata *Pittosporum eugenioides*
Tawa *Beilschmiedia tawa* (2)
Tii koouka *Cordyline australis*
Tiitoki *Alectryon excelsa* (2)
Tootara *Podocarpus totara*
Toro *Myrsine salicina* (2)
Wharangi *Melicope ternata*
Whau *Entelea arborescens*
Whauwhaupaku *Pseudopanax arboreus* (2)

Shrubs & climbers

Akakura *Metrosideros carminea*
Akatawhiwhi *Metrosideros fulgens* (2)
Akatea *Metrosideros perforata*
Hangehange *Geniostoma ligustrifolium* (2)
Harakeke *Phormium tenax*
Kaihua *Parsonsia heterophylla*
Kareao *Ripogonum scandens*
Kaaramuramu *Coprosma robusta*
Karamuu *Coprosma lucida*
Kawakawa *Macropiper excelsum* (2)
Kiekie *Freycinetia banksii* (2)
Kohia *Passiflora tetrandra* (2)
Korokio *Corokia cotoneaster*
Koromiko *Veronica macrocarpa* var. *macrocarpa*
Koromiko *Hebe stricta* var. *stricta*
Koowhai ngutukaakaa *Clianthus puniceus*
Mangemange *Lygodium articulatum* (2)

Manono, kanono *Coprosma grandifolia* (2)
Mingimingi *Coprosma rhamnoides*
Puawaananga *Clematis paniculata* (2)
Poohuehue *Muehlenbeckia complexa*
Taataaramoa *Rubus cissoides*
Taawhiri karo *Pittosporum cornifolium*
Tauhinu *Ozothamnus leptophyllus*
Taupata *Coprosma repens*
Taurepo *Rhabdothamnus solandri* (2)
Toetoe *Cortaderia fulvida*
Tuurepo *Streblus heterophyllus*
Coprosma areolata (2)
Wharariki *Phormium cookianum*

Groundcovers

Huruhuru whenua *Asplenium oblongifolium* (2)
Kiokio *Blechnum novae-zelandiae*
Miikoikoi *Libertia grandiflora* (2)
Miikoikoi *Libertia ixioides*
Moouku *Asplenium bulbiferum* (2)
Pinaatoro *Pimelea prostrata*
Piripiri *Acaena anserinifolia* / *novae-zelandiae*
Piupiu *Lomaria discolor*
Pukupuku *Doodia australis*
Puurei *Carex dissita*
Puukio *Carex virgata*
Rautahi *Carex lessoniana/geminata*
Rengarenga *Arthropodium cirratum*
Tii rauriki *Cordyline pumilio* (2)
Toatoa *Haloragis erecta*
Totara *Fuchsia procumbens*
Tuurutu *Dianella nigra* (2)
Tuuhara, peepepe *Machaerina sinclairii* (2)

2 Enrichment planting

● See *Ngaa Hau o Maangere Plant Provision* p. 61

COMMUNITY GARDENS & ORCHARDS

*"Naau te rourou, naaku te rourou, ka ora ai te iwi"
"With your food basket and mine, the people will thrive"*



Layna, kai nursery manager at Ihumaatao

While all ngahere in public space should be accessible to community, for this takiwaa we are referring to market gardens and landscape garden areas cared for by community for the purpose of food production, accessibility to fresh produce, social connection, mental wellbeing, employment and social enterprise. In most cases these gardens act as education hubs. For this takiwaa in particular, community need to lead the planning of gardens.

Types of gardens, orchards and food forests range from high maintenance, requiring near daily to weekly attention, through to monthly and seasonal requirements. Resources required include plants, mulch and plant food. To function well, community gardens also require/create opportunities for sharing knowledge, teaching, sharing of workloads and harvested kai.

Useful link: [Hua Parakore](#)

Community garden structures

- Market garden social enterprise
- Teaching garden with a coordinator/s and volunteers
- Open sharing of harvest from across the garden or assigned allotments, or a combination of both
- Corporate - as part of workspaces for the wellbeing of employees

Elements of a sustainable community garden

- Place to gather, workshop and learn
- A location that can be secured long term for the community garden
- Accessibility of the location of the garden and how far it is from access points
- Often sheltered (but not essential) with access to water
- Garden coordinator/s to implement the vision, keep an overview of what needs doing and hold the kaupapa with the community. The paid coordinator/s assist with the continuity of the garden
- Resources such as a foundation plan and layout structure of the garden that may develop over time and be implemented in stages as the people using the garden increase
- Plants, seeds, fruit trees along with funding or donated resources are often required for infrastructure such as paths, compost bins, signs, and/or for ongoing costs such as wages for coordinator/s' time

Donated materials can include mulch, signs, path materials, and tools such as spades, rakes, garden trowels buckets, hoses and wheelbarrows.

Fruit trees

Refer to the Fruit Tree Menu (p. 70) for descriptions of species, how they grow and what their requirements are. Considerations when selecting are:

- What type of fruit do you and your community want to eat?
- Selecting heritage fruit tree cultivars will provide strong stock and protect diversity of food
- Type of soil and the root stocks required (this informs what you are able to grow)
- The available soil moisture content
- Is there shelter from wind and frosts?
- What type of orchard will it be, e.g. full sun single-layer planting with an understory of herbal ley such as with pip and stone fruit, or a multi-layered food forest implemented over time to build structure. Both of these types can be integrated across a space. Integrated planting requires careful planning, good understanding of the flow of the site, as well as what resources will be required to maintain and nurture the planting over many years for what will result in a valuable community asset
- Existing fruit trees on site and nearby and whether existing trees can be supplemented. Plan for harvest across all seasons - this could be within your own site or a collaboration of sites to complete the whole potential fruit tree menu

Placement of your trees and other plantings needs thoughtful consideration of how far apart fruit trees should be. It is important to sun map the site as well as identify what pollinators or companion planting are needed to increase nitrogen fixing pollinators and beneficial insects.

COMMUNITY GARDENS & ORCHARDS PROVISION

Trees

Akeake *Dodonea viscosa*
Hiinau *Elaeocarpus dentatus*
Houhere *Hoheria populnea*
Kootukutuka *Fuchsia exorticata*
Koowhai *Sophora microphylla*
Makomako *Aristolelia serrata*
Maanuka *Leptospermum scoparium*
Niikau *Rhopalostylis sapida*
Tarata *Pittosporum euginoides*
Tii koouka *Cordyline australis*
Titoki *Alectryon excelsus*
Whauwhaupaku *Pseudopanax arboreus*

Shrubs & climbers

Hangehange *Geniostoma ligustrifolium*
Harakeke *Phormium tenax*
Kaaramuramu *Coprosma robusta*
Kawakawa *Macropiper excelsum*
Kiekie *Freycinetia banksii*
Kohia *Passiflora tetrandra*
Koromiko *Hebe stricta var. stricta*
Koowhai ngutukaakaa *Clianthus puniceus*
Kuumarahou *Pomaderris kumeraho*
Poohuehue *Muehlenbeckia complexa*
Taataramoa *Rubus cissoides*
Taupata *Coprosma repens*

Groundcovers

Mouku *Asplenium bulbiferum*
Piupiu *Blechnum discolor*
Rengarenga *Arthropodium cirratum*
Totara *Fuchsia procumbens*
Asplenium oblongifolium

Exotic fruit trees

Apple *Malus domestica*
Avocado *Persea americana*
Banana *Musa acuminata*
Casimiroa *Casimiroa edulis*
Cherimoya *Annona cherimola*
Feijoa *Acca sellowiana*
Fig *Ficus carica*
Grapefruit *Citrus paradisi*
Inga bean *Inga edulis*
Lemon *Citrus limon*
Lemon myrtle *Backhousia citriodora*
Lime *Citrus aurantifolia*
Macadamia *Macadamia integrifolia / tetraphylla*
Mandarin *Citrus reticulata*
Moringa *Moringa oleifera*
Mountain pawpaw *Vasconcellea pubescens*
Olive *Olea europaea*
Orange *Citrus sinensis*
Nashi pear *Pyrus pyrifolia*
Plum *Prunus domestica*
Peach *Prunus persica*
Pear *Pyrus communis*
Pomegranate *Punica granatum*
Strawberry guava *Psidium cattleianum*
Tamarillo *Solanum betaceum*

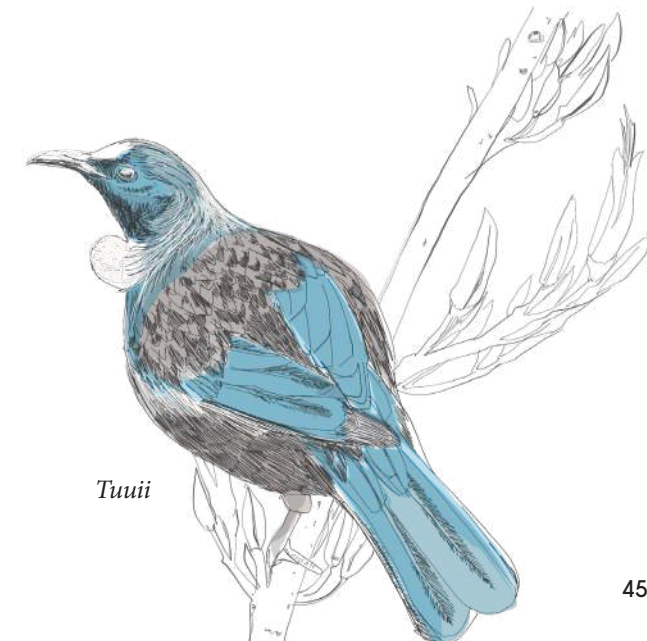
Exotic shrubs & climbers

Blueberry *Vaccinium corymbosum*
Grape *Vitis vinifera*
Lavender *Lavandula spp.*
Lemongrass *Cymbopogon citratus*
Lemon verbena *Aloysia triphylla*
Passionfruit *Passiflora edulis*
Pepino *Solanum muricatum*

Raspberry *Rubus idaeus*
Rosemary *Rosmarinus officinalis*
Runner bean *Phaseolus coccineus*
Sage *Salvia officinalis*
Sugarcane *Saccharum officinarum*
Tea *Camellia sinensis*

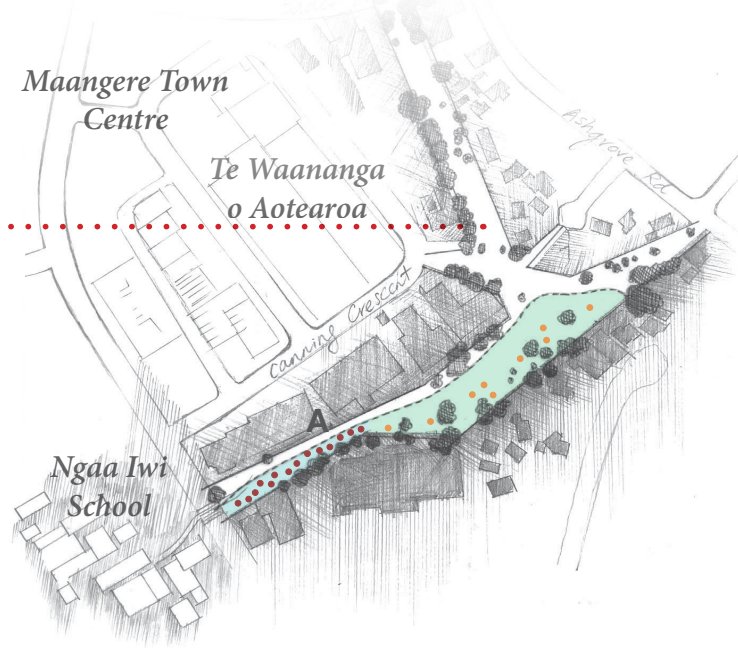
Exotic groundcovers

Borage *Borago officinalis*
Calendula *Calendula officinalis*
Chicory *Cichorium intybus*
Comfrey *Symphytum officinale*
Crimson clover *Trifolium incarnatum*
Kuumara *Ipomoea batatas*
Lemon balm *Melissa officinalis*
Oregano *Origanum spp.*
Rhubarb *Rheum rhabarbarum*
Sorrel *Rumex acetosa*
Strawberry *Fragaria spp.*
Thyme *Thymus vulgaris*
Taro *Colocasia esculenta*



Tuui

ASHGROVE RESERVE COMMUNITY ORCHARD



● Stage 1 Planting

- Pear: Beurre Bosc [x1]
- Apples: Gala, Granny Smith, Braeburn [x5]
- Mandarin: Satsuma [x3]
- Orange: Caracara Navel [x2]
- Tahitian Lime [x1]
- Lisbon Lemon [x1]
- Banana [x3]
- Babaco [x1]
- Piripiri
- Kawakawa
- Lavender

● Stage 2 Planting

- Avocado [x1]
- Apricot [x2]
- Pear [x2]
- Apples [x2]
- Bananas [x2]

PERSPECTIVE A Looking East



Throughout 2022 Kāinga Ora, ME Family Services and Uru Whakaaro worked with schools and community to create an orchard at Ashgrove Reserve in Ngaa Hau o Maangere. Local families and schools came together to plan, prepare, and plant citrus, apples, pears and bananas. Community facilities and local schools/community groups will continue to maintain the orchard to ensure ongoing care and tree health. Community planting days will continue into 2023 with planting planned for the eastern end of the park. The vision is that in years to come this orchard will provide an abundance of fruit for all to enjoy.

NO MOW & MULCH



No mow signage



Mulch in parks for community



No mow around dripline

- Improved soils
- Improved plant health
- Healthier tree root zones
- Improved storm water management
- Retains water in dry periods
- Beneficial for plant health
- Increased biodiversity
- Reduced emissions

FRUIT TREES



Pear



Apple



Lisbon Lemon



Tahitian Lime



Banana



Babaco



Apricot



Avocado



Mandarin



Orange

POLLINATORS



Kawakawa



Piripiri



Lavender

ASHGROVE RESERVE COMMUNITY PLANTING

“Golden Peach - when I was a little girl these were everywhere I went. On every state home there was a fruit tree; lemons and peaches planted in everybody’s back yards. That is still something I advocate for - fruit trees for everyone.” - Kowhai Olsen, Te Ahiwaru



Laying out the circles



Tamariki from Ngaa Iwi School preparing the beds



Tamariki planting with their teacher, Kathrina



Mulched beds ready for planting



Tamariki planting with Vern from ME Family Services



Lime tree with supports

STREETSCAPES



Tiitoki street trees



Mixed fruit & vegetable provision planting



Mixed species berm enrichment planting



Puuriri

Streetscapes play a vital role in neighbourhood connection. They are the living highways between maunga to moana and they are our connecting arteries from kaainga, to the community gardens, to kura and through to the parks. Biodiversity corridors play an important role in the provision for and connection to ngahere across the city. Street plantings provide shade over impermeable surfaces, sequestering carbon, providing pollution filtration, breaking rainfall impact, filtering water run-off and reducing traffic speeds.

What are we trying to achieve:

- Increased biodiversity and opportunities for native habitats
- Connected corridors between reserves network
- Reduced mowing as well as eliminating spraying and poor maintenance practices

Considerations for planting in streetscapes include:

- Tree species recommended for streets/road reserves in the [Maangere-Ootaahuhu Urban Ngahere Action Plan 2021](#)
- Infrastructure such as overhead power lines, underground cables, and drainage
- Proximity to bus lanes, cycleways, parking provision and access to and from vehicles on passenger's side
- Road grade (how busy it is)
- Size of adjacent buildings/eaves, view shafts, sightlines, visibility at corners for traffic
- Sight lines for pedestrian crossings and traffic clearance of any overhanging canopy
- Available plantable space - areas available for planting along roadways are often narrow and

are not more than a couple of metres wide with a defined depth. Form and size of root mass should be taken into account

- Providing shade in streets while avoiding shading out surrounding houses creating poor light and damp spaces in winter months
- Choose species to improve impoverished soils and include understory planting for soil moisture retention

In 2022, Greenscene undertook an inventory of existing trees across the Kāinga Ora development precinct. This is a valuable tool for decision-making and there would be great value in continuing this work across the wider Ngāa Hau o Maangere area. This work helps inform the diversity and quantity of existing canopy cover and will help inform improved management practices.

Main roads to cul-de-sacs

Select planting according to the type of street and its traffic level. Low levels of traffic provide opportunity for edible exotics, whereas larger canopy trees can be planted on streets with medium density traffic that are not on bus routes. Main roads give opportunity for large tree species to create connecting corridors.

Cul-de-sacs with full sun provide opportunities for fruit trees and edible planting. Consider whether the planting site allows application of compost and annual mulching, which is essential for fruit trees, and where possible look for engineering solutions that allow for this.

Fruit trees for the street context require robust species with high tolerance to wind. They must be

able to go intermittent years without being pruned, with a low care required threshold. Include trees such as feijoa, mandarins, lemons, plums. Trees with upright vase form are more suited to the street environment. Edible understory planting is best suited in clean, compost enriched soils on quiet roads with low vehicle traffic and heavy foot traffic. Street tree planting with flowers, vegetables, herbs and native plants will help to calm street traffic.

Atmosphere and climate

Streetscape planting contributes to regulation of air quality, regulation of local/microclimates and carbon sequestration/maintenance of carbon cycle. This includes: street trees, pollinator pathways, rain gardens, urban swales, grass swales, green roofs and green walls. Incorporation of a variety of street trees and other vegetation into the street environment will help filter air borne particles and pollutants. Wind and canopy density can affect the amount of pollution able to be trapped and cleared at ground level. For planting to improve air quality at ground level, planting must take the form of low-level vegetation barriers that are aligned at typical vehicle exhaust height and adjacent to the road.

For carbon sequestration, keep street trees and associated vegetation in high health to maintain good function to enable carbon sequestering potential. Manage, maintain and retain existing mature trees.

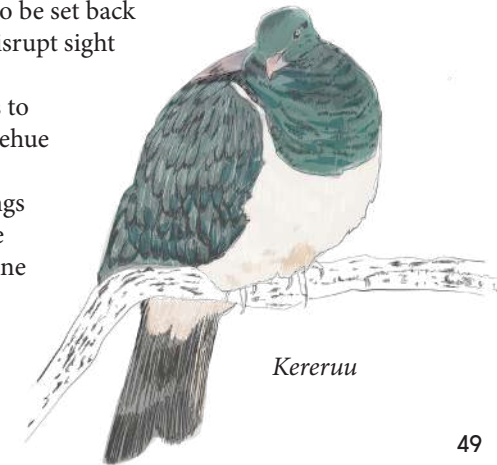
Water quantity and quality

Due to the proportion of impervious surfaces within the road corridor, there is a limited infiltration of

rainwater into the groundwater. To help address this, retain mature trees and plant new tree canopy to intercept and transpire rainfall. Reduce the extent of the impervious surfaces in the road reserve as well as protect and remediate permeable soils to improve ground water infiltration.

Plant selection

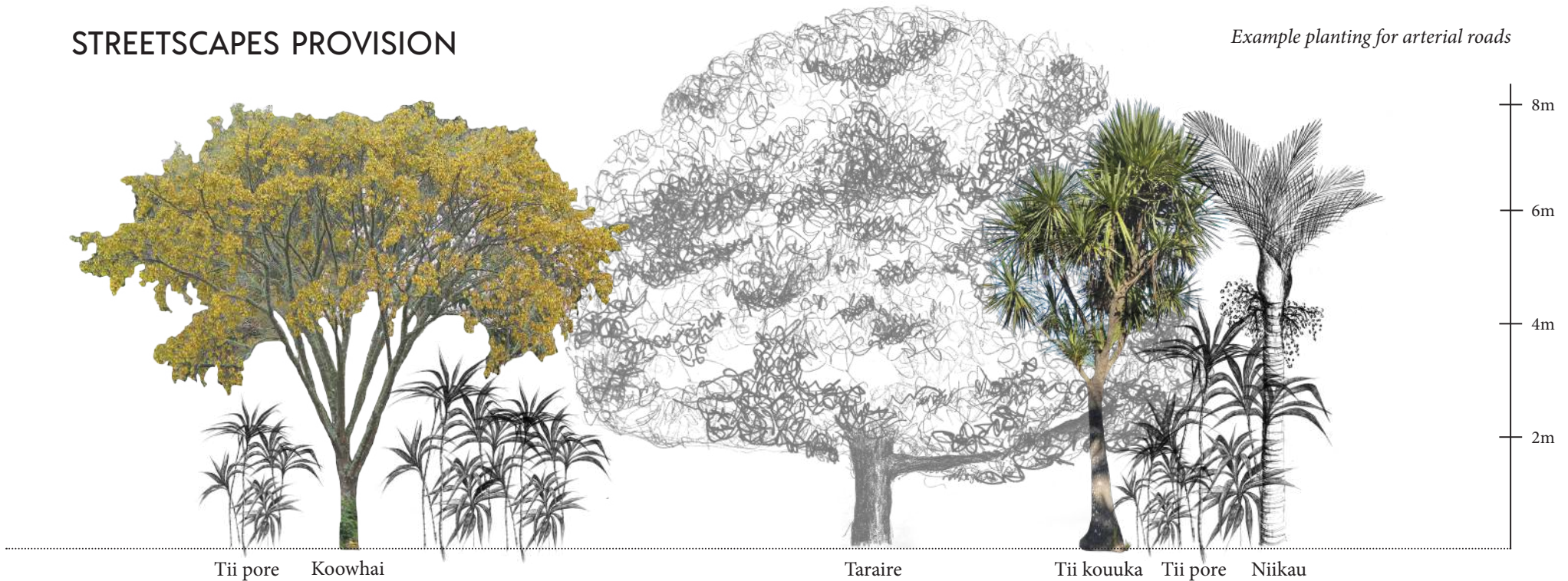
- No more than two trees per berm, use a base structure of perennials for underplanting and no more than 20% annuals
- Avoid deep tap rooted trees unless approved by city arborist for the location
- No more than one harakeke cluster which requires setback from street corners, paths and intersection
- Do not plant spiky plants such as aloe, agaves, cacti or yucca
- Remove any seeding phoenix palms or environmental weeds as they appear
- Planting for the purpose of rongoaa in streetscapes is not recommended
- In areas where the berm can be protected or is wide enough to have an interior rare species - create refuge for kookihi, waiuu atua and koowhai ngutukaakaa (this is a large shrub and will need to be set back where it would not disrupt sight lines)
- Native ground covers to avoid include: poohuehue due to its ability to swamp all the plantings and ongaonga (native nettles) which have fine sharp needles



Kereruu

STREETSCAPES PROVISION

Example planting for arterial roads



Trees

- Horoeke *Pseudopanax crassifolius* (6m, C, S)
- Karaka *Corynocarpus laevigatus* (8m, R)
- Kohekohe *Dysoxylum spectabile* (12m, R)
- Koowhai *Sophora microphylla* (8m, R, S)
- Sophora chathamica* (6m, R, S)
- Maire *Nestegis apetala* (6m, R)
- Maire kootae *Nestegis montana* (4m, R)
- Ngaio *Myoporum laetum* (5m, B)
- Niikau *Rhopalostylis sapida* (5m, C, S)
- Puuriri *Vitex lucens* (10m+, B, E)
- Rewarewa *Knightia excelsa* (12m, C)
- Taraire *Beilschmiedia tarairi* (10m+, R)
- Tarata *Pittosporum eugenoides* (6m, R, E)
- Tawa *Beilschmiedia tawa* (10m+, R)
- Tawapou *Planchonella costata* (6m+, R)
- Tii koouka *Cordyline australis* (8m, C, D)
- Tiitoki *Alectryon excelsus* (8m, R, S)
- Tootara *Podocarpus totara* (12m+, B, E)

Shrubs

- Akakura *Metrosideros carminea*
- Akatea *Metrosideros perforata*
- Mingimingi *Coprosma propinqua*
- Poohuehue *Muehlenbeckia complexa*
- Tainoka *Carmichaelia australis*
- Tauhinu *Ozothamnus leptophyllus*
- Taupata *Coprosma repens*
- Wharariki *Phormium cookianum* subsp. *hookeri*
- Coprosma rhamnoides*

Groundcovers

- Kiokio *Blechnum novae-zelandiae*
- Koowharawhara *Astelia banksii*
- Miikoikoi *Libertia grandiflora*
- Miikoikoi *Libertia ixioides*
- Miikoikoi *Libertia peregrinans*
- Mouku *Asplenium bulbiferum*

- Oioi *Apodasmia similis*
- Pinaatoro *Pimelea prostrata*
- Piripiri *Acaena anserinifolia / novae-zelandiae*
- Piupiu *Lomaria discolor*
- Pukupuku *Doodia australis*
- Puurei *Carex dissita*
- Puukio *Carex virgata*
- Rengarenga *Arthropodium cirratum*
- Totara *Fuchsia procumbens*
- Tuuhara *Machaerina sinclairii*
- Tuurutu *Dianella nigra / latissima*
- Waiuu atua *Euphorbia glauca*
- Wiiwii *Ficinia nodosa*
- Asplenium oblongifolium*
- Carex testacea*

Crown shape

- R Round
- C Columnar
- B Broad

Root system

- E Extensive
- S Shallow
- D Deep

STREETSCAPES PROVISION

Example berm planting for local streets - berm planting (left) integrated with kaainga planting (right)

BERMS

Exotic perennial herbs

- Ageratum *Ageratum houstonianum*
- Allium *Allium spp.*
- Bee balm *Monarda didyma/fistulosa*
- Catnip *Nepeta cataria*
- Comfrey *Symphytum officinale*
- Coreopsis *Coreopsis grandiflora*
- Cranesbill geranium *Geranium spp.*
- Echinacea *Echinacea spp.*
- Echium *Echium candicans*
- Globe thistle *Echinops ritro*
- Hyssop *Hyssopus officinalis*
- Korean mint *Agastache rugosa*
- Mexican marigold *Tagetes lemmonii*
- Penstemon *Penstemon spp.*
- Pincushion flower *Scabiosa caucasica*
- Oregano *Origanum spp.*
- Rosemary *Rosmarinus officinalis*
- Sage *Salvia spp.*
- Thrift *Armeria maritima*
- Thyme *Thymus spp.*

Exotic annual herbs

- Alyssum *Lobularia maritima*
- Bishop's flower *Ammi visnaga*
- Blue woodruff *Asperula orientalis*
- Borage *Borago officinalis*
- Calendula *Calendula officinalis*
- Cornflower *Centaurea cyanus*
- Cosmos *Cosmos bipinnatus*
- Poppy *Papaver spp.*
- Purple tansy *Phacelia tanacetifolia*
- Siberian motherwort *Leonurus sibiricus*
- Spider flower *Cleome hassleriana*



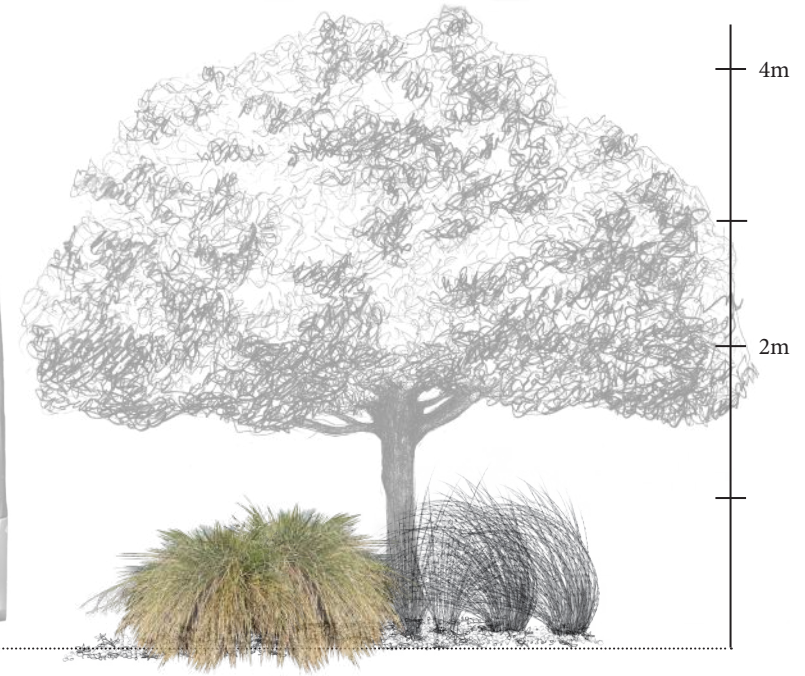
● See Ngaa Hau o Maangere Plant Provision p. 61

STREETSCAPES PROVISION

RAIN GARDENS & SWALES



Harakeke Tii koouka



Puurei Puuriri

Trees

- Horoeke *Pseudopanax crassifolius* (6m)
- Houhere *Hoheria populnea* (8m)
- Kaikomako *Pennantia corymbosa* (5m)
- Karaka *Corynocarpus laevigatus* (8m)
- Koowhai *Sophora microphylla* (8m)
- Maanatu *Plagianthus regius*
- Maanuka *Leptospermum scoparium*
- Niikau *Rhopalostylis sapida* (5m)
- Puuriri *Vitex lucens* (10m+)
- Putaputaweta *Carpodetus serratus*
- Tarata *Pittosporum eugenoides*
- Titoki *Alectryon excelsus*
- Tii koouka *Cordyline australis*

Shrubs

- Akatea *Metrosideros perforata*
- Korokio *Corokia cotoneaster*
- Koromiko *Hebe stricta* var. *stricta*
- Mingimingi *Coprosma propinqua*
- Poohuehue *Muehlenbeckia complexa*
- Tainoka *Charmichaelia australis*
- Taatarakeke *Coprosma acerosa*
- Tauhinu *Ozothamnus leptophyllus*
- Taupata *Coprosma repens* 'prostrate'
- Toetoe *Austroderia fulvida*
- Wharariki *Phormium cookianum* subsp. *hookeri*
- Coprosma rhamnoides*

Groundcovers & sedges

- Kiokio *Parablechnum novae-zelandiae*
- Miikoikoi *Libertia peregrinans*
- Oioi *Apodasmia similis*
- Paanakenake *Lobelia angulata*
- Pinaatoro *Pimelea prostrata*
- Puukio *Carex virgata*
- Puurei *Carex dissita*
- Puurei *Carex secta*
- Rautahi *Carex geminata*
- Remuremu *Selliera radicans*
- Rengarenga *Arthropodium cirratum*
- Toatoa *Haloragis erecta*
- Tuuhara *Machaerina sinclairii*
- Tuurutu *Dianella nigra/latissima*
- Wiiwii *Ficinia nodosa*
- Wiiwii *Machaerina juncea*
- Carex testacea*

● See *Ngaa Hau o Maangere Plant Provision* p. 61

KURA

Kura act as community hubs and are important sites for contributing to the restoration of ngahere across Ngaa Hau o Maangere. Kura play a critical part of the intergenerational approach to restoring ngahere. Planting initiatives within kura should be designed for students and the wider community to learn hands-on ecology skills, as well as contribute to the overall increase of biodiversity across Ngaa Hau o Maangere.

Tiny Forests in Schools

Tiny Forests in Schools is a current initiative that aims to activate restoration of ngahere within kura of Ngaa Hau o Maangere. This is a collaborative initiative bringing together an advisory team of taiao practitioners and community to identify and support schools to plant a small number of native trees as a way to contribute to increasing ngahere. This provides a learning opportunity for students to activate their curiosity and understand the important role trees play in our communities.

Considerations & opportunities

Planning should happen on site, bringing the school community together (students, teachers, principal, caretakers and volunteers) to understand and participate in the selection of the right tree, right place. Identify type of soils, availability and conservation of water, ecosystem type and how different areas are used by students. Consider existing native tree selection, maara kai, fruit trees and any school connections to forest walks.

Select plants and trees suitable for the location; considerations include spacing, shade, light and the existing built environment. Be mindful not to block access and driveways into sports fields. Planted areas could include: outdoor classrooms; papa taakaro (playgrounds and natural interactive pathways);

connections around school between classes, halls, libraries and offices; the provision for shade over impermeable surfaces; sitting areas for breaks and eating lunch; entrances, driveways and carparks; future school expansion or renovation of buildings or playground renewals.

Resources

Under this initiative, schools can access resources for the trees as well as advisory around planting design and species selection. The following may also be required: map of school, infrastructure for edible gardens, garden beds, mulch, trees, compost bins and worm farms, tools sheds and caretakers spaces, added training assistance for caretakers, connection to external iwi/community nurseries.

Education

Undertaking a mini BioBlitz provides an opportunity for the students to connect with the living environment and to understand what is already existing within the school. Looking out from the school, students can learn how biodiversity corridors and patches connect to those in the surrounding neighbourhood. Maramataka seasonal observations are a great way for monitoring with children of all ages. Students can observe the wider school environment, including flowering, fruiting and visiting birds. Studying the flow of wai in its various states through the school provides an understanding of the wellbeing of the school site and its connection to awa in the wider neighbourhood.

Further options

There may be additional considerations and opportunities that are site or school specific such as: rare or taonga species, ceremonial tree planting, memorial garden to a past member of the school community, native or edibles plant nursery.



Weetaa hotel



Ngaa Iwi School - outdoor learning area

KURA PROVISION

Example courtyard planting

Trees

- Akapuka *Griselinia lucida* (5m)
- Horoeaka *Pseudopanax crassifolius* (6m)
- Houhere *Hoheria populnea* (8m)
- Karaka *Corynocarpus laevigatus* (8m)
- Kaanuka *Kunzea robusta* (18m)
- Kaikomako *Pennantia corymbosa* (5m)
- Kaaramuramu *Coprosma robusta* (5m)
- Kauri *Agathis australis* (15m+)
- Kohekohe *Dysoxylum spectabile* (12m, 2)
- Koohuuuuu *Pittosporum tenuifolium* (6m)
- Kootukutuku *Fuchsia excorticata* (5m, 2)
- Koowhai *Sophora microphylla* (8m)
- Sophora chathamica* (6m)
- Maahoe *Meliclytus ramiflorus* (5m)
- Maire *Nestegis apetala* (6m)
- Makomako *Aristolelia serrata* (8m)
- Maamaangi *Coprosma arborea* (6m, 2)
- Maamaku *Cyathea medullaris* (12m, 2)
- Maanuka *Leptospermum scoparium* (4m)
- Maapou, maapau *Myrsine australis* (5m)
- Mataii *Prumnopitys taxifolia* (8m+, 2)
- Miro *Prumnopitys ferruginea* (10m+, 2)
- Niikau *Rhopalostylis sapida* (5m, 2)
- Ponga *Cyathea dealbata* (8m, 2)
- Porokaiwhiri *Hedycarya arborea* (5m, 2)
- Puuriri *Vitex lucens* (10m+)
- Rewarewa *Knightia excelsa* (12m)
- Taraire *Beilschmiedia tarairi* (10m+)
- Tarata *Pittosporum eugenoides* (6m)
- Tawa *Beilschmiedia tawa* (10m+, 2)
- Tawaapou *Planchonella costata* (6m+, 2)
- Tii koouka *Cordyline australis* (8m)
- Tiitoki *Alectryon excelsa* (8m)2
- Tootara *Podocarpus totara* (12m+)
- Toro *Myrsine salicina* (6m, 2)
- Wharangi *Melicope ternata* (4m)
- Whau *Entelea arborescens* (5m)
- Whauwhaupaku *Pseudopanax arboreus* (6m, 2)



Feijoa Mouku Koromiko Puuriri Kaaramuramu Panakenake Koowhai

Shrubs & climbers

- Akakura *Metrosideros carminea* (vine)
- Akatea *Metrosideros perforata* (vine)
- Hangehange *Geniostoma ligustrifolium* (3m, 2)
- Harakeke *Phormium tenax* (3m)
- Houpara *Pseudopanax lessonii* (4m)
- Kaihua *Parsonia heterophylla* (vine, 2)
- Karamuu *Coprosma lucida* (3m)
- Kawakawa *Macropiper excelsum* (2m, 2)
- Kiekie *Freycinetia banksii* (vine, 2)
- Kohia *Passiflora tetrandra* (vine, 2)
- Korokio *Corokia cotoneaster* (2m)
- Koromiko *Hebe stricta var. stricta* (4m)
- Koromiko *Veronica macrocarpa var. macrocarpa* (1.5m)
- Koowhai ngutukaakaa *Clianthus puniceus* (2m)
- Poohuehue *Muehlenbeckia complexa* (vine)
- Puawaananga *Clematis paniculata* (vine, 2)
- Tainoka *Carmichaelia australis* (4m)
- Taupata *Coprosma repens* (3m)
- Toetoe *Austroderia fulvida* (1.5m)
- Wharariki *Phormium cookianum* (1.5m)
- Coprosma areolata* (4m)

Groundcovers

- Kiokio *Blechnum novae-zelandiae* (1m, 2)
- Koowharawhara *Astelia banksii* (1m)
- Miikoikoi *Libertia ixioides* (0.4m, 2)
- Miikoikoi *Libertia peregrinans* (0.25m)
- Oioi *Apodasmia similis* (1.5m)
- Pikopiko, mouku *Asplenium bulbiferum* (1m, 2)
- Pinaatoro *Pimelea prostrata* (0.15m)
- Piripiri *Acaena novae-zelandiae* (0.15m)
- Piupiu *Lomaria discolor* (1m, 2)
- Pukupuku *Doodia australis* (0.3m, 2)
- Remuremu *Selliera radicans* (0.03m)
- Rengarenga *Arthropodium cirratum* (0.6m)
- Taatarakeke *Coprosma acerosa* (0.4m)
- Tii rauriki *Cordyline pumilio* (1m, 2)
- Toatoa *Haloragis erecta* (1m)
- Totara *Fuchsia procumbens* (0.15m)
- Tuurutu *Dianella nigra* (0.5m)
- Waiuu atua *Euphorbia glauca* (0.5m)

2 Enrichment planting

● See Ngaa Hau o Maangere Plant Provision p. 61

TINY FORESTS IN SCHOOLS

Tiny Forests in Schools is part of the broader Maangere Ngahere Project that aims to increase ngahere across Ngaa Hau o Maangere.



NGAA IWI SCHOOL

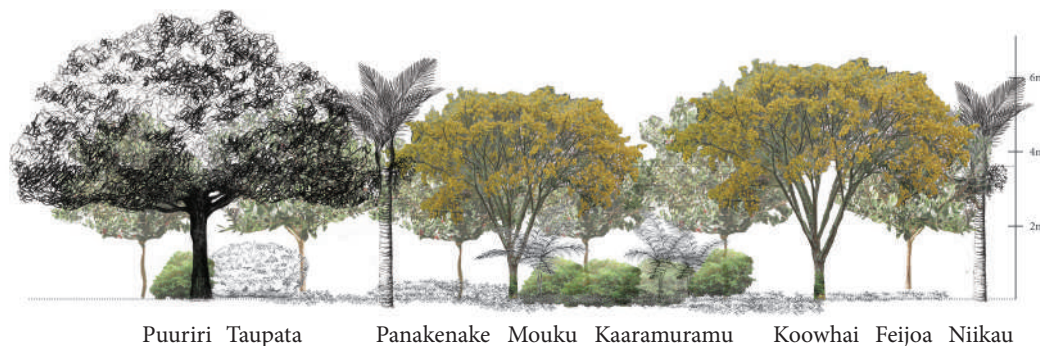
Recommendations

- Orchard: mulch fruit trees and provide protection around trunks
- Playground: x3 puuriri/tawapou, tiitoki/plum - for shade to replace existing trees that are being removed
- Puuriri: flowers and fruit all year round for birds, provides food and shade, strongest wood - good for swings, lasts c.2,000 yrs (as high as a classroom can sit underneath) - slows down after that

COURTYARD PLANTING

Screen of trees to sit at back beside courtyard where children eat & play

- x3 koowhai, x1 puuriri
- x10 smaller (native edible screen): koohuuuu, karamuu, taupata, niikau, feijoa

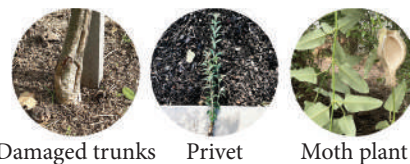


USEFUL LINKS

- [iNaturalist](#)
- [New Zealand Plant Conservation Network](#)
- [Tiaki Taamaki Makaurau | Conservation Auckland: Te kimi kiirearea | Pest search](#)
- [Toimata Foundation: Te Aho Tūroa and EnviroSchools](#)

LOOK OUT FOR

Issues



Opportunities



Mulching trees Attract beneficial insects

PLANTING PALETTE



KAAINGA



Banana & avocado at the kaainga



Maara kai at Cohaus housing development



Poohutukawa, tii kouka, rimu & niikau at the kaainga



Korokio hedge

Kaainga is our first and daily connection to ngahere and an opportunity to integrate connections for families and individuals to a healthy environment.

Existing gardens often hold treasures planted by existing or previous tenants, such as fruit trees and cultural/ornamental plants that may require assistance with feeding or pruning to regain full health. Take stock of the existing, and build and enrich from those foundations. Start with the removal of environmental pest plants, feeding and improving the existing vegetation to be retained, and then select any additional plants required. Look for opportunities to have a diverse selection of species from large tree to mid-story to groundcover layers with climbers woven throughout.

Considerations include:

- Prioritising planting in the design process for all new developments
- Robust design for quality spaces that will last generations
- Size of available space and plant size at maturity
- Potential for planting to shade impermeable surfaces
- Sight lines and access to doorways and windows
- Potential to create shading in summer while allowing winter sun (avoiding cold, damp homes)
- Sufficient sun hours for maara kai
- Good sight lines between houses and their play areas
- Use of scented, fragrant, edible and sensory plants
- Spaces such as high traffic areas or small backyard dry/shade zones in the shadow of buildings require robust planting

- Walkways and gathering areas for mixed use residential areas
- Screening for rubbish bin holding bays
- Prioritizing permeable surfaces for car parks
- Providing sufficient size of garden areas for good function
- Placement of compost bins and providing good access around the garden
- Shade size of planting in 5, 10, 20+ years
- Tree span - proximity to building and roads
- Distance to other large trees
- Scale of the planting
- Avoid full sun species being used for south shade patches

Hedges & vegetation screens

Hedges, and more so mixed species vegetative screens, provide an opportunity to include further indigenous biodiversity. They contribute to neighbourhood connectivity and can be a refuge for insects, moths, small manu and moko. Currently many of the hedges across Ngaa Hau o Maangere consist of environmental weed species, which can be transitioned to native hedges or vegetation screens to create biodiversity corridors.

The type of trees or shrubs selected for a hedge or vegetative screen will depend on the purpose or function it is required to achieve. Hedges can be planted as visual and sound barriers, to soften existing fencing, or work in combination with a security or child safety fence. Hedges can define a garden space, act as a planting backdrop and add to the overall biodiversity and biomass of the area, along with providing a carbon sequestration function. While formal hedges are maintained tightly during summer,

in autumn (while having limited food provision for birds) they can still play a role in encouraging small birds, insects and lizard habitat. Vegetation screens planted no less than vehicle height can aid in pollution reduction between streets and housing.

Hedging types

Monoculture cut hedges - formal e.g. koohuhuu, maapou, kaapuka and tarata are all plants suitable for cut hedging which is the most labour intensive. They require trimming twice per year in spring and autumn to maintain a shape, promote new growth and prevent overcorrection cutting back into hard wood, which in turn can risk die back.

Monoculture uncut e.g. harakeke belt. This will require up to a 2 metre wide band for plants to reach full potential width. Provision for feeding native biodiversity is uninterrupted in uncut hedges.

Mixed variety cut hedges, such as a maapou - koohuhuu - tarata combination. While these can be difficult to achieve even growth across all species, the mixed colour, texture and look of the hedge adds variety. These have the same biodiversity outcomes as a monoculture cut hedge.

Mixed variety hedges / screens - informal and uncut. These can include repeating trees as the foundation species with integrated mixed species as medium to small shrubs. These are the most productive and biodiverse of all hedge / screen types. They increase food, shelter and nesting provision for urban native birds.

Transitioning an existing hedge

Existing hedges which contain environmental weeds species of high concern such as elaeagnus, privet, monkey apple and cape honeysuckle (lower concern) act as a living seed bank that can be spread by birds to neighbouring sites and local reserves. Weed source hedges can be transitioned to a native ones.

Transitioning a weed species hedge, a failing hedge, undertaking infill repairs or a full replacement will require first establishing why the plant(s) have died. Hedge loss can be from dampness, water pooling, drainage issues or leaking pipes causing root rot in one or more of the plants in a line. Hard pruning in winter or over pruning in the middle of summer will cause some species to struggle to regrow after pruning into hard wood if already in an unhealthy state. Heavy mulching with fresh grass clippings against the base of the trunk can also cause damage to the trunk of the plant. Growing hedges in full sun is preferred, whilst hedges on the southside of a fence or around the border of a property that goes in and out of shade will cause stems to elongate or become weak. Which side of a fence to put the hedge on will depend on the space available. The density of the fence will affect the amount of even light and whether one sided growth of the hedge will occur.

Planting a new hedge

Implementation of a new hedge will start with preparation of soil and appropriate selection of plant species for the site. Old hedges may require feeding after pruning in autumn.

KAAINGA PROVISION

Trees

Horoekea *Pseudopanax crassifolius* (6m, C)
 Houhere *Hoheria populnea* (8m, R)
 Houpara *Pseudopanax lessonii* (4m, R)
 Kaikomako *Pennantia corymbosa* (5m, C)
 Karaka *Corynocarpus laevigatus* (8m, R)
 Kohekohe *Dysoxylum spectabile* (12m, R)
 Koowhai *Sophora microphylla* (8m, R)
 Maire *Nestegis apetala* (6m, R)
 Maire kootae *Nestegis montana* (4m, R)
 Maanatu *Plagianthus regius* (6m, C)
 Maanuka *Leptospermum scoparium* (4m, R)
 Niikau *Rhopalostylis sapida* (5m, C)
 Putaputaweetaa *Carpodetus serratus* (6m, R)
 Puuriri *Vitex lucens* (10m+, B)
 Rewarewa *Knightia excelsa* (12m, C)
 Taraire *Beilschmiedia tarairi* (10m+, R)
 Tarata *Pittosporum eugenioides* (6m, R)
 Tawa *Beilschmiedia tawa* (10m+, R)
 Tawaapou *Planchonella costata* (6m+, R)
 Tii koouka *Cordyline australis* (8m, C)
 Tiitoki *Alectryon excelsa* (8m, R)
 Toro *Myrsine salicina* (6m, C)
 Wharangī *Melicope ternata* (4m, R)

Crown shape

R Round
 C Columnar
 B Broad

● See Ngaa Hau o Maangere Plant Provision p. 61

Shrubs & climbers

Akakura *Metrosideros carminea*
 Akapuka *Griselinia lucida*
 Akatawhiwhi *Metrosideros fulgens*
 Akatea *Metrosideros perforata*
 Kaihua *Parsonsia heterophylla*
 Kawakawa *Piper excelsum*
 Karamuu *Coprosma lucida*
 Koromiko *Veronica macrocarpa* var. *macrocarpa*
 Korokio *Corokia cotoneaster*
 Mingimīngi *Coprosma propinqua*
 Poohuehue *Muehlenbeckia complexa*
 Puawananga *Clematis paniculata*
 Tainoka *Carmichaelia australis*
 Tauhinu *Ozothamnus leptophyllus*
 Taupata *Coprosma repens*
 Taawhiri karo *Pittosporum cornifolium*
 Wharariki *Phormium cookianum* subsp. *hookeri*
 Coprosma crassifolia
 Coprosma rhamnoides

Groundcovers

Huruuru whenua *Asplenium oblongifolium*
 Kiokio *Blechnum novae-zelandiae*
 Koowharawhara *Astelia banksii*
 Miikoikoi *Libertia grandiflora*
 Miikoikoi *Libertia ixioides*
 Miikoikoi *Libertia peregrinans*
 Mouku *Asplenium bulbiferum*
 Oioi *Apodasmia similis*
 Paanakenake *Lobelia angulata*
 Pinaatoro *Pimelea prostrata*
 Piripiri *Acaena anserinifolia* / *novae-zelandiae*
 Piupiu *Lomaria discolor*
 Pukupuku *Doodia australis*
 Puurei *Carex dissita*
 Puukio *Carex virgata*
 Remuremu *Selliera radicans*
 Rengarenga *Arthropodium cirratum*
 Tataaraheke *Coprosma acerosa*
 Totara *Fuchsia procumbens*
 Tuuhara *Machaerina sinclairii*
 Tuurutu *Dianella nigra*
 Waiuu atua *Euphorbia glauca*
 Wiiwii *Ficinia nodosa*
 Carex testacea



KAAINGA PROVISION

HEDGES & VEGETATION SCREENS

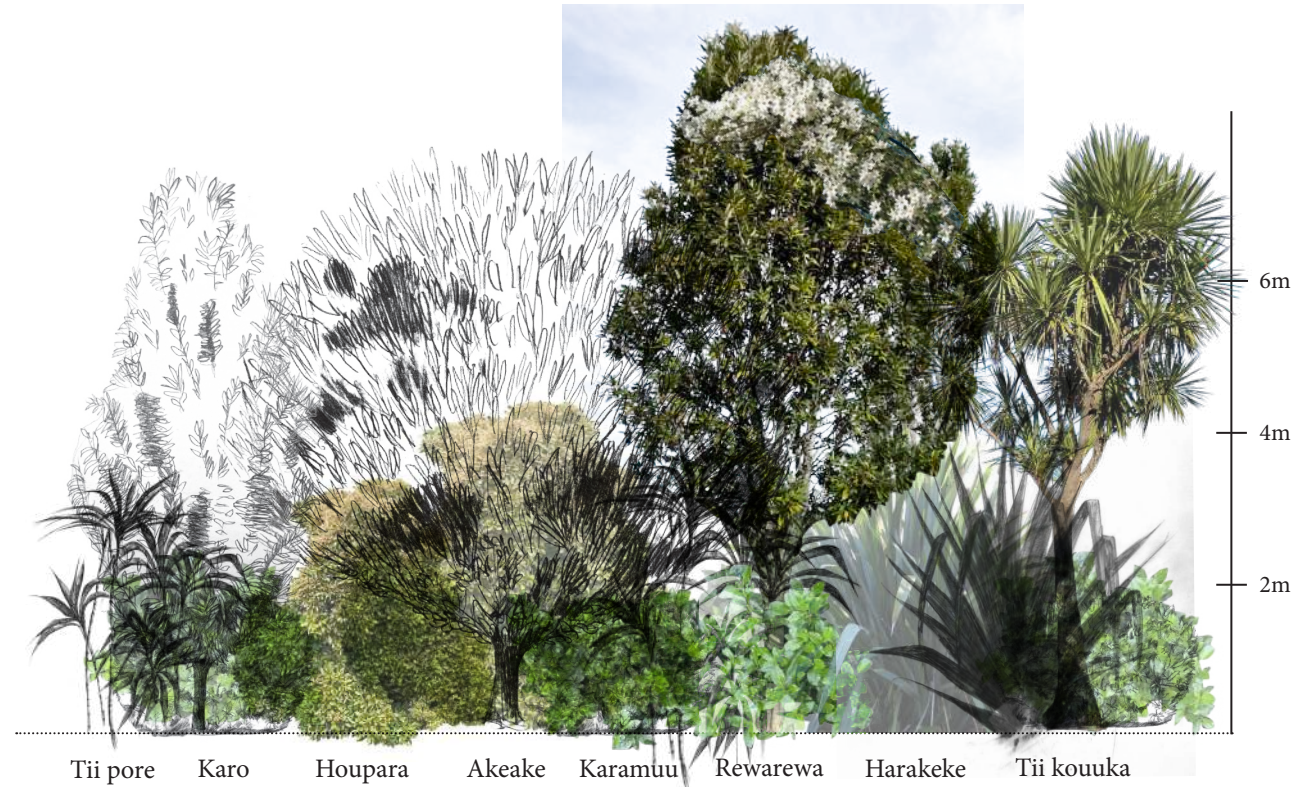
Trees

- Akapuka *Griselinia lucida*
- Akeake *Dodonaea viscosa*
- Houhere *Hoheria populnea*
- Houpara *Pseudopanax lessonii*
- Karaka *Corynocarpus laevigatus*
- Koohuuhuu *Pittosporum tenuifolium*
- Maanuka *Leptospermum scoparium*
- Maapou *Myrsine australis*
- Maire *Nestegis apetala*
- Ngaio *Myoporum laetum*
- Niikau *Rhopalostylis sapida*
- Tarata *Pittosporum eugenioides*
- Taupata *Coprosma repens*
- Tii koouka *Cordyline australis*
- Tiitoki *Alectryon excelsa*

Shrubs

- Harakeke *Phormium tenax*
- Karamuu *Coprosma lucida*
- Karo *Pittosporum crassifolium*
- Kawakawa *Macropiper excelsum* (2)
- Koohuuhuu *Pittosporum tenuifolium*
- Korokio *Corokia cotoneaster*
- Koromiko *Hebe stricta* var. *stricta*
- Puawananga *Clematis paniculata*
- Taupata *Coprosma repens*
- Coprosma crassifolia*

Example windbreak planting



2 Enrichment planting

● See *Ngaa Hau o Maangere Plant Provision* p. 61

4 NGAA TIPU

NGAA HAU O MAANGERE PLANT PROVISION

INGOA	BOTANICAL NAME	FORM	HEIGHT	SPREAD	MAUNGA	AWA	REPO	TAKUTAI	PARKS & RESERVES	KAAINGA	STREETSCAPES	RAINGARDENS & SWALES	KURA	COMMUNITY GARDENS	HEDGES	TOLERANCES										NOTES				
																Coastal	Dry	Mid	Wet	Windy	Shelter	Full sun	Semi shade	Shade						
LARGE TREES (6M AND ABOVE)																														
Akeake	<i>Dodonaea viscosa</i>	Shrub / tree	6m	3m																						Mau raakau				
Hiinau	<i>Elaeocarpus dentatus</i>	Tree	20m	6m																							Kai; manu; insects; 2 year lead in			
Horoeka	<i>Pseudopanax crassifolius</i>	Shrub / tree	10m	3m																							Mau raakau; manu; rongoa			
Houhere	<i>Hoheria populnea</i>	Shrub / tree	8m	3m																							Toi; ahi; rongoa			
Kaanuka	<i>Kunzea robusta</i>	Tree	18m	3m																								Manu; toi		
Kahikatea	<i>Dacrycarpus dacrydioides</i>	Tree	55m	5m																								Manu; rongoa; ahi		
Kaikomako	<i>Pennantia corymbosa</i>	Tree	8m	3m																								Regionally rare species; ahi; toi		
Karaka	<i>Corynocarpus laevigatus</i>	Tree	15m	8m																									Rongoa	
Kauri	<i>Agathis australis</i>	Tree	50m	5m																									2 year lead in; clean plant source	
Kohekohe	<i>Dysoxylum spectabile</i>	Tree	15m	8m																									Manu	
Koohuhuu	<i>Pittosporum tenuifolium</i>	Shrub/ Tree	7m	3m																										
Kootukutuku	<i>Fuchsia excorticata</i>	Tree	10m	2m																									Ahi; manu	
Koowhai	<i>Sophora microphylla</i>	Tree	8m	4m																									Rongoa; manu	
Koowhai	<i>Sophora tetraptera</i>	Tree	15m	5m																										Rongoa; manu
Koowhai	<i>Sophora chathamica</i>	Tree	15m	5m																										Rongoa; manu
Maahoe	<i>Melicytus ramiflorus</i>	Shrub/Tree	10m	8m																										Manu; ahi (fire risk don't cluster)
Maamaku	<i>Cyathea medullaris</i>	Fern	20m	14m																									Cluster; rongoa	
Maamaangi	<i>Coprosma arborea</i>	Shrub/Tree	12m	5m																										
Maanatu	<i>Plagianthus regius</i>	Tree	12m	4m																										

INGOA	BOTANICAL NAME	FORM	HEIGHT	SPREAD	MAUNGA	AWA	REPO	TAKUTAI	PARKS & RESERVES	KAAINGA	STREETSCAPES	RAINGARDENS & SWALES	KURA	COMMUNITY GARDENS	HEDGES	TOLERANCES								NOTES				
																Coastal	Dry	Mid	Wet	Windy	Shelter	Full sun	Semi shade		Shade			
Maire	<i>Nestegis apetala</i>	Shrub	6m	4m																						Rare, at risk		
Maire kootae	<i>Nestegis montana</i>	Tree	15m	5m																								
Maire rauriki	<i>Nestegis lanceolata</i>	Tree	15m	5m																								
Maire tawake	<i>Syzygium maire</i>	Tree	16m																						Vulnerable species; manu			
Makomako	<i>Aristotelia serrata</i>	Shrub/ Tree	10m	5m																					Manu; rongoa; toi; kai			
Mangeao	<i>Litsea calicaris</i>	Tree	12m																						Manu; rongoa			
Matai	<i>Prumnopitys taxifolia</i>	Tree	25m	6m																					2 year lead in; manu			
Miro	<i>Pectinopitys ferruginea</i>	Tree	25m	6m																					Manu			
Ngaio	<i>Myoporum laetum</i>	Tree	10m	6m																					Manu; rongoa			
Niikau	<i>Rhopalostylis sapida</i>	Palm	15m	4m																						Cluster; manu; toi		
Ponga	<i>Cyathea dealbata</i>	Fern	10m	3m																								
Poohutukawa	<i>Metrosideros excelsa</i>	Tree	30m	30m																						Manu; rongoa; toi		
Porokaiwhiri	<i>Hedycarya arborea</i>	Tree	15m																									
Pukatea	<i>Laurelia novae-zelandiae</i>	Tree	35m																							Manu; rongoa		
Putaputaweetaa	<i>Carpodetus serratus</i>	Shrub/ Tree	10m	4m																								Manu; pepe tuna
Puuriri	<i>Vitex lucens</i>	Tree	20m	20m																						Manu; rongoa; toi		
Raataa	<i>Metrosideros robusta</i>	Tree	30m	12m																								Requires host plant
Rewarewa	<i>Knightia excelsa</i>	Tree	12m	4m																							Manu; kai	
Rimu	<i>Dacrydium cupressinum</i>	Tree	35m	7m																						Rongoa; manu		
Taanekaha	<i>Phyllocladus trichomanoides</i>	Tree	15m	2m																							2 year lead in; rongoa	

INGOA	BOTANICAL NAME	FORM	HEIGHT	SPREAD	MAUNGA	AWA	REPO	TAKUTAI	PARKS & RESERVES	KAAINGA	STREETSCAPES	RAINGARDENS & SWALES	KURA	COMMUNITY GARDENS	HEDGES	TOLERANCES								NOTES		
																Coastal	Dry	Mid	Wet	Windy	Shelter	Full sun	Semi shade		Shade	
Taawai	<i>Nothofagus truncata</i>	Tree	30m																							
Taawari	<i>Ixerba brexioides</i>	Tree	10m																							2 year lead in
Taraire	<i>Beilschmiedia tarairi</i>	Tree	20m																							2 year lead in
Tarata	<i>Pittosporum eugenioides</i>	Tree	9m	4m																						Rongoaa
Taupata	<i>Coprosma repens</i>	Shrub	8m																							
Tawa	<i>Beilschmiedia tawa</i>	Tree	25m																							2 year lead in
Tawaapou	<i>Planchonella constata</i>	Tree	18m																							Manu; rongoaa; toi
Tii koouka	<i>Cordyline australis</i>	Tree	10m	2m																						Manu; rongoaa; kai; toi
Tiitoki	<i>Alectryon excelsa</i>	Tree	7m	6m																						Manu; rongoaa
Tootara	<i>Podocarpus totara</i>	Tree	30m																							2 year lead in; rongoaa; ahi
Toowai	<i>Weinmannia silvicola</i>	Tree	15m	10m																						Manu; rongoaa
Toro	<i>Myrsine salicina</i>	Tree	10m	4m																						2 year lead in
Whaarangi	<i>Melicope ternata</i>	Tree	8m	5m																						
Whau	<i>Entelea arborescens</i>	Shrub	15m	10m																						Mahi kai
Whauwhaupaku	<i>Pseudopanax arboreus</i>	Shrub/ Tree	8m	2m																						Manu
MEDIUM TREES (2M - 6M)																										
Akapuka	<i>Griselinia lucida</i>	Tree	5m	2m																						Epiphytic
Hangehange	<i>Geniostoma ligustrifolium</i>	Shrub	4m	2m																						
Harakeke	<i>Phormium tenax</i>	Herb	3m	3m																						Toi; rongoaa; manu
Houpara	<i>Pseudopanax lessonii</i>	Shrub/ Tree	6m	3m																						

INGOA	BOTANICAL NAME	FORM	HEIGHT	SPREAD	MAUNGA	AWA	REPO	TAKUTAI	PARKS & RESERVES	KAAINGA	STREETSCAPES	RAINGARDENS & SWALES	KURA	COMMUNITY GARDENS	HEDGES	TOLERANCES									NOTES			
																Coastal	Dry	Mid	Wet	Windy	Shelter	Full sun	Semi shade	Shade				
Taawhiri karo	<i>Pittosporum cornifolium</i>	Tree	2m	1m																		Epiphytic; 2 yr lead in						
Tauhinu	<i>Ozothamnus leptophyllus</i>	Shrub																				Good nursery species						
Taurepo	<i>Rhabdothamnus solandri</i>	Shrub	2m	1m																		Manu; mahi toi						
Toetoe	<i>Cortaderia fulvida</i>	Grass	2m	2m																		Toi						
Tutu	<i>Coriaria arborea</i>	Shrub/ Tree	3m	2m																		Rongoaa						
Tuurepo	<i>Streblus heterophyllus</i>	Shrub	6m	4m																								
Whekii	<i>Dicksonia squarrosa</i>	Fern	6m	2m																								
	<i>Coprosma areolata</i>	Shrub	5m	2m																								
	<i>Coprosma crassifolia</i>	Shrub	4m	2m																		Rongoaa						
	<i>Coprosma rhamnoides</i>	Shrub	2m	2m																		Manu; mokomoko; toi						
	<i>Olearia solandri</i>	Shrub/ Tree	4m	4m																								
SMALL / GROUND COVERS (UP TO 2M)																												
Akakura	<i>Metrosideros carminea</i>	Vine																										
Akatawhiwhi	<i>Metrosideros fulgens</i>	Vine																										
Akatea	<i>Metrosideros perforata</i>	Vine																										
Haawera	<i>Coprosma hawera</i>	Ground cover	.6m	2m																								
Huruhuru whenua	<i>Asplenium oblongifoilum</i>																											
Kaihua	<i>Parsonsia heterophylla</i>	Vine																					Mahi toi					
Kareao	<i>Ripogonum scandens</i>	Vine																					Raranga; kai; mahi kai					
Kiekie	<i>Freycinetia banksii</i>	Vine																					Kai; toi; raranga					

INGOA	BOTANICAL NAME	FORM	HEIGHT	SPREAD	MAUNGA	AWA	REPO	TAKUTAI	PARKS & RESERVES	KAAINGA	STREETSCAPES	RAINGARDENS & SWALES	KURA	COMMUNITY GARDENS	HEDGES	TOLERANCES								NOTES
																Coastal	Dry	Mid	Wet	Windy	Shelter	Full sun	Semi shade	
Piripiri	<i>Acaena anserinifolia</i>	Ground cover	.15m	.3m																		Cluster; rongoa		
Piupiu	<i>Lomaria discolor</i>	Fern	1m	1m																		Provision use		
Poohuehue	<i>Muehlenbeckia axillaris</i>	Vine	.5m	1m																		Coastal vine		
Poohuehue	<i>Muehlenbeckia complexa</i>	Vine	.5m	1m																				
Puawaananga	<i>Clematis paniculata</i>	Vine																				Plant at the base of host; tohu		
Pukupuku	<i>Doodia australis</i>	Fern	1m	1m																		Plant in clustered blocks		
Puukio	<i>Carex virgata</i>	Sedge	1m	.5m																				
Puurei	<i>Carex dissita</i>	Sedge	1m	1m																				
Puurei	<i>Carex secta</i>	Sedge	1m	1.5m																				
	<i>Carex testacea</i>	Sedge																						
	<i>Carex litorosa</i>	Sedge	.5m	.5m																				
	<i>Austrostipa stipoides</i>	Sedge	1m	1m																				
Raupoo	<i>Typha orientalis</i>		3m	.5m																		Toi; kai; hangahanga		
Rautahi	<i>Carex lessoniana</i>	Sedge	1m	1.5m																				
Remuremu	<i>Selliera radicans</i>	Low GC	.2m	2m																				
Rengarenga	<i>Arthropodium cirratum</i>	Ground cover	.6m	.6m																		Dry zones		
Taatarakeke	<i>Coprosma acerosa</i>	Shrub	.7m	1.5m																		At risk species; mokomoko		
Taataramo	<i>Rubus cissoides</i>	Vine																				Rongoa		
Tainoka	<i>Carmichaelia australis</i>	Shrub																						
Tii Rauriki	<i>Cordyline pumilio</i>	Ground cover	1m	1m																		Kai; purerehua		

INGOA	BOTANICAL NAME	FORM	HEIGHT	SPREAD	MAUNGA	AWA	REPO	TAKUTAI	PARKS & RESERVES	KAAINGA	STREETSCAPES	RAINGARDENS & SWALES	KURA	COMMUNITY GARDENS	HEDGES	TOLERANCES								NOTES		
																Coastal	Dry	Mid	Wet	Windy	Shelter	Full sun	Semi shade		Shade	
COMMUNITY CHARACTER																										
Aute	<i>Broussonetia papyrifera</i>	Tree	8m	8m																						
Tii pore	<i>Cordyline terminalis</i>	Shrub	3m	1m																						
Frangipani	<i>Plumeria spp.</i>	Shrub/Tree	2.5m	3m																						
Kaute	<i>Hibiscus rosa-sinensis</i>	Shrub/Tree	2.5m	2.5m																						
Taro	<i>Colocasia-esculenta</i>	Shrub	1m	1m																						
Tiare	<i>Gardenia taitensis</i>	Shrub	2m	1.5m																						
Peruvian Lily	<i>Alstroemeria spp.</i>	Shrub	1.5m	1.5m																						

Further species to be selected by or in collaboration with community and/or kura

FRUIT TREE MENU

PIP FRUIT

APPLES



BRAMLEY - Height 5m. Parks and food forest. Large, irregular in shape, light green skin, outstanding flavor and texture for cooking apple, not a dessert apple. Summer fruiting- plant in winter.

EARLY STRAWBERRY - Recorded 1838. Similar to Golden Delicious. Red streaks when ripe, sweet & crisp flesh. Heavy bearer & good lunch box size for kids. Ripe Late December.

SUNRISE - Early ripening. Good sweet/sharp balance, fairly acidic. Crisp flesh & juicy. Ripening over a long period making it a valuable home garden variety. Ripe in late December onwards.

OWEN THOMAS - Introduced 1920. Intense rich, sweet/sharp. Soft & creamy. Juicy flesh. Eat fresh, not a keeper. Ripe January.

PEASGOODNONSUCH - A huge apple, highly esteemed culinary apple which fluffs up well when cooked. Tart, acidic & sweet. Ripe mid to late January.

AKANE - Introduced 1970. Japanese. A vibrant red wine skin with pure white flesh. Crisp, juicy & chewy flesh with a hint of strawberry flavour. Ripe late January.

BONZA - Introduced 1950's. An Australian chance seedling. Green/red in colour. Sweet & juicy with very white firm flesh. Flat shape. Dual purpose. Eaten fresh or as a cooker. Holds shape when cooked. Ripe late January.

MOLLIE'S DELICIOUS - 1966. Large ribbed angular shape. Rich in taste, similar to Golden Delicious. Crisp, sweet, crunchy cream flesh. Ripe late Jan/Feb.

JONATHAN - Introduced 1864. American variety. Widely regarded as one of the best tasting apples. Good sweet/sharp balance. Med sized white flesh with a refreshing taste. All-purpose variety. Ripens the same time as blackberries in February.

COX'S ORANGE PIPPIN - A med sized apple with a sharp tangy flavour. Skin is striped red and green. Reliable old-fashioned variety & still a renowned commercial apple, ripening in Feb.

M I D S E A S O N

MOUNTAIN RD - A wild Kaipara apple found on Mountain Rd. Chance seedling; tough tree having lived through grazing cows & strong winds. Med sized green apple with a red blush when ripe. Sweet, tart & crunchy. Old fashioned flavour. Ripe mid to late Feb.

TELSTAR - New Zealand raised 1934. Med sized. Pale yellow heavily overlaid with dark crimson stripes. Cinnamon russet dots. Flesh is fine, yellow. Juicy, crisp & sweet aromatic taste. Ideal for smaller gardens. Heavy cropper. Ripe late Feb/March.

FREYBURG - Med to large size. Attractive yellow & green skin. High quality of flavour. Aromatic, honeyed & very sweet. Taste has a combination of apple, pear & banana. Creamy white flesh with a firm texture. Stunning eating. Well known NZ heirloom. Ripe March.

SIR PRIZE - Introduced 1958. Well known NZ heirloom. Medium to large size. Attractive yellow & green skin. High quality of flavours. Aromatic & sweet. Taste has a combination of apple, pear & banana. Creamy white flesh, firm texture. Stunning eating. Ripe March.

GOLDEN RUSSET - Small to medium sized. Golden apple with full russet skin. Tart & flavoursome with a

nice crisp flesh. Sweetens with time in the fruit bowl. Well known for its health giving properties & makes wonderful Cider. Heavy cropper.

BIESTERFELDER REINETTE - Introduced 1905. A German favourite with a good aromatic flavour. Sweet with crisp juicy flesh. Excellent disease resistance. Ripe March.

PRISCILLA - Medium in size. Dark red blush on yellow skin. A fine dessert quality apple, very sweet. Scented. Crisp & juicy. Black spot & scab resistant apple, bred in America making it ideal for organic growers. Heavy bearer. Ripe: March.

CAPTAIN KIDD - New Zealand raised 1924. Med sized, bright red streaky skin. Sweet juicy reliable cropper. Resistant to black spot, our must have in our projects. Ripe March/April.

BRAMLEY'S SEEDLING - Large green apple with a hint of red blush. It's sharp & acidic properties make it famous as a top culinary apple. Ideal for pies, pastries, crumbles & chutneys. Holds together well when baked. A well-known & renowned English cooking apple over 200 years old. Ripe March/April.

L A T E S E A S O N

MONTY'S SURPRISE - NZ Heritage Apple. Crisp good eating also used for cooking. Huge fruit. Can be eaten as a preventative measure to reduce the incidence of disease in the human body. Ripe April.

GOLDEN DELICIOUS - World famous apple with great taste, texture, aroma & appearance. Large, yellow skinned apple, very sweet honeyed taste. Favourite for salads, sauce & apple butter. Mid ripening. Heavy regular cropper.

REINETTE DU THORN – Med size, nicely perfumed dessert apple. Yellow with red streaks. Exceptional flavour. Sweet to sub acid. Vigorous tree with good disease resistance. Belgium, 1854.

JONAGOLD - Introduced 1968. Large. Red skin with a gold undertone. Juicy sweet. Crossed between a Jonathan & a Golden Delicious. It is an eating apple, but used by cider makers in areas of the world where cider apples are hard to come by. Produces a soft and highly perfumed cider. Ripe April.

GRANNY SMITH - Crisp, firm, tart. Well balanced flavour. New Zealand's most popular commercial cooking apple. Heavy bearing, long living tree. Ripe late April.

TARA RD - Late eating. Med size apple, very good flavour. Red stripes, white crispy flesh. Good keeper. Ripe late May.

WINTER GOLD – Port Albert Origin. Thought to have arrived with the Albertlanders. Medium to large size. Red, gold & lemon-yellow skin. Very good taste. Sweet with a crunchy firm texture. Late June.

PEARS



GREEN ANJOU - Large, Green, crisp, sweet, juicy, firm flesh, excellent keeper. Fruits in Summer. Suitable for berms, parks, or food forests.

RED ANJOU - Mild, sweet flavor with a smooth texture and an abundance of juice when fully ripe. They are much the same as their Green counterparts in all aspects aside from color. This color makes them distinctive. Fruits in Summer. Suitable for berms, parks, or food forests.

CITRUS

LEMONS



LISBON - Ripens mainly in winter and early spring (although bears fruit year-round). Large, upright, spreading, and vigorous. They are thorny with dense foliage and resistant to adverse weather conditions. The fruit is very juicy and acidic with few seeds. Will grow to about 4 m tall. Suitable for parks or food forest.

MEYER - Ripens throughout the year but mainly in winter/spring. Meyer Lemon trees are small to medium size, moderately vigorous, hardy, and productive. The fruit is juicy, acidic, and moderately seedy. When mature, the tree has a size of approx 2 m high and 2 m wide at a medium growth rate.

LIMES



BEARRS - Ripens March to September. Small, deep-green seedless fruit. The fruit has juicy, acidic flesh and skin which turns lime-yellow at maturity. Protect from frost. When mature, the tree has a height of up to 6m at a medium growth rate. Suitable for berm/parks/food forest.

MAKRUT - Height 2-11m. Spread up to 5m. Suitable for berm/ parks/ food forest.

ORANGES



CARA CARA NAVEL - Ripens June to November. Distinctive rich pink flesh. Flavour is low acid, sweet and has more depth and richness than that of the traditional navel. Virtually seedless. Needs plenty of sun, warmth and protection from hard frosts. Will

grow to approx 4 m high when mature.

HARWOOD - Late (Valencia) Ripens November to March. NZ selection of Valencia orange (main commercial variety) with high yields of juicy, thin-skinned fruit with excellent flavour. Grown on trifoliata rootstock, the tree is large, vigorous, and productive. When mature, will grow to about 1.5 m in height and 2 m in width at a medium growth rate.

MANDARINS



SATSUMA - Ripens early, starting before the end of May. Satsuma are slow-growing, somewhat spreading trees and small compared to most other citrus. The leaves are usually dark green and the tree habit is very open. They are among the most cold-tolerant citrus grown in New Zealand. The fruit often ripens before full colouration and the skin is very easy to peel. They are seedless and eating quality is fair. Season through to late July or early August.

SILVERHILL SATSUMA - Ready for picking end of May into July. An early ripening Satsuma that has thick-skinned, easy peel, sweet and juicy fruit with segments that easily separate. This variety grows well in cooler areas. When mature, grows to about 4 metres high at a medium growth rate.

ENCORE - Ripens November-February. A delicious seedless mandarin with good crops of medium to large easy-peel fruit. Very juicy and sweet. Vigorous selection with a long hanging period on the tree. The trees are thornless, moderately vigorous and bushy. However, they are somewhat 'Biennial' in cropping. Protect from frost when young. When mature, will grow to about 1.4 metres in height and about 2 metres in width at a medium growth rate.

STONE FRUIT

PLUMS



BLACK DORIS - Fruit is of medium size, with purple black skin and dark red sweet, juicy flesh. Vigorous, up right tree habit. A cross variety. Mid-season. H 6m x W 5m. Berm/ parks/ food forest. Feb harvesting.

DANS EARLY - Red skin and yellow flesh, small fruit but prolific crops, reliable heavy bearer, good taste for early plum. Budded onto Peach Rootstock. Avoid wet areas. Ripe December. Height 6m. Suitable for berms food forest.

EARLY SEASON

EARLY RED - Medium sized plum. Dark red skin with firm dark red flesh. Tart & sweet. Tree has a lovely weeping form

PEACH



A large, juicy, outstanding red skinned, white fleshed peach. A hardy, healthy tree. The best Summer peach. Height 4m. Suitable for berm, park, food forest.

NECTARINE



Juicy meat and stone, similar to the peach. It is a hairless peach obtained by genetic mutation. Height 3m. Suitable for berms, parks, food forest.

APRICOT - TRAVATT



Large, sweet and juicy golden-yellow fruit. The tree has the potential to grow up to 6 metres tall. Plant in a sunny, sheltered position with well-drained soil. The

best time to plant is in autumn to set root before the cold weather sends the tree into dormancy. Trevatt apricot is self-fertile but having pollinator results in bigger, juicier fruit. It will take around 5 years before your tree starts bearing fruit but after this will continue to do so for many years.

FRUIT FOREST

AVOCADO - HASS



Fruits August-April. Rich, creamy flavour. Can grow 24 + m tall. Suitable for parks and food forests.

BANANA



Lady finger bananas are fully ripe in Summer, Autumn. The fruit has a creamy consistency, with a sweeter flavour than common bananas. 5m tall. Suitable for parks, food forests.

CHERIMOYA - CUSTARD APPLE



Cherimoya fruit are sweet with a tropical flavor; combination of pear and pineapple and creamy enough that they're also known as custard apples.

FIG - BRUNSWICK



Long brown fig with sweet amber flesh. Good flavor. Light first crop in summer with second main crop in autumn. Cold hardy.

PERSIMMON



Height 6m. Suitable for berm, food forest. Deep orange fruit, sweeter and juicier the more ripe and darker. Grown through northern New Zealand.

PAWPAW



Height 9m. Suitable for parks, food forest. Pawpaws begin to ripen from mid-August to September.

FEIJOA



Summer, Autumn. These trees produce a beautiful red flower in November and by early April the trees produce their fruit as they ripen.

PEPINO



1m tall. Suitable for berms, parks, food forest. The pepino has a taste that is similar to a cucumber, cantaloupe, and a honeydew melon. Habit - A small vigorous bush, that flowers during spring and summer and fruits heavily from December until the first frost.

TROPICAL GUAVA



The sweet, juicy, large pink fruit ripen in late winter (August to November) so need warm temperatures during these months. Has antioxidant properties and is said to relieve pain and reduce fever. The base of the leaf is popular in cooking recipes for its aroma and blend of minty and citrus-like flavour. White-yellow-rose-red-coloured flesh. Height 6m. Suitable for berms, parks, food forest.

MACADAMIA INTEGRIFOLIA



Macadamia nut has a mild, butter-like flavour. It can be eaten raw or used in cooking. Macadamia nuts are rich in vitamins, minerals, fiber, antioxidants, and healthy fats. Tree height 6m. Suitable as street trees & in parks. Winter-Spring (August-September).

EXOTIC PERENNIAL HERBS

PINEAPPLE SAGE (SALVIA ELEGANS)

H 1.5m. Produces flashy scarlet-red flowers. Both the leaves and the flowers are edible, commonly used in herbal teas or as a colourful garnish. (Pineapple sage tea is said to calm your nerves and aid an upset stomach).

LEMONGRASS (CYMBOPOGON)

H 1.5 m. Lemongrass can help prevent the growth of bacterias and yeast. It has antioxidant properties and is said to relieve pain and reduce fever. The base of the leaf is popular in cooking recipes for its aroma and blend of minty and citrus-like flavour.

LEMON VERBENA (ALOYSIA CITRODORA)

H 2.5m. Flowers have an intense lemon aroma when crushed. Used in cooking for its lemon aroma, also helps digestive disorders and joint pain among other things. Toxic to dogs, cats, and horses.

ROSEMARY (SALVIA ROSMARINUS)

H 2m. Rosemary has antibacterial, antiviral, and antifungal properties, also increases memory. Consuming it often can help lower the risk of infection and help boost immunity. It is widely used in cooking recipes for flavouring and aroma. Attracts bees as good source of nectar.

GREEK BASIL (OCIMUM BASILICUM)

H .2m. Has a softer flavour than traditional basil.

Greek basil leaves are said to have great medicinal properties. Chewing the leaves can also be a quick fix for various stomach issues like nausea and diarrhoea. Although it's not used in some traditional basil recipes like pesto or salads, Greek basil has a very aromatic flavour which makes it ideal for sauces, pastas and cooking in general.

JERUSALEM ARTICHOKE (HELIANTHUS TUBEROSUS)

H 3m. The plant grows similar to a sunflower with its bright yellow flowers. Both the flower and leaves are edible, they are also commonly grown for their tuber, used as a root vegetable. Common in cooking, you can find Jerusalem artichoke in a variety of recipes.

FLOWERS

AGERATUM

H .6m. Ageratums attract bees and butterflies and come in a range of stunning colours making them perfect for your berm or garden. Also they're a non-stop bloomer from mid-summer to autumn making your garden look brighter for longer.

COSMOS (COSMOS BIPINNATUS)

H .5m. Cosmos have bright flowers that attract bees, butterflies, and other beneficial insects and pests don't seem to bother them, making them a perfect addition to your berm or garden. They are also easy to grow and will self sow. The flowers are edible.

ECHINACEA (ECHINACEA PURPUREA)

H 1m. All parts of the plant are edible. Nectar attractive

to bees. Beneficial for symptoms such as coughs, fevers and sore throats. It is also recommended to boost immunity and help the body fight infections.

ECHIUM (ECHIUM CANDICANS)

H 2.5 m. Flower is white, bluish-white, or purple-blue. Attracts bees and other important pollinators. All parts of the plant are considered poisonous.

MEXICAN MARIGOLD (TAGETES ERECTA)

H 2m. Tagetes erecta is native to Mexico. They have bright orange and yellow flowers and fragrant foliage. The scent repels pests like mosquitos, nematodes and cabbage worms away. Can treat digestive issues, toothaches, and colds.

SALVIA AMISTAD (SAGE)

H .2 m. Has large royal-purple flowers that attract birds and butterflies. Planting in lots, Salvia Amistad becomes an aromatic addition to your garden bed.

SPIDER FLOWERS (CLEOME)

H 1 m. Flowers range from white to pink to purple which attract the vegetable stink bugs away from other plants.

ZINNIA

H .5m. Zinnia provide a source of pollen for beneficial insects, they are one of the best annuals for attracting pollinators, especially butterflies. Easy to collect the seeds to grow the following year.

Refer to *Community Gardens & Orchards* on p. 44 for full list of considerations when selecting fruit trees. Useful links: [New Zealand Tree Crops Association](#); [Forgotten Fruits](#)

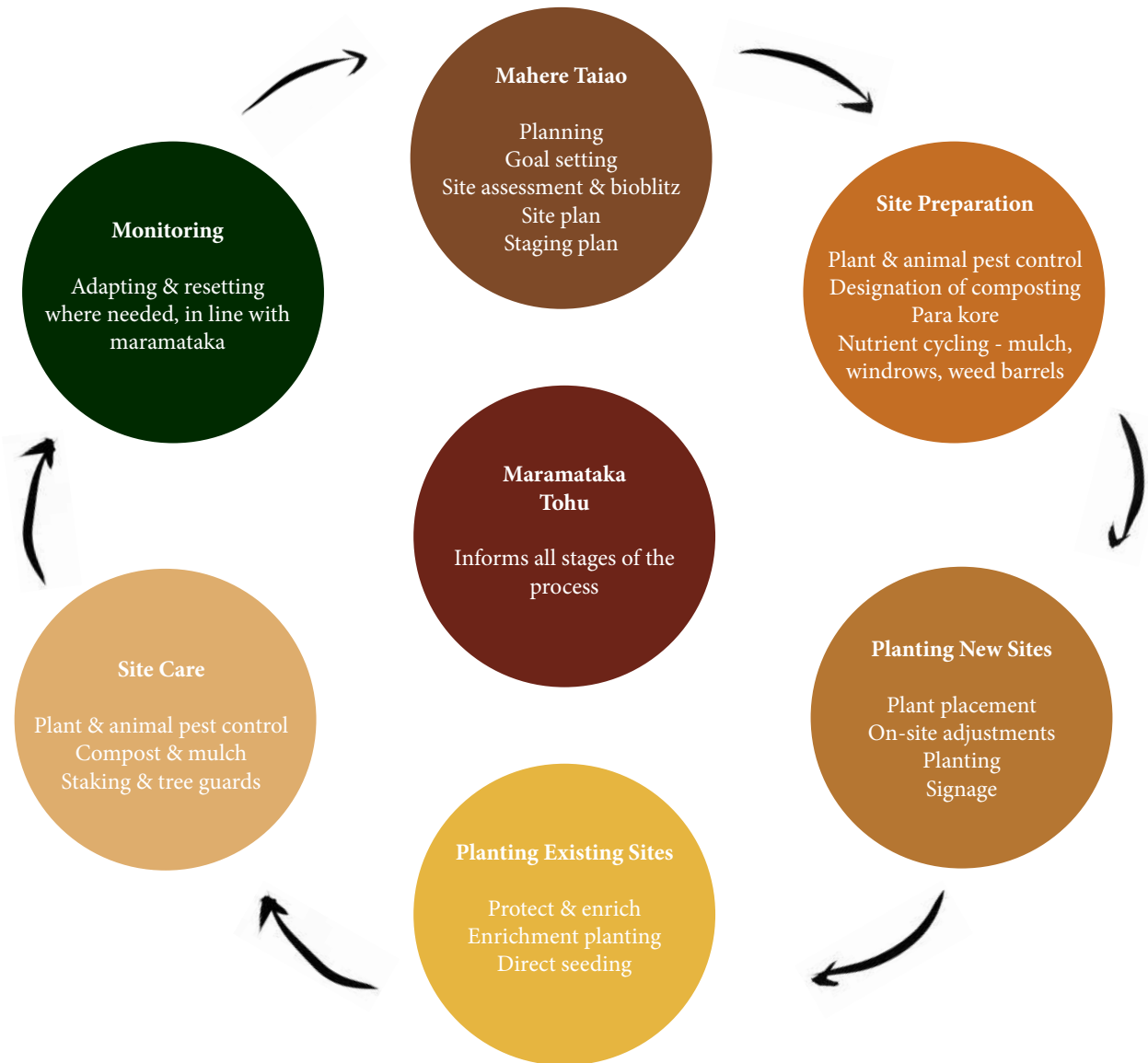
5 TUKANGA AUAHATANGA; MANAAKI TAI AO

This section outlines guidance on good practice methodology for planting across all takiwaa, from the planning stages through to monitoring established landscapes and ecosystems.

The diagram to the right shows this in visual form, with stages leading back to Mahere Taiao, after implementation and monitoring have been undertaken to inform new plans and actions.

This section provides guidance for each of these stages of the methodology, as well as provides tools for using and understanding maramataka and outlines different methods of creating compost - the foundation of ngahere. Finally, this section finishes with detailed resources and methodology for pest management, inclusive of pest plants, diseases and animals.

Throughout this section guidance can refer to either restoration planting or landscape planting - the two main types of planting that are occurring throughout Ngaa Hau o Maangere. Restoration planting will typically be occurring across Maunga, Awa, Repo and Takutai takiwaa, as well as in some areas of Parks & Reserves. Landscape planting will generally occur across Parks & Reserves, Community Gardens & Orchards, Streetscapes, Kura and Kainga takiwaa.



MARAMATAKA

“Poohutukawa are tohu for when kina are ready” - Krissy Bishop, Te Pu-a-nga Maara

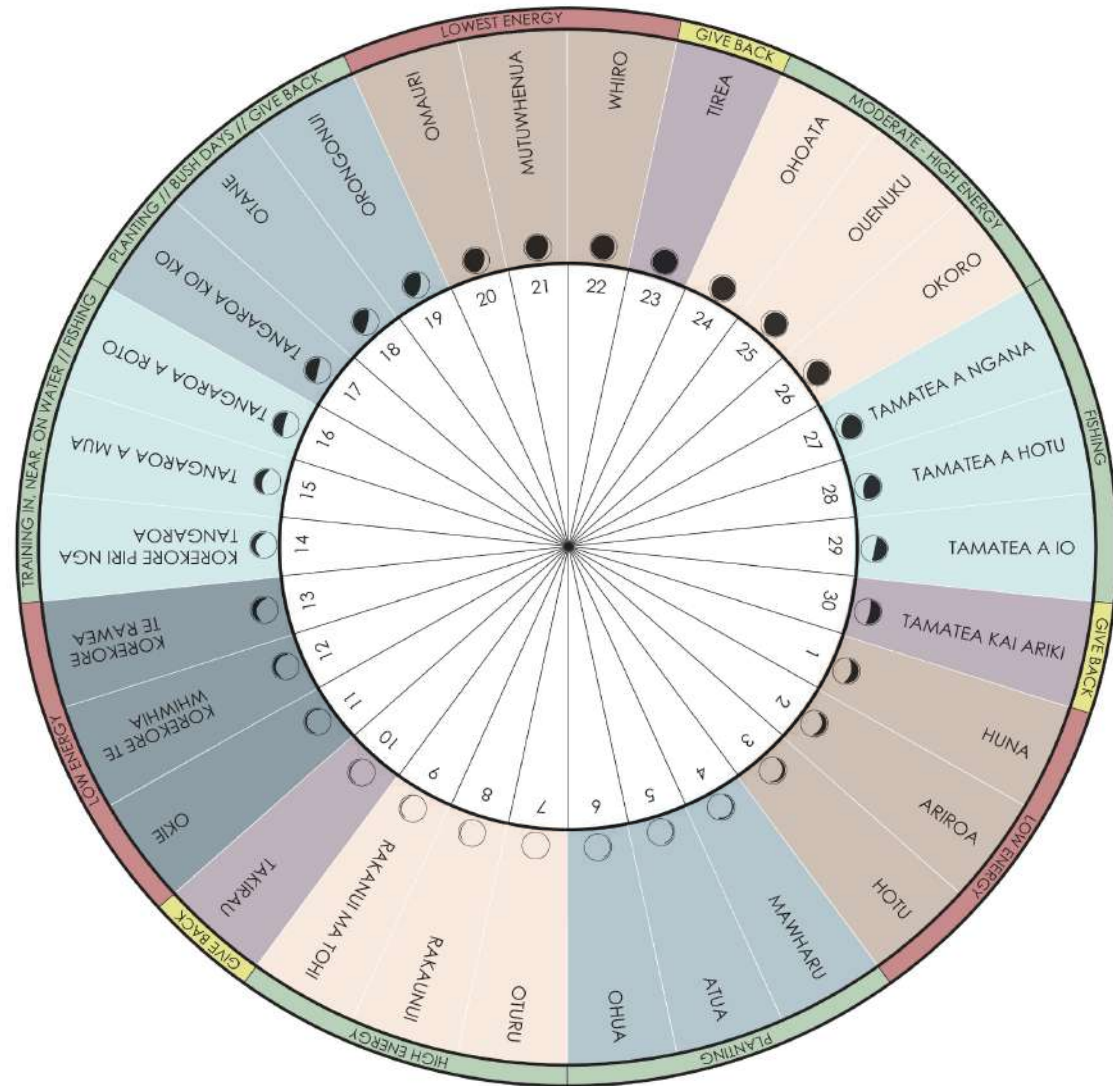
Aroturuki: Aata maatakitaki

Maramataka provides guidance for restoration activities in alignment with moon phases and seasonal patterns.

Maramataka guides us with understanding our observations. In turn, this strengthens local knowledge of seasonally recurring life cycle events, such as fruiting or flowering times. Observations can be undertaken from the third year following initial planting, especially for species such as maanuka and karamuu, but also for canopy species such as karaka and kahikatea.

The image to the right shows a maramataka mataraa, supplied by Rereata Makiha, which can be used to keep track of the days of maramataka. [Download and print](#) your own maramataka mataraa and see [here](#) for guidance on how to use it.

The example work plan provided (on opposite page) gives a base to build a restoration work plan in line with maramataka.



Restoration mahi	Pipiri	Hoongoingoi	Here-turi-kookaa	Mahuru	Whiringa-a-nuku	Whiring-a-a-rangi	Hakihea	Kohitaatea	Huitanguru	Poutuute rangi	Paenga whaawhaa	Haratua
TAU:	Hootoke			Kooanga			Raumati			Ngahuru		
Start date												
Walk over with kaitiaki				Pre-start once plan is confirmed		Weed clearance						
Plant pests						Clear existing access paths	Clear access paths	Weed clearance	Weed clearance	Weed clearance		
Animal pests					Set traps Pest tracker tunnels/chew cards set up	Set traps	Set traps	Set traps	Set traps		Set traps	Set traps
Site preparation											2 week	2 week
Direct seeding										Direct seeding		
Planting												Planting
Monitoring		Manu counts	Place chew cards/ tracking tunnels Photograph site		Manu counts at the same time of day, note weather, kereruu discovery	Photograph site from photo points		Photograph site from photo points Manu counts	Place chew cards/ tracking tunnels Photograph site			Photograph site

WHENUA

The foundation of all ngahere begins with soils.

Composting

Composting is the art of utilising local organic resources such as the non-regenerative parts of environmental weeds, waste stream cardboard, leaf litter, branches, twigs and raw food scraps, through a process involving layering of the brown (carbon rich) and green (nitrogen rich) materials that break down over time to usable organic material.

Compost is a valuable resource essential for improving soil structure and moisture retention. The various stages of composting can provide habitat for soil macroinvertebrates, create environmental conditions required for mycorrhizal fungi that have a symbiotic relationship with plants helping to access nutrients and water. When applied on top of the soil as a mulch layer, compost can slow the germination of weed seeds already present in the soil.

The diagram to the right shows the process of layering green and brown material in a windrow that will compost down over time, creating a resource that can be repurposed in the form of mulch applied back onto restoration / landscaped sites. The page opposite details the three main methods of composting food scraps to create compost for maara kai, outlining each of their benefits and requirements.

Composting and rats

In areas where composting is undertaken in open sites, such as utilising environmental weeds for windrows at restoration sites, it is best not to include food scraps and set traps to reduce the potential of rats. Home or community composting using food scraps should include rat proofing and pest control adjacent to composting infrastructure.



Useful links: [Hua Parakore](#); [ShareWaste NZ](#)

Anaerobic composting

This method uses a combination of 'greens' and 'browns' to create soil.

- Largest system - needs >1m² space
- Must be outdoors
- Need 1 bin for an average household
- Needs garden waste (70% 'browns')
- Can't take meat or bones
- Needs additional pest proofing
- Needs turning. Final product ready to use in garden



Anaerobic composting



Bokashi composting



Worm farm

Bokashi composting

Bokashi ferments food scraps using enzymes in a two part segmented bucket.

- Very compact
- Can be kept indoors or outdoors
- Need 2 bins for an average household
- No garden waste - must add enzymes
- Takes any food scraps including meat
- Pest proof
- Less maintenance. Final product must be dug into a trench

Worm farms

Worm farms create soil using worms and by carefully adding food scraps over time.

- Medium sized - needs <1m² space
- Must be outdoors but needs shade
- Need 1 bin for an average household
- Needs 30% 'browns' and worms
- No meat, bones, citrus or eggshells
- Pest proof
- Needs checking on. Final product ready to use in garden



MAHERE TAIAO



Restoration planning workshop

Planning is critical for planting across all takiwaa.

Restoration goals

For restoration specific plantings, for example across Maunga, Awa, Repo and Takutai takiwaa, ensure that restoration goals areas are considered at the outset of the project. The broad goal of restoration is to re-establish the structure, functioning and diversity of an ecosystem, and generally involves revegetation and the eradication or control of pests. Restoration happens for and by communities, and every restoration project will have different goals it sets out to achieve. Environmental monitoring allows us to measure success against the restoration goals.

Site assessment & BioBlitz

Always assess planting sites and take stock before starting any planting. Site analysis to include but not limited to: soil, aspect, slope, hydrology, exposure to salt-laden winds, existing vegetation (both native and exotic), animal pest baseline data, neighbouring site influences (e.g. source of invasive weeds or native plant material for propagation). When working with kura and/or community, a [BioBlitz](#) could be run to assess existing biodiversity. A BioBlitz is a method of assessing all living species that happens in a defined area of your site over a 24 hour period. It also acts as an education tool.

Site plan

Preparing a site plan before planting is useful and ensures that the planting achieves the desired look, feel and function. For restoration planting, prepare site plans annually, including site access points, health and safety risk assessment, weed management

priorities, pest control trap lines and planting schedule (i.e. number of plants, grades and spacing).

For all planting, considerations for planting placement include: sight lines, view shafts, access, and any neighbouring built elements such as signage, paths, seats, and fence lines. Identify existing access points and any additional pathways required to move equipment into the site. These pathways may be retired in future years. Be mindful of any planned pathways through or adjacent to planting areas that may reduce habitat connectivity.

Management areas

For large sites it is helpful to create definable management areas. Consider access points, resources, contractor only and volunteer enabled zones. For any restoration planting, divide sites into planting zones and estimate the size of each zone: see Awa, Repo or Takutai Provision (p. 36, 38, 40) for planting zones.

Staging planting

Stage your planting in line with your available resources. I.e. if you have a budget that covers the planting of 1,000 plants but not any site care of the planting, and that same budget covers the planting of 500 plants and also site care - always go with the latter.

Monitoring

Plan your monitoring systems at the outset (see p. 84 for detailed information on what and how to monitor). Monitoring may be project specific (e.g. monitoring all manu) or location specific (e.g. weed densities for each restoration management area).

SITE PREPARATION



Preparing the soil

Site preparation is a first priority before any planting can occur. For restoration planting on open sites, first reduce grass cover. For restoration planting in existing sites, existing pathways need to be cleared to create access for equipment into planting blocks and to enable weed clearance.

For landscape planting across any takiwaa, preparation may include clearance of weeds and the addition of compost prior to planting. For streetscape plantings, refer to Auckland Transport landscape specifications.

Mulch and compost

Mulching and/or using compost at the time of site preparation may be beneficial for some planting sites, such as landscape planting, productive or specimen tree planting or planting across Kaainga, Kura and Community Gardens & Orchards takiwaa. For preparing these sites, soil should be prepared and enriched with compost and topped with aged mulch to ensure plants have sufficient nutrients.

Pest control

For any existing sites, ensure pest control commences before planting as part of site preparation. Weed control in blocks can be staged as resources allow. Best weed clearance time is spring to summer, followed by planting site preparation in summer to late autumn. Moving and working on site requires mindfulness. For example, while undertaking weed control or site assessments, take care to not disturb regenerating native seedlings and wildlife.

For full detail on plant and animal pest control and disease control see p. 86 - 99.

Para kore

Before commencing planting the site should be assessed for the following potential waste:

- Contaminated whenua
- Historic dumping
- Litter

Contaminated whenua will need to be assessed as safe before any work can commence. Any plans for mitigation will depend on the contents of the contamination and where it can be mitigated on site.

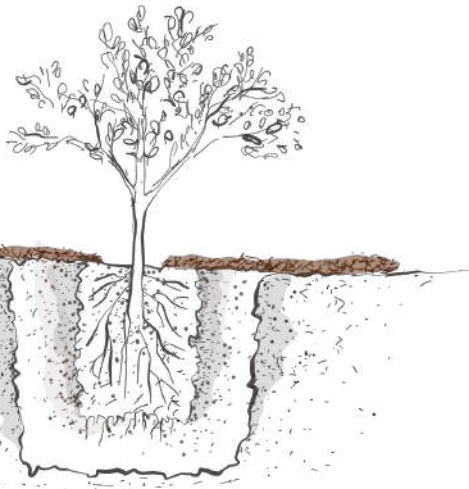
All waste must be removed prior to any planting. For illegally dumped rubbish (any rubbish dumped on public property) you can report this by calling 0800 NO DUMP (0800 663 867) to notify Auckland Council. Available 24 hours a day, seven days a week. Restoration site cleanups, these may be with active regular volunteers or part of a community clean up event.

For ongoing litter, carrying out monitoring is critical. [Litter Intelligence](#) is Aotearoa's first and only national litter monitoring programme, enabling communities to collect data, gain insights and take action to prevent litter. Currently the programme is operating in the coastal, freshwater and stormwater environments. This guide recommends utilising this programme to monitor for litter across Ngaa Hau o Maangere.

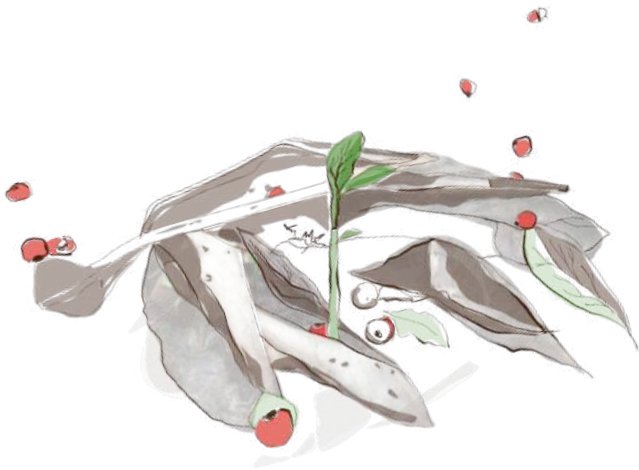
[ME Family Services](#) provides [community education](#) around waste and support to reduce and regenerate waste for Ngaa Hau o Maangere.

[Para Kore ki Taamaki](#) supports Maori communities across Auckland towards achieving zero waste.

PLANTING: NEW & EXISTING SITES



When planting, ensure plant is placed at correct height



Direct seeding

Plant placement / set-out

For restoration planting, planting should appear as natural as possible. When placing out plants consider eventual plant size and natural ngahere spatial patterns. Species may occur singularly and well spaced, or clustered in drifts (e.g. pukupuku). On site, plants are to be set out in accordance with the site plan which indicates plant zones, spacing, access and areas not to be planted. Any alterations to the plan decided on the day due to environmental changes such as flooding or slip erosion should be noted. Each site should be monitored and audited for quality of implementation and growth against the original site plans. Plant placement for landscape plantings should take into consideration the form the planting will take as it matures and how this needs to work with any site lines, accessways, and built elements such as cycleways.

Planting

Prepare the planting hole. Ensure there is sufficient space for the plant. Once the hole is prepared the compost needs to be added with the plant so that the plant is sitting close to the ground surface with compost just covering the potting mix so no roots are exposed. Allow room for mulch to be added on top of compost. Ensure mulch is placed away from the stem to prevent stem heating or rot.

Feeding at time of planting

For restoration planting plant feeding should occur at time of planting if sites are free draining and lack organic material as they are easily leached of nutrients. Use organic sheep pellets at a rate of one handful per plant. Avoid feeding species that prefer nutrient poor soils (e.g. rewarewa and kumarahou).

Enrichment planting

Enrichment planting is used to improve diversity towards creating a comprehensive living ecosystem. It can occur as soon as there is a protective receiving environment e.g. wind protection or canopy cover.

Direct seeding

Direct seeding is a method of enrichment planting generally used in areas with existing (or recently established) canopy cover. Sites for direct seeding require a leaf litter layer.

This technique is particularly suitable for areas:

- That are difficult to access for planting
- Where the understory is sparse
- Where digging holes would disturb the roots of surrounding mature native vegetation

Seeds are harvested with the same care and storage requirements as for nursery production. A mix of seeds can be developed to be cast at the same time. Intensive rat trapping or baiting must be undertaken in the two weeks prior to casting and two weeks post casting.

Advantages of direct seeding include reduced cost per unit, reduced material requirements, no nursery grow-on stages, and minimal transportation, handling or set-out costs.

While some seeds require inhibitors to be removed or their dormancy to be broken, they can then establish without the root disturbance suffered by nursery-grown plants. No feeding is required as nutrients are moderated by the leaf litter present. Species suited to direct seeding include those with tap roots, e.g. puuriri, karaka, kohekohe, rewarewa, niikau.

SITE CARE



Tree guard and living mulch

For planting across all takiwaa, site care is critical and includes control of returning weeds from seeding or regeneration, animal pest and disease control and monitoring plant health and feeding requirements. For full detail on plant and animal pest control and disease control see p. 86 - 99. For restoration planting, frequency of site care should be:

- Follow-up weeding for the first 1-2 years up to 4x per year
- Year 3 and 4 up to 2x per year
- Year 5 and 6 assess for weed regeneration or reinvasion and spot control of weeds prior to second stage infill planting

Tree guards

In restoration planting, tree guards provide protection from wind, frost, and the pulling out of plants by puukeko. They also reduce the amount of weeding required and make it easier to find plants. Install tree guards at time of planting for all plants less than 0.5m height at time of planting.

Mulch and compost

Top up compost annually for garden scale plantings. Sites that were mulched during site preparation may require mulching periodically as part of site care, e.g. annually.

Harvesting harakeke

When harvesting harakeke for raranga / whatu, always use a sharp knife and cut on the diagonal at the base of the puu harakeke, away from the rito and from top to bottom.



Harvesting for raranga / whatu

MONITORING

Environmental monitoring

Environmental monitoring is critical for any restoration planting. The purpose of monitoring is to determine the effectiveness of a restoration programme, to provide a measure of success in terms of restoration objectives and ecological gains. Monitoring the results of a restoration project over time allows for modifications and improvements of restoration approaches. For landscape planting, undertake monitoring of plant establishment and tree health. Goal setting should be included at the beginning of all monitoring programmes.

Coordination of monitoring programmes

Implementation and coordination of monitoring and data collection can be undertaken by kaitiaki, the community and Auckland Council.

Types of monitoring

Monitoring should be undertaken to collect biodiversity, wai, erosion, pest and waste data, as well as data about the impacts in the community (which can be measured using cultural health indicators). Planting across all takiwaa, not just restoration planting, can be monitored against cultural health indicators.

[Econet](#) is a monitoring system for all aspects of conservation projects currently under development. To use their CAMS weed app for monitoring widespread weeds and their management, contact EcoNet [here](#) with your details and where you are working.

Biodiversity

Plant establishment

Monitoring for plant survival provides an assessment of performance for all plantings across all planting typologies. Trees That Count offer an [open-sourced monitoring framework](#).

Record:

- Survival rates
- Plant growth/health and reasons for tree mortality
- Canopy closure
- Natural native regeneration (an indication of ecosystem stability)

Monitoring for specific species:

- Threatened plant species
- Culturally important plant species

Plant growth, overall site coverage and heights can be assessed by drone footage taken prior to planting and annually or bi-annually for the duration of the programme.

Aata maatakitaki

Phenology monitoring provides us with relevant local knowledge of seasonally recurring life cycle events, such as fruiting or flowering times. It can be undertaken from the third year following initial planting, especially for species such as maanuka and karamuu, but also for canopy species such as karaka and kahikatea. Phenology gives an indication of plant productivity and local seasonal maramataka. [iNaturalist NZ — Mātaki Taiao](#) is a platform to keep track of fruiting and flowering observations.

Manu - birds

Manu can be monitored by casual observation through 'citizen science' (i.e. five-minute bird count) and uploaded to [iNaturalist NZ — Mātaki Taiao](#) to determine bird presence during breeding seasons. Species names and numbers should be recorded, as well as location, date and time and variables such as weather conditions. A minimum of five bird counts for local key species are recommended annually, at each planting site. See Predator Free NZ for their [manu monitoring toolkit](#).

Ngaarara / mokomoko - lizards

Monitoring can occur two weeks prior to weed clearance and again at two year intervals over a ten year period. Record presence, density and distribution. Lizards are easily stressed. All handling or translocation of lizards requires a permit under the Wildlife Act. The spread of moko populations will occur naturally through connectivity of planting. See Predator Free NZ for their [ngaarara / mokomoko monitoring toolkit](#).

Pekapeka - bats

Pekapeka may be considered for monitoring. Simple visual counts can be undertaken at dusk during warm, fine nights from October to March. See Predator Free NZ for their [pekapeka monitoring toolkit](#).

Tangata

Cultural health indicators

- Reconnection of hapuu members with Ngaa Hau o Maangere cultural landscape
- Increase in materials for provision and waananga, and increase in accessibility of harvest sites.
- Enhance traditional ethnobotanical provision, including toi maaori and rongoaa species
- Adherence to protocols for sites of cultural significance (e.g. waahi tapu and archaeological sites)
- Increase in provision for mahinga kai
- Cultural competency of those undertaking restoration work from seed harvest to site care
- Employment potential and opportunities
- Environmental education and community engagement

Note: Cultural health indicators to be set by mana whenua.

Wai

Monitoring for water quality and all aspects of wai is an important aspect of monitoring that gives us clear indicators of ecosystem health, as well as an indicator of the ability to support mahinga kai. The guide recommends aligning any monitoring with existing systems in use by mana whenua and/or community.

Water observation systems under a maatauranga framework are in use by mana whenua, as well as grab sampling to check water quality under a Western science framework.

The Wai Care monitoring system is used by existing community awa education programmes. Data can be recorded on the Wai Care website which forms part of a public resource of data from citizen groups across Auckland region. Data can be retrieved and graphed for groups' own purposes.

Erosion

Erosion has a high impact on water quality and any erosion points could be monitored for extent. With planting, you are looking for a reduction of erosion over time. This monitoring can be undertaken through photographing the sites over time.

Pests

The guide recommends aligning monitoring of animal and plant pests with existing monitoring programmes.

Animal pests

Predator Free NZ has a [list](#) of animal pest monitoring programmes, resources and active groups. One of these is [trap.nz](#), a free and user-friendly resource for monitoring trapping and baiting of pests. Available through their website or as an app.

Plant pests

Plant pest monitoring should include invasive and noxious weed species presence, density, regeneration, and re-invasion, as well as early detection of new species.

Waste

For ongoing litter, carrying out monitoring is critical. [Litter Intelligence](#) is Aotearoa's first and only national litter monitoring programme, enabling communities to collect data, gain insights and take action to prevent litter. Currently the programme is operating in the coastal, freshwater and stormwater environments. This guide recommends utilising this programme to monitor for litter across Ngaa Hau o Maangere.

ENVIRONMENTAL PEST PLANTS

A weed is a plant growing where it is not wanted.

Impact of weeds

Weeds can reduce biodiversity as well as impact on native habitat structure by smothering or out-competing native species, preventing natural regeneration and reducing habitat for native fauna. They can also have adverse effects on people by causing allergies and health problems and by reducing amenity values in public and private spaces.

Two-thirds of environmental weeds in New Zealand have been deliberately introduced as ornamental plants and have escaped or been moved into native habitat. During the planning phase before planting, it is important to identify weed types and species. Sleeper weeds are those invasive plants that have naturalised in an area but haven't become an issue yet. Prioritise removal of sleeper weeds while populations are still small.

Weed identification

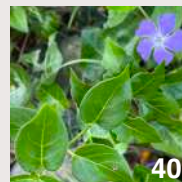
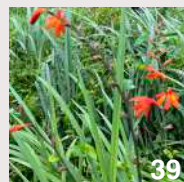
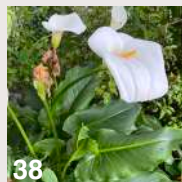
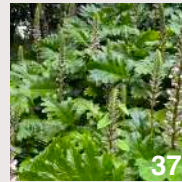
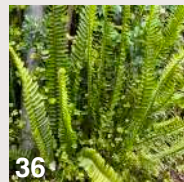
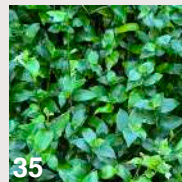
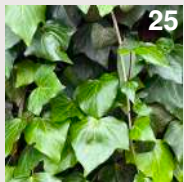
Weeds are classified according to the National Pest Plant Accord (NPPA). The NPPA is an agreement to prevent the sale, distribution and propagation of specified pest plants where either formal or casual. The horticultural trade is the most significant cause of weeds spreading in New Zealand.

Weeds such as Japanese honeysuckle, moth plant, convolvulus, blue morning glory, smilax, elaeagnus, climbing asparagus or blackberry all impact individual plants, populations and habitat by smothering. Other exotic species such as privet, woolly nightshade, rhamnus, Japanese spindle weed or hawthorn can displace native plants or interfere with native seed dispersal.



TREES & SHRUBS

- | | | | |
|------------------------|---------------------------|--------------------------|-----------------------|
| 1. Bamboo | 6. Cottonaster | 11. Tree privet | 16. Peppermint wattle |
| 2. Evergreen buckthorn | 7. Loquat | 12. Eleagnus | 17. Velvet groundsel |
| 3. Wattle | 8. Woolly nightshade | 13. Chinese privet | 18. Sweet pea shrub |
| 4. Wilding pine | 9. Close up of its flower | 14. Lilly pilly / acmena | 19. Prunus |
| 5. Wattle | 10. Boneseed | 15. Pheonix palm | 20. Lantana |



CLIMBERS

- 21. Mothplant flowers, pods
- 22. Blue morning glory
- 23. Japanese honey suckle
- 24. German ivy
- 25. Ivy
- 26. Climbing dock
- 27. Common jasmine
- 28. Convolvulus
- 29. Monstera
- 30. Maderia vine

GROUND COVERS

- 31. Pampas
- 32. Nasturtium
- 33. Agapanthus
- 34. Ginger
- 35. Tradescantia
- 36. Tuber ladder fern
- 37. Acanthus
- 38. Arum lily
- 39. Monbretia
- 40. Periwinkle

Resource for pest plant identification:
[Tiaki Taamaki Makaurau | Conservation Auckland:](#)
[Te kimi kiirearea | Pest search](#)

Weed management

Weed management method(s) will depend on the type of site, which ranges from restoration planting in open pasture sites or existing bush blocks, to landscape planting areas across private and community spaces. Note that spraying is not supported by community groups or mana whenua as a weed control method.

For landscape plantings

For landscape planting across the multiple typologies, small and low impact, vegetable and garden bed weeds are often confused with environmental weeds. For this guide we are only referring to environmental weeds and leaving the rest for the gardeners to decide about beneficial, edible and medicinal weeds and their management. All are suitable for the home compost and should not be removed for landfill. To avoid dumping weeds in landfill, look for on-site options for composting weeds or local community composting hubs.

Landscaping across private spaces can contribute to the overall well being of ngahere in Ngaa Hau o Maangere through the removal of environmental weeds often infesting backyards and fence lines, scrambling up trees and buildings and nestled within hedges. High priority garden weeds include mothplant, climbing asparagus, smilax, honeysuckle and jasmine. Weed trees include woolly nightshade, chinese privet, tree privet, elaeagnus, and cape honeysuckle. Groundcovers include pampas, ginger and tradescantia. Practices that can negatively impact public areas, parks and natural spaces include garden dumping of hedge trimmings, poor composting practice and poor disposal of weeds.

For restoration plantings

Open Pasture and Existing Bush Sites

For restoration and native landscape planting, the aim of weed management is to protect existing native vegetation and to maintain conditions for natural regeneration. This objective is supported by ongoing monitoring.

When planning weed control, important factors to take into account include resources of both time and money. Aim to reduce weeds below a point of impacting on the next stage of restoration planting. The aim of weed management is to protect and restore.

When planning, take into account the nearest weed source for reinvasion. Connecting planting sites and closing canopy cover reduces space for weeds to establish or to develop weed hot spots. Only clear and plant areas that can be scheduled and resourced for ongoing maintenance. In an effort to eliminate weeds on site, do not over clear which in turn can cause erosion, slips and exposed sediment to wash over cliffs.

Weed control in existing bush blocks & natural areas

Assessment of existing species density and frequency should be mapped before starting clearance. Once you have recorded what you started with, set goals to track what you want to achieve. The main two ways to combat weed works is species-led and site-led weed control.

Species-led weed control

For sites that have been assessed for weeds and where the following weeds are present:

- Weeds occurring in low density pockets that, if left for another season, are known to potentially have a high ecological or financial resource impact.
- Weeds found in Environmental Pest Plants (p. 92 - 96) e.g. mothplant, ginger, climbing asparagus.

This type of weed control requires moving across the site in a grid, doing a full clearance of the target weed species, and follow up monitoring for regenerating weed seedling occurrence.

Site-led weed control

For sites where most to all weeds present are reduced to the point of impacting on new plants to be established. Start with mapping out practical access points into the site and clear these areas first. If the sites have an upstream weed source, once access has been made work from the top of the stream down.

Large sites may require a combination of site-led and species-led weed clearance. For example, using site-led clearance specifically where planting will occur, along with species-led clearance across the entire site for high risk species prior to each area within the larger site coming on line for restoration planting.

Manual weed control

Manual weed control involves cutting down, grubbing or digging out of weeds to reduce organic living mass and allow compost direct to site. Manual control requires careful planning and seasonal observations in plant growth. Aim to control weeds before they fruit or set seed. Follow on maintenance includes reduction, hand pulling and grubbing out regenerating seedlings, as well as hand releasing of the planting site, of up to approximately one metre diameter around plants. Clear in stages and allow for the surrounding native vegetation to replace the weeds.

After planting, the use of mechanical weed control (weed-eaters/scrub bars) within restoration blocks should be avoided as the rate of trunk damage is often high. As well as this, the reduction of ground cover over summer months reduces moisture retention within the planting sites.

Those undertaking weed work will need adequate plant identification experience to avoid weeding out natives or cover crops. Understanding the reproduction and growth habits of weeds will prevent issues of unwanted regeneration (e.g. only seeds and roots of ginger need to be hot composted or broken down anaerobically to prevent regrowth).

Windrows

Windrows help to reduce erosion, enrich soils and keep lawn mowers out. Cut and stack weeds in rectangular blocks creating hot compost that returns nutrients to the planting blocks and allows habitat refuge for invertebrates and lizards. While new native habitats are establishing, windrows are a refuge

powerhouse for insects, lizards, butterflies, moths and fungi that would be lost if chemical control was used. These need to be big enough, with species such as honeysuckle that easily regenerate from fragments in the centre where enough heat is created to kill and break down any plant material. Build the windrows along the edge as a protective layer. As plant material rots down it will feed the site and create a nutrient-rich soil base to be planted into.

Organic mulch

Mulch made from wood chip processed on site can be applied to planting sites as an effective weed management method. Mulch made on site should sit for a period to break down before applying. This will give it the opportunity to heat and kill any unwanted weed seeds present, as well as feed the site post nitrogen consumption which occurs via the breaking down of organic matter. Organic material can break down to 10% of its original mass.

Living mulch

Interplanting or direct seeding with fast growing cover crops can help to reduce weed regeneration and to retain moisture over the first two growing seasons to aid native plant establishment. Living mulch includes native plants such as toetoe within the riparian zone that is shaded out later as larger natives establish shade cover. Direct seeding plants such as kaaramuramu or maapere can provide fast bird food, shade out unwanted weeds and will later be replaced by successional native species.

Weed matting

Weed matting is available in both complete ground cover or as individual tree surrounds. Plastic-based weed matting for complete ground cover should



Kikiyu hand released around newly planted harakeke



Windrow

be avoided where possible as it cuts off the ability of ground organisms to surface, which reduces biodiversity establishment. Individual tree surrounds do have a benefit in reducing competition from weeds, as it prevents germination of weed seeds and retains moisture around establishing roots. Only natural biodegradable materials should be used such as natural fibre carpet (in small amounts only, not as blanket cover), cardboard or coffee sacks to go under mulch, hessian or wool individual tree surrounds. For large scale planting this may be cost prohibitive, and using it for areas on a slope may result in material slumping next to the trunk on the top side. On windy sites it is advisable to peg matting down. Avoid all erosion control weed matting that has a plastic-backed thread for holding matting together.

Tree guards

Tree guards should be used at the time of planting to provide protection from wind, frost, and the pulling out of plants by puukeko.

Chemical weed control

This guide does not recommend the use of chemical weed control across any site, from the home garden to existing native bush blocks. However if chemical weed control is to be used, it should only be utilised for open pasture restoration sites.

Chemical control is often seen as the most cost effective, quick-fix control method, especially in vast or isolated areas where manual labour is difficult to carry out. While it is cheaper in the short-term to buy chemicals and have them applied by fewer but qualified growsafe-accredited handlers, the long-term ecological re-establishment rate of both native planting and native fauna return is often slower to achieve. Use of chemicals has to be weighed up against the health and wellbeing of the staff needing to handle and safely store such chemicals. The long-term impacts of chemical herbicides on beneficial native organisms are often overlooked for the short-term gain of mass clearance. The following outlines types of chemical control applications.

Foliage Spraying

Foliage spraying is the most harmful method of chemical control to both people and biodiversity. The most common form of chemical control used for low-cover weed growth. Spraying is either applied over the entire area or as spot spraying only. Foliage Spraying should be avoided.

Disadvantages to using foliage spraying:

- Damage to non-target plants is highly likely
- Increase in risk of accidents, injury and harm to persons using and storing chemicals

- Likely to have less volunteers and/or school groups wanting to be involved in chemically treated sites
- Takes longer for native biodiversity to re-establish and therefore increase on site

Before spraying consider the biodiversity impacts:

- How long will the herbicide stay in the soil after application?
- How close to the stream can be sprayed?
- Weather conditions on the day of and after application
- What type of chemical to use for the type of weeds you have
- Read the instructions and always follow all personal health and safety handling guidelines

Cut stump method

Cut stump method should only be used on selective species. This method is still a risk to people in the handling and application. It involves cutting the tree or shrub as low as possible back to a stump and immediately (within 5 minutes) painting with a herbicide before a new skin can seal the cut. Stump cutting leaves the root mass in the soil to aid with erosion control on the banks, as the roots rot out slowly and allow time for new plants to establish. This method uses less chemicals and is more targeted in use, but can leave areas open for weed seed germination.

Frilling

Frilling is the method of random cuts in tree trunks that are then painted with a herbicide so that it can be absorbed in active growth. Trees should not be ring barked as this reduces uptake and defeats

the purpose of absorption. Advantages include the reduced quantity of herbicide required and stopping trees from seeding straight away. The disadvantages are that it opens areas up for weed seed germination, and can cause overhanging branches dropping into streams which obstruct the flow.

Integrated management - manual and chemical weed control

If it is decided that chemical use is the preferred method of control for the time / resources available, to get a site ready to a manageable state prior to planting, a planned reduction of chemical use over time is strongly advised. Only in reducing the presence of chemicals and allowing for healing can ecological establishment happen. Finding a balance between the two methods can be assessed on a site by site basis depending on the weed types and density of weeds present.

First undertake manual weed control and stacking of tree material for insect invertebrate refuge and as a source of organic material to return to the planting site once tree material has broken down. Follow up with chemical spray control of secondary weed germination or persistent vine weeds from around the site (avoid windrow material). Once planted, reduce chemical use to manual control and reseed the planting site at canopy cover stage with the remaining log material from the original windrow.

ENVIRONMENTAL PEST PLANTS

Common name Botanical name	Type	Ideal growing conditions	Impact	Pest Management status	Regeneration type	Method of control. On site treatment. Key months to control. Health & safety.
GROUND COVERS/ SHRUBS						
Agapanthus <i>Agapanthus orientalis</i>	Ground cover rhizome	full sun dry	Displacement Prevents regeneration	sustained control	seed & rhizomes	Dig out. Undertake weeding before seed set. Dry or rot rhizomes in a water barrel. Monitor for seedlings.
Alligator weed <i>Alternanthera philoxeroides</i>	Ground cover creeper	full sun/ wet	Displacement/ prevents regeneration	NPPA, sustained control	stems & root fragments	Dig out and hot compost stems and roots.
Arum lily <i>Zantedeschia aethiopica</i>	Ground cover rhizome	sun/ semi shade / Damp	Displacement	NPPA, sustained control	seed & rhizomes	Dig out. Dry or rot rhizomes in water barrel. Total control. Monitor for seedlings. Poisonous.
Arum lily green goddess <i>Zantedeschia aethiopica</i>	Ground cover rhizome	sun/ semi shade / Damp	Displacement/ prevents regeneration	NPPA, sustained control	seed & rhizomes	Dig out. Dry or rot rhizomes in water barrel. Total control. Monitor for seedlings. Plants are poisonous.
Bamboo <i>Phyllostachys spp</i>	Ground cover grass	full sun / dry	Displacement/ prevents regeneration	sustained control	rhizomes	Cut and dig out, chip and mulch.
Bear's breeches <i>Acanthus mollis</i>	Ground cover	full sun semishade/dry	Displacement/ prevents regeneration		seeds & root fragments	Dig out and hot compost roots.
Chilean Rhubarb <i>Gunnera tinctoria</i>	rhizome	sun/ semi shade /damp	Displacement/ prevents regeneration	NPPA, sustained control	seed & rhizomes	Dig out and hot compost rhizomes. Plant has spines.
Elephants ear <i>Alocasia brisbanensis</i>	rhizome	sun/ semi shade /damp	Displacement/ prevents regeneration	sustained control	seed & rhizomes	Dig out and hot compost rhizomes. Plants are poisonous, may cause skin and eye irritation.
Fennel <i>Foeniculum vulgare</i>	Tall herb	Sun/ dry	Displacement/ prevents regeneration	-	seed	Pull or cut and mulch on site.
Giant reed <i>Arundo donax</i>	Giant grass	Sun/ dry / damp	Displacement/ prevents regeneration	NPPA, sustained control	seed, rhizomes & stems	Cut, dig out and hot compost stems and roots.
Inkweed <i>Phytolacca octandra</i>	shrub	Sun/ dry / damp	Displacement/ prevents regeneration	-	seed	Cut and leave in place for mulch. Plants are poisonous.
Italian arum <i>Arum italicum</i>	rhizome	semi shade damp	Displacement/ prevents regeneration	sustained control	seed & rhizomes	Dig out, hot compost rhizomes. Plants are poisonous.
Knotweed <i>Persicaria spp.</i>	Ground cover	semi shade / dry	Displacement/ prevents regeneration	sustained control	seed & stems	Dig out, hot compost stems and roots.
Monstera <i>Monstera deliciosa</i>	Ground cover scrambler	sun / semi shade	Displacement/ prevents regeneration	-	rhizomes	Dig out, hot compost rhizomes. Total control.
Montbretia <i>Crocsmia X crocosmiflora</i>	Bulb	full sun	Displacement/ prevents regeneration	sustained control	seeds, rhizomes & corms	Dig out and hot compost rhizomes & corms
Nasturtium <i>Tropaeolum majus</i>	Ground cover	full sun / shade	Displacement/ prevents regeneration	-	seeds	Peel back and mulch. Total control. Monitor for regeneration.

Common name Botanical name	Type	Ideal growing conditions	Impact	Pest Management status	Regeneration type	Method of control. On site treatment. Key months to control. Health & safety.
Nutgrass <i>Cyperus rotundus</i>	Sedge	ful sun / shade / damp	Displacement	sustained control	rhizomes	Dig out and hot compost rhizomes.
Palm grass <i>Setaria palmifolia</i>	Grass Grass	ful sun / shade / damp	Displacement/ prevents regeneration	sustained control	seed & rhizomes	Dig out and hot compost rhizomes.
Pampas <i>Cortaderia selloana</i>	Tall grass	full sun/ dry	Displacement/ prevents regeneration	NPPA, sustained control	seed	Dig out when small, cut & shade out when large. Mulch on site. Total control. Monitor for regrowth and regeneration.
Periwinkle <i>Vinca major</i>	Ground cover	semi shade / dry	Displacement/ prevents regeneration	sustained control	stems & rhizomes	Dig out. Hot compost stems & roots. Monitor for regrowth and spread.
Sharp rush <i>Juncus acutus</i>	Rush	full sun / damp - dry	Displacement/ prevents regeneration	sustained control	seed & rhizomes	Dig out and hot compost rhizomes.
Stinking iris <i>Iris foetidissima</i>	Bulb	sun/ semishade	Displacement/ prevents regeneration	-	seed & rhizomes	Dig out and hot compost rhizomes. Poisonous seeds.
Sweet pea shrub <i>Polygala myrtifolia</i>	Shrub	sun/ dry	Displacement/ prevents regeneration	NPPA, sustained control	seed	Dig out and mulch. Ongoing control.
Tuber ladder fern <i>Nephrolepis cordifolia</i>	Ground cover/ fern	sun/ semishade	Displacement/ prevents regeneration	NPPA, sustained control	tubers	Dig or pull out. Hot compost rhizomes.
Umbrella sedge <i>Cyperus eragrostis</i>	Rush	sun	Displacement	-	rhizomes, tubers	Dig out. Hot compost rhizomes.
Velvet groundsel <i>Roldana petasitis</i>	Shrub	sun/ semishade	Displacement/ prevents regeneration	sustained control	seed & stem layering	Cut and mulch on site. Poisonous if ingested. Handling may cause skin irritation.
Watsonia <i>Watsonia meriana</i>	Bulb	full sun	Displacement/ prevents regeneration	-	underground & aerial corns	Dig out and rot corms in water barrel.
Wild ginger <i>Hedychium gardnerianum</i>	Ground cover rhizome	semi shade/light wells / damp-dry	Displacement/ prevents regeneration	NPPA, sustained control	seed & rhizomes	Dig out and rot rhizomes in water barrel.
CLIMBERS/ VINES						
Banana passionfruit <i>Passiflora tripartita</i>	Climber	bush	Choking	NPPA, sustained control	seed & stem fragments	Cut & grub out roots. Remove seeds to containment off site if no practical treatment can be achieved in place.
Black-eyed Susan <i>Thunbergia alata</i>	Climber	over trees / hedges	Smothering/ displacement	-	seed & root fragments	Cut and grub out roots. Leave tops in trees to dry out.
Bindweed <i>Convolvulus spp.</i>	Climber	full sun/ damp new plantings	Choking	-	stem & rhizomes	Dig out. Rot all all parts in water barrel or remove from site. Level of control = containment.
Blackberry (wild) <i>Rubus fruticosus agg.</i>	Ground cover rambler	full sun/ damp pockets	Smothering/ displacement	sustained control	seed & rhizomes	Dig out. Rot roots & rhizomes in water barrel. Total control. Monitor for density. Plant has thorns.

Common name Botanical name	Type	Ideal growing conditions	Impact	Pest Management	Regeneration type	Method of control. On site treatment. Key months to control. Health & safety.
Blue morning glory <i>Pomoea indica</i>	Climber	full sun/ damp pockets	Smothering/ displacement	NPPA, sustained control	stem & root fragments	Cut & grub out roots, leave tops in trees to dry out.
Blue passion flower <i>Passiflora caerulea</i>	Climber	full sun/ damp pockets	Smothering/ displacement	NPPA, sustained control	seed & stem layering	Cut & grub out roots, leave tops in trees to dry out.
Cape ivy <i>Senecio angulatus</i>	Climber	Sun/ Semi shade / dry	Smothering/ displacement	sustained control	runners	Dig out. Hot compost all parts or remove from site.
Climbing asparagus <i>Asparagus scandens</i>	Climber	semi shade/ dry	Choking/ blocks light	NPPA, sustained control	seed & tubers	Dig out. Rot tubers and rhizomes in water barrell. Total control. Monitor for regeneration and seedlings.
Climbing dock <i>Rumex sagittatus</i>	Climber	semi shade/ dry / moist	Smothering / displacement	sustained control	seed, tubers & stem fragments	Dig out. Rot all parts in water barrell or remove from site. Monitor for density and regrowth
German ivy <i>Senecio mikanioides</i>	Climber	semi shade/ dry / moist	Choking	sustained control	seed/stem fragments	Dig out. Compost all parts. Monitor for regeneration and seedlings.
Great bindweed <i>Calystegia silvatica</i>	Climber	full sun dry	Choking	-	seed & rhizomes	Dig out. Rot rhizomes in water barrell.
Ivy <i>Hedera helix</i>	Climber/ ground cover	sun/ shade / dry	Choking	sustained control	seed & stem fragments	Cut/grub out roots. Remove if cannot be composted on site. Monitor regrowth. Poisonous.
Japanese honeysuckle <i>Lonicera japonica</i>	Climber/ ground cover	sun/ shade / dry	Smothering / blocks light	NPPA, sustained control	seed/stem fragments	Cut & grub out roots. Leave tops in trees to dry out.
Jasmine <i>Jasminum polyanthum</i>	Climber	sun/ shade / dry	Choking/ blocks light	sustained control	seed, suckers & stem fragments	Cut/grub out roots. Leave tops in trees to dry out. Hot compost. Monitor for removal if regenerates.
Madeira / Mignonette <i>Anredera cordifolia</i>	Climber	sun/ shade / dry	Choking/ blocks light	NPPA, sustained control	rhizomes, aerial & underground tubers	Cut & grub out roots. Leave tops in trees to dry out. Monitor for regrowth and seedlings.
Moth plant <i>Araujia hortorum</i>	Climber	shaded roots full sun tops / dry	Choking/ blocks light	NPPA, sustained control	seed	Cut/grub. Remove pods & treat. Monitor for regrowth. Poisonous sap. Skin irritant. Key months: Jan - March. C
Smilax <i>Asparagus asparagoides</i>	Climber ground cover	Semi shade / dry	Choking	NPPA, sustained control	seed & tubers	Dig out. Containment. Treat off site. Monitor/remove at first site. Follow up for regrowth. Key months: April to May.
TREES						
Black sheoak <i>Allocasuarina littoralis</i>	tree	full sun/ dry	Displacement	-	seed	Cut or pull. Chip and mulch on site.
Black wattle <i>Acacia mearnsii</i>	tree	full sun/ dry	Displacement	sustained control	seed	Cut or pull. Chip and mulch. Total control. Follow up. Monitor for regrowth.
Boneseed <i>Chrysanthemoides monilifera</i>	tree / shrub	full sun/ dry	Displacement	NPPA, sustained control	seed	Cut or pull. Mulch. Reduce. Monitor for regrowth and seedlings. Key months: February to March.

Common name Botanical name	Type	Ideal growing conditions	Impact	Pest Management status	Regeneration type	Method of control. On site treatment. Key months to control. Health & safety.
Brush wattle <i>Paraserianthes lophantha</i>	tree	full sun/ dry	Displacement	sustained control	seed & suckering	Cut or pull. Chip and mulch.
Camphor laurel <i>Cinnamomum camphora</i>	tree	full sun/ dry	Displacement	-	seed & suckering	Cut or pull and mulch on site.
Castor oil plant <i>Ricinus communis</i>	tree	full sun/ dry	Displacement	sustained control	seed & suckering	Cut & dig out roots and mulch on site. Poisonous seeds and flowers. Allergen.
Casuarina <i>Casuarina glauca</i>	tree	full sun/ dry	Displacement	-	seed	Cut or pull. Chip & mulch on site.
Cherry <i>Prunus spp.</i>	tree	starts in shade- full sun damp	Displacement	sustained control	seed	Cut or pull. Chip & mulch on site.
Chinese privet <i>Ligustrum sinense</i>	tree	full sun - semi shade/ damp - dry	Displacement	sustained control	seed	Cut,/pull, mulch on site. Poisonous berries/leaves. Monitor for seedlings. Avoid weed work when flowering from Nov.
Coral tree <i>Erythrina x sykesii</i>	tree	full sun/ damp-dry	Displacement	-	suckering & stem fragments	Always treat standing plants, do not cut down as all stems root profusely. All treatments best in late summer-autumn.
Cotoneaster <i>Cotoneaster glaucophyllus</i>	shrub	full sun / dry	Displacement	sustained control	seed	Cut or pull. Contain on site and monitor for regrowth.
Elaeagnus <i>Elaeagnus x reflexa</i>	shrub	sun/ shade/ damp - dry	Displacement/ smothering	sustained control	Seed, fragments, root suckers	Cut & paste stumps. Leave tops hanging in trees to dry out. Issue along awa and hedges
Evergreen buckthorn <i>Rhamnus alaternus</i>	shrub	semi shade - dry understory	Displacement	NPPA, sustained control	seed	Cut /pull, mulch on site. Total control. Monitor for regrowth and seedlings.
Feral olive <i>Olea europaea</i>	tree	full sun/ dry / issue on the maunga	Displacement	-	seed & suckering	Cut or pull and mulch on site.
Gorse <i>Ulex spp.</i>	shrub	full sun/ dry issue on the Maunga	Displacement	sustained control	seed	Cut or pull and mulch on site. Plant has spines.
Gum <i>Eucalyptus spp.</i>	tree	full sun/ dry	Displacement	-	seed	Cut or pull and mulch on site.
Honey locust <i>Gleditsia triacanthos</i>	tree	shade/ sun/ damp / moist	Displacement	-	seed	Cut or pull. Chip and mulch on site.
Illawarra flame tree <i>Brachychiton acerifolius</i>	T	full sun - Damp	Displacement		seed/ fragment	
Japanese spindle tree <i>Euonymus japonicus</i>	tree	shade/ sun/ damp / moist	Displacement	NPPA, sustained control	seed	Cut /pull, mulch on site. Total control. Monitor for regrowth/ regeneration. Poisonous berries and seeds.
Lantana <i>Lantana camara</i>	shrub	Full sun / dry	Displacement	progressive containment , NPPA	seed	Cut / pull, mulch on site. Total Control . Poisonous berries. Skin irritant. Monitor for regrowth and regeneration.

Common name Botanical name	Type	Ideal growing conditions	Impact	Pest Management status	Regeneration type	Method of control. On site treatment. Key months to control. Health & safety.
Loquat <i>Eriobotrya japonica</i>	tree	shade/ sun/ damp. sheltered	Displacement	-	seed	Cut or pull and mulch on site .
Monkey apple <i>Syzygium smithii</i>	tree	shade/ sun/ damp/ dry	Displacement	NPPA, sustained control	seed	Cut or pull out and mulch on site.
Moreton Bay fig <i>Ficus macrophylla</i>	tree	shade/ sun/ damp/ dry	Displacement	sustained control	seed	Cut or pull out and mulch on site.
Phoenix palm <i>Phoenix canariensis</i>	tree	full sun/ shade	Displacement	sustained control	seed	Cut or pull out and mulch on site. Plant has large spines.
Queen of the night <i>Cestrum nocturnum</i>	shrub	full sun/ shade/ dry	Displacement	NPPA, sustained control	seed & suckering	Dig out and hot compost all parts. Poisonous.
Silver wattle <i>Acacia dealbata</i>	tree	full sun/ shade/ dry	Displacement	-	seed & suckering	Cut or pull out and mulch on site.
Swan plant <i>Gomphocarpus physocarpus</i>	shrub	full sun/ shade/ dry	Displacement	-	seed	Cut or pull out and mulch on site. All parts poisonous.
Sydney golden wattle <i>Acacia longifolia</i>	tree	full sun/ shade/ dry	Displacement	sustained control	seed	Cut or pull out and mulch on site.
Taiwan cherry <i>Prunus campanulata</i>	tree	full sun/ shade/ dry	Displacement	sustained control	seed	Cut or pull out and mulch on site.
Tree privet <i>Ligustrum lucidum</i>	tree	full sun/ shade/ dry	Displacement	NPPA, sustained control	seed	Cut or pull out. Reduce. Monitor regrowth/regeneration. Key month: Nov. Berries and leaves poisonous. Allergen.
Wilding pine <i>Pinus radiata</i>	tree	full sun/ shade/ dry	Displacement	-	seed	Cut or pull out, chip and mulch on site.
Woolly nightshade <i>Solanum mauritianum</i>	tree	full sun/ dry	Displacement	NPPA, sustained control	seed	Cut or pull out and mulch on site. Monitor for regrowth/ seedlings. Key month: Nov. All parts poisonous. Skin irritant. TC
Cape honeysuckle <i>Tecomaria capensis</i>	shrub	sun/ shade	Chocking / displacement	-	stem layering	Cut & grub out roots. Remove stems if cannot be contained on site. Issue on the maunga.



Further information: [Tiaki Taamaki Makaurau](#) | [Conservation Auckland: Te kimi kiirearea](#) | [Pest search](#)

NATIVE PLANT DISEASES & FRUIT TREE PESTS



Kauri dieback impacts

Kauri dieback

Planted young kauri (*Agathis australis*) were noted within Ngaa Hau o Maangere and kauri dieback protocols should be followed. Symptoms of kauri dieback (*Phytophthora agathidicida*) are bleeds of gum (often globular), collar rot, yellowed leaves or canopy dieback. Any signs of infection should be reported to Auckland Council or Ministry for Primary Industries.

Kauri dieback protocols include the scrubbing of boots and applying trigene disinfectant before and after accessing the site. Phytosanitary kits must be present in all vehicles and prestart inspections of equipment and footwear undertaken by all staff.

See [Tiakina Kauri](#) for more helpful information.



Myrtle rust

Myrtle rust

Myrtle rust (*Austropuccinia psidii*) is a fungus which affects plant species in the Myrtaceae family such as poohutukawa, maanuka and kaanuka. These species are present in Ngaa Hau o Maangere and in the planting lists. The fungus commonly affects new growth and is visible as:

- Bright yellow powdery eruptions, initially on the underside of leaves
- Brown/grey rust pustules (older spores) on older lesions
- Grey spore growth on the underside of leaves

If you see these symptoms, don't touch it, take a photo of the whole plant, the affected leaf and a close-up of the spores and submit this to [iNaturalist](#).

If appropriate, remove the plant/plant material. See [Myrtle Rust in New Zealand](#) for a guide on removal.



Guava moth impacted feijoas

Guava moth

Guava moth / Te puureehua guava (*Coscinoptycha improbana*) key facts include:

- Small moth, 15mm wingspan
- Originally from Australia. First recorded in 1999. Found in Northland
- Caterpillar bores into fruit. Potential pest of fruit such as citrus, feijoa, guava and macadamia, destroying the crop.

Source: [Manaaki Whenua](#)

ENVIRONMENTAL ANIMAL PESTS

For the protection of ngahere across Ngaa Hau o Maangere, animal pest control is vital across all planting typologies. Introduced animal species can degrade native habitat by eating foliage, fruits and seeds, and through predation and competing with native animals for food. Steps include:

- Prepare an animal pest management strategy
- Identify which pests are a problem and what control methods should be used
- Consider health and safety as well as environmental impacts associated with pest control.

Target species are:

- Rats
- Feral Cats
- Hedgehogs
- Possums
- Exotic parrots
- Rabbits
- Mustelids

Before starting a pest control programme, each site within the project requires an assessment of:

- Which native plants and animals are present
- The amount of pests that are present and how many will need to be eradicated over what period of time to be effective
- Which type of monitoring to undertake to determine if pest control is effective
- Take into account any ripple effects that may result and how to minimise these.

Timing and duration of pest control will need to align with restoration objectives. If the objectives are

only to restore small forest bird populations, then rat control during breeding season should be adequate. If the objective is to have a biodiverse habitat with a full potential range of invertebrates and lizards, then year round control will be required.

A ripple effect example might be an increase in rat numbers when stoats are the primary focus of trapping. To reduce ripple effects, an integrated pest control programme to target both serious biodiversity pests and potential problem species needs to happen.

Pest control management plans need to be integrated and wide-coverage with community buy-in at commencement to be the most cost effective with high ecological outcomes.

Rats

The two main types of rats in New Zealand are the ship/black rats that are able to climb trees, and the Norway rats that are normally found near water. Ship rats are the most common, and both species are rapid breeders. Ship rats are able to breed all year round, having three to six litters of ten kits per year and can live in social groups of sixty.

Distributed throughout New Zealand forests, rats are the most frequent predator of small forest birds, seeds, invertebrates and lizards, making them key ecosystem disruptors. Ship rats undertake the most predation on tree dwelling birds. In comparison, the Norway rats are mainly ground dwelling and have the greatest impact on ground nesting species.

Rats have a small home range of 1ha, and this along with their high breeding rates means they can impact

heavily in a small area rapidly and re-infest a pest control area quickly. Monitoring and consistent baiting and trapping is important for effective control.

Timing for rat control is important and key to species being protected. For kereruu, a way of control would be to have low numbers before nesting started and then with numbers kept low until the chicks fledge. This would be early spring to late summer. To protect invertebrates and lizards, rats should be controlled year round. Rats also have higher activity on certain days of the maramataka, such as Tangaroa a kiokio.

Feral Cats

All cats are active hunters and able to kill insects, tuna, kooura, fish, lizards, birds, rabbits and rodents. During the day and night they can cover long distances quickly, with a 20km range for male cats and 500m for females with kittens.

Hedgehogs

Hedgehogs eat large numbers of insects and lizards and prey on eggs of ground-nesting birds. There is no specific control for hedgehogs but they are often a by-catch of other pest control traps.

Possums

Possums are able to devastate forests and those dwelling in it. They can disrupt ecological processes in a forest such as flowering, fruiting, seed dispersal and germination. Possums are known to heavily browse trees one at a time, killing a favoured food and moving on to the next. They have been caught

on film eating eggs and chicks along with a range of native invertebrates.

Habits include:

- Feeding at night and sleeping during the day
- Living in trees and they can move across open ground
- Often following the same track lines
- Home range is about 200m in forests with multiple nest sites
- Have favourite trees which will have heavy browsing and recognisable scratch marks
- They are curious about new objects which makes setting new bright traps an advantage

Possums don't tend to feed on wet nights and can't wait until there is fine weather. It is often good to check traps on the first fine night following a few nights of rain.

Possums have seasonal preferences. Traps or bait stations which can be moved to target seasonal food sources such as:

- Willow - popular budding in Oct - December
- Kareao, taraire, hinau, tawa - fruiting in May - August
- Tootara (fruit) and other podocarps late summer

Target fresh signs of possums present, such as run paths, browsing and scratch-marked trees.

Exotic Parrots

Exotic parrots that have been released and accidentally lost from captivity displace indigenous

parrots including kaakaa and kakariki. From September 1st 2022, the ringneck parakeet, rainbow lorikeet and monk parakeet species were banned from sale and breeding in Taamaki Makaurau. Anyone who sees an exotic parrot in the wild should report it to the Ministry for Primary Industries, their local regional Council or on the website inaturalist.nz.

Rabbits

Rabbits are a threat to new planting being established. Use tree guards to reduce damage to new planting.

Mustelids

Mustelids include weasels, stoats and ferrets. They are now some of the top predators in New Zealand ecosystems.

- Ferrets are the largest mustelid and weigh up to 1.5kg
- Ferrets are strictly nocturnal, while stoats and weasels also hunt during the day
- All are good swimmers
- They can prey on animals three times their body weight
- Breed rapidly in response to available food
- Food includes: rats, rabbits and mice along with birds, bird eggs, lizards and invertebrates
- Mustelids can't store fat and need to eat 1/3 of their body weight daily
- Stoats kill 95% of kiwi chicks
- Stoats kill several times a day
- They are good climbers and swimmers
- Young stoats disperse many kilometres from place of birth at the beginning of summer

Flexible and opportunistic in diet choice, if there is a change in availability to mustelids' normal food they will move on to other sources. When trapping rats, rabbits and mice, mustelids should be incorporated in pest control plans so as not to shift mustelids to native food sources.

In general they are difficult to trap. Setting lines will need to be calculated and pest programmes will need to occur over long periods to be effective.

MANA WHENUA & COMMUNITY CONNECTIONS

- Te Aakitai Waiohau
- Te Ahiwaru
- Makaurau Marae
- Tūpuna Maunga Authority
- ME Family Services
- Maangere Mountain Education Center
- Te Ara Rata Stream Team
- Papatuaanuku Kookiri Marae
- Old School Teaching Gardens
- Friends of The Farm, Maangere Bridge
- Maangere Connect
- Timebank Maangere
- Rep FM
- Maangere Bikefit
- Maangere Rotary
- Maangere Arts Center
- Te Pu-a-nga Maara
- Whenua Warrior
- Pest Free South Auckland
- Beautification Trust
- MAU Studio
- Pacific Vision Aotearoa
- Para Kore ki Taamaki
- Oke
- Sustainable Schools
- Sustainable Coastlines
- Whitebait Connection
- Sea Cleaners
- Maangere-Ootaahuhu Local Board
- Auckland Transport



The diagram above provides a snapshot of the different groups who are contributing to the regeneration of taiao in Ngaa Hau o Maangere, including those rooted in Ngaa Hau o Maangere and those further afield whose work touches down in this area.

DOCUMENTS CONSIDERED & FURTHER READING

- *Auckland's Urban Ngahere Strategy* (Auckland Council, (2019)
- *Māngere-Ōtāhuhu Local Board Ngahere Analysis Update* (Auckland Council, 2021)
- *Māngere-Ōtāhuhu Urban Ngahere Action Plan* (Auckland Council, 2021)
- *Tiaki Tāmaki Makaurau | Conservation Auckland* website (Auckland Council, 2023)
- *Indigenous Terrestrial and Wetland Ecosystems of Auckland* (Auckland Council, 2017)
- *Planting for Pollination: Native Plant Species Guide* (Auckland Council)
- *New Zealand Rushes: Juncus factsheets* (NIWA, 2016)
- *Bioretention devices* (Manaaki Whenua | Landcare Research)
- *Te Reo o Te Repo* (Manaaki Whenua | Landcare Research, 2017)
- *Landscape and Ecology Values within Stormwater Management* (Auckland Regional Council, 2010)
- *Wetlands facts 02* (Auckland Council)
- *Pest animal control guidelines for the Auckland region* (Auckland Council, 2022)
- *Hikina te Wero: Environmental Action Plan 2020-2030* (Auckland Transport, 2021)
- *Urban Street and Road Design Guide* (Auckland Transport, 2022)

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P. 9 right: Auckland Libraries Heritage Collections. Map by Dr Ferdinand von Hochstetter

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P. 10 middle: Auckland Council. Photo by Alistair Jamieson

P. 10 right: Manukau City Council. Photo by Alistair Jamieson

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