Final report

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Re-imagining Streets with Green Infrastructure

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Public summary

The objective of *Re-imagining Streets With Green Infrastructure* was to demonstrate how streets can be adapted to improve resilience to heatwaves, drought and flooding, while improving their safety, livability and sociability. It worked with local residents and stakeholders to develop and evaluate designs for deep retrofitting of streets as integrated green infrastructure. The outcomes are evidence to inform more ambitious policy change in urban greening, solutions to address key barriers to implementation, and tools to work with residents to co-design greener streets.

The project followed an interdisciplinary co-design method, integrating streetscape design and engineering expertise to demonstrate the potential for green infrastructure in existing streets. It applied the co-design method to three residential streets in Melbourne, working with local residents and stakeholders. Integration of local communities in design processes provides a pathway for residents to become champions of deep retrofit of streets as green infrastructure. The project also explored creative solutions to constraints that commonly limit innovation and problem-solving in conventional streetscape design projects. It identified best practices and innovation to inform the co-design process, and for wider application and learning. Throughout the project, the team connected with key stakeholders for advice and to guide dissemination to communities, government and industry.

Re-Imagining Streets contributed to establishing new norms of streetscape design, in local and state government, and communities. The central product is a set of exemplar designs for three co-designed deep retrofits of different streets in Greater Melbourne and evaluation of the changes in resilience. Breese Street in Brunswick is an example of an inner-urban street that is undergoing urban infill, with recent and ongoing high density housing construction and very low provision of street trees. Alfrieda St in St Albans is an established residential and commercial street that is also an important local road, with wide street verges but low tree canopy and biodiversity. Kookaburra Avenue in Wyndham is a more recently developed residential street and bus route that includes schools and community facilities. The design pack shows the current state, designs led by local residents, and modelling of resilience outcomes for each street.

The benefit to the Australian horticulture industry is improved understanding of the potential for higher levels of tree planting and vegetation in urban disaster risk reduction, and increased demand for plants, products and services required for the implementation and maintenance of green infrastructure in cities. The project developed guidance for incorporating more plants into streets, emphasising the functional value of green infrastructure to address urban disaster risk. It will increase the reputation of the Australian horticulture industry in supporting good urban design and public space management, contributing to green cities, disaster resilience and climate change mitigation and adaptation. The project communicated findings to government and industry through seminars, webinars, an exhibition and a range of extension materials

The project outputs can be accessed on the project webpage https://www.unimelb.edu.au/retrofit/blog/re-imagining-streets. These include: design reports and resilience assessments for three streets, a booklet providing solutions to specific constraints to tree planting in streets, a set of international case studies of street transformation, a co-design engagement guide and toolkit for community-led street greening, videos and other extension materials.

Keywords

Resilience, community engagement and participation, urban design, street trees, local government

Introduction

'Public space', is typically imagined to be squares and parks, but most of the public space in cities is actually in streets – typically constituting 80-90% of all public-owned land in a city. In turn, a significant majority of street space is used for traffic and for parking. As a result, huge areas of public land in suburbs are sparsely vegetated and covered in impermeable asphalt, exacerbating urban risks of extreme heat and flooding. Rethinking streets as green infrastructure provides an opportunity to rebalance these areas, improving urban resilience to heat and flooding and delivering co-benefits such as improved health and livability.

This project aimed to test how far a rebalancing of functions can go in typical residential streets, in terms of delivering cooling and flood risk mitigation, as well as improving local livability, safety and sociability. The goal was to demonstrate how retrofits can deliver close to 80% mature canopy cover and permeability in residential streets, through extensive redesign. The project engaged residents and stakeholders in co-designing radically greened streetscapes, to ensure that streets as green infrastructure deliver multiple co-benefits while also meeting the ambitions and addressing the concerns of residents.

Major reallocations of streetscape space are rare, and lack an explicit focus on residential neighbourhoods or on disaster mitigation. Programs exist that focus on retrofitting streets to improve stormwater management, without integrating heat and drought mitigation potential. Current efforts to retrofit residential streetscapes using nature are ad-hoc and incremental. This project builds on these by (1) making them more systematic and scalable by documenting a typology of treatments that work around typical problems; (2) demonstrating co-creative approaches to engage residents in designing positive changes; and (3) going further than existing precedents, targeting deep retrofits that deliver much higher canopy and permeability.

Methodology

Three streets in Melbourne were selected to engage in co-designing deep retrofit with green infrastructure. The sites reflect different lead stakeholders, physical, economic and social conditions, with varying degrees of difficulty.

Site	Street Type	Lead Stakeholder	Technical Difficulty	Social Difficulty
1. Brunswick	Urban infill	Community	High	Low
2. St Albans	Established suburban	Local government	Low	Medium
3. Wyndham	Suburban growth area	Community Service Provider	Medium	High

Site 1: Brunswick

Breese Street in Brunswick is an exemplar of an inner-urban neighbourhood undergoing rapid change. It is typical of transit-oriented, urban infill development strategies which are likely to be of increasing importance in Australian cities in coming years. The formerly light industrial area is now the site of dense residential development taking advantage of public transport infrastructure and other local amenities (Figure 1.). It is the second highest area of vulnerability to extreme heat risk in the Merri-Bek City Council. Despite high levels of development in recent years there has been very little investment in the public realm, and Breese Street retains its industrial fabric despite now being home to thousands of people. The public realm is almost devoid of trees or plants and two-lane traffic with on-street parking creates a sense of danger for residents who rely on active and public transport. Residents have formed a grassroots group 'Better Breese Block' to transform the street, focussing on improving traffic conditions and installing green infrastructure.

Figure 1. Breese St

Site 2: St Albans

Alfrieda St in St Albans connects a thriving commercial centre at one end to sports and community infrastructure at the other, with detached homes with large setbacks, schools and churches in between. It is a wide street with large green verges and roundabouts at intersections with local streets (Figure 2.). The verges are planted with lawn and young trees. 59% of residents in the local area were born overseas and 66% speak a language other than English at home. Brimbank City Council have developed a masterplan for Alfrieda St, with most engagement and design to date focused on the commercial end of the street. The council were interested to develop designs for the residential section of the street and worked with us to recruit residents to participate in the co-design process.

Figure 2. Alfried St

Site 3: Wyndham

The west of Melbourne is an area of rapid population growth. In recent decades significant areas of new suburban development has been underserved by green infrastructure. This has created areas of high vulnerability to extreme heat, flooding and other hazards. Low provision of public transport creates high dependence on cars, and low provision of social infrastructures present challenges for community development. Kookaburra Avenue in Wyndham is a main residential street with a school and local community facilities, close to Heathdale Glen Orden Wetlands, and is a local bus route (Figure 3.). We worked with the Wyndham Park Community Centre to recruit local service users to engage in co-designing the street around the community hub.

Figure 3. Kookaburra Ave

At each site the project engaged local residents and stakeholders in a co-design process to produce a concept design for deep-retrofit with green infrastructure, aiming to achieve 80% canopy cover. This was a modified version of the 'bottom-up infrastructure' co-design method (Bell et al. 2023).The method has six stages: setting aims, characterising communities, capturing requirements, analysing options, crafting solutions and evaluation (ongoing).

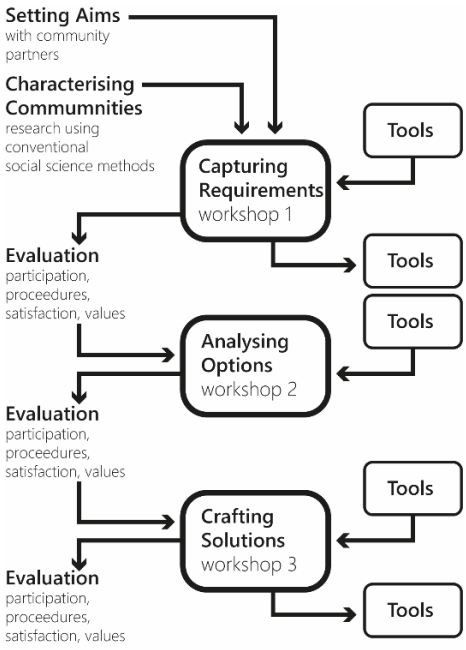

Figure 4. Co-design Method

The method is centred around three community workshops, preceded by the definition of aims and background analysis of the community and local environment (Figures 5, 6 and 7). The first workshop clarifies community values and requirements. This provides the basis for the research team to define options to meet the requirements which are analysed by the community in workshop 2, using data and modelling tools. The selected option is further developed by the research team and then refined with the community in workshop 3, again using a selection of data and other decision and design tools. Evaluation of the process is undertaken throughout, assessing the quality of participation, the effectiveness of the methods, satisfaction of participants and alignment with their values.

The project developed detailed solutions to site-specific constraints, such as infrastructure servicing, traffic, storm water and maintenance. Whilst specific to the sites it is anticipated that these solution sets will be applicable to other similar streets elsewhere in Melbourne and Australia. The detailed solutions were compared to the baseline condition for each street. Comparison will include costs, where data is able to be provided by local government partners, key resilience indicators, and qualitative assessment of the outcomes.

Figure 5. Breese St co-design workshop

Figure 6. Alfrieda St co-design workshop

Figure 7. Kookaburra Ave co-design workshop

Results and discussion

Each of the three co-design communities developed unique solutions to retrofit greening to their existing streetscapes. The variety of solutions were a reflection of community needs, lived experiences, and local priorities, as well as differences in the physical context of each street.

Breese Street

The community of Breese Street, Brunswick, were strongly motivated to improve the pedestrian experience of their street. Through the co-design process, participants elected to redesign the roadway, reducing its width and reallocating parking spaces to create a 'green meanders'. This served the dual purpose of increasing the area available for greening while also calming traffic. The roadway design was carefully considered based on community needs and known use of the space.

Existing conditions

Information about the physical state of Breese Street was collated from existing records, feature surveys and other data provided by the City of Merri-bek (Breese Street Precinct Background Report), observations made by the participants during the workshops, and data collected and modelled by the research team.

The street has 3 *Melalueca* sp. in streetscape and isolated trees in the private realm. There is 0m^2 of public greenspace within the streetscape. Bulleke-bek park on the adjacent West St was created by Council in 2021. The street is high-density residential and mixed land-use, with future development applications for additional multi-storey apartment buildings. The street includes 60 carparks, covering 720m^2. Weekday average traffic volume ranges from ~1,700 to 2000 vehicles per day. Infrastructure services include overhead powerlines, sewerage, telecommunications. The bluestone gutters are a heritage feature and the main stormwater conveyance infrastructure. Tall buildings and street orientation result in full sun during middle of day, deep shade in early afternoon. Maximum air temperatures during January reached 39^{o}C, while mean radiant temperatures reached 48^{o}C.

Resident priorities

Eight overlapping themes emerged to represent community requirements for a future greening retrofit. The majority of these themes emerged during the exercises of Workshop 1 and were reinforced through design decisions, refinements and conversations throughout the workshops.

- An inviting, cared for place
- Safe and accessible for pedestrians
- A green, living street
- Natural shade, in the right place, at the right time
- Beauty, character, and identity
- Supports community building
- Well thought-out, future-proof implementation
- Resilient to extreme weather

Design Response

Car Parking

Reduced from 60 car spaces of on-street parking to 20. Parking located in areas of highest need, providing support for trades, delivery drivers, users of public park, and visitors to apartment residences. Remaining parking spaces 2.4 m wide to improve accessibility. The carpark at Hope Street redesigned to create internal circulation, reducing the level of traffic onto Breese Street, allowing excess driveways to be removed to improve pedestrian experience, and increases space available for greening (Figures 8 and 9).

Road

Reduced road width to vary between 3.3m and 3.8m road. The carriageway shifted to predominantly occur on west side, redesigned as a meander and negotiated way as a form of traffic control. Avoids conflict with services and powerlines, leaving areas with the most natural light to be allocated to greenery. Remove or replace existing driveways where no longer functionally required.

Trees

Added 32 canopy species. Suggested species *Eucalyptus leucoxylon* subsp. *megalocarpa*. In heavily shaded zones, *Gleditsia tricanthos* or *Jacaranda mimosifolia* for light canopy effects.

Garden beds

Associated with canopy trees, social spaces, or as rain gardens. Positioned at road surface level to enable passive irrigation. Edge protection required to reduce traffic run over. Suggested copse plantings, consider *Eucalyptus pulverulenta* 'baby blue' at 4-m spacing. Greening used to extend the footprint of Bulleke-bek park, align with existing social gathering spaces (e.g. eateries and entrances to apartment complexes), and match with available light.

Pedestrian accessibility

Raised pedestrian crossings at intersections, to reinforce pedestrian priority. Replace existing kerb with semi-mountable to enable continuous footpath levels for enhanced pedestrian safety and accessibility.

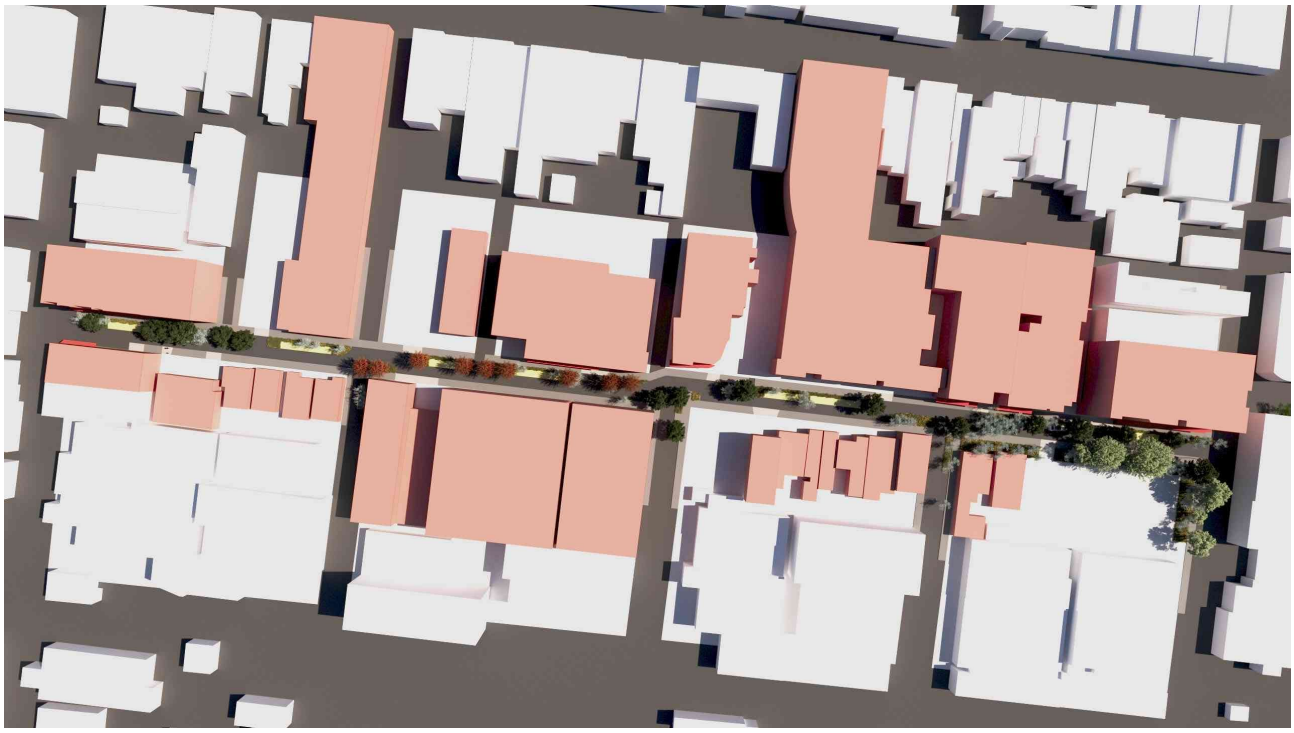

Figure 8. Aerial view of a community co-designed Breese Street, from Albion Street (far left) to Hope Street (far right).

Figure 9. Street-level view of Breese St, looking north from Hope Street. new Canopy trees and greening along east side of street. Meandering street alignment and use of greening to create visual screening, slowing traffic. Existing *Melaleuca* and power poles shown.

Alfrieda Street

The community of Alfrieda Street, St Albans, recognised the constraints imposed by overhead lines. Given their street contained extensive nature strips, the community felt they could achieve meaningful greening gains by tailoring tree species selection, rather than the accept the cost of undergrounding powerlines. Tall shade-casting eucalypts were placed on the open side of the street, while lower growing callistemon were placed under the powerlines. No street or parking space was reallocated to greening, as it was determined that this change would provide only minimal increase in canopy cover while introducing severe constraints on residents mobility (i.e. restricting driveway access).

Existing conditions

44 trees exist primarily *Zelkova serrata* with the occasional other mixed native and exotic species. These are planted symmetrically either side of the road despite the existence of powerlines on the eastern verge. These specimens are struggling due to the crossfall on the verges that drains rainwater away from the footpath toward the road as quickly as possible (C. 1970's drainage design). Despite the fact they were planted in 2016, these specimens show very little growth due to lack of passive irrigation (water). Regardless, even in ideal conditions this species does not grow large enough to provide canopy cover that would allow continuous canopy cover spanning the large number of existing and likely increasing number of future driveways.

Resident priorities

- Residents were slightly divided on parking spaces but on further inspection of the road - agreed that retention of the 10 existing spaces was beneficial, requiring the bike path to be fitted into the existing 4m wide verges.
- Residents were interested in cabling the powerlines, but their species preferences (lower natives such as Callistemon sp.) could be selected to fit beneath the required clearances.
- Residents felt it would be better to use some of the current 4.4m wide verge to accommodate the bike path rather than losing the parking and reduced lane widths it would mean to accommodate it on the road.

Design response

Verges

Excluding a general allowance for driveways the verges are about 280m2 per side, per segment (from intersection to intersection). A bike path would reduce that permeable surface by approximately 60m2 per side per segment. To facilitate current drainage practice and to implement passive irrigation into the street requires substantial reprofiling of the verge (the crossfall needs to be essentially reversed to become a depression - and the existing trees would need to be removed in that process as they will otherwise be too high in the ground). As such extensive work is required within the verge it makes complete sense to use that opportunity to also allow for design and implementation of the bike path (Figures 10 and 11).

Trees

In this case tree species were selected for the western verge that could produce a canopy spread that would span the large gaps created by driveways. On the western verge 12 new trees of a large species such as: *Corymbia maculata* (height for eastern verge shade provision) 18m / *Angophora costata*(denser canopy for shade provision) 15m / *Eucalyptus sideroxylon* (biodiversity and canopy density) / *Eucalyptus nicholii* (hardy, dense canopy and biodiversity) would be suitable. These trees would provide shade to the road surface in the afternoon and at times would provide shade to the eastern footpath and bike path. The eastern verge species were selected based on biodiversity capacity, colour and ability to fit beneath the clearance of the powerlines. Nominally 25 new trees per segment / per verge.

Roundabouts

Currently the street has roundabouts at every intersection as a traffic slowing measure. The designs shown work within the limitation of retaining these roundabouts. While the team did explore the alternatives to roundabouts at a conceptual level, the increase in green space appeared to be low for the investment cost. However, due to the roundabouts, single lane bike paths on either side are more feasible than a dual lane bike path on one verge (further substantial traffic engineering input would be required if a dual lane bike path were to be implemented).

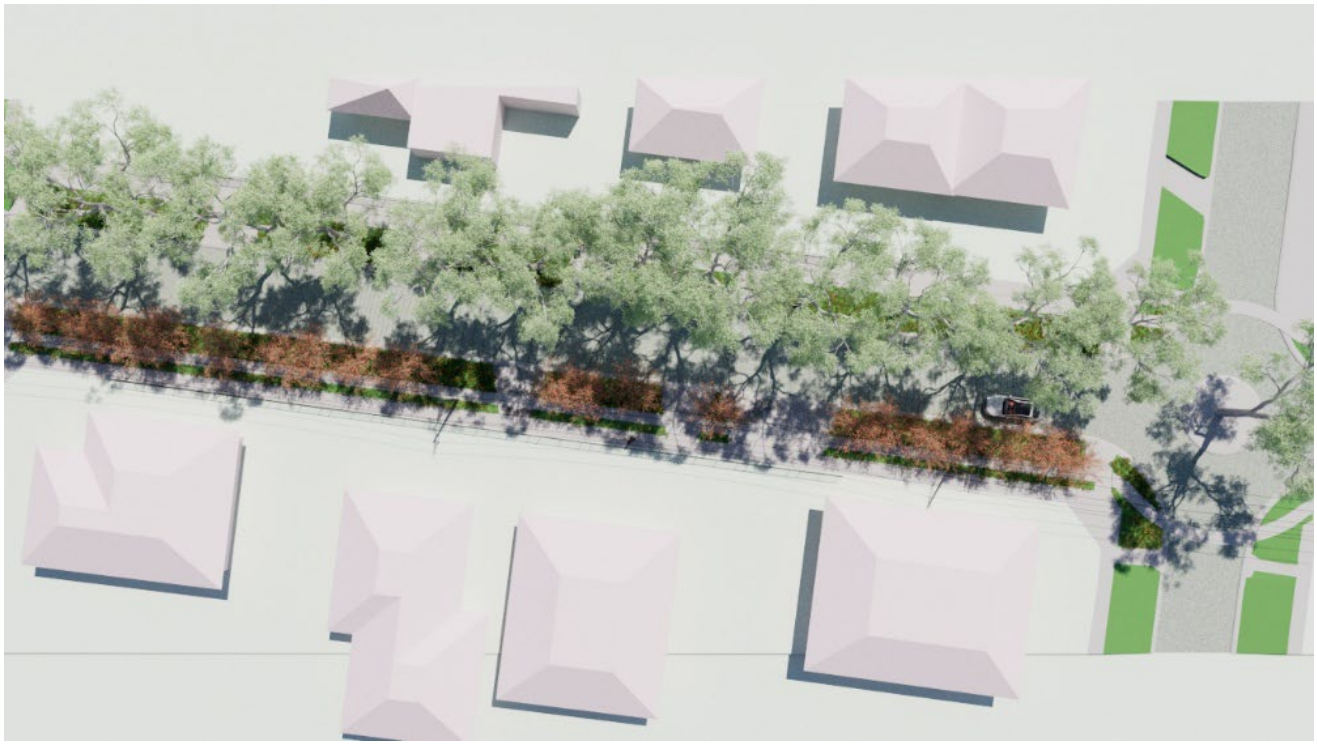

Figure 10. Aerial view of a community co-designed Alfrida Street, south from Henry St (far right).

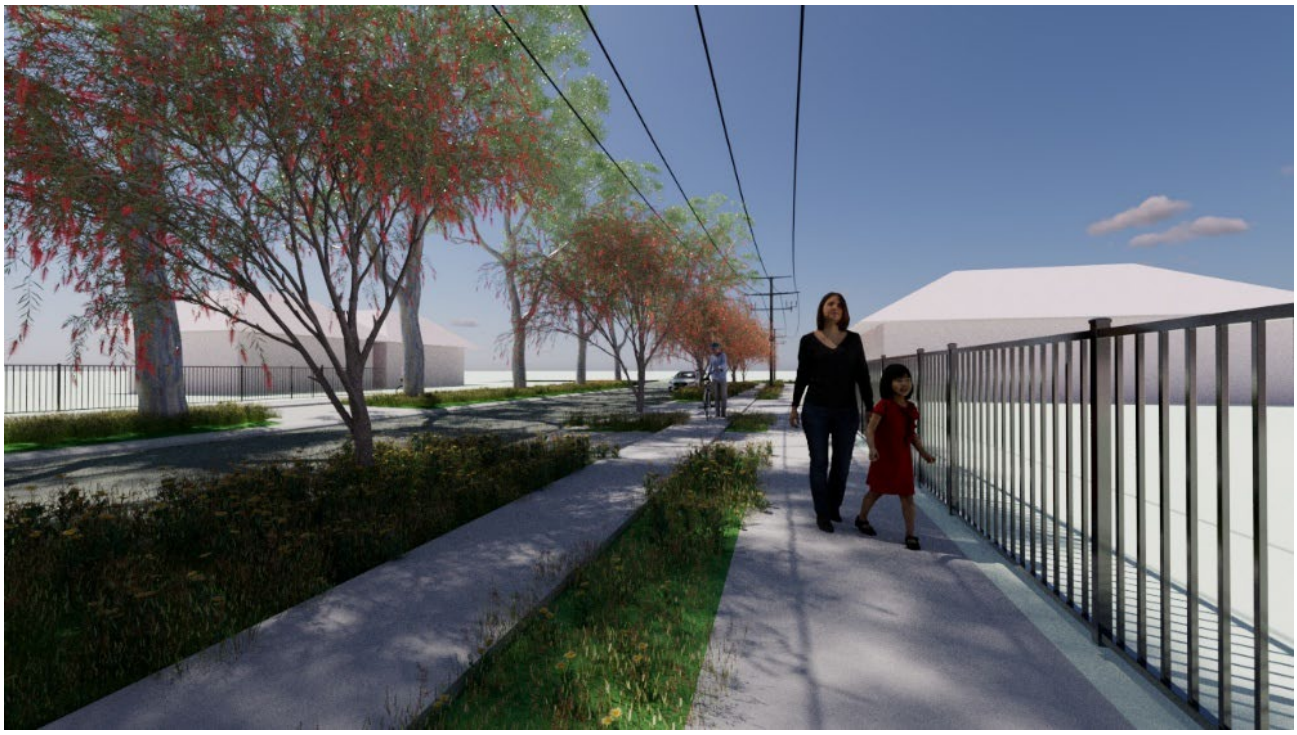

Figure 11. Street-level view of Alfrieda St, looking north from William St. New Canopy trees and greening along the west side of street. Separated bike lane and smaller *Callistemon sp.* and grassy meadow plantings shown on the east side of the street to enhance biodiversity.

Kookaburra Avenue

Improving community pride and using the street retrofit as demonstration that this was a place worth investing in. The community opted to invest in relocating powerlines underground to make space for increased canopy trees. Particular attention was placed on providing shade to the nearby primary school, community services center, and bus stops. Rebranding the neighborhood character as a 'place for birds' was also a focus, with the community keen to embed native plantings and resources to support biodiversity.

Existing conditions

24 street trees exist primarily *Melia azedarach* and Callistemon species, on both north and south medians.

Resident priorities

- Residents highlighted the 3 entry ways on the northern verge where people often wait for school pick up etc..
- Residents noted that they also liked the open grassland feel of the street and didn't want it completely filled.
- Residents noted there was ample space in the private realm (southern verge) and public institutions (northern verge) that residents could be incentivised to plant with trees.
- Residents were keen to see planting reflect or improve the identity of the area through planting choices that attract birds (reflecting street naming of the area). However they were also keen that species did not drop too much leaf litter / branches/ fruit.
- Residents felt that people used the verge on the southern side for parking and that if that opportunity was removed - thewy would just park in the bike lane which would be more annoying.

Design response

Trees

In this particular location, given the street orientation and the location of 3 major entry ways on the northern side - undergrounding the powerlines is likely to be high return for investment. Critical afternoon shade can be provided by increasing the tree planting WITHIN the northern verge side of the street, And, road surface shading, critical for cyclist comfort and reduction of heat absorption of the road surface, requires large tree species to be planted where the powerlines currently occur (Figures 12 and 13).

The design adds a nominal additional 24 trees to the street, though the space is ample and it would be possible to fit many more. What would be important here is tree height, thus better conditions for fewer trees would have a greater impact on cooling than more trees maintained in the currently poor condtions.

Species have not been nominated as the requirement for bird attracting but low mess generating is universal and unresolvable - species selection is less important than species mix (i.e. for biodiversity a layered structure and mixed species is useful, but needs to include native bird food species (i.e. Eucalypts).

The southern verge is left largely unchanged apart from native understory planting. For a street looking to attract Kookaburras, this has advantages as open grassy spaces are likely to provide habitat for ground dwelling native species of insects, reptiles and mammals.

Social spaces

Opportunities exist with the property boundaries of the school, community hub and childcare to improve social spaces and gathering areas.

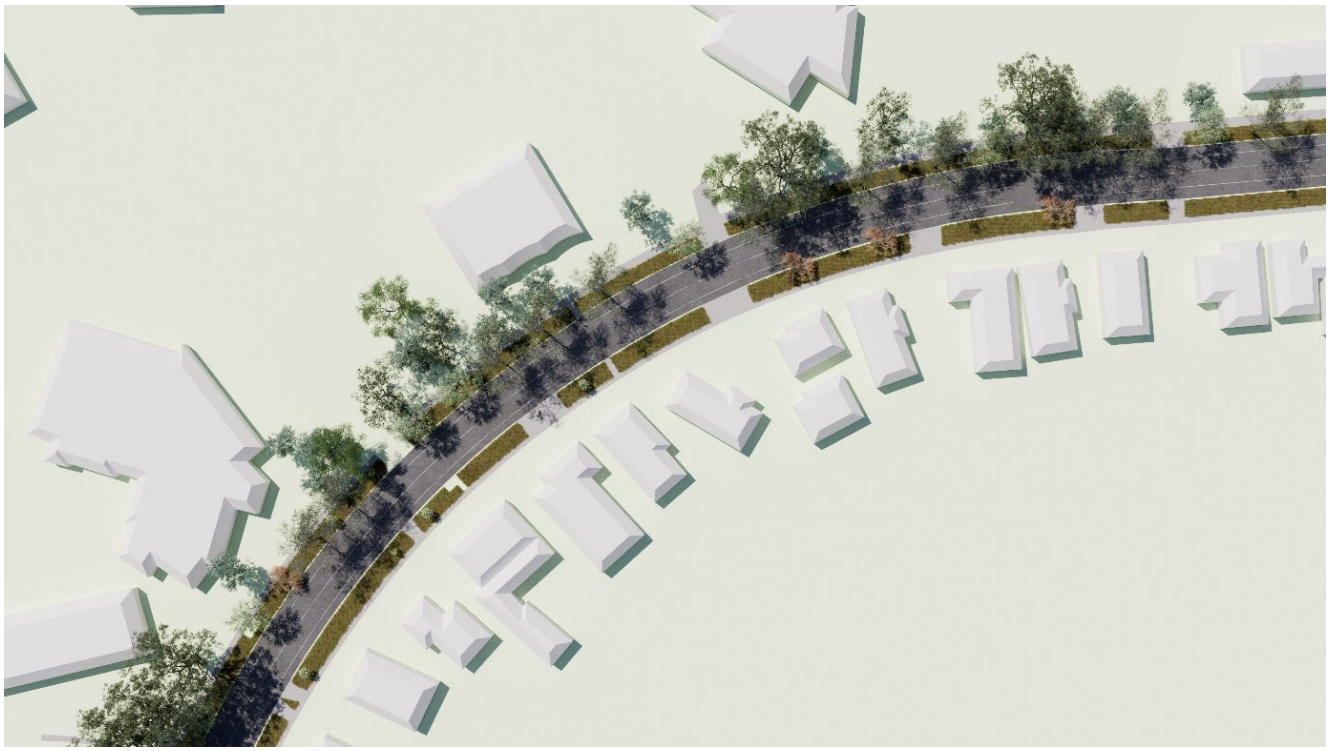

Figure 12. Aerial view of Kookabura Ave, focused on the Wyndham Park Community Centre and school. New Canopy trees and greening along the west side of street. Power lines have been removed to enable larger canopy. Existing trees retained.

Figure 13. Street-level view of Kookaburra St, looking from the community centre towards the school. New Canopy trees and provide shade at school pickup time, with power lines removed.

Discussion

In all three streets, residents were willing and able to engage with the tasks of designing street greening retrofits. They were motivated to improve their local environment and to learn more about the benefits of trees and green infrastructure. The level of engagement and the resilience outcomes varied between the three sites, with Breese St having the highest number of participants overall and the highest number of people who attended all three workshops. Breese St also saw the greatest level of change and engagement with water management as well as heat. This strong level of engagement can be attributed to the project initiation by the Better Breese Block community group, providing leadership and motivation to deliver change in the street.

The other two streets saw good engagement and design interventions to improve heat resilience, and to improve biodiversity in Alfrieda St and civic pride in Kookaburra Ave. However, the designs with these communities engaged less with stormwater management and flood resilience resulting in no or minimal change to the baseline conditions for water management measures. Recruitment was facilitated by the local council in Alfrieda St and the community centre in Kookaburra Ave. The co-design process was adapted and different tools were developed to engage different community cohorts, however the resilience outcomes were less ambitious for these sites than for Breese St where participant recruitment and project initiation was led by an active, issues-based local community group.

The project demonstrated that diverse communities are able to engage with resilience concepts and co-design feasible interventions to improve green infrastructure in streets. The co-design process can be adapted to meet the needs of diverse communities with variable levels of prior knowledge about design and resilience. The most ambitious and resilient design outcomes were achieved when the project was initiated by the local community, rather than residents being recruited by local government, community service organization and the university.

Heat resilience improvements were more readily achieved in the co-design outcomes than flood resilience and water quality improvements. This can be attributed to relative complexity of surface water flows and management compared to the lived experience of heat on streets. Engagement with water sensitive urban design was demonstrated in Breese St, and requires deeper engagement and further development of co-design tools.

Outputs

Table 1. Output summary

Output	Description	Detail
1) Technical solutions for greener streets	A 'how-to' booklet of solutions to common constraints to street greening retrofits, including examples that were co-designed by residents of the three case study streets.	The output is available on https://figshare.unimelb.edu.au/projects/Re-imagining_Streets_with_Green_Infrastructure/275604
2) Design packs for 3 co-designed street retrofits	1. Illustrative concept images with annotations 2. Technical landscape plans (including plant species palettes) 3. Technical engineering plans (utilities, traffic, parking, drainage) 4. Assessment of resilience to surface water flooding, heat and drought 5. Costing of each design with a short outline of possible financial tools to facilitate retrofits	The design pack for all three streets is available on https://figshare.unimelb.edu.au/projects/Re-imagining_Streets_with_Green_Infrastructure/275604
3) Engagement guide on co-design	Outlining the overall process for co-designing street retrofits with heat-affected communities to radically change streets for risk reduction and liveability.	The output is available on https://figshare.unimelb.edu.au/projects/Re-imagining_Streets_with_Green_Infrastructure/275604
4) Co-design tool kit	Describing the methods used to engage diverse communities in integrated design of street greening retrofits and assessment of disaster risk reduction.	The output is available on https://figshare.unimelb.edu.au/projects/Re-imagining_Streets_with_Green_Infrastructure/275604
5) Case study set	5 one-page examples of retrofits that changed urban streets around the world.	The output is available on https://figshare.unimelb.edu.au/projects/Re-imagining_Streets_with_Green_Infrastructure/275604

6) Extension program package	Graphics and video clips to support public, policy and industry engagement.	The project was featured in the Retrofit exhibition at the University of Melbourne from 24 July until 29 August 2025. Events associated with the exhibition were attended by around 900 people. The exhibition open during the University of Melbourne Open Day, and floor tours were attended by several hundred people. A Retrofit Forum event during the exhibition attracted more than 80 people, allowing for dissemination of the findings to industry, community and academic audiences. Dr Kylie Soanes was the lead researcher on the project and is a social media science communication influencer with more than 26,000 followers on Instagram (@drkyliesoanes). During the project she posted 19 short videos explaining the project and underpinning science. The Breese Street project featured in local media reporting on the Merri-bek Council masterplan for the street, which as conducted in parallel and informed by our co-design process. https://brunswickvoice.com.au/breese-block-vision-takes-a-big-step-forward/ The project was reported in the Star Weekly, aiding our recruitment for participants in the Alfrieda Street case study. https://brimbanknorthwest.starweekly.com.au/news/greening-alfrieda-street/ Final reports on the streets were shared with participants in the co-designs.

Outcomes

Table 2. Outcomes summary

Outcome	Alignment to fund outcome, strategy and KPI	Description	Evidence
New norms of streetscape design, in local and state government, property development firms and in risk-exposed residential communities. Improved understanding of the potential for vegetation in urban disaster risk reduction.	Green Cities Fund Outcome: Urban environments which are prepared for and resilient to floods, extreme heat, sea level rise and wildfire.	Urban designers at Merri-bek City Council and Brimbank City Council observed the co-design process and outcomes. They were able to use the community values and design ideas in developing masterplans for the sites, to be implemented through future Council planning and budgeting.	Merri-bek City Council Masterplan for Breese St. Stakeholder reference group feedback.
Communities engaged in designing interventions to improve health and resilience in their local streets.	Horticulture Sustainability Framework: Community health and wellbeing is improved by increased greenspace, plants and cut flowers in homes, cities and towns	Community members demonstrated improved knowledge about urban resilience through participating in the design process. The design outcomes incorporated community values including improved safety and social spaces, as well as resilience objectives.	Surveys of participants before and after the co-design processes. Resilience assessments of designs.
Design packs for streets demonstrating increased canopy trees and biodiversity planting.	Horticulture Sustainability Framework: Increased use of horticultural plants and green space cools our cities and mitigates climate extremes	The designs for the three streets show dramatically enhanced canopy cover in streets, with resilience assessments of their impact on heat and flooding mitigation.	Resilience assessments of designs that meet community values and aspirations and include diverse and appropriate plant selections.

Monitoring and evaluation

Table 3. Key Evaluation Questions

Key Evaluation Question	Project performance	Continuous improvement opportunities
Does the Re-imagining Streets with Green Infrastructure project, the webpage, media releases, project team presentations and workshops possess sufficient scientific credibility to deliver an evidence base that can change practice?	Engagement with local media, Retrofit exhibition, Retrofit Forum, conference presentation.	Ongoing development of scientific publications. Further development of platform for sharing project outcomes.
Are the outputs from the project relevant to the key stakeholders and contributors?	Design pack for three streets. International case studies. Co-design Toolkit and Engagement Guide. How-to Guide.	Return to engage with key stakeholders to explore further opportunities for impact and development of the outcomes.
Are the outputs from the project relevant to wider industry, community and government beneficiaries outside of the project and in other states?	International case studies. Co-design Toolkit and Engagement Guide. How-to Guide.	Disseminate at national conferences and in Australian scientific publications.
Is the project structured and communicated adequately to be nationally relevant?	Three different streets and communities engaged in co-design.	Future research on risk and resilience in urban tree management, application submitted to the Australian Research Council.
Are the planned research and communication activities aligned so that strong messages are backed up once data and evidence become available?	Resilience evaluations of the tree street designs.	Graphic design for fact-sheets highlighting resilience benefits of co-design streets and opportunities for further improvements.
Are the planned research activities still prioritised appropriately according to feedback from key stakeholders and other interested industry and government parties?	Stakeholder reference group meetings.	Final meeting of SRG to present outcomes and support dissemination

Recommendations

1) Expand tree canopy and permeable surfaces in residential streets to improve resilience to floods and heat and meet community needs.
2) Councils, developers and designers should strengthen engagement with communities by co-designing interventions to increase green infrastructure in streets, to build community resilience and deliver desirable outcomes.
3) Support active community groups and citizens to deliver improved resilience outcomes in streets.
4) Undertake further work to develop tools to incorporate biodiversity measures in street retrofit co-design.
5) Refine the co-design process and tools to reduce costs of delivery and enable wider application.
6) Quantify the impact of tree management guidelines, such as pruning or tree removal, on the resilience of streets to heat and floods.
7) Review current guidelines for separation between trees and infrastructure services in residential streets to identify opportunities to enhance canopy cover and permeability.

Refereed scientific publications

Journal article

Currently under preparation

Conference presentation

Dade, M., Soanes, K., Langenheim, N., Croeser, T., Nice, K., Blackham, D., Bell, S., 2025. Community Values in Co-Designing Resilient Street Retrofits in Melbourne, State of Australasian Cities Conference, Brisbane, 9-11 December.

Intellectual property

No project IP or commercialisation to report.

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