

STREETSCAPE BIODIVERSITY CASE STUDY

AUGUST 2020



THE UNIVERSITY OF
MELBOURNE



CITY OF MELBOURNE



A CITY THAT CARES FOR THE ENVIRONMENT

Environmental sustainability is the basis of all Future Melbourne goals. It requires current generations to choose how they meet their needs without compromising the ability of future generations to be able to do the same.

Acknowledgement of Traditional Owners

The City of Melbourne respectfully acknowledges the Traditional Owners of the land, the Boon Wurrung and Woiwurrung (Wurundjeri) peoples of the Kulin Nation and pays respect to their Elders, past and present.

CONTENTS

Background	04	Maintenance phase	16
Objectives and rationale	05	Key maintenance lessons learned	17
Project details overview	06	Monitoring phase	18
Project team	06	Key monitoring lessons learned	18
Costs	07	Outcomes	19
Project timeline	07	Biodiversity values	19
Research phase	08	Visual amenity values	20
Plant palette	08	Urban nature planting guide	20
Design and construction phase – Clowes Street case study	09	Summary	21
Background information	09	References	21
Site description	10		
Planting design and layout	11		
Key design lessons learned	13		
Plant procurement	14		
Site preparation	14		
Planting	14		
Key construction lessons learned	15		

August 2020

Cover image: Clowes Street biodiversity planting site. Photo credit: David Hannah.

Acknowledgments

Many people have contributed to the development of this case study. We are truly grateful and would like to thank all contributors including the City of Melbourne, researchers at the University of Melbourne – School of Ecosystem and Forest Sciences, Naturelinks Landscape Management Pty Ltd and Serco Australia Pty Ltd for providing their input, time and expertise.

Disclaimer

This report is provided for information and it does not purport to be complete. While care has been taken to ensure the content in the report is accurate, we cannot guarantee it is without flaw of any kind. There may be errors and omissions or it may not be wholly appropriate for your particular purposes. In addition, the publication is a snapshot in time based on historic information which is liable to change. The City of Melbourne accepts no responsibility and disclaims all liability for any error, loss or other consequence which may arise from you relying on any information contained in this report.

To find out how you can participate in the decision-making process for City of Melbourne's current and future initiatives, visit melbourne.vic.gov.au/participate

BACKGROUND

The City of Melbourne collaborated with the University of Melbourne to develop and test an understorey plant palette designed to increase streetscape biodiversity in the urban environment.

In 2018, the plant palette was integrated into four streetscapes within the City of Melbourne – Clowes Street, South Yarra; Docklands Drive, Docklands; Park Street, Parkville; and Arden Street, North Melbourne.

As this is an experiment designed to test ecological outcomes, biodiversity and plant performance are being monitored to compare the four planted trial sites against similar control sites using before and after surveys.



Clowes Street biodiversity planting site.

OBJECTIVES AND RATIONALE

The City of Melbourne's *Nature in the City Strategy*¹ aims to increase biodiversity and habitats within the municipality and develop a more ecologically connected urban landscape. A key goal of the strategy is to *increase understorey plants on land managed by the City of Melbourne by 20 per cent by 2027*.

Recent research in Melbourne has shown that increasing the complexity of understorey vegetation, and the percentage of understorey that was native, had positive effects on bat, bird and insect communities². Relatively few native understorey species, however, are currently used in streetscape plantings due to harsh growing conditions, infrastructure and traffic constraints, and horticultural limitations. Therefore, the performance of many native understorey species in these novel urban environments is uncertain and requires testing.

Obtaining evidence through well-planned and documented trial plantings is important for informing evidence-based council spending decisions that benefit biodiversity, while delivering high quality, cost-effective streetscape projects.

Failure to recognise that the streetscape can be a harsher environment compared to parks and gardens can result in: dead or unattractive plantings that fail to promote a positive public perception towards native plant species; increased maintenance inputs and replacement costs; and ultimately, the creation of poor quality and unsustainable urban landscapes.

The Streetscape Biodiversity Project is being developed as a resource for landscape architects and other urban design professionals. Its evidence-based recommendations can assist the design and plant selection of future streetscape renewal projects to improve biodiversity, amenity and function while being successful and cost effective. Its findings will promote greater integration of biodiversity habitat into existing urban land use, thereby creating a more ecologically connected City of Melbourne.



Ladybird on a Sticky Everlasting (*Xerochrysum viscosum*) flower.

PROJECT DETAILS OVERVIEW

Project team

City of Melbourne

A range of expertise from within the City of Melbourne contributed to this project, including:

- **Ecologist**
Project role - General project manager
- **Project Manager**
Project role - Construction project manager (planting design and site construction)
- **Digital Content Advisors**
Project role - Urban nature planting guide (website design and build)
- **Landscape Architects**
Project role - Clowes Street planting design

University of Melbourne

- **Associate Professor Nicholas Williams**
Title - Urban Ecologist
Project role - Research project manager (planting palette, planting design, experimental design and monitoring)
- **Associate Professor John Rayner**
Title - Horticulturist
Project role - Planting palette, planting design and monitoring
- **Dr Caragh Threlfall**
Title - Urban Ecologist
Project role - Planting palette, experimental design and monitoring
- **Jessica Baumann**
Title - Research Assistant
Project role - Planting palette, monitoring and evaluation

Other

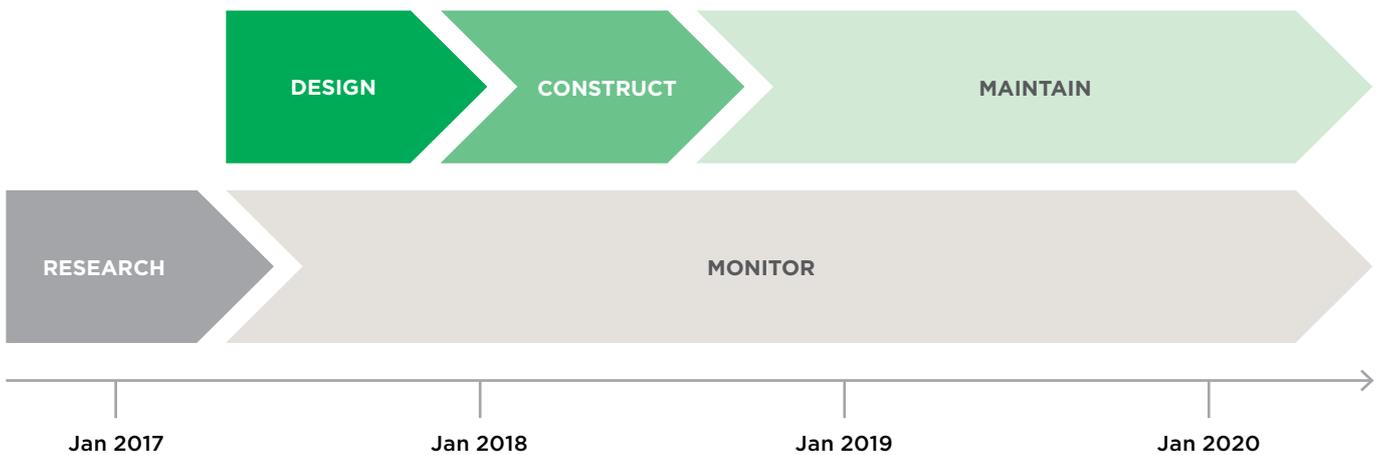
- **Evolve**
Urban nature planting guide - website design and build
- **Michael Hanley**
Native bee hotel construction
- **Naturelinks Landscape Management Pty Ltd**
Site maintenance (October 2018 to June 2019)
Site monitoring (October 2018 to June 2019)
Plant health monitoring (July 2019 to June 2020)
- **Rodger Elliot**
Horticultural expert - review of planting palette
- **Serco Australia Pty Ltd**
Site maintenance (July 2019 to present)

Costs

STREETSCAPE BIODIVERSITY PROJECT COSTS (\$AUD) FROM 2016-2020 (FIVE CALENDAR YEARS)	
Planting palette and guide (research and website build)	
Subtotal	\$56,085
Capital works to build and 12 months plant establishment maintenance (excluding City of Melbourne internal design, project management and earthworks*)	
Subtotal	\$93,505
Post-12 months establishment maintenance costs (for 1.5 years)	
Subtotal	\$17,700
Biodiversity monitoring and Before-After-Control-Impact (BACI) evaluation	
Subtotal	\$69,250
GRAND TOTAL	\$236,540

*Part of larger project costs.

Project timeline



RESEARCH PHASE

Plant palette

The streetscape understorey plant palette was initially developed by ecologists and horticulturalists from the University of Melbourne, with plants selected based on horticultural attributes and tolerances, and the biodiversity resources they provide.

- **Horticultural attributes:** The plant palette focussed on predominantly native species, comprising perennial herbs, grasses and shrubs that were aesthetically attractive, low maintenance and had high environmental tolerances, including to drought, waterlogging and compaction.

- **Biodiversity resources:** Plants were selected based on documented scientific evidence that they could provide resources for birds, bees or butterflies. These included: nectar and pollen for pollinating insects and small non-aggressive birds; larval food resources for local butterflies; seed and fruit for birds; nesting material for birds and solitary bees; and protection for small birds, for example, plants with dense and prickly foliage.

The preliminary list of plant species then went through internal and external expert horticultural review.



Clowes Street biodiversity planting site.

DESIGN AND CONSTRUCTION PHASE – CLOWES STREET CASE STUDY

Background information

In 2017, the City of Melbourne undertook upgrades and changes to Clowes Street, South Yarra, as part of the Annual Capital Works Program, guided by the *South Yarra Urban Forest Precinct Plan*³ and *Nature in the City Strategy*¹.

Summary of works included reducing the road width with no loss of parking, improving tree growing conditions and creating new planted areas of low to mid storey plants as part of biodiversity trials for the Streetscape Biodiversity Project.



Clowes Street, South Yarra streetscape improvement proposal - Existing conditions.



Clowes Street, South Yarra streetscape improvement proposal - Proposed conditions.

Site description

Located at the western end of Clowes Street in South Yarra, the trial planting site comprises one long garden bed, 2 m in width and 106 m in length, that is directly adjacent to a bluestone and brick wall (Melbourne Girls Grammar School). The planting site was formerly a bitumen footpath.



Sketch example of proposed footpath and planting.



Location of the Clowes Street biodiversity planting site. Source: Naturelinks Landscape Management Pty Ltd.

Planting design and layout

The proposed planting arrangement for the Clowes Street biodiversity planting site was undertaken by City of Melbourne landscape architects and guided by advice from researchers at the University of Melbourne.

The wide border planting gave the landscape architects a unique opportunity to see a typical streetscape planting project in a new way. This included using structural complexity and having higher height allowances in understorey planting design than typically possible with smaller footpaths where space is scarce, or in median plantings where low planting is required for sightline visibility for vehicles.

Through working together with the ecologist at the City of Melbourne during design development, landscape architects were briefed to focus on creating a complex planting arrangement with a high diversity of plant species. Plants were to be selected from the plant palette developed by the University of Melbourne.

According to the landscape architects, it was conveyed in the brief that the planting design should be able to be applied to various biodiversity project sites of varying requirements. This, however, was not envisioned by the general project manager, who expected a site-specific planting design. In light of these miscommunications, a "typical" planting design guideline was created by the landscape architects to be used repetitively across the Clowes Street biodiversity site, and in the future, broadly across other streetscape biodiversity planting sites. The planting design guideline specified the location of groups of plant types rather than individual plants - as shown in Figure 1.

Researchers at the University of Melbourne provided guidance on planting arrangement and composition based on horticultural attributes (for example, consideration of growth habits of different species to inform planting density) and maintenance considerations (for example, placing larger shrubs that require minimal maintenance in less accessible areas).

The final plant list used at the Clowes Street trial planting site (Table 1) was initially developed from the streetscape understorey plant palette, but was largely influenced by plant availability. The plants used were predominantly indigenous to the greater Melbourne area.

Overall, the design process realised a more complex planting design that integrated a broader range of plants installed at high densities than a typical streetscape planting.

The design intermingled drifts of plant groupings, where plants with comparable growth habits were arranged together to maximise vegetation success. Arranging plant species massing as drifts was intended to establish aesthetic and ecological connectivity. This involved creating colonies of single plant varieties that naturally spread by self-seeding or by growth from root stems. It also involved grouping plants together that provided similar biodiversity resources to promote optimal foraging and use by local fauna, for example, food resources were abundant in one specific area.

As the design included a number of smaller, ephemeral plant species that die back in summer compared to conventional streetscape plantings, during the design phase a decision was made to increase planting density to allow for plant loss and to maintain the sense of massed drifts of planting.

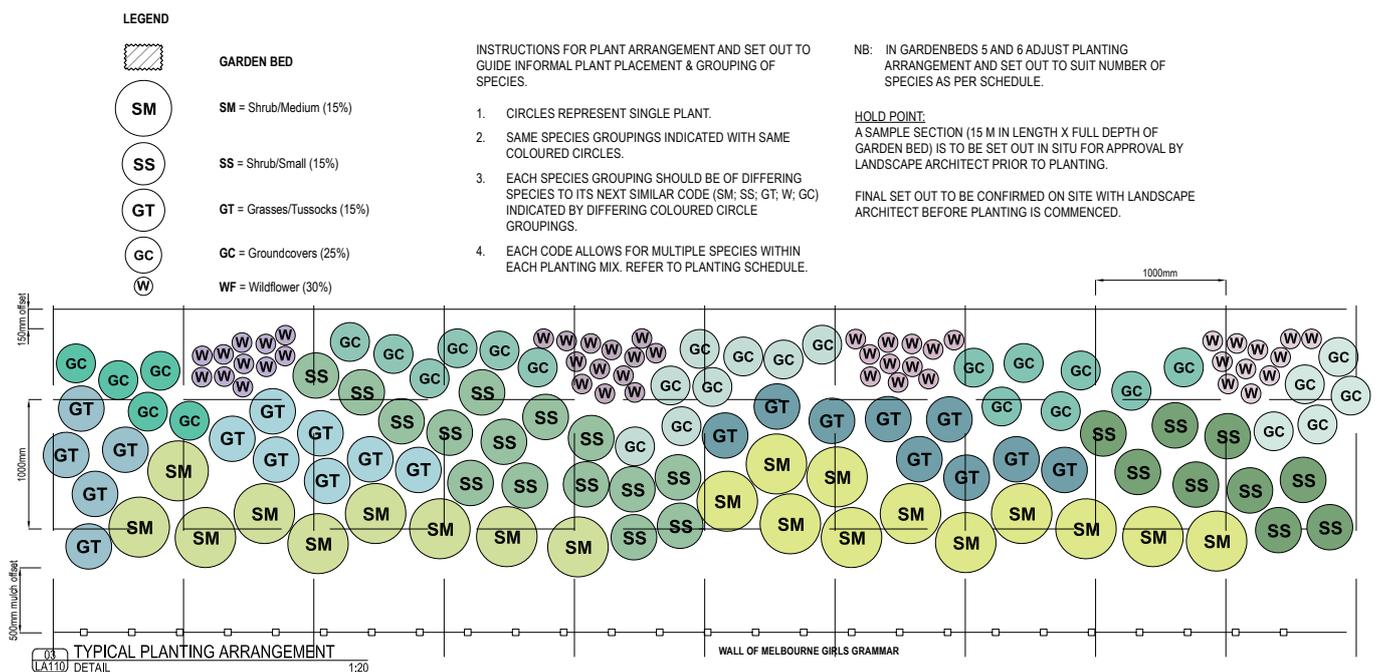


Figure 1. Typical planting arrangement proposed by the landscape architects for implementation across the entire Clowes Street biodiversity planting site.

Table 1. Plants installed at the Clowes Street biodiversity planting site.

	SCIENTIFIC NAME	COMMON NAME	NATURAL DISTRIBUTION
Groundcover	<i>Brachyscome multifida</i>	Cut-leaf Daisy	Indigenous
	<i>Bossiaea prostrata</i>	Creeping Bossiaea	Indigenous
	<i>Calocephalus lacteus</i>	Milky Beauty-heads	Indigenous
	<i>Einadia nutans</i>	Nodding Saltbush	Indigenous
	<i>Pultenaea pedunculata</i>	Matted Bush Pea	Indigenous
	<i>Myoporum parvifolium</i>	Creeping Boobialla	Indigenous
	<i>Scaevola calendulacea</i>	Coastal Fan-flower	Indigenous
	<i>Veronica gracilis</i>	Slender Speedwell	Indigenous
	<i>Wahlenbergia communis</i>	Tufted Bluebell	Indigenous
Perennial herbs	<i>Chrysocephalum apiculatum</i>	Common Everlasting	Indigenous
	<i>Chrysocephalum semipapposum</i>	Clustered Everlasting	Indigenous
	<i>Pycnosorus globosus</i>	Drumsticks	Indigenous
	<i>Xerochrysum viscosum</i>	Sticky Everlasting	Indigenous
Shrubs	<i>Acacia acinacea</i>	Gold Dust Wattle	Indigenous
	<i>Acacia brownii</i>	Heath Wattle	Indigenous
	<i>Atriplex cinerea</i>	Coast Saltbush	Indigenous
	<i>Correa alba</i>	White Correa	Indigenous
	<i>Crowea exalata</i>	Small Crowea	Indigenous
	<i>Melicytus dentatus</i>	Tree Violet	Indigenous
	<i>Pimelea humilis</i>	Common Rice-flower	Indigenous
	<i>Rosmarinus officinalis</i> (prostrate)	Prostrate Rosemary	Exotic
	<i>Thryptomene saxicola</i>	Rock Thryptomene	Native
Grasses / tussocks	<i>Dianella amoena</i>	Matted Flax Lily	Indigenous
	<i>Dichelachne crinita</i>	Long-hair Plume Grass	Indigenous
	<i>Lomandra longifolia</i> 'Tanika'	Spiny-head Mat-rush	Indigenous
	<i>Poa sieberiana</i>	Grey Tussock-grass	Indigenous
	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	Indigenous

Key design lessons learned

- Streetscape biodiversity renewal projects require engagement with various internal and external stakeholders from multi-disciplinary backgrounds. Consequently, clear and frequent communication between all stakeholders is necessary for successful project outcomes that accurately reflect the brief. This needs to be overseen by the project manager.
- Species must be selected to tolerate site conditions, including environmental constraints and available resource and maintenance inputs.
- Information on the biodiversity value of indigenous or native plants is complex, context-dependent and not always publicly available. Consequently, talking to local experts including ecologists and conservation biologists to obtain information on direct plant-animal species interactions is necessary.
- Selecting indigenous or native plant species with the ability to recruit spontaneously and establish self-sustaining populations is highly desirable. Doing so will reduce maintenance costs, with fewer plants required to be replaced, along with increasing the likelihood of these plants spreading beyond the streetscape. This will increase available resources for native fauna more broadly within the urban landscape.
- Ensure maintenance and long-term management of the streetscape planting is considered during the design phase. This includes ensuring adequate skill level (for example, plant identification skills) of maintenance staff. Upskilling or training may be required.
- Landscape architects and other urban design professionals tend to approach planting designs with humans as the intended 'users' of the site in mind. Consideration of wildlife, such as bees, birds and butterflies as additional 'users' tends not to be prioritised. To encourage adding biodiversity value to landscapes, it is important to provide information or precedents that allow those involved in design and maintenance to understand the range of issues influencing ecological complexity and needs.
- Arrangement and composition is important in establishing, maintaining and sustaining diverse streetscape plantings. 'Zoning' plant categories (for example, grouping plants with comparable growth habits and vigour) and ensuring suitable planting densities that maximise vegetation success and weed suppression, can provide practical means of achieving this. In saying this, those involved in the design of these biodiverse streetscapes need to be aware that the original design will likely change over time (for example, due to the presence of self-seeders).

Plant procurement

Plants were supplied by an external contractor that sourced them through a plant broker. Construction was delayed by one year due to plants being ordered with inadequate time in advance.

Furthermore, not all plant species were available which resulted in alternative plant species being provided by the contractor. This, however, occurred without consultation with the project ecologists or horticulturists to ensure the substituted plants reflected similar horticultural attributes and biodiversity values.

Some substituted plant species were therefore considered 'unsuitable' (for example, not listed in the streetscape understorey planting palette, unsuited to microclimate or not accurately reflecting design intent).

Consequently, some plant losses occurred and additional planting was required the following planting season. Inappropriate plant species that were substituted without consultation were not paid for by City of Melbourne and instead, accounted for by the external plant supplier contractor.

Site preparation

Site preparation for the Clowes Street biodiversity site varied from standard streetscape planting specifications and protocols. The bitumen footpath was dug up and new topsoil imported. The site was prepared to ensure that the conditions, particularly soils, favoured the largely indigenous and native planting palette, in accordance with the available maintenance inputs during plant establishment and over time. An amount of 20 mm stone aggregate mulch was applied over the topsoil. Herbicide spraying was used to eradicate weeds prior to planting. A drip irrigation system was installed.

Planting

Initial planting at Clowes Street occurred in April 2018. Plantings were undertaken by external contractors. Standard planting protocols were modified on site according to species habit, for example, groundcovers with a suckering habit were required to be planted less densely compared to upright growing forbs. Artificial habitat, in the form of a native bee hotel, was also installed.

Whilst landscape architects increased plant density of many of the wildflowers and herbs during the design phase, when the typical planting arrangement was applied over the whole site, the volume of plants required was still underestimated. This was attributed to the use of different plant types and pot sizes that the landscape architects typically specify, and the lack of detail drawn in the planting arrangement. Consequently, this needed to be adjusted on site.

Feedback from the planting sub-contractor was that the general planting guidelines provided by the landscape architects were too vague because individual species for each location were not specified. In future, a more detailed design would be highly beneficial.

The initial plant schedule suggested for Clowes Street did not accurately reflect the design as drawn in the planting arrangement. In particular, the planting schedule reflected significantly less shrubs than what was shown in the planting arrangement, which resulted in confusion on site. This was because the planting arrangement was not detailed enough to calculate plant density accurately.

Fortunately, the sub-contractor possessed the horticultural knowledge required to arrange the plants in an appropriate way. If this had not been the case, planting would likely have been further delayed. An additional 108 shrubs were planted a month after initial planting to create a design that more accurately reflected the intent of the landscape architects. The number of shrubs planted, however, was still significantly lower than originally intended. Additional shrubs were planted the following season.

Key construction lessons learned

- Unusual or uncommon plant species need to be ordered well in advance, and / or contract grown in order to ensure availability and avoid planting delays.
- Engage specialist contractors, particularly those with relevant horticultural knowledge and experience with indigenous or native species. This will avert the likelihood of inappropriate plant substitution when desired plants are unavailable or impractical. Ensure the contract is clear that substituted species will not be accepted. Inspect stock at delivery for correct species and quality.
- Create detailed site-specific planting plans to ensure plant layout and installation is straightforward and efficient. This would preferably involve showing every individual plant more accurately rather than general planting groups; however, it may not be feasible for larger projects. Detailed site-specific planting plans will ensure the correct numbers of plants are supplied, avert significant shortfalls in plantings and make it easier to locate species in the future.

Construction and growth of the Clowes Street biodiversity planting site



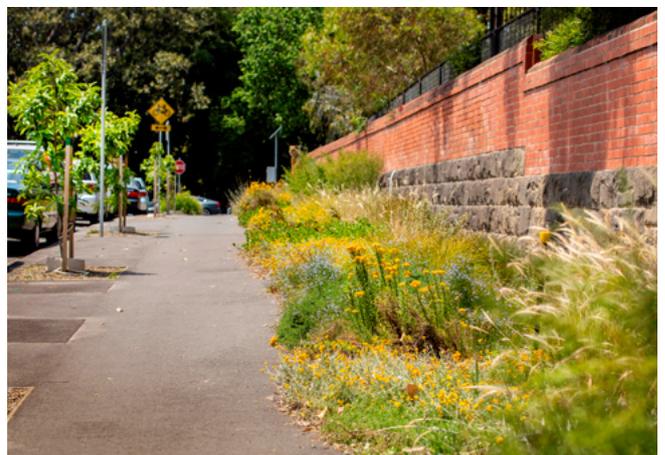
Original condition as a bitumen footpath (April 2017).



Plant installation (April 2018).



Post-plant installation (November 2018).



Post-plant installation (November 2019). Photo: David Hannah.

MAINTENANCE PHASE

The streetscape biodiversity sites are located in high-profile areas within the City of Melbourne. Ongoing maintenance is therefore pivotal to ensure plantings continue to be well-presented, as far as practicable within a monthly visit schedule. For general upkeep of the sites, approximately 16 hours of maintenance work per month occurs across the four streetscape trial planting sites. Additional maintenance inputs are sometimes required in different seasons or when unforeseen events such as vandalism occur.

Ecologically sensitive, post-planting maintenance is undertaken by an externally contracted horticultural operational team as per normal.

This includes:

- temporary retention of native and exotic weeds that are considered highly beneficial to insects (for example, exotic Milk Thistle, *Sonchus oleraceus*, is utilised by native bees at times when native plants are not in flower)
- fostering natural recruitment of plantings whenever possible through appropriate weed and pest management practices
- reducing the frequency of pruning of native plants to retain insect habitat
- spot spraying weeds solely in open areas and edges to avoid off-target damage to beneficial species
- limiting leaf litter removal only to when it is clearly having detrimental effects to existing plants.

Other general maintenance procedures include manual hand weeding, deadheading and seed removal of weeds, rubbish collection, and infill plantings when necessary.

Following handover of the sites to City of Melbourne's contract maintenance provider, planted species and recruiting seedlings of native species were commonly misidentified as weeds, and as a result were erroneously damaged or removed through herbicide spraying. For instance, monitoring at the end of 2019 showed plant death and damage to *Myoporum parvifolium* (Creeping Boobialla) and *Chloris truncata* (Windmill Grass) at the Park Street biodiversity site – a result of likely off-target spraying. This demonstrates the challenge of inadequate plant identification skills when horticultural staff are maintaining indigenous vegetation for biodiversity outcomes. Overcoming this problem would result in more effective maintenance and better, more cost-efficient project outcomes.

Whilst herbicide spraying was used to eradicate weeds prior to planting, efforts were soon found to be ineffective at both the Park Street and Arden Street biodiversity sites.

At Park Street, this was attributed to persistence of the weed seedbank in the existing soil which was retained. Likewise, geophyte weeds such as *Oxalis* sp. and South African Weed Orchid (*Disa bracteata*) were found present in the imported soil at Arden Street. This led to additional resource inputs to site maintenance which would have been otherwise avoidable if more effective weed management practices were implemented during site preparation (for example, repeated herbicide spraying).

The four planted trial sites varied in streetscape type and traffic conditions. The stricter safety and traffic control requirements for the Arden Street site, located on a median strip in the centre of a busy road, created challenges for the maintenance contractors.



Arden Street biodiversity planting site.

Key maintenance lessons learned

- Effective weed management practices during site preparation are essential. A critical evaluation of the weed flora present will help determine the weed treatments that will be most successful (for example, scalping, herbicide applications or hand removal). In some cases, retrofitting a streetscape site for biodiversity planting may be impractical due to high weed loads in the existing soil and the high cost of excavation and disposal. Further research is needed in this area. If imported soil is used, ensure soil is clean of viable weed plant propagules (for example, seeds and rhizomes) and sourced from a reliable provider.
- The costs of maintaining urban planting projects are often underestimated. Ongoing maintenance forms a significant proportion of project costs and needs to be taken into consideration during project budget allocation. This is particularly relevant when establishing diverse plantings which are typically more costly to maintain, especially when a variety of life forms and plant habits are used. For instance, pruning or watering requirements may vary for each species and require more site visits.
- Consider safety and traffic control for plantings on different streetscape elements. For example, planting and managing vegetation on median strips may pose more challenges than on a footpath. Agreement from maintenance contractors is critical as early as possible.
- Streetscape plantings intended for ecological outcomes require a clear long-term management plan so that maintenance interventions are guided to ensure the success of the planting design. This requires an outline of the ecologically sensitive maintenance techniques, frequency and timing that are feasible within an allocated budget.
- Adequate plant identification skills and relevant horticultural knowledge for maintenance staff are paramount. Sites need to be maintained using ecologically sensitive techniques that ideally promote plant and insect recruitment. More often than not, the workers typically employed by councils to manage standard streetscapes do not have the skillset or experience required to effectively manage diverse native plantings in urban settings.
- Adapting management techniques to research findings and maintenance challenges is essential to the long-term success of streetscape plantings⁴. Regular knowledge sharing between horticultural maintenance teams and ecologists will allow maintenance crews to discuss realistic maintenance procedures that fulfil horticultural amenity expectations whilst accommodating biodiversity needs⁴.

MONITORING PHASE

Biodiversity and plant performance at the streetscape biodiversity sites are currently being monitored by Naturelinks and researchers from the University of Melbourne. The City of Melbourne has identified native bees, butterflies and birds as priority fauna species to benefit from the biodiverse streetscape plantings.

Using a Before-After-Control-Impact (BACI) experimental design, the diversity and abundance of target fauna were surveyed before and after plant installation at the four biodiversity 'impact' sites and the three control sites associated with each impact site. 'Before' surveys were undertaken in March 2017 (late summer) and November 2017 (late spring) revealing relatively low levels of existing biodiversity. 'After' surveys were undertaken in spring and summer 2018-2019, and are ongoing.

Plant performance assessments (for example, health and appearance) were conducted immediately after planting, during establishment (approximately 10-12 weeks post planting), and at 12 week intervals thereafter.

Key monitoring lessons learned

- Project managers need to understand the importance of keeping accurate and detailed data records to ensure experimental integrity is maintained. This includes tracking information on the number of each species initially planted at each site and recording any in-fill plantings. Failure to do so can lead to problems acquiring meaningful baseline and monitoring data.
- Monitoring has revealed that native bees are nesting in dead stems of some plant species. In this instance, pruning should be delayed or avoided if possible. This information needs to be communicated clearly with the horticultural maintenance team. This highlights the importance of regular knowledge sharing between horticultural maintenance teams and those monitoring the biodiversity values of sites to successfully adapt management to needs in an ongoing way⁴.
- Streetscapes are typically high-traffic areas, for both people and dogs. There have been numerous instances of dogs urinating on the native bee hotels across sites. For ecological outcomes, bee hotels should be placed as far away from footpaths as possible to prevent such disturbance.

OUTCOMES

Biodiversity values

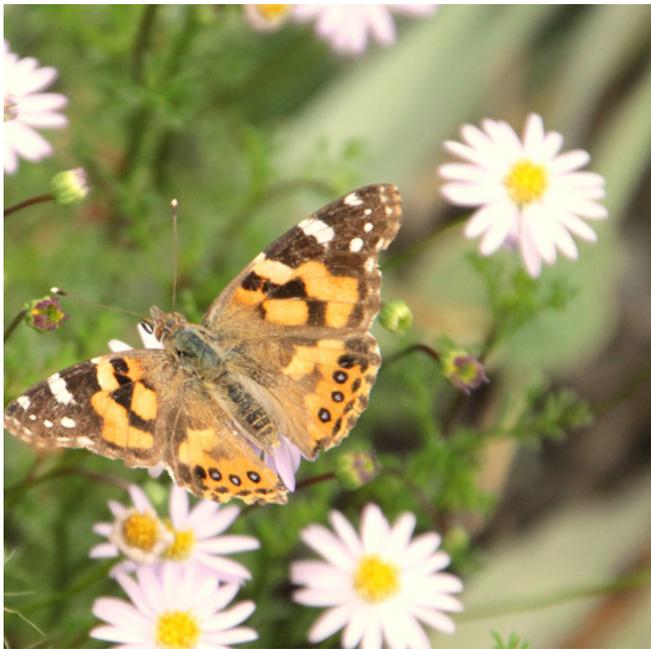
Preliminary results of biodiversity surveys have been promising. Both the number of bee species and the number of individual bees observed have increased across all streetscape planting sites in comparison to control sites. This is especially encouraging because no bee species were recorded at three of the streetscape planting sites prior to plant installation.

Species observed at the Clowes Street site include the native Blue-banded Bee (*Amegilla asserta*) and its associated Cuckoo Bee (*Thyreus* sp.), which seeks out the nests of Blue-banded Bees to lay its own eggs there.

There has also been a substantial increase in butterfly abundance at the Clowes Street site. Additionally, Australian Painted Lady (*Vanessa kershawi*) and Common Grass Blue (*Zizina labradus*) butterflies that were absent prior to plant installation are now abundant at two of the planting sites.

Little change in the bird community has been observed at the streetscape planting sites. However, many of the prickly shrub species planted specifically for bird habitat are still relatively small and do not yet provide adequate cover for birds to nest in or take refuge in. Likewise, the grass species planted are not yet producing large amounts of seed, so the smaller granivores (birds that eat seeds and grains) and insectivores (birds that eat insects) which the plant palette has been designed to attract are not yet expected to be present.

At Clowes Street, there has been recruitment of several species, including Long-hair Plume Grass (*Dichelachne crinita*), Drumsticks (*Pycnosorus globosus*), Tufted Bluebell (*Wahlenbergia communis*) and Ringed Wallaby Grass (*Rytidosperma caespitosum*), both within the streetscape planting site and to nearby tree cut-outs. This is a positive result because having desirable plant species spread beyond the streetscape planting increases resources available for native fauna across the urban landscape.



Australian Painted Lady (*Vanessa kershawi*) butterfly observed at the Clowes Street biodiversity planting site.



Hover Fly (Family: Syrphidae) observed at the Clowes Street biodiversity planting site.

Visual amenity values

Feedback from the public regarding the streetscape biodiversity sites has been largely positive. However, because these sites were designed for ecological outcomes, maintaining visual amenity value has not always been achievable. For example, the retention of dead stems and leaf litter does not please some people. The use of native understorey plants in streetscapes is generally not something that people are familiar with in the City of Melbourne; nonetheless, the plantings have been well-received.

In particular, the Clowes Street biodiversity site has received a high level of positive feedback from locals because the design reflects a more typical exotic perennial border-style planting. People walking by tend to slow down, admire the plantings and have been frequently seen picking flowers. Additionally, the clever and innovative native planting designs across the four sites provoke curiosity from residents, many of whom ask the horticultural maintenance teams for advice or the names of plant species.

The streetscape planting site at Docklands Drive has not been as valued. This is likely due to the lack of flowers and plant coverage due to rabbit browsing, unattractive mulch made from black scoria which was predominantly selected

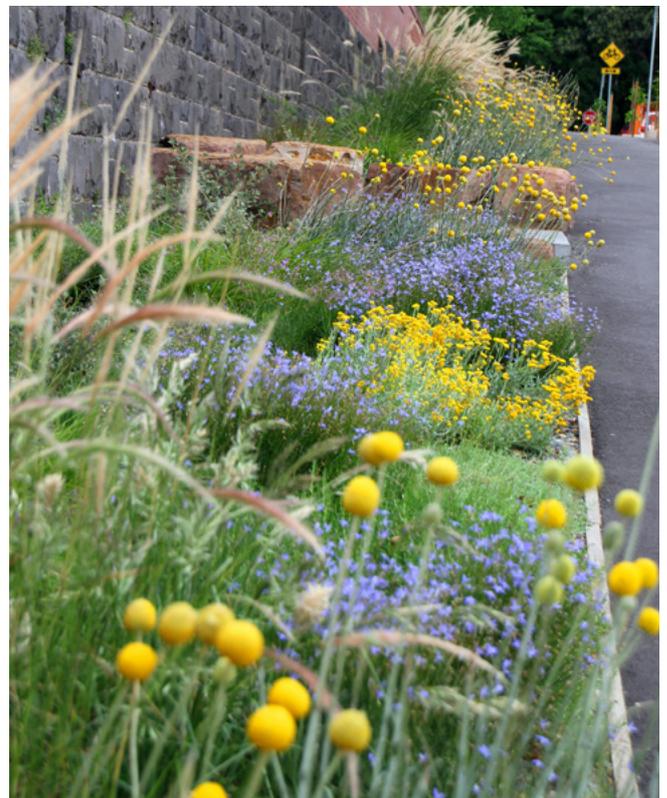
for its ability to reduce weeds, rubbish accumulation, and poor plant selection and soil nutrient deficiencies that have led to plant death. Additionally, the site has significant wind and salt exposure, which has added to the already challenging growing conditions. In response, the streetscape biodiversity palette is being expanded to include coastal plant species able to thrive in these harsh environments.

Urban nature planting guide

The understorey plant palette developed by the University of Melbourne has been made publicly accessible on the Urban Nature Planting Guide website.

Currently comprising over 100 suitable species for urban landscapes, the website includes plant selection filters to assist landscape architects, urban designers and home gardeners to choose suitable understorey species for urban plantings, such as streetscape plantings that will enhance biodiversity and be attractive to the public. Lessons from the flora and fauna surveys from the Streetscape Biodiversity Project will feed into reviewing and updating the Urban Nature Planting Guide.

See the Urban Nature Planting Guide at: melbourne.vic.gov.au/plantingguide



Comparison of two streetscape biodiversity planting sites at Docklands Drive and Clowes Street.

SUMMARY

City of Melbourne's Streetscape Biodiversity Project is increasing and expanding the cover of low maintenance native understorey species across the city. This will increase urban flora and fauna diversity and abundance, and simultaneously provide a more attractive landscape for the public.

REFERENCES

1. City of Melbourne 2017, 'Nature in the City Strategy', www.melbourne.vic.gov.au/SiteCollectionDocuments/nature-in-the-city-strategy.pdf
2. Threlfall, CT, Mata, L, Mackie, J, Hahs, AK, Stork, NE, Williams, NSG & Livesley, SJ 2017, 'Increasing Biodiversity in Urban Green Spaces through Simple Vegetation Interventions' in *Journal of Applied Ecology*, Vol 54, No 6, pp. 1874-1883.
3. City of Melbourne 2013, 'South Yarra Urban Forest Precinct Plan 2013-2023', www.melbourne.vic.gov.au/SiteCollectionDocuments/UFPP_South_Yarra_Precinct.pdf
4. Korossy-Horwood, R 2019, *Biodiversity sites annual management plan (2019-2022)*, Naturelinks Landscape Management Pty Ltd, Melbourne, Victoria.



Clowes Street biodiversity planting site. Photo: David Hannah.

How to contact us

Online:

melbourne.vic.gov.au

In person:

Melbourne Town Hall - Administration Building
120 Swanston Street, Melbourne
Business hours, Monday to Friday
(Public holidays excluded)

Telephone:

03 9658 9658
Business hours, Monday to Friday
(Public holidays excluded)

Fax:

03 9654 4854

In writing:

City of Melbourne
GPO Box 1603
Melbourne VIC 3001
Australia



Interpreter services

We cater for people of all backgrounds
Please call 03 9280 0726

03 9280 0717 廣東話
03 9280 0719 Bahasa Indonesia
03 9280 0720 Italiano
03 9280 0721 普通話
03 9280 0722 Soomaali
03 9280 0723 Español
03 9280 0725 Việt Ngữ
03 9280 0726 عربي
03 9280 0726 한국어
03 9280 0726 हिंदी
03 9280 0726 All other languages

National Relay Service:

If you are deaf, hearing impaired or speech-impaired,
call us via the National Relay Service: Teletypewriter (TTY)
users phone 1300 555 727 then ask for 03 9658 9658
9am to 5pm, Monday to Friday (Public holidays excluded)

melbourne.vic.gov.au



CITY OF MELBOURNE