

Māngere-Ōtāhuhu Local Board Ngahere Analysis Update 2021

Canopy cover changes with the
2013 to 2016/2018 LiDAR data

Urban Ngahere Strategy 2019
Knowing Programme



A summary of the urban environment in Māngere-Ōtāhuhu

Nearly

78,500
residents



All statistical areas with less than **20%** canopy cover

Over **5,000** hectares of land

Over **700**

hectares of parks, including:

- **Ambury Regional Park**
- **Māngere Centre Park**
- **Moyle Park**

Less than **1%** of canopy cover more than **30 metres** tall

More than half of Statistical Areas have less than **10%** of canopy cover

Average canopy cover of

8.3%

across local board, including canopy cover of:

14%	9.4%	8.2%	6.7%
on public parkland	on road reserves	on other public land	on private land

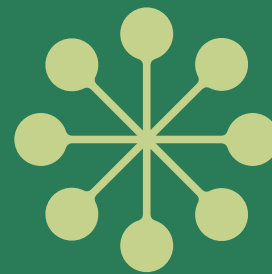
229 parks,
24 of which contain **playgrounds**

301 hectares of Significant Ecological Area

50% of total canopy cover on private land

New zoning under Auckland Unitary Plan includes Mixed Housing Urban, Terrace Housing and Apartment Buildings, and Future Urban

420ha of urban forest in 2013,
increasing to 437ha in 2016/2018



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Māngere-Ōtāhuhu Local Board

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1.0 Preface

Tāmaki-Makaurau / Auckland is New Zealand’s largest city, and plantings of exotic and native trees have taken place as the region has developed. Early Māori settlers would have planted trees such as karaka, pūriri and tōtara to indicate a special place or to mark a celebration, while European settlers planted trees that were familiar and provided a sense of place. London Plane, English Oak, and European Lime trees were some of the earliest recorded plantings in Auckland. Settlers arriving from around the world commenced the history of Auckland’s diverse and unique tree cover.

A healthy urban ngahere provides a multitude of social, economic and environmental benefits. However, concern has been raised that Auckland is moving backwards in regard to urban tree cover as a result of urban sprawl, urban intensification and recent weakening of tree protection rules, while there is an increasing awareness of the threat posed by climate change and the incursion of plant pests and diseases. These threats may be better managed if there is a good understanding of the character and extent of the urban ngahere.

The Māngere-Ōtāhuhu Local Board has provided locally driven initiatives funding to Auckland Council’s Principal Advisor Urban Ngahere (Forest) in the Parks, Sports and Recreation Department to develop an analysis of the tree cover in its area of responsibility. This update report is the result of a programme of work by Auckland Council involving detailed analysis of urban tree coverages on public and private land, aiming to identify opportunities to nurture, grow and protect urban trees in the local board area. The analysis work is directed by the Auckland Council’s Urban Ngahere (Forest) Strategy 2019, which has 18 key objectives to help Council and local boards to deliver a healthy ngahere for a flourishing future.



2.0 Introduction

2.1 Māngere-Ōtāhuhu Local Board

The Māngere-Ōtāhuhu Local Board covers approximately (c.) 5,200 hectares (ha) on the southern part of the Auckland isthmus. The local board is dominated by Te Pane-o-Mataoho (Māngere Mountain) and surrounded by the Manukau Harbour and the Tāmaki Estuary. It is well connected to the Auckland Central Business District and other parts of Auckland by both road (State Highway 20) and rail (Southern and Eastern Line). The population of the local board is over 75,000 residents, representing a 10.6% increase since 2013. An information graphic summarising local board details related to urban forest is provided at the beginning of this report.

The local board area spans from Tāmaki Estuary in the east to Manukau Harbour in the west, and the Manukau inlet to the north with much of these coastal borders containing local parks and reserves. The board adjoins Ōtara-Papatoetoe Local Board to the east and south, and Maungakiekie-Tāmaki Local Board to the north.

Māngere-Ōtāhuhu encompasses 26 statistical areas. Land use within the board is varied, a result of the different phases of settlement and development undertaken by Māori and Europeans. Industrial works are largely associated with the statistical areas Ōtāhuhu Central, Ōtāhuhu Industrial, Auckland Airport and Māngere South; while residential dwellings are predominantly located in areas of Māngere, Favona, Harania and Ōtāhuhu South, South-west and North. The Māngere Town Centre is the main commercial town hub in the local board. The statistical areas boarding the Manukau Harbour, including Māngere Bridge Ambury and Māngere South East, remain in rural productive land, including agriculture and horticulture. Much of the Auckland Airport statistical area remains open grassland as it is under 'Special Purpose Zoning' to maintain a clear airfield.

There are numerous significant natural features and significant archaeological sites in the area, particularly along the western side and adjacent to the coast including the Ōtuataua Stonefields, Ambury Farm Regional Park, coastal wetlands and several volcanic cones and lagoons.

Approximately 14% of the local board area is public parkland, with over 100 local parks as well as several significant sports parks, including Māngere Centre Park, Moyle Park, Walter Massey Park, Sturges Park and Seaside Park. Large passive reserves include Māngere Domain, Ambury Farm Regional Park and Ōtuataua Stonefields Historic Reserve, which contains pockets of remnant rock forest with karaka, pūriri and tītoki. Continuous tracts of urban forest in the local board area are primarily limited to riparian and coastal vegetation along the upper reaches of the Manukau Harbour. Key sites for biodiversity in the Māngere-Ōtāhuhu Local Board include Ōtuataua Stonefields, Ambury Farm Regional Park, Portage Road Reserve, Puketutu Island, and Pūkaki Lagoon. Overall, very little original indigenous forest of the area remains.

Amongst these sensitive ecological sites and other scattered areas of vegetation, portions of the local board area are now zoned for development intensification under the Unitary Plan. The new zoning, including the Mixed Housing Urban Zone and the Terrace Housing and Apartment Buildings Zone, now allows for significantly smaller sections, particularly around Māngere Central. Further urban development may also occur around Maungataketake as this area is zoned as Future Urban. Consequently, portions of the urban forest canopy are under a range of pressures from future development, which could potentially lead to irreversible changes in urban forest cover.



View of Te Pane-o-Mataoho / Māngere Mountain, Māngere, Auckland

2.2 Study Background

‘Urban ngahere’ (urban forest) comprises all the trees within a city – including parks, coastal cliffs, stream corridors, private gardens and streets – both native and naturalised exotic species. For the purposes of this report, ‘urban ngahere’ is defined as all of the trees and other vegetation three metres or taller in stature within the Māngere-Ōtāhuhu Local Board, and the soil and water systems that support these trees. This urban ngahere definition encompasses trees and shrubs in streets, parks, private gardens, stream banks, coastal cliffs, rail corridors, and motorway margins and embankments. It also includes both planted and naturally established plants, of both exotic and native provenance.

The scale of the tree and shrub cover across Auckland is sufficiently extensive on both public and private land to make a meaningful contribution to the liveability and sense of place for its residents. Benefits of the urban ngahere include:

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

The Auckland Unitary Plan offers various degrees of protection to urban ngahere and groups of trees meeting specific characteristics (e.g., pre-identified significance, vegetation by coasts or streams); however, other important urban ngahere assets have no statutory protection and can therefore be removed. The completion of a study in urban canopy cover in Māngere-Ōtāhuhu is important to provide information on baseline tree distribution that future canopy cover measurements can be compared to. This baseline data also provides information on where there are pressures on canopy cover and opportunities for tree planting. Increases in canopy cover are also intended to contribute to other Auckland Council programmes such as Te Tāruke-ā-Tāwhiri: Auckland’s Climate Plan (Auckland Council 2019c).

2.3 Data Collection

Urban canopy cover across Auckland was mapped in 2013 (Auckland Council 2019b), and again in 2016/18 by use of LiDAR (Light Detection and Ranging). Airborne LiDAR is an optical remote sensing technology that irradiates a target with a beam of light; usually a pulsed laser, to measure an object’s variable distances from the earth surface. Two LiDAR data sets are covered in this report, collected in the years 2013 and 2016/18. The second survey (2016/18) had to be completed over two years due to unfavourable weather conditions that limited data quality. As these two LiDAR data sets provide a solid baseline for future comparative work, investigations into alternatives to LiDAR for mapping urban ngahere are currently underway.

3.0 Results and Discussion

3.1 Urban Canopy Cover Overview

Based on the 2013 data set, urban ngahere covered 8.0% of the Māngere-Ōtāhuhu Local Board area, including 7% of roads, 14% of public parks, and 7% of private land. Further information on the 2013 data has been provided in a baseline report (An assessment of Urban Ngahere (Forest) cover and distribution within the Māngere-Ōtāhuhu Local Board; Auckland Council 2019b). Overall canopy cover increased to 8.3% based on the 2016/18 data set (Table 1).

The 2016/18 LiDAR data indicates that the Māngere-Ōtāhuhu Local Board had a net increase in canopy cover of c.17 hectares over the measured time period,

predominately in the road corridor. However, the detailed analysis shows there has been a decrease in the proportion of taller canopy cover within the local board.

The percentage change may not be reflective of total loss, as it is likely some of the forest lost has been replaced by other vegetation growing to over three metres tall. Māngere-Ōtāhuhu has also retained the lowest ranking of Auckland’s sixteen urban local boards for urban ngahere canopy cover. This is largely due to the low canopy cover on privately owned land.

Urban Local Board	Public open space		Private land		Roads		Other public land		Overall coverage	
	2013	2016/2018	2013	2016/2018	2013	2016/2018	2013	2016/2018	2013	2016/2018
Kaipātiki	63	64	25	25	12	14	33	34	30	30
Upper Harbour	50	52	29	30	11	13	10	11	27	28
Hibiscus and Bays	28	29	24	23	15	14	43	42	25	24
Puketāpapa	50	50	17	16	10	12	15	15	20	20
Albert-Eden	33	34	19	18	17	20	19	18	20	20
Ōrākei	25	25	20	19	14	16	20	20	20	19
Waitematā	42	43	16	15	15	17	11	10	19	19
Whau	34	34	17	16	12	13	12	12	17	17
Devonport-Takapuna	24	27	17	17	11	13	13	14	16	16
Howick	25	26	17	17	6	8	11	12	16	16
Henderson-Massey	30	32	14	14	7	8	11	12	15	15
Papakura	16	17	15	15	8	11	8	9	13	14
Manurewa	24	26	11	12	6	9	7	7	12	13
Maungakiekie-Tāmaki	21	23	9	9	10	12	11	11	11	12
Ōtara-Papatoetoe	13	14	8	8	7	9	10	10	9	10
Māngere-Ōtāhuhu	14	14	7	7	7	9	8	8	8	8

Table 1: Urban ngahere in Auckland’s urban local board areas: data includes percentage cover (to nearest whole number) of urban ngahere for different land tenures, and the overall percentage cover of urban ngahere within each board, with a comparison between the 2013 and 2016/18 data sets.

3.2 Canopy Distribution across Māngere-Ōtāhuhu Local Board

The range of variation in canopy cover between statistical areas of the local board is relatively narrow, as shown in **Figures 1 and 2**. The distribution of canopy cover across the local board is relatively evenly distributed compared to other local boards in Auckland, ranging from 5% in Ōtāhuhu Industrial to 15% in Ōtāhuhu East.

Increases in overall canopy cover between the two data sets are most apparent in Ōtāhuhu North, Māngere Bridge, Ambury and Massey Road North (see **Figure 2**), the locations of which have had extensive revegetation planting. Planting areas include the Seaside Park, Ambury Park and areas around the Watercare water treatment plant as an ongoing restoration project.

Small decreases (less than 0.5%) in overall canopy cover occurred between 2013 and 2016/18 in Ōtāhuhu Industrial, Favona West and North and Auckland Airport, attributed mainly to the redevelopment of commercial and industrial sites. Canopy cover should increase in these areas in future data as growth of mitigation planting and planting of street trees occurs throughout developed areas. Auckland Airport, in particular, should see increases in canopy cover as plants within a Watercare restoration project continue to grow and more plantings occur such as on Te Motu a Hiaroa / Puketutu Island.

Over the whole local board, gaps in urban ngahere are generally associated with two categories, the first being high density buildings in industrial and commercial

areas. These are found scattered throughout the local board, concentrated within Ōtāhuhu Industrial, Central and Southwest and in the north east corner of Auckland Airport. Such areas feature extensive buildings and carparks with very little vegetation present, such as around the Pacific Steel Group, Mainfreight New Zealand, Linfox Logistics Head Office and Woolworths New Zealand.

The second category of urban ngahere gaps on a local scale is associated with extensive grasslands typical of sports fields and large recreation reserves. In the Māngere-Ōtāhuhu Local Board this includes Ambury Regional Park, Ōtuataua Stonefields, Portage Rd Reserve, Aorere Park, Māngere Centre Park and Radonich Park. While planting urban ngahere within the sports complexes is not feasible, works could involve

increasing forest cover on the edges of the fields and elsewhere in the parks. Local reserves sited in residential suburbs (e.g. David Lange Park, Imrie Avenue Reserve), as well as drainage and esplanade reserves, represent the most strategic locations to establish further urban ngahere, offering direct benefits to residents as well as improvements to storm water quality.

Planting in parks offers the best opportunities for long-term sustainable management of the urban ngahere due to the lower chance of conflict with infrastructure. A goal is suggested of providing shade trees to all of Māngere-Ōtāhuhu's playgrounds. Other under-developed local parks such as Boggust Park and Radonich Park also have significant potential for additional tree planting.



Established ngahere in Māngere

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Māngere-Ōtāhuhu

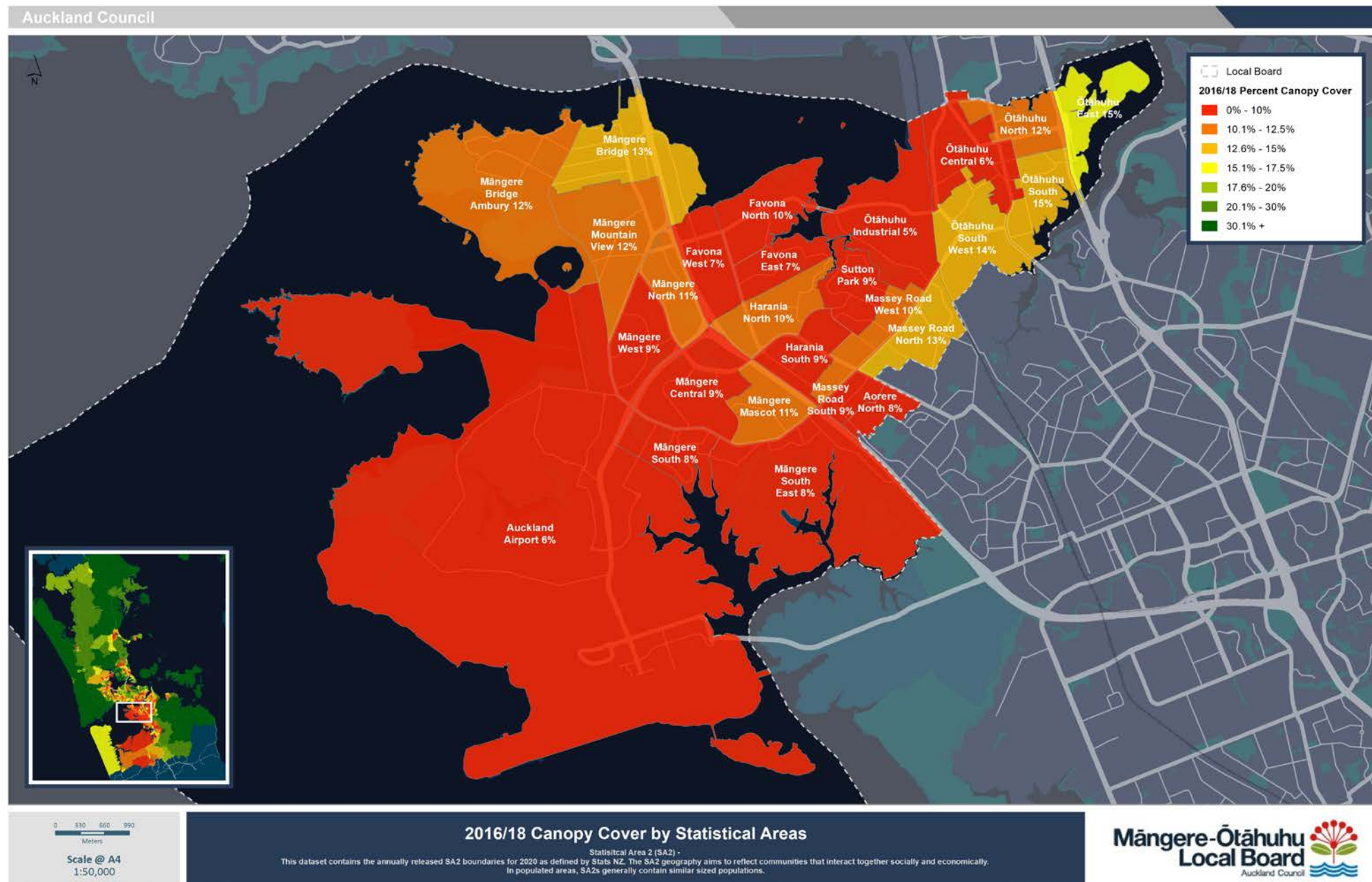


Figure 1: 2016/18 Canopy Cover by Statistical Areas

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Māngere-Ōtāhuhu

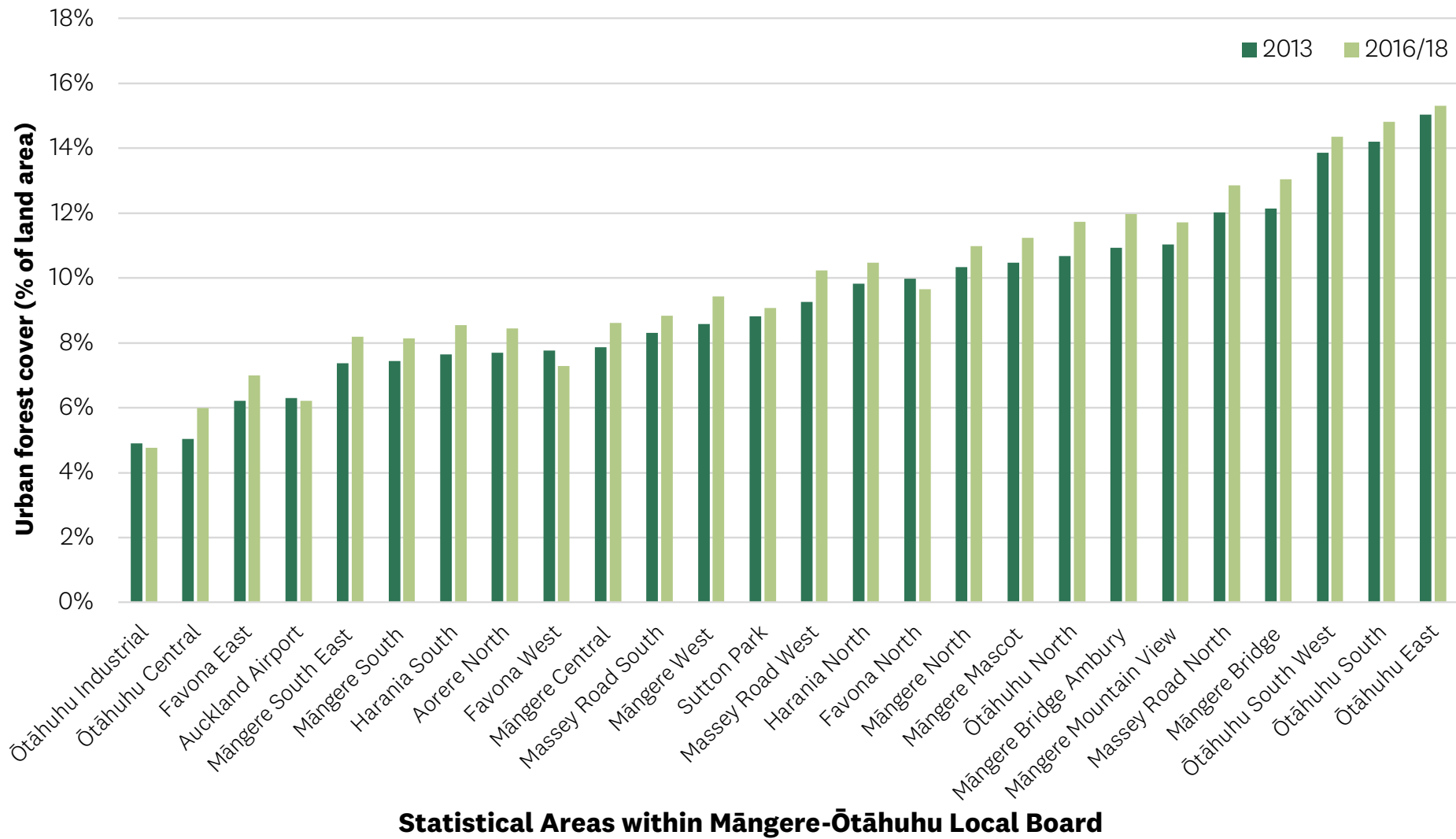


Figure 2: Spatial distribution of urban ngahere canopy within the statistical areas of Māngere-Ōtāhuhu Local Board

3.3 Urban Ngahere Canopy Height

LiDAR data includes a height component, and this information was used to split the recorded canopy cover into different height categories: 3-5 metres; 5-10 metres; 10-15 metres; 15-20 metres; 20-30 metres; and taller than 30 metres. This data is representative of canopy cover height, rather than tree height, as each individual tree may be recorded in several categories.

The height class distribution of the urban ngahere canopy within Māngere-Ōtāhuhu Local Board is displayed in **Figure 3**. In 2013, approximately 26% of the canopy cover was between 3-5m tall, 37% between 5-10m tall, and 37% taller than 10m. This distribution remained similar in the 2016/18 data sets, although the percentage of canopy cover over 10 metres tall slightly decreased, and there was an increase in canopy cover 3-10 metres tall, showing there are new tree plantings in the local board area reaching the height (3m) at which they register as urban ngahere for this study.

This data shows a relatively high presence of tall canopy cover within the local board area compared to other local boards, with all cover taller than 15 metres (including height categories 15-20 metres, 20-30 metres, and 30 metres plus) representing approximately 15% of the total canopy assessed. However, the data also shows a net 2.5 ha loss of forest cover 30 metres and taller between the 2013 to 2016/18 datasets.

Research has shown that many of the benefits attributed to urban ngahere are disproportionately provided by larger trees (Davies et al. 2011, Moser et al. 2015). Large trees typically create more shade per tree due to a larger and wider canopy spread (Moser et al. 2015); intercept larger amounts of particulate pollutants and rainfall due to significantly larger leaf areas; contain more carbon and have higher carbon sequestration rates (Beets et al. 2012, Schwendenmann and Mitchell 2014, Dahlhausen et al. 2016). Additionally, trees are often less susceptible to careless or malicious vandalism by the general public once established; can be pruned to provide higher canopy clearance over roadways; carparks and pedestrian footpaths; typically contribute more to calming and slowing traffic on local streets than small trees; and absorb more gaseous pollutants.

It is therefore an immediate priority to retain existing large trees across the local board area to ensure the positive benefits of these are not lost, in line with the Ngahere Strategy (Auckland Council 2019a) that specifically highlights the importance of retaining trees that are over ten metres in height to maximise the benefits that trees of this size provide.

The increase in proportion of shorter vegetation (3-10 metres) in the 2016/18 data set indicates existing vegetation reaching the height (three metres) at which it registers in the LiDAR data as urban ngahere for the purposes of this study. This vegetation is likely to include revegetation efforts associated with recent development, for example along State Highway 20 and the Watercare water treatment plant redevelopment. Restoration planting will add to urban ngahere cover in future and is progressing the Tararata stream catchment, Ambury Regional Park and Te Pukaki Tapu o Poutukeka / Pūkaki Lagoon.

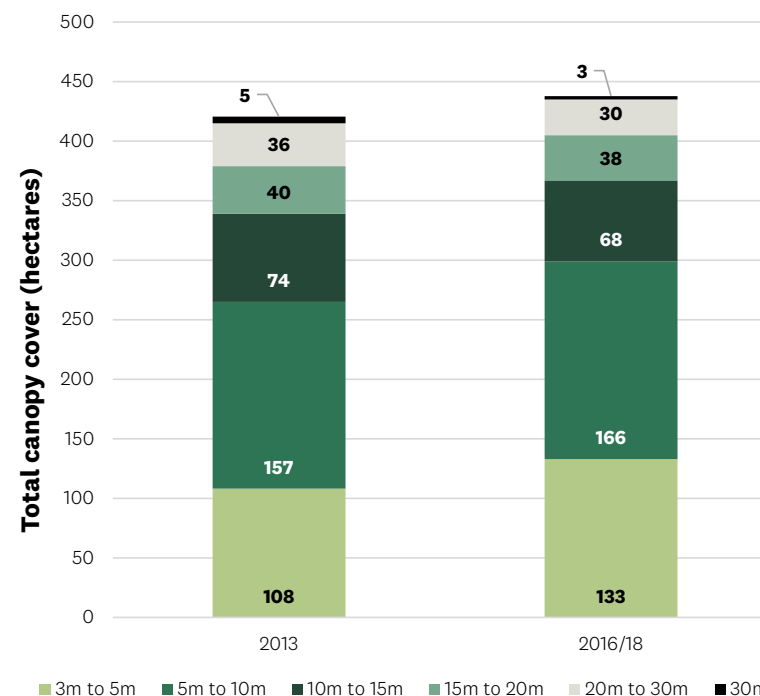


Figure 3: Height class distribution of urban ngahere canopy across all land tenures within Māngere-Ōtāhuhu Local Board

3.4 Urban Forest Tenure

The tenure of urban ngahere described in this report relates to the zoning and ownership of different land parcels within the local board. Publicly owned land is described as either ‘public parks’ or ‘other public land’ (e.g. schools, Council-owned property), trees in the road corridor/road reserves are described as ‘street trees’, and privately owned land (residential or commercial) is described as ‘private land’.

The tenure distribution of urban ngahere canopy within the Māngere-Ōtāhuhu Local Board is displayed in **Figure 4**. Exactly half (50%) of the urban ngahere is located on private property. Public Parks and other publicly owned land (e.g., schools) make up a similar proportion of the urban ngahere, together equating to 41% of the total urban ngahere cover in the local board area.

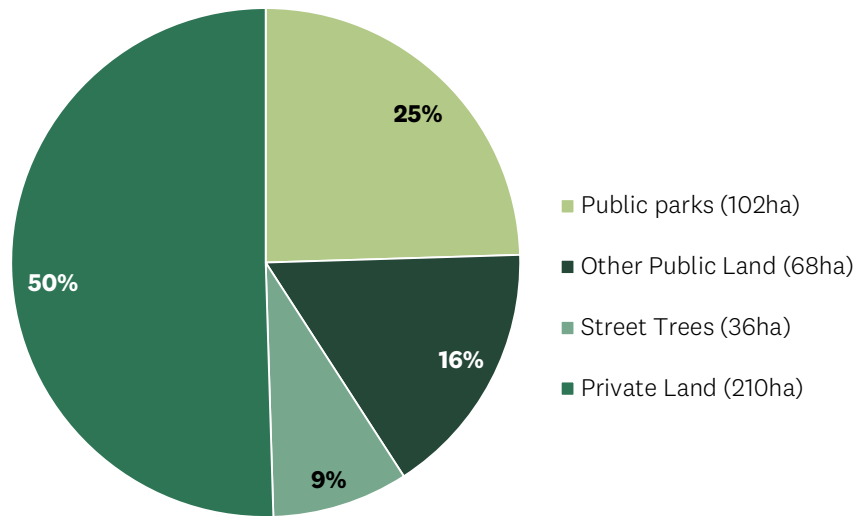


Figure 4: Tenure of urban ngahere canopy within Māngere-Ōtāhuhu Local Board (Auckland Council 2019b)

The 2013 data set shows that public parks have the highest proportion of urban ngahere coverage relative to area out of all the land tenures, as shown in **Figure 5**, followed by private land. However, due to an increase (2.3%) between the 2013 and 2016/18 dataset, road reserves have the second highest percentage of urban tree coverage. Despite the increase, trees in the road corridor still have a lesser role in the provision of urban ngahere in Māngere-Ōtāhuhu, with the coverage of this land tenure being relatively low compared to other urban local boards. To continue with this increasing trend, it is recommended to protect existing street trees wherever possible and continue efforts to establish new street tree plantings.

There has also been a minor net increase in urban ngahere canopy in other public land (0.5%) between the two survey data sets. The percentage canopy cover of public parks (14%) and private land (7%) has stayed the same, as outlined in **Figure 5**.

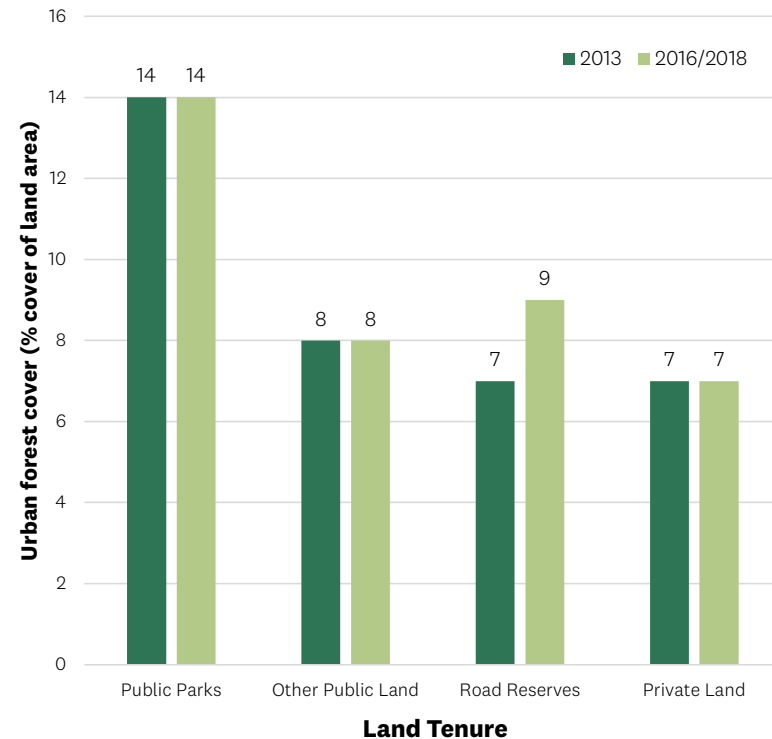


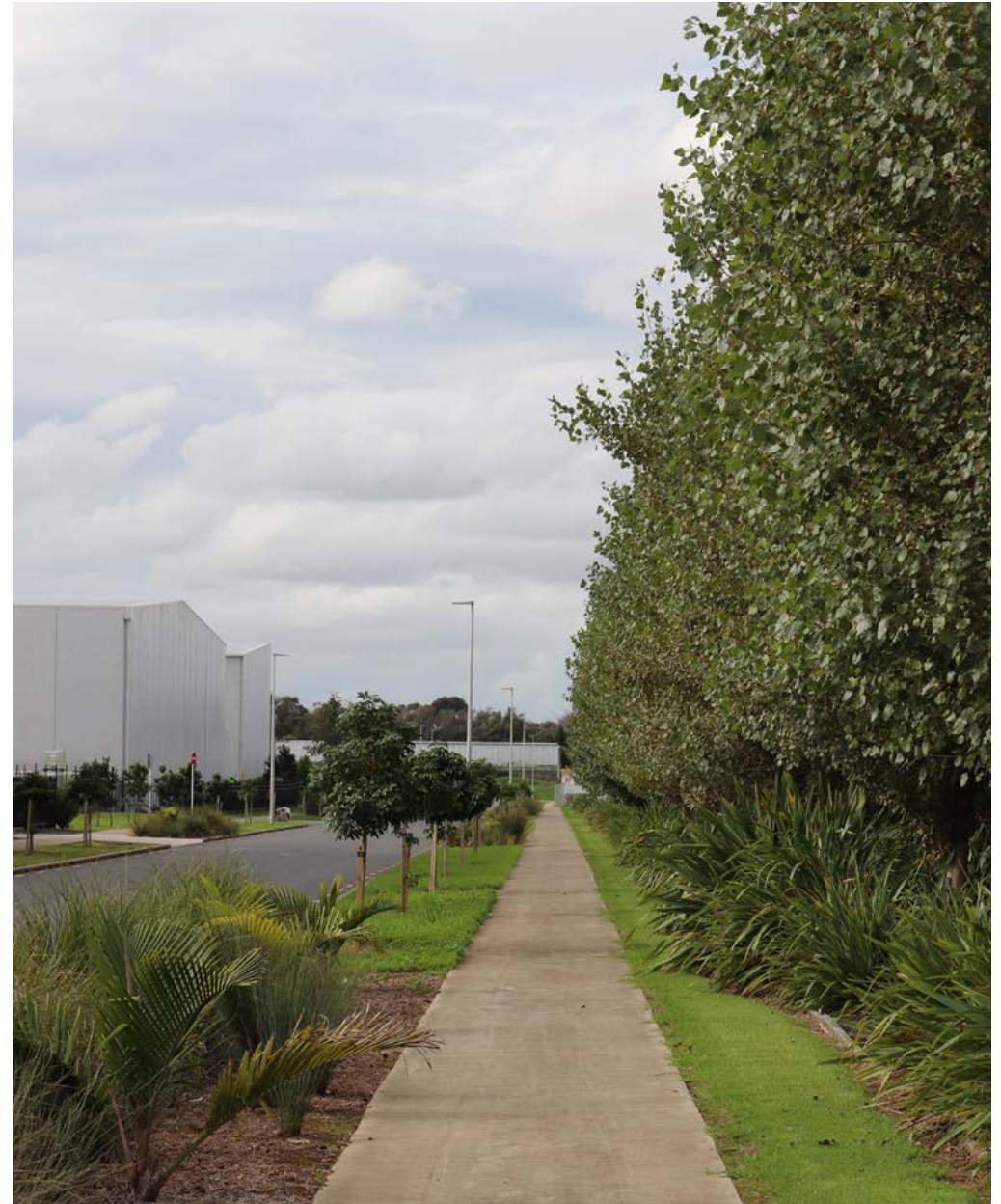
Figure 5: Change in urban ngahere cover of different land tenures in Māngere-Ōtāhuhu Local Board between 2013 and 2016/18

3.5 Urban Ngahere in Relation to Growth Pressures

The Significant Ecological Area overlay (SEA; **Figure 6**) prioritises the areas of urban ngahere in Māngere-Ōtāhuhu with the highest ecological value, providing a starting point for protection. With future development and urban intensification, however, SEA and other continuous areas of urban ngahere are at risk. Canopy cover in relation to the Auckland Future Urban Land Supply Strategy (Auckland Council 2017) forecasting areas of growth is shown in **Figure 7**. Several areas of Māngere-Ōtāhuhu, including Māngere town centre, have land zoned as ‘Residential – Terrace Housing and Apartment Buildings’ in the Auckland Unitary Plan, which is the highest density zone for urban residential development. Land around Maungataketake is also zoned as Future Urban land, to be developed when infrastructure allows and when a Structure Plan has been completed (Auckland Council 2017).

Converting existing rural and residential properties into these new land uses could lead to greater loss of urban ngahere, particularly in regards to trees that can be removed as a permitted activity (i.e., no statutory protection), as tree removal either within the site or on adjacent road reserves may increase the development potential of the site. This is of particular concern for taller trees, as replacement plantings will take many decades to achieve the same height and associated benefits as the canopy cover that has been lost. As such, the Urban Forest Strategy (Auckland Council 2019a) aims to limit loss of percentage of trees larger than 10 metres tall. Structure Planning for Future Urban areas also requires consideration of existing natural heritage values.

Correspondingly, incorporating urban ngahere plantings in new developments will become essential in retaining and increasing urban ngahere cover throughout the board area, particularly as rural land is converted to urban use. A long-term focus on public parks over time will make these more attractive for local residents who will have progressively less open space on private properties as a result of urban intensification. Urban design of new streetscapes will also be important in ensuring appropriate provisions for trees in road reserves, and planting of indigenous species or trees with other notable characteristics, for example rarity or cultural value, will increase the chances of these trees having a higher protection status in the future.



New plantings of native trees in urban development, Māngere

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Māngere-Ōtāhuhu

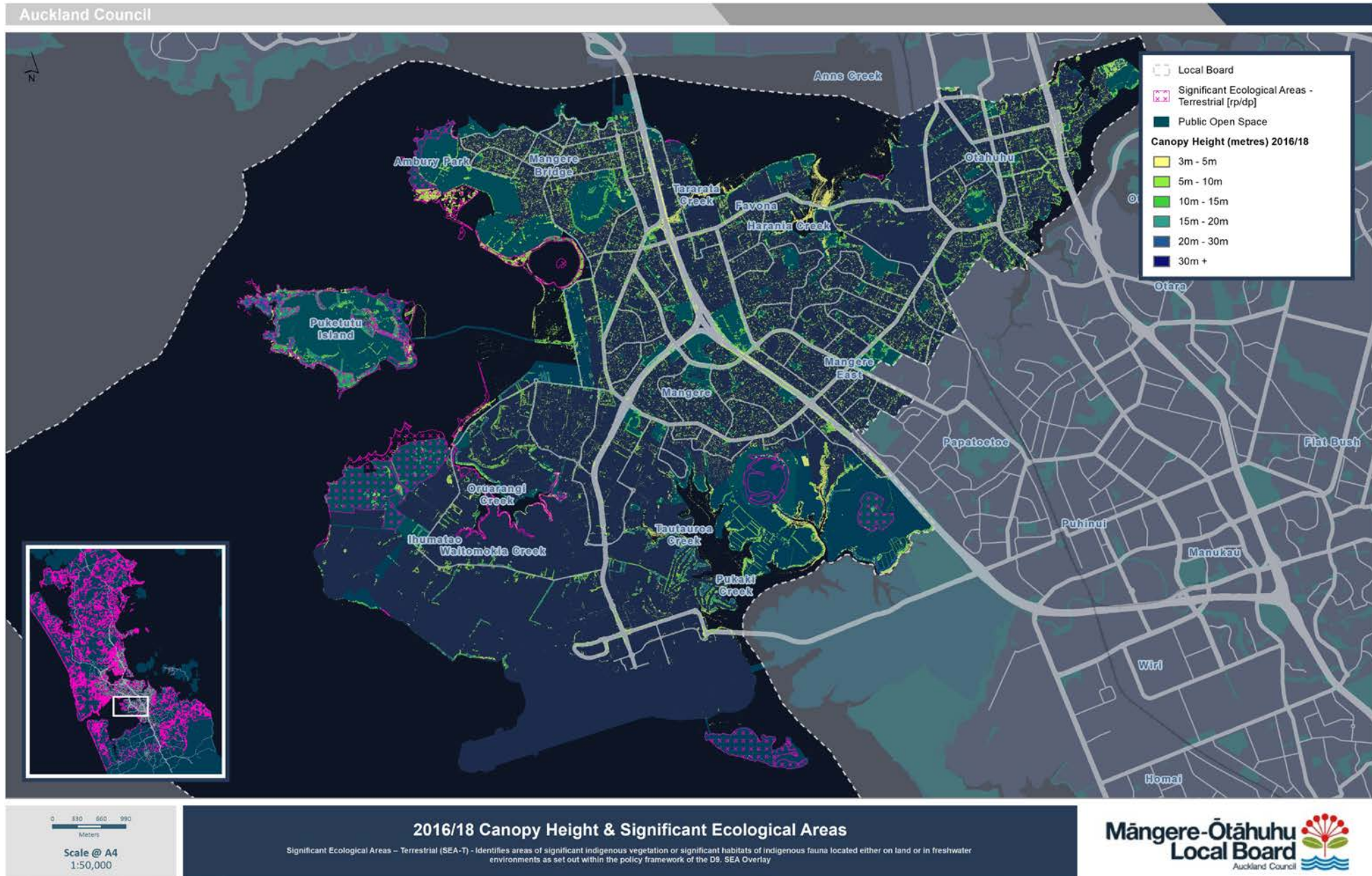


Figure 6: 2016/18 Canopy Height & Significant Ecological Areas

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Māngere-Ōtāhuhu

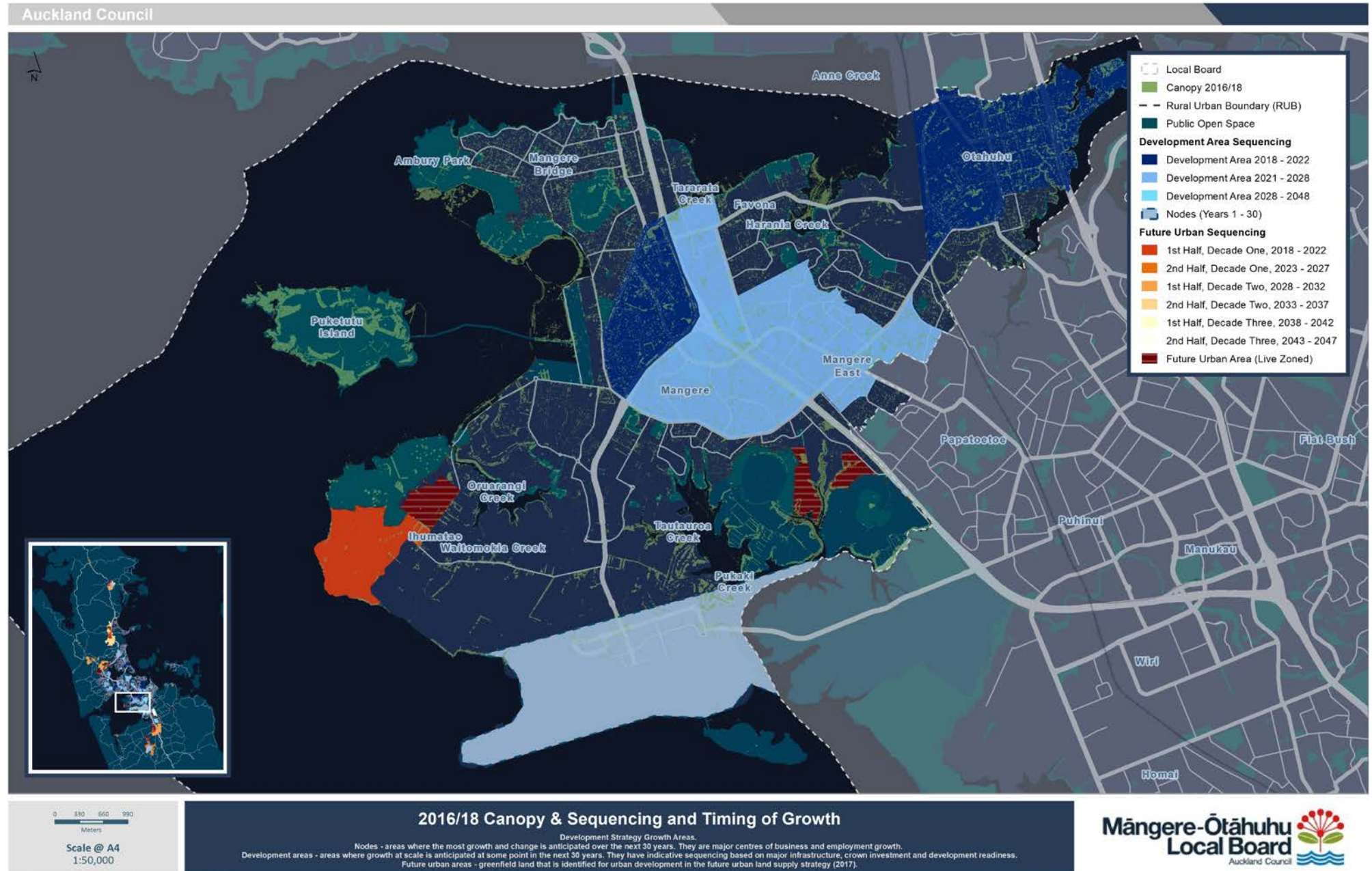


Figure 7: 2016/18 Canopy & Sequencing and Timing of Growth

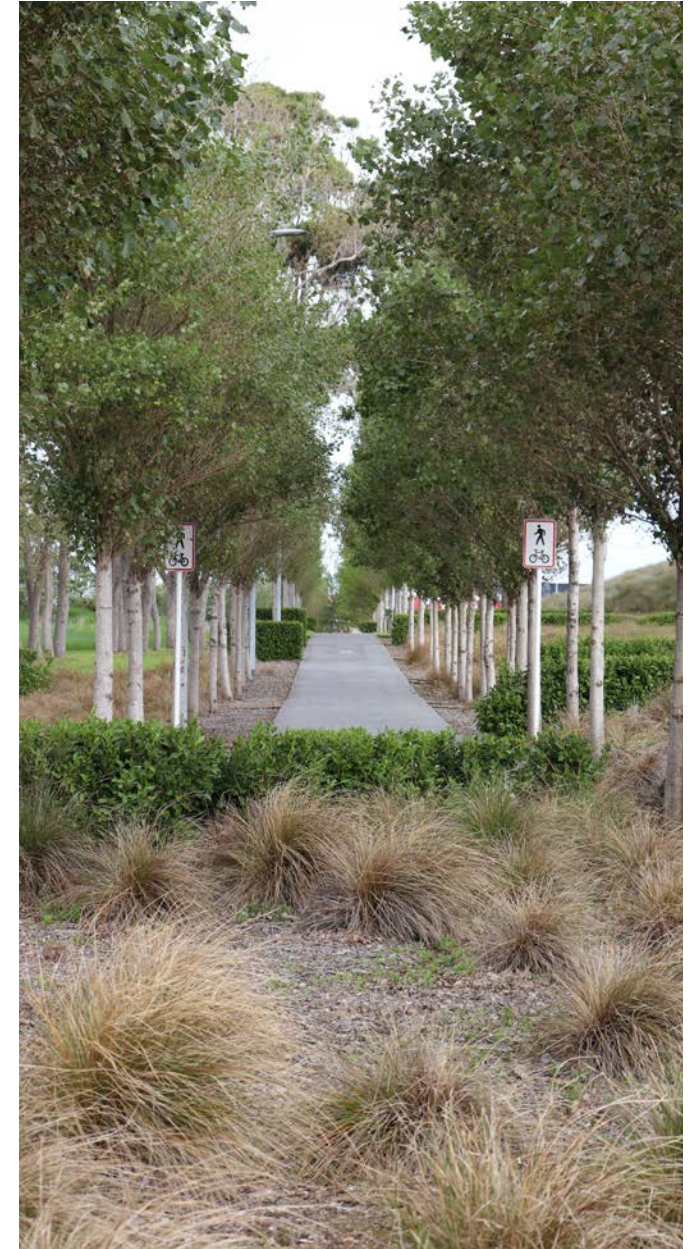
3.6 Recommendations

Recommendations for future urban ngahere management to the Māngere-Ōtāhuhu Local Board include:

- Raise awareness of the value and benefits of urban ngahere canopy and provide advice and assistance to private landowners looking to plant trees on their properties
- implement the Māngere-Ōtāhuhu Urban Ngahere Action Plan 2021 which sets out the processes required to plan, consult with communities to plant new trees annually through the local board work program; along with direction for stakeholders to focus their efforts on helping the local board achieve an overall increase in tree canopy cover
- initiate tree planting programmes in industrial and commercial areas, assess unused areas of public parkland e.g., Boggust Park and Radonich Park
- continue and expand on current restoration planting projects including Ambury Regional Park and Tararata Creek

- undertake connectivity analysis of urban canopy cover (e.g., along streets and watercourses) and determine priority locations for increasing cover in road reserves to create ecological corridors to connect areas of parks and open spaces
- use connectivity analysis to inform future updates to the local board urban ngahere action plan
- protect existing street trees wherever possible and continue efforts to establish new street tree plantings
- continue carrying out urban canopy cover analysis on a regular basis to monitor trends and increases throughout the local board area.

The metrics of the canopy analysis will be used to help inform and prioritise the efforts of the Māngere-Ōtāhuhu Urban Ngahere Action Plan 2021. The action plan highlights the areas to plant new trees and sets out the process to fund, implement, and find ways to protect and nurture existing ngahere on public and private land.



Tree planting along urban cycleway, Auckland Airport

4.0 Acknowledgements

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- Graphics and formatting completed by Q Brand Builders.

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