

Cool and green residential streets

The role of street trees in cooling residential streets

Urban air temperatures are higher than comparative natural landscapes because of impervious urban materials and human activities such as air conditioning building and driving vehicles, which emit heat into the environment. High urban air temperatures, combined with heat waves, are a threat to public health and well-being. These threats are increasing with climate change.

Increasing trees in urban environments is an effective approach for reducing urban heat through transpiration and shading. Trees are effective for urban cooling and improving human thermal comfort. Creating shaded streets that link public transport hubs, parks and key facilities also encourages walking and recreation. Aside from providing urban cooling, trees can also reduce stormwater runoff volumes, improve air quality, store carbon and improve habitat for native animals. During the summer, tree shade reduces the energy costs associated with air conditioning.

The cooling effect of trees is increased if they have ready access to water to increase their evapotranspiration rates, which provides additional cooling beyond shading the area underneath the tree canopy.

According to the Australian Bureau of Statistics (2020), the average block size for new houses across Australian cities has reduced by 22% to 470 square meters over the past 15 years¹. While the land area has decreased, house sizes have remained the same, making it difficult for residents to plant their own trees. In established areas, trees are being lost as housing density increases through subdivision and urban development. The threat posed by high urban temperatures means the public realm, including residential streets, must do more of the heavy lifting to increase canopy and cool the city.

The costs of achieving a high level of greening in residential streets is estimated in this typology document.

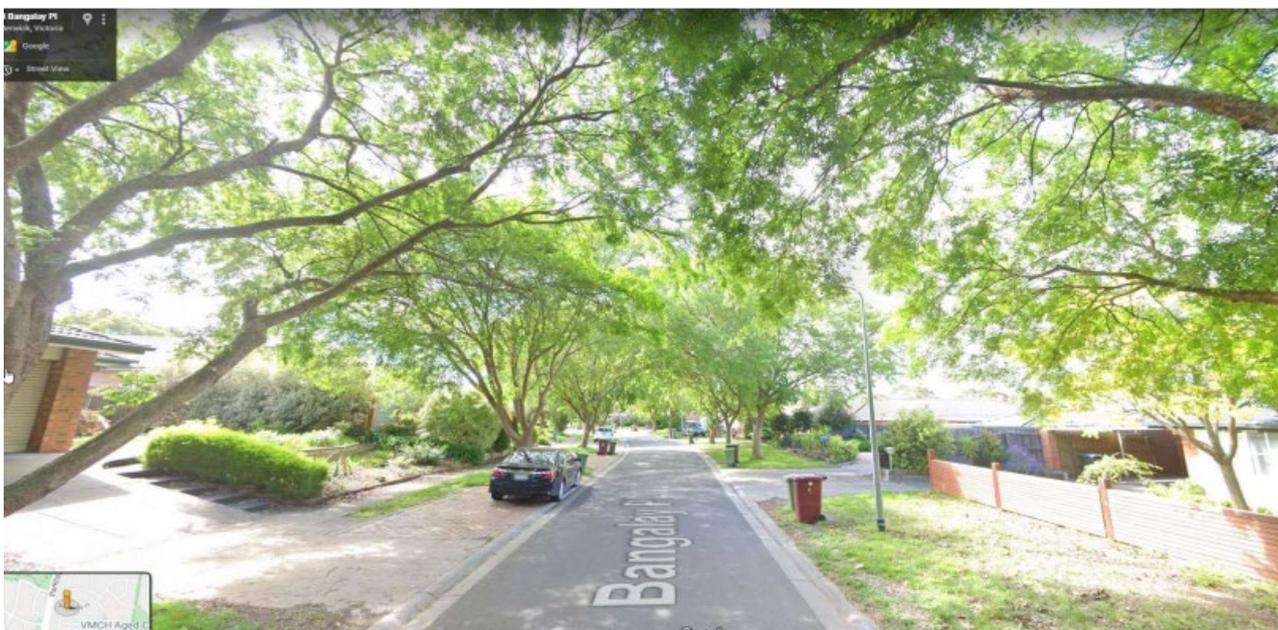


Figure 1. Example of residential with high level of canopy tree shading

¹ Australian Bureau of Statistics (2020). *Australians building houses on smaller blocks*. <https://www.abs.gov.au/articles/australians-building-houses-smaller-blocks>

The cost of green residential streets

Analysis of residential areas across Greater Melbourne undertaken as part of this study indicated that an appropriate target of for residential streets is 30% canopy cover. The lifecycle cost of achieving this level of canopy cover in a standard length of residential road area has been estimated using the [Tree Costing Tool](#), as shown below.

The varied nature of residential areas in Melbourne means there are a range of site-specific factors that will strongly influence the cost of greening residential streets, such as the presence of powerlines, underground services, and urban design features such driveway crossovers. The costs estimated for this typology should therefore be used as a starting point and further refined through the planting plan development

Two greening scenarios have been developed for greening residential streets: a standard, greening only scenario and a blue/green scenario that incorporates a simple water sensitive urban design element.

Greening only scenario

- 8 m diameter trees
- 10 m spacing between trees
- No tree removal costs
- Cost estimates in the middle of the range
- Any trees that die are replaced
- Planting directly into nature strips

Green and blue scenario

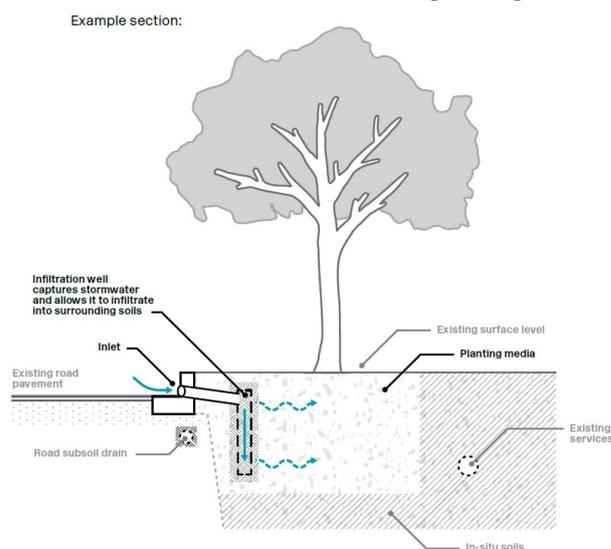
- As per the greening only scenario, with the addition of an infiltration trench passive irrigation system for each tree, as shown in the conceptual diagram below (reproduced from CRC for Water Sensitive Cities guidelines²).

The Tree Costing Tool contains a detailed list of cost items that have been used to estimate the cost of greening commercial centres. The costs include:

- Tree supply and installation (including stakes, ties, traffic control) and WSUD construction costs
- Inspection and maintenance throughout the life of the tree
- Replacement of trees that die before they are established
- Adjustment for inflation

The costs are expressed in terms of their net present value (as per the Victorian Treasury guidelines³).

The estimated costs for a 100 m stretch of residential street for both scenarios are presented in the table below (assumes 20 trees in both scenarios).



Cost item	Greening only	Green and blue
Tree establishment* and WSUD construction	\$39,220	\$89,220
Tree maintenance	\$22,260	\$29,700
Lifecycle cost of project	\$61,480	\$118,920
Lifecycle cost of one tree	\$3,074	\$5,946

*This cost includes establishing new trees to replace those that die and need to be replaced in the 30-year project horizon.

² Cooperative Research Centre for Water Sensitive Cities (2020). Designing for a cool city—Guidelines for passively irrigated landscapes. Melbourne, Victoria: Cooperative Research Centre for Water Sensitive Cities.

³ Victorian Department of Treasury and Finance (2022). Wage Inflation and discount rates. Retrieved from <https://www.dtf.vic.gov.au/financial-reporting-policy/wage-inflation-and-discount-rates>