

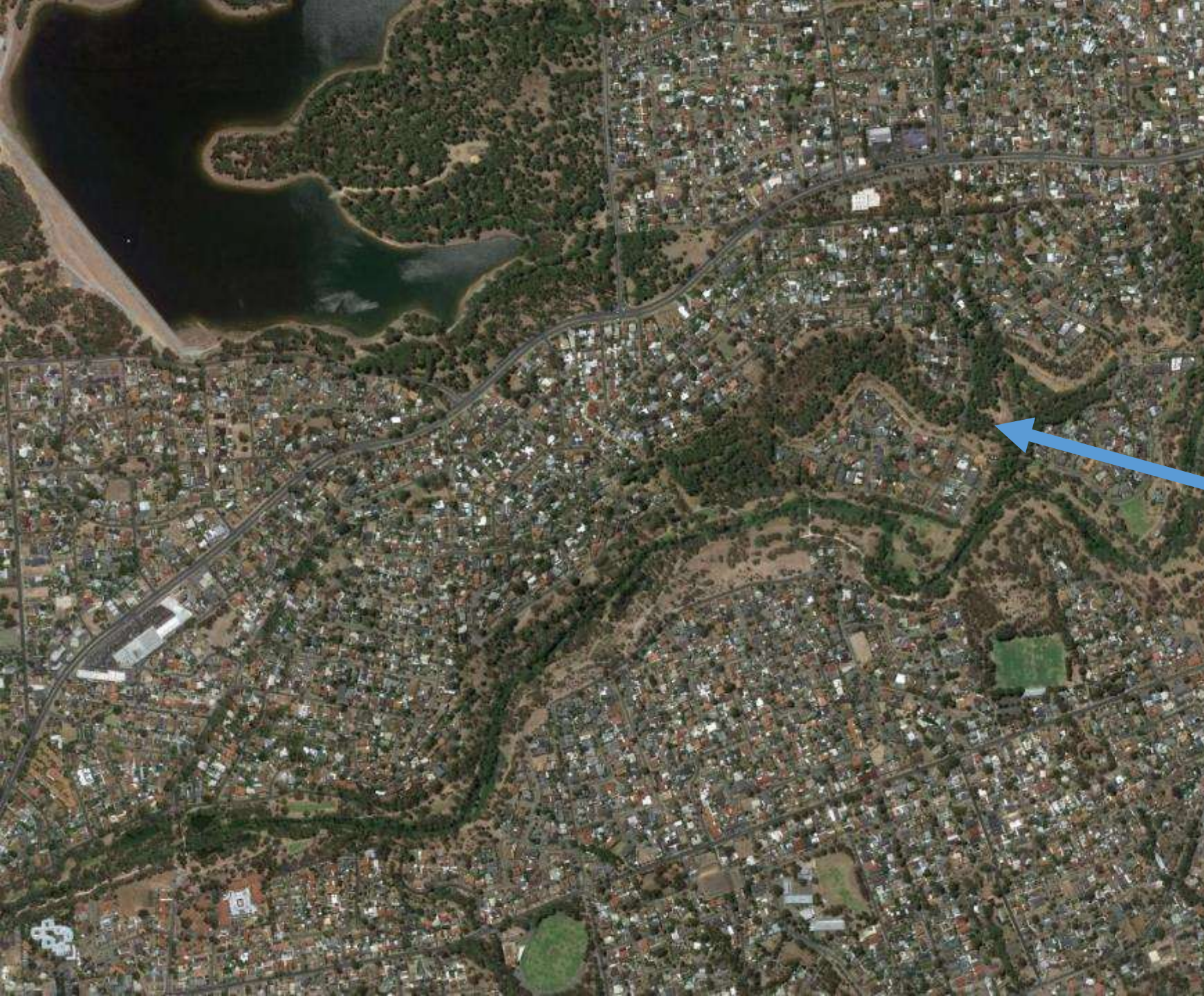
An aerial photograph of a residential neighborhood with a semi-transparent green overlay. The overlay consists of numerous small green circles, each representing a tree, scattered across the houses and streets. The text is centered over this image.

# What do we have and what could we have?

*The role of tree population data in  
promoting tree benefits*

Craig Hinton  
craig.hinton@enspec.com











Species

Age / maturity / life stage

Height

Canopy spread - EW, NS, widest, average

DBH

Health / vitality

Pests / diseases

Form / defects

Observations – wounds, cavities, habitat hollows,  
limb failures, etc.

*Other attributes*

Collection date

Assessor

Unique identifiers

GNSS accuracy

*Works program*

*Risk assessment*

*Amenity valuation*

*i-Tree Eco*

Occupied / vacant?

Location – spatial coordinates

Location – street address

Planting site – nature strip, pavement, median, etc.

Hardware – guards, grates, etc.



# Three key things





**What do we have?**

**What don't we have?**

**What could we have?**



# What do we have?







Total area (200m radius)  
123.7 ha (56.2a)

Canopy cover

2005

30.1ha (13.7a)

2008

26.6ha (12.1a)

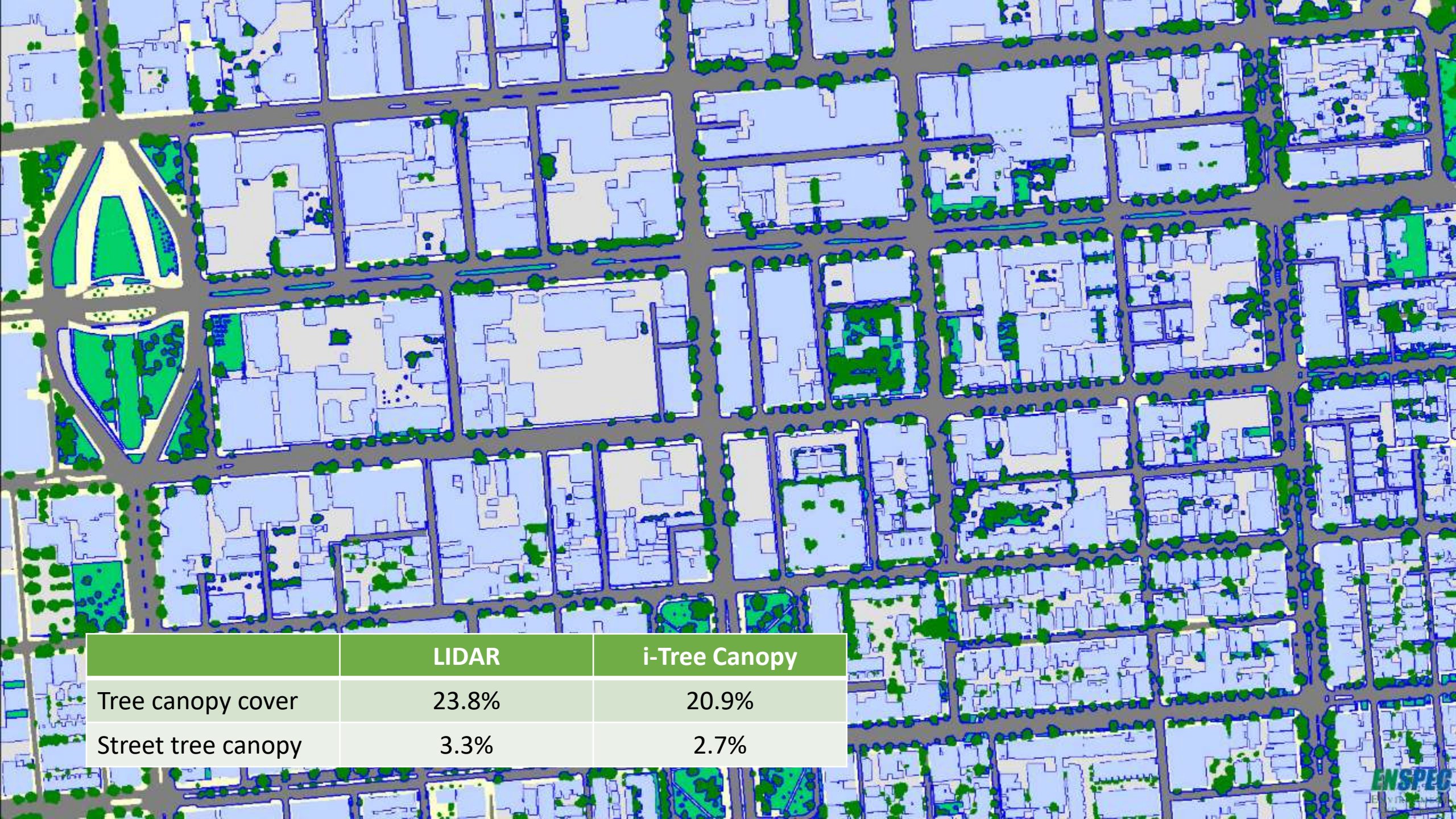
11.7% loss since 2005

2014

23.2ha (10.5a)

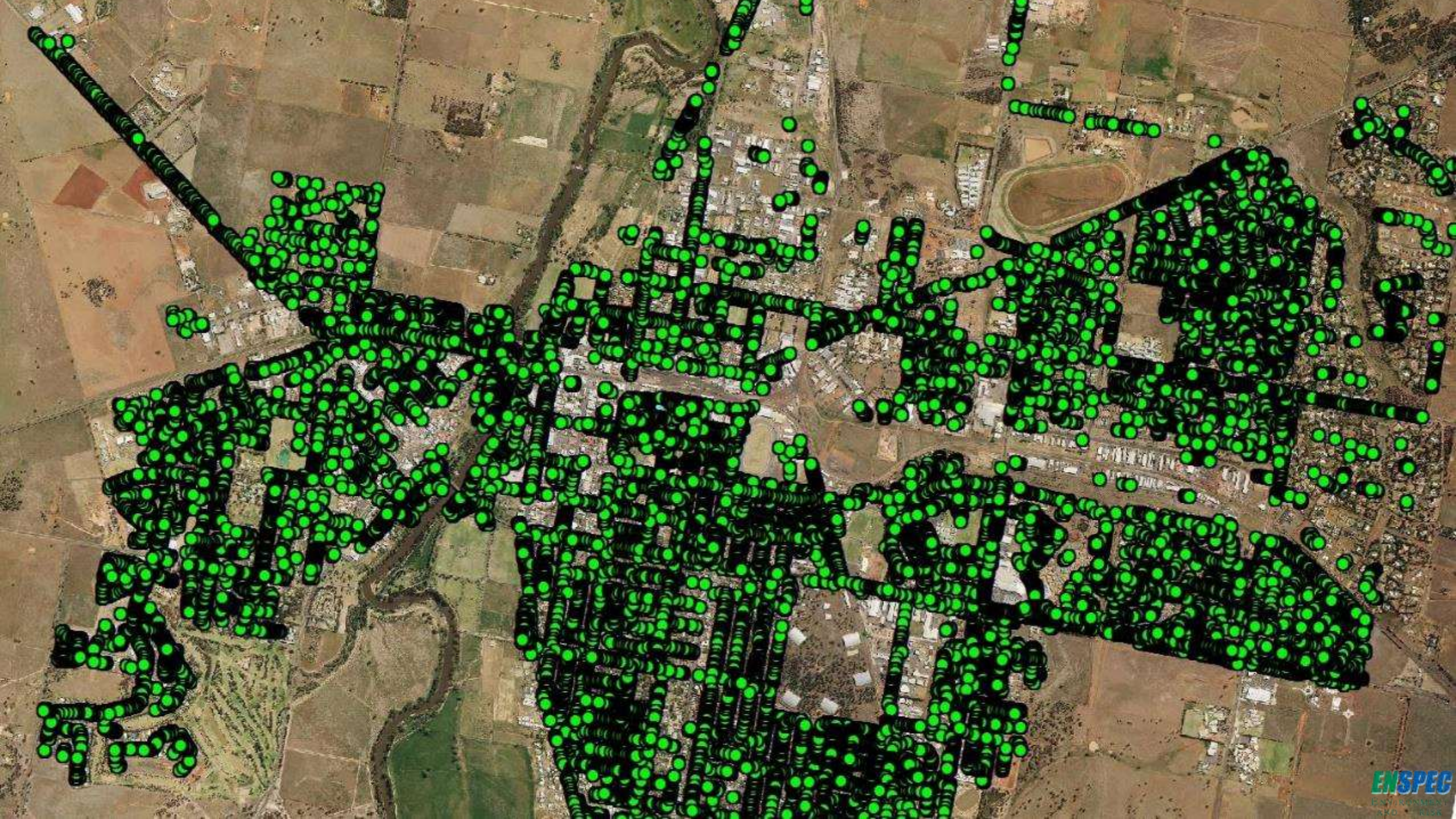
26.3% loss since 2005





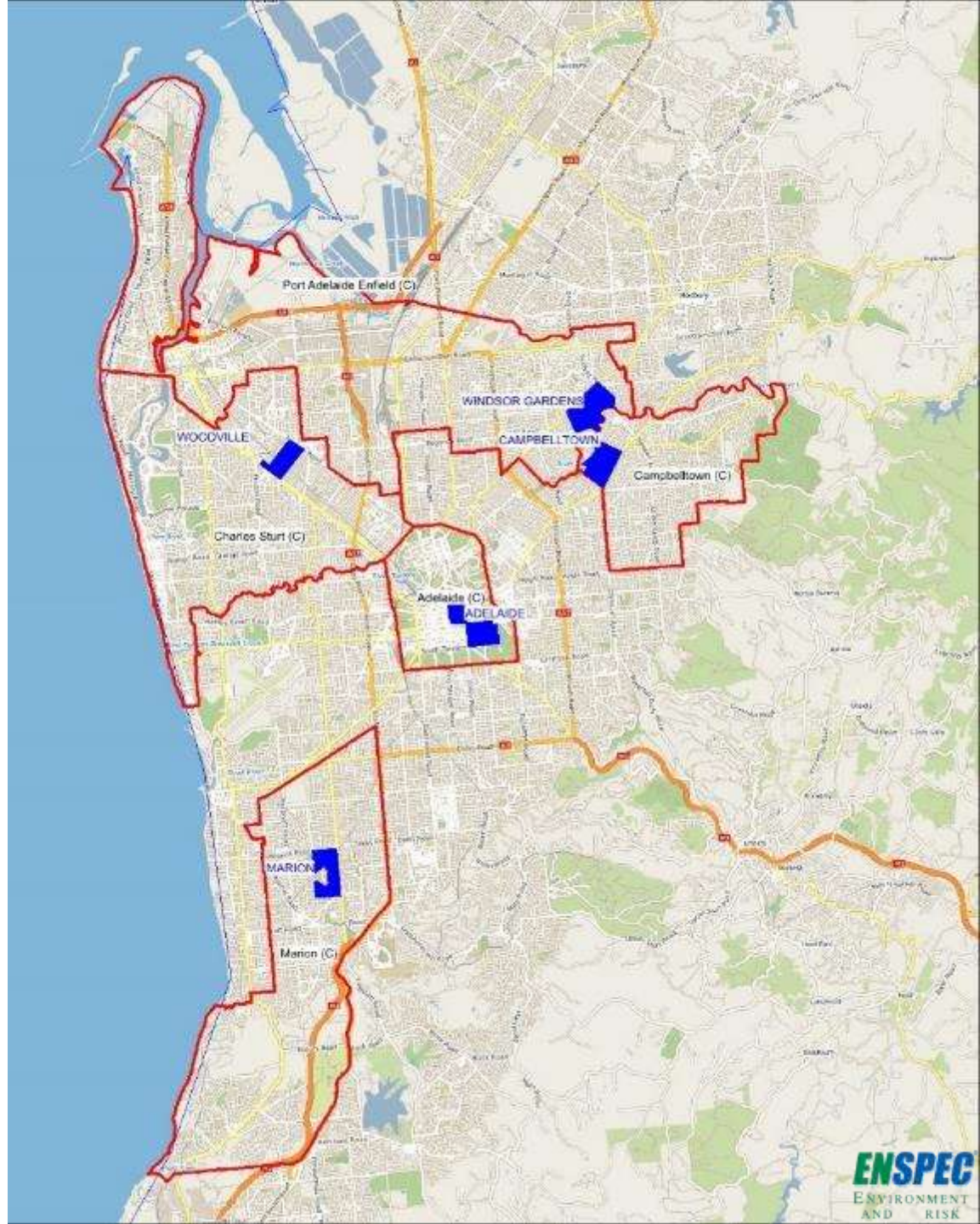
	LIDAR	i-Tree Canopy
Tree canopy cover	23.8%	20.9%
Street tree canopy	3.3%	2.7%







Location	Current benefit (\$A)	
Adelaide	\$	436,030
Campbelltown	\$	787,118
Charles Sturt	\$	1,375,334
Marion	\$	1,161,688
Port Adelaide Enfield	\$	2,559,273
Port Pirie (urban)	\$	567,458
<b>Grand Total</b>	<b>\$</b>	<b>6,886,901</b>





### i-Tree Eco Summary Values

Trees Assessed	11,191
Current Carbon Storage	2,954 tonnes (\$71,330)
Annual Carbon Sequestered	195 tonnes (\$4,720)
Annual Pollution Removal	1.84 tonnes (\$769)
Annual Cooling Benefit	151,240 kWh (\$52,782)
Annual Heating Benefit	73,865 kWh (\$25,788)
Annual Total Energy Benefit	225,105 kWh (\$78,570)
Annual Rainfall Interception	3,025 m <sup>3</sup> (\$6,871)
Amenity Value	\$34,786,454

### Best Performing Genera

Carbon Storage	<i>Quercus</i>
Annual Carbon Sequestered	<i>Quercus</i>
Annual Pollution Removal	<i>Pinus</i>
Carbon Monoxide	<i>Cupressus</i>
Nitrogen Oxides	<i>Cupressus</i>
Ozone	<i>Cupressus</i>
Sulphur Dioxide	<i>Cupressus</i>
Particulate Matter (10µm)	<i>Pinus</i>
Particulate Matter (2.5µm)	<i>Pinus</i>
Annual Cooling Benefit	<i>Washingtonia</i>
Annual Heating Benefit	<i>Corymbia</i>
Annual Total Energy Benefit	<i>Washingtonia</i>
Annual Rainfall Interception	<i>Pinus</i>
Amenity Value	<i>Pinus</i>

### Average Annual Benefits

Urban Forest Function	
Average Annual Carbon Sequestered	17 kg (\$0.40)
Average Annual Pollution Removal	0.164 kg (\$0.10)
Average Annual Cooling Benefit	17 kWh (\$6.20)
Average Annual Heating Benefit	8 kWh (\$3.00)
Annual Total Energy Benefit	25 kWh (\$9.20)
Average Annual Rainfall Interception	0.27 m <sup>3</sup> (\$0.60)
Total Annual Benefit	\$10.30

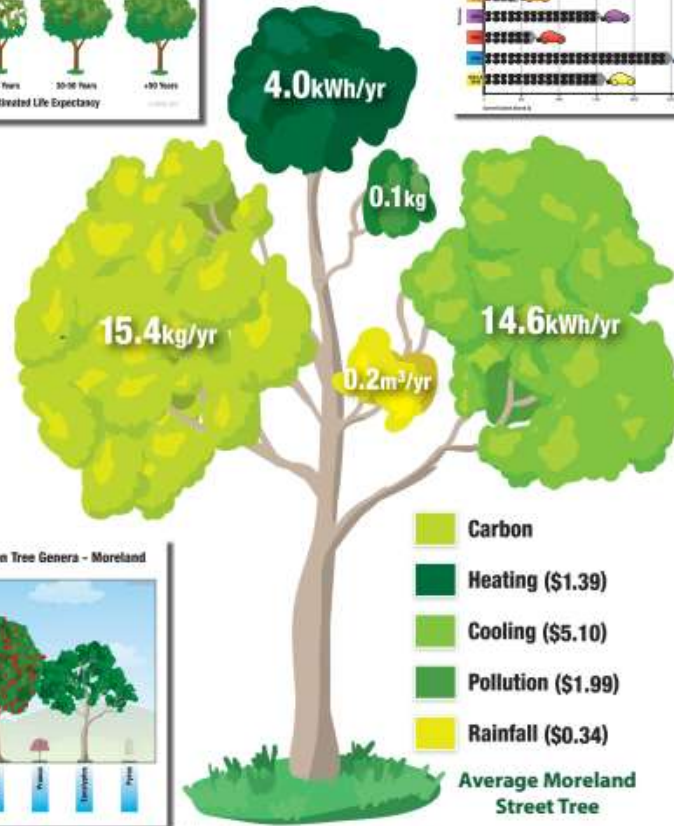
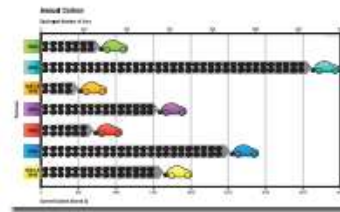
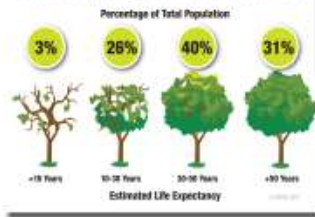




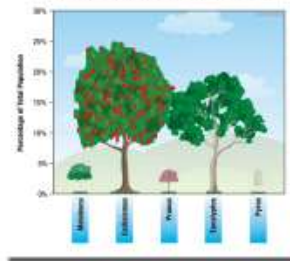
# MUNICIPAL TREE POPULATION OVERVIEW

## Moreland Street Tree Plan

Tree Life Expectancy Distribution - Moreland CC

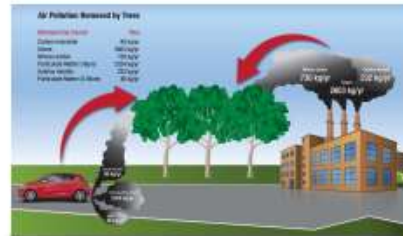


Most Common Tree Genera - Moreland

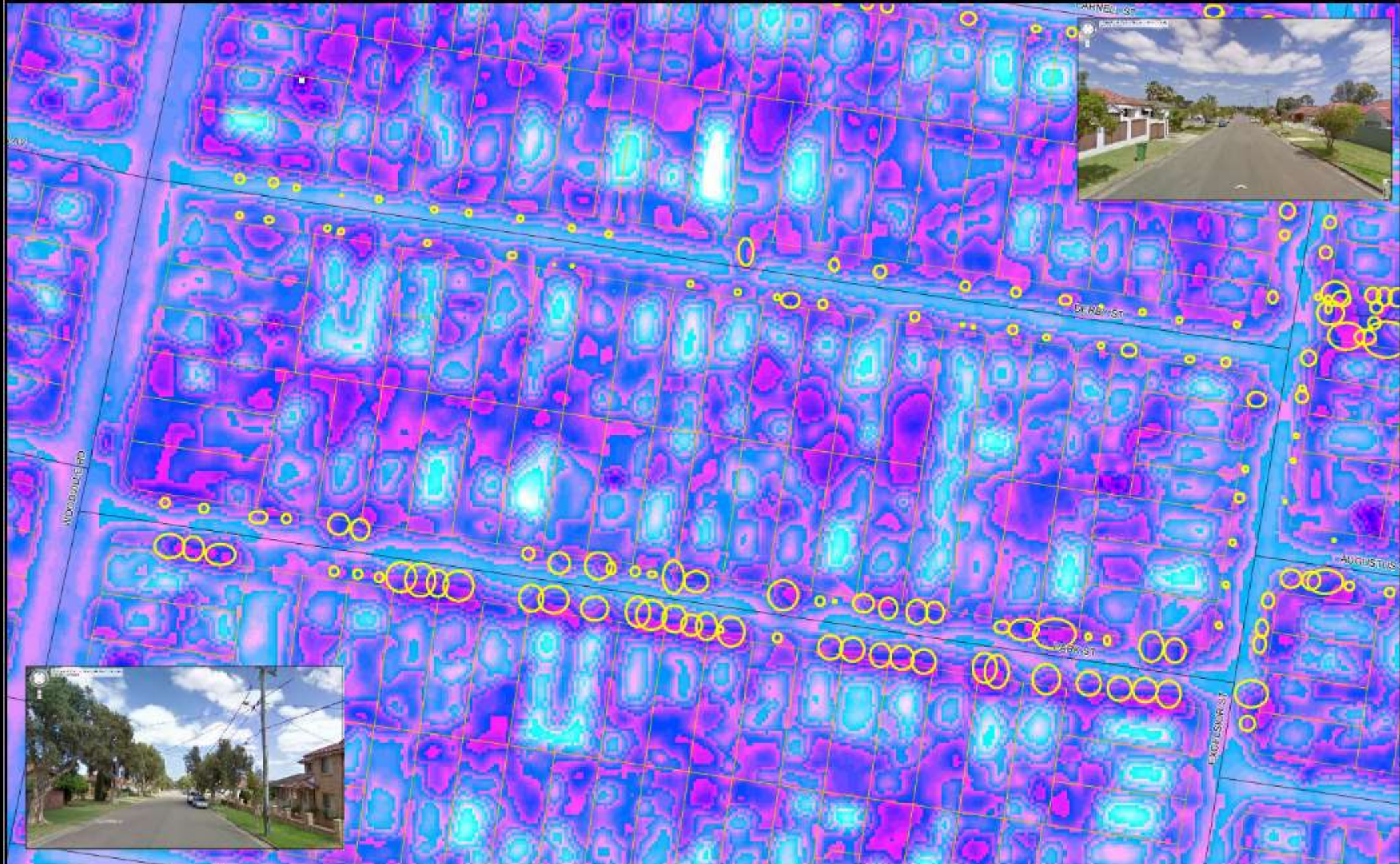


- Carbon
- Heating (\$1.39)
- Cooling (\$5.10)
- Pollution (\$1.99)
- Rainfall (\$0.34)

Average Moreland Street Tree








**ENSPEC**  
ENVIRONMENT  
AND RISK

2/13 Viewtech Place  
Rowville Vic 3178  
Ph: 0417 027 152  
www.enspec.com

Site Location:	Address:
2/13 Viewtech Place	Rowville Vic 3178
Project No:	Map ID:
	MGA (GDA 94) Zone 56
Date:	Scale:
10/7/2013	1:1200

Client:	Parramatta City Council
Project:	ITree ECO Sample
Title:	Tree canopies overlaid on thermal imagery Park St & Derby St, Merrylands - day image
Drawn No:	101-072013

**LEGEND**

  Tree canopy projection

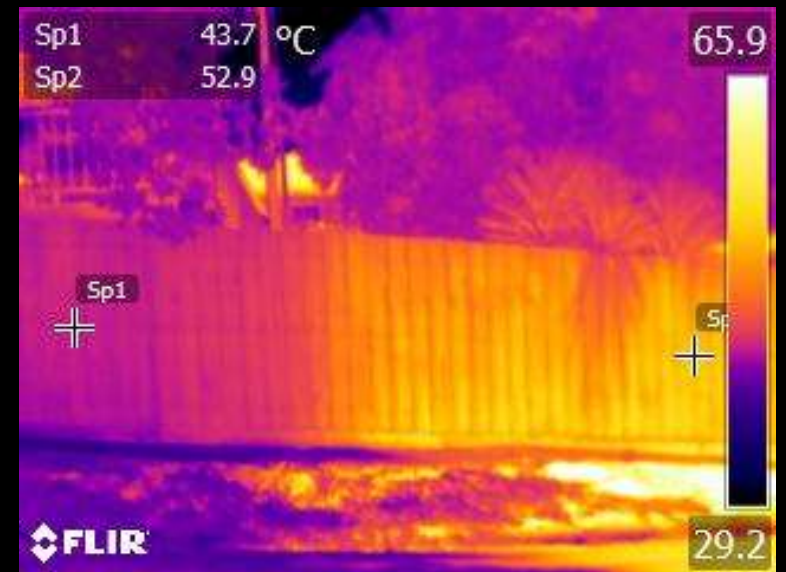


What don't we have?





Spot surface temperatures

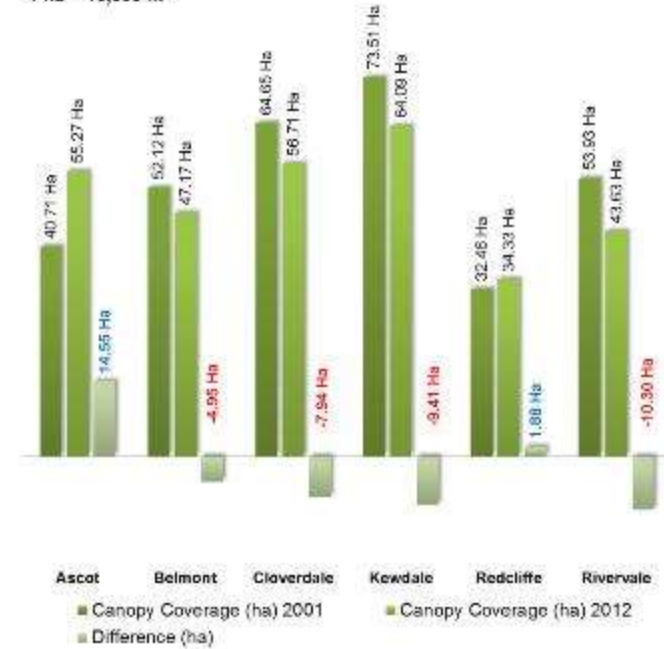




# Urban Forest Strategy Canopy Mapping March 2013



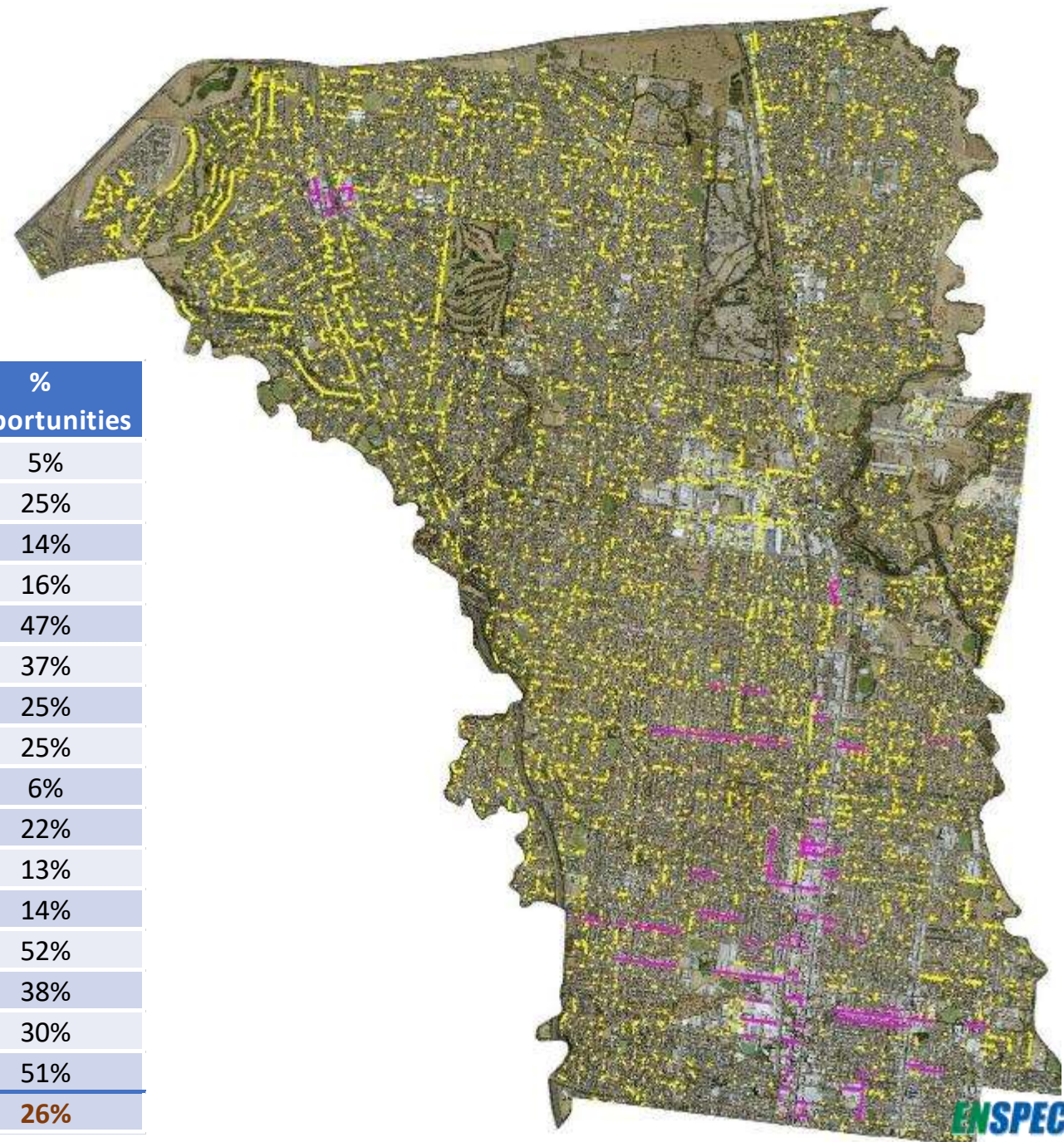
1 ha = 10,000 m<sup>2</sup>



Year	2001	2012	2021 Prediction	2001 -2012 Percentage Change
Private	13.2280 ha	9.3644 ha	6.6293 ha	-29.21%
Public Open Space (POS)	3.1260 ha	3.4681 ha	3.8476 ha	10.94%
Road Reserve (Street Tree Canopy)	3.2747 ha	3.6132 ha	3.9868 ha	10.34%
Total Canopy Cover	19.6287 ha	16.4457 ha	13.7789 ha	-16.22%
% Canopy Cover	10.5%	8.8%	7.37%	

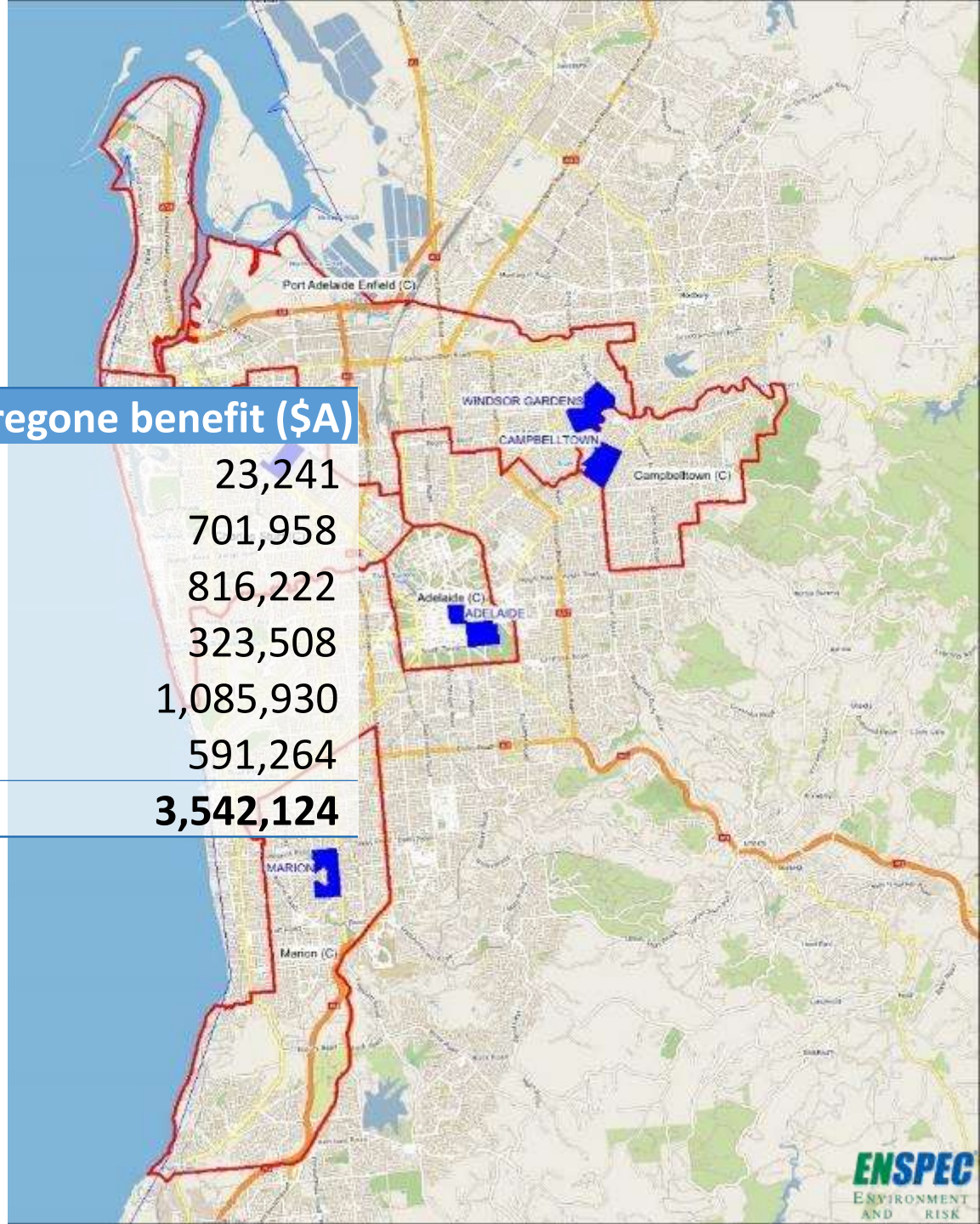


	Total street tree sites	Existing street trees	Planting opportunities	% opportunities
Adelaide	6854	6507	347	5%
Banyule	80000	60000	20000	25%
Brisbane (sample)	20056	17167	2889	14%
Cairns (sample)	24402	20509	3893	16%
Campbelltown	42150	22280	19870	47%
Charles Sturt	81104	50898	30206	37%
Darwin	1576	1186	390	25%
Dubbo	45000	33604	11396	25%
Hobart	10038	9423	615	6%
Marion	43230	33814	9416	22%
Monash	100006	87490	12516	13%
Moreland	63453	54313	9140	14%
Northern Midlands	7740	3732	4008	52%
Parramatta	57885	35883	22002	38%
Port Adelaide Enfield	136324	95712	40612	30%
Port Pirie (urban)	46326	22687	23639	51%
<b>Total</b>	<b>766144</b>	<b>555205</b>	<b>210939</b>	<b>26%</b>





Location	Current benefit (\$A)	Foregone benefit (\$A)
Adelaide	\$ 436,030	\$ 23,241
Campbelltown	\$ 787,118	\$ 701,958
Charles Sturt	\$ 1,375,334	\$ 816,222
Marion	\$ 1,161,688	\$ 323,508
Port Adelaide Enfield	\$ 2,559,273	\$ 1,085,930
Port Pirie (urban)	\$ 567,458	\$ 591,264
<b>Grand Total</b>	<b>\$ 6,886,901</b>	<b>\$ 3,542,124</b>













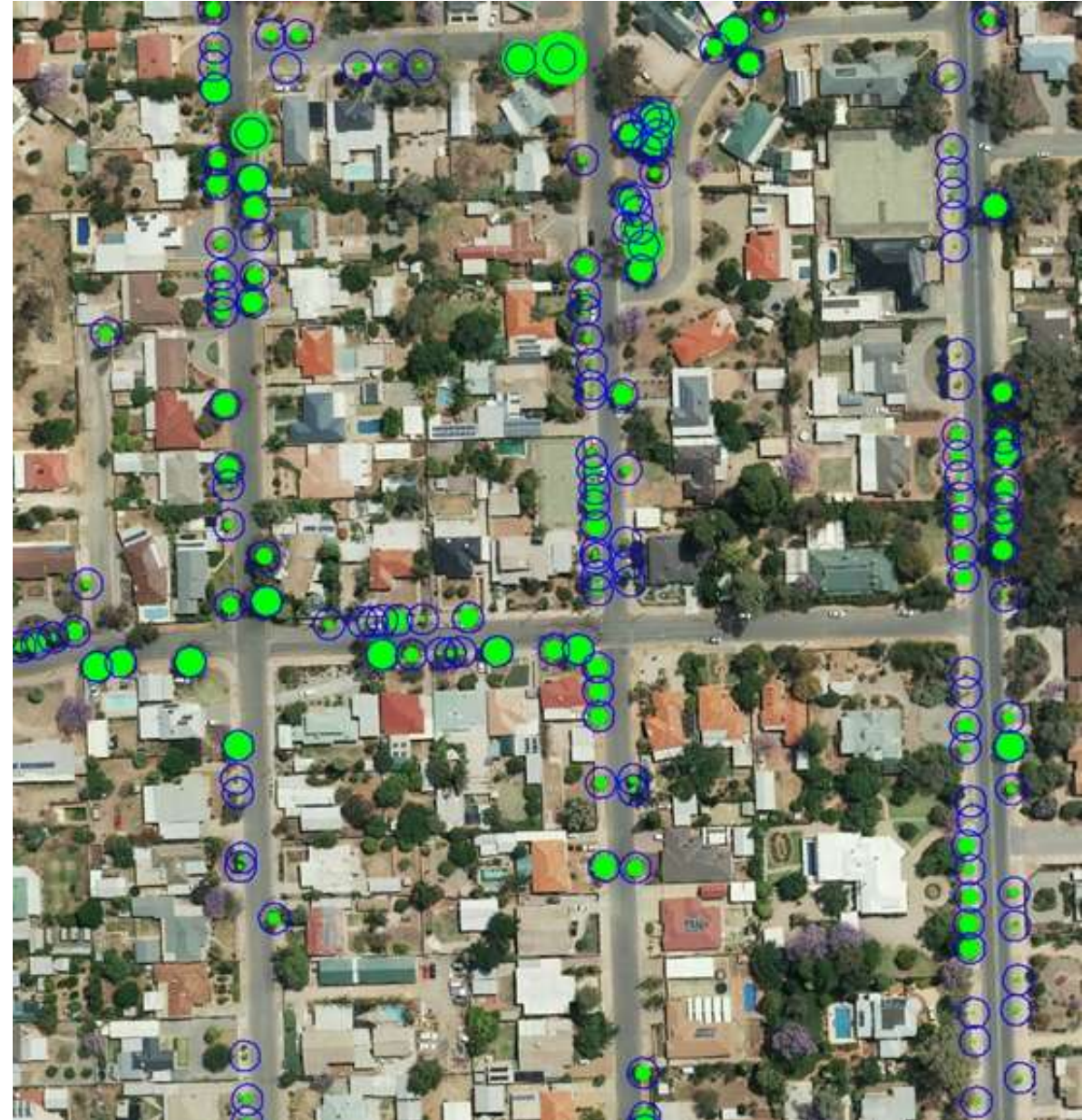


**What could we have?**





**Port Adelaide Enfield (Windsor Gardens)**



**Port Pitrie (Risdon Park)**





# Street Tree Master Plan



Coastal	Total no.	%	Total cost
New plantings	601	20.9%	\$28,848
Replacement plantings	219	7.6%	\$10,524
Maintenance			\$24,608
Existing trees	2,274	79.1%	
<b>TOTAL</b>	<b>2,875</b>		<b>\$63,980</b>

Outer Suburban	Total no.	%	Total cost
New plantings	3,871	23.7%	\$185,808
Replacement plantings	546	3.3%	\$26,208
Maintenance			\$132,510
Existing trees	12,472	76.3%	
<b>TOTAL</b>	<b>16,343</b>		<b>\$344,526</b>

South Frankston	Total no.	%	Total cost
New plantings	2,829	20.2%	\$135,792
Replacement plantings	957	6.8%	\$45,924
Maintenance			\$113,573
Existing trees	11,199	79.8%	
<b>TOTAL</b>	<b>14,028</b>		<b>\$295,289</b>
<b>TOTAL</b>	<b>34,190</b>		<b>\$2,666,840</b>
<b>TOTAL ANNUAL</b>			<b>\$177,789</b>

Inland Suburban	Total no.	%	Total cost
New plantings	8,920	33.5%	\$428,160
Replacement plantings	1,247	4.7%	\$59,868
Maintenance			\$305,018
Existing trees	17,692	66.5%	
<b>TOTAL</b>	<b>26,612</b>		<b>\$793,046</b>

Semirural	Total no.	%	Total cost
New plantings	15,000	100.0%	\$720,000
Replacement plantings	0	0.0%	\$0
Maintenance			\$450,000
Existing trees	0	0.0%	
<b>TOTAL</b>	<b>15,000</b>		<b>\$1,170,000</b>

Planting targets and budgets by zone –  
Planting Only Option

*Better trees, Better neighbourhoods, Better community.*





# Street Tree Master Plan



## Implementation Options Summary

### Current planting program

Trees planted in 15 years

**\$2,100,000**

26,000

**\$140,000p.a.**

### Plant Only Option

Trees planted in 15 years

*Continued inconsistent planting, lower quality*

**+\$2,900,000**

+34,000

**+\$193,000p.a.**

### Targeted Replacement Option

Trees planted in 15 years

*Some quality improvements, some improved consistency*

**+\$5,000,000**

+37,000

**+\$333,000p.a.**

### Full Implementation Option

Trees planted in 15 years

*Maximum quality, greater consistency*

**+\$7,500,000**

+43,000

**+\$500,000p.a.**

(1% rate revenue)

*Better trees, Better neighbourhoods, Better community.*

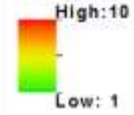


# Melbourne

More information is available at [project final report](#), pp 59 to 61.



## Vulnerability Index

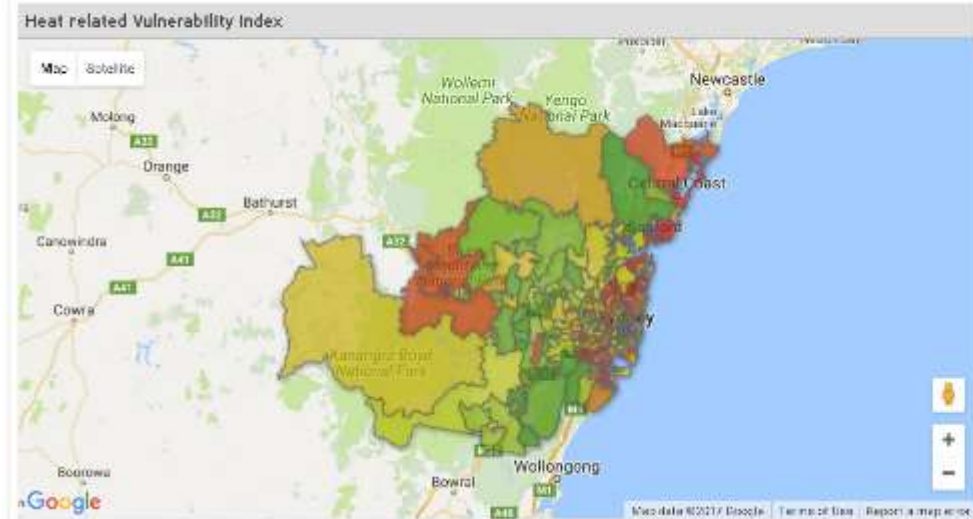


***“Heatwaves already kill more people in Melbourne than any other Australian city and climate change and a growing population mean this figure is expected to triple by 2050.”***

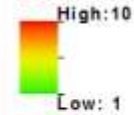
(PricewaterhouseCoopers and Australian Federal Department of Climate Change and Energy Efficiency, (2011))

# Sydney

More information is available at [project final report](#), pp 66 to 69.

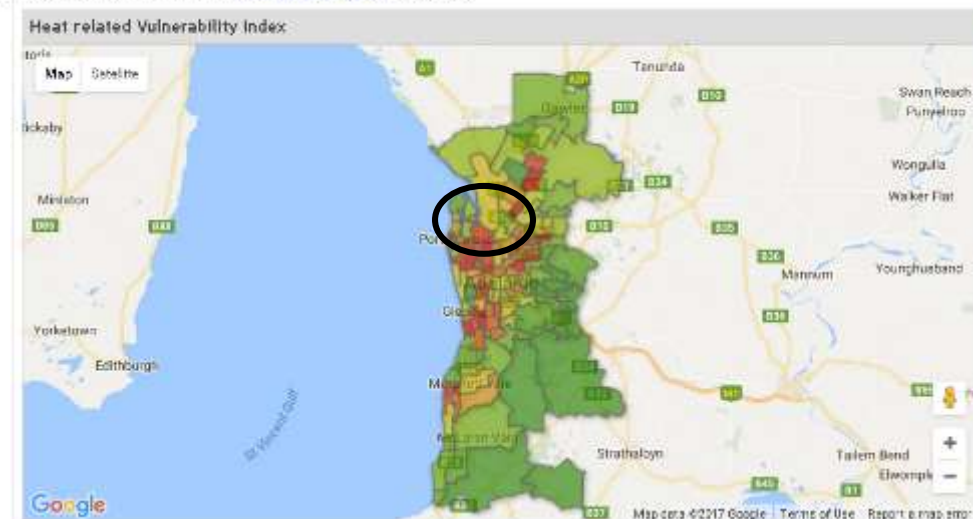


## Vulnerability Index



# Adelaide

More information is available at [project final report](#), pp 65 to 68.



## Vulnerability Index

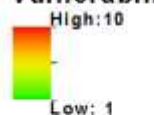
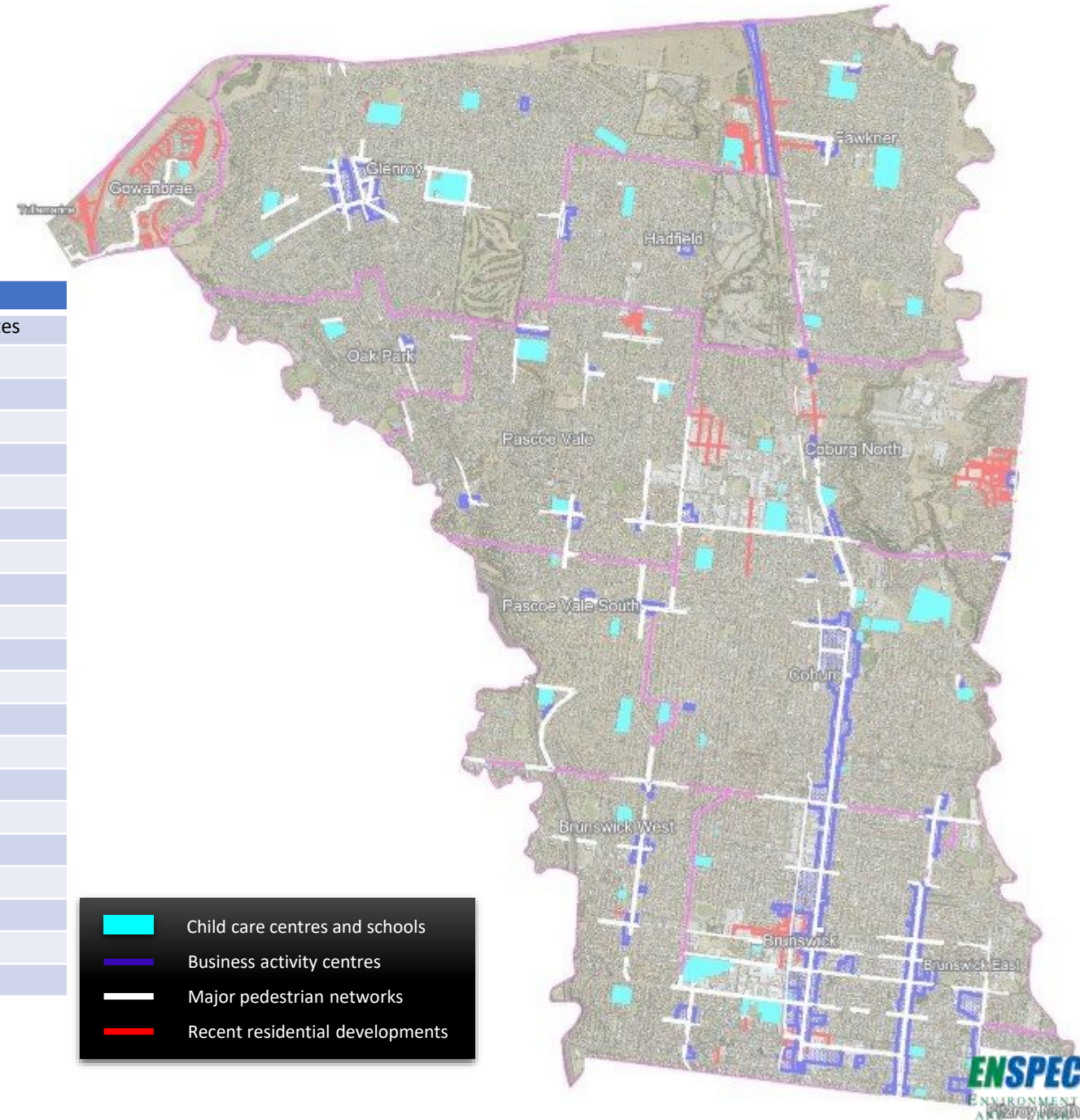




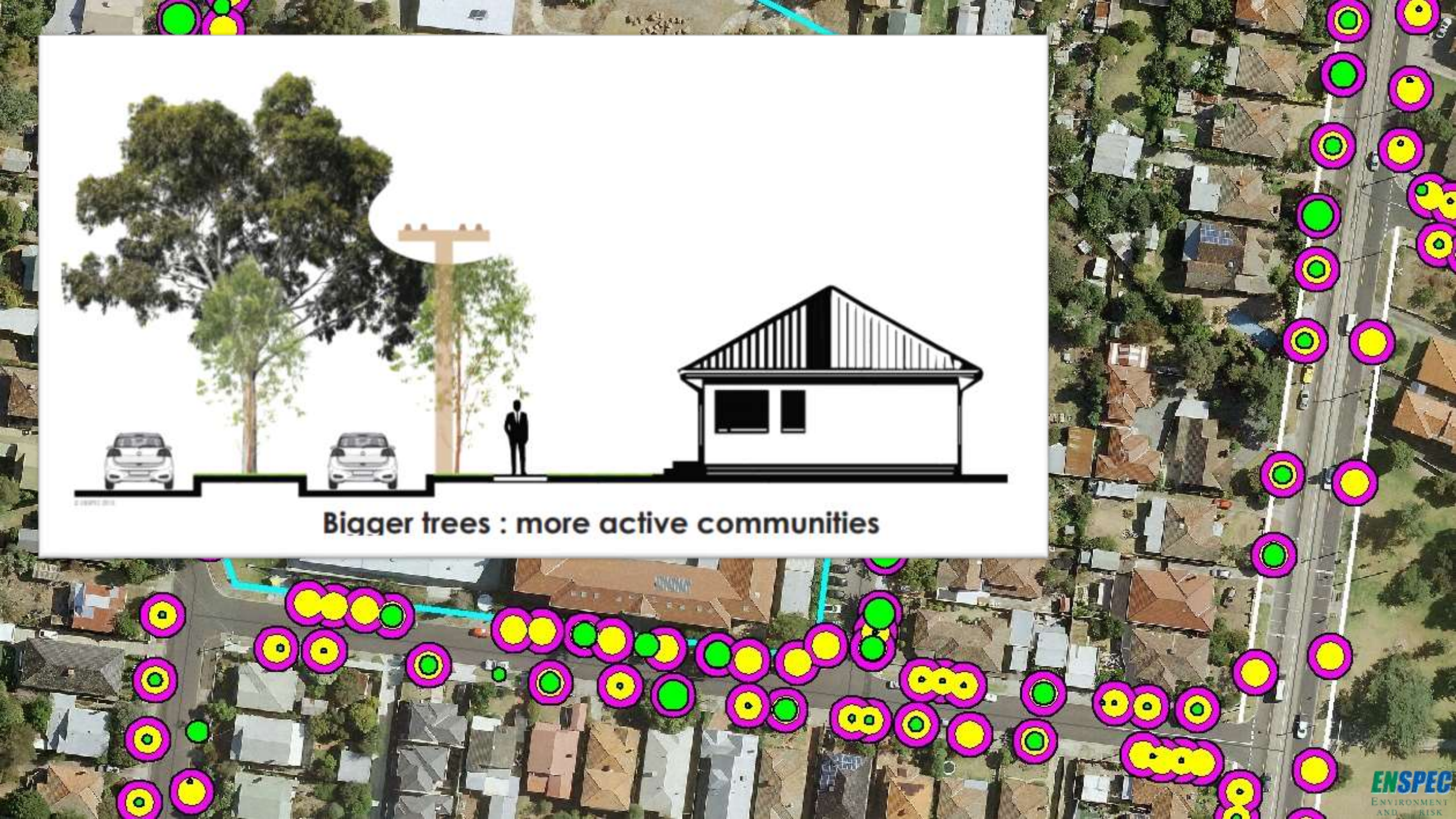
Table 7			
UHI Priority Area	Total Tree Sites	Status	Number of Sites
Priority Area 1 The North Social Vulnerability Area	20717	Current	16766
		Proposed	92
		<u>Vacant</u>	<u>3859</u>
Priority Area 2 Business Activity Centres	3145	Current	2553
		Proposed	194
		<u>Vacant</u>	<u>398</u>
Priority Area 3 Neighbourhood, Educational & Shopping Centres	4291	Current	3621
		Proposed	120
		<u>Vacant</u>	<u>550</u>
Priority Area 4 Low Canopy Cover	903	Current	755
		Proposed	43
		<u>Vacant</u>	<u>105</u>
Priority Area 5 Major Industrial Areas	35338	Current	30618
		Proposed	492
		<u>Vacant</u>	<u>4228</u>
Moreland City Council	64394		







Bigger trees : more active communities





## Location

Adelaide

Campbelltown

Charles Sturt

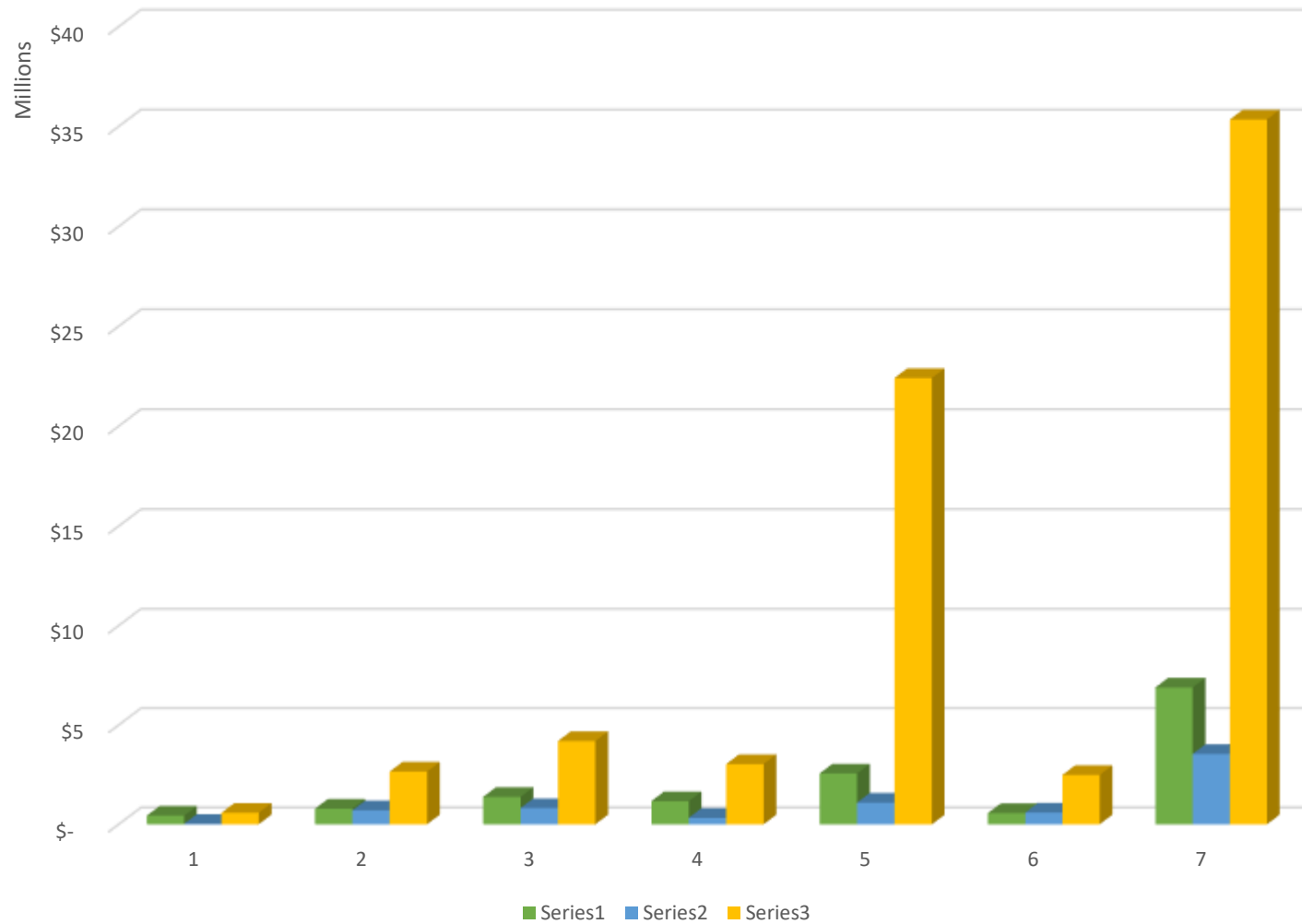
Marion

Port Adelaide Enfield

Port Pirie (urban)

**Grand Total**

### Comparative Benefit



## Grand Total Benefit (\$A)

578,763

2,653,110

4,192,820

3,032,817

22,410,221

2,484,375

**35,352,107**





### Energy Saving Benefits

Throughout the year, trees provide shade, reduce wind speeds, and transpire dew, convert liquid water into water vapour, and these processes can significantly affect ground surface temperatures. The canopy characteristics of a tree (e.g., location or orientation, size, height) will determine its contribution to air movement, which is referred to as its passive energy benefit. A tree is close proximity to a climate controlled building can reduce the heating requirements for air-conditioning in summer, by shading and transpiring, and reduce its requirements for heating in winter by sheltering a heat-cold wind and frost.

Within the current street tree population, species of *Platanus* are providing the greatest annual cooling benefit in summer months, and species of *Populus* are providing the greatest heating benefit in winter. Through calculations made within Tree Eco 2.0 it is estimated that residential and commercial properties are saved approximately 1.2 million dollars annually by the passive energy benefits provided by Banyule City Council urban forest.



**Urban Forest Strategic Plan**  
**Banyule City Council**  
 Urban Forests, Naturally Benefitting our Community





70

WINDYBUSH  
110 4  
WARRICK 2  
WYONG 11  
1-4

OPAL

WINDYBUSH  
WARRICK  
WYONG

HALLMARK  
HALTER



