Puketāpapa 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 Puketāpapa

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

71 parks
all containing urban ngahere

Around
60,000
residents

50% of canopy cover (**190ha** of urban forest) with no statutory protection

Approximately **191** hectares of Significant Ecological Area, concentrated on the southern coast

Average canopy cover of
20%
across local board, including canopy cover of:

50%	12%	15%	16%
on public parkland	**on road reserves**	**on other public land**	**on private land**

130
Notable Tree records

Only two areas (Wesley South and Wesley West) with less than **10%** canopy cover

c.1,800
hectares of land, with

90%
in urban development

c.120
hectares of parks, including:

- **Monte Cecilia Park**
- **Waikōwhai Park**
- **Manukau Domain**

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

379ha of urban forest in 2013,
decreasing to 373ha in 2016/2018

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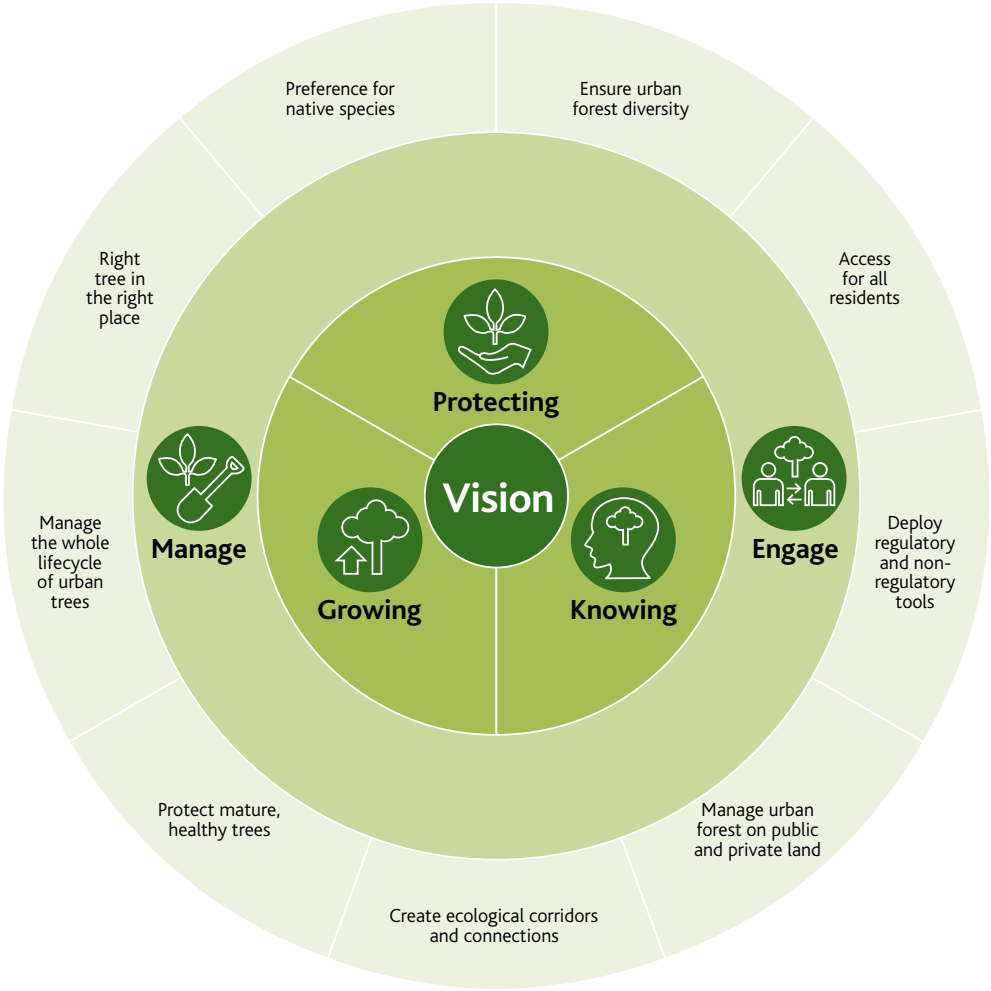
1.0 Preface

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. Early European settlers would have 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. The Morton Bay fig trees in Monte Cecelia Park in Hillsborough are the largest of their type in New Zealand, and another example of the history of Auckland's diverse and unique tree cover.

When European settlers arrived to Tāmaki-Makaurau / Auckland, the gullies of the isthmus were filled with raupō, edged with a varied growth of sedges and other moisture loving plants; and slopes of gullies covered with karamu and cabbage trees. Numerous ferns and low-growing plants amongst blocks of scoria were described as having a luxuriance of growth (Kirk 1870). By the late 19th century, nearly all the land within the Puketāpapa area was under cultivation with a large number of introduced plants. While some of this land has now been left to regenerate, the continuous forest in the local board area is largely confined to the southern coastline along the Manukau Harbour.

The Puketāpapa 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 across Auckland Council to develop detailed analysis of urban forest cover on public and private land, identifying 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 Puketāpapa Local Board

The Puketāpapa Local Board covers approximately (c.) 1,885 hectares (ha) in southern central Auckland, to the north of the Manukau Harbour. Development of the area commenced in the early 20th century, with most growth occurring after the second world war (Auckland Regional Council, 2010). The area is now connected to other parts of Auckland by the South-Western Motorway and has one of the highest rates of urban land cover at around 75%. The population is just over 60,000 residents (Puketāpapa Local Board Plan 2017).

Puketāpapa contains 21 statistical areas (Figure 1). The land use within the local board is primarily residential, including the suburbs of Three Kings, Mount Roskill, Hillsborough, Lynfield, Wesley, and Royal Oak. Small commercial and industrial areas occur around Mt Roskill, including the Foodstuffs North Island Support Centre. The balance of the urban land largely comprises native forest and shrubland along the coast (c. 9.3%), and parklands. Prominent parks include Puketāpapa / Mt Roskill, Te Tātua a Riukiuta / Three Kings, Monte Cecilia Park, and the sequence of reserves along the Manukau Harbour.

At present the remaining indigenous forest cover is largely along the coast of the Manukau Harbour. Wattle Bay is one of the largest reserves, forming part of a highly significant strip of coastal forest that extends from Green Bay to White Bluff. The forest coastline creates an ecological corridor for a range of native flora and fauna, promoting natural processes such as seed dispersal and wildlife movement from the Waitākere Ranges along the Manukau cliffs and into the coastal reserves. Wattle Bay Reserve is of particular significance given it is one of the largest remaining remnants of native coastal forest on the Auckland isthmus, and it has been identified as a Significant Ecological Area (SEA) under the Auckland Unitary Plan. Over 213 indigenous plant species occur in this coastal area (Pishief and Shirley 2015).

Overall, 71 local parks are present in the Puketāpapa Local Board. These include several large-scale sports parks such as Keith Hay Park, Fearon Park/Harold Long Reserve, and Margaret Griffen Park. Several of these parks are under redevelopment to improve facilities, upgrade play areas, and improve the natural environment with stream rehabilitation and indigenous tree planting (Puketāpapa Local Board 2013), including naturalisation of concreted sections of Te Auaunga / Oakley Creek. Two private eighteen-hole golf courses are also present within the area, being Maungakiekie Golf Course and Akarana Golf Course.

Large portions of the local board area are now zoned for development intensification under the Auckland Unitary Plan. The new zoning, including the Mixed Housing Urban Zone and the Terrace Housing and Apartment Buildings Zone, now allows for smaller sections, particularly around Wesley and Three Kings. Consequently, much of the urban forest is under a range of pressures from development, which could potentially lead to irreversible changes in urban forest cover (Brown et al., 2015).

Historic collection of exotic trees as Monte Cecilia Park, Hillsborough

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 Puketāpapa 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 Puketāpapa 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 covers 20.4% of the Puketāpapa Local Board area, including 44.4% of public parks, 16.8% of private land and 10.6% of roads. Further information and detailed analysis of the 2013 data has been provided in a baseline report (Puketāpapa Local Board Urban Ngahere (Forest) Analysis Report September 2019; Auckland Council 2019b). Updated findings show that overall canopy cover decreased to 20.0% based on the 2016/18 data set (Table 1).

Across the assessed time period, Puketāpapa Local Board has retained a relatively high forest canopy cover compared to other urban local boards in Auckland. There are several opportunities for further tree planting initiatives in some parts of the local board. It will also be important to identify unprotected large trees (>15 metres tall) in residential areas and assess how these can be retained to meet the objective of no net loss in future canopy cover surveys.

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 Puketāpapa Local Board

The urban ngahere is not distributed evenly throughout the local board, as shown in **Figures 1 and 2**, which display variation by statistical area. Waikōwhai South has at least twice as much percentage urban ngahere cover as most of the local board statistical areas, as it is mostly made up of Waikōwhai Park, Wattle Bay and Captains Bush. Cover is lowest in the industrial and commercial centres, including Wesley and Mount Roskill. Wesley South has the lowest urban ngahere cover likely due to the construction of the State Highway 20 tunnel; however, canopy cover is expected to increase as planting along the motorway grows above three metres.

Net increases in overall canopy cover between the two data sets are most apparent in Royal Oak West, Mount Roskill North and Mount Roskill Central North, where scattered street trees have been planted throughout the suburbs contributing to the overall urban ngahere cover.

Small net decreases in overall canopy cover occurred between 2013 and 2016/18 in nine statistical areas, but are most apparent in Waikōwhai South, Lynnfield South, Hillsborough South and Mount Roskill White Swan. These decreases are likely attributed to several small residential subdivisions and developments and small-scale residential tree removal, such as landowners removing trees to improve outlook from their properties.

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 mainly found in Wesley South and Mount Roskill Central North. Such areas feature extensive buildings and carparks with very little vegetation present, such as around the Foodstuff Headquarters.

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 Puketāpapa Local Board this includes Keith Hay Park, Fearon Park/Harold Long Reserve, War Memorial Park, Margaret Griffen Park, Lynfield College, and Mt Roskill Grammar School. Plans to upgrade many of the larger sports parks are already underway, for example the Fearon Park and Harold Long Reserve upgrades will include planting of additional shade trees, raingardens, and native buffer planting at the reserve edges (Opus Consultants 2015).

Example of urban trees on edge of sports fields, Keith Hay Park.

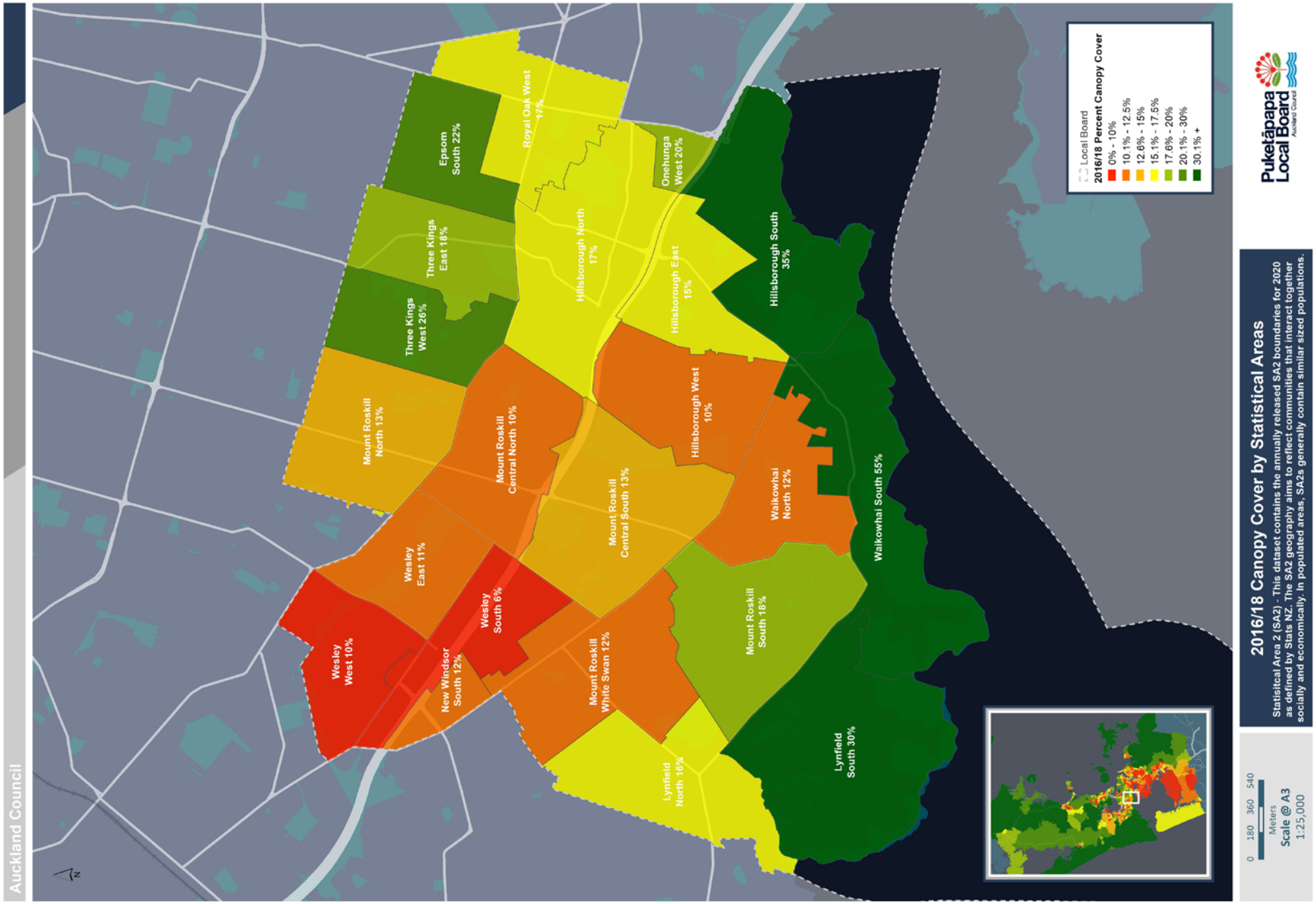


Figure 1: 2016/18 Canopy Cover by Statistical Areas

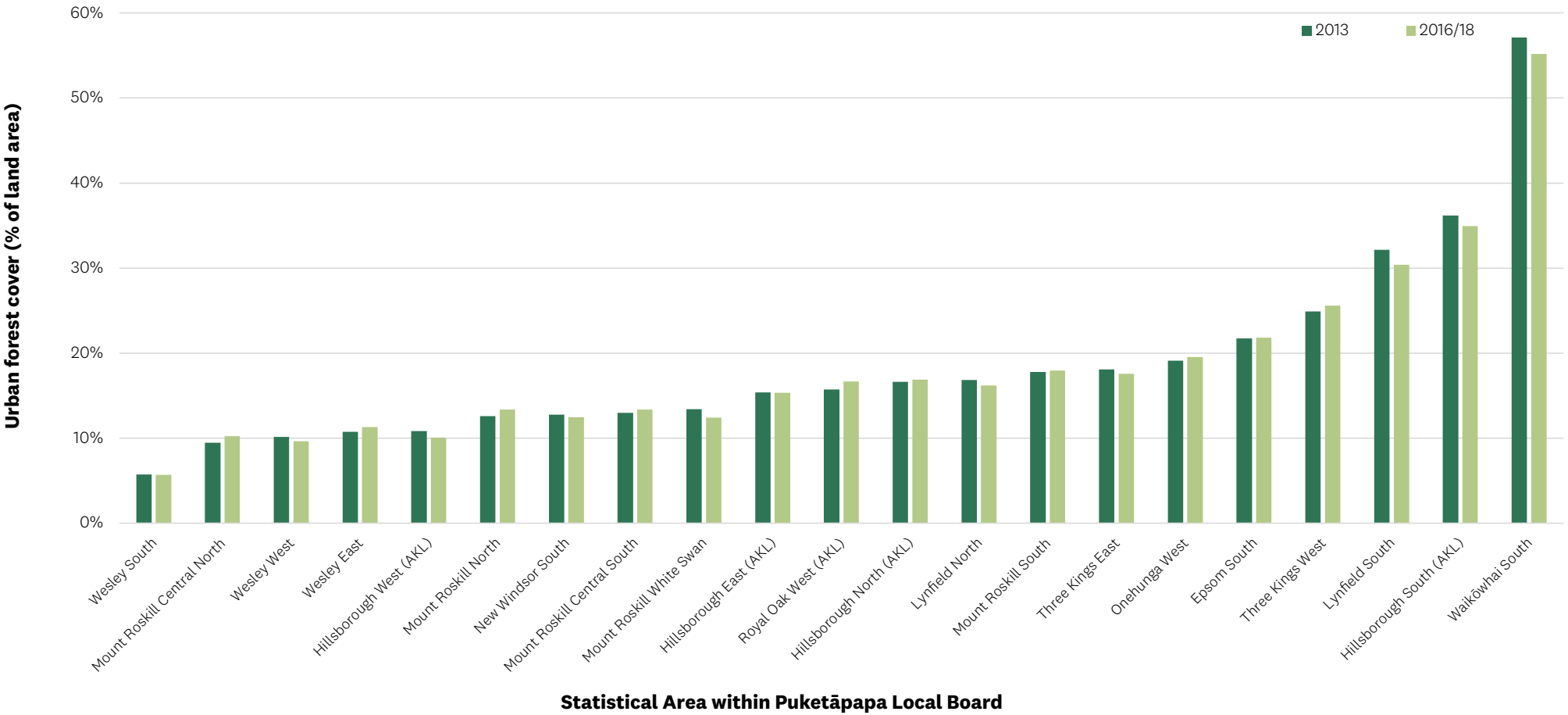


Figure 2: Spatial distribution of urban ngahere canopy within the statistical areas of Puketāpapa Local Board

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 Puketāpapa Local Board is displayed in **Figure 3**. In 2013, approximately one quarter of the canopy cover was between 3-5 metres tall, and almost one half between 5-10 metres tall. The remaining quarter represented canopy cover taller than 10 metres. This distribution remained similar in the 2016/18 data sets, although the proportion of canopy cover over 5 metres tall slightly decreased, being replaced by an increase in canopy cover 3-5 metres tall.

This data shows only low presence of tall canopy cover within the local board area, with all cover taller than 15 metres (including height categories 15-20 metres, 20-30 metres, and 30 metres plus) representing less than 10% of the total urban ngahere canopy assessed. Research has shown that many of the benefits attributed to urban ngahere are disproportionally 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 in the 2016/18 data set indicates existing vegetation reaching the height (three metres) at which it qualifies as urban ngahere for the purposes of this study. This vegetation is likely to include restoration planting efforts associated with recent developments, for example the completion of the State Highway 20 motorway tunnel. Restoration planting is also progressing, including around a tributary of Oakley creek in Molley Green Reserve and along Hendry Avenue as an endorsement of 'Trees for Babies'.

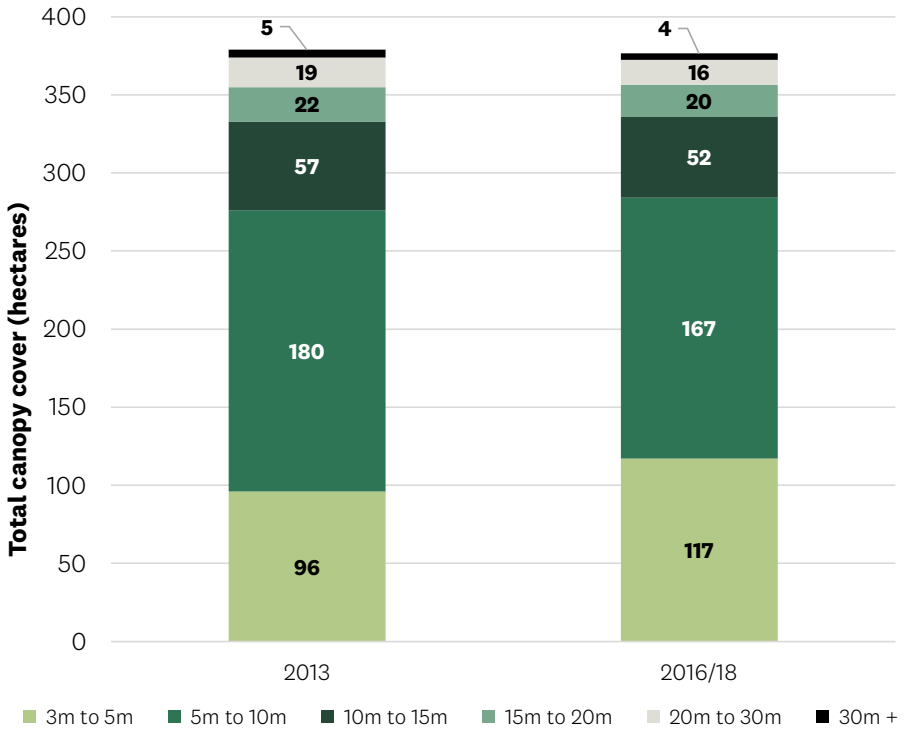


Figure 3: Height class distribution of urban ngahere canopy across all land tenures within Puketāpapa Local Board

3.4 Urban Ngahere 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 Puketāpapa Local Board is displayed in **Figure 4**. Just less than half (44.8%) of the urban ngahere is located on private property. Canopy cover in public parks also makes up a large percentage of the total canopy (38%). Publicly owned land (e.g., schools) and road reserves contain the lowest proportion of urban ngahere, with each having less than 10%.

Public parks have the highest proportion of urban ngahere out of all the land tenures, as shown in **Figure 5**, with the total coverage being twice as much as any other land tenure. There has been a net increase in urban ngahere canopy in the road corridor, between the two survey data sets. However, the percentage canopy cover of other land tenures has slightly decreased.

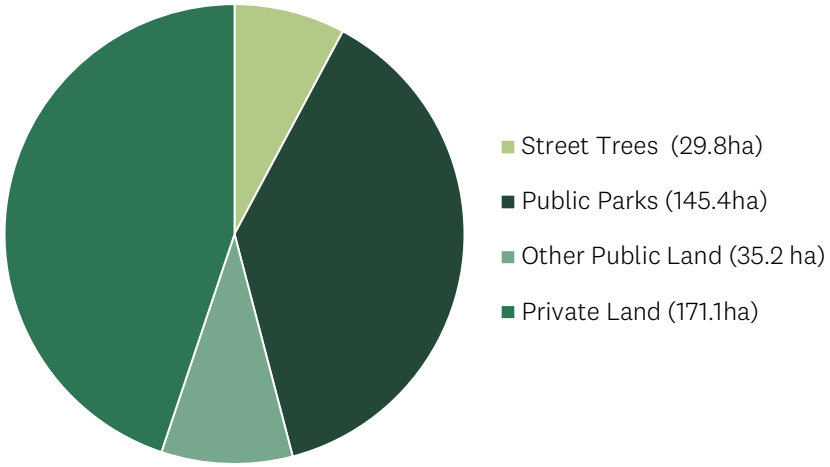


Figure 4: Tenure of urban ngahere canopy within Puketāpapa Local Board (Auckland Council 2019b)

Street trees have a lesser role in the provision of urban ngahere in Puketāpapa, with the coverage of this land tenure (12%) being relatively low compared to other urban local boards. The recommendation to address this is to protect wherever possible existing street trees and increase efforts to establish new street tree plantings. Areas where they have less prominence, such as Wesley, New Windsor North and Hillsborough East, provide a good opportunity to increase urban ngahere cover within the local board that will provide long term benefits to communities. The increase in urban ngahere cover in public parks and road corridors from the most recent data set indicates initial actions to increase canopy cover are proving to be successful, along with growth of existing street trees.

Public parks provide opportunities for long-term sustainable management of urban ngahere, as there is a lower chance of conflict with future housing intensification, less infrastructure conflicts, more considered selection of appropriate species and location for plantings, better arboricultural management, and a coherent policy for ongoing planting of replacement trees.

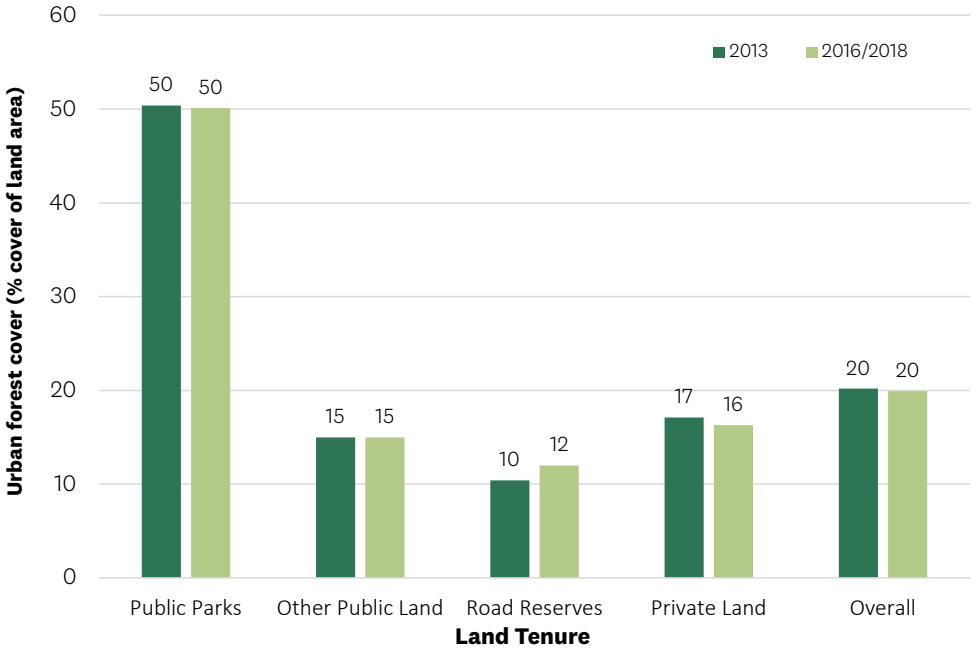


Figure 5: Change in urban ngahere cover of different land tenures in Puketāpapa Local Board between 2013 and 2016/18

3.5 Urban Ngahere in Relation to Growth Pressures

The Significant Ecological Area overlay (SEA; **Figure 6**) prioritises the areas of urban ngahere in Puketāpapa 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**. The largest pockets of SEA and areas of contiguous urban ngahere are found on public reserve land, however, these urban ngahere tracts extend northwards onto residential properties. While the Single House zoning of many of these properties recognises the need to retain larger lot sizes, some of the land, particularly in Lynfield, is zoned 'Mixed Housing Urban' which allows for more intensive development.

Pockets of land in Puketāpapa are also zoned as 'Residential – Terrace Housing and Apartment Buildings' in the Auckland Unitary Plan, which is the highest density zone for urban residential development. This could lead to greater loss of urban ngahere, particularly in regard to trees that can be removed as a permitted activity (i.e., no protection status). For trees that do require consent for removal, while considered on an isolated basis the effects may be considered small, however on a cumulative basis the effects may be large, and these environmental impacts are generally beyond the scope of what is assessed in an application.

This is of particular concern for taller trees, as replacement plantings will take many decades to reach 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.

Correspondingly, incorporating urban ngahere plantings in new developments, such as the Mt Roskill South housing initiative, will become essential in retaining and increasing urban ngahere cover throughout the board area. A 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 intensification continues.

It will also likely be necessary to implement non-regulatory rules in addition to Auckland Council's regulatory tools that act to protect the urban ngahere. Since the removal of blanket tree protection rules, non-regulatory tools will become increasingly important to control the removal of trees and vegetation, particularly on private properties. Examples include landowner advice and assistance with tree care and planting, such as the Tree Protection Grants, community education and outreach programmes, and raising awareness of the value and benefits of the urban ngahere. These tools, if implemented effectively, will help to instil pride for privately owned trees reducing the risk of these being removed, for future development or otherwise.

Urban Ngahere streetscape, Three Kings, Auckland

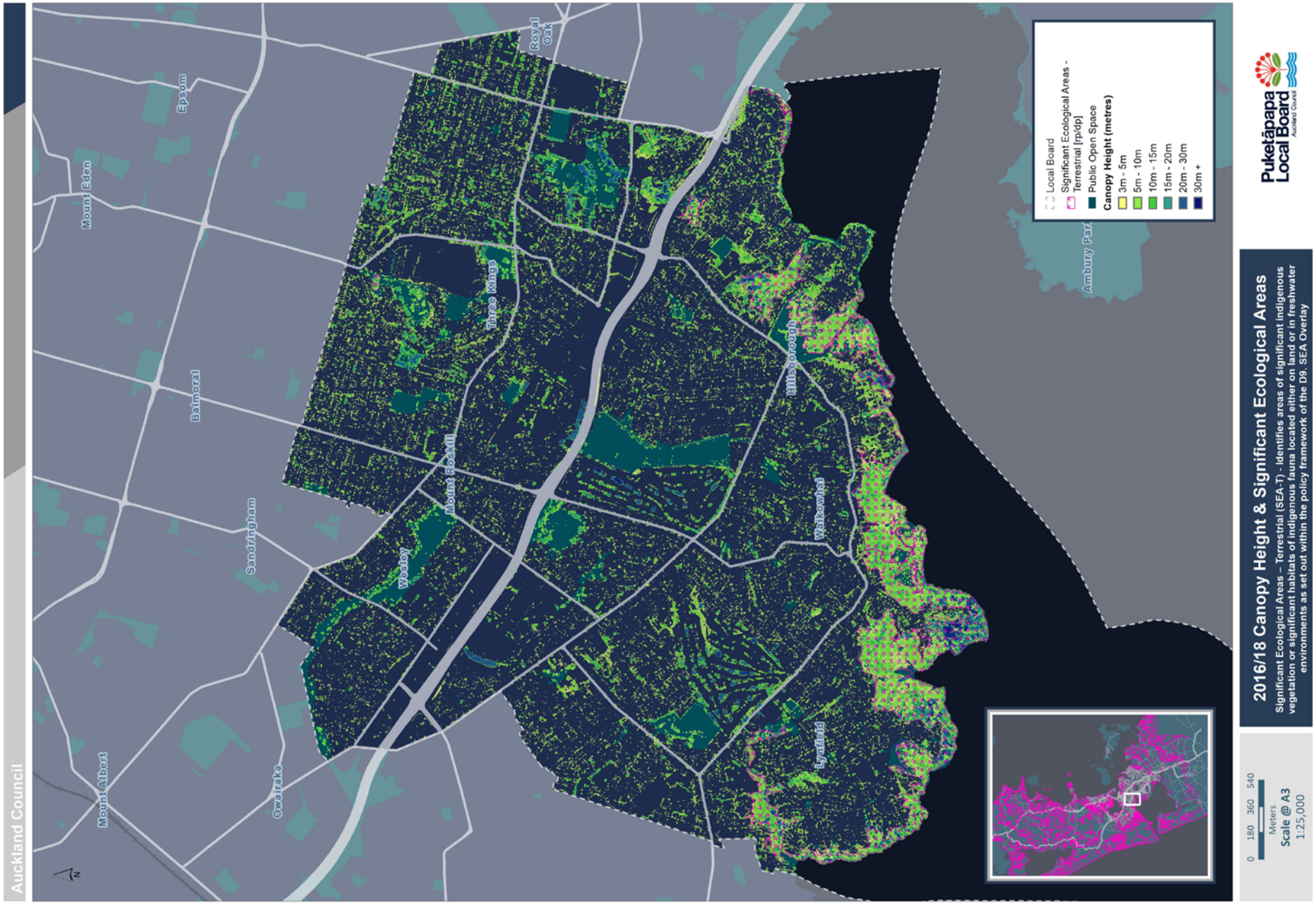


Figure 6: 2016/18 Canopy Height & Significant Ecological Areas

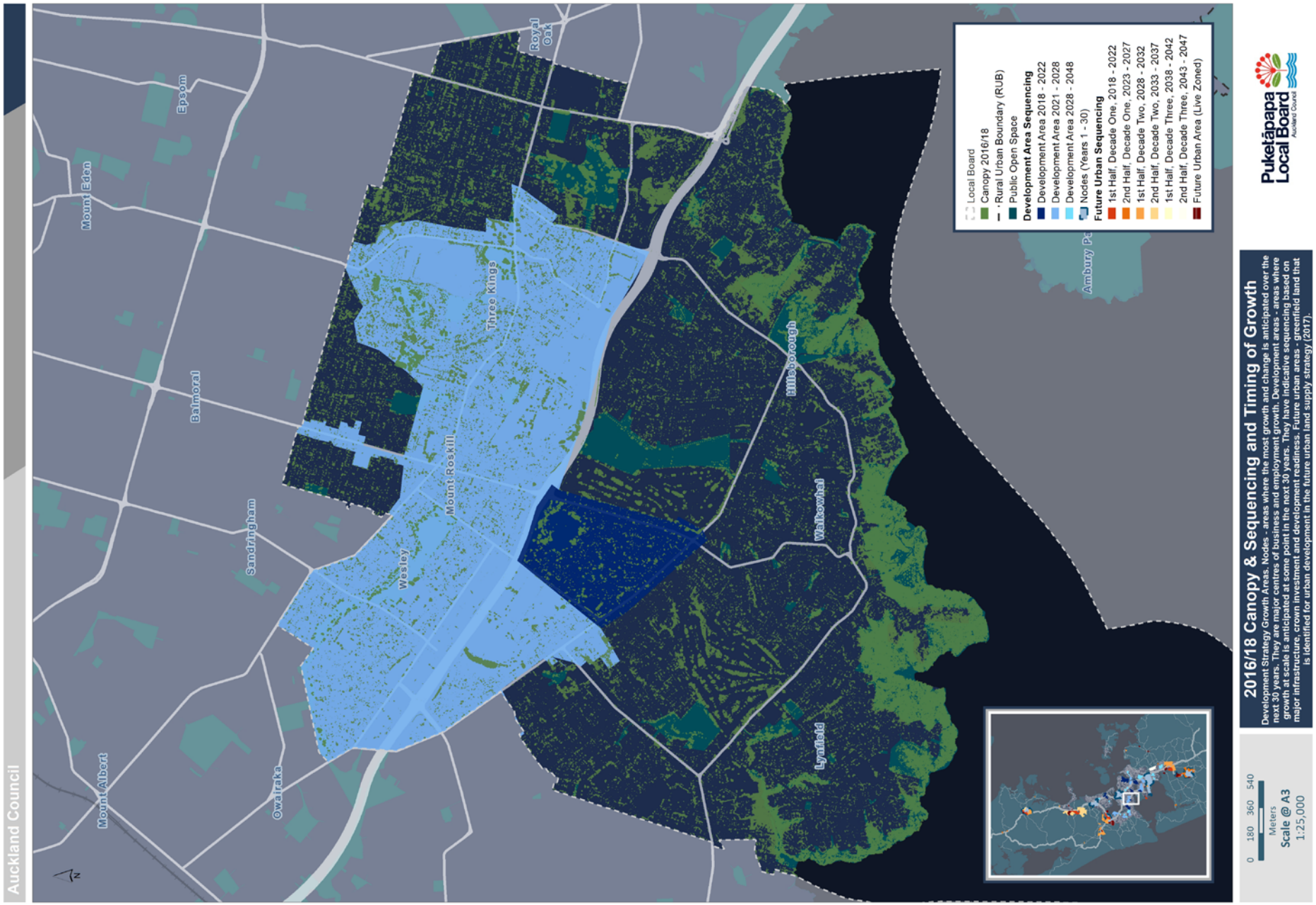


Figure 7: 2016/18 Canopy & Sequencing and Timing of Growth

3.6 Recommendations

Recommendations for future urban ngahere management to the Puketāpapa 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 Puketāpapa Urban Ngahere Action Plan 2021
- complete upgrade works of Walmsley Park and Keith Hay Park, including tree planting around naturalised Oakley Creek
- initiate tree planting programmes in the commercial and industrial areas of Mt Roskill, particularly in locations of high public use, for example Stoddard Road
- identify unprotected large trees (>15 metres tall) in residential areas and assess whether the protection level of these can be increased (e.g., through Notable Tree Overlay or land covenant)
- ensure all new residential developments contain street tree and park plantings, where possible, particularly where existing trees will be lost to facilitate this development
- undertake connectivity analysis of urban canopy cover (e.g., along streets and watercourses) and determine target locations for increasing cover in parks and road reserves to create ecological corridors to other concentrated vegetation
- 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 Puketāpapa Urban Ngahere Action Plan. 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.

Notable Queensland Kauri and Norfolk Island Pine trees' Monte Cecilia Park, Hillsborough

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Puketāpapa
Local Board
Auckland Council