

# **Albert-Eden 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 Albert-Eden

Over

**100,000**  
residents



Nearly  
**3,000**  
hectares of  
land, with

**84%**  
in urban  
development

**329**

hectares of parks,  
including:

- Ōwairaka-Mt Albert
- Maungawhau-Mt Eden
- Titikōpuke-Mt St John

Two areas, Epsom North and  
Mount Eden North, with more  
than **30%** canopy cover

More than **55%** of  
total canopy cover  
on private land

**2%** of canopy cover  
more than **30 metres** tall

**64%** of canopy cover with  
no statutory protection

Average canopy cover of

**20%**

across local board, including canopy cover of:

<b>34%</b>	<b>20%</b>	<b>18%</b>	<b>18%</b>
on public parkland	on road reserves	on other public land	on private land

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

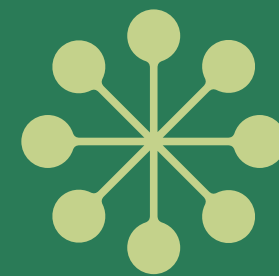
562 ha of urban forest in 2013,  
**increasing to 570ha in 2016/2018**

**87 parks**  
and **28 playgrounds**

**77** hectares of Significant  
Ecological Area

**800**  
Notable Tree records

**1.8%** of original indigenous  
vegetation cover remaining



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Albert-Eden 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.

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 karamū and cabbage trees. By the late nineteenth century, much of the Auckland area was under cultivation with a large number of

introduced plants. Along with residential development commencing in the mid-20th century, these actions have now reduced indigenous forest cover within the Albert-Eden Local Board to small fragments, primarily in local reserves.

The Albert-Eden 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 cover 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 forest for a flourishing future.





## 2.0 Introduction

### 2.1 Albert-Eden Local Board

The Albert-Eden Local Board covers approximately (c.) 2,988 hectares (ha) in central Auckland to the south and southwest of the Central Business District (CBD). It is well connected to the CBD and other parts of Auckland by both road (State Highway 16 Motorway) and rail (Western Train Line). The board area includes some of Auckland's earliest suburbs, along with new development, has a population of just over 100,000 residents (Albert-Eden Local Board Plan 2017), and approximately 84% of the land cover is urban development. An information graphic summarising details related to urban forest in Albert-Eden Local Board is provided at the beginning of this report.

Albert-Eden is the most urbanised local board in the Auckland Region. The land-use within the local board is primarily residential, with commercial areas concentrated in town centres such as the Pt Chevalier Shops, Mt Albert centre, Dominion Road, and the St Lukes Shopping Centre. Approximately 15% of the local board area is public parkland.

At present the remaining indigenous forest cover is approximately 1.8%, including rare lava forests around Te Auaunga / Oakley Creek, Withiel Thomas Reserve, Gribblehurst Park, Almorah Road, and Maungawhau / Mt Eden (Albert-Eden Local Board Plan 2017). The general absence of larger areas of native bush means the urban forest of the local board area is primarily composed of street trees, park trees, and trees on private land. The largest of these specimen trees would have been planted by the first settlers to the area in the early 20th century.

Large portions of the local board area are now zoned for development intensification under the Auckland Unitary Plan 2016. The new zoning, including the Mixed Housing Urban Zone and the Terrace Housing and Apartment Buildings Zone, now allows for smaller sections. 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).



Urban Forest on and around Mount Eden



Oakley Creek Walkway

## 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 Albert-Eden 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, 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 Albert-Eden 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 2019b).

## 2.3 Data Collection

Urban canopy cover across Auckland was mapped in 2013 (Auckland Council 2019c), 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 2016/2018. The second survey (2016/2018) 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 20% of the Albert-Eden Local Board area, including 17% of roads, 33% of public parks, and 19% of private land. Further information on the 2013 data has been provided in a baseline report (Albert-Eden Local Board Urban Ngahere (Forest) Analysis Report September 2019; Auckland Council 2019c).

Overall, canopy cover did not have a net change based on the 2016/2018 data set (Table 1).

As an overview, the initial analysis contained in this report (in line with the knowing phase of the Auckland

Urban Ngahere Strategy) shows where tree planting and/or incentives to retain existing trees could be concentrated, as further outlined in the Albert-Eden Urban Ngahere Action Plan 2021. Implementation of the action plan will increase coverage of urban ngahere across the entire local board area, which is one of the aims of the community as outlined in the Albert-Eden Local Board Plan. The analysis also shows an already relatively high level of urban ngahere in the local board compared to other urban areas of Auckland, and in particular, the highest proportion of street trees and planting in local parks. The 2016/18 LiDAR data indicates growth in canopy cover on road reserves and

parks in the Albert-Eden Local Board, given a combined net increase in canopy cover of c. 18 hectares.

This provides evidence that clearance of trees has not occurred to the extent that may have been predicted following removal of general tree protection, but has occurred, particularly on private land, where there has been a net total canopy cover loss of c. 10 hectares in 2016/2018 compared to 2013. There has also been a shift in the height class distribution between the two data sets, with net decreases in the proportion of taller canopy cover.

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 Albert-Eden Local Board

The urban ngahere is not distributed evenly throughout the local board, as shown in **Figures 1 and 2**. On a local scale, gaps in urban ngahere within the board area are generally associated with two general categories, the first being areas with extensive grasslands typical of sports fields. In the Albert-Eden Local Board this includes Alexandra Park, Eden Park, Chamberlain Golf Course, and larger school complexes such as Mt Albert Grammar School.

The second general category of urban ngahere gaps on a local scale is associated with high-density buildings and commercial areas. This is most noticeable in the commercial area of Kingsland / Mt Eden, the industrial area of Morningside, the St Lukes shopping area, and the Unitec campus. Unitec however has the advantage of being located in close proximity to Te Auaunga / Oakley Creek and the surrounding riparian vegetation, most of which is covered in the highest protection category, being identified as a Significant Ecological Area.

Over half (54%) of the local board is covered in impervious surfaces, which presents an opportunity to plant urban ngahere as a direct remedy. Trees are a well-known solution for stormwater management, as their extensive canopies and subsurface root systems are capable of capturing and pumping substantial amounts of water, providing cooling effects (Berland et al. 2017). Establishing trees within impervious surfaces will act to intercept rainfall before it reaches the ground

and slows inflow rates. This has follow on benefits for stormwater management systems such as underground pipes and nearby waterways (Dwyer and Miller 1999). Opportunities exist for new tree planting in the road corridor which will assist in stormwater management by capturing stormwater flows via infiltration. Trees and other 'green infrastructure' solutions, including rain gardens, permeable pavements, bioswales, and green roofs would be worth implementing at a greater scale and should be encouraged.

There has been minor net changes in urban tree coverage on a local scale, as shown in **Figure 2**.

In general, statistical areas of Albert-Eden have had only a minor net increase or minor net decrease in canopy cover. The only current concern may be that three areas with already low tree coverage (Eden Terrace, Wesley West and Mount Eden North East) had a minor net decrease in cover between the two data sets (**Figure 2**); upon examination this appears to be attributed to small scale residential tree removal and trimming of larger trees. These areas should be re-evaluated in future analysis.



Urban ngahere Reimers Avenue, Eden Park



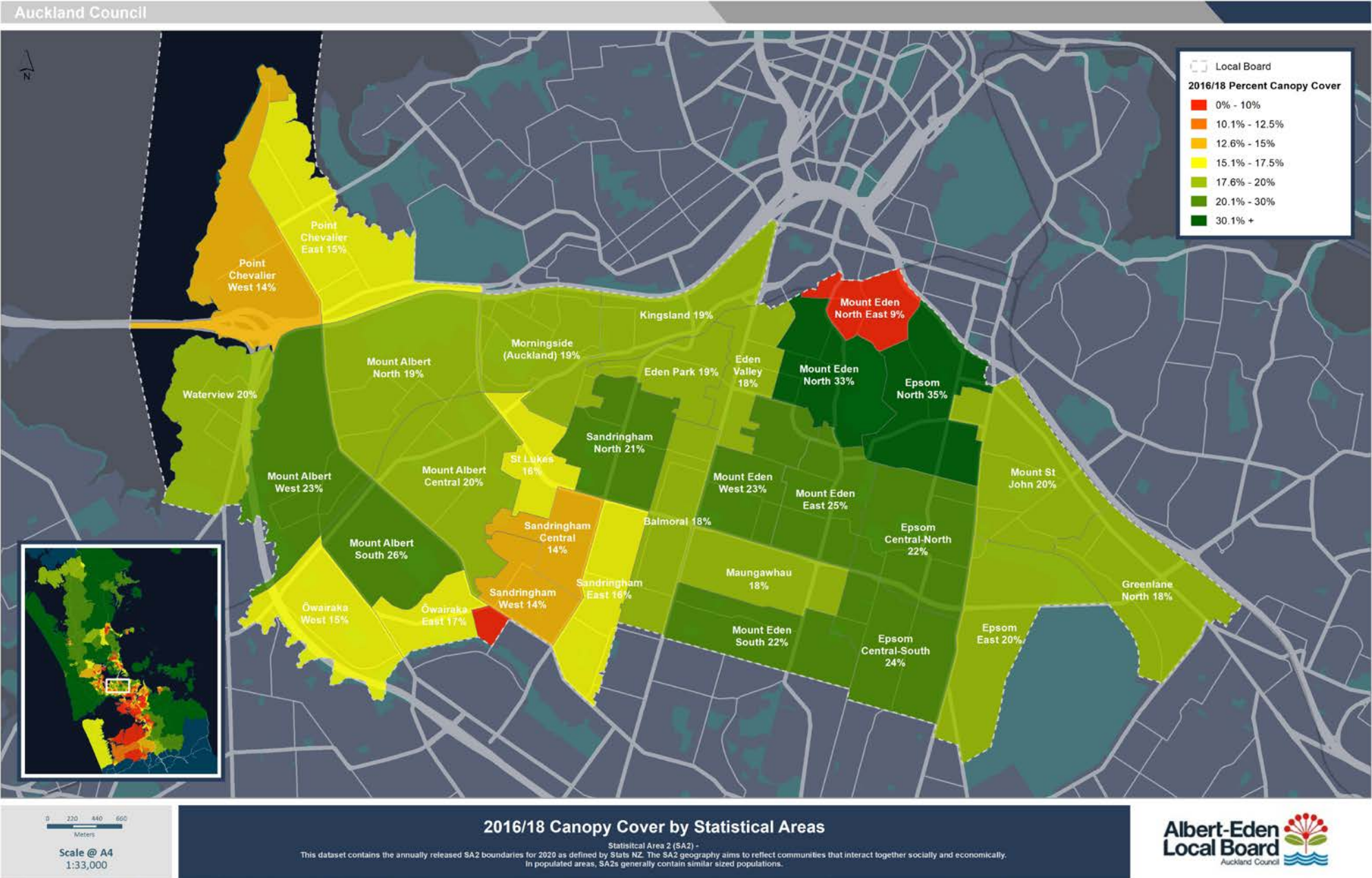


Figure 1: 2016/18 Canopy Cover by Statistical Areas

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Albert-Eden

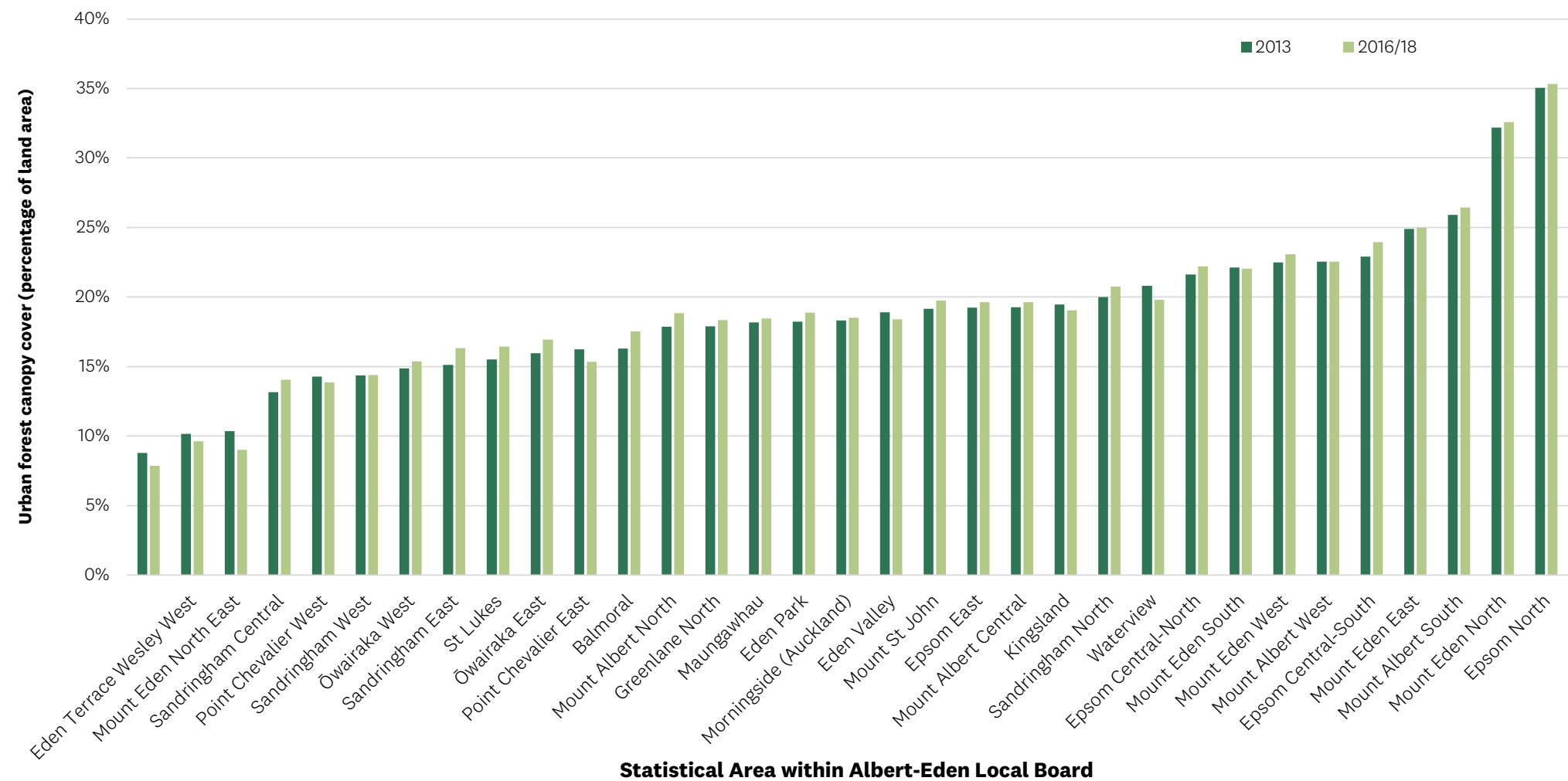


Figure 2: Spatial distribution of urban ngahere canopy within the statistical areas of Albert-Eden Local Board

### 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 Albert-Eden Local Board is displayed in **Figure 3**. In 2013, approximately one quarter of the canopy cover was between 3-5 metres tall, one half between 5-10 metres tall, and the remaining quarter represented canopy taller than 10 metres. This distribution remained similar in the 2016/18 data set, although the percentage of canopy cover between 3-5 metres tall increased to one third of the forest canopy.

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 approximately 7% 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 (all more than ten metres tall) across the local board area to ensure the positive benefits of these are not lost, as also emphasised in the Urban Ngahere Strategy (Auckland Council 2019a).

Conversely, the relatively high proportion of shorter canopy cover across the local board (31% in the 3-5m category and 46% in the 5-10m category) in the 2016/18 data set, indicates a relatively recent surge of tree planting, assuming the smaller stature canopy corresponds to younger trees, rather than shrubs which are limited at their mature height.

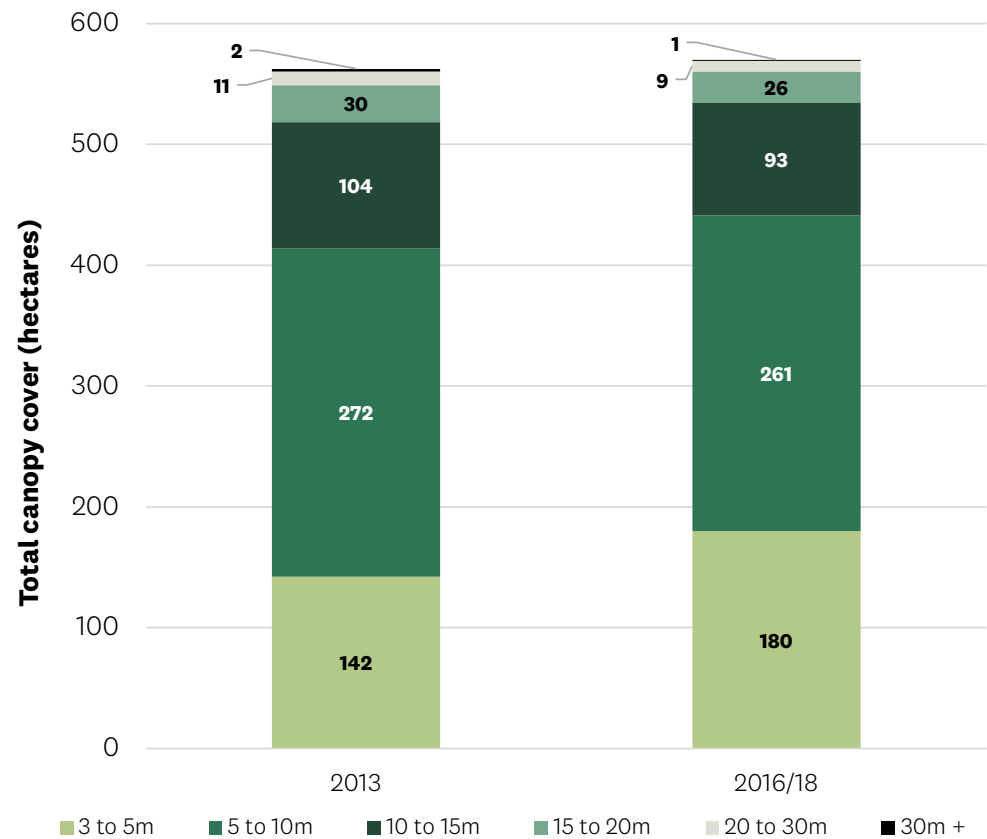


Figure 3: Height class distribution of urban ngahere canopy across all land tenures within Albert-Eden Local Board



## 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 Albert-Eden Local Board is displayed in **Figure 4**. Over half (55%) of the urban ngahere in Albert-Eden is located on private property, which is reflective of the board area being colonised relatively early in Auckland’s history. Public parks and other publicly owned land (e.g., schools) contain a similar proportion of urban ngahere, being 15% and 10% of the total urban ngahere cover, respectively.

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 road reserves. The results show there has been an increase in urban ngahere canopy in public parks, as well as road reserves/road corridors, between the two survey data sets. The percentage canopy cover of other public land and private land has stayed the same.

As the urban ngahere on private land is already relatively high, public parks are a good place to focus additional urban ngahere planting as they comprise approximately 9%

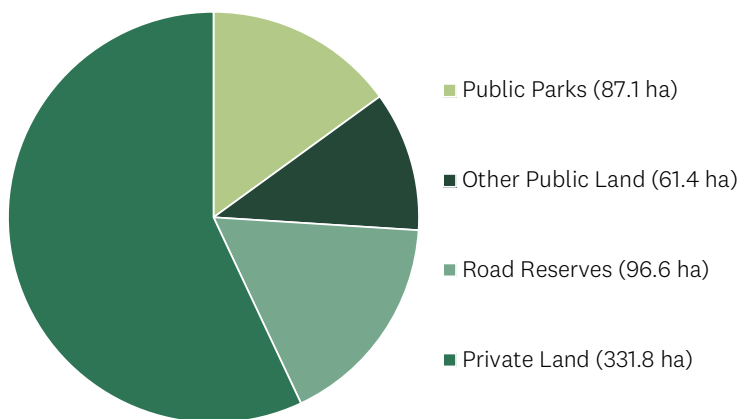


Figure 4: Tenure of urban ngahere canopy within Albert-Eden Local Board (2013 data set)

of the local board land area and are widely distributed. In addition, public parks offer the best opportunities for long-term sustainable management of the urban ngahere due to the lower chance of conflict with future housing intensification, less infrastructure conflicts (which is often an important negative associated with street tree plantings), more considered selection of appropriate species and location for plantings, better arboricultural management, and a coherent policy for ongoing planting of replacement trees. In Albert-Eden, there are also multiple community groups dedicated to preserving the urban ngahere of public reserve land, such as the Friends of Maungawhau and Friends of Oakley Creek / Te Auaunga.

Street trees also have a prominent role in the provision of urban ngahere in Albert-Eden, particularly in the older suburb areas of Epsom, Mt Eden and Mt Albert. Areas where they have less prominence (e.g., Pt Chevalier West, with 8% canopy cover in road corridors, and Wesley West, with 6%) provide a good opportunity to plant new trees to increase urban ngahere cover within the local board that will provide long term benefits to communities. Establishment of trees in the road reserves of the Morningside industrial area and around Mt Eden prison will also improve the urban ngahere in these locations, where there is little to no space to establish trees on private land.

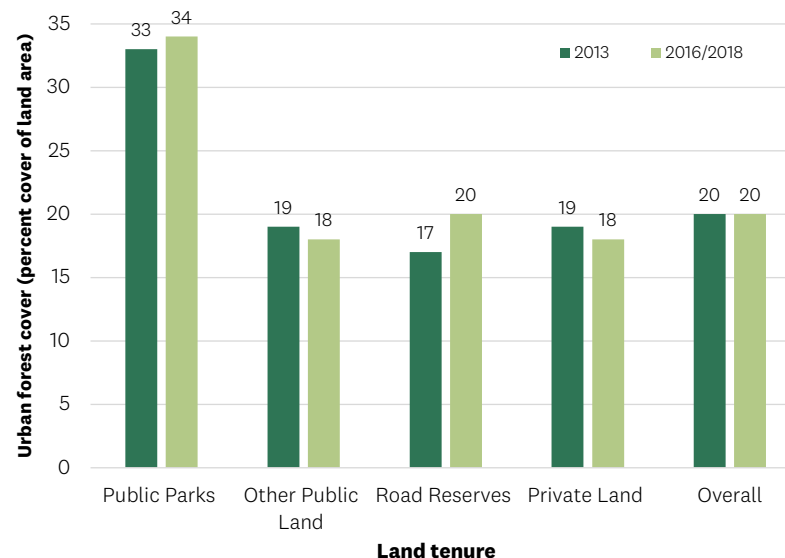


Figure 5: Change in urban ngahere cover of different land tenures in Albert-Eden Local Board between 2013 and 2016/18

## 3.5 Urban Ngahere in Relation to Growth Pressures

The Significant Ecological Area overlay (SEA; **Figure 6**) prioritises the areas of urban ngahere in Albert-Eden 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**. In Albert-Eden, much of the land earmarked for further development is zoned 'Residential – Terrace Housing and Apartment Buildings', which has the potential to see even greater loss of urban ngahere, particularly in regards 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.

Despite the already high canopy cover relative to other land tenures, public parks and other public land also represent the most strategic locations to establish further urban ngahere. The type of planting that could be carried out within the existing public reserve network falls into two main categories. The first category is plantings around the margins of sports parks where this does not conflict with the sports fields themselves (e.g., Pt Chevalier Bowling Club, Kūkūwai Park, Mt Albert Grammar, St Cuthbert's College, and Dilworth Senior Campus); all these parks have grassy margins and/or odd shaped corners that are separated from the playing fields. The second category is establishing urban ngahere in reserves zoned for informal recreation use that are currently dominated by grassland (e.g., Mt Albert Domain, Heron Park, and Coyle Park).

Residential intensification of the Auckland urban area will further limit the space available for retaining and establishing medium to large-sized trees on both public and private land in the future. To this end, the Albert-Eden Local Board is encouraged to work with Auckland Council to readdress the current rules for tree and vegetation protection, in particular for trees more than ten metres tall. The assessment of options to protect trees and vegetation on private land could include legal protection mechanisms such as Council registered covenants and covenants established through the Queen Elizabeth II Trust and Ngā Whenua Rāhui programmes.



Urban Ngahere, Sandringham



# Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Albert-Eden



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



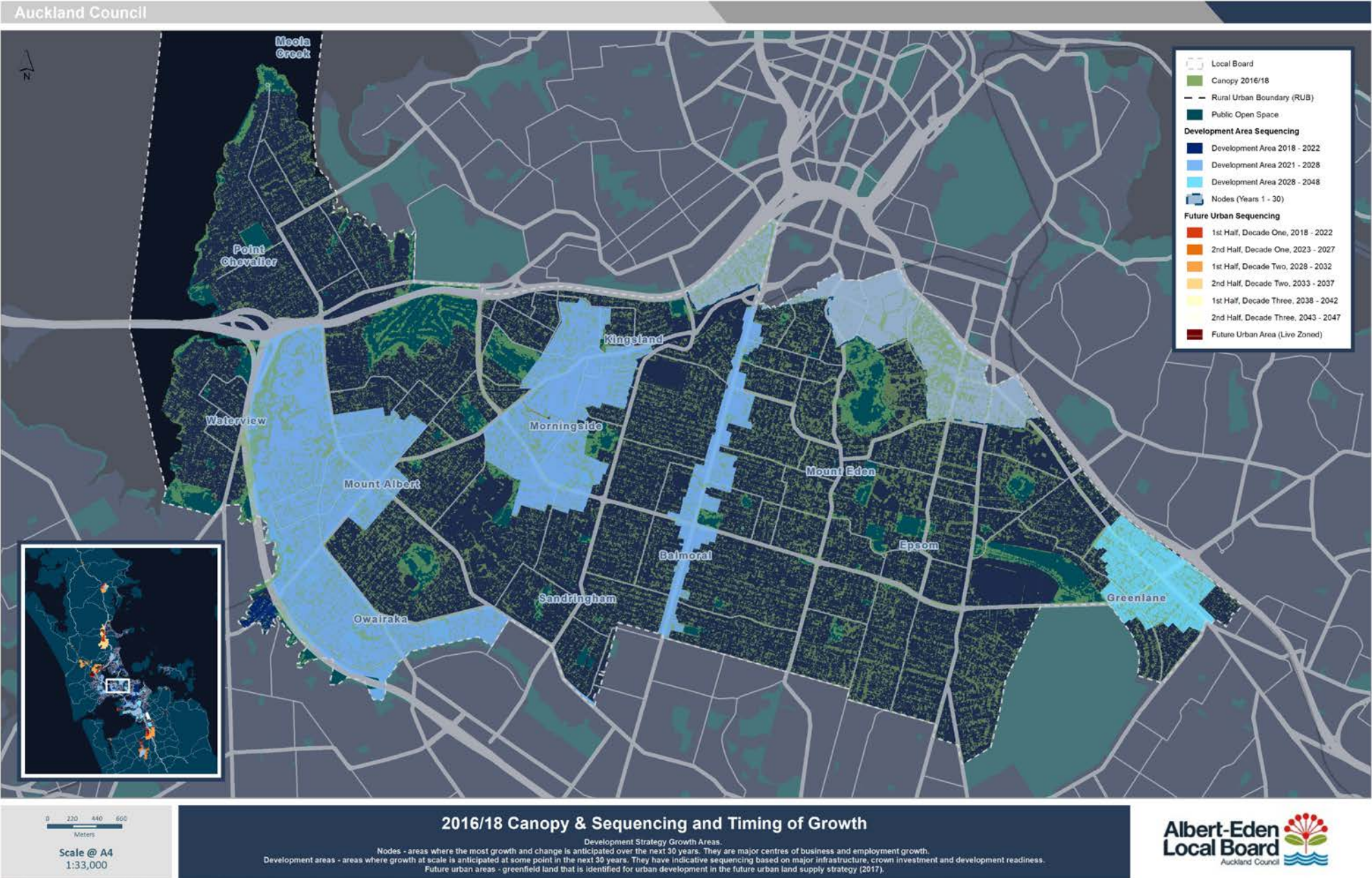


Figure 7: 2016/18 Canopy & Sequencing and Timing of Growth



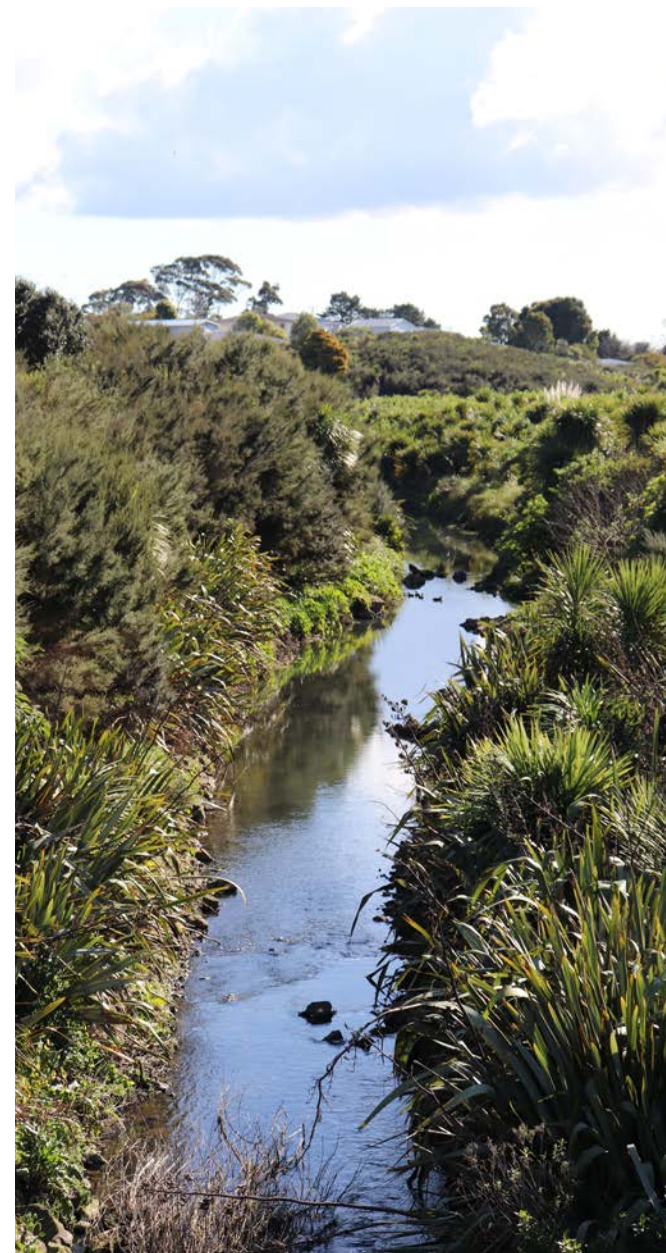
## 3.6 Recommendations

The assessment of urban tree cover in the Albert-Eden Local Board presented in this update report aims to assist in the knowing phase of the Auckland Urban Ngahere Strategy. The analysis of existing tree cover distribution, structure, tenure, and protection, provides the local board with a basis for determining where to focus efforts in improving urban ngahere cover during the growing phase, to be initiated in the near future.

Recommendations for future urban ngahere management to the Albert-Eden Local Board include:

- Raise awareness of the current rules for tree and vegetation protection, including the Significant Ecological Area and Notable Tree overlays
- implementation of the Albert-Eden Urban Ngahere Action Plan 2021
- initiate tree planting programmes in the commercial and industrial areas of Kingsland, Mt Eden and St Lukes, particularly in locations of high public use, for example Dominion Road
- initiate tree planting where possible in unused corners or edges of sports parks, including Kūkūwai Park
- investigate potential for including green infrastructure in new commercial and residential developments, and how this could become a requirement for developers
- undertake connectivity analysis of native plantings (e.g., along Oakley Creek) and determine target locations for increasing urban ngahere 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 Albert-Eden 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.



Ngahere restoration Te Auaunga / Oakley Creek, Ōwairaka

## 4.0 Acknowledgements

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