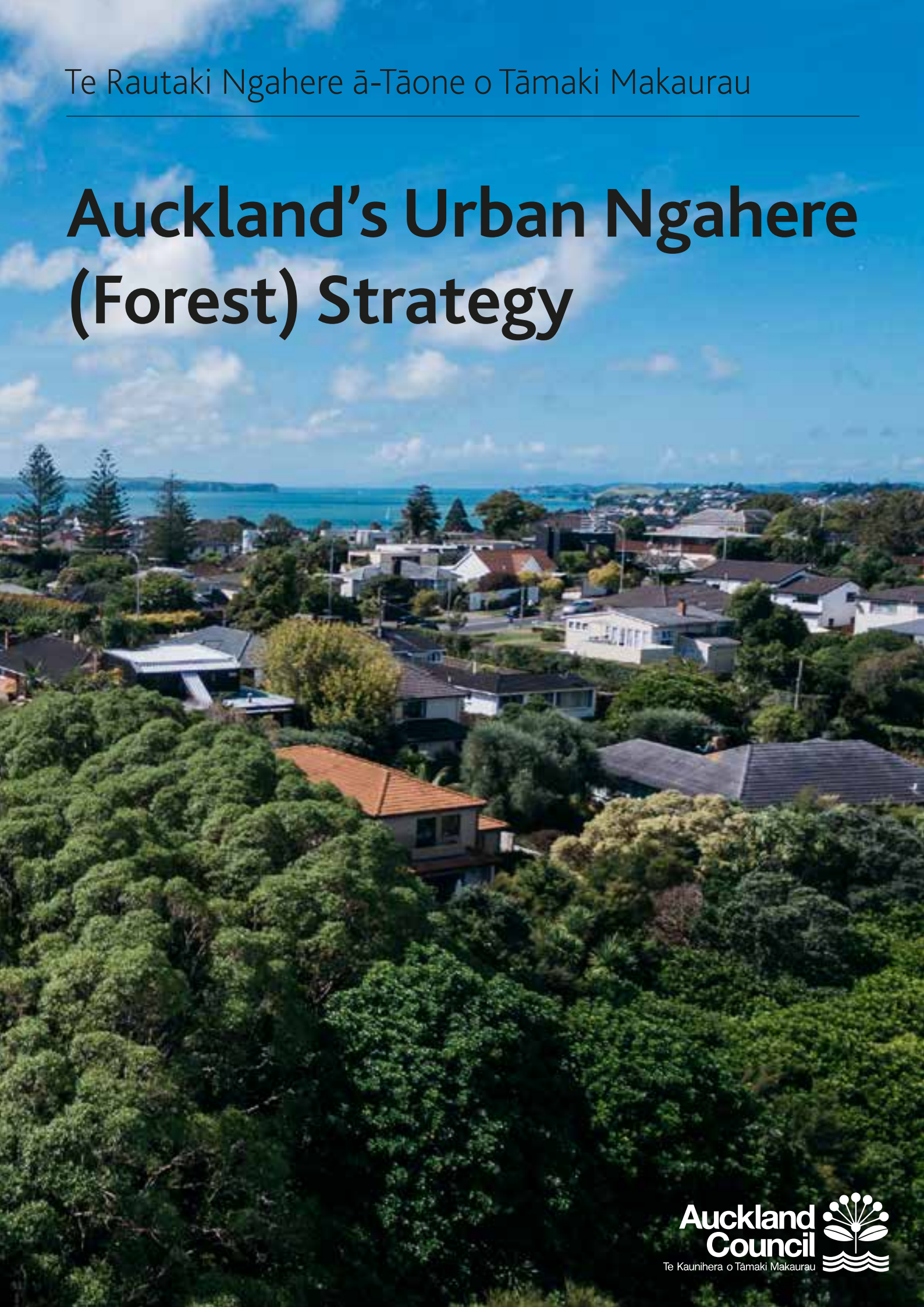
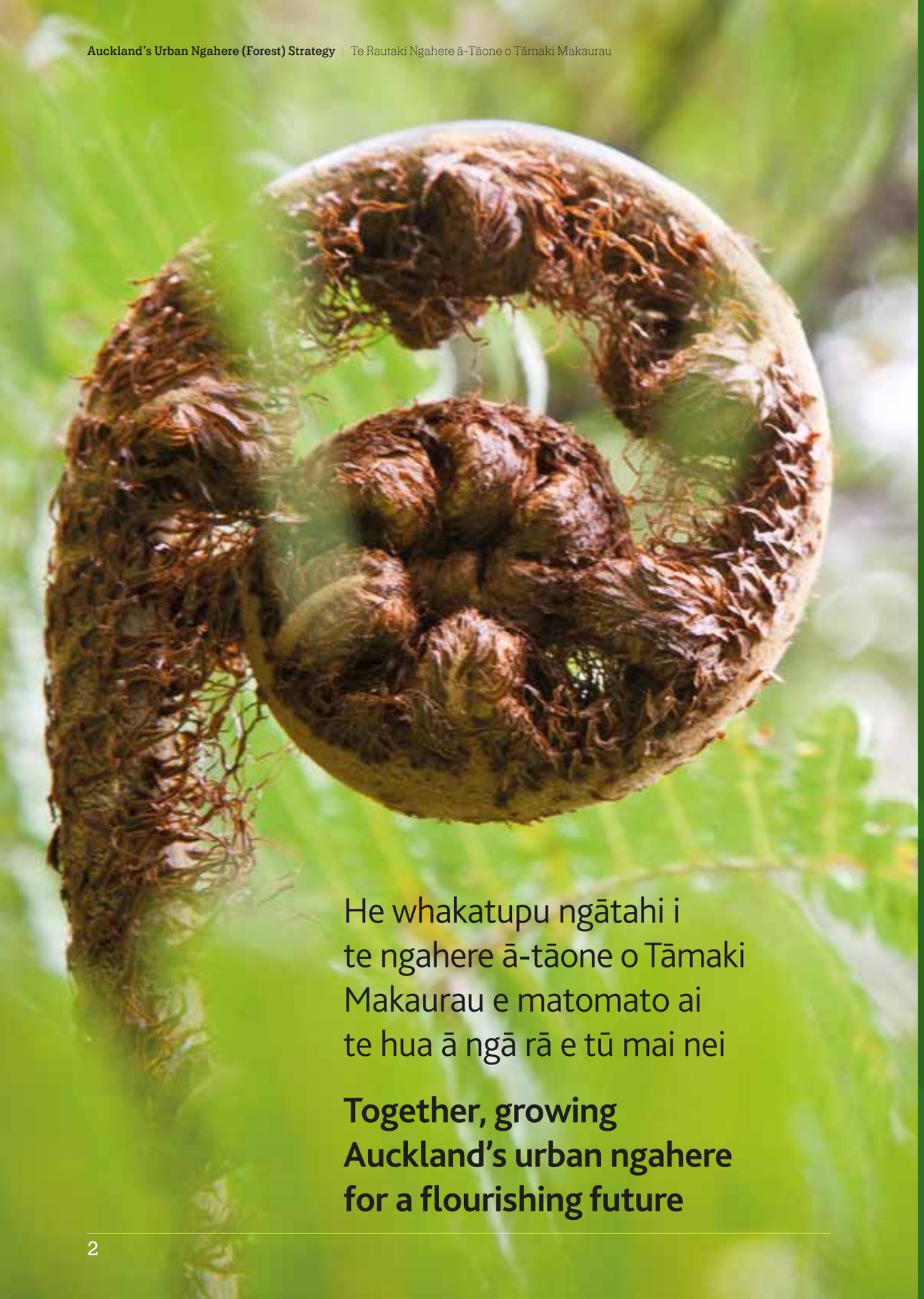
Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Auckland's Urban Ngahere (Forest) Strategy



Auckland Council
Te Kaunihera o Tāmaki Makaurau



He whakatupu ngātahi i
te ngahere ā-tāone o Tāmaki
Makaurau e matomato ai
te hua ā ngā rā e tū mai nei

**Together, growing
Auckland's urban ngahere
for a flourishing future**

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

He Mihi

Nau mai e te hā o Tāne,
Whakatau mai e te oranga o Tāne.

Tīkina mai te ate rahirahi
o te Tāone nui o Tāmaki Makaurau
hei whakaniko anō ai i te whenua tapu;
ko tō whaea, ko Papatūānuku.

Kia toro ake ōna hua me ōna pai
kia tauawhia e tō matua
e Rangi-nui e tū iho nei,
kia rongohia anō te tīhau a ngā manu,
me te kētete a ngā pēpeke.

Kia wawara anō te reo o ngā rākau
kua roa e ngū ana
ki te wao kōhatu e tāwharau nei
i ngā maunga tapu o tō whenua taketake.

Tane-o-te-waiora,

Tāne-whakapiripiri,

Tāne-nui-a-rangi,
tukua mai anō tō ihi,
tukua mai anō tō mana.

Māu e kitea anō ai
he awa para-kore e rere ana,
he hau mā e kōrewarewa ana,
he taiao hauora e takoto ana.

Kia hipokina anō e tō korowai kākāriki te tāone nui
kia whiwhi ko mātou,
kia whiwhi te ao katoa.

Tāne let your breath pervade all,
may your life-essence be ever-present.

Reclaim the very heart
of Auckland city
and adorn once again the hallowed ground;
that is your mother, Papatūānuku.

May all that is fruitful and good
reach skyward to the embrace of your father
Rangi-nui on high
so the chorus of birds may be heard again,
and the splendid symphony of insects in response.

Bring with you the sounds of rustling trees
that have long stood silent
to this concrete jungle that bounds
the sacred mountains of your primal domain.

Tāne-purveyor of life,

Tāne-provider-of-shelter,

Tāne-source-of-all-knowledge,
bestow us again with your wonder,
and grace us with your prestige.

By you, we will again realise
fresh waterways,
pure air,
and a healthier environment.

Garb the city with your verdant cloak
that we, your heirs might benefit,
and so too, the whole world.

Te Pumanawa Square, Westgate.

Kupu whakataki
Foreword

A healthy urban ngahere (forest) enriches our communities, our local economies and our natural environment. Auckland cannot become a world-class city without one.

Whether you are from Takanini or Takapuna, Herne Bay or Henderson, trees and vegetation are valuable to all of us. They clean our air and stormwater, cool and beautify our urban spaces and bring nature to our doorsteps. Developed in partnership with tangata whenua, the strategy gives voice to an important role trees play in the mauri of the land. They provide a wide range of measurable benefits that make our lives healthier, happier and more gratifying.

How can we protect what we value in the face of a growing and urbanising population, rising inequality, and the major impacts of invasive pests and climate change? How do we maintain and enhance the richness that our urban ngahere provides? How do we align our efforts?

This is precisely why we have developed a strategy for Auckland's urban ngahere. It delivers on the vision for our future Auckland, ensuring each one of us – and future Aucklanders – have access to the tangible benefits provided by a vibrant, green city.

The strategy ensures that when Auckland Council, corporate partners, community groups and each one of us plants or maintains a tree, our collective efforts truly add up to something – contributing towards increasing our average canopy cover from 18 to 30 per cent. Likewise, the strategy helps target our efforts to grow the urban ngahere where it's scarce – as in parts of South Auckland – so that all local board areas have at least 15 per cent canopy cover.

This strategy provides an overarching vision and 18 high level actions under three main themes, Knowing, Growing and Protecting but doesn't provide all the answers or deliver the vision. We will need to work with each of you and across all local boards to tailor specific and unique approaches to implementation that respond to the local context, harnessing and building local talents, partnerships and resources along the way.

I invite you to join me. Let's work together to grow, protect and maintain our valuable urban ngahere for a greener and greater Auckland for all of us.

Councillor Penny Hulse
Chair, Environment and Community Committee

Kei te puku
Contents

1. A strategic plan for Auckland's urban ngahere (forest) 8

1.1. What is Auckland's urban ngahere? 10
1.2. Benefits of Auckland's urban ngahere 14
1.3. Current policy context for our urban ngahere 20

2. Current status of our urban ngahere 22

2.1. Distribution of canopy cover 23
2.2. Height distribution 28
2.3. Level of protection 30

3. Current and future pressures 32

3.1. A growing population and urban intensification 33
3.2. Climate change 35
3.3. Pressure on water infrastructure 36
3.4. Pests and diseases 37

4. Strategic framework 38

4.1. Vision 41
4.2. Objectives 42
4.3. Mechanisms 42
4.4. Principles 44

5. Strategy outcomes 50

5.1. Knowing outcomes 51
5.2. Growing outcomes 53
5.3. Protecting outcomes 54
5.4. Mechanism outcomes 55

6. Implementation framework 56

6.1. Urban ngahere strategy collaboration 57
6.2. Funding and partnerships 58
6.3. Area specific implementation 58
6.4. High level actions 59

7. References 62

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Tagata Way, Māngere.

Wynyard Quarter – creating a liveable neighbourhood.

1

He mahere rautaki mō te ngahere ā-tāone o Tāmaki Makaurau

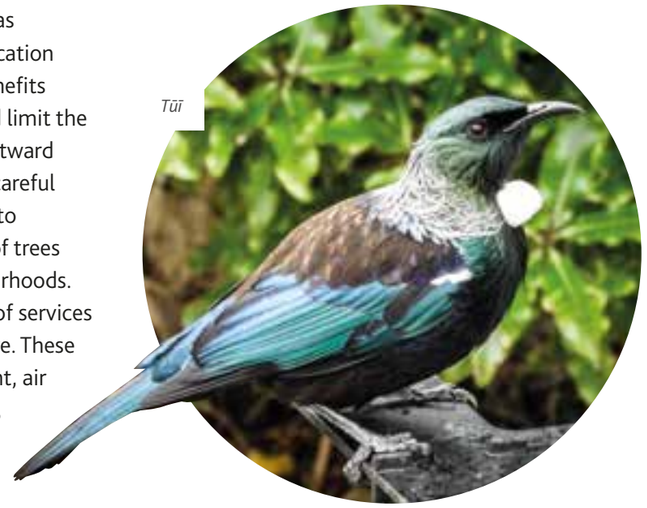
A strategic plan for Auckland's urban ngahere (forest)

When Tāne went to the heavens – so the story goes – he was enraptured by the tūī that lived in his brother Rehua's hair. Tāne desperately wanted to bring the tūī back to earth but he was told he must first plant trees to provide food. So Tāne introduced trees to our world and, three years later when the kahikatea blossomed, Tāne's wish came true. The tūī came to live with him.

When it comes to trees, the message is much the same. If we plant trees now, in time, we create value for our communities. We might even hear the dawn chorus – e kō i te ata – once again within urban Auckland.

Auckland is growing and changing rapidly. To accommodate this, Auckland Council has committed to a strategy of urban intensification to increase housing density, deliver the benefits associated with a compact urban form and limit the negative impacts linked with continued outward growth. Successful development requires careful planning; intensification and growth need to complement the protection and planting of trees and vegetation to create liveable neighbourhoods. Trees and vegetation also provide a range of services required for Auckland to function and thrive. These include enhanced stormwater management, air pollution removal, improved water quality, cooling to reduce the urban heat island effect, and ecological corridors to connect habitats and improve biodiversity.

Our urban ngahere faces a number of pressures. Alongside the need for urban development, amendments to the Resource Management Act (RMA) came into effect in 2015, lifting blanket tree protection in urban areas. As a result, the vast majority of trees on private urban properties are no longer protected. Threats from pests and diseases, as well as the impacts of climate change are further challenges. If we want to continue to benefit from the services provided by our urban ngahere it is essential that we better understand its status and value and plan to protect and grow it. Our urban ngahere has the mauri (life force) to care for us but needs our help to be sustainable and healthy.



Tūī

1.1 He aha te ngahere ā-tāone o Tāmaki Mākaurau? What is Auckland's urban ngahere?

Auckland's urban ngahere is the realm of Te Waonui o Tāne (the forest domain of Tāne Mahuta) and consists of the network of all trees, other vegetation and green roofs – both native and introduced – in existing and future urban areas.

It's important to recognise the urban ngahere as more than just trees and vegetation. Urban ngahere captures the interconnected whakapapa (genealogy) of all living things to the wider ecosystem. It consists of a complex network weaving through public and private land, and includes the water, soil, air and sunlight that support it. It also involves people, wildlife and the built environment – all of which impact upon, or are impacted by, the urban ngahere. The urban ngahere has its own mauri (life force) but also depends upon a range of conditions and relationships to support its health, growth and survival.

Auckland's urban ngahere is diverse; it includes trees and vegetation in road corridors, parks and open spaces, natural stormwater assets, community gardens, living walls, green roofs and trees and vegetation in the gardens of private properties. The urban ngahere, like the pōhutukawa fringing Auckland's coastline, is an important part of Auckland's identity and natural heritage and shapes the fabric of the landscape. Trees also help distinguish our heritage places and areas, such as Albert, Western and Myers Parks, early cemeteries, for example, Symonds Street and Waikumete, and the settings of properties, including Monte Cecilia and Alberton. In addition, Auckland's scheduled character areas often feature memorial plantings and early street plantings.

Manukau Square

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Auckland's urban ngahere – the view towards Mount Albert from Mount Eden / Maungawhau.

Examples of Auckland's urban ngahere:

Parks and open space

Potters Park, Mt Eden

Orewa Beach

Street trees and road corridors

Franklin Road, Ponsonby

Federal Street shared space

Private gardens

Island Bay, Birkdale

Blockhouse Bay

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Native forest

Native forest

Tī Kōuka / Cabbage tree

Kererū / New Zealand pigeon

Natural stormwater assets

Te Auaunga Awa / Oakley Creek

Rain garden, Wynyard Quarter

Green roofs and living walls

The University of Auckland green roof

Green roof images sourced from:
Zoë Avery from Living Roofs Aotearoa, www.livingroofs.org.nz

Private residential green roof

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

1.2 Ngā painga o te ngahere ā-tāone o Tāmaki Makaurau
Benefits of Auckland's urban ngahere

The range of social, environmental, economic and cultural benefits that urban trees deliver is well-documented, with cities increasingly recognising the financial value of the services they provide. The USDA Forest Service estimated that trees in New York City provide US$5.60 in benefits for every US$1 spent on tree planting and care.[1] Growing and protecting our urban ngahere is essential to maintain and enhance the broad range of services it provides:

Social

- Improve health and wellbeing
- Reduce the urban heat island effect
- Provide shade
- Enhance visual amenity

Environmental

- Enhance biodiversity
- Improve air quality
- Carbon sequestration
- Improve water quality

Economic

- Increase property values
- Reduce flood risk
- Reduce energy costs
- Reduce healthcare costs

Cultural

- Support education
- Local food growing
- Sustain and enhance mauri
- Cultural heritage

Social

Improve health and wellbeing

Research has shown that access to trees and nature can reduce stress, improve mental health and promote wellbeing[2] whilst tree lined streets have been shown to encourage walking.

Reduce the urban heat island effect

The cooling effect of trees, as a result of evapotranspiration, reduces the urban heat island effect[3] and enhances Auckland's resilience to an increasing number of hot days (>25°C), one of the projected impacts of climate change.

Provide shade

Trees shading school grounds, playgrounds, public spaces, and cycling and walking routes provide relief from the sun and protect people from harmful ultraviolet (UV) radiation, in turn reducing the risk of heat stroke, sunburn and melanoma.

Enhance visual amenity

Trees can visually enhance a street, the character of an area and foster neighbourhood pride. They add beauty, soften harsh urban environments and screen unsightly views.

Environmental

Enhance biodiversity

A healthy urban ngahere enriches biodiversity and provides opportunities for connected habitats that support wildlife.

Improve water quality

Trees intercept rainwater and reduce the amount of pollutants being washed from hard surfaces into the stormwater system and watercourses. Increasing canopy cover will also contribute towards fewer storm water overflows from our combined sewer/stormwater systems and therefore lower levels of water pollution in our harbours and streams.

Carbon sequestration

Trees reduce carbon dioxide (CO_2) in the atmosphere through sequestering carbon in new growth. One tonne of carbon stored in wood is equivalent to removing 3.67 tonnes of CO_2 from the atmosphere.

Improve air quality

Trees improve air quality by removing air pollutants, such as particulate matter, and absorb gases harmful to human health. A 2006 study estimated that Auckland's urban trees remove 1320 tonnes of particulates, 1230 tonnes of nitrogen dioxide and 1990 tonnes of ozone.[4]

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Economic

Reduce healthcare costs

Improving air quality and enhancing health and wellbeing will reduce the need for healthcare and associated costs.

Reduce flood risk

An increase in canopy cover would intercept an increased volume of rainwater; reducing and slowing urban runoff and placing less pressure on stormwater systems. International studies show that trees intercept 15 to 27 per cent of the annual rainfall that falls upon their canopy, depending on a tree's species and architecture.[5]

Increase property values

Studies have shown that mature street trees increase residential property values and attract buyers and tenants.

Reduce energy costs

Well-positioned trees provide shade and reduce cooling requirements and associated energy costs in buildings.

Cultural

Support education

Tree nurseries and planting projects promote environmental awareness and provide opportunities to encourage and facilitate learning.

Cultural heritage

The cultural benefits of Auckland's urban ngahere are diverse and priceless. Native forest is important to mātauranga Māori (knowledge and understanding), and trees create a cultural connection to place and history.

Sustain and enhance mauri

Mauri is a life force derived from whakapapa (genealogical connections and links to ecosystems), an essential element sustaining all forms of life. Mauri provides life and energy to all living things, including our urban ngahere, and is the binding force that links the physical to the spiritual worlds.[6] Mauri can be harmed if the life-supporting capacity and ecosystem health of our urban ngahere is diminished. Protecting and growing our urban ngahere will sustain and enhance its mauri.

Local food growing

Planting fruit trees and establishing community orchards provides people with access to fresh fruit. Maintaining and harvesting fruit trees can connect and strengthen communities.

Native forest

The cultural significance of Auckland's urban ngahere

The urban ngahere is an important part of Tāmaki Makaurau / Auckland's cultural heritage. Remnants of native forest represent traditional supermarkets (kai o te ngahere), learning centres (wānanga o te ngahere), the medicine cabinet (kapata rongoā), schools (kura o te ngahere) and spiritual domain (wairua o te ngahere).[7] Trees also represent landing places of waka (canoe) and birth whenua (to Māori, it is customary to bury the whenua or placenta in the earth, returning it to the land).

Many of Auckland's trees provide a visible reference to the city's history and development. European settlers planted London plane trees along streets in the 1860s which have now grown to create grand tree-lined avenues in the city centre and the adjoining suburbs of Ponsonby, Freemans Bay and Grey Lynn. Bishop Selwyn, New Zealand's first Anglican Bishop, is reported to have brought hundreds of Norfolk Island pine seedlings to Auckland in 1858-60. Many of the mature Norfolk Island pines now in Auckland, such as those at Mission Bay, are likely to have been grown from these seedlings.[8]

London Plane trees on Greys Avenue in 1904.
Sir George Grey Special Collections, Auckland Libraries. 1-W1170 (Henry Winkelmann).

Greys Avenue 2017

1.3 Te horopaki ā-kaupapa here mō ā tātou ngahere ā-tāone ināia tonu nei
Current policy context for our urban ngahere

Auckland's plans and polices recognise and reference the value of trees and vegetation to varying degrees but do not provide a clear framework for the management of Auckland's urban ngahere. A range of plans and polices influence our urban ngahere (Figure 1) – explicitly and implicitly – yet urban ngahere objectives are only incidental to other considerations, such as green growth, climate change, indigenous biodiversity, and encouraging sport and recreation. In the past, this contributed to a situation in which Auckland's urban ngahere was managed and maintained through piecemeal initiatives rather than in a strategic and holistic way. This strategy consolidates and builds upon existing directives that support our urban ngahere and sets out a clear framework to protect and grow Auckland's urban ngahere for a flourishing future.

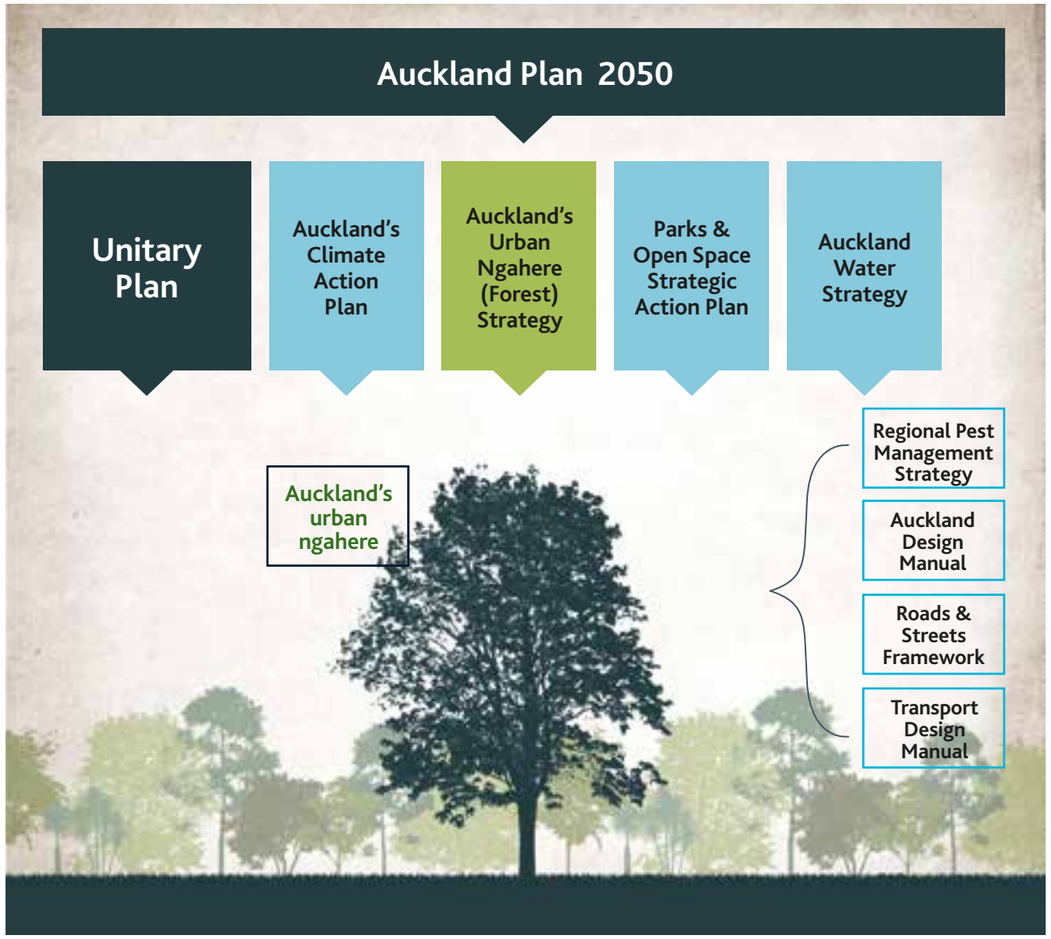
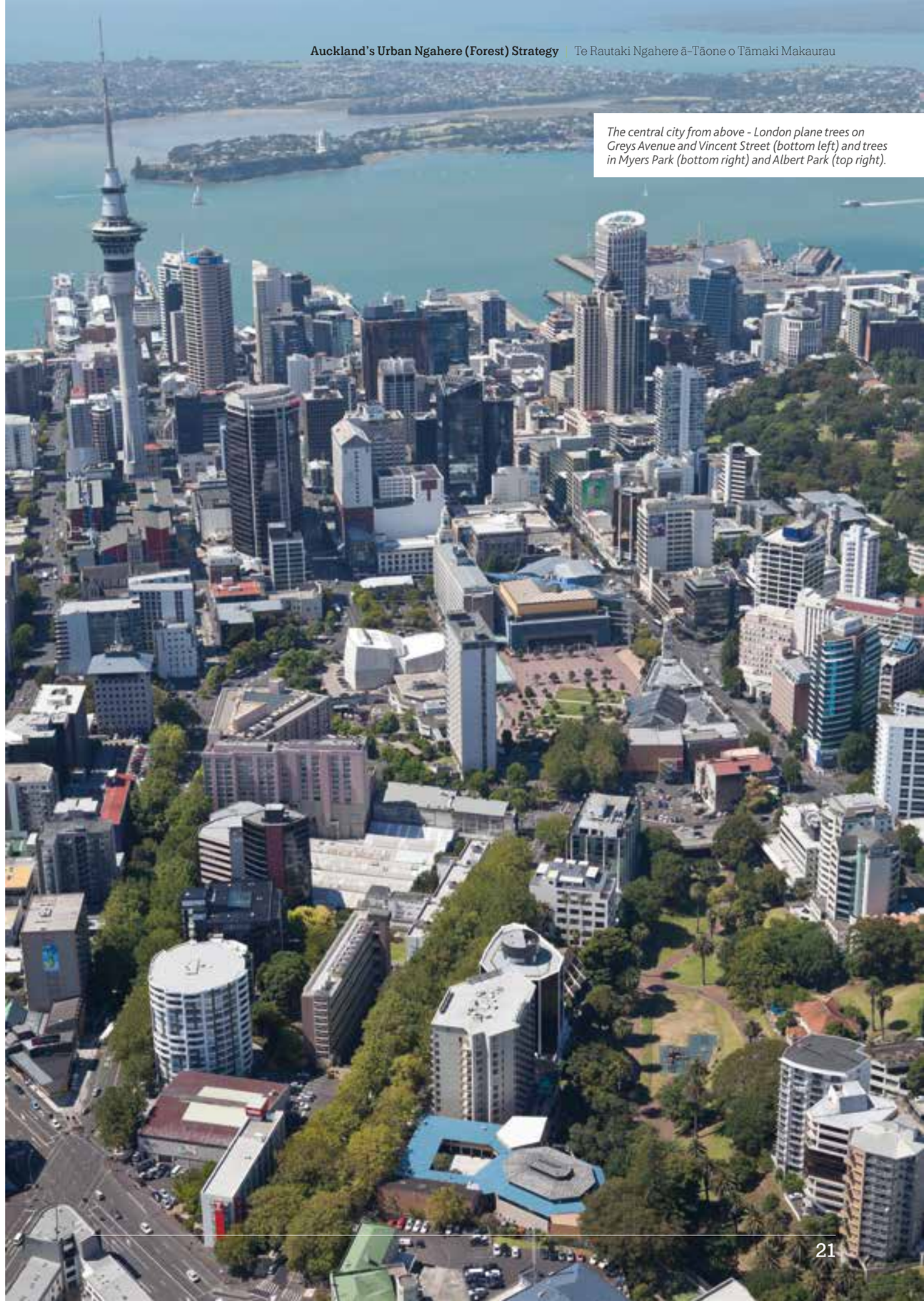


Figure 1 – Key plans, strategies and guidance documents that influence Auckland's urban ngahere



The central city from above - London plane trees on Greys Avenue and Vincent Street (bottom left) and trees in Myers Park (bottom right) and Albert Park (top right).

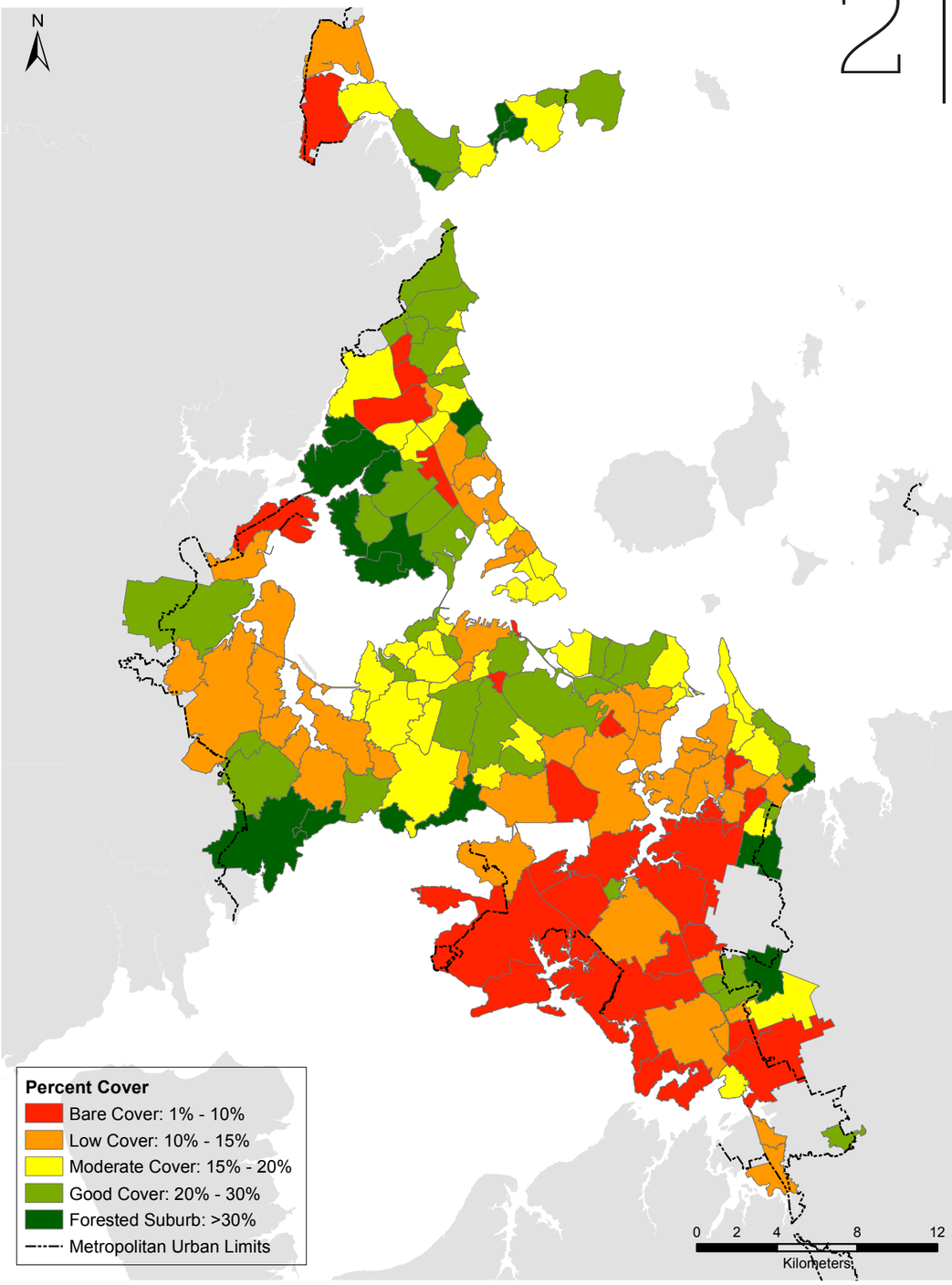


Figure 2 – Average percentage canopy cover of urban ngahere (3m+ height) in Auckland suburbs – based on analysis of the 2013 LiDAR survey.

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

2 | Te tūranga a ō tātou ngahere ā-tāone ināia tonu nei
Current status of our urban ngahere

2.1 | Te hora o te uhinga rākau
Distribution of canopy cover

Analysis of data from the 2013 LiDAR survey found that Auckland's urban area has just over 18 per cent canopy cover, with 10,130 hectares of canopy cover belonging to trees over three metres tall. This varied across different land types, with urban ngahere on 11 per cent of Auckland's road area, 24 per cent of public land, and 18 per cent of private land.

Figure 2 illustrates that Auckland's urban ngahere is distributed unequally throughout the city, with lower levels of canopy cover in southern suburbs, and relatively high canopy cover in northern and western parts of the city. Auckland's three leafiest suburbs are Titirangi, which adjoins the Waitakere Ranges (68 per cent canopy cover), Wade Heads (57 per cent) and Chatswood (55 per cent), where historically the landform was unsuitable for development. Unequal canopy cover distribution is particularly apparent at a local board area level (see Figure 3). The local boards with the lowest canopy cover are Māngere-Ōtāhuhu (eight per cent) and Ōtara-Papatoetoe (nine per cent). The local board with the highest canopy cover is Kaipātiki with 30 per cent canopy cover, two-thirds of which is in public open spaces.

The majority of Auckland's urban ngahere – 61 per cent – is located on privately-owned land. The remaining 39 per cent is on public land, with seven per cent on Auckland Council parkland, nine per cent on road corridors, and 23 per cent on other public land, such as schools (see Figure 4).

What is LiDAR?

LiDAR (Light Detection and Ranging) is used to examine the surface of the Earth through collecting data from a survey aircraft. It measures scattered light to find a range and other information on a distant target. The range to the target is measured using the time delay between transmission of a pulse and detection of a reflected signal. This technology allows for the direct measurement of three-dimensional features and structures and the underlying terrain. The ability to measure the height of features on the ground or above the ground is the principle advantage over conventional optical remote sensing technologies such as aerial imagery.

LiDAR data itself does not provide information on the status of Auckland's urban ngahere, further analysis of the data is required to create a tree canopy layer and quantify the distribution and height of the urban ngahere.

An aerial view of unequal canopy cover

Māngere, 2017

Mount Eden, 2017

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

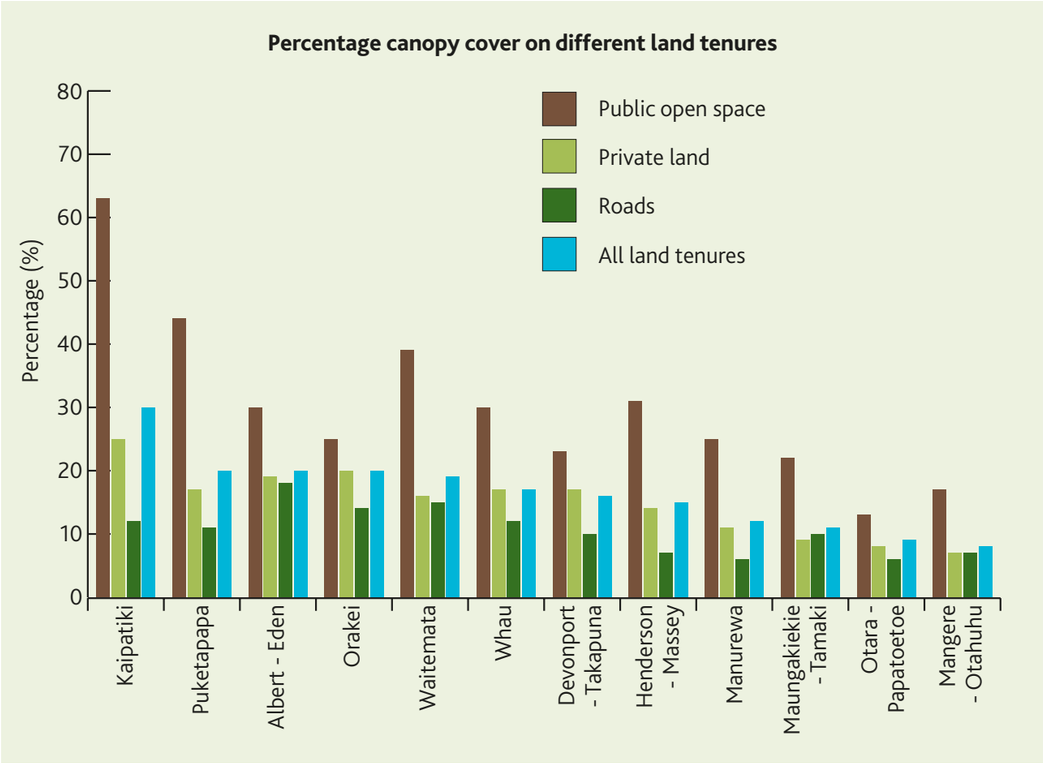


Figure 3 - canopy cover on different land tenures by local board area.

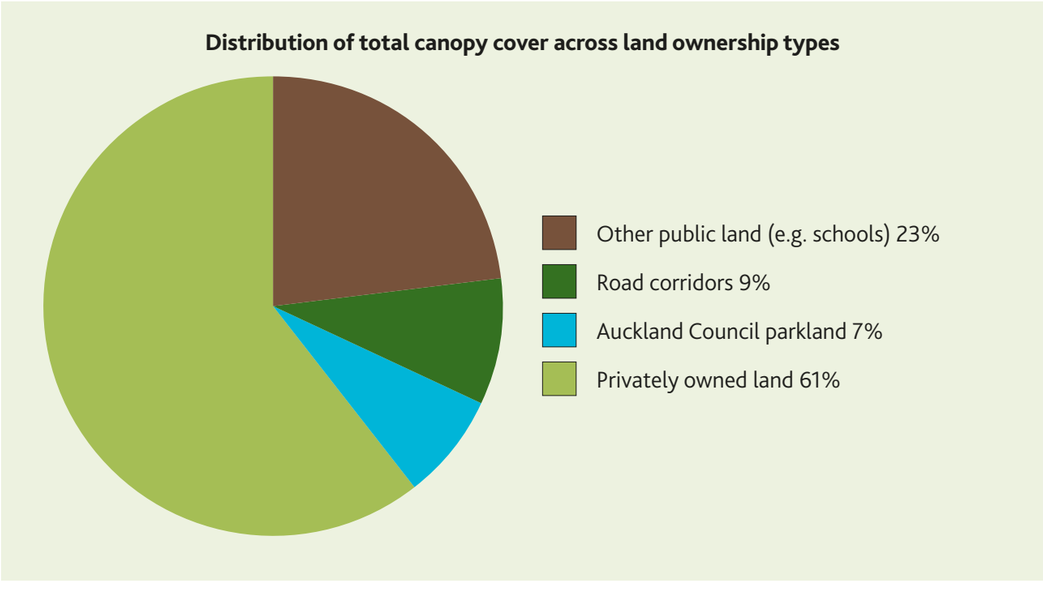
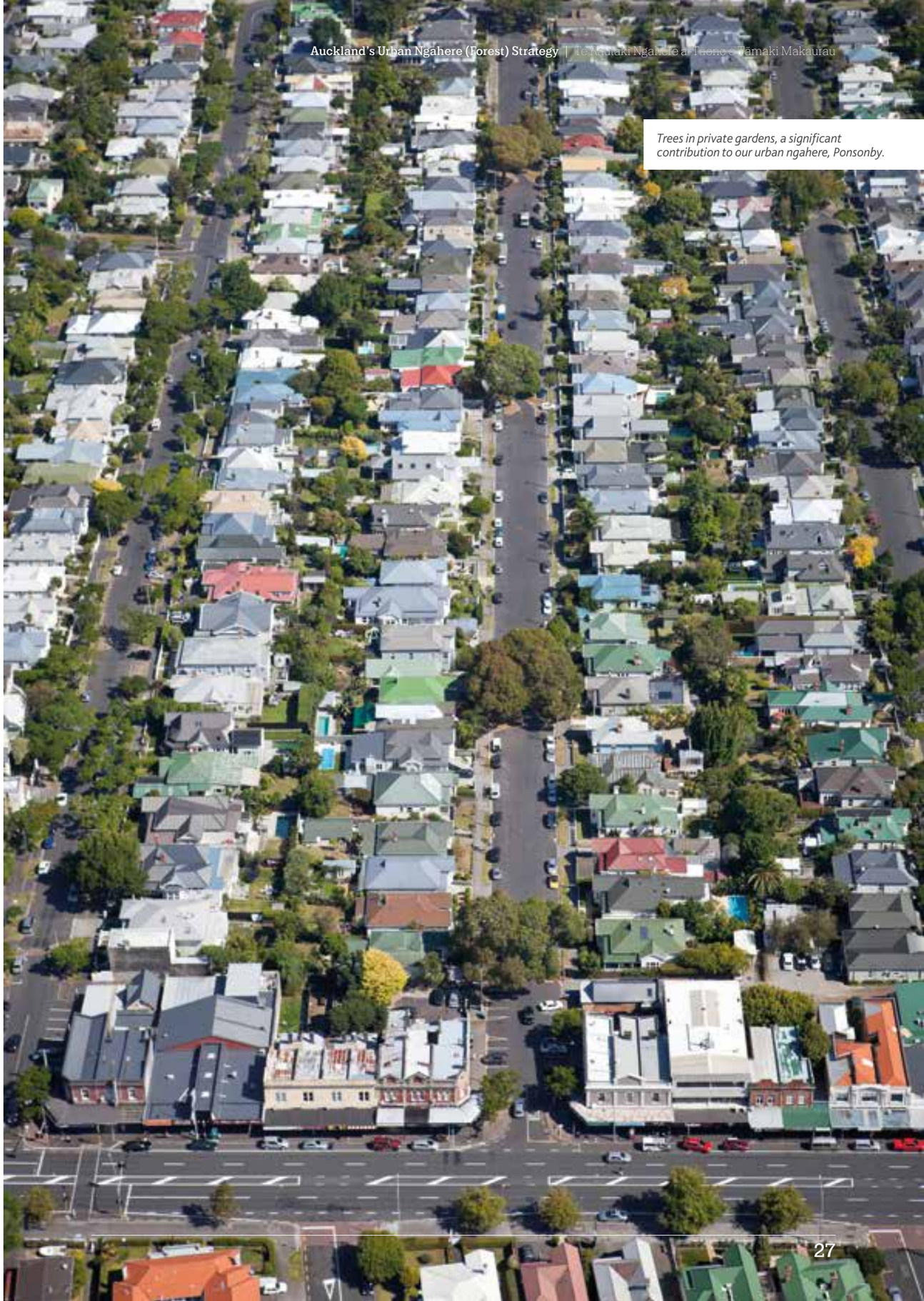


Figure 4 – proportion of canopy cover on different land ownership types (2013 LiDAR survey).

Urban ngahere on different land ownership types - the view west from Arch Hill to the Waitakere Ranges.

Why the unequal distribution?

There are a number of reasons for the difference in tree cover across the region, including land ownership (public/private), land use (urban/industrial/agricultural), geography and legal protections (eg Significant Ecological Areas and notable trees). Historically, the type of development and street layout also influenced the funding and space available for tree planting. For example, in areas developed for social housing, there was typically a low level of investment in tree planting, resulting in relatively few street trees. The age of a suburb can also be a factor, for example trees planted close to the city centre in the early days of Auckland's development have now matured (eg in Ponsonby). More recently, prior to the amalgamation of the region's councils into Auckland Council, some legacy council areas had active tree planting programmes.



Trees in private gardens, a significant contribution to our urban ngahere, Ponsonby.

2.2 Te hora tū teitei
Height distribution

The 2013 LiDAR survey reveals that tall trees are rare in our urban ngahere; only six per cent of the urban ngahere is over 20 metres in height, the majority, 64 per cent, is less than 10 metres (see Figure 5). This is partly due to the species that make up the urban ngahere and their height at maturity. In addition, trees over 20 metres in height need to be in the right place to allow for growth and are likely to be at least 60 years old. Historically, most mature trees were removed as land was cleared for agriculture and Auckland developed.

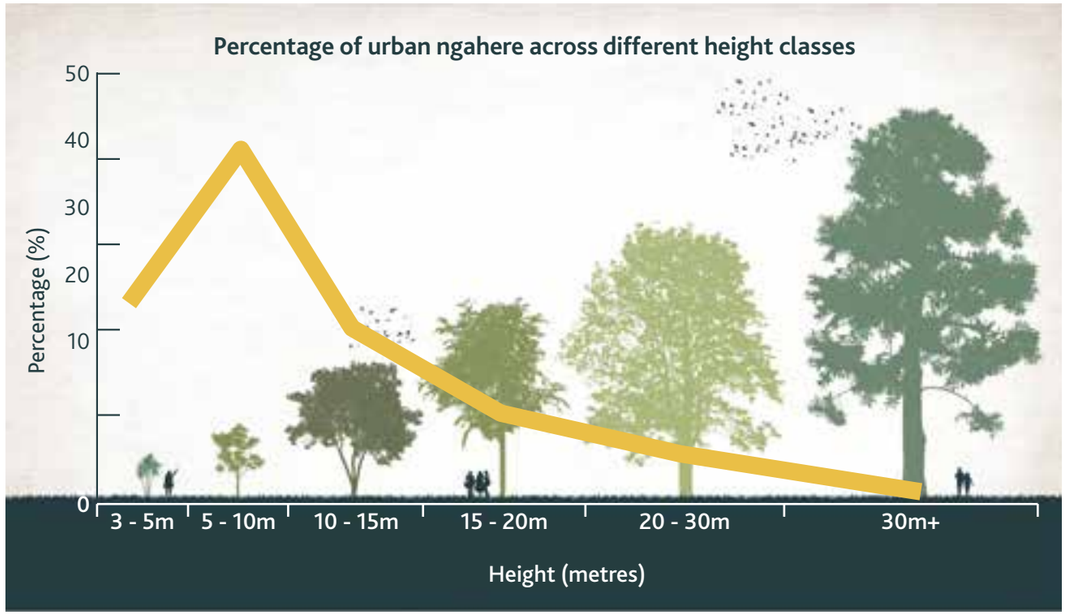


Figure 5 – Percentage of urban ngahere across different height classes.

When it comes to trees, size does matter!

Benefits are disproportionally greater for larger trees. For example, big trees provide more shade because of their larger, wider canopy spread; their greater leaf areas and more extensive root systems intercept larger amounts of rainfall and stormwater; they absorb more gaseous pollutants, have higher carbon sequestration rates, and typically contribute more to calming and slowing traffic on local streets than small trees. Larger trees also usually have few or no low branches to interfere with activity at ground level, especially if pruned to provide higher canopy clearance over roads, public space and pedestrian footpaths.

2.3 Te paerewa āraitanga Level of protection

Just 50 per cent of Auckland's urban ngahere has some degree of statutory protection. A high level of protection applies to urban ngahere in Significant Ecological Areas (SEAs) which account for 62 per cent of all protected forest (although SEAs capture only about one-third of Auckland's total urban ngahere). A moderate level of protection is provided to urban ngahere in outstanding natural features or landscapes, open space conservation zones, coastal yards, riparian yards and lake protection zones. Some protection is provided to urban ngahere in coastal natural character areas or open space informal recreation zones. A low level of protection is given to urban ngahere in open space active recreation zones and road corridors.

The Notable Trees Schedule in the Unitary Plan is another form of protection. This schedule contains nearly 3000 items (representing some 6000 trees and groups of trees), the majority of which were 'rolled over' from legacy council schedules as part of the Unitary Plan process.

The proportion of protected urban ngahere varies widely from suburb to suburb, much like the level of urban ngahere canopy cover:

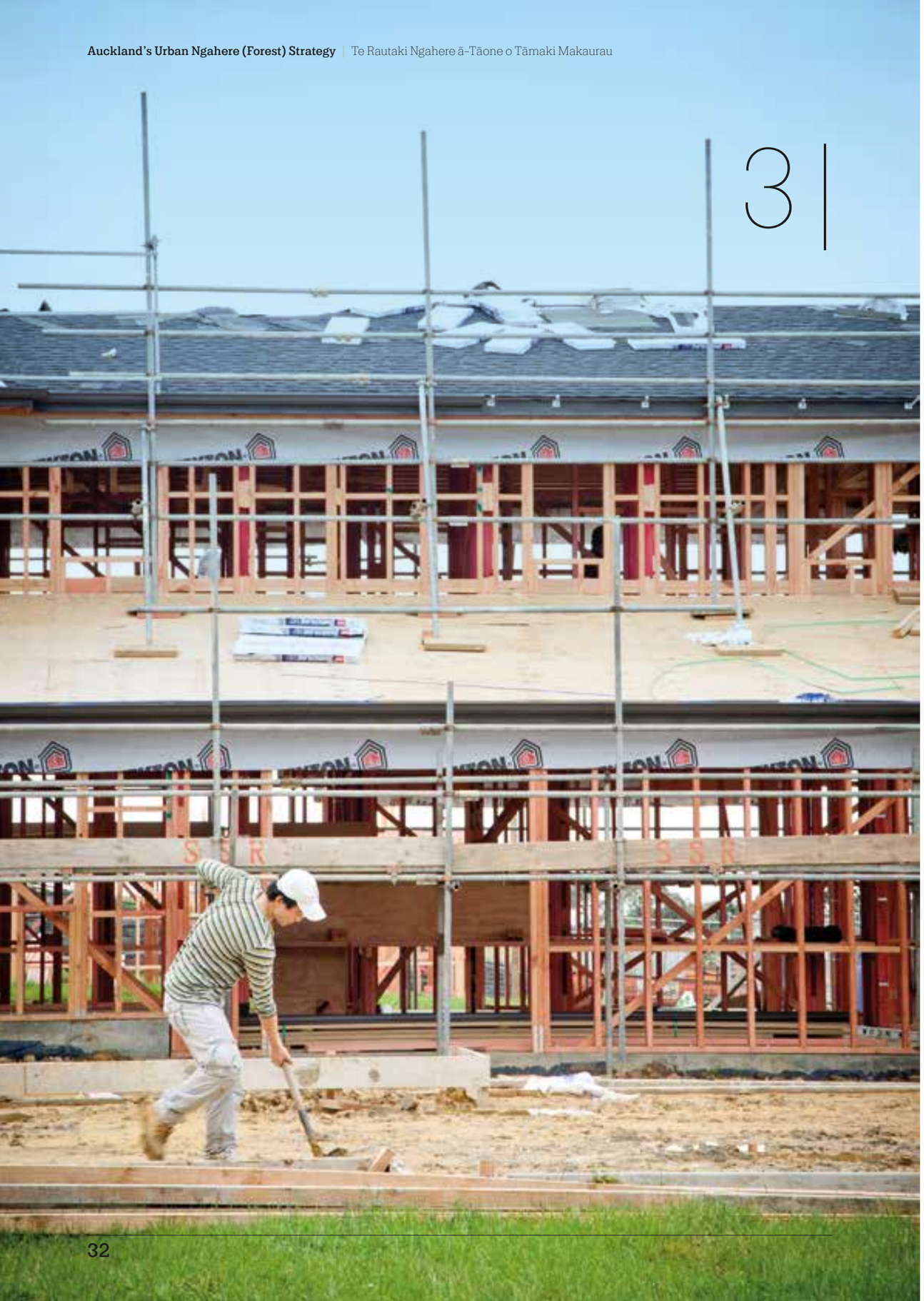
- Suburbs with large patches of indigenous ngahere that have been designated as Significant Ecological Areas (SEAs) tend to have a high level of urban ngahere canopy cover and a high level of protection (eg Chatswood, Birkenhead and Titirangi).
- Leafy suburbs where the urban ngahere is dominated by exotic and native trees in private backyards (eg Remuera, Epsom and Mt Eden) have moderate to high canopy cover but a low level of protection.
- Some suburbs have a low level of urban ngahere canopy cover, but a relatively high proportion of the canopy cover has some form of protection (eg Māngere, Wiri and Manukau).
- A number of suburbs that have experienced recent urban growth currently have a low level of urban ngahere canopy cover and protection (eg Northpark, Golflands, Howick, New Lynn and New Windsor).

Birkdale

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

A Pin Oak being lowered into position by a mobile crane and planted at Britomart Place in approximately the 1950's. Credit: Robert Hepple

The Pin Oak pictured above in 2018 – now protected and on the Notable Trees Schedule. This tree is the central feature of a busy intersection, visually contributing to the local streetscape and visible from Quay Street, Beach Road, Anzac Avenue and Fort Street. It is also notable as a solitary specimen of a species that is not well represented in the locality.



3 | Ngā pēhitanga o ināianei, anga atu anō hoki
Current and future pressures

3.1 Te tupu haere o te tātai tāngata me ngā whakakīkītanga āhua tāone
A growing population and urban intensification

Auckland is experiencing unprecedented growth and is projected to grow substantially into the future. Around 1.66 million people currently live in Auckland; over the next 30 years this number could grow by another 720,000 people to reach 2.4 million. Auckland will need many more dwellings, possibly another 313,000, in addition to new infrastructure and community facilities. Development will be focused within existing and future urban areas within the urban boundary (see Figure 6) and this will put significant pressure on the urban ngahere. Much of this growth will occur in existing urban areas through intensification; as land is redeveloped, unprotected trees are at risk of being removed to maximise the developable area of a site.

Development as an opportunity to create new green urban environments: Medium density housing with street tree planting, Addison Development, Takanini.

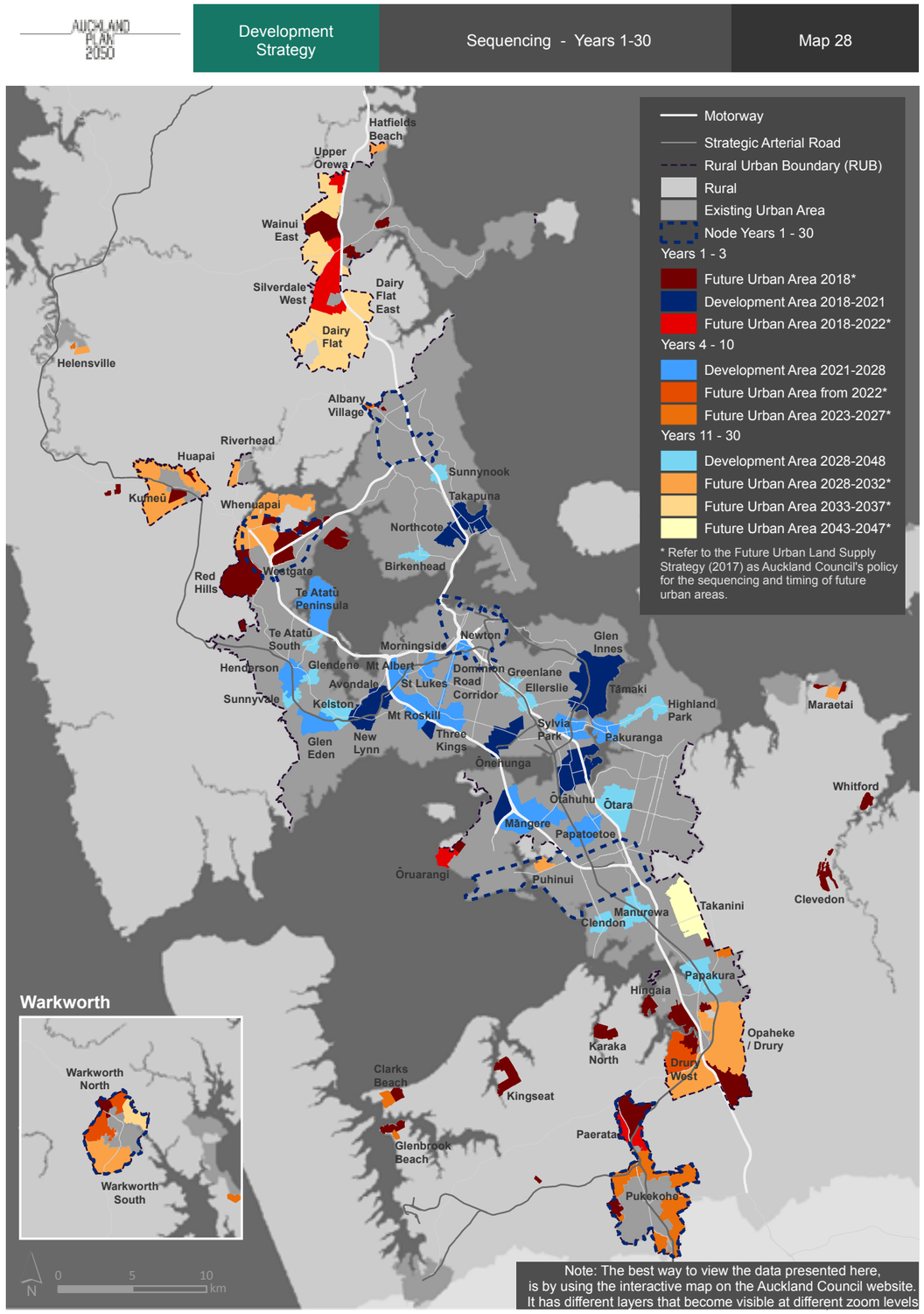


Figure 6 – Anticipated development in existing and future urban areas as outlined in the Development Strategy (2018).

The regeneration of Wynyard Quarter.

Without properly recognising the value of trees and understanding the benefits they provide; urban growth is likely to occur at the expense of the urban ngahere. However, urban development and intensification also present opportunities to green our city – to plant and grow our urban ngahere and create new green urban environments in areas set to be urbanised over the next 30 years. Future urban areas are outlined in Auckland's Future Urban Land Supply Strategy (2017) and the Development Strategy (2018). These areas cover around 15,000 hectares, with the potential to accommodate approximately 137,000 dwellings and 1400 hectares of new business land.

Urban regeneration within the existing city limits, such as the implementation of the City Centre Waterfront Refresh Plan and redevelopment plans for suburbs, presents an opportunity to retrofit green spaces and replace lost trees. The benefits of keeping established trees and the opportunities for these to complement and add value to new developments needs to be recognised. Where development occurs around trees, implementing a best practice approach to tree protection significantly increases their survival rate.

3.2 Te takahurihanga o te huarere
Climate change

Climate change threatens our urban ngahere through changing seasonal rainfall patterns, more severe weather events, and increased susceptibility to pests and diseases. Auckland is projected to experience increased occurrence of drought and reduced soil moisture. This requires us to better understand the threats to our urban ngahere and what can be done to protect it.

3.3 Ngā taimahatanga kei runga i ngā whakahaere ā-wai
Pressure on water infrastructure

Auckland's water infrastructure is vital to ensure that Aucklanders have clean water to drink and use, that wastewater is disposed of safely, homes, businesses and infrastructure are protected from flooding, and waterways and harbours are healthy. Population growth is putting all components of Auckland's water infrastructure under pressure. At the same time, this infrastructure is ageing and needs to be managed to ensure its continued performance. Climate change will place additional pressure on water infrastructure as the frequency and intensity of storm events is predicted to increase.

The Auckland Plan 2050 sets a clear direction to use Auckland's growth and development to protect and enhance the environment.[9] This includes a focus on using green infrastructure to deliver greater resilience, long-term cost savings and quality environmental outcomes.[10] The Auckland Unitary Plan emphasises the use and enhancement of natural hydrological systems and green infrastructure during development to address pressures on stormwater infrastructure.[11] This strategic direction and focus on using green infrastructure provides an opportunity to grow Auckland's urban ngahere.

What is green infrastructure?

Green infrastructure is a strategically planned network of natural and semi-natural areas designed and managed to deliver multi-functional benefits such as stormwater management, water purification, filtration of airborne pollutants, space for recreation and climate mitigation and adaptation. Auckland's urban ngahere is an integral part of our green infrastructure network.

Green infrastructure - Te Auaunga Awa / Oakley Creek

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

3.4 Ngā mate orotā me ngā mate urutā
Pests and diseases

Animal pests and weeds threaten the urban ngahere, including the precious native forest remnants that are found in pockets on public and private land. Possums eat leaves, buds, flowers and young shoots, while weeds like climbing asparagus and monkey apple, smother or out-compete valued species.

Myrtle rust

Plant diseases are a serious threat to the future of our urban ngahere. Kauri dieback is causing localised extinctions, Dutch elm disease has been in Auckland for many years now, myrtle rust has also reached Auckland and is a risk to pōhutukawa, bottlebrush, eucalyptus, and willow myrtle, all common street trees in central Auckland. Climate change is expected to create more favourable conditions for plant diseases to establish and spread. Successfully managing the urban ngahere means these threats must be understood and addressed, if we do not take sufficient action to address these threats, we place our urban ngahere at greater risk. Actions include pest and disease control, using a mix of species and, where possible, disease resistant variants of susceptible species in new plantings, and by responding quickly and effectively to new and emerging threats. To better understand and address kauri dieback and myrtle rust, Auckland Council is working with central government agencies, Crown Research Institutes and academia.

The elm tree (centre right) outside Auckland Art Gallery was removed in 2018 as it was infected with Dutch elm disease.

Kauri Park, Birkenhead – at risk from kauri dieback.

4

Te tarāwaho rautaki
Strategic framework

The strategic framework consists of a vision, three main objectives (Knowing, Growing and Protecting), two key mechanisms for delivering these objectives (Engage and Manage), and a set of nine supporting principles (Figure 7).

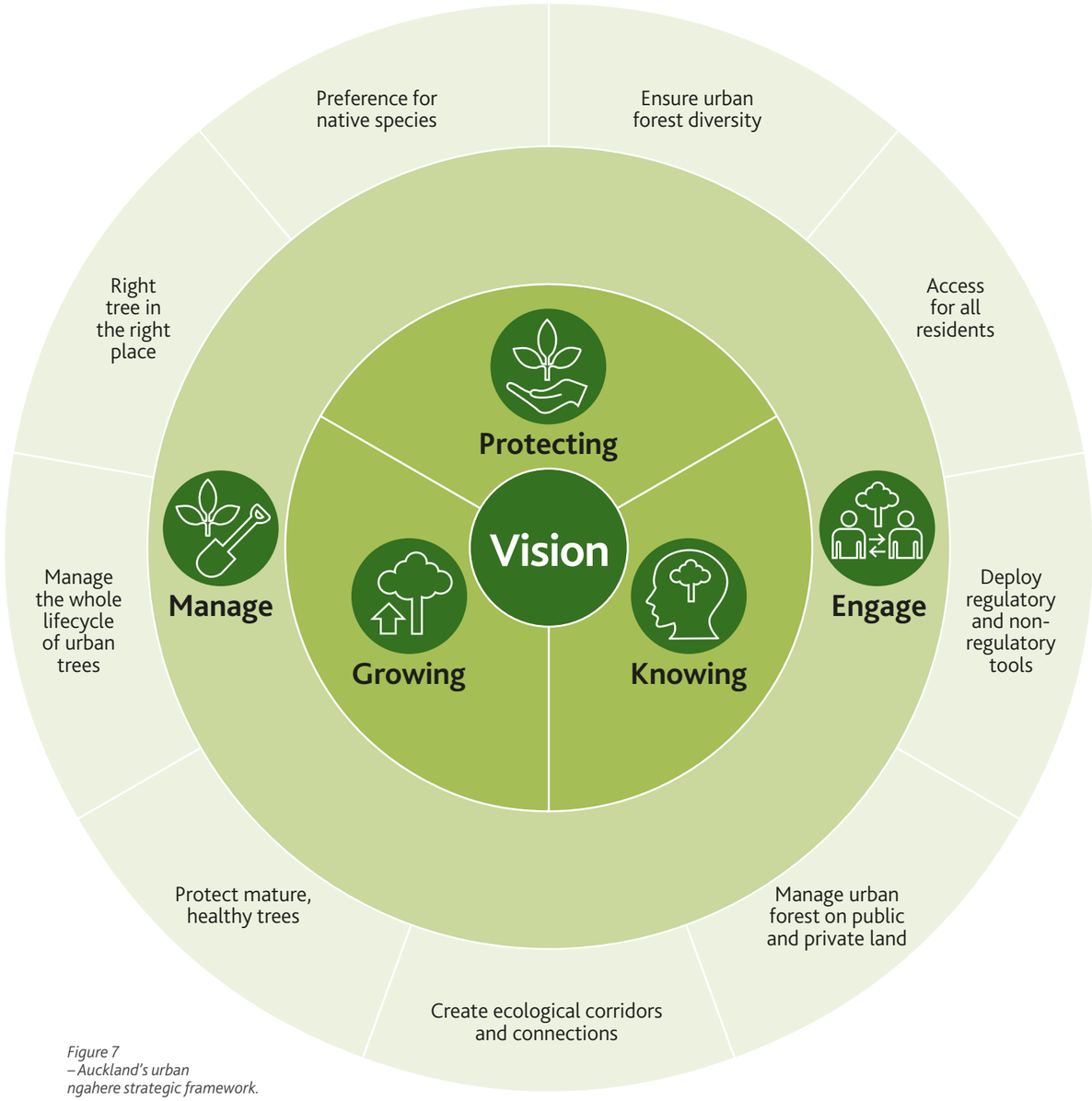


Figure 7 – Auckland's urban ngahere strategic framework.

A flowering pōhutukawa variety.

He whakatupu ngātahi i te ngahere ā-tāone o Tāmaki Makaurau e matomato ai te hua ā ngā rā e tū mai nei

Together, growing Auckland's urban ngahere for a flourishing future

4.1 Te tirohanga whānui Vision

Our vision is that Aucklanders are proud of their urban ngahere, that Auckland has a healthy and diverse network of green infrastructure, that it is flourishing across the region and is celebrated, protected, and cared for by all. The urban ngahere is equally distributed across our communities and brings significant benefits to the city. It contributes to our resilience, enhances stormwater management, delivers energy savings, supports biodiversity, and improves health outcomes and quality of life for all Aucklanders. Expanding and improving the urban ngahere is enabled through strong, collaborative partnerships across Auckland. Communities, government, businesses and citizens work together to make our urban ngahere flourish.

We will know we have been successful when we have:

- increased canopy cover across Auckland's urban area
- enhanced the associated social, environmental, economic and cultural benefits
- addressed unequal distribution of canopy cover through increasing canopy cover in neighbourhoods with previously low levels of cover
- increased the network of green infrastructure on public land
- improved linkages between green spaces by establishing ecological corridors
- effectively engaged with private landowners to support a thriving urban ngahere on private land
- planted diverse tree and plant species on public land
- shared knowledge of our urban ngahere
- instilled a sense of pride in Aucklanders for their urban ngahere.

4.2 Ngā whāinga Objectives

Knowing	Auckland needs to know the status of its urban ngahere, the extent, number and distribution of trees, as well as their size, health and condition. Understanding the social, environmental, economic and cultural value of Auckland's ngahere and quantifying the benefits it provides will support better informed, strategic decision-making about its management and growth.
Growing	Auckland needs to grow its urban ngahere to multiply these benefits and address distributional inequity. By expanding and enriching its urban ngahere, Auckland will maximise the social, environmental, economic and cultural benefits that trees, shrubs and other vegetation bring to an urban environment.
Protecting	Protecting existing ngahere is crucial to safeguarding the added values and benefits mature trees provide. Caring for saplings is critical for ensuring older trees are replenished before the end of their life, our urban ngahere grows over time, and publicly-funded planting is successful.

4.3 Ngā tikanga whakahaere Mechanisms

To achieve these objectives, Auckland Council needs to engage and manage.

Engage	Engage with partners and stakeholders – with mana whenua, residents, private landowners, community organisations and the private sector to ensure the urban ngahere is well managed, its benefits are well recognised and that growing and protecting the urban ngahere on public and private land is widely supported.
Manage	Manage the city's urban ngahere on public land through coordinated planning, strategic planting, smart and innovative urban design while facilitating best practice standards for work on and around trees through maintenance contracts.

Street trees in front of Mount Eden / Maungawhau.

4.4 Ngā mātāpono Principles

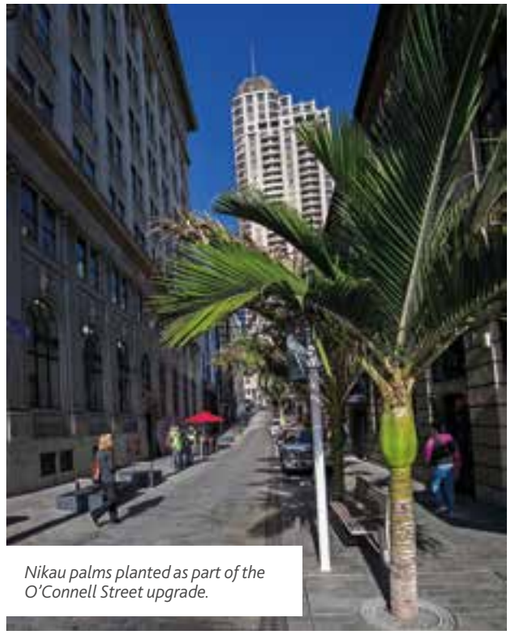
1. Right tree in the right place

It's important to consider growing conditions and their impact on proposed tree species, soil type, drainage, slope, sunlight access, the presence of pests and weeds and the potential current and future impacts of proposed tree species on the nature and function of a place. Growth rate and size of a proposed tree species at maturity should be basic considerations in determining suitability for a specific site. Planting the right tree in the right place is an important factor in minimising future maintenance requirements and costs.

Figure 8 – Consider the context of the site and plant the right tree in the right place

2. Preference for native species

The Auckland Unitary Plan encourages the use of indigenous trees and vegetation for roadside plantings and open spaces to recognise and reflect cultural, amenity, landscape and ecological values. Planting exotic trees may be appropriate in some cases, eg where there is a need for deciduous trees to provide solar access in winter, or fruit trees to establish community orchards. Exotic trees may also be suitable for cultural or heritage reasons in specific locations.



Nikau palms planted as part of the O'Connell Street upgrade.

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Urban ngahere alongside motorway interchanges and Te Ara I Whiti – the Lightpath.

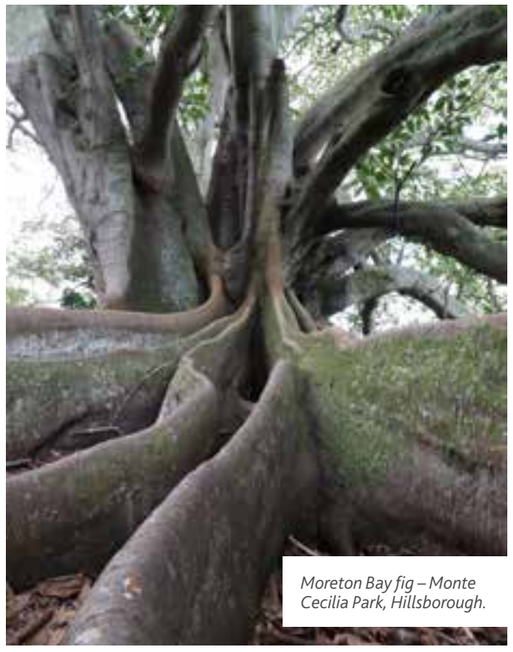
3. Ensure urban forest diversity

Planting a range of species increases the urban ngahere's resilience to the impacts of diseases, pests, and climate change. Planting a diverse range of species will ensure only a portion of the urban ngahere will be affected as diseases and pests tend to be limited to a certain tree species or genus. It is also important to maintain genetic diversity for each species to support better resilience, for example through our seed collection programme. Planting trees with varying lifespans helps to avoid a large-scale decline in numbers as trees with similar lifespans reach the end of their lives.

4. Protect mature, healthy trees

The benefits provided by trees become exponentially greater as they mature. It's also more cost effective to care for mature trees, as this typically costs less than planting and caring for new trees. The only way to replace a 40-year-old tree is to spend 40 years caring for a new tree.

People often have strong emotional connections to landmark, mature trees in their neighbourhoods, and are more likely to mourn the loss of a large tree. Additionally, some native species, such as kākā, and bats, prefer taller trees and their presence can significantly improve the biodiversity value of an area.



Moreton Bay fig – Monte Cecilia Park, Hillsborough.

Onepoto Domain, Northcote.

5. Create ecological corridors and connections

The urban ngahere is home to a range of ecological groups, such as birds , insects, moths and butterflies. It brings nature into urban environments, a place where the majority of Aucklanders (90 per cent) live and spend most of their time. It can also provide ecological corridors for species migrating through urban environments (see Figure 9). Connecting Auckland's urban ngahere, particularly remnant natural areas, to create ecological corridors and connections between green spaces is important to enhance biodiversity.

6. Access for all residents

The unequal distribution of canopy cover across Auckland needs to be addressed when new plantings are planned. Considerations include the delivery of urban ngahere benefits, public demand for a higher canopy cover and physical access to the urban ngahere in a local area.

Kākā
Photo: Tim Lovegrove

7. Manage urban forest on public and private land

Around 61 per cent of Auckland's urban ngahere canopy is on privately-owned land, with 39 per cent on public land. However, many of the benefits of trees are realised beyond private property boundaries and by many more people than just individual landowners. A loss of urban ngahere on private land is also a loss for the city. While there are opportunities for Auckland Council to grow and protect the urban ngahere on public land, the overall status of the urban ngahere is, to a large degree, dependent on the decisions of private landowners. Managing Auckland's urban ngahere requires private landowners' support and cooperation. Engagement is crucial and is one of two key delivery mechanisms for the proposed strategic framework.

8. Deploy regulatory and non-regulatory tools

Auckland Council has a range of regulatory tools to protect the urban ngahere, such as rules relating to Significant Ecological Areas (SEAs), the schedule of Notable trees, and rules to limit the extent of vegetation removal in sensitive environments, like streams and coastlines. These regulatory tools apply to trees and vegetation on private properties. However, since amendments to the Resource Management Act (RMA) came into effect in 2015, lifting blanket tree protection in urban areas councils depend mainly on non-regulatory tools to control the removal of trees and vegetation on private properties. Examples include landowner advice and assistance with tree care and planting, community education and outreach programmes, and raising awareness of the value and benefits of the urban ngahere.

Urban ngahere on public and private land, Mount Eden.

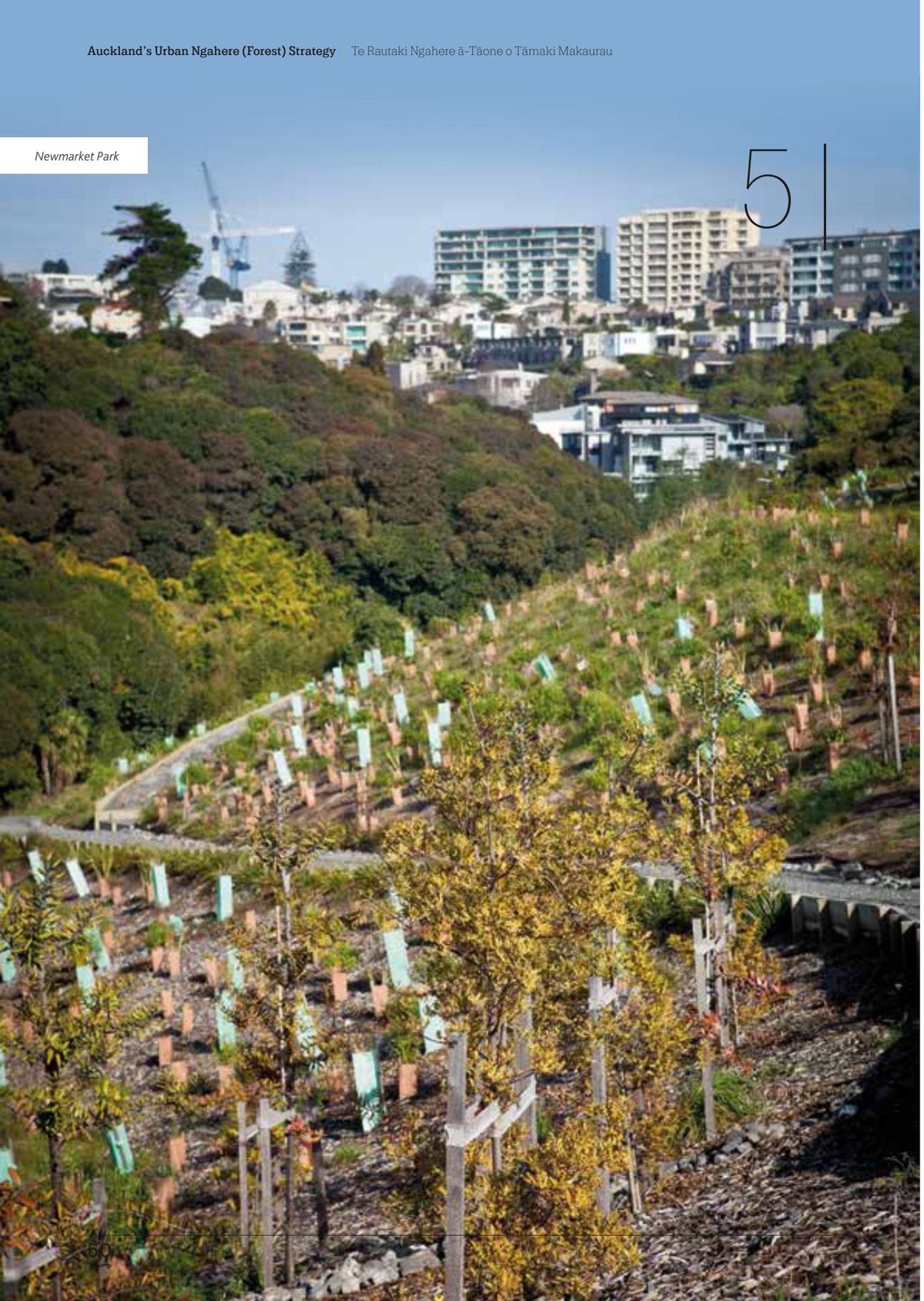
9. Manage the whole lifecycle of urban trees

Achieving the long-term vision to grow Auckland's urban ngahere for a flourishing future not only depends on planting more trees and vegetation but also looking after them during their lifecycle. New plantings may not be able to flourish (or even survive) without ongoing aftercare and maintenance. Investing in maintenance and proactive management will yield greater long-term benefits, as well as ensure money is well spent, with less wastage and repeated effort.

Figure 9 - the potential for ecological connections across urban and rural landscapes (adapted from Meurk & Hall, 2006[12])

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Trees towards the start and end of their lifecycle – Coyle Park, Point Chevalier.



Newmarket Park

5 | Ngā hua ā-rautaki Strategy Outcomes

The strategy outcomes are underpinned by an implementation framework and high level actions outlined in the next section.

5.1 | Te mōhio ki ngā mea ka hua Knowing outcomes

To better understand the status and value of Auckland's urban ngahere.

Improved knowledge will assist us to make more informed and strategic decisions on how to manage our urban ngahere.

The knowing outcomes will give us a better understanding of the status and trends of important indicators, such as canopy cover, height and age distribution and species diversity across both public and private land. Understanding these factors will enable us to better evaluate and understand the value of our urban ngahere. i-Tree Eco software[13] could present an opportunity to do this, however at present additional research is required to fully adapt i-Tree data and analysis to a New Zealand context.

A better understanding of the trends and status of the canopy cover can direct planting efforts to where the most value can be realised. Potential future impacts and pressures on Auckland's urban ngahere, such as climate change and new pests and diseases, can also be better managed and minimised.

Table 1 – Knowing outcomes

Objective	Outcomes
Knowing	Better understanding of the status and trends on private and public land over time.
	Better understanding of the diverse values and benefits of Auckland's urban forest.
	Better understanding of existing and future risks and pressures.

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Figure 10 - unequal canopy cover at a local board level (2013 LiDAR survey)

5.2 Te whakatupu i ngā mea ka hua
Growing outcomes

To grow Auckland's urban ngahere and grow it more equitably.

Growing our urban ngahere will increase the average canopy cover and also provide a fairer distribution of the urban ngahere and associated benefits across Auckland (see Figure 10).

We can grow our urban ngahere and increase resilience to existing and future pressures, such as pests, diseases and climate change, through the application of the strategic framework's nine principles.

Table 2 – Growing outcomes

Objective	Outcomes
Growing	Increase the average canopy cover to 30 per cent across Auckland's urban area with no local board area having less than 15 per cent canopy cover.
	Increased resilience to existing and future pressures.

5.3 Te tiaki i ngā mea ka hua
Protecting outcomes

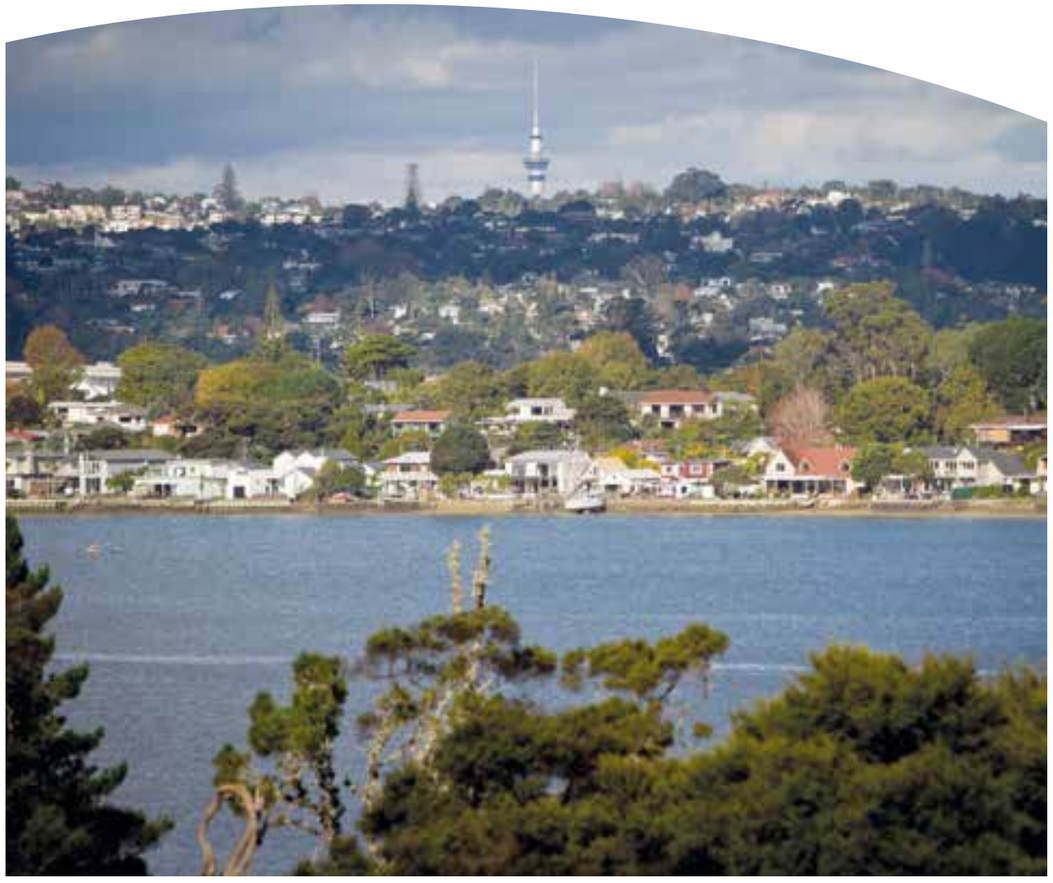
To protect and maintain Auckland's existing and future urban ngahere.

Protecting our existing urban ngahere is crucial to realising the values and benefits of mature trees. Caring for new plantings and young trees is essential to ensure that older trees are replaced at the end of their life and our urban ngahere grows over time.

Achieving no net loss ensures that any losses are balanced by a gain elsewhere. At a local board level, any loss will need to be balanced out by a gain in canopy cover elsewhere within the local board area.

Table 3 – Protecting outcomes

Objective	Outcomes
Protecting	No net loss of canopy cover at the scale of local board areas.
	No loss of percentage of trees larger than 10 metres.
	No net loss of notable trees.



5.4 Ngā tikanga whakahaere ka hua
Mechanism outcomes

Engage and Manage are the two mechanisms Auckland Council will use to achieve the Knowing, Growing and Protecting objectives. For example, increasing the canopy cover and prioritising options for future planting on public and private land will only be possible through engaging and working collaboratively with communities and partners.

Engage

Community support is critical for fulfilling all three main objectives. Auckland Council must engage with relevant partners and stakeholders – mana whenua, private landowners, community groups, and the private sector –to support the growth and protection of Auckland's urban ngahere. The council must also engage with the public more widely about the benefits of urban ngahere to ensure they are understood and recognised.

Table 4 – Engage outcomes

Mechanism	Outcomes
Engage	A well-established community engagement programme.
	Increased public awareness of the values and benefits of Auckland's urban ngahere.

A community engagement programme is needed that addresses Growing and Protecting and is supported by partnerships with relevant stakeholders. The programme must also integrate the aspirations of Māori, in accordance with the principle of partnership enshrined in te Tiriti o Waitangi and recognise the special role of mana whenua as kaitiaki (guardians) whereby ngahere and whenua ora (environmental services) are intimately connected to Māori wellbeing. As the programme evolves, we will develop a better understanding of community aspirations, and knowledge gaps relating to urban ngahere benefits and value.

Manage

Another key mechanism in successfully implementing the vision is the effective management of existing and future urban ngahere on public land through coordinated planning, strategic planting, smart and innovative urban design, and facilitating best practice standards for work on and around trees through maintenance contracts.

Table 5 – Manage outcomes

Mechanism	Outcomes
Manage	Increased survival rate of new plantings and sustainability of Auckland's urban ngahere on public land.

As noted in section 2.2, tree size matters when it comes to the scale of benefits delivered. Central to effective management is the requirement to nurture growing trees and increase the proportion of larger trees.

6 Tarāwaho whakatinana Implementation framework

The implementation framework consists of high level actions that are central to achieving the strategy outcomes. In addition to the high level actions, collaboration, funding and partnerships and area specific implementation are all fundamental to the strategy's success.

6.1 Te mahi tahi mō te rautaki ngahere ā-tāone Urban ngahere strategy collaboration

Success will require close collaboration with many partners at various levels across operational boundaries and disciplines, within the municipality and beyond. Some of the key cross boundary groups are:

Cross-council collaboration:
This involves collaboration between internal stakeholders, interdepartmental cooperation and working closely with council controlled organisations. In the urban context, planners should work with foresters and arborists to effectively integrate policy and knowledge management tools to grow and protect the urban ngahere.

Community and council collaboration:
Effective implementation of the strategy requires effective engagement with community groups and institutions that play a role in growing and protecting the urban ngahere.

Business and council collaboration:
Insight provided by business groups, including developers, is important to support the strategy's successful implementation. The decisions and actions of business groups can have a significant influence on the urban ngahere.

International cooperation:
This strategy draws on the knowledge and experience of many leading cities that have developed their own urban forest strategies. Continued sharing of technical, governance and community know-how will help to achieve better outcomes for Auckland.

6.2 Ngā tahua pūtea me ngā hononga ā-hoa
Funding and partnerships

Continuing support from Auckland Council, developers, businesses and the wider community is fundamental to successfully growing and protecting Auckland's urban ngahere. For example, leading developers understand that delivering a successful and sustainable project is not just about building design, but also the surrounding environment and the outcomes this can deliver. Businesses can also contribute to the growth and protection of the urban ngahere through financial support, planting initiatives and effective maintenance of trees on their properties. Most importantly, having financial support from the council ensures the development of knowledge, growth and protection of urban ngahere on public and private land.

Effective communication on the benefits of urban ngahere, such as better stormwater management, carbon sequestration, lower infrastructure costs, enhanced biodiversity and community health – not to mention the city's aesthetic enhancement – is an important tool to justify project costs to stakeholders and partners. It's important to document and disseminate urban ngahere benefits to gain continuous support from all Aucklanders.

6.3 Whakatinanatanga ā-wāhi motuhake
Area specific implementation

The strategy must take an area specific approach to implementation. This will require engaging with each local board, partners and stakeholders to discuss needs and drivers for growing and protecting Auckland's urban ngahere. This will ensure the strategy's high level actions are defined and implemented in a way that matches the needs of each local area.

6.4 Kaupapa mahi matua
High level actions

The Engage and Manage mechanisms identified in the strategy framework run through all the high level actions and are central to their successful implementation.

Table 6 – Knowing high level actions

Knowing

High level actions to support the following outcomes:

- better understanding of the status and trends on private and public land over time
- better understanding of the diverse values and benefits of Auckland's urban forest
- better understanding of existing and future risks and pressures.

	High level actions	Implementation timeframe (years)		
		1-2	3-5	Ongoing
1	Incorporate three-yearly LiDAR surveys in council work programmes.			●
2	Create database for existing assets within two years.	●		
3	Integrate scientific knowledge of the urban ngahere with mātauranga Māori in partnership with mana whenua of the urban ngahere.			●
4	Quantify values and benefits (within 12-18 months).	●		
5	Determine survival rates of new council plantings.			●
6	Identify key pressures and risks in partnership with mana whenua and local boards.	●		

Table 7 – Growing high level actions

Growing

High level actions to support the following outcomes:

- increase the average canopy cover to 30 per cent across Auckland's urban area with no local board area having less than 15 per cent canopy cover
- increased resilience to existing and future pressures.

High level actions		Implementation timeframe (years)		
		1-2	3-5	Ongoing
1	Increase canopy cover in road corridors, parks and open spaces to support an average of 30 per cent canopy cover across Auckland's urban area with no local board area having less than 15 per cent canopy cover.			●
2	Identify and prioritise locations for future planting on public land in partnership with mana whenua and local boards.	●		
3	Use science and ongoing engagement with local boards, mana whenua and communities to inform decisions in relation to types of planting.			●
4	Increase the capacity of nursery programmes (including maraes) to increase the supply of eco-sourced plants.			●
5	Leverage partnerships established through existing initiatives (eg the Mayor's Million Trees programme).		●	

Auckland's Urban Ngahere (Forest) Strategy | Te Rautaki Ngahere ā-Tāone o Tāmaki Makaurau

Table 8 – Protecting high level actions

Protecting

High level actions to support the following outcomes:

- no net loss of canopy cover at the scale of local board areas
- no loss of percentage of trees larger than 10 metres
- no net loss of notable trees.

High level actions		Implementation timeframe (years)		
		1-2	3-5	Ongoing
1	Complete a comprehensive review of tree protection under the Auckland Unitary Plan Operative in part.	●		
2	Explore potential for new regulatory tools to protect trees on private properties (eg working with central government).	●		
3	Increase landowner grants and incentive programmes (eg heritage tree fund for private property owners).			●
4	Address current and future pressures to Auckland's urban ngahere and protection.			●
5	Raise public awareness of the values and benefits of the urban ngahere (eg status and trends, pressures, planting guidelines, proper tree care).			●
6	Raise arboriculture maintenance programme from two to five years or until new plantings are well established (a target survival rate of 70-80 per cent).	●		
7	Establish a labelling programme for protected trees within 12 months (eg species, age and benefits).	●		

Fort Street

Ngā tohutoro
References

1. Peper, P. et al. 2007. New York City, New York Municipal Forest Resource Analysis. USDA Forest Service, Pacific Southwest Research Station and Center for Urban Forest Research
https://research.fs.usda.gov/treesearch/45969
2. McDonald, R. et al. 2017. Funding Trees for Health, The Nature Conservancy,
https://www.nature.org/content/dam/tnc/nature/en/documents/Trees4Health_FINAL.pdf
3. Salmond, J. et al. 2016. Health and climate related ecosystem services provided by street trees in the urban environment, Environmental Health 2016 15 (Suppl 1):S36
https://ehjournal.biomedcentral.com/articles/10.1186/s12940-016-0103-6
4. Cavanagh, J. E. and Clemons, J. 2006. Do Urban Forests Enhance Air Quality? Australian Journal of Environmental Management, Volume 13, 2006 – Issue 2
https://www.tandfonline.com/doi/pdf/10.1080/14486563.2006.9725122?needAccess=true
5. Xiao, Q. and McPherson, E. G. 2011. Rainfall interception of three trees in Oakland, California, Urban Ecosyst (2011) 14:755–769
https://research.fs.usda.gov/treesearch/39932
6. Harmsworth, G., R. Awatere, S. 2013. Indigenous Māo ri Knowledge and Perspectives of Ecosystems. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand
https://www.pnzmemberhub.org.nz/single-post/2013/01/01/indigenous-m%C4%81ori-knowledge-and-perspectives-of-ecosystems#:~:text=Authors:%20Garth%20R.,goals%20and%20desired%20indigenous%20outcomes
7. Wilcox, M. D. 2012. Auckland's Remarkable Urban Forest, Auckland Botanical Society **(book)**
8. Manaaki Whenua - Landcare Research, Māori values and native forest (Ngahere) **https://www.landcareresearch.co.nz/assets/researchpubs/harsworth_maori_values_native_forest.pdf**
9. The Auckland Plan 2050, Outcome: Environment and Cultural Heritage, Direction 3: Use Auckland's growth and development to protect and enhance the natural environment
https://www.aucklandcouncil.govt.nz/en/plans-policies-bylaws-reports-projects/our-plans-strategies/auckland-plan/environment-cultural-heritage/focus-area-use-green-infrastructure-deliver-greater-resilience.html
10. The Auckland Plan 2050, Outcome: Environment and Cultural Heritage, Focus area 6: Use green infrastructure to deliver greater resilience, long-term cost savings and quality environmental outcomes
https://www.aucklandcouncil.govt.nz/en/plans-policies-bylaws-reports-projects/our-plans-strategies/auckland-plan/environment-cultural-heritage/focus-area-use-green-infrastructure-deliver-greater-resilience.html
11. The Auckland Unitary Plan Operative in part (Updated 13 July 2018), E1 Water quality and integrated management
http://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland%20Unitary%20Plan%20Operative/Chapter%20E%20Auckland-wide/1.%20Natural%20Resources/E1%20Water%20quality%20and%20integrated%20management.pdf
12. Meurk, C.D. Hall, G.M.J. 2006. Options for enhancing forest biodiversity across New Zealand's managed landscapes based on ecosystem modelling and spatial design. New Zealand Journal of Ecology (2006) 30(1): 131-146
https://newzealandecology.org/nzje/2297
13. i-Tree Eco
https://www.itreetools.org/eco/index.php

© 2019 Auckland Council
March 2019
Auckland Plan, Strategy and Research Department

Auckland Council (2019). Auckland's Urban Ngahere (Forest) Strategy

ISBN 978-1-98-856480-7 (Print)
ISBN 978-1-98-856481-4 (PDF)

Auckland's Urban Ngahere (Forest) Strategy was approved by the Auckland Council Environment and Community Committee on 20 February 2018.

Auckland Council
Te Kaunihera o Tāmaki Makaurau