Bankstown and Campsie Landscape Controls

Final Draft
March 2021

OCULUS

Bankstown and Campsie Urban Tree Canopy Masterplan

Phase 2 Report

Project Number: S20-020
Project Address: Canterbury Bankstown Council

Revision	Issue	Date	By	Checked
A	Phase 1 Report	04.09.20	SB	KS
B	Phase 2 Report	09.11.20	SB	KS
C	Phase 3 Report	29.01.21	SB	KS
D	Draft for Exhibition	02.03.21	SB	KS
E	Final Draft for Exhibition	11.03.21	SB	KS

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1.0
Introduction

1.1 Introduction

Background

The City of Canterbury Bankstown Council (Council) is proposing to develop an Urban Tree Canopy Master Plan as well as recommendations for DCP landscaping controls for Bankstown City Centre and Campsie Town Centre.

This report addresses the Controls component of the urban tree canopy studies and will inform future amendments to the LEP and DCP.

This study is one part of a suite of technical studies commissioned by Council to inform master planning and planning policy reform for the Bankstown City Centre and Campsie Town Centre.

Objectives

The objective of this report is to make recommendations on principles, objectives and controls to inform Council's master planning process and associated LEP and DCP.

This includes:

+ A review of current Council's DCP controls regarding deep soil planting, communal open space and WSUD principles;
+ A review and recommendation of best practice objectives and controls for increasing deep soil zones in developments located in city centres in regard to appropriate size, depth and soil volume for different building typologies and land uses;
+ A review and recommendation of best practice controls for integrating landscaping with built form such as but not limited to green walls, communal open space and planted roofs in city centres, whilst cognisant of LEP building height limitation;
+ Informing Council of controls that incorporate water-sensitive design into development sites within the Study Areas; and
+ Recommending planning and design provisions that are clear and easy to understand.

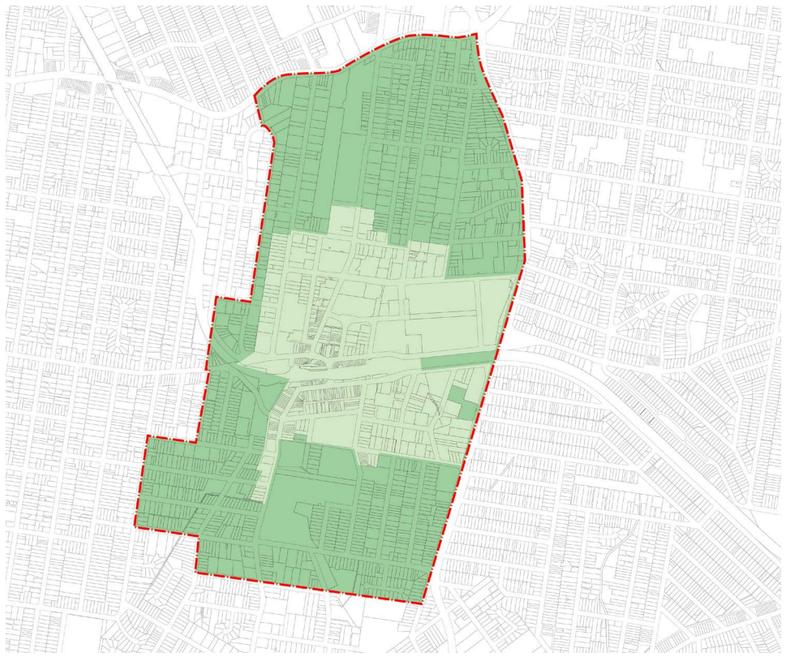
Tree planting on private land. image credit: OCULUS

1.2 Key Issues and Considerations

The following outlines items to be considered in the development of principles and controls relating to tree canopy cover, deep soil, landscape and planting provision, and water sensitive urban design as part of private

Tree canopy targets

- Council's canopy cover targets for residential areas and centres, including:
  - 15% canopy cover for centres; and
  - 25% canopy cover for medium - high density residential areas
- Relative percentage canopy cover required on private land to achieve these targets. Initial assumptions have led to the following indicative targets to be met on private land:
  - 20% canopy cover on private land for medium - high density residential development
  - 5% canopy cover on private land within commercial centres.



Deep soil zones

- Defining what a 'deep soil zone' is and if there is any scope to clarify or add flexibility to what is considered a deep soil zone.
- Minimum % of site area for deep soil
- Minimum size or width for deep soil areas
- Requirements for tree planting
- Adapting deep soil controls to different sizes and types of development

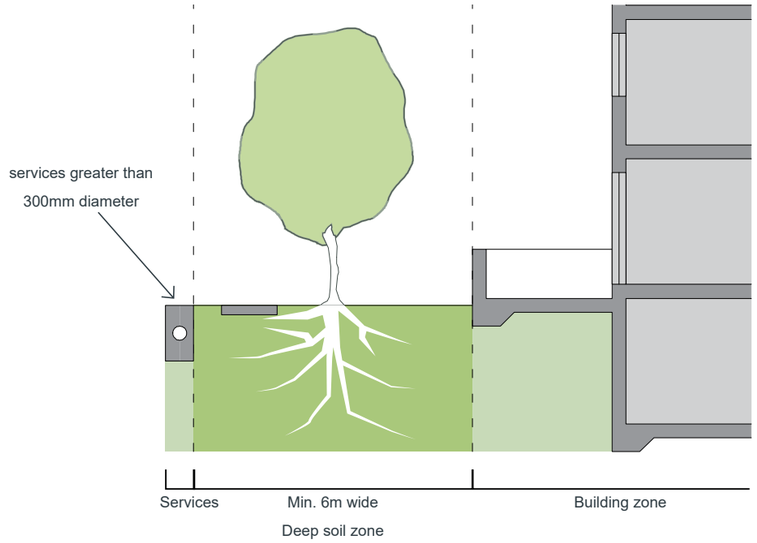


Figure 3E.2 Diagram showing the minimum dimension of deep soil zones for sites greater than 1,500m^2

image: NSW Apartment Design Guide

Communal Open Space

+ Minimum % of site area for communal open space vs m^2 rate per dwelling
+ Minimum width or size for communal open space
+ Solar access provision
+ Other design guidance and requirements for communal open space such as amenities and facilities

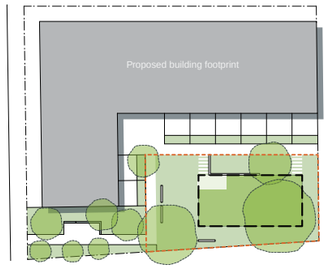


Figure 3D.3 The principal usable part of communal open spaces should be consolidated

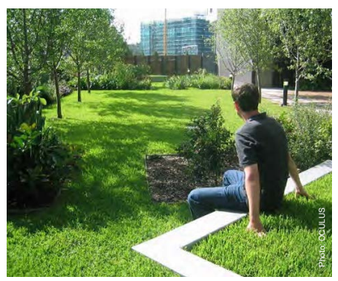
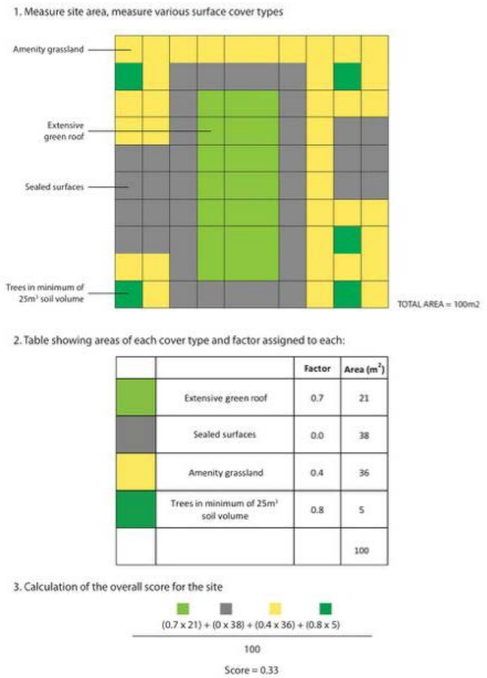


Figure 3D.4 Recreation areas such as the communal garden setting above allow residents to relax and connect to the natural environment

image: NSW Apartment Design Guide

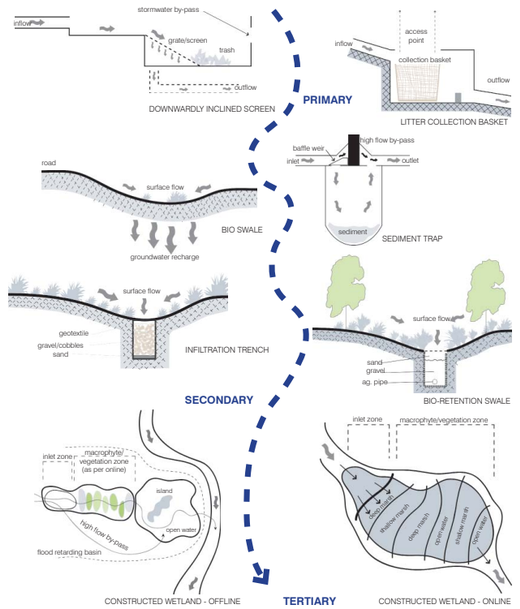
Landscape Area

+ Using a green target system as opposed to, or in support of, other landscape controls
+ Minimum size of landscaped areas
+ Factoring in the varying impacts of different landscape elements
+ Location of landscape areas - green roofs and facades
+ Types of planting to be used - Australian native, exotic or locally indigenous planting
+ Relationship to deep soil zones and communal open space areas
+ Other guidance e.g. soil depths/areas/volumes on structure
+ Relationship to other tools e.g Greenstar



Water Sensitive Urban Design

+ Relationship to other tools e.g. BASIX, Greenstar and guidelines
+ Performance based - e.g. MUSIC modelling
+ Relationship to deep soil zones, landscape area, irrigation demand
+ Design guidance e.g. rainwater collection, on site detention, stormwater treatment, permeable surfaces, greywater systems, irrigation, plant water use



2.0
Current Controls

2.1 Current DCP Controls

Overview

There are three key documents providing development controls across the study area:

+ The Canterbury Development Control Plan 2012;
+ The Bankstown Development Control Plan 2015; and
+ The NSW Apartment Design Guide

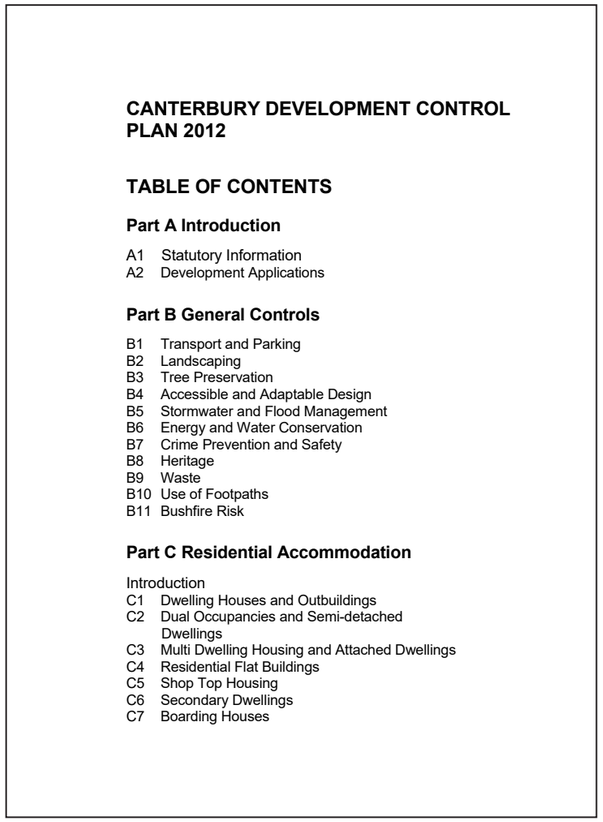
These documents have been reviewed against their current provisions for deep soil, site cover, landscape provision, tree planting and water sensitive urban design.

Across these documents there are a number of controls that support the retention and addition of trees and landscape, including:

+ deep soil requirements;
+ setbacks and site coverage;
+ communal open space provision; and
+ tree planting requirements and recommendations

While these controls promote canopy cover to a degree, a more direct set of controls will be required to ensure that specific canopy cover targets are met for each development site.

Refer to the following pages for further findings relating to the current set of controls.



CANTERBURY DEVELOPMENT CONTROL PLAN 2012

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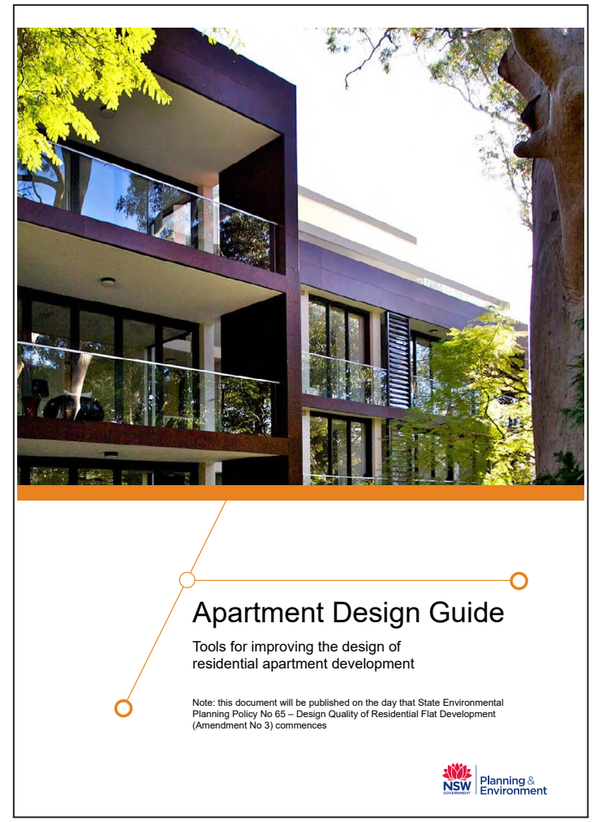
Bankstown
Development Control Plan
2015



Apartment Design Guide

Tools for improving the design of residential apartment development

Note: this document will be published on the day that State Environmental Planning Policy No 65 – Design Quality of Residential Flat Development (Amendment No 3) commences

NSW Planning & Environment

Site Cover

Bankstown DCP 2015

+ Centres - Minimum setbacks are identified on a plan in the DCP. Predominantly no setbacks in the centre, with 3m setbacks further towards CBD edge.
+ Residential - 5.5 - 6m front setback, except in Centres

Canterbury DCP 2012

+ Typically 6m front setbacks for residential
+ No front setbacks in local centre (excl Canterbury Rd)
+ 40-60% site cover for Dwelling Houses (low density)

New South Wales Apartment Design Guide (SEPP 65)

+ Site cover is dictated by deep soil requirements and setback requirements related to visual privacy.

Findings

+ To achieve 5% canopy cover in the commercial centre, additional site cover or landscape area controls will be required.

Communal Open Space

Bankstown DCP 2015

+ Multi-Dwelling Housing - 50m^2 of open space per dwelling

Canterbury DCP 2012

+ Multi-Dwelling Housing - 40m^2 of open space per dwelling

New South Wales Apartment Design Guide (SEPP 65)

+ Communal open space to be minimum 25% of the site area

Findings

+ Achieving 20% canopy cover by only planting trees within the minimum communal open space area required by the ADG would result in 80% canopy cover across this communal open space. This outcome would likely impede on the amenity of these spaces and as such future DCP controls should provide recommendations to avoid this potential

Deep Soil

Bankstown DCP 2015

+ Deep soil required in setbacks for Medium and High density residential - 2m to side and rear

Canterbury DCP 2012

+ Deep soil required in setbacks for Medium and High density residential - varies 1-5m
+ 15-25% deep soil requirement for Dwelling Houses (low density)

New South Wales Apartment Design Guide (SEPP 65)

+ Minimum 7% of site area
+ Min dimensions for 650-1500m2 = 3m, greater than 1500m2 = 6m
+ Design Guidance:
  + 650-1500m^2: minimum 10% of site area
  + >1500m^2: minimum 15% of site area
+ Exceptions for non-residential uses as ground floor, site location, building typology, high density areas, centres (considerable loophole)

Comparison - Western Australia Residential Design Codes

+ Minimum 10% of site area OR 7% if existing trees are retained

Comparison - Victoria Better Apartments Design Standards

+ 750-1000m^2: minimum 5% of site area
+ 1001-1500m^2: minimum 7.5% of site area
+ 1501-2500m^2: minimum 10% of site area
+ >2501m^2: minimum 15% of site area
+ If an existing tree over 8m is retained, the deep soil minimum area is 7% of site area

Findings

+ Current deep soil controls will not provide the area needed for canopy cover targets alone. Trees proposed on structure will likely be required to contribute to canopy cover.

Tree Planting

Bankstown DCP 2015

+ Development must retain and protect any significant trees (note: the term "significant tree" is not defined in the DCP).
+ Development must landscape the following areas on the allotment by way of trees and shrubs with preference given to native vegetation endemic to the City of Bankstown:
  + a minimum 45% of the area between the dwelling house and the primary road frontage; and
  + plant at least one 75 litre tree between the dwelling house and the primary road frontage.

Canterbury DCP 2012

+ B2 Landscaping section contains significant guidance on tree planting, including:
  + General controls
  + Retention of existing trees
  + Street Trees
  + Tree protection measures
+ Provides min. standards for soil volumes and planter box depths
+ Maximise the retention of existing trees, bushland and natural site features.
+ Contains B3 Tree Preservation section.

Tree Management Orders (included within Bankstown and Canterbury DCPs)

+ Provides controls for tree management
+ Lists controls for pruning, removal and replacement planting of trees
+ The TMOs for Campsie and Bankstown are mostly identical in content and controls
+ The Canterbury TMO content overlaps with B3 Tree Preservation

Draft Canterbury Bankstown DCP 2021 (on exhibition)

+ The Draft DCP contains a new combined section for Tree Management that may address some of the issues raised regarding tree planting.

New South Wales Apartment Design Guide (SEPP 65)

+ Recommended tree planting in deep soil zones:
  + Up to 850m^2 - 1 medium tree per 50m^2 of deep soil zone
  + Between 850 - 1,500m^2 - 1 large tree or 2 medium trees per 90m^2 of deep soil zone
  + Greater than 1,500m^2 - 1 large tree or 2 medium trees per 80m^2 of deep soil zone
+ Guide provides minimum soil volumes and depths for plant type and sizes.

Comparison - Western Australia Residential Design Codes

+ Requirement for trees in deep soil:
  + <700m2: 1 medium tree & small trees to suit
  + 700-1000m2: 2 medium trees OR 1 large tree & small trees to suit
  + >1000m2: 1 large & 1 medium tree for each additional 400m2 over 1000m2 OR 1 large tree for each additional 400m2 over 1000m2

Findings

+ The Campsie and Bankstown DCPs provide some general guidance and recommendations for the retention of existing trees and planting of new trees, however clear controls and specific requirements are required in future DCPs to ensure canopy cover percentages are achieved.
+ The TMOs contain a clause allowing for the removal of ' Trees located within 3.0 metres of the external wall of an approved dwelling', which greatly reduces the potential retention and planting of trees.
+ No provisions are provided for the retention of newly planted trees. Rectifying this within future DCPs is needed to ensure the trees planted to meet new canopy

Water Sensitive Urban Design

Bankstown DCP 2015

+ All proposals with an intended gross floor area equal to or greater than 5,000m^2 (whether multi use or single use) must submit with the development application, a site water management plan that investigates and where feasible provides for the integrated management and use of water for the proposed development.

Canterbury DCP 2012

+ Controls set out in B2 Landscaping:
  + Use plants that have low water requirements, are drought tolerant and reduce lawn areas to minimise water use.
  + Use drip irrigation systems in preference to spray watering.
  + Use measures to limit stormwater run-off from the development so that the pre-development stormwater pattern and flows are maintained.
  + Integrate landscape design with water and stormwater management - use landscaped detention basins where appropriate.
  + Provide for water cycle management in streetscape and hard landscape design.
  + Limit impervious surfaces to reduce run-off and increase stormwater absorption on site.
+ Stormwater and Flood Management:
  + Requirements around OSD based on land use type
  + Absorption systems discouraged (clay soils)

New South Wales Apartment Design Guide (SEPP 65)

+ Refers out to BASIX requirements
+ Design Guidance Only:
  + Minimise potable water use: rainwater collected, stored and reused on site, low water-use plants

Findings

+ Current controls do not specify specific landscape areas or treatments for Water Sensitive Urban Design
+ WSUD may form part of a ‘green target’ approach, given their beneficial impact on amenity, water treatment, green cover and heat island effect

3.0
Best Practice

3.1 Water Sensitive Urban Design

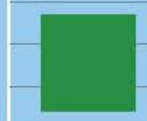
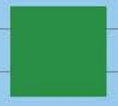
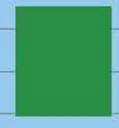
Case Study: Water Sensitive Urban Design Guidelines, Melbourne Water (2009)

The Water Sensitive Urban Design (WSUD) Guidelines set out Council's expectations for WSUD projects within the municipality, to inform developers and consultants. The document provides information on the approvals process, design considerations, suitability of WSUD types in different conditions and considerations for construction, protection, maintenance and handover of WSUD assets.

These guidelines provide a useful reference for the suitability of particular WSUD types for different situations. This and other information within the Melbourne Water Guidelines could potentially suppliment the WSUD controls suggested in this report should Council wish to expand on the detail of information and guidance provided. At this stage it is recommended that controls focus on performance-based outcomes and general principles with flexibility for developers to deliver quality WSUD interventions as best suits their particular site and development.

Table A-1: Summary of treatment function, applicability and cost: Adapted from: Victorian Stormwater Committee (1999); Wong (2006); EPA (2008)

☑ High applicability
☑ Medium applicability
☑ Low applicability

	Bioretention swales	Bioretention basins /raingardens	Vegetated swales/ buffer strips	Sand filters	Sedimentation basins	Constructed wetlands	Ponds and shallow lakes	Rainwater tanks
FUNCTION:								
Water quality treatment	☑☑☑	☑☑☑	☑☑☑	☑☑☑	☑☑☑	☑☑☑	☑	☑
Flow attenuation	☑☑	☑☑	☑☑	☑☑	☑☑	☑☑☑	☑☑☑	☑☑☑
Stormwater conveyance	☑☑☑	☑	☑☑☑	☑	☑	☑	☑	☑
Particle size removal								
Coarse-Medium particles 5000 µm - 125 µm								
Fine particulates 125 µm - 10 µm								
Very fine/Colloidal particulates 10 µm - 0.45 µm								
Dissolved particles <0.45 µm								
Additional function		Landscape value	Aesthetic appeal Habitat values		Landscape value	Habitat, visual and recreation amenity	Habitat, visual and recreation amenity	Stormwater re-use
APPLICABILITY:	Median strip/verge	Streets	Median strip/verge/ parks	Streets/many	Pre-treatment to wetland	Parks/vacant land	Aesthetic/post wetland	On-property
Area requirement	Larger areas (with limited public access)	Limited space	Larger areas (with limited public access)	Limited space	Large areas	Large areas	Large areas	Limited space
Slope considerations and approach to site constraints	Gentle slopes (< 5%). Where slopes exceed 5%, flow spreaders or check dams may be required.	Flat land. Where land is sloped terraces can be used.	Gentle slopes (< 5%). Where slopes exceed 5%, flow spreaders or check dams may be required.	Suitable for steeper slopes	Flat land	Flat land	Suitable for steep land	Suitable on most sites
Level of flow control	Conveyance	Discharge	Conveyance	Discharge	Discharge	Discharge	Discharge	Source
INDICATIVE COSTS:								
Installation costs	Moderate	Moderate	Low	Low/Moderate	High	High	High	Low
Maintenance costs	Moderate	Moderate	Moderate/High	Moderate	Moderate/High	Moderate	Moderate	Low

3.2 Green Target Initiatives

An integrated approach to landscape cover

The following international and local examples address landscape cover through a system of weighted landscape factors contributing to an overall score or requirement for private development.

These systems consider the combined impact of a number different factors, including water sensitive urban design, tree planting, landscape treatments and facade and green roof planting. This provides the developer with a level of flexibility in incorporating green and blue infrastructure into development while ensuring overall positive outcomes.

In considering a similar application for Canterbury Bankstown Council, the weighting of trees would have to be done to ensure a sufficient level of canopy cover. This approach would also require an additional level of complexity to introduce, however this will translate into a better overall environmental and social outcomes.

The Melbourne Green Factor tool is the most relevant case study to this Bankstown given its Australian context. It is suggested that Council create a dialogue with Melbourne Council if they wish to pursue a Green Target approach in order to gain insight into their lessons learnt relating to this relatively new (and voluntary) initiative.

Case Study: Seattle Green Factor

The Green Factor is a tool to ensure landscape is properly considered in planning urban development. A development is given a target score dependent on its total area, context and other attributing factors.

The Green Factor establishes a weighted menu of landscape elements, and requires project proposals to meet a minimum score by selecting features from that menu.

High factors are assigned to green roofs, large trees, and wall areas covered with climbing plants. This is shown in the adjacent example.

The Green Factor results in a certain amount of green cover in the development. It also rewards surface cover types which tend to be of high functionality than others by assigning them a high factor.

*Revised 12/29/10

Green Factor Score Sheet

SEATTLE × *green factor*

Project title:

Parcel size *(enter this value first)* * enter sq ft of parcel: 5,000 — SCORE: -

	Landscape Elements**	Totals from GF worksheet		Factor	Total
A	**Landscaped areas (select one of the following for each area)**				
1	Landscaped areas with a soil depth of less than 24"	enter sq ft: 0		0.1	-
2	Landscaped areas with a soil depth of 24" or greater	enter sq ft: 0		0.6	-
3	Bioretention facilities	enter sq ft: 0		1.0	-
B	**Plantings (credit for plants in landscaped areas from Section A)**				
1	Mulch, ground covers, or other plants less than 2' tall at maturity	enter sq ft: 0		0.1	-
2	Shrubs or perennials 2'+ at maturity - calculated at 12 sq ft per plant (typically planted no closer than 18" on center)	enter number of plants: 0	0	0.3	-
3	Tree canopy for "small trees" or equivalent (canopy spread 8' to 15') - calculated at 75 sq ft per tree	enter number of plants: 0	0	0.3	-
4	Tree canopy for "small/medium trees" or equivalent (canopy spread 16' to 20') - calculated at 150 sq ft per tree	enter number of plants: 0	0	0.3	-
5	Tree canopy for "medium/large trees" or equivalent (canopy spread of 21' to 25') - calculated at 250 sq ft per tree	enter number of plants: 0	0	0.4	-
6	Tree canopy for "large trees" or equivalent (canopy spread of 26' to 30') - calculated at 350 sq ft per tree	enter number of plants: 0	0	0.4	-
7	Tree canopy for preservation of large existing trees with trunks 6"+ in diameter - calculated at 20 sq ft per inch diameter	enter inches DBH: 0	0	0.8	-
C	**Green roofs**				
1	Over at least 2" and less than 4" of growth medium	enter sq ft: 0		0.4	-
2	Over at least 4" of growth medium	enter sq ft: 0		0.7	-
D	**Vegetated walls**	enter sq ft: 0		0.7	-
E	**Approved water features**	enter sq ft: 0		0.7	-
F	**Permeable paving**				
1	Permeable paving over at least 6" and less than 24" of soil or gravel	enter sq ft: 0		0.2	-
2	Permeable paving over at least 24" of soil or gravel	enter sq ft: 0		0.5	-
G	**Structural soil systems**	enter sq ft: 0		0.2	-
		sub-total of sq ft =	*0*		
H	**Bonuses**				
1	Drought-tolerant or native plant species	enter sq ft: 0		0.1	-
2	Landscaped areas where at least 50% of annual irrigation needs are met through the use of harvested rainwater	enter sq ft: 0		0.2	-
3	Landscaping visible to passersby from adjacent public right of way or public open spaces	enter sq ft: 0		0.1	-
4	Landscaping in food cultivation	enter sq ft: 0		0.1	-
			Green Factor numerator =		-

** Do not count public rights-of-way in parcel size calculation.*

*** You may count landscape improvements in rights-of-way contiguous with the parcel. All landscaping on private and public property must comply with the Landscape Standards Director's Rule (DR 6-2009)*

Case Study: Berlin Biotope Area Factor

In Berlin inner city, plans for the development of new buildings fall under a regulation requiring a proportion of the area to be left as green space: the Biotope Area Factor (BAF) or BFF (Biotop Flächenfaktor). All potential green areas, such as courtyards, roofs and walls are included in the BAF. It responds to the need to encourage more green space in densely built-up urban areas.

The BAF started to be implemented in 1994 and is still on-going. A considerable number of new built areas in the inner centre have implemented this regulation, translating it into green areas.

The Biotope Area Factor establishes that the development of new buildings requires a proportion of the area to be left as a green space. The BAF provides developers, architects and designers with clear but flexible guidelines on the portion of a plot of land that must be planted or provide other green space functions in terms of: improvement of the microclimate, urban cooling, sustainable drainage, improvement of natural habitats and enhancement of the quality of the residential environment. Specific solutions implemented in the BAF included: (i) greening of functional spaces (e.g. bike or bin sheds); (ii) planting trees and shrubs or, in smaller areas, climbing plants to create green walls; (iii) introducing green roofs; (iv) paving only on main routes and using permeable surfaces elsewhere.

Use of regulations has proven to be an effective means of increasing green cover in Berlin city centre as every new development needs to comply with BAF targets. Flexibility of the approach provides significant advantages. Developers can choose between a number of different options for greening or creating permeable surfaces, and pick those that are the most beneficial and effective for themselves and the users of the development.

Case Study: Malmo Green Space Factor and Green Points System

The Malmö city district of Västra Hamnen (Western Harbour) in Sweden is an example where green infrastructure planning tools have been successfully used in new developments. The planning of the Western Harbour area began in the late 1990s.

As part of the district's objective of creating new, high-quality green space, the City Council agreed to use a 'Green Space Factor' and a 'Green Points System' to achieve a minimum level of greenery, and special green and blue qualities for private development.

Green Space Factor

The aim of using the Green Space Factor was to secure a certain amount of green cover in every building lot, and to minimise the degree of sealed or paved surfaces in the development. It is applied to the whole building lot, taking into account both the building areas and the open space.

The approach essentially assigns factors to different surface types (as outlined in the adjacent table), which are then multiplied by the area of each within the courtyard and summed; the total is divided by the courtyard area to give the overall Green Space Factor, which must reach a specified target level. The minimum level of the Green Space Factor to be reached was set at 0.5.

Green Points System

Green Points were added to the Green Space Factor to achieve certain additional qualities. Developers were given a list of 35 Green Points and were required to choose 10 of them. As for the Green Space Factor, the chosen 10 Green Points were described in the detail plans. Among the points, some aimed to aid biodiversity such as the inclusion of bat boxes and wild flowers in the courtyards, whilst others were included to improve the architectural qualities of the yard or help with stormwater management.

Green Space Factors:

Surface Type	Factor
Vegetation on ground	1
Vegetation on trellis or facade	0.7
Green roofs	0.6
Vegetation on beams, soil depth between 200 millimetres and 800 millimetres	0.7
Vegetation on beams, soil depth more than 800 millimetres	0.9
Water surfaces	1
Collection and retention of stormwater	0.2
Draining of sealed surfaces to surrounding vegetation	0.2
Sealed areas	0
Paved areas with joints	0.2
Areas covered with gravel or sand	0.4
Tree, stem girth 16-20 centimetres ($20m^2$ / tree)	20
Tree, stem girth 20-30 centimetres ($15m^2$ / tree)	15
Tree, stem girth more than 30 centimetres ($10m^2$ / tree)	10
Solitary bush higher than 3 metres ($2m^2$ / bush)	2

Case Study: City of Melbourne Green Factor

Green Factor is a green infrastructure assessment tool designed by the City of Melbourne and developed to help with designing and constructing new buildings that are environmentally friendly and include green infrastructure. It forms part of their work to respond to the climate and biodiversity emergency.

This new online tool is designed to help landscape designers, architects, planners and developers benchmark and improve how effective their greening designs for new buildings are. The hope is that it will help increase the amount of vegetation cover on private land in Melbourne.

The City of Melbourne's environmental strategies have been used to prioritise the types of greening that will provide benefit to the public and the environment. The scoring of Green Factor is underpinned by the latest research into the environmental and social benefits of green infrastructure. Green Factor is the first online tool of this kind in Australia.

Green Factor will help new buildings to deliver benefits in the following areas:

+ urban heat island effect reduction
+ biodiversity and habitat provision
+ stormwater reduction
+ social amenity such as recreation and mental wellbeing
+ urban food production
+ aesthetic values.

Green Factor is free and available for anyone to benchmark their greening designs. At present, its primary use is to help new developments in Melbourne to get the most benefits from their green designs. Eventually, the tool will also be used to ensure new planning applications comply with future planning policy requirements around climate action.

The tool is currently voluntary but the City of Melbourne is asking all developers who submit a planning application for new buildings (except single dwellings) to submit a green factor scorecard, aiming to achieve a target score of 0.55 or 0.25 for industrial. This will help developers to get familiar with the tool and understand future requirements.

4.0
Principles and Controls

4.1 Tree Protection and Retention

Principles

+ With approximately 70% of both study areas being private land and only 30% being streets and parks, it is essential that existing canopy cover on private land is maintained and enhanced in order to achieve tree canopy cover targets.
+ For commercial centres, a canopy cover target of 15% has been set which will require a minimum canopy cover of 5% to be achieved in private land, in conjunction with the target of 40% for open space and streets.
+ For those parts of the study area outside of the commercial centre (typically zoned medium-high density residential), a canopy cover target of 25% has been set which will require a minimum canopy cover of 20% to be achieved in private land, in conjunction with the target of 40% for open space and streets.
+ The most effective way of increasing average tree size and tree canopy is to protect and manage existing trees within Bankstown and Campsie.
+ With 13-14% of the existing canopy cover provided by existing trees, it is imperative that these are maintained in order to reduce the reliance on new tree planting which will take many years to help achieve canopy cover targets.
+ As trees take many years to grow, it makes sense that Council should implement strategies and actions to retain trees that are healthy and in good condition.
+ Importantly, larger trees have been found to be more valuable (providing between 4 to 8 times the benefits) than small trees. Therefore, Council needs to promote the maintenance and protection of these assets.

Recommended Controls

+ Consolidate the DCP Tree Management Orders and Canterbury Council DCP Section B3 Tree Preservation to avoid double up of controls.
+ Remove the following exemption from the TMOs: "Trees located within 3.0 metres of the external wall of an approved dwelling, not including a secondary dwelling. The distance shall be measured from the external wall of the approved dwelling to the centre of the trunk of the tree at 1.4 metres above ground level"
+ Add the following Prescribed Trees item: ‘any tree planted on developments on the same property that obtained Development Consent after *day* of *month*, 2021 (*being the date that the new canopy cover controls are put into place*)’
+ Trees included in the above category that are removed for valid reasons (listed under 'Exemptions' in the TMOs) are to be replaced with trees of an equivalent estimated mature size.
+ A significant tree is one which is has been assessed under a specific methodology to be significant. Future controls and strategies should only use the terminology ‘significant tree’ where this is appropriate.
+ Controls should make reference to *Australian Standard 4970 (2009) Protection of Trees on Development Sites* in regards to the retention and protection of trees on developments.
+ The requirement for tree retention and protection should form part of the Development Application Conditions of Consent.

Other Actions

+ Council to prepare a Significant Tree Register. This should establish a specific methodology to classify trees as 'significant'. The terminology 'significant tree' should only be used to refer to trees that have been classified as such according to the methodology. Once adopted, the register should be listed within Schedule 5 of the LEP for greater protection.
+ Council should adopt the use of bonding to protect existing trees. Council should seek to bond high value street and park trees to provide additional protection. Bonds should be based on a Council approved valuation system. Note, bonding of trees on private land may not be legally binding.
+ Council should ensure that there are adequate resources and procedures in place for Landscape Compliance Officers to enforce the controls.
+ There should be appropriate action taken against developers who do not adhere to conditions of consent regarding tree retention and protection.
+ Council to undertake regular audits (every 5 years) of tree canopy cover on public and private land to assess current status against tree canopy cover targets.
+ Council to prepare Street Tree Master Plans for Campsie and Bankstown in order to select the most appropriate tree species for each location given site conditions, spatial and climatic constraints and neighbourhood character.
+ Council to incorporate the work undertaken as part of the Water Efficiency Study for Urban Tree Management by DPIE in their tree management policy and procedures.
+ Council to establish a community engagement and communication plan as regards the urban tree canopy. This should involve a variety of tools and fora to engage the community with the Urban Tree Canopy Master Plan and other policies related to urban tree management. The plan should also enable the community to 'have a say' in future tree planting projects.

4.2 Tree Planting / Canopy Cover

Principles

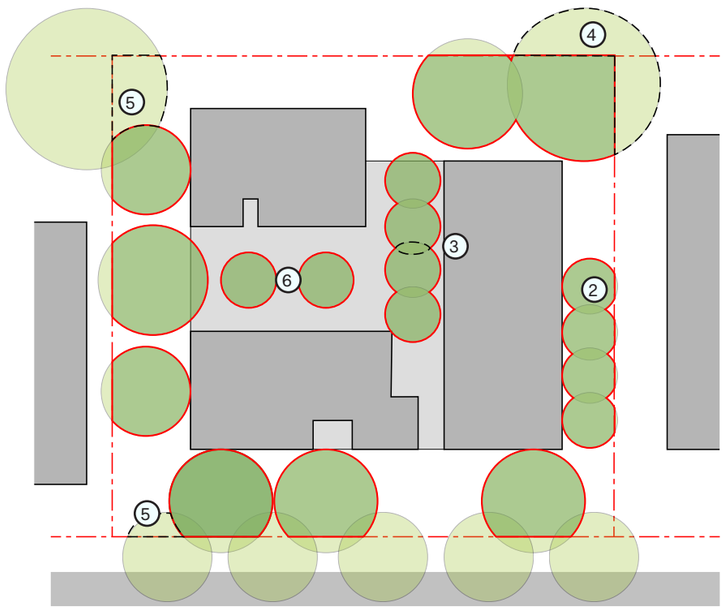
+ With the existing canopy cover across both Bankstown and Campsie study areas being in the range of 13-14%, it is imperative that Council increases the canopy cover across both areas significantly.
+ For commercial centres, a canopy cover target of 15% has been set, and for urban residential areas, a canopy cover target of 25% has been set. These targets align with those established by the Greater Sydney Region Plan, the Department of Planning, Industry and Environment's 5 Million Trees Program, and the NSW State Government in their Greener Places design guide.
+ Based on an assessment of the existing canopy cover and comparison to relevant guidelines, reveals there is a significant gap that needs to be addressed to meet these targets and Council's vision.
+ Increasing the canopy cover to meet these targets is no easy task. It involves managing the gradual removal of the existing canopy through natural attrition or due to impacts such as development, ensuring replacement trees are planted where appropriate and identifying opportunities for new trees.
+ Increasing canopy cover on private land can only be achieved through protecting existing trees, enforcing tree planting as part of developments, and investigating other incentive programs for tree planting.
+ The easiest way, certainly in the short term, to increase canopy cover, is for Council to look at opportunities to plant new trees in public streets and parks. By planting the largest trees possible for the site, tree canopy cover and the resultant benefits can be maximised.

Recommended Controls

In addition to existing DCP and ADG controls:

All Sites:

+ Developments to provide tree plantings that will achieve the mature tree canopy cover targets outlined in these controls. Canopy cover targets are based on a percentage of the total site area, to be calculated in accordance with the following controls, as outlined on the plan below:
  1. Area is based on a nominated mature size of existing and proposed trees.
  2. The minimum tree spread to count towards the targets is 3m diameter (small tree).
  3. Any overlap between tree canopies to only count once towards total area.
  4. Any areas of canopy extending outside of the site to be excluded.
  5. Any areas of canopy extending into the site from trees planted in adjacent sites are not to be included.
  6. Trees on structure, including podiums and rooftops, count towards the targets.



Canopy cover targets are as follows:

Within Commercial Centres:

+ Commercial Centres to be defined based on LEP zoning, or identified as a specific area on a map to be provided in conjunction with these controls.
+ Canopy Targets as follows, based on development type:
  + Non-residential only: 5%, of which 0% (minimum) is based on trees planted in deep soil
  + Mixed use including residential: 10%, of which 25% (minimum) is based on trees planted in deep soil
  + Residential only: 15%, of which 25% (minimum) is based on trees planted in deep soil
+ Council to investigate whether certain sites within the centres to be exempt (if mixed use) or included (commercial only) from deep soil controls

Outside Commercial Centres:

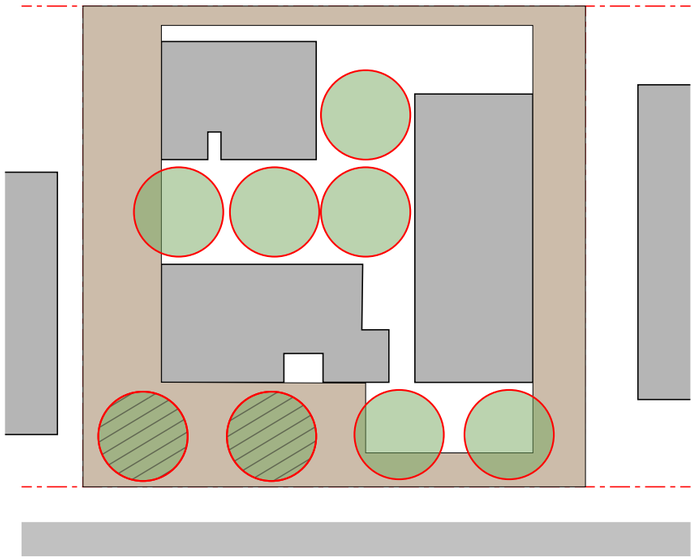
+ Canopy Target: 20%, of which 25% (minimum) is based on trees planted in deep soil

Car Parks:

+ New at grade car parks should provide a minimum of one tree per five car spaces.
+ Each tree should achieve a minimum 50m^2 of canopy cover when mature, supported by adequate soil volumes.

Note: specific controls for different typologies or size of sites to be further explored with Council (e.g. may be specific canopy cover requirements for certain sites within Commercial Centres).

+ Development Applications to provide a Plant Schedule that nominates mature canopy sizes for each species based on the species and growing conditions. *Council to produce a list of common species showing acceptable canopy spreads.*
+ Development Applications to include a Tree Canopy Plan that shows the existing and proposed trees at their nominated mature size and details of the proposed canopy cover by area and percentage of site.
+ Development must provide sufficient room and growing conditions, including soil volumes in accordance with ADG recommendations (noting that there are different recommendations for deep soil and on-structure planting), for trees to grow to nominated sizes. The Developer is to provide arborist confirmation in the form of a report submitted as part of Development Applications that nominated tree spreads and overall canopy cover can be achieved.



Tree canopy cover requirement

Deep soil

Trees planted in deep soil = 25% of the tree canopy cover requirement

Indicative layout showing 25% of canopy cover based on trees planted in deep soil (for residential developments and areas outside of commercial centres)

- Architectural and Landscape plans and sections submitted for approval are to provide information sufficient for Council to assess the growing conditions of trees, including:
  - Location of Deep Soil Zones
  - Location, species and canopy spread of all existing trees to be retained or removed, including those adjoining properties. Tree numbering to correspond with the Arborist Report.
  - Sections through tree and planter beds on structure, indicating depths of soil to be provided
  - Stormwater pipes and pits, including any onsite detention, and drainage to planter beds on structure
  - Underground and overhead services and easements
  - Proposed surface treatments and extent of any structural soil systems if required to achieve soil volumes
  - Landscape maintenance program
- Canopy trees are to be located within residential developments in accordance with ADG Communal Open Space guidelines. Note that as per standard practice, shade created by proposed trees is not to be included as part of the solar access calculations for Communal Open Space areas.
- Whilst the use of locally indigenous species and provenance plant material is important, particularly in some some sites close to bushland, the wording of the Bankstown DCP should consider that heavily promoting indigenous species may not be appealing to some aspects of the the community and may also result in a narrow species diversity.
- Include controls to protect newly planted trees and requirement for replacement planting if removed (refer to Tree Protection and Retention Controls).
- Minimum tree sizes, specifications for new planting, and watering rates for new trees to be included in DCPs.

Other Actions

- Council's approval system should include inspections to ensure that landscaping associated with new developments is implemented and maintained in accordance with relevant controls and approved plans.
- Council should consider requiring developers to contribute towards the undergrounding of powerlines, especially in commercial centres and medium-high density residential areas, to facilitate additional and larger size street tree planting.
- Council should explore opportunities to engage with utility companies to promote aerial bundling of overhead wires (where undergrounding is not possible) and use of shared services trenches where multiple new services are being installed.
- Council should ensure that there are adequate resources and procedures in place for Landscape Compliance Officers to enforce the controls.
- Council to investigate the development of a Green Factor Tool based on the City of Melbourne's and other international examples. This will require extensive research and development, as well as consultation with a wide range of internal and external stakeholders.
- Council to investigate whether certain sites or typologies within commercial centres to be exempt (if mixed use) or included (commercial only) from tree planting in deep soil controls.

4.3 Deep Soil

Principles

+ Deep soil zones have important environmental benefits, such as allowing infiltration of rain water to the water table and reducing stormwater runoff, promoting healthy growth of large trees with large canopies and protecting existing mature trees which assist with temperature reduction in urban environments.
+ Deep soil zones are preferable to planting beds on structure for the establishment of new trees as they are typically able to provide larger soil volumes, planting within natural soil substrates, and use of natural soil moisture. Planting beds on structure require artificial drainage and irrigation systems and soil mixes.
+ It is difficult to achieve adequate soil volumes and suitable growing conditions to support large trees on structure due to limitations on planter size, depth, loading, and competing demands for space such as GFA and communal open space.
+ The retention, protection and ideally enhancement of deep soil zones containing existing trees, particularly large trees, is very important in helping achieve the objective of maintaining the existing urban tree canopy and helping to achieve tree canopy targets.
+ All sites should achieve the minimum deep soil requirements as set out in the ADG unless there are overriding urban design reasons why they should not be provided for non-residential or mixed use sites within Commercial Centres.
+ Larger sites should achieve the higher requirements in excess of the minimum as set out in the ADG ie. 10% of the site as deep soil on sites with an area of 650m^2 - 1,500m^2 and 15% of the site as deep soil on sites greater than 1,500m^2, unless there are specific reasons why these cannot be achieved.

Recommended Controls

All Sites:

+ Deep soil zones are as defined in the ADG:
  + "Deep soil zones are areas of soil not covered by buildings or structures within a development. They exclude basement car parks, services, swimming pools, tennis courts and impervious surfaces including car parks, driveways and roof areas."
+ Where deep soil is required, minimum width dimensions shall be:
  + 2m for sites less than 650m^2 (*Note ADG has no minimum dimension for sites under 650m^2*)
  + 3m for sites between 650 and 1500m^2
  + 6m for sites greater than 1500m^2
+ Provide soil volumes on sites with sand, clay, alluvial, transition and disturbed soils as per the ADG.

Outside Commercial Centres:

+ Minimum deep soil requirements (% of site area):
  + 7% on sites with an area less than 650m^2
  + 10% on sites with an area of 650m^2 - 1,500m^2
  + 15% on sites greater than 1,500m^2

Within Commercial Centres:

+ Minimum deep soil requirements (% of site area):
  + Non-residential only: 0%
  + Mixed use including residential: 7%
  + Residential only: 7%

Other Actions

+ Council to investigate whether certain sites or typologies within commercial centres to be exempt (if mixed use) or included (commercial only) from deep soil controls.
+ Council to investigate the development of a Green Factor Tool based on the City of Melbourne's and other international examples. This will require extensive research and development, as well as consultation with a wide range of internal and external stakeholders.

4.4 Communal Open Space and Landscape

Principles

+ The provision of communal open space should achieve the design criteria set out in the ADG ie. a minimum area equal to 25% of the site and a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid winter).
+ The design of communal open space should follow the Design Guidance as set out in the ADG, in particular:
  - communal open space should be consolidated into a well designed, easily identified and usable area;
  - communal open space should have a minimum dimension of 3m, and larger developments should consider greater dimensions; and
  - communal open space should be co-located with deep soil areas
+ The planning and design of communal open space should achieve multiple benefits including social interaction, recreation, amenity, stormwater management, comfortable microclimate and tree canopy cover.
+ To achieve 20% canopy cover across medium-high density residential areas, 80% of communal open space would need to have tree canopy cover. Such a high canopy cover is not compatible with other requirements such as solar access and usability.
+ However, communal open space should achieve a canopy cover of 40% which is based on international and national best practice, and is the recommended minimum canopy cover to achieve a meaningful reduction in urban heat.
+ As communal open space is often located on structure in medium-high density residential developments, it is essential that suitable growing conditions are provided for all planting and especially trees, particularly with respect to soil volume and depth, drainage, irrigation, growing media, and plant selection.
+ Regular, ongoing, adequate and appropriate maintenance of landscape, particularly trees, is essential to ensure that the design intent is achieved, that plants are healthy and achieve their desired mature sizes and lifespan. This is even more important with landscape on structure, where soil volumes and access to soil moisture are limited.

Recommended Controls

In addition to existing DCP and ADG controls:

+ The design of exterior private open spaces such as podium, sky or roof top gardens are to achieve amenity by addressing visual and acoustic privacy, safety, security, and wind effects.
+ Planting areas across all precincts are to incorporate a minimum of 60% native planting for local character. The remaining 40% (max) may be supplemented with exotics for colour and variation, and edible species as part of vegetable or herb gardens.
+ Planting design should be appropriate for the intended location and function. Tree and plant species selection must take into account a number of factors including:
  + Structural loading and waterproofing (if on structure);
  + Fire risk;
  + Climate/microclimate;
  + Size requirements/constraints, including proximity to buildings, awnings and facades;
  + Form;
  + Locally Indigenous / Australian Native / Exotic;
  + Density of foliage;
  + Growth rate and lifespan;
  + Water requirement, including drainage and irrigation;
  + Availability;
  + Maintenance (i.e. leaf fall, fruit drop) and safety;
  + Other considerations such as heritage interpretation.
+ Landscape plans must be provided as part of Development Application documentation and include planting plans and schedules which nominate the location, size, spacing, number and specification of all plants.
+ Development must provide sufficient room and growing conditions, including soil volumes in accordance with ADG recommendations (noting that there are different recommendations for deep soil and on-structure planting), for plants to grow to nominated sizes. The Developer is to provide horticulturist (AQF Level 5 Arborist) confirmation in the form of a report submitted as part of Development Applications that the nominated planting design intent and mature sizes can be achieved.
+ A landscape management and maintenance plan should be provided as part of Development Application documentation to explain how landscape associated with new buildings is to be maintained for the initial establishment period and beyond. This should include a maintenance schedule which nominates the minimum maintenance operations to be carried out each month/year. The landscape management and maintenance plan should also include a plant replacement strategy.
+ Plant establishment and maintenance periods associated with new developments should be a minimum of 24 months.

Other Actions

+ Council should ensure that there are adequate resources and procedures in place for Landscape Compliance Officers to enforce the controls.
+ Council to investigate the development of a Green Factor Tool based on the City of Melbourne's and other international examples. This will require extensive research and development, as well as consultation with a wide range of internal and external stakeholders.

4.5 Water Sensitive Urban Design

Principles

- Water sensitive urban design (WSUD) measures should be integrated into the landscape design as green and blue infrastructure are closely related and can often be co-located or combined.
- Appropriate WSUD measures should be adopted for the specific situation, with reference to WSUD guidelines.
- It is important to maximise deep soil areas for water infiltration. This not only assists with sustainable stormwater management, but also helps to recharge soil moisture to support trees and tree canopy.
- The landscape design should consider the availability of rainwater for reuse, treated recycled water and the volume of any rainwater tanks in order to minimise, and ideally eliminate, the use of potable water for landscape irrigation.
- The use of treated grey or blackwater should be encouraged in addition to the collection and reuse of rainwater, as there is often an inadequate and unreliable supply of rainwater to reuse for irrigation in addition to other uses such as toilet flushing.

Recommended Controls

In addition to existing DCP and ADG controls:

- WSUD measures must be integrated as part of an integrated water management strategy for each site, taking into consideration water resilience, water efficiency and stormwater volumes and quality.
- Adopt the controls outlined in the *Bankstown City Centre and Campsie Town Centre Sustainability Study* relating to water, including:
  - 6. All new buildings to be water resilient
  - 11. Water Efficiency
- Incorporate WSUD measures into new developments as required to achieve Council targets (targets to be confirmed).
- Ensure that available water content of soils in irrigated landscapes does not fall below 50% during vegetation growing seasons.
- Improve soil structure to allow for oxygenation and water movement for the benefit of tree roots.
- Minimise impermeable surfaces such as asphalt and concrete with porous surfaces such as porous paving, turf, garden beds and rain gardens to reduce heat retention and encourage soil moisture retention.
- Incorporate the recommendations from the CRC for Water Sensitive Cities for WSUD in the Campsie study area.
- Integrate water sensitive urban design measures into the landscape design where possible.
- Adopt appropriate WSUD measures for the specific situation.
- Maximise deep soil areas for water infiltration - refer to Recommended Deep Soil Controls.
- Minimise, and ideally eliminate, the use of potable water for landscape irrigation.
- Consider the use of treated grey or blackwater in addition to the collection and reuse of rainwater to reuse for irrigation in addition to other uses such as toilet flushing.
- Detention tanks must not be located in deep soil areas or under communal open space. They should not restrict the soil depth or volume available for trees and other plants.

Other Actions

- Council to incorporate the work undertaken on the Campsie precinct by CRC for Water Sensitive Cities into future planning for WSUD in the Campsie study area.
- Council to promote the investigation and adoption of grey and blackwater recycling, particularly on a precinct-wide basis or for larger development sites.
- Council to review the opportunities for integrating and retrofitting WSUD measures into their existing streets and open spaces.
- Council to incorporate the work undertaken as part of the Water Efficiency Study for Urban Tree Management by DPIE in their Street Tree Management Policy, procedures and standard tree planting details.
- Council to investigate the development of a Green Factor Tool based on the City of Melbourne's and other international examples. This will require extensive research and development, as well as consultation with a wide range of internal and external stakeholders.
- Council to prepare standard drawings for typical WSUD elements to guide Council and developers.
- Council infrastructure projects to incorporate WSUD elements.
- Council should ensure there are adequate resources and procedures in place for WSUD Compliance Officers to enforce the WSUD controls on private developments.
- Council to promote the use of localised and/or site-specific water recycling facilities as part of private developments in Campsie and Bankstown as an alternative source of urban irrigation.
- Investigate opportunities to develop/pilot a smart system to monitor soil moisture. This could monitor moisture real time and trigger site specific irrigation when moisture drops below the threshold level.

4.6 Green Factor System

Principles

+ Green factor systems or tools can provide landscape cover through a system of weighted landscape factors contributing to an overall score or requirement for private developments.
+ These systems consider the combined impact of a number of different factors, including WSUD, tree planting, landscape treatments and green roof and facade treatments. This provides developers with a level of flexibility in incorporating green and blue infrastructure into developments while ensuring overall positive outcomes.
+ A green factor system could be developed which included a weighting for existing and new trees to ensure a sufficient level of canopy cover in-line with canopy cover targets.
+ Such a system would require an additional level of complexity and time to develop and introduce, requiring significant research and consultation, but ultimately this would translate into improved environmental and social outcomes across a broad range of factors.

Recommended Controls

Controls would be developed after the introduction of a Green Factor System.

Other Actions

+ Council should undertake research into other Green Factor Tools including the City of Melbourne's and other international examples to further understand what is involved in developing such a tool.
+ Council should undertake preliminary consultation and feasibility for the development of a Green Factor Tool in order to define the specific objectives, scope and cost of such a project.
+ Assuming Council is committed to developing such a tool, it should seek to allocate appropriate resources and funds for such a project.
+ As with the City of Melbourne's Green Factor Tool, it is recommended that there is an initial trial period where its primary use is to help new developments to get the most benefits from their green designs. Eventually, the tool could also be used to ensure new planning applications comply with future planning policy requirements around climate action.

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