

Cooling activity centres

The role of street trees in cooling commercial activity centres

Commercial activity centres are hubs of economic activity throughout the city, and also provide spaces for social gatherings, entertainment and performances. Commercial centres, particularly large 'big box' retail centres, typically have large areas of car parking (and large numbers of cars), large building thermal masses, and generate significant heat from cooling systems. These factors combine to increase the surrounding air temperature.

There are several ways the temperature in activity centres can be reduced, including¹²:

- Built form interventions such as shade sails over car parks and reduced areas of impervious hardstand
- Green and blue infrastructure such as tree canopy cover and irrigation of green spaces to increase evaporative cooling.

Increased levels of greening in commercial activity centres also increases visual amenity and attractiveness, leading to increased visitation rates. Providing a cooler environment makes activity centres more accessible for vulnerable people, helping to address heat inequity.

Commercial centres are typically a hostile environment for trees. Large areas of hard impervious surfaces limit infiltration (bypassing the tree root zone), and the level of compaction and rock/soil mix typically used for pavement subgrade can limit tree growth. By using stormwater for passive irrigation, and improving soil quality and volume, healthy trees with large canopies can be established.

The costs of achieving a high level of greening in commercial centres are estimated in this typology document.

The cost of greening commercial activity centres

Analysis of commercial areas across metropolitan Melbourne undertaken as part of this study indicated that a realistic, but aspirational, canopy cover target for streets in commercial areas is 19% canopy cover. Currently, 90% of roads in commercial mesh blocks in metropolitan Melbourne have canopy coverage of 19% or below, and 10% of roads have greater than 19% cover. The lifecycle cost of achieving this level of canopy cover in a standard length of road in a commercial area has been estimated using the [Tree Costing Tool](#), as shown below.

Various site-specific factors will strongly influence the cost of greening commercial centres, particularly infrastructure such as stormwater drains, powerlines and underground services. The estimated costs presented for this typology are indicative and intended to be used as a starting point when considering this type of greening project.

Three greening scenarios have been developed for commercial centres: a baseline tree planting scenario, a simple blue and green scenario, and an advanced blue and green scenario. An overview of the scenarios is presented in the table immediately below.

¹ Pfautsch, S., Wujeska-Klaue, A., Piracha, A., Paolini, R., Nouwelant, R. V. D., & Morrison, N. (2022). Despicable Urban Places: Hot Car Parks.

² Onishi, A., Cao, X., Ito, T., Shi, F., & Imura, H. (2010). Evaluating the potential for urban heat-island mitigation by greening parking lots. *Urban forestry & Urban greening*, 9(4), 323-332.

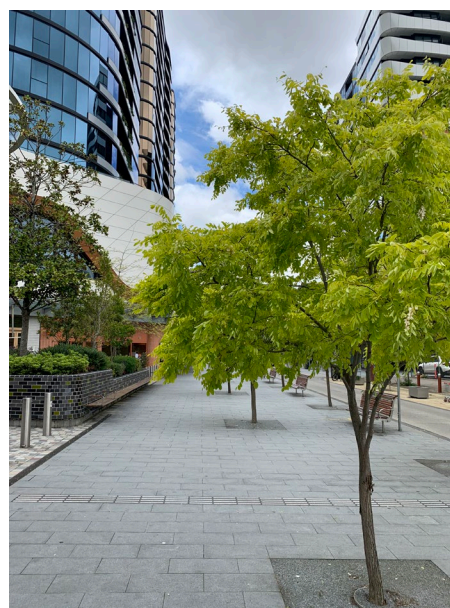
Baseline greening only scenario	Simple green and blue scenario	Higher end green and blue scenario
<ul style="list-style-type: none"> • 8 m diameter trees • 10 m spacing between trees • No tree removal costs • Cost estimates in the middle of the range • Any trees that die are replaced 	<ul style="list-style-type: none"> • Tree size and spacing as per greening only scenario • Trees planted alongside stormwater capture storages (gravel trenches) • About 400 litres water storage per tree 	<ul style="list-style-type: none"> • Tree size and spacing as per greening only scenario • Tree planted within at least 10 m³ of structural soil³ (alternative to conventional pavement material) • Stormwater capture storage designed within structural soil system (e.g. raised underdrainage connection) • About 700 litres water storage per tree

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)
- Inspection and maintenance of the tree and WSUD infrastructure (if relevant) 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 guidelines⁴).

The estimated costs for the three greening scenarios are presented for a 100 m length of street in a commercial activity centre in the table below (assumes 20 trees in all scenarios and includes the items for each scenario set out in the table above, including WSUD for every tree, where relevant).



Trees growing in structural soils in Glen Waverley (photo provided by Patrick Mallon)

Cost item	Baseline greening only scenario	Simple green and blue and scenario	Advanced green and blue scenario
Tree establishment* and WSUD construction	\$39,220	\$119,220	\$179,220
Maintenance	\$22,260	\$29,700	\$29,700
Total project lifecycle cost	\$61,480	\$148,920	\$208,920
Lifecycle cost of one tree	\$3,074	\$7,446	\$10,446

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

³ Structural soil is a growing medium composed of uniformly sized rocks (about 50 mm diameter) and soil that can be compacted to pavement design and installation requirements while permitting tree root growth.

⁴ 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>