

Howick 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 Howick

Approximately

142,700
residents

Two statistical areas - Shelly Park and Tuscany Heights - with more than **30%** canopy cover

More than **70%** of total canopy cover on private land

Nearly
7,000
hectares
of land

727

hectares of parks, including:

- Mangemangeroa Reserve
- Point View Reserve
- Murphys Bush

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

54% of canopy cover with no statutory protection

Average canopy cover of

16%

across local board, including canopy cover of:

26%	8%	12%	17%
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

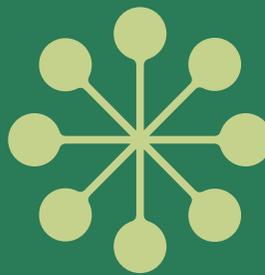
1,123 hectares of urban forest in 2013, **remaining the same in 2016/2018**

More than
230 local parks
and **55 playgrounds**

293 hectares of Significant Ecological Area

118
Notable Tree records

1.8% of original indigenous vegetation cover remaining



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Howick 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 Howick Local Board to small fragments, primarily in local reserves.

The Howick 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 Howick Local Board

The Howick Local Board covers approximately (c.) 7,000 hectares (ha) in eastern Auckland, located between the Tāmaki River to the west, the Mangemangeroa Stream to the east and the Redoubt Road ridge to the southeast. The population of the local board is approximately 142,700 residents.

Land-use within the board is very varied, with well-established (pre-1990) residential suburbs dominating the northern half of the board, newer and developing residential suburbs to the east and south, large retail centres at Botany Downs and Pakuranga Plaza, and a swathe of commercial and industrial land to the west, encompassing Highbrook Park and parts of East Tāmaki. Howick’s southern and eastern boundaries extend just beyond the recognised rural-urban boundary into the adjacent rural regions around Brookby and Whitford, with the south-eastern spread of development butting up against the physical and regulatory limits imposed by topography and zoning.

Approximately 11% of the local board area is public parkland, with bush reserves containing pockets of remnant native forest. These reserves are predominantly

located along Howick’s eastern margins at the interface between the suburbs and the rural areas beyond and on the coastal fringe. Examples include Mangemangeroa Reserve, Point View Reserve, and Murphys Bush.

Large reserves for passive or active recreation, or a mixture of both, are distributed throughout Howick and include Barry Curtis Park, Lloyd Elsmore Park, Macleans Park (with substantial areas of native revegetation planting), Tī Rakau Park, Pigeon Mountain, Murvale Reserve (with an outstanding collection of early exotic plantings), and William Green Domain.

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. 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).

An information graphic summarising local board details related to urban forest is provided at the beginning of this report.



Urban forest around central Howick



The ‘Rural-Urban Boundary’ viewed from Point View Reserve, East Tāmaki Heights

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 Howick 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 Howick 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 2016/2018. 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.



New native restoration planting

3.0 Results and Discussion

3.1 Urban Canopy Cover Overview

Based on the 2013 data set, urban ngahere covered 16% of the Howick Local Board area, including 6% of roads, 25% of public parks, and 17% of private land. Further information on the 2013 data has been provided in a baseline report (Howick Local Board Urban Ngahere (Forest) Analysis Report September 2019; Auckland Council 2019b). There was no net change in overall canopy cover 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 that there are some obvious areas of urban ngahere concentration, while there are also areas that are lacking urban ngahere. The lowest cover (3-6%) tends to be in central/southern areas of the

local board (Botany Central/South, Redcastle, Ormiston North and Donegal Park), while the eastern parts of the local board, Shelly Park and Tuscany Heights, have the highest cover (more than 30%). Although the canopy cover in East Tāmaki is low (5%), the percentage of canopy cover >30 m tall is high compared to other statistical areas in the local board. Other suburbs with a relatively high level of tree cover are the older coastal suburbs of Shelly Park, Mellons Bay and Cockle Bay.

The 2016/18 LiDAR data indicates growth in canopy cover on road reserves and parks across the Howick Local Board, with a combined net increase in canopy cover of c.26 hectares. Conversely, there has been a net reduction in canopy cover of c.8 hectares on privately owned land. An example of this decrease has been observed on private land in Ormiston East, where canopy cover has shown a net reduction of 13 hectares since 2013.

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 2016/2018 data sets.

3.2 Canopy Distribution across Howick 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. Urban ngahere covers 16% of the Howick Local Board area as a whole. However, when excluding the rural parts of Howick and considering only the urbanised areas, the level of canopy cover is closer to 11%. This is a low figure for an urban area and well below the level of cover targeted within Auckland's Urban Ngahere Strategy. This strategy has a goal of achieving an average 30% canopy cover across all of urban Auckland, with no local board area having less than 15% cover (Auckland Council, 2019a).

The reliance on the rural fringe of Howick in raising its overall level of tree cover is highlighted by the fact that, despite making up less than a quarter of the board's land area, it contains nearly half of its urban ngahere cover. Small losses of rural land to urbanisation would be likely to have a disproportionate effect on the urban ngahere, both in terms of overall tree cover and by affecting a greater proportion of large trees.

Over half (51%) of the local board is covered in impervious surfaces, which presents an opportunity to plant urban ngahere, particularly in the road corridor, 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 interception and infiltration. Trees and other 'green infrastructure' solutions, including rain gardens, permeable pavements, bioswales, and green roofs, are worth implementing at a greater scale and should be encouraged.

There has not been a significant change in urban tree coverage on a local scale, as shown in **Figure 2**. In general, statistical areas of Howick have had only a minor net increase or minor net decrease in canopy cover. The only current concern may be Donegal Park, with already low tree coverage, had a minor net decrease in cover between the two data sets. Upon examination this appears to be attributed to small scale residential tree removal and trimming of larger trees.



Matanginui/Green Mount, East Tāmaki, Auckland

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Howick

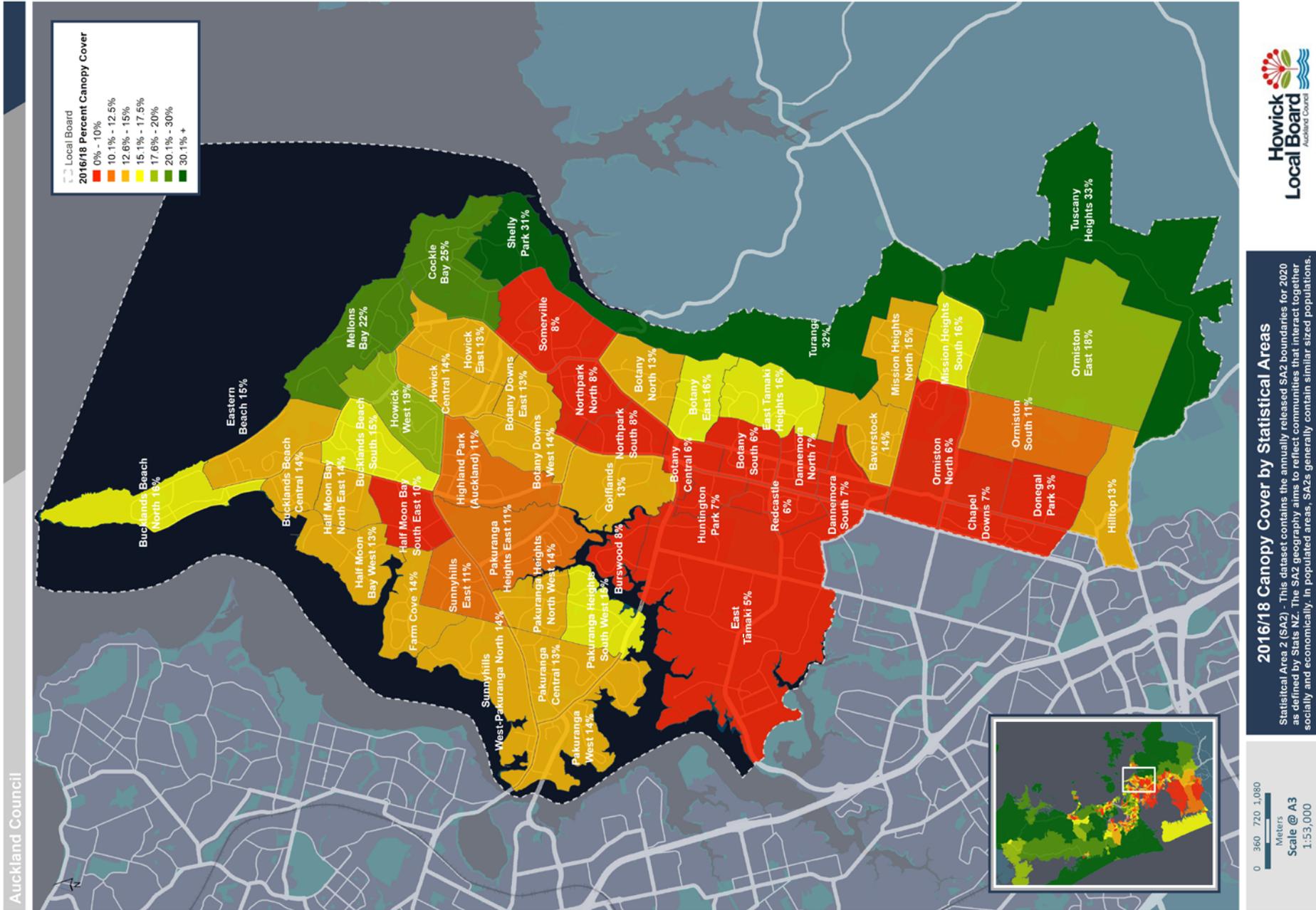


Figure 1: 2016/18 Canopy Cover by Statistical Areas

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 Howick Local Board is displayed in **Figure 3**. In 2013, 26% of the canopy cover was between 3-5 metres tall, 40% 5-10 metres tall, and the remaining 34% was canopy taller than 10 metres. This distribution remained similar in the 2016/2018 data sets, although the percentage of canopy cover over between 3-5 metres tall increased to 32% of the forest canopy. This data shows only low presence of tall canopy cover within the local board area, with all canopy cover taller than 15 metres (including height categories 15-20 metres, 20-30 metres, and 30 metres plus) representing approximately 12% of the total urban ngahere canopy cover assessed and are mainly found in bush remnants and the rural fringes, particularly within East Tāmaki Heights and Flat Bush.

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, as also emphasised in the Urban Ngahere Strategy (Auckland Council 2019a).

The relatively high proportion of shorter canopy cover across the local board (32% 3-5m tall and 39% 5-10m tall) in the 2016/2018 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. When grouped by land use type, it can be seen how the contribution of the trees in rural Howick skews the figures for the board as a whole, with this area containing approximately 50% less canopy cover under five metres tall as a proportion of overall cover than in urban Howick, and has nearly twice the proportion of canopy cover over ten metres tall.

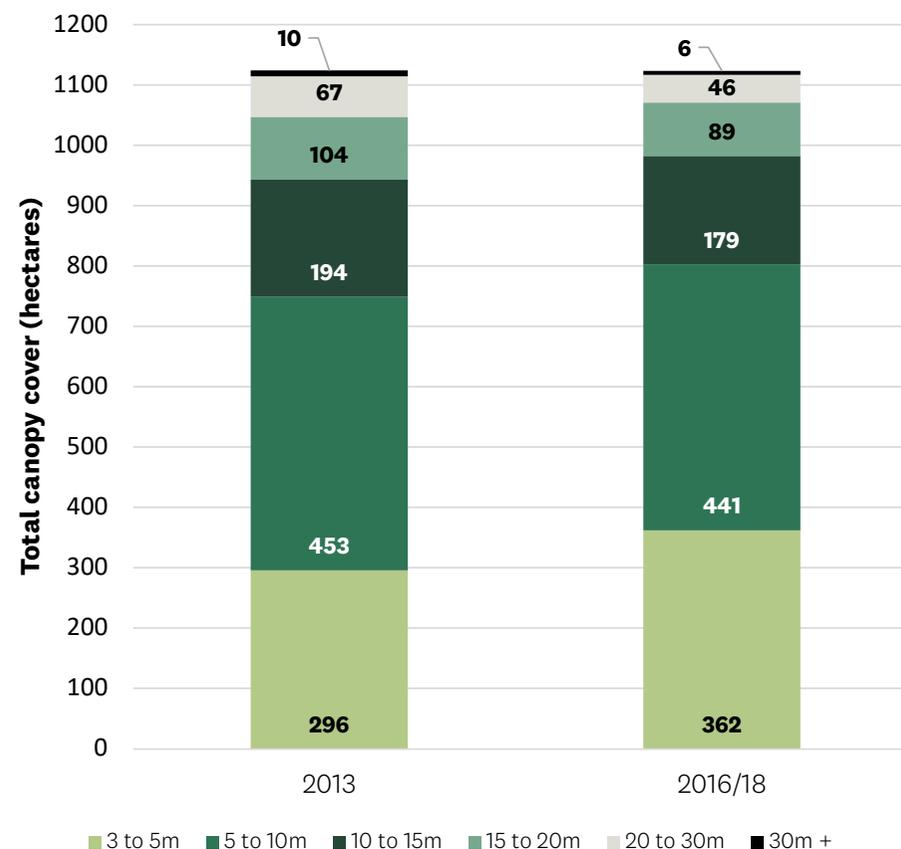


Figure 3: Height class distribution of urban ngahere canopy across all land tenures within Howick Local Board

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 Howick Local Board is displayed in **Figure 4**. Nearly three quarters (74%) of the urban ngahere in Howick, much of which is unprotected, is located on private property. Public parks and other publicly owned land (e.g., schools) contain a similar proportion of urban ngahere, being 15% and 11% of the total urban ngahere cover, respectively.

Howick Local Board stands out in the regional data as having a very low degree of tree coverage (8% in 2016/18) within its road reserves (Table 1), which may reflect the relatively recent construction of a large part of the road network and, to some degree, poor planting choices and practices in the newer suburbs. This situation presents an opportunity for enhancing the urban ngahere by infill planting of carefully chosen street trees, that will provide benefits long term to local communities.

Planting may also be considered on rural roads, the canopy within which makes up only 2% of the rural tree coverage. With only 5% canopy cover on other public land

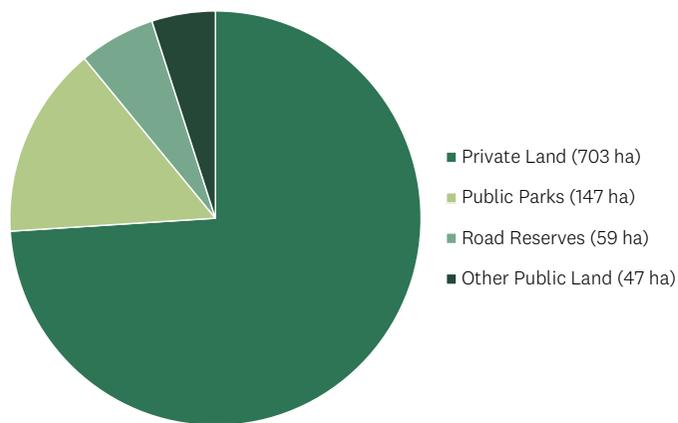


Figure 4: Tenure of urban ngahere canopy within Howick Local Board (2013 data set)

in rural parts of the local board, there may also be an opportunity to encourage planting within this category of land such as schools and colleges, where additional educational benefits may be gained.

In addition to having low levels of canopy cover, roads also exhibit generally small tree size, with only 13% being over ten metres tall, compared to 39% for parks. This reflects the more cramped growing environment within the road corridor (particularly below ground) and the more frequent cycling of tree stock as trees are regularly removed and replaced to allow for infrastructure works.

Public parks have the highest proportion of urban ngahere relative to area out of all the land tenures, as shown in **Figure 5**, followed by private land. There has been a minor net increase in urban ngahere canopy in public parks, as well as road reserves and other public land, between the two survey data sets. The percentage canopy cover of private land has stayed the same.

Public parks are good place to focus additional urban ngahere planting as they comprise approximately 10% 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.

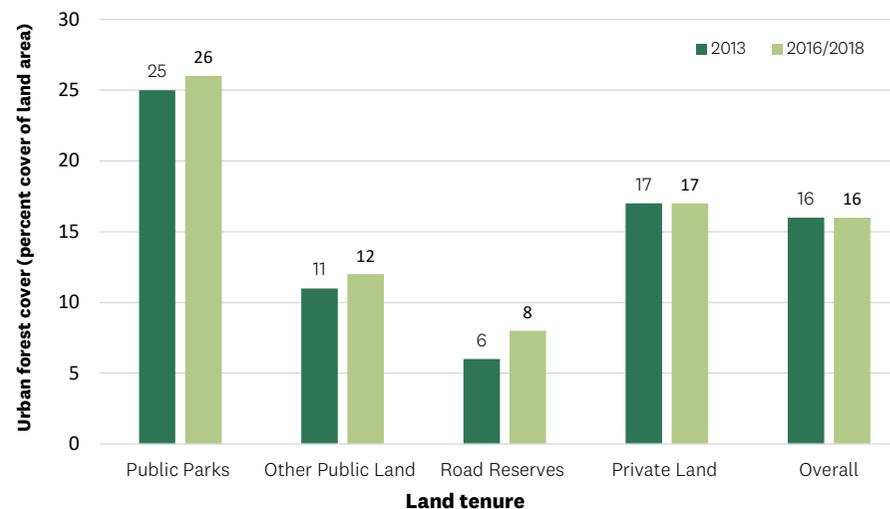


Figure 5: Change in urban ngahere cover of different land tenures in Howick Local Board between 2013 and 2016/18

3.5 Urban Ngahere in Relation to Growth Pressures

The Significant Ecological Area overlay (SEA; **Figure 6**) prioritises the areas of urban ngahere in Howick 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**.

There is increased pressure on the urban ngahere in Howick through a combination of greenfield development, lack of suitable growing space, and conflicts with infrastructure. An increase in urban ngahere cover in local parks and residential suburbs will provide more universal benefits as a greater number of people are likely to encounter the forest and connect to nature. Urban ngahere on public land provides opportunities to connect with communities, enhanced biodiversity, educational opportunities and helps to develop a sense of place.

The lack of scheduled notable trees in the southern half of Howick is another issue that may warrant investigation, as there may potentially be trees that have so far been overlooked but would meet the necessary standards for inclusion on the schedule. This may particularly be the case in parts of Flat Bush currently under development, where large, high value trees are scattered within former farmland and riparian margins.

Protecting existing and adding to the numbers of trees in the road corridor is an important and ongoing measure to retain and extend urban ngahere cover, as the tree cover in the road corridor is currently low. The importance of trees in the street environment is going to increase, and will, in time, incorporate the only accessible trees for some residents.

To this end, the Howick Local Board is encouraged to work with Auckland Council to readdress the current rules for tree and vegetation protection, especially in relation to highlighting the importance of large trees and the multiple benefits they offer to the local community.



Notable trees, Howick, Auckland

Te matomatotanga o Te Ngahere-a-Tāone Te Rohe o Howick

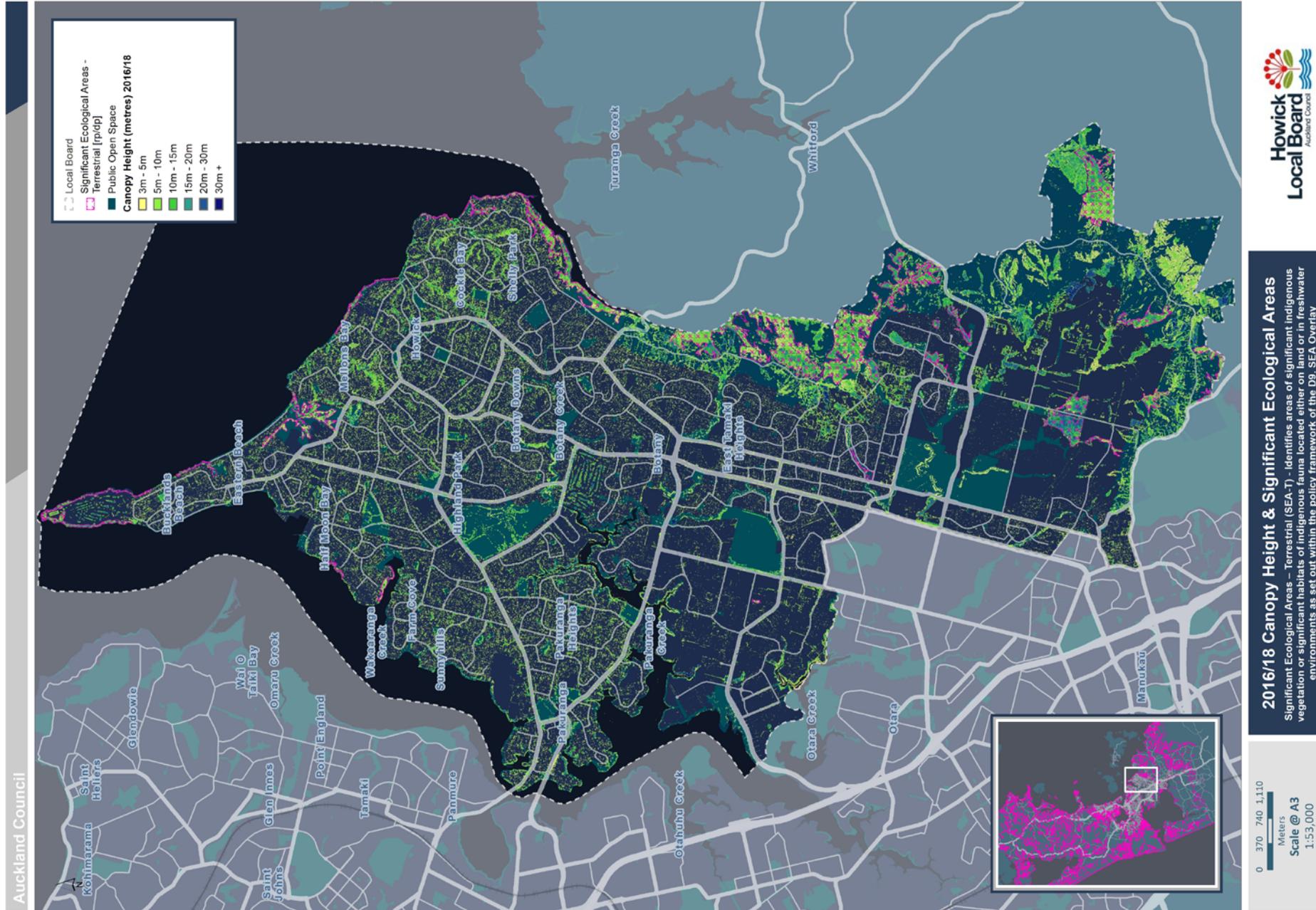


Figure 6: 2016/18 Canopy Height & Significant Ecological Areas

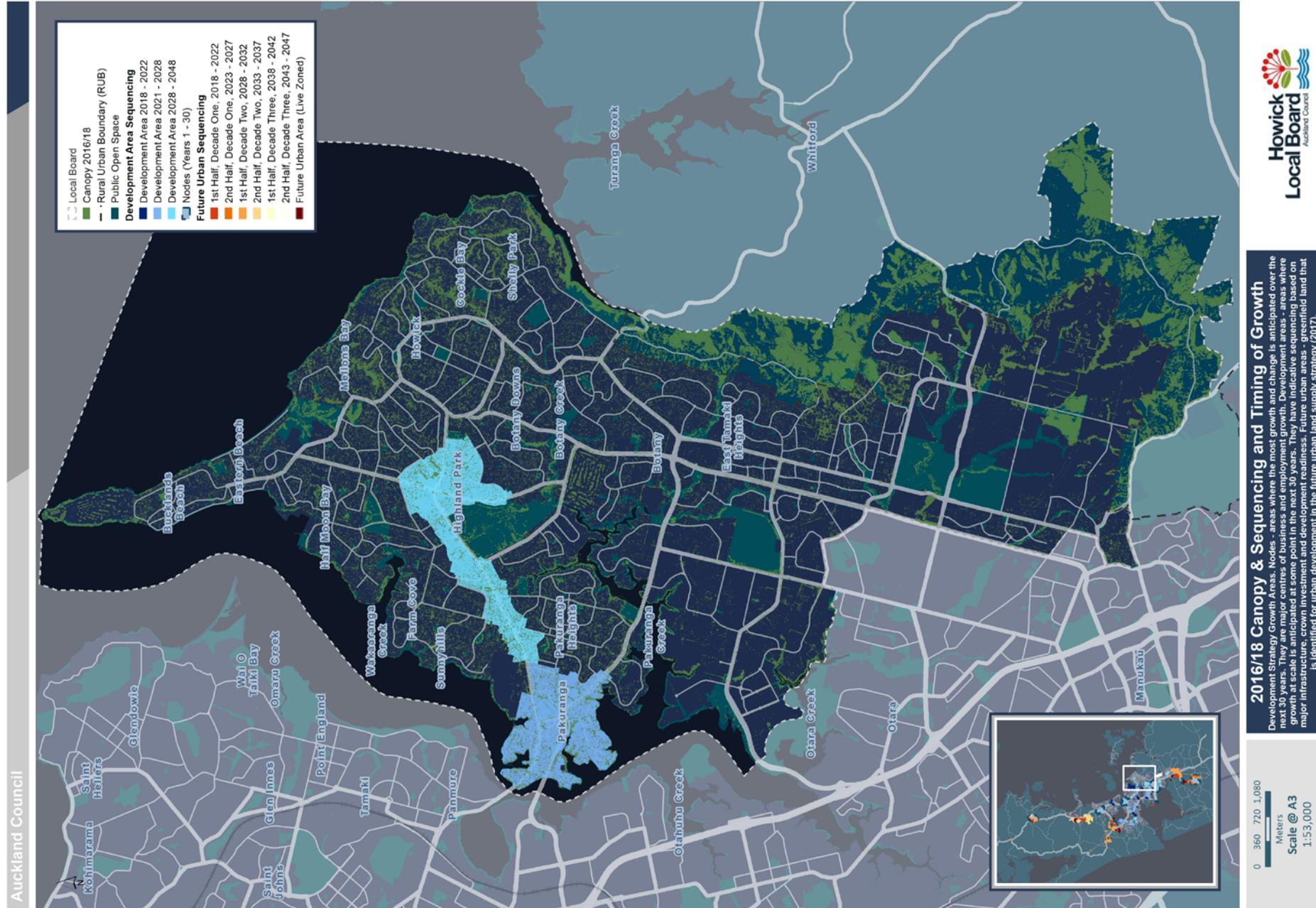


Figure 7: 2016/18 Canopy & Sequencing and Timing of Growth

3.6 Recommendations

The assessment of urban tree cover in the Howick Local Board presented in this update report aims to assist in the knowing phase of the Auckland Urban Forest 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 Howick Local Board include:

- Prioritise the efforts of the Howick Urban Ngahere Action Plan 2021 to plant new trees in parks and streets
- raise awareness of the current rules for tree and vegetation notable Tree overlay
- strengthen local funding initiatives to engage with, educate, and support private owners of land featuring valuable trees

- set an initial goal of achieving a minimum of 15% urban ngahere cover within the fully urban portion of Howick
- initiate tree planting where possible in unused corners or edges of parks, including the designation of the former Greenmount landfill as a reserve
- identify parks containing playgrounds with low tree shading (e.g., Simon Owen Place Reserve and Monash Park) and obtain funding for large grade specimen trees to plant
- prioritise tree planting in predominantly industrial/commercial suburbs with low canopy cover, e.g., East Tāmaki, Huntington Park, Clover Park and Highland Park.

The metrics of the canopy analysis will be used to help inform and prioritise the efforts of the Howick 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.



Palm avenue planted along Te Irirangi Drive, East Tāmaki, Auckland

4.0 Acknowledgements

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