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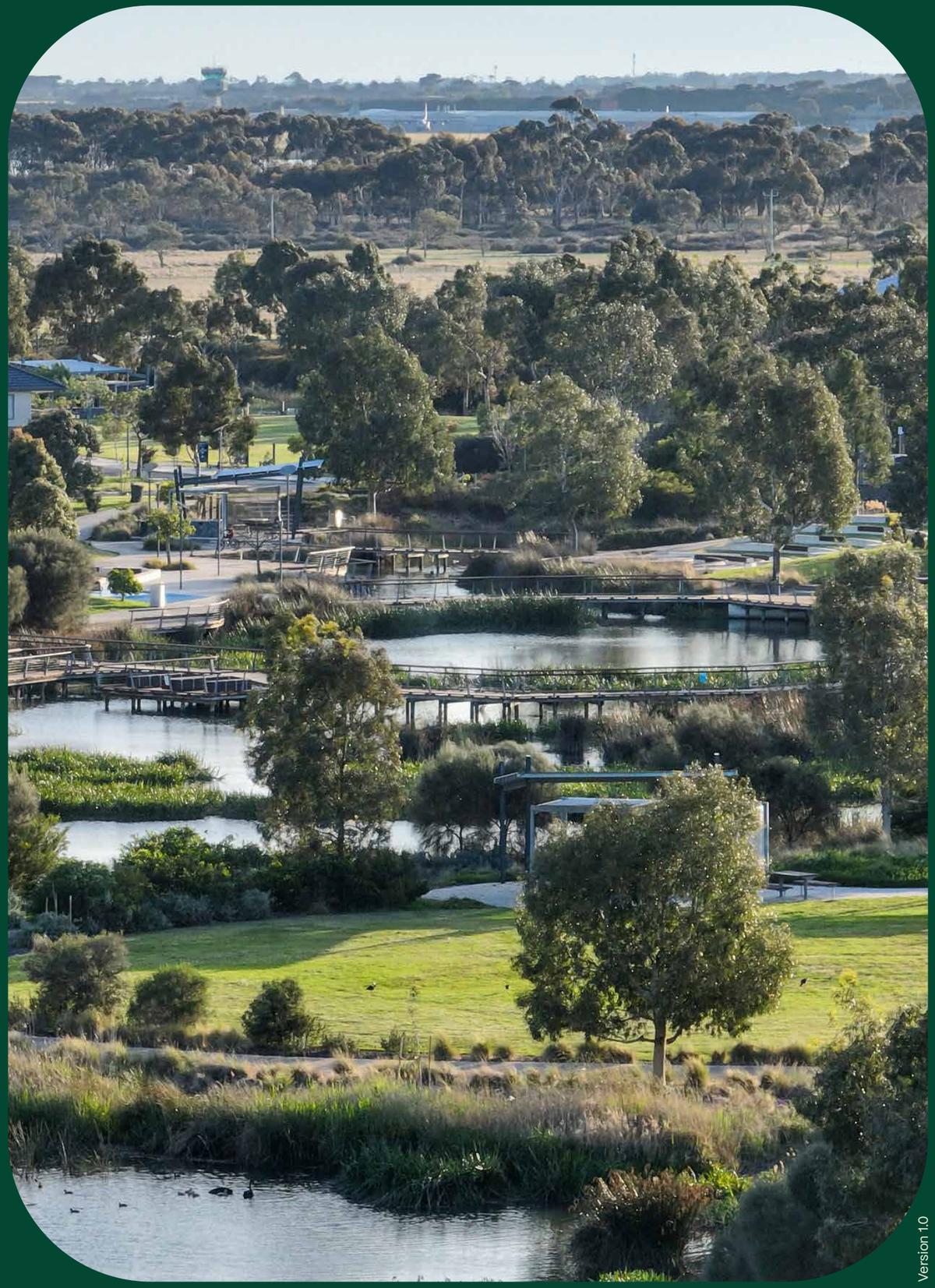
Design Guidelines

for New Communities

Nature-based development excellence for better urban environments.



Nature Based Cities®

Version 1.0

Since time immemorial First Nations people have managed, cultivated and cared for the landscape and waterways where Australia was established and continues to grow. First Nations people hold profound knowledge, understanding, obligation and custodianship of these natural assets, and this is often expressed as Connection to Country.

As the oldest living and continually practiced culture on earth, we acknowledge the ongoing connection between Indigenous people and the Country of Australia, including our shared natural green spaces. We acknowledge the traditional custodians, and pay our respects to their Elders – past, present and emerging.

Acknowledgments

These guidelines were commissioned by Nature Based Cities, prepared by Tract and peer reviewed by Ark Resources and Nature Advisory.

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Introduction

1.1 What are Nature Based Cities?

There are many emerging approaches to creating sustainable outcomes in the urban environment. But what works? Which are philosophical ideals, and which have meaningful outcomes?

The terms 'biophilia', 'biodiversity positive design', 're-wilding', 'nature-positive developments' and 'biodiversity sensitive urban design' (BSUD) are but a few of the emerging terms employed worldwide to describe urban design movements to reduce ecological impacts and embrace nature in design.

'Nature-based' design synthesises sustainable, environmental, ecological, aesthetic and cultural values to set a direction for improving design outcomes.

Within new communities, the 'Nature Based Cities' design approach recognises the co-benefits for both humans and urban ecology when nature is successfully integrated into the urban fabric.

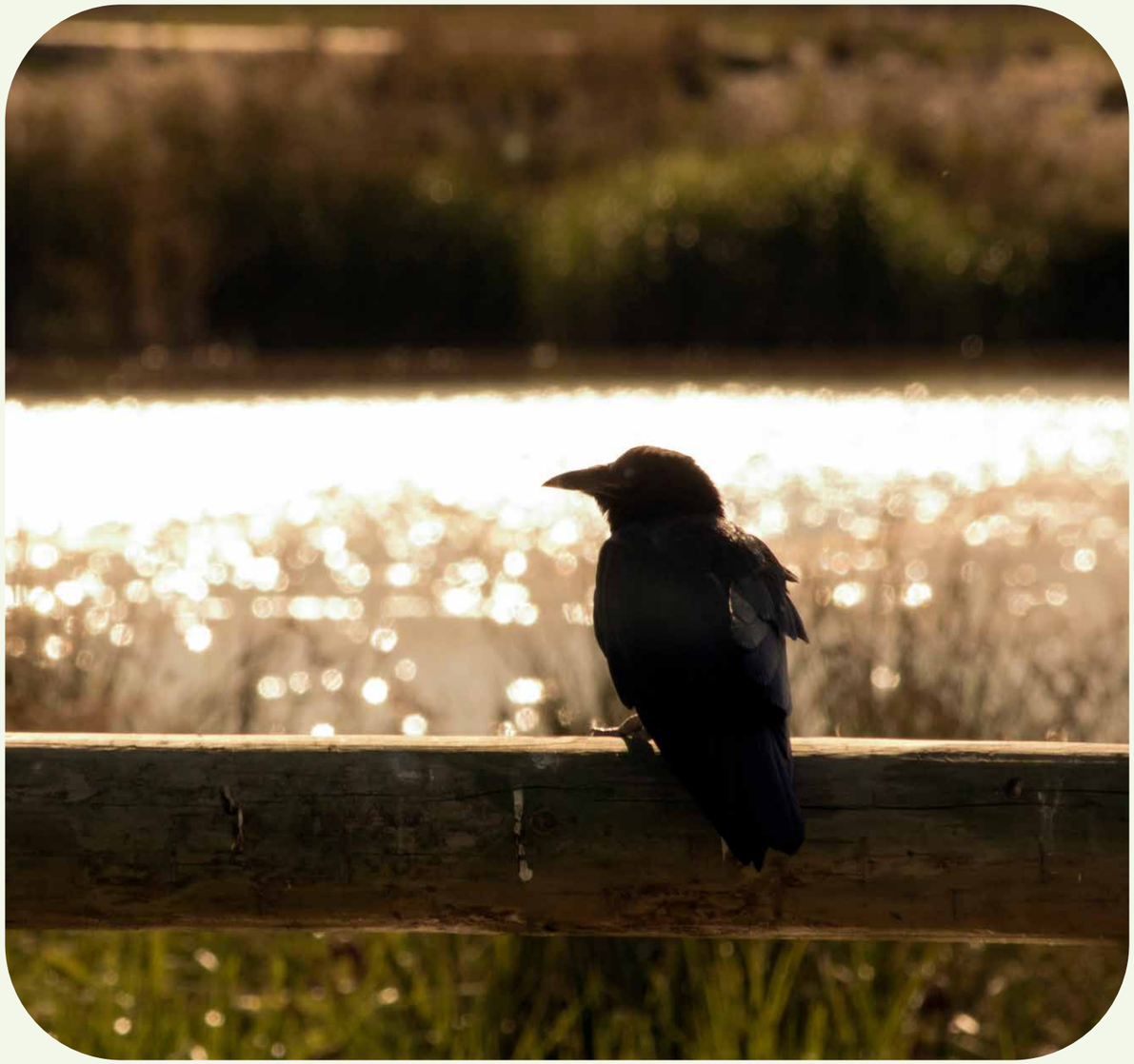
Nature based cities take every opportunity to increase green space over grey and design these green spaces to deliver multiple benefits for nature and people.

The University of Melbourne describes the importance of this 'Nature-based city' approach below:

'Creating nature-based cities, in which green spaces are essential elements integrated in the urban fabric of our cityscapes, is critical for sustainable and liveable urban futures.'

Picture this

As you wander down the winding path, the late-afternoon sun filters through tall eucalypts, scattering warm light across the native grasses. A pair of magpies warble from a nearby fence line, their song drifting lazily over the community garden where neighbours tend to raised beds of herbs and tomatoes. Further along, a small footbridge arches over the wetland; dragonflies skim the water's surface. Children pedal past on their bikes, their tyres crunching softly over gravel as they race toward the open green. And then, as the breeze carries the scent of lemon myrtle from your front yard, you know you're home — welcomed by flowers blooming in your garden and the familiar calm of a place shaped by nature.



1.2 What are the benefits to you as a developer?

The business case for investing in quality, well considered, green infrastructure is compelling. Consumers have been shown to pay up to 15% premium for green infrastructure in their dwellings, with multifunctional green space delivering the most benefits.[1]

Increase property value	A 10% percent increase in tree canopy cover across a suburb has been shown to increase property values in an area by 7.7 percent. [2]
Smoother approval processes	Development approvals may be more easily sought and quicker to achieve.
Improve marketability	Cooler – Urban greenery can drop temperatures by 4–8°C which will be critical for liveability as summers get hotter with more extreme heat days [3] Healthier – Greenery can remove pollutants, provide mental health benefits and encourage active transport that can reduce traffic congestion. Biodiverse plantings can improve respiratory health and improve gut micro biota [4] More comfortable – Trees can reduce wind impacts by up to 10% [5] Perceptions of safety – Increased canopy cover has been linked to increased perceptions of safety [5]
Differentiate the development	Create a unique sense of place by using local species
Reduce operational costs	Reduce air conditioner use with savings estimated at between 12–15% per annum when trees and urban greenery are in place [5]
Reduce maintenance costs	Maintenance costs can be lower in the long term with less mowing, irrigation, fertilisers and pesticides once established [6]

1. Zalejska-Jonsson et al, 2020, 2. AECOM, 2017, Urbis Research, 2017, 3. Cooperative Research Centre for Water Sensitive Cities, 2020, 4. Liddicoat et al, 2018, 5. Moore, 2019 6. Government Architect NSW, 2024.

Figure 1. Local plant species create a unique sense of place at Saltwater Coast, Victoria

1.3 What are the community benefits?

The Nature Based Cities framework seeks to create thriving environments for the health and wellbeing of all its inhabitants. In the article 'Integrating Green Infrastructure into Urban Planning: Developing Melbourne's Green Factor Tool', the University of Melbourne developed a framework for prioritising functional outcomes in urban green spaces.

These primary functions and associated benefits are:

- Urban temperature regulation (cooling)
- Habitat for biodiversity
- Runoff mitigation
- Recreation
- Air purification
- Place values and social cohesion
- Aesthetic benefits
- Food supply

There are, of course, other considerations and benefits for our urban environment, which include:

- Ecological enhancement
- Biodiversity improvements
- Reduced urban fragmentation
- Disaster risk and resilience (climate change, flood, fire and drought)
- Physical and mental health benefits
- Increased property value
- Carbon sequestration
- Increased open space provisions
- Social, cultural and well-being benefits

1.4 Purpose of the guidelines

High-level sustainability and environmental aims are not often at the forefront of property developer's minds during the feasibility and early planning stages of a development.

Nature and living landscape outcomes are often applied much later in the design process and integrated as a way of 'dressing up' marketing images or satisfying technical development approval requirements.

These Guidelines seek to build upon leading academic research, strategic policy and industry recommendations to provide a series of practical design principles that Property Developers, Owners and their design teams can implement at project commencement and integrate into the urban form.

These guidelines are for New Communities projects at a neighbourhood or precinct scale, typically over 5 hectares that include publicly accessible streets and open space. The guidelines and scorecards can be applied to both green and brown field sites.

At its core, the guidelines offer a range of methods, benchmarks and targets to enhance amenity and livability, increase biodiversity and improve climate resilience.

The guidelines present early design considerations alongside green infrastructure typologies and case studies.

An associated scorecard has been designed and should be used at the commencement of a project to set targets for the development and to brief your project consultant team. This scorecard can then be used for gaining your Nature Based Cities accreditation.

Figure 2. Hanlon Park, Bur'uda, QLD

02

Planning & Design Considerations

2.1 Early engagement

At project inception, consider the early engagement of key specialist consultants and stakeholders who can set a strong direction, narrative, and green/blue targets for the project.

Early collaboration between designers and specialist consultants will establish a robust framework for sound, cost effective ecological principles. Additionally, this can lead to innovative measures to enhance environmental, social and economic outcomes through place-based opportunities, spatial integration and minimising environmental footprints.

Figure 3. Connect existing green corridors through the site.

Do

- **Collaborate with Traditional Custodians to understand their traditional ecological knowledge of the site and surroundings. This should be enabled by a First Nations Engagement Strategy.**
- **Engage an Ecologist to advise on existing ecology, any constraints, and opportunities for enhancement.**
- **Engage a Landscape Architect to assess the vegetation character and tree amenity in relation to spatial arrangements.**
- **Collaborate with other land management specialists.**
- **Undertake collaborative, targeted design workshops with consultants and authorities to set a vision and set nature targets for the project. (Refer Scorecard)**

Why

- Collaboration with Traditional Custodians encourages integration of key site values, expands spatial awareness of landform and integrates language, uses and management practices for the site.
- Arboricultural consultation determines which trees have high and moderate values and those with structural integrity (safe, useful life expectancy). An Arborist will determine appropriate tree protection zones and root zone extents, which may affect the setback and site planning, including neighbouring properties. Early engagement with the Arborist will also assist with providing suitable construction techniques to integrate the landscape with the built form.
- Your Ecologist will consider broader canopy connections, corridor links, habitat assessment, threatened flora and fauna, biodiversity targets and strategies. They will work with your Landscape Architect to improve the biodiversity outcomes of the site.
- Urban Designers and Landscape Architects can identify landscape opportunities, setback requirements, open space programming, place / character themes to differentiate your development and establish a framework for the landscape contribution.
- Urban Designers and Landscape Architects will identify opportunities for ecological movement corridors, blue-green networks and open spaces to establish large scale connectivity and greening at a precinct level.
- Your Landscape Architect will also implement an appropriate planting regime to enhance the native vegetation and habitat to support biodiversity.
- Specialists such as Civil Engineers, Hydraulic Engineers, Flood Engineers or Bushfire Ecologists may be required for your particular landscape setting. Up front integrated water and fire management measures reduces potential spatial and financial development risks, including interim undeveloped land solutions.
- Collaboration with future asset owners is essential to agree landscape and water integration opportunities. Local managers, Council officers and other authorities have a high level of local knowledge and understanding. Respectful and targeted engagement can lead to co-benefits, innovation and long-term sustainable outcomes.

The following page is a design process ‘flow chart’ to assist with navigating the nature-based city design process:

Design and engagement process

Analyse

Undertake due diligence planning and select sites that supports development

Undertake a features and level Survey

Appoint the Primary Consultant team:

- Engineers (i.e. Civil, Hydraulic & Geotechnical)
- Surveyor
- Town Planner
- Urban Designer
- Landscape Architect
- Arborist
- Ecologist

Integrate

Undertake the background assesment & preliminary design phase with input from whole team to identify all issues, opportunties & constraints, including:

- Site character & features analysis
- Identification of existing biodiversity values & environmental impacts
- Topographic Profiles
- Soil Analysis
- Urban Design Analysis
- Blue/Green Design Opportunities
- Sites/ places of cultural heritage significance

Leadership Workshop

- Agree on design principles & actions to enhance the preferred character & ecology
- Agree on Nature Based City landscape targets as appropriate to the site & market
- Agree on priority development/non-development areas & primary connections

Collectively progress the Site Planning, Urban Design framework & Subdivision layout to implement 'Nature Based' targets/benchmarks, with input from the consultant team

Seek & integrate technical input from specialists & stakeholders, such as:

- Cultural Heritage advice
- Bushfire management
- Climate risk assessors
- Authorities /future asset managers
- Service providers

Landscape Masterplan

Commence the landscape master plan early & integrate consultant team input

Evaluate

Community Engagement

Seek input from the community user groups & future residents – using the draft landscape plan

Assess design against agreed targets & amend the design, where needed

Adopt strategies for assessment / implementation of future stages

2.2 Place-based design approach

Embedded in the goal of nature-based design outcomes are the principles of place-based design. By integrating the local site characteristics, climatic conditions, soil type and topography, Developers can establish a strong project identity and improve liveability, resulting in improved sales in a highly competitive marketplace.

Understanding the site hydrology, landform and landscape features will support the retention of elements and materials in place, thereby limiting off-site disposal and setting up the project to be sustainable in the long term. It is important to consider the site foundation, quality of soil (structurally, chemically and horticulturally) and balancing the earthworks on site. This will broadly contribute to sustainable water management practices and support local flora and fauna.

A thorough site analysis is fundamental to this process. It will consider opportunities for preserving areas of significance through a systems assessment of:

- Broader regional context, geology, hydrology and drainage
- Existing topography
- Existing contributory vegetation, habitat and environmental areas
- Ecological communities and values
- Culturally important places
- Climatic impacts such as rainfall, fire, flood, sea level rise, extreme heat
- Pre-existing uses and introduced vegetation
- Watercourses, natural wetlands and catchments
- Constraints such as contamination, servicing or utilities
- Interface conditions
- Prevailing view lines and significant landmarks.

An in-depth understanding of these natural systems through early input from specialist consultants will contribute to biodiversity conservation, ecological resilience and nature-based outcomes.

Generally, avoidance is a better strategy than mitigation or remediation.

Do

- **Undertake a rigorous site analysis and protect valuable areas.**
- **Engage an Urban Designer and Landscape Architect to integrate the design into the broader environment.**
- **Protect and enhance key landscape features in public open space areas.**
- **Integrate and strengthen the topographic, soil and hydrological site conditions.**
- **Undertake a laboratory soil test to determine performance characteristics and suitability for plant growth early in the process.**
- **Work with specialists to understand the local climate (heat, flooding, wind) impacts, including the development of a range of site responsive mitigation techniques.**
- **Develop an earthworks strategy aiming to retain suitable topsoil, and minimise earthworks and erosion.**
- **Undertake stormwater, sustainability, arboricultural, biodiversity and climate resilience management plans.**

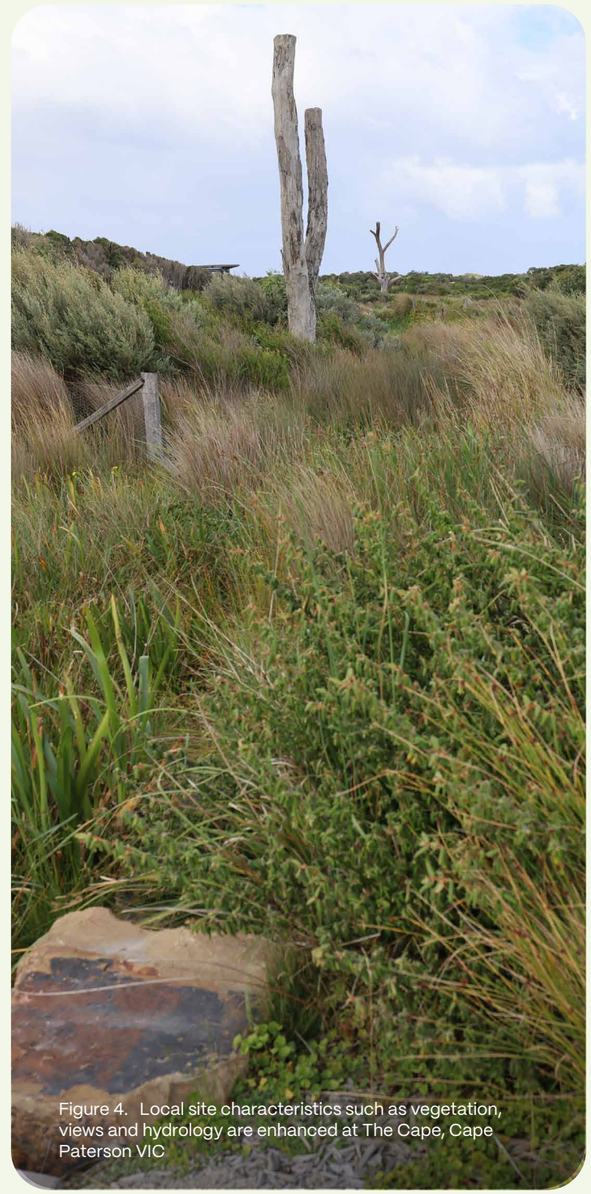


Figure 4. Local site characteristics such as vegetation, views and hydrology are enhanced at The Cape, Cape Paterson VIC

2.3 Precinct planning

At a municipal or suburban scale, planning for nature will develop the overall landscape character, establish responsive land-use planning and functional site connections. The consideration of a broad design framework can improve biodiversity corridors, enhance scenic vistas and embed the built form into the landscape setting.

A 'greener' design framework will create spatial differentiation in land-use, a finer grain network, reduction in heat island effect and afford greater landscape opportunities.

Features should be designed to optimise ecosystem service benefits taking account of the site's deficiencies, and opportunities.

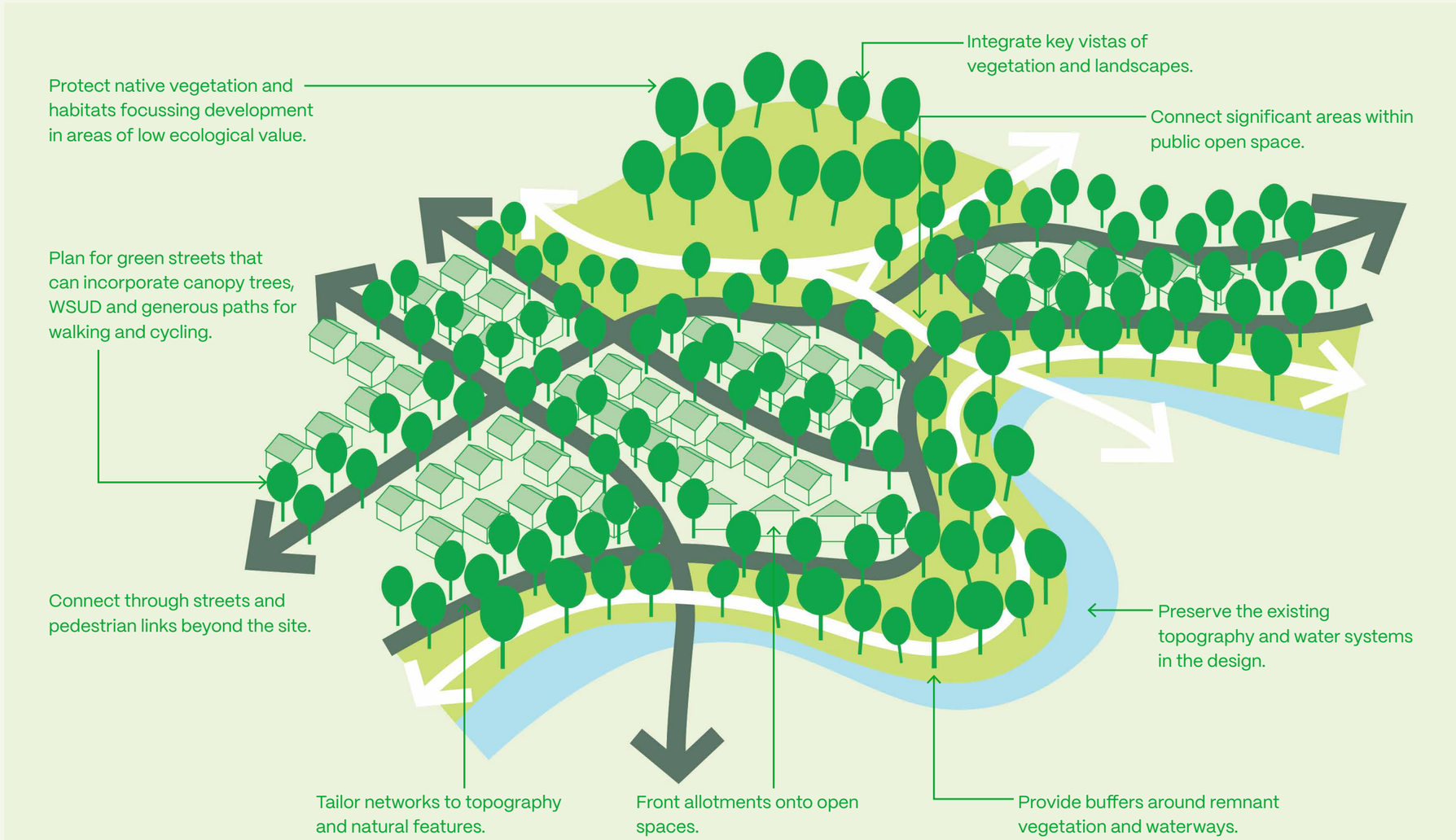


Figure 5. Precinct planning principles

Do

Structure

- Tailor networks to topography and natural features.
- Connect to surrounding green and blue corridors.
- Preserve existing significant vegetation, habitat and watercourses.
- Retain public access to key site features.
- Frame view lines and vistas in the street network or open space provision.
- Focus development on low ecological value areas.
- Front allotments onto open spaces.

Network

- Establish a road network hierarchy that focuses on tree canopy and biodiversity outcomes such as 'boulevards' with overarching canopies, planted nature strips and blue-green streets.
- Provide shared spaces and transport corridors that accommodate vehicles, pedestrians and trees.
- Provide localised and widened in-ground areas for large canopy tree installation (i.e. at T-intersections or outstands).
- Reduce barriers to walking through provision of linear corridors of sufficient width to enable tree planting.

Public open spaces

- Co-locate open spaces with existing retained features such as trees, waterways and vegetation.
- Provide a range of open spaces with distinct size, shape, function and character – well distributed and linked together throughout the land parcel.
- Ensure all residential lots are in close proximity to open space (less than 300 metres).
- Provide both passive and active recreation spaces to create diverse landscape strategies.
- Provide multi-use spaces that integrate encumbrances with other purposeful uses.
- Form pocket parks from irregular shaped allotment perimeters to assist with building separation.

Figure 6. Nature-based design features connecting built form, streets and open spaces.

Avoid

- Overlaying standard grid arrangements on land parcels, without considering place-based principles;
- Locating sub-stations or kiosks in open space reserves as these restrict tree placement;
- Isolating or surrounding parks with residential fabric only;
- Closing off cul-de-sacs for pedestrians and cyclists;
- Creating long street networks without spatial green breaks.

2.4 Integrated Water Management

From the outset, working with prevailing hydrological systems and incorporating water management elements into the development is fundamental to establishing abundant, resilient and sustainable environments.

The retention and protection of existing waterways and natural wetlands will preserve habitats, reinforce ecological connectivity and can form the basis for a network of nature reserves, walking trails and open spaces.

Detaining, infiltrating, harvesting, treating and storing of stormwater are key targets for sustainable development. Slowing water run-off from the site not only builds flood and drought resilience, but also enhances vegetation performance, urban amenity and cooling.

Strong landscape outcomes will require close collaboration between Hydrologists, Engineers, Landscape Architects, Nursery Suppliers, Asset Managers and Authorities. Whilst best practice targets will be based upon the specific site conditions, early advice from Landscape Architects is integral in the design process. This will inform the design by integrating spatial requirements, compatible recreational uses, vegetative buffers, grading, amenity, safety, erosion control, planting and maintenance considerations – thereby maximising landscape opportunities throughout the site.

Figure 7. Shailer Park Wetland, QLD

Do

- Connect to prevailing waterbody systems beyond the site boundary.
- Create vegetated buffers around waterways, wetlands & sensitive habitats.
- Locate various waterbody forms along drainage lines, at low elevation and optimised for public and faunal access.
- Prepare an Integrated Water Management and Stormwater Plan to identify WSUD opportunities, blue-green streets and permeable paving solutions (including hydraulic-water balance modelling).
- Interconnect waterbodies and WSUD systems precinct wide with open spaces, green streets, roof tops and car parks to detain and treat stormwater.
- Conduct targeted, multidisciplinary consultant workshops to develop an overall Integrated Water Management Strategy.
- Engage with, and prepare operational and maintenance plans to aid negotiation with Asset Managers and other stakeholders.

2.5 Ecological principles in precinct design

This section establishes the ecological principles that should guide design across a precinct. Sections 2.6 and 2.7 build on this framework by addressing biodiversity-led planting and the treatment of existing vegetation respectively.

When designing new precincts, the aim should be to actively improve ecological systems and foster interspecies relationships across the entire site. Embedding ecological design principles within the project framework protects, enhances, and restores the broader environment throughout the life of the project and into the future.

Figure 8. Wildlife signage at the Cape, VIC

Engage an Ecologist

An Ecologist should be engaged at project inception to undertake a preliminary site assessment. This establishes the existing biodiversity values within and surrounding the site, and provides the basis for meaningful biodiversity protection and enhancement outcomes throughout the design process.

Working alongside the design team, the Ecologist will:

- Assess habitat value of existing vegetation, local native species, and habitat condition.
- Identify the historical ecological context, current species diversity, and potential future habitat value as species and ecosystems shift in response to climate change.
- Identify risks and opportunities for wildlife, and define nature corridors, biolinks, and targeted species regimes the design can support.
- Provide assessments against relevant planning strategies, controls, and biodiversity benchmarks.
- Integrate biodiversity targets and post-occupancy measurement frameworks.
- Ensure the brief to the Landscape Architect provides clear guidance on building indigenous biodiversity into the design.

The Mitigation Hierarchy

When assessing and responding to biodiversity impacts, the following hierarchy must be applied in order, with guidance from the Ecologist:

1. **Avoid** — design to prevent biodiversity loss in the first instance.
2. **Minimise** — where avoidance is not possible, reduce the impacts.
3. **Restore** — rehabilitate affected habitats and ecological function.
4. **Offset** — as a last resort, compensate for residual losses through approved biodiversity offset schemes.

Collaboration: Ecologist and Landscape Architect

Together, the Ecologist and Landscape Architect will collaborate throughout the design process to:

- Minimise impacts to nature and protect high-biodiversity areas from development pressure.
- Enhance areas and features of high ecological value such as remnant trees and vegetation.
- Strengthen natural corridors to connect and extend fragmented land, habitats, and water courses.
- Integrate biodiversity features including movement corridors, buffers, transition zones, and structural elements that provide food and shelter.
- Prioritise indigenous species and provide structural and species diversity, including robust understorey planting.
- Increase space for nature by taking every opportunity for additional planting.
- Remove or control invasive plant species and feral animals.
- Employ strategies for material reuse and recycling, such as retaining fallen timber as habitat.
- Reduce risks to nature from light, noise, odour, and other pollution.
- Identify opportunities for community education, human interaction with nature, and connections to indigenous cultural heritage.

Design Considerations

Protect and enhance native vegetation and habitats

Focus development in areas of low ecological value and design compact building footprints. Avoid removing high-value vegetation as identified by the Ecologist. Protect and enhance existing habitat connectivity within and off-site where possible. Make the most of what is already there.

Access to water

Water points for wildlife are essential and should be included on site wherever possible. New water elements should follow natural topography and incorporate naturalistic, sinuous margins with shallow edges. Blue-green infrastructure also supports community education, environmental stewardship, and reduced irrigation demand.

Transition zones and buffers

A variety of edge treatments, including vegetative buffer planting and open firebreaks of sufficient width, should be adopted early in design to protect significant vegetation, water bodies, and other sensitive features.

Multifunctionality

Landscape features should aim to be multifunctional and provide multiple benefits. For example, buffer planting along a road can reduce air pollutants reaching the site, while also reducing noise, providing a green corridor for wildlife, and recreation corridor for people.

Retain large canopy trees

Mature canopy trees provide unique landscape character, enhanced shade, site cooling, and carbon storage in the soil. They also provide significant and often irreplaceable habitat for indigenous fauna. It can take decades to replace the benefits of mature trees, and their retention should be a priority at every stage of the design process.

Ecological structures and microhabitats

Varying substrates and topography across a site creates differing microclimates and ecological niches suitable for a wide range of fauna. Soil mounds, decomposing vegetation, rock piles, and deadwood provide shelter for invertebrates and other fauna, and can serve as hibernation sites. In urban areas, artificial structures such as tree hollows, retained logs, frog and bee hotels, and bird and bat nesting and roosting structures can effectively recreate these habitat features and provide significant benefits to urban wildlife.

Co-locate compatible uses

Sensitive landscape features should be paired with compatible land uses. Many birds and mammals require natural light, low artificial light, and low noise levels. Where possible, locate low-density residential interfaces adjacent to conservation zones rather than higher-intensity town centres. Preserve or create dark areas and corridors across the site, particularly in areas of valuable habitat.

Implement Nature Based Solutions

Nature based solutions are actions that address societal challenges, while simultaneously benefiting people and nature, and by their nature provide ecosystem services and multi-functionality. Seek opportunities to use Nature based solutions in place of traditional engineered solutions. For example, Water Sensitive Urban Design features reduce flood risk, improve air and water quality, and provide wildlife habitat, and amenity.

Green corridors and biolinks

Locate new open spaces to connect with existing corridors, waterways, parks, habitats, and functional ecosystems. Wildlife corridors improve biodiversity outcomes and strengthen visual and physical connections to nature for residents and visitors. Connectivity between habitats can be achieved through a combination of maintaining smaller habitat fragments (stepping stones) between larger sites and by maintaining continuous green corridors. Aim to create a network of habitats and linkages across the site.

Safe wildlife movement

Design for connectivity beyond the site boundary. Consider contiguous street tree canopy, green roofs, aerial habitat bridges, subterranean culverts and tunnels, and fauna launching poles to facilitate wildlife movement across urban barriers.

Promote Natures Benefits

Ecosystem Services are the benefits that people and society get from the natural environment. Working with nature, solutions such as rain gardens, street trees, green roofs and walls and development of green spaces can help to tackle socio-environmental challenges including air quality, water security, biodiversity loss, human health and wellbeing, and effects of climate change such as increasing flood events and hotter temperatures. Precinct scale developments have great opportunities to optimise these benefits for the community, and this should be embedded within the planning and design process from the outset.

2.6 Designing for Biodiversity

Building on the ecological principles in Section 2.5, this section focuses on how biodiversity outcomes are achieved through planting design and habitat creation. Section 2.7 addresses the treatment of existing vegetation on site.

The priority in any nature-inclusive design should be to create landscapes that are complex, dynamic, resilient and self-sustaining. A wilder, more naturalistic planting approach will optimise habitat value and build ecological resilience over the long term. Rather than selecting plants solely for aesthetic appeal, aim for self-sustaining, regenerative, and adaptive ecosystems. Ecological ambition and design ambitions are not in tension, often the most biodiverse landscapes are the most visually compelling.

Some of the most valuable habitat features in a landscape are not planted, they are the product of ecological process. Design should actively make room for decay, natural competition, and disturbance, as these create a wider variety of ecological niches and support a greater range of fauna than a uniformly maintained landscape can.

Improving Biodiversity Through Design

Biodiversity outcomes can be improved by:

Diversifying habitats and communities

- Provide a diverse range of habitat types suited to the local area, such as forest, woodland, scrub, and grassland.
- Think at different scales. The provision of loose soil mounds, decomposing vegetation heaps, and rock and deadwood piles on site will provide shelter for a range of invertebrates and other fauna, and function as hibernation sites.
- Vary soil conditions and substrates across the site to create differences in planting structure and provide micro-niches at ground level.
- Processes that enhance decay, natural competition, shelter, and disturbance will create a wider variety of ecological niches and support a greater range of fauna.

Delivering structural complexity and resilience

- Select plants from different genera and families, with a variety of forms, colours, and sizes to provide a complexity of structure for different fauna species' needs.
- Include plant species that produce flowers, fruits, and seeds, incorporating a range of flower types providing food sources throughout the year.
- Plant in clumps and design in layers, to mimic natural habitats and establish a dynamic plant community.

Supporting local wildlife and targeted species

- Incorporate features that support the needs of local wildlife with input from an ecologist, such as priority habitats, bird/bat boxes, specific food plants for birds, mammals and invertebrates.
- Planting can incorporate both indigenous species and appropriate non-invasive exotic species. However, indigenous species are much better for supporting local wildlife as they have co-evolved together. A high proportion of indigenous planting should therefore be incorporated.
- Design outside lighting to be sensitive to nocturnal fauna including bats. Preserve or create dark areas and corridors across the site, particularly in areas of valuable habitat.

Managing for nature

- Allowing vegetation to naturally succeed often leads to the establishment of a self-sustaining, well-functioning ecosystem that is adapted to the local conditions. This can be achieved through relaxed or minimal management, which also reduces maintenance costs (see 2.10).
- Undertake periodic ecological monitoring to assess how the landscape is performing against biodiversity targets and adjust management accordingly (see 2.11).
- Consider adopting a 'Biodiversity Sensitive Urban Design' process as part of your development process using resources such as Biodiversity Sensitive Urban Design Guides (see the Appendix).

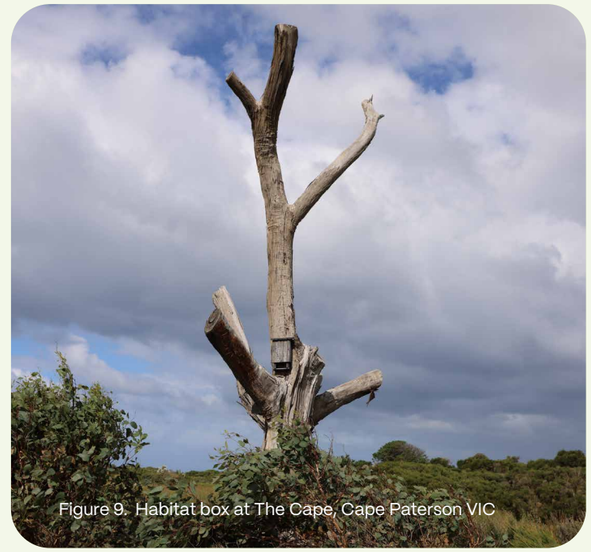


Figure 9. Habitat box at The Cape, Cape Paterson VIC

Why include biodiversity?

1

Global initiatives

- Nature Positive is a global societal goal aimed at enhancing the health, abundance, and resilience of nature, aiming for more nature in the world by 2030 compared to 2020. Nature Positive is aligned with the Kunming-Montreal Global Biodiversity Framework (COP15) of which Australia is a signatory.
- The private sector including land development businesses are under growing pressure from consumers, investors, employees, communities and governments to integrate sustainability into their core business.
- Businesses that protect, restore and sustainably manage nature, enhance business resilience by understanding risk and opportunities, help meet their sustainability commitments, and build a positive reputation.

2

Regulatory drivers

- Legislative momentum: The Australian Government's Nature Positive Plan and its reforms to the Environment Protection and Biodiversity Conservation Act signal a fundamental shift in how development impacts on nature are assessed and managed. The government is pursuing a nature repair agenda and greater expectations for biodiversity improvement are occurring. The UK Government's mandatory biodiversity net gain requirement is widely regarded as a model Australia is tracking closely. Projects that get ahead of these requirements now will be better positioned as the regulatory landscape continues to shift.
- Strategic planning policy: At all levels of government, biodiversity considerations are expected and implemented through environmental policies, Flora/Fauna Acts, assessment standards, and vegetation controls.
- To protect threatened species in cities: Approximately 30% of Australia's EPBC-listed threatened species (around 370 species) occur in urban areas.

3

Ecological & design drivers

- Long-term resilience: Biodiverse, structurally complex landscapes are more resilient to climate variability, pest pressure, and disturbance — reducing long-term maintenance costs.
- Habitat connectivity: Nature-inclusive design supports urban wildlife corridors and contributes to regional ecological networks.
- Community wellbeing: Exposure to biodiverse, naturalistic green spaces improves mental health, physical activity, and community connection.

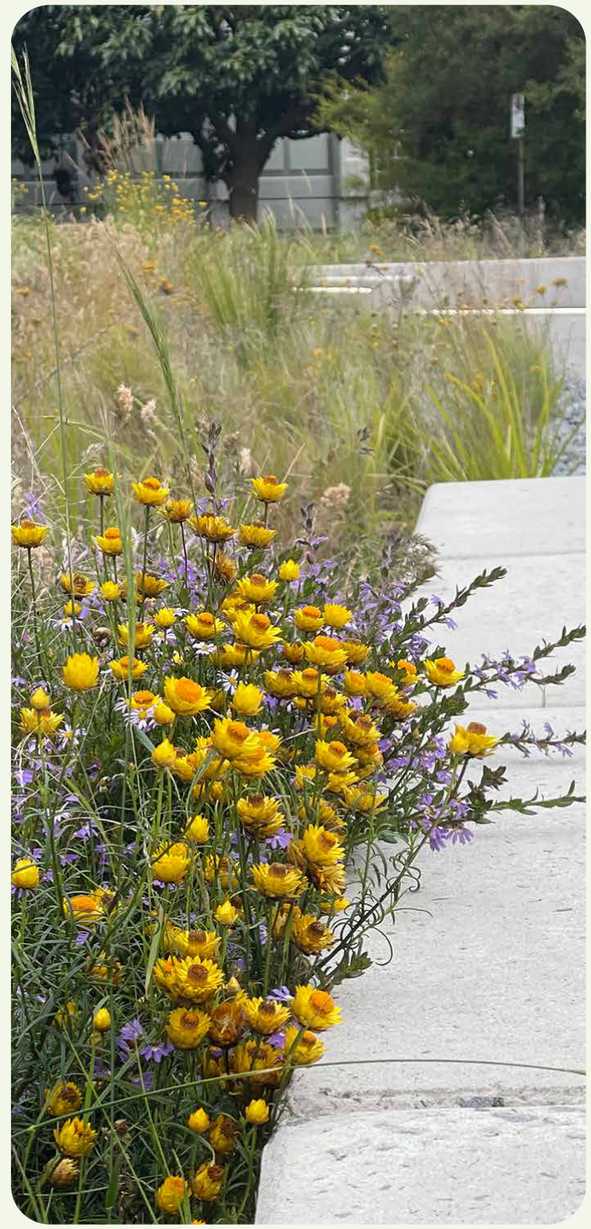


Figure 10. A diverse planting scheme at Monash University, VIC creates seasonal interest

2.7 Existing vegetation – Protect, Minimise, Connect

The ecological principles in Section 2.5 and the biodiversity design approaches in Section 2.6 are most effective when grounded in a thorough understanding of what already exists on site. Protecting and enhancing existing vegetation is one of the most cost-effective and ecologically valuable actions a project can take.

A key principle at all scales of development is to retain and enhance significant vegetation. Preserving vegetation with inherent aesthetic, ecological, hydrological, and cultural values delivers strong visual character outcomes, social connection, and embodied energy reduction. The retention of remnant features and habitats in place provides long-term ecological resilience and reduces costs over the lifespan of the development.

Figure 11. Retained trees in parkland at Brookwater Estate, Queensland

Roles and Assessments

The Landscape Architect can assess the character, form, and visual appearance of existing vegetation, including whether it is suitable within an urban environment and affords good long-term amenity for future occupants.

The Ecologist assesses the habitat and biodiversity value of existing vegetation and provides input into protection and enhancement of ecological values. The ecologist's early involvement is important to determine any ecological constraints and opportunities.

Where removal of vegetation is unavoidable, the decision must be guided by the mitigation hierarchy (Section 2.5) and supported by documented ecological and arboricultural assessments.

Key Actions

- **Seek Landscape Architectural input early to establish a strong visual character and integrate prevailing vegetation communities into the design.**
- **Engage an ecologist early, ideally before a development plan is devised, so that they can influence avoidance and protection of ecological values.**
- **Consider the habitat value and cultural significance of trees alongside their useful life expectancy (ULE) and arboricultural condition. Importantly, trees in decline often hold significant habitat value (e.g. hollows, deadwood) that should be considered before any removal decision is made.**
- **Implement tree protection measures (fencing, signage, exclusion zones) prior to any site works commencing, in accordance with relevant Australian Standards.**
- **Consider future connectivity of the site and retain habitat patches and corridors as part of a site-wide ecological strategy.**
- **Locate existing trees and vegetation in publicly accessible reserves wherever possible.**
- **Provide adequate setbacks at and below ground level, and at canopy level, for retained trees.**
- **Minimise encroachment into root zones of existing trees and undertake root investigations to understand and reduce potential impacts.**

2.8 Landscape master planning

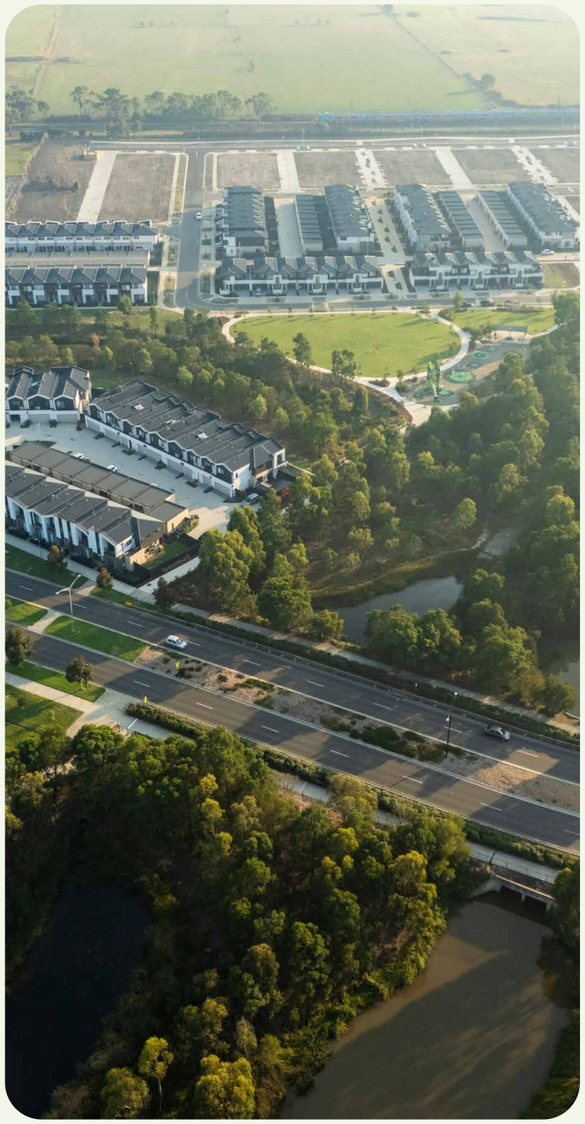


Figure 12. Site responsive master planning integrating waterways and existing vegetation at Olio, Officer, Victoria

Upon addressing the site fundamentals and broad planning approach, the design framework will be refined and informed by greater detail and technical input by the consultant team. Your Landscape Architect will seek to create an appropriate landscape setting with differing functional spaces. A robust, coherent master plan will develop a strong narrative for the precinct, identify key site functions and hierarchies, plan for trees in all open spaces and target species for conservation, with suitable, site-specific planting palettes.

Your landscape master plan should consider the following key principles and objectives:

Character

- Establish a strong identity by enhancing the sites natural features.
- Enhance local ecosystems using diverse, local species.
- Protect native vegetation and habitats by linking patches together.
- Minimise hard surfaces and enhance functional drainage systems into highly valued, amenity spaces.

Holistic Planning and Design

- Increase tree canopy along active transport routes.
- Increase tree canopy and vegetation along edges of reserves, conservation areas and medium or higher density sites (where crossovers and services are reduced).
- Connect streets, corridors and buffers by creating green spines, shade and habitat links to extend between open spaces and beyond the site extents.
- Integrate multiple green layers and green infrastructure throughout all open spaces of the site.
- Co-locate compatible uses to support wildlife.
- Provide multi-use spaces, such as easements with novel ecosystems or active recreation with flood storage.

Community

- Provide a high amenity environment for future residents.
- Enhance visual connections to open spaces, significant trees and along water courses.
- Identify other nature-based opportunities such as boundary interfaces, estate entries, temporary works (i.e. display villages/sales areas) and nature-based play activities.

Trees

- Provide for in-ground tree planting of sufficient size and proportion.
- Utilise soil calculators to establish root volume for optimal growth.
- Set canopy cover targets (30% minimum).
- Integrate native vegetation to support diversity and habitat (including nectar-eating birds, insects and animals).
- Create tree palettes and street tree strategies that are attractive, robust, soil and climate responsive, contribute to the local character and enhance biodiversity.

Strategy

- Integrate measures to mitigate climate risk such as fire, flood, drought and extreme heat.
- Set targets for future commitments during detailed design stages.
- Identify suitable plant stock sizes to provide instant visual impact, with sound structural form.
- Integrate conservation, weed control management and maintenance strategies.
- Identify plant procurement strategies, plant densities and commensurate landscape budgets.

2.9 Community engagement & education

Educating and engaging the community about the value of nature is key to ensuring long term sustainability, improving marketability and engendering a sense of care and ownership.

The masterplan should incorporate elements that highlight the importance of nature, or engage the community in nature-based activities.

Consider including the following design interventions in your project:

- interpretive signage
- bird hides
- nature-based play
- nature trails, lookouts and viewing platforms
- designs that integrate Traditional Custodian ecological knowledge and land management practices
- public art that references the local ecology
- demonstration gardens designed to attract and support wildlife
- indigenous plant labels that provide information about benefits to wildlife

Further, consider targeting a selected species such as a particular frog or flower which can harness community focus and support.

Of key importance is to enlist the support from future residents to respect and value vegetation in the urban landscape.

This will help to ensure the vegetation thrives during and after construction works; and through periods of drought, for example. Whilst local Councils typically own and maintain the public open space reserves and street trees, engendering a connection with nature for new communities and their residents helps to build a sense of ownership, and minimise harmful impacts to the landscape.

Consider providing an information pack with purchases, comprising:

- The value of street trees for shade, habitat, and wellbeing;
- Local environmental values, natural features and fauna protection for conservation or habitat reserves;
- Places where people can engage with nature such as parks, corridors or nature play areas;
- Links to community groups (Landcare, birdwatching or tree planting);
- References to Council information, sustainable gardening practices, gardens for wildlife programs and indigenous nurseries;
- Information on targeted wildlife species and how the neighbourhood has been designed to support them;
- Ways people can contribute locally which may include free planting schemes, volunteering and donations;
- Localised information pertaining to specific ecological systems – fire, flood or drought – and how residents can help;
- Protection measures for street trees during and post construction works, including nature strip management, rubbish disposal, additional watering and maintenance techniques;
- Information to assist with planning and designing their garden for enhanced biodiversity, health and shade;
- Traditional Custodian values and care for Country approaches;
- Practical tips on weed reduction, pollution minimisation and pet containment systems;
- Contact details for management officers or relevant authorities.

Figure 13. Interpretive signage highlighting the significance of natural features

2.10 Management & Maintenance

Our landscapes live for a long time.

Ongoing care for and management of both newly planted and established vegetation is vital for the enduring health and resilience of our landscapes. A new community designed around nature will require a unique maintenance and management regime after the project is completed. Your landscape architect, ecologist and landscape contractor or maintenance company can design a longer-term landscape and biodiversity management plan to allow the project to reach its full potential in terms of landscape maturity, habitat protection, biodiversity net gain and visual presentation.

Many of the public open spaces and streetscapes in your development will be maintained by the local authority post establishment. It's important to work collaboratively with the responsible authority to ensure they understand and are equipped to take on long term maintenance responsibilities.

Consider the following in preparing your management plan:

- Maintain higher grass heights when mowing to support insect populations. A technique of differential mowing can be used where some areas of grass are allowed to grow long.
- Consider timing and types of pesticide and herbicide treatments to avoid harm to sensitive species.
- Watering and irrigation are critical for plant establishment but can be reduced once planting is established. It may be necessary to continue to irrigate some planting types, particularly during extended periods of low rainfall, or in areas with limited soil volume.
- Retain dead flowers on native plants as a food source and to allow for self-seeding.
- Monitor plant health and provide replacements or species substitutions to retain planting densities.
- Manage and monitor tree health and form.
- Maintain habitat trees and nesting boxes.
- Consider potential for Aboriginal cool-burning practices to manage weeds and fire risk.
- Ensure weed management is carried out by appropriately qualified contractors who can differentiate between environmental weeds and regenerating native plants.
- Involve community groups in caring for significant places.

Management should be adaptive to navigate the dynamic, unpredictable nature of ecosystems and to effectively respond to changing environmental conditions, such as climate change, shifting land-use patterns, and new knowledge

Figure 14. Native planting in the reserve at Springwood Gawler East, SA

2.11 Monitoring Success

Post occupancy performance and assessment of nature-based design projects is relatively uncommon and a developing area. An evaluation after construction and upon vegetation establishment has potential benefits for:

- Informing the broader industry;
- Improving the design, implementation and management of similar projects or strategies;
- Assisting with on-going facilities and operational management;
- Engaging with key stakeholders, residents and interested groups;
- Optimising efficiencies in utility and water consumption to minimise costs;
- Meeting on site biodiversity targets.

There are two main approaches that could be taken to assess the project performance – namely technical assessment and community value.

Measurements and monitoring of items such as air temperature and species counts can form part of a Biodiversity Management Plan. This is typically undertaken by a qualified Ecologist and should be implemented during the design and documentation phases to influence the design outcomes.

Importantly, the evaluation should also include any remedial actions or improvements as part of the long-term strategy for the site – as microclimates, weather patterns and landscapes change over time.

Long term monitoring and maintenance is essential to achieving the goals set out in the Biodiversity Management Plan, which should form part of the contractual agreement for the future management of the site. This will ensure that habitats created are locally relevant, ecologically functional and contribute all the benefits targeted over the long term.

Occupant surveys can also form part of the evaluation and be based upon the health and well-being benefits established in section 1.2.

Figure 15. Wetlands at Crace, ACT

03

Types of Green Infrastructure

3.1 Existing remnant vegetation

This section outlines the various types of landscape spaces and infrastructure that can be incorporated into planning for broad scale developments. Each type of green infrastructure should be designed to build biodiversity, as well as meet human needs.

Preservation of existing, significant vegetation may take the spatial form of open spaces or corridor links at a variety of scales including tree reserves, pocket parks, nature reserves, and conservation management zones.

These spaces have a focus on avoidance, maintenance and management, rather than redevelopment.

Remnant spaces often contain perimeter landscape treatment to preserve and protect the significant vegetation, habitat or target species. This may comprise vegetated buffers, firebreaks or fencing as relevant to the vegetation community. Underground and aboveground services, easements and crossings that fragment the space or disturb the soil should generally be avoided.

You may also have authority requirements to comply with as part of the site redevelopment in terms of native vegetation and cultural heritage places.

Do

- **Preserve and enhance value, including topography and ground conditions.**
- **Implement perimeter protection elements.**
- **Improve the existing conditions and biodiversity with new planting.**
- **Connect the space with the broader open space network.**
- **Provide front facing allotments and community activation to encourage a sense of ownership.**
- **Implement a management plan that outlines strategies for long term protection of the vegetation, including weed management.**

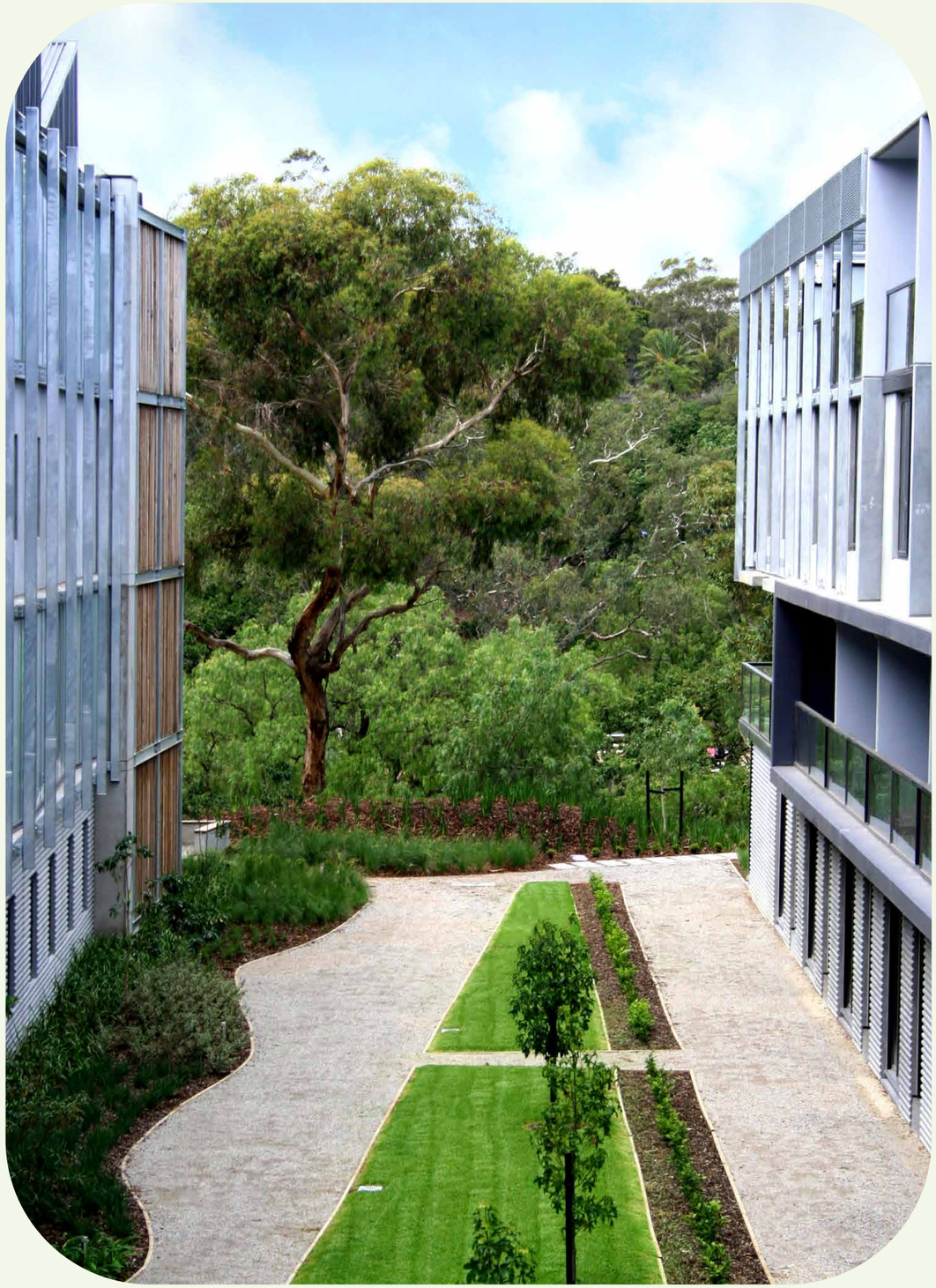


Figure 16. Vista to existing vegetation at Riviera Apartments, VIC

3.2 Existing trees

Remnant and existing trees can contribute significantly to the landscape amenity of an area and provide instant visual appeal and marketability in new developments. They can cool new buildings, sequester carbon in undisturbed soil and aid filtration of water runoff.

Further, retention of existing trees in-ground can improve soil conditions and biological plant processes. The ground plane is primary habitat for a range of beneficial insects and pollinators – leading to improvements across the entire ecosystem.

Retention of existing trees is always preferable to planting new trees which can take a long time to establish and provide the benefits that existing trees are already providing. Some trees have cultural and social connections and are irreplaceable from a faunal habitat perspective as hollows can take 100–200 years to develop.

Trees retained within New Communities can be located in a variety of typologies, including open spaces, pocket parks and linear corridors. Where possible, retain the landscape setting, such that the tree not only maintains access to water, sunlight and nutrients, but the setting also reflects the characteristics of the local vegetation community.

In the design process, consider:

- Minimising tree removal
- Retaining large and significant canopy trees
- Protecting the entire root zone
- Undertaking a non-destructive dig investigation (NDD) to ascertain actual root locations
- Retaining the ground plane environment intact and not impacting the water infiltration into existing root zones or below the canopy
- Implementing protection measures
- Enhancing visibility and access to feature trees
- Reusing material salvaged from removed trees to enhance the local environment and provide habitat

Figure 17. Playground designed around existing trees providing instant shade. Civic Park, Cumberland, NSW

Case Study: Berwick Waters Tree Walk Park

Location: Bunurong Country, Clyde North, Victoria

Developer: Frasers Property, Australia

Landscape Architect: Tract

Completed: 2025

Nature based features:

The existing trees on site were retained and incorporated into the play space design with elevated boardwalks weaving through the canopy.

Key takeaways:

- Existing trees have been incorporated into public open spaces at the masterplanning phase.
- Existing trees provide instant shade, visual impact and opportunities to engage with nature.
- Clever design and engineering can protect existing trees, whilst providing opportunities for play and exploration close to the tree root zones, via elevated boardwalks.
- The unique design and retention of trees provide a point of difference and a visual anchor for this important space within the new community.

Links:

https://tract.com.au/projects/berwick-waters-tree-walk-park/

Figure 18.

3.3 Wetlands & WSUD initiatives

Site planning with integrated water management systems such as capturing site runoff, rainwater storage, street water flow diversion and passive irrigation techniques, improves the soil conditions and downstream water quality.

Constructed wetlands, rain gardens and other WSUD systems are designed to capture and treat the stormwater run-off through garden bed filtering and 'reedy' style plants to remove nutrients and toxins, prior to the water exiting the site. These systems should be codesigned with both Landscape Architects and Engineers to ensure the hydraulic functioning and visual appearance is appropriate. Ecologists can also provide input to enhance biodiversity value. As they require ongoing maintenance and removal of the filter material, all water body elements and WSUD initiatives will need to be reasonably accessible via a maintenance vehicle.

The design should also consider and plan for passive irrigation to enhance tree canopy and establishment. This may occur through permeable paving, redirection of road surfaces and kerbs to a soakage pit, or swale formation to irrigate specimen trees.

Investing in harvesting systems (such as underground storage tanks) and recycled water systems for irrigation purposes in open spaces, parks and especially active recreation reserves will optimise growth outcomes for trees in the long term.

Consider:

- Integrating recreational, environmental and biodiversity outcomes into drainage infrastructure
- Stormwater diversion for habitat creation and aesthetic value
- In-ground water storage systems (tanks or swales) for plant establishment purposes
- Implementation of a range of WSUD techniques at a variety of scales
- Localised grading to passively irrigate street trees and open spaces
- Visual connections and access to permanent water for improved social connections
- Buffer planting to key waterways and wetlands for safety and biodiversity

Figure 19. Wetland at Saltwater Coast, VIC

Case Study: Hanlon Park / Bur'uda

Location: Turrbal and Yuggera Country, Buranda, QLD

Landscape architect: Tract

Completed: 2022

Nature based features:

The vision of a healthy ecosystem and connected communities was central in the reimagining of Hanlon Park from a concrete-lined drain to a vibrant urban space. The design transformed the drainage channel back into a naturalised creek, with the associated hydrological, engineering and environmental work delivering reduced flood risk for the community and a healthier ecosystem throughout the park via improved water quality and habitats. The organic form of the creek meanders through the site, with creek lookouts and crossings, feature planting and rockwork designed to replicate and reflect the natural erosion and sedimentation processes of creek formation.

Key takeaways:

The transformation of the creek has improved utilisation of the park including improved connectivity for cyclists and pedestrians, plus well-utilised nature play area.

The project restores natural systems by transforming the channel into a naturalised creek, balancing flood resilience with environmental and climate positive design benefits by;

- Creating terrestrial and aquatic flora and fauna habitats
- Improving fish passage
- Increasing habitat quality, diversity, and waterway health
- Fostering wildlife refuge and human exploration with basking stones, recycled slabs and fallen log crossings on lower sections of the creek
- Providing cooler spaces in a warming climate, with 462 new trees and over 56,000 shrubs planted.

Figure 20.

3.4 Streetscapes

With lot sizes and front setbacks decreasing in our suburbs, our streets have become a priority place to enhance biodiversity, urban cooling and amenity in addition to traditional transport functions.

The planting of new trees within the street network affords greater urban comfort, well-being and increased habitat. Streetscapes also provide opportunities for understorey planting to visually enhance the neighbourhood and provide habitat links for fauna, especially pollinators.

A high-quality streetscape can extend the functionality of a broader ecosystem, including carbon reduction, transpiration increase and lowering of thermal temperatures.

A cool, shady and attractive streetscape also encourages greater access to open spaces, neighbourhood integration, a strong landscape character and has the potential to mitigate climate change.

Streetscapes offer a low-cost option to substantially improve biodiversity and increase financial return.

Continuity

Continuous, well distributed, in-ground tree planting is the most effective and sustainable way to incorporate new planting into a new development. Increases in tree density – particularly to side allotments, median strips and outstands – is a simple, low-cost initiative. Similarly, extra planting at heat sensitive areas such as public transport nodes, aged care, school and childcare facilities is an effective outcome.

Access to soil

Our streets are often constrained both above and below ground by transport and servicing functions. Both long term root health and canopy establishment can be compromised by services and other infrastructure. Seek to combine services underground in deep, common trenches and below footpaths or roadways where possible, to maximise soil volume and tree density. Similarly, relocation of stormwater drainage below the roadway will avail more suitable ground conditions for tree roots. This will require a strongly collaborative Consultant team, with ability to negotiate with future asset owners and authorities.

Sufficient in-ground space enables trees to seek adequate water and nutrients to perform well, for optimum growth and creation of shade, whilst minimising root invasion. Increasing the width and depth of the nature strip growing medium is the easiest way to achieve large, carbon sequestering trees.

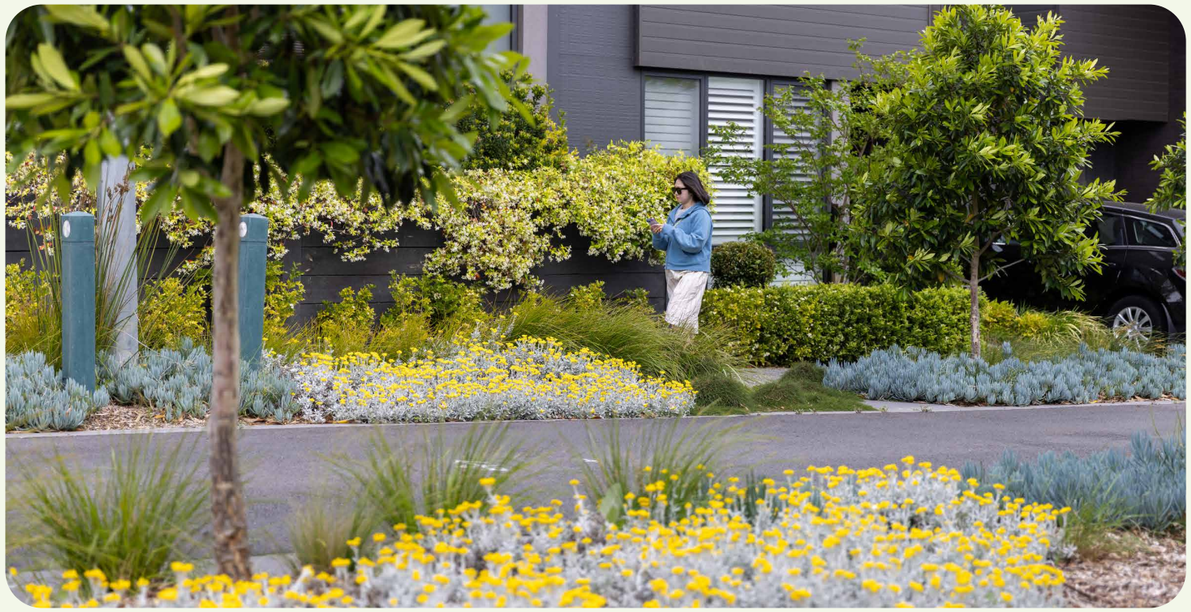


Figure 21. Nature strip planting to streets within the Alphington Paper Mill Redevelopment, VIC

Arborists and Landscape Architects can use soil calculators to determine appropriate soil volumes for the type of soil substrate or offer a range of techniques to support root development. Engineered soil systems and matrices, whilst attracting a high initial capital cost, can support initial tree establishment and lead to lower long-term maintenance and replacement costs.

Horticultural practice

The technical and horticultural requirements for site preparation, species selection, tree installation, and maintenance are all key elements to establishing a successful tree. Arboricultural assessment of the tree stock, prior to delivery, can further assist with the structural development of the tree and ability to withstand harsh weather conditions such as wind and heat stress.

Access to water

WSUD initiatives are often encouraged in verges and median strips by authorities and future asset owners. They can restore soil moisture levels to recharge and stabilise groundwater levels in catchments, which promotes vegetative growth. Integrated passive irrigation systems to water newly planted street trees offers multiple benefits but may need specific spatial parameters and construction techniques coordinated between different consultants.

Similarly, pervious surfaces and other innovative drainage elements can improve soil moisture, without conceding land within the streetscape corridor. Porous pavement systems and associated drainage infrastructure allow rainwater to filter through to the ground and enhance tree root zones when water is directed to the tree pit. These are typically adopted in more urban, pedestrian oriented streets and town squares, with lower surface permeability. Discuss these options with your Engineer to ascertain movement, loading, constructability and lifecycle cost impacts.

Growing environment

- Improve soil characteristics to enhance growing conditions.
- Increase setbacks and nature strip widths to enhance street tree growth.
- Integrate passive irrigation systems or permeable paving solutions.
- Consolidate vehicle crossovers to maximise tree density.
- Consolidate, relocate or deepen service trenches to maximise soil volume.
- Co-locate electrical joints, pillars, junction pits, streetlights and street signs to minimise offsets or relocate to locations where trees cannot be planted, such as road corners or driveway edges.
- Incorporate stratacells or structural soil below hard pedestrian surfaces to enable strong root development.

Landscape design

- Distribute trees throughout the entire street network including nature strip widenings, laneways, paper roads, median strips, roundabouts, traffic islands and land bridges.
- Incorporate double rows, median planting or tree outstands within carriageways, where space permits.
- Plant dense, semi-advanced tree stock to enable attractive and immediate outcomes.
- Plant well vegetated street verges with continuous tree canopy coverage along pedestrian priority streets, active transport and biodiversity corridors.
- Preference diverse and complex garden beds over grassed nature strips.

Tree types

- Include nectar-bearing trees and a high species diversity in tree palettes.
- Install a high proportion of native and indigenous species to adapt to prevailing soil and climate conditions.
- Include trees with varied leaf characteristics to improve air quality and transpiration rates.
- Preorder tree stock to assure availability of diverse and advanced tree species.

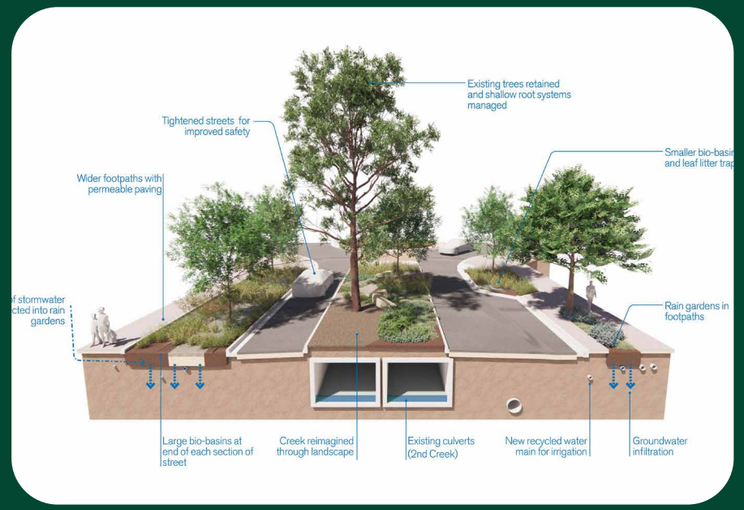
Case Study: St Peters Street Upgrade

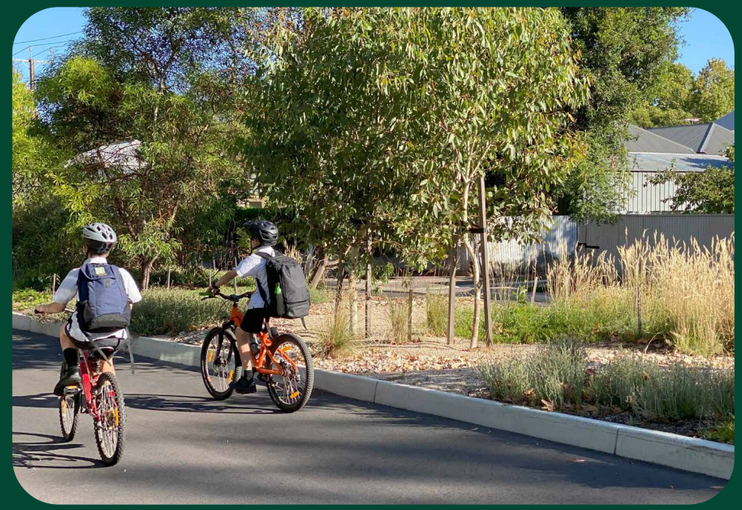
Location: Kaurna Country, St Peters, SA

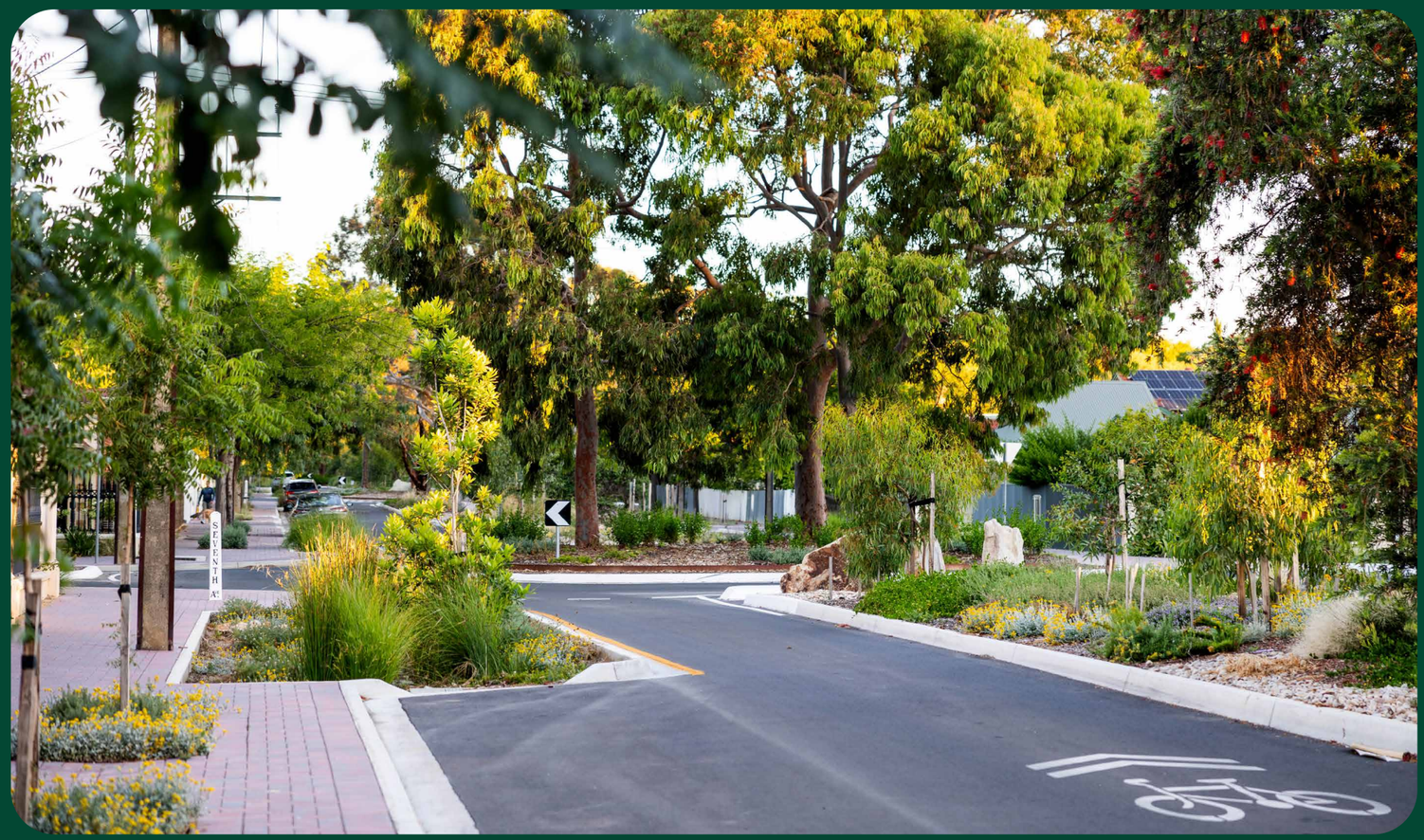
Developer: City of Norwood Payneham & St Peters

Landscape Architect: Landskap and City of Norwood Payneham and St Peters

Completed: 2023







Nature based features:

St Peters Street is a climate-resilient, people-focused streetscape. Once marked by narrow footpaths, sparse trees and wide roadways, it has been transformed through passive stormwater design, enhanced biodiversity and improved pedestrian amenity. Local planting palettes and materials, create a wild aesthetic. Habitat has been expanded with 97 trees retained, 205 new trees, 12,000 plants and repurposed timber logs for habitat. Indigenous species were selected for biodiversity, water quality and easy maintenance. The upgrade also features integrated WSUD elements, including swales, permeable spoon drains, passive irrigation, permeable paving and recycled-water systems.

Key takeaways:

- An attractive, safe and comfortable streetscape encourages physical activity and support mental health and wellbeing.
- Retained and new trees provide generous canopy coverage and urban cooling.
- Biodiversity is enhanced by planting verges and nature strips with local species.
- Wildlife movement is facilitated between open spaces.
- WSUD features ensure cleaner waterways.

Figure 22. St Peters Street demonstrates how trees and understorey planting can be maxiimised in streets (Images courtesy of Landskap and Duncan Mackenzie)

3.5 New community parks

New parks provide excellent opportunities for nature to thrive. They can range in size and amenity – from small, local parks through to district level recreational spaces – and can accommodate a diversity of outcomes.

New community parks cater for human use and interaction. They offer shade and cooling in warm climates, connection to nature and recreational activities. As such, traditional parks accommodate pathways for circulation, plaza areas for gathering and other surfaces for sport and play activities. One of the easiest ways to enhance nature in open spaces is to minimise hard surfaces and maximise vegetation.

Embedding a broad and well-connected tree canopy is essential to embracing nature in designed spaces. A high tree canopy coverage (either through new planting or retention of existing trees), will increase habitat, create an attractive environment and promote health and wellbeing. Whilst large trees (such as Eucalypt species) maximise carbon sequestration and provide nesting opportunities – incorporating a range of smaller and medium-sized trees will offer food diversity for animals and closer proximity for people.

Consider spaces solely devoted to nature through the establishment of 'Microforests' or 'Carbon sinks'. These can take the form of habitat patches which comprise predominantly indigenous vegetation, with dense layering of different plant types to maximize carbon sequestration; or wet areas such as wetlands or ponds with perimeter, natural and vegetated edges. Both systems aim to support biodiversity and healthy ecosystems.

Irrigation is essential to enable the landscape to thrive during summer and drought conditions. Retention of soil moisture through WSUD initiatives is a priority in community parks, as is harvesting of stormwater and use of recycled water for irrigation purposes – at least for the duration of the plant establishment period.

Consider:

- A proportion of 70% soft to 30% hard surfaces in the design, with permeable surfaces;
- Prioritising WSUD principles with supportive material and plant selection;
- Planting as many large trees as possible to maximise long term carbon sequestration in woody material;
- A high tree canopy coverage, which extends into the surrounding street network;
- Protecting parkland trees from drought stress by retaining existing soil conditions and prioritising irrigation to them in times of low rainfall;
- Prioritising understorey planting over mown lawns in areas not required for pedestrian access.
- Incorporating nature-based play experiences;
- Integrating strategic planting like microforests or pollinator gardens. Refer 3.10.

Figure 23.

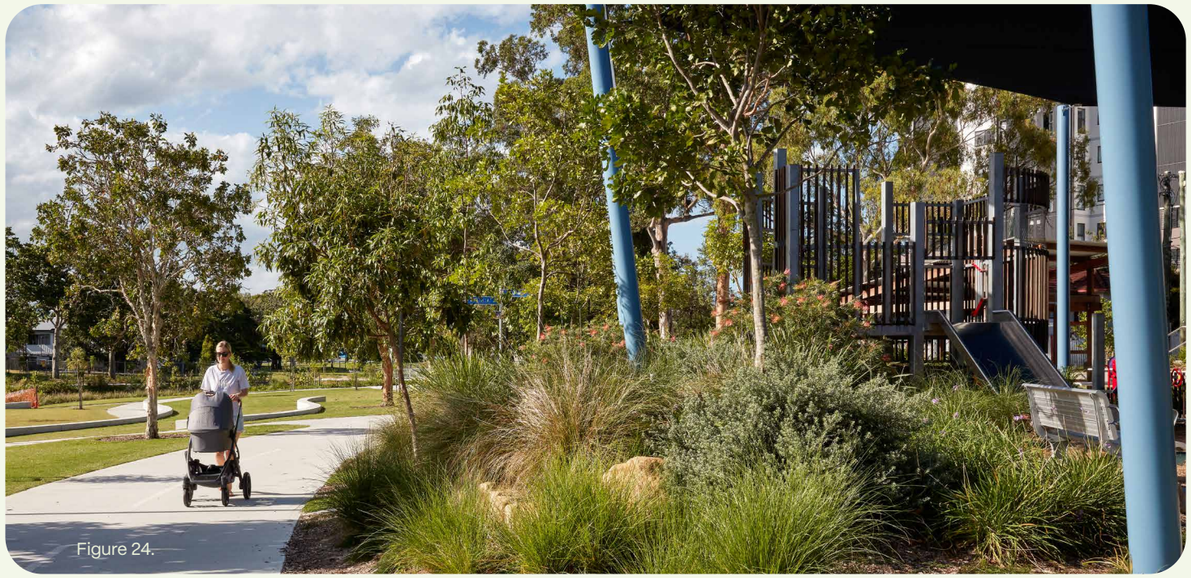


Figure 24.

Figure 21. Parkland at Brookwater Estate, QLD
Figure 22. Hanlon Park, Burnada, QLD

3.6 Urban plazas & squares

Most new communities, especially in higher density settings, will include public open spaces that are urban in nature and designed as multifunctional plazas or squares with civic and commercial uses. These spaces usually require larger hard paved areas to accommodate events and a higher intensity of use.

Consider:

- Large canopy trees for shade and urban cooling;
- Structural soil to maximise soil volume under pavements and enhance tree growth;
- Rationalising areas of hard paving by analysing space requirements for proposed uses. Can some hard paving be replaced by gardens, lawn or gravel?
- Incorporating permeable paving and passive irrigation techniques.

Figure 25. Plazas don't need to be hardscape. They can incorporate permeable paving, canopy trees, planting and seating edges like the example above at Westmead Hospital, NSW.

3.7 Linear parks & pedestrian trails

Walkability enables residents to engage with nature on a regular basis and enjoy the associated health benefits. The design of all new communities should aim to create a network of dedicated green links for walking and cycling. Green links are linear open spaces with defined pedestrian and cycle paths, trees and planting. In some cases, these can be incorporated into conventional streets through a widening of the street reserve to accommodate shared paths and additional planting. In these cases, vehicle crossovers should be minimised via rear loading or multi-residential typologies.

Another benefit of green links is that they can serve as ecological connectors, allowing wildlife to move between habitat patches.

Consider:

- Designing a connected network of green links throughout the development that connects residents to parks and amenities;
- Providing shade to paths by maximising canopy cover;
- Minimising conflicts between pedestrians, bikes and vehicles by providing off-road dedicated paths;
- Providing nature trails through areas dedicated to conservation;
- Utilising green links as habitat corridors that allow wildlife to move between habitat patches.

Figure 26. Green links allow people to engage directly with nature whilst providing opportunities for exercise.

3.8 Community gardens

Productive gardens offer residents the opportunity to garden, engage with ecological systems, and secure sustainable food sources. Productive gardens should be incorporated in sunny, accessible locations supported by other social activities and include adequate seating and dining opportunities.

Typically, the infrastructure comprises above grade planters for access and drainage purposes, however the design should also allow for adequate circulation, water accessibility and maintenance. Material stores, gardening sheds and waste disposal should be incorporated into the design to enable practical, seasonal maintenance. Planters should be located in an area with minimum of 6 hours of sunlight and protected from prevailing winds.

Productive gardens are also a good opportunity to use indigenous food plants and connect with indigenous culture in the area.

Whilst some productive species and gardens (such as fruit trees) can be integrated into open space settings, community gardens are typically standalone areas and are often collocated with maintenance assets, community centres or educational facilities. Upfront collaboration and management plans with asset owners and operators are key to smooth and successful implementation.

Consider a dedicated area for food production and/or pollinators (such as beehives), which incorporate good solar orientation, maintenance areas and materials and equipment storage.

Figure 27.

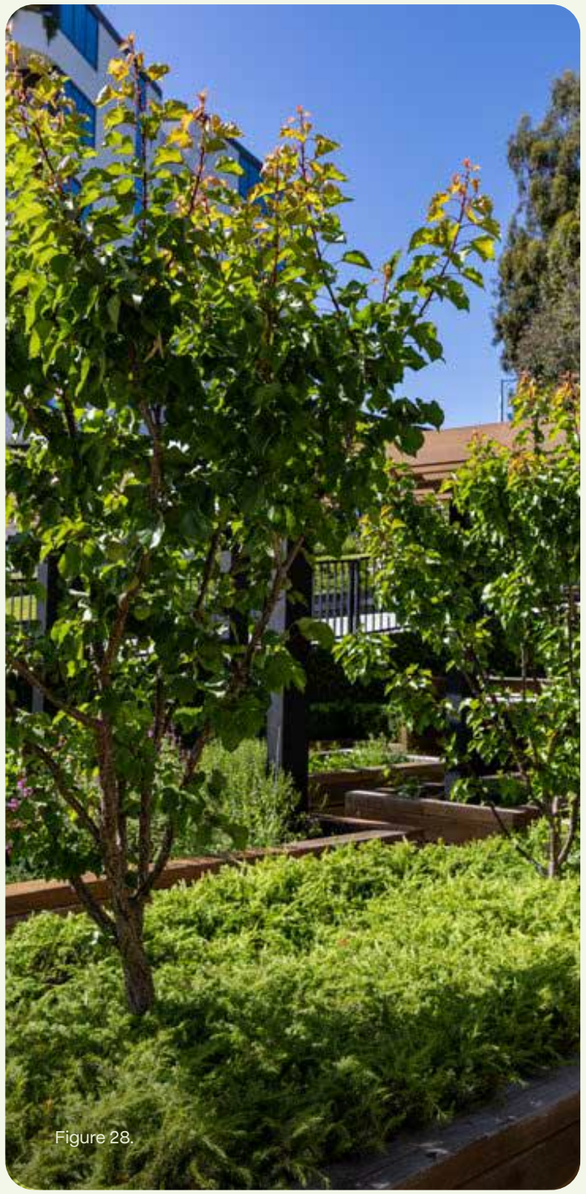


Figure 28.

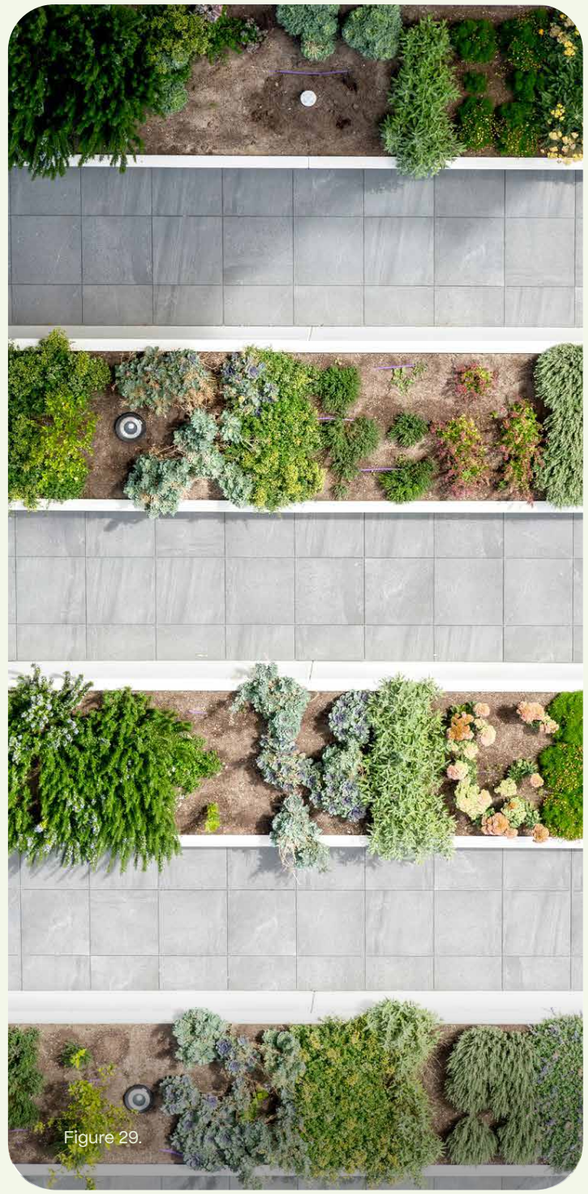


Figure 29.

Figure 25. Exotic plants at elevated levels can increase biodiversity and faunal connections where birds and bees are limited in diversity. Kodo Apartments, Adelaide.

Figure 26. Productive gardens can be integrated in open areas as a low-cost element. Tullamore Apartments, Doncaster, VIC

Figure 27. Diverse planting in productive areas can enhance the external visual aspect. Kodo Apartments, Adelaide.

Case Study: Harcrest Community Garden

Location: Wurundjeri Country, Wantirna South, VIC

Landscape Architect: MDG

Completed: 2015

Nature based features:

Set within larger parkland, the Harcrest Community Garden is a shared community asset for residents to grow and harvest their own produce. The garden contains approximately 40 plots that can be leased by residents. An orchard of fruit trees is located adjacent to the productive gardens.

Key takeaways:

- The gardens promote a sense of community and enhance social connections as residents share produce and work together.
- Garden plots are in high demand reflecting an interest in growing food crops and smaller private gardens.

Figure 30.

3.9 Private Gardens

Private residential gardens constitute a large amount of space in neighbourhoods (estimated at 30% of total urban green space) and can make a substantial contribution to local biodiversity and leafy green outcomes.

Developers can provide the framework to optimise the biodiversity value of private gardens and enhance connections with the wider precinct.

Primarily, the sizing and orientation of the lot and building envelope should consider space for tree planting – exclusive of vehicle parking and outdoor dining needs. Whist residential planning scheme provisions offer controls for permeability, site coverage and minimum garden bed sizes, often these clauses do not specifically address canopy tree establishment as a key driver of nature in place.

As part of the marketing and sales strategy, Garden Design Guidelines can be prepared to set quality benchmarks and standards throughout the development. These guidelines should have an integrated landscape focus that considers character, layout and plant selection.

They should also consider methods to mitigate downstream impacts of high rainfall events and stormwater management.

Building and Landscape design guidelines should consider provision for:

- Sufficient building setbacks to enable canopy tree planting within both the front and rear garden;
- Maximum building size and coverage (ratios or footprints);
- High site permeability, with garden beds prioritised over hard surfaces;
- In-ground soil areas of sufficient volume for deep rooted trees;
- Methods to reduce local surface temperature including:
  - A Advice on moisture sensors and irrigation to horizontal surfaces
  - B Shading from canopy trees and pergolas
  - C Avoidance of synthetic turf; and
  - D Vegetated screening to exposed walls
- Suitably sized rainwater tanks or in-ground infiltration swales;
- Indigenous plant selection and low maintenance landscape designs;
- Lawn alternatives (using natural, permeable materials);
- Requirements for formal design submissions and maintenance schedules.

Local Councils have an array of resources, grants and schemes available to enhance backyard, nature strip, and water-wise planting – as well as links to local environmental groups, indigenous plant nurseries and habitat infrastructure suppliers, which Residents can be referred to.

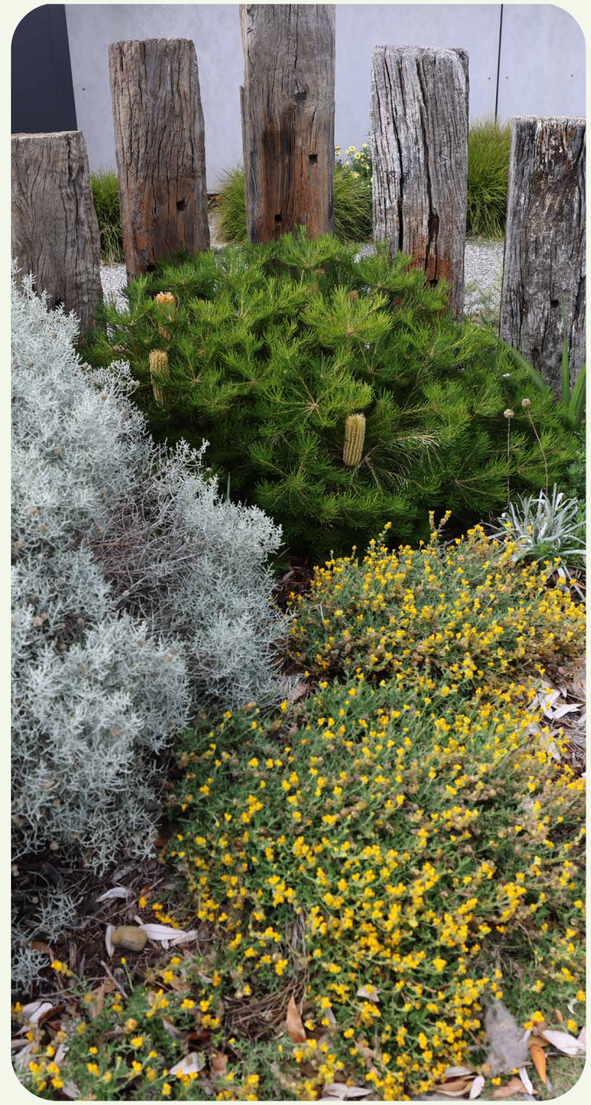


Figure 31. Cape Paterson, VIC

Case Study: The Cape Garden Design Guidelines

Location: Bunurong Country, Cape Paterson, VIC

Landscape Architect: Australian Ecosystems

Nature based features:

Design guidelines are provided with all private garden design requiring approval by a Design Review Panel to ensure adherence to sustainability principles.

- Plant palettes for private gardens are provided with a predominantly coastal or heathland theme.
- All plants are native or indigenous, except for a few special purpose exotic trees for fruit and exotic climbers for vertical greening.
- Cats are prohibited and dogs are required to be on leash in public spaces to protect local wildlife.
- Minimum of 20% of the lot area is to be permeable.
- Front fencing is prohibited, to maintain an open landscape character.

Key takeaways:

- Private Garden Design Guidelines have maximised biodiversity and site permeability.
- Weeds and feral animals are minimised, protecting local wildlife.
- The guidelines have promoted a consistent landscape and visual character that has boosted saleability of lots.

Links:

https://liveatthecape.com.au/

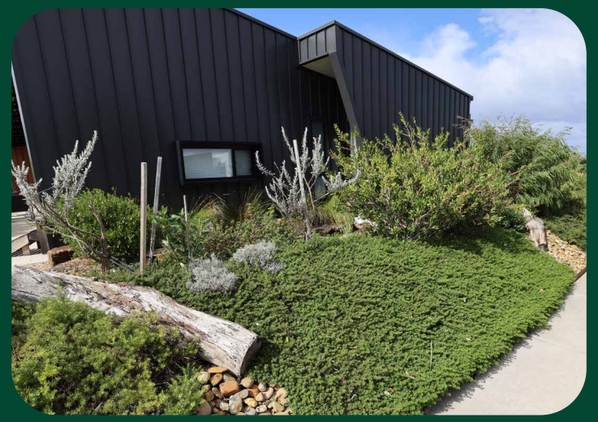


Figure 32.

3.10 Strategic planting

For all areas of open space, strategic planting can maximise outcomes for nature.

Microforests
are densely planted spaces in urban areas, with multi-layered planting and a diversity of native species. They are a space effective way of capturing carbon, reducing urban heat, creating habitat and providing visual interest in a development.

Woody meadows
are plantings of native shrubs that are coppiced to promote flowering, create dense form and maintain desirable heights for urban areas. Extensive research has been undertaken by the University of Melbourne to ensure these landscapes can be designed to be low cost and resilient.

Wildlife patches and corridors
are designed specifically for target wildlife species. Informed by ecologist advice, these spaces will take a specified size and form, and incorporate planting and other habitat features such as water and shelter to create optimal conditions for target species.


Figure 33.

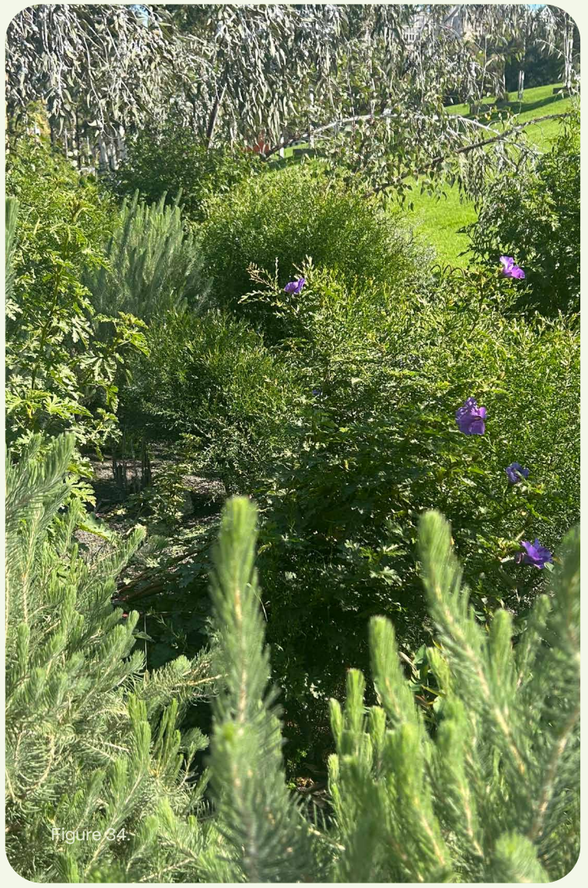


Figure 34.


Figure 35.

Figure 31. Microforest at Southbank Boulevard, VIC
Figure 32. Woody Meadow at Birrarung Marr, VIC
Figure 33. Coastal planting designed as wildlife habitat at the Penguin Parade Visitor Centre, Phillip Island, VIC

Grassy meadows
are plantings of native grasses and herbaceous plants to recreate a grassland or grassy woodland habitat. They can incorporate wildflowers to create visual interest and extend flowering times for a variety of pollinator species. Grassy, flowering meadows have become very popular and are suitable for urban areas as nature strips or in public areas that require low planting to retain sight lines for passive surveillance.

Polinator gardens
are designed to maximise pollen-rich flora to support pollinator species such as bees, butterflies, moths and birds. A diverse range of species is selected to ensure flowering across the year. These gardens are visually appealing due to their flowering and are a great way to engage the community to implement and care for gardens such as nature strips that can create corridors such as 'bee highways'.

Vertical greening
in the form of climbing plants trained to grow on walls or fences is a great way to maximise greenery where space is limited. Refer to the Nature Based Cities Design Guidelines for Multi-residential development form more information.


Figure 36.

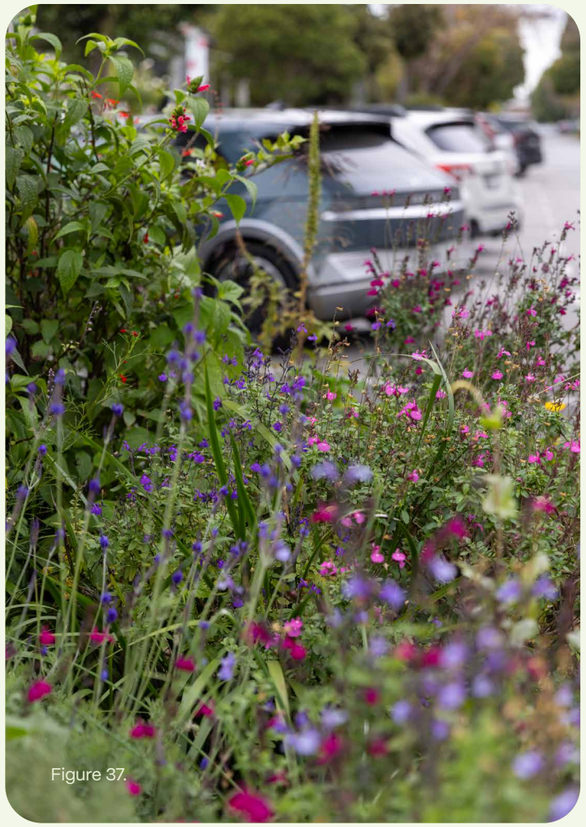


Figure 37.

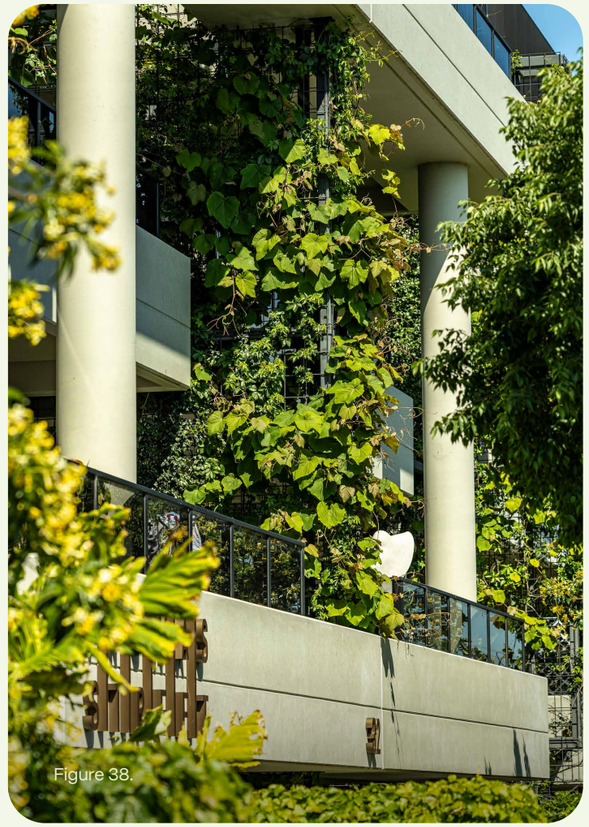


Figure 38.

Figure 34. Monash University Flowering Meadow, VIC
Figure 35. The 'Bee Highway' in South Melbourne, VIC
Figure 36. Green Facade at Moonee Ponds, VIC

04

Reference Documents & Further Reading

4.1 Reference documents and further reading

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- VPA/Spiire (2023) EDCM Green Streets Project.
- WSROC, Resilient Sydney and the Greater Sydney Commission. Cool Suburbs Factsheet (undated).
- Water Sensitive Cities Australia (2023) Practice Guide – Cooling (Lot Scale).
- WAPC (2025) Urban greening strategy.

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