

Cost benefit analysis

1. Staff carried out an analysis to estimate the costs and selected benefits (air pollution removal, energy savings, carbon sequestration and avoided stormwater runoff) to illustrate international practice for valuing the benefits of urban forest and to gain further insight into the four scenarios outlined below:

Business as usual: Allow for an ongoing decline of the canopy cover of Auckland's urban ngahere.

- Ongoing maintenance costs for street and park trees with no investment in an urban ngahere strategy and additional tree planting.
- Based on anecdotal evidence, continuing with business as usual would result in a decline in canopy cover and associated benefits over time.

Restore to 2013 baseline: Stabilise the ongoing decline of the canopy cover of Auckland's urban ngahere using the canopy cover of 2013 as a baseline.

- To restore canopy cover to a 2013 baseline of 18% canopy cover, investment in an urban ngahere strategy is required to grow new trees and protect existing trees, in addition to ongoing maintenance costs for street and park trees.

Improving: Grow Auckland's urban ngahere canopy cover (22%) with a focus on addressing inequality.

World class: Aim to significantly grow Auckland's urban ngahere canopy cover (30%) in line with ambitions of other world class international cities.

For both 'Improving' and 'World Class' scenarios:

- The cost benefit analysis assumes an upfront investment over the first five years to implement the strategy and plant new trees. The benefits selected for analysis are realised as the canopy cover grows over time.
- It is assumed that ongoing annual maintenance costs would rise in line with the increased number of street and park trees.
- For both scenarios the estimated annual benefits significantly exceed the costs.
- The 'Improving' scenario requires less upfront investment and has lower ongoing maintenance costs but delivers a lower level of ongoing benefit each year than the 'World Class' scenario.

Current status: 18% canopy cover and in decline

		Data source	Park trees (NZ\$/year)	Street trees (NZ\$/year)	Urban Forest Ecosystems (NZ\$/year)	Native revegetation (NZ\$/year)	Totals
	Data source		<i>Estimated from asset inventory</i>	<i>Estimated from asset inventory</i>	<i>RIMU plot samples</i>	<i>RIMU analysis</i>	
	Number of trees		500,000	240,000	3,900,000	250 ha	4,640,000
Benefits	Air pollution removal (tonnes/year)	<i>Melbourne i-Tree study</i>	255	122	1,986	<i>Not assessed</i>	
	Air pollution removal (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 1,770,000	\$ 849,600	\$ 13,806,000	<i>Not assessed</i>	\$ 16,425,600
	Energy savings (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 2,945,000	\$ 1,413,600	<i>Not assessed</i>	<i>Not assessed</i>	\$ 4,358,600
	Carbon sequestration (tonnes/year)	<i>Melbourne i-Tree study</i>	12,220	5,866	95,316	<i>Not assessed</i>	
	Carbon sequestration (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 255,000	\$ 122,400	\$ 1,989,000	<i>Not assessed</i>	\$ 2,366,400
	Avoided stormwater runoff (m3)	<i>i-Tree Eco interception 8.6%</i>	<i>Not assessed</i>	972,238	<i>Not assessed</i>	<i>Not assessed</i>	
	Avoided stormwater runoff (NZ\$)	<i>London i-Tree Study</i>	<i>Not assessed</i>	\$ 860,431	<i>Not assessed</i>	<i>Not assessed</i>	\$ 860,431
TOTAL							\$ 23,150,600
Costs	Planting (NZ\$/year)	<i>Council budget</i>	0	0	0	<i>Not assessed</i>	0
	Maintenance (NZ\$/year)	<i>Council budget & estimated park/street trees split</i>	3,534,000	7,866,000	0	<i>Not assessed</i>	11,400,000
TOTAL							\$ 11,400,000
Current benefit							\$ 11,750,600

Improving: 22% canopy cover in 2048

		Data source	Park trees (NZ\$/year)	Street trees (NZ\$/year)	Urban Forest Ecosystems (NZ\$/year)	Native revegetation (NZ\$/year)	Totals
	Data source		<i>Estimated from asset inventory</i>	<i>Estimated from asset inventory</i>	<i>RIMU plot samples</i>	<i>RIMU analysis</i>	
	Number of trees		610,000	292,800	4,758,000	305 ha	5,660,800
Benefits	Air pollution removal (tonnes/year)	<i>Melbourne i-Tree study</i>	311	149	2,423	<i>Not assessed</i>	
	Air pollution removal (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 2,159,400	\$ 1,036,512	\$ 16,843,320	<i>Not assessed</i>	\$ 20,039,232
	Energy savings (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 3,592,900	\$ 1,724,592	<i>Not assessed</i>	<i>Not assessed</i>	\$ 5,317,492
	Carbon sequestration tonnes/year)	<i>Melbourne i-Tree study</i>	14,908	7,156	116,285	<i>Not assessed</i>	
	Carbon sequestration (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 311,100	\$ 149,328	\$ 2,426,580	<i>Not assessed</i>	\$ 2,887,008
	Avoided stormwater runoff (m3)	<i>i-Tree Eco interception 8.6%</i>	<i>Not assessed</i>	1,186,130	<i>Not assessed</i>	<i>Not assessed</i>	
	Avoided stormwater runoff (NZ\$)	<i>London i-Tree Study</i>	<i>Not assessed</i>	\$ 1,049,725	<i>Not assessed</i>	<i>Not assessed</i>	\$ 1,049,725
TOTAL							\$ 28,243,732
Costs - first 5 years	PM salary & implementation costs (NZ\$/year)	<i>Estimate</i>					\$150,000
	Planting (NZ\$/year)	<i>Estimate</i>	\$ 1,760,000	\$ 1,267,200	\$ 686,400	\$ 440,000	\$ 4,153,600
TOTAL							\$ 4,303,600
Costs - Ongoing	Maintenance (NZ\$/year)	<i>Council budget & estimated park/street trees split</i>	4,311,480	9,596,520	0	<i>Not assessed</i>	13,908,000
Combined costs	First 5 years (NZ\$/year)	<i>Estimated as above</i>					\$ 18,211,600
Ongoing benefit							\$ 14,335,732

World class: 30% canopy cover in 2048

		Data source	Park trees (NZ\$/year)	Street trees (NZ\$/year)	Urban Forest Ecosystems (NZ\$/year)	Native revegetation (NZ\$/year)	Totals
	Data source		<i>Estimated from asset inventory</i>	<i>Estimated asset inventory</i>	<i>RIMU plot samples</i>	<i>RIMU analysis</i>	
	Number of trees		800,000	384,000	6,240,000	400 ha	7,424,000
Benefits	Air pollution removal (tonnes/year)	<i>Melbourne i-Tree study</i>	407	196	3,177	<i>Not assessed</i>	
	Air pollution removal (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 2,832,000	\$ 1,359,360	\$ 22,089,600	<i>Not assessed</i>	\$ 26,280,960
	Energy savings (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 4,712,000	\$ 2,261,760	<i>Not assessed</i>	<i>Not assessed</i>	\$ 6,973,760
	Carbon sequestration tonnes/year)	<i>Melbourne i-Tree study</i>	19,552	9,385	152,505	<i>Not assessed</i>	
	Carbon sequestration (NZ\$/year)	<i>Melbourne i-Tree study</i>	\$ 408,000	\$ 195,840	\$ 3,182,400	<i>Not assessed</i>	\$ 3,786,240
	Avoided stormwater runoff (m3)	<i>i-Tree Eco interception 8.6%</i>	<i>Not assessed</i>	1,555,580	<i>Not assessed</i>	<i>Not assessed</i>	
	Avoided stormwater runoff (NZ\$)	<i>London i-Tree Study</i>	<i>Not assessed</i>	\$ 1,376,688	<i>Not assessed</i>	<i>Not assessed</i>	\$ 1,376,688
TOTAL							\$ 37,040,960

Costs - first 5 years	PM salary & implementation costs (NZ\$/year)	<i>Estimate</i>					\$150,000
	Planting (NZ\$/year)	<i>Estimate</i>	\$ 4,800,000	\$ 3,456,000	\$ 1,872,000	\$ 1,200,000	\$ 11,328,000
TOTAL							\$ 11,478,000

Costs - Ongoing	Maintenance (NZ\$/year)	<i>Council budget & estimated park/street trees split</i>	5,654,400	12,585,600	0	<i>Not assessed</i>	18,240,000
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Combined costs	First 5 years (NZ\$/year)	<i>Estimated as above</i>					\$ 29,718,000
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Ongoing benefit							\$ 18,800,960
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