Retrofitting raingardens: Understanding context and satisfaction to guide streetscape change

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Abstract

Retrofitting raingardens into residential streets is an important way to improve water quality of urban catchments. However, such raingardens will change the appearance of the streetscape, which residents might not appreciate or accept. More broadly, the changes might be at odds with community expectations, with ramifications for the widespread implementation of WSUD. In a study into community perceptions of raingardens in Melbourne, the residents' satisfaction with the appearance of their street was explored in relation to the street's structure and the presence of raingardens. Satisfaction with the street in general correlated with satisfaction with the street's trees, nature strip, footpath and gutter. Comments elaborating why the residents were satisfied with their street, and how the street's appearance could be improved, enriched interpretation of these quantitative analytical results. Qualitative analysis of the comments revealed that context is critical: a raingarden should be designed for the specific street and its residents. A raingarden designed for one location is unlikely to be appropriate for another, quite different, location. Notwithstanding context, issues common to the design of most raingardens related to selection of street trees and other plant material, traffic congestion and provision of parking, and raingarden maintenance. A raingarden's design should address each of these issues in order to optimise the chance of the residents' appreciation and acceptance of it. Resolution of these issues can be guided by an understanding of context. Such understanding can be obtained simply by visiting the site and strolling down the particular street. Many of the residents' preferences for their streetscape are visible in their own front gardens, providing insight into plant selection, planting style, the need for on-street parking and a desirable level of maintenance, which can be applied in the design of the retrofitted raingarden.

1. INTRODUCTION

Four elements have been identified as essential to the adoption of water sensitive urban design (WSUD): a supportive regulatory framework, assessment and known costing, proven technology and design, and community acceptance (Wong 2009). The CRC for Water Sensitive Cities is conducting research into each of these elements, in order to facilitate the implementation of WSUD in Australian cities. This paper presents some results of research into community perceptions of retrofitting raingardens into suburban streets of Melbourne. Raingardens will change the appearance of a city's streets, a change that community members might not perceive favourably, appreciate and accept. More broadly, the changes might be at odds with community expectations, with ramifications for the widespread implementation of WSUD. Understanding perceptions of retrofitted raingardens can inform their design, so that retrofitted raingardens reflect community preferences. They are then more likely to be appreciated and accepted.

Community acceptance of landscape change is often determined from studies of landscape preferences (e.g. Kaplan and Kaplan 1989; van den Berg and Koole 2006; Nassauer et al. 2009). Changes may not result in a preferred landscape. A complementary measure, however, could be satisfaction (Stedman 2003). Satisfaction with a street might be related to its physical structure and the various landscape elements that comprise it. Retrofitting raingardens into a street often leads to loss of car parking space on the street, removal of footpath and/or replacement of grass with tussock grasses and sedges. These landscape changes may not be preferred but the landscape might still be assessed as satisfactory. In this case, streetscape changes may be acceptable to the community, facilitating the adoption of WSUD.

In this study, satisfaction of community members for their own streetscapes and others, with or without raingardens, was explored. The residents' satisfaction with the appearance of their street was assessed in relation to the street's structure and the presence of raingardens. Quantitative and qualitative data relating to street satisfaction were collected and analysed. Interpretation was enriched by analysis of qualitative data describing reasons for preferring streetscapes with or without raingardens. This understanding can be incorporated into design guidelines for raingardens to optimise the residents' acceptance of the changed streetscape. Raingardens can be designed so that residents' satisfaction with their street is unaffected, perhaps even increased, when the raingardens are inserted into the streets. Community acceptance of WSUD will then be enhanced, advancing its adoption.

2. METHODS

The study, which was part of a larger study of community perceptions of raingardens, was conducted in four suburbs of Melbourne, Victoria, in which raingardens have been implemented: Richmond, Pascoe Vale, Chelsea, Mt Evelyn. These suburbs are located at different distances from Melbourne's central business district, representing different densities, settlement patterns, mixes of land use and sociodemographic attributes of residents/land owners. Richmond lies 3 km from the CBD; Pascoe Vale, 10 km; Chelsea, 30 km; and Mt Evelyn, 44 km.

2.1. Street selection

Streets with raingardens were Cremorne Street, Richmond; Tate and Parker Streets, Pascoe Vale (these two streets were treated as a single street because Tate Street forms a T-intersection with Parker Street); Sherwood Avenue, Chelsea; and Heath Avenue, Mt Evelyn. Using Atlas id (id, the population experts, Collingwood, Victoria: www.atlas.id.com.au), four streets without raingardens were selected to pair with each of these streets. Atlas id displays maps of many Melbourne municipalities with Australian Bureau of Statistics census data for 2011 at the level of Statistical Area 1 (SA1). In each SA1 containing a selected street with a raingarden, a nearby street without a raingarden was also selected. This ensured that residents of both streets shared the same sociodemographic profile, to allow statistical comparisons.

2.2. Data collection

Categorical and numerical data were collected with an anonymous survey, which was designed to explore attitudes towards stormwater management at street scale, focusing on the retrofit of raingardens into established suburban streets. The emphasis in this paper is on categorical data.

Two questions explored attitudes towards the appearance of the street on which respondents lived. The questions required open-ended answers, the first about the current appearance of the street, and the second about how it could be improved.

A series of questions determined the respondent's satisfaction with the street of residency and its various landscape elements (e.g. trees, footpath). A modified Likert scale was used, ranging from 1, strongly dissatisfied, to 7, strongly satisfied, with 4 as a neutral midpoint. Respondents were then asked to comment on any other things in their street with which they were satisfied or dissatisfied.

Preference for streets with or without raingardens was examined with two questions presenting photographs of streets in Moonee Ponds and in Mentone. In each pair of streets in each suburb, the predominant difference in appearance was that one street had raingardens and the other did not. After rating preference, respondents were asked their reasons for liking one street more than the other. These categorical data, rather than the numerical preference data, are presented in this paper.

The survey concluded with questions seeking sociodemographic information, though these data are not relevant to this paper.

2.3. Photographing streetscapes

Great care was taken in photographing each street, using a digital Canon SLR camera set on

automatic. To ensure consistent composition of the images, despite different locations, the same vantage point was used at a cross-over or street intersection, at an angle of 10° to the road alignment. As it was impossible to eliminate all cars from the streetscape photos, cars were included in every photo. People and animals were excluded (Kaplan and Kaplan 1989). Every effort was made to photograph each street under similar weather conditions, at the same time of day.

2.4. Respondents

Residents, older than 18 years of age, in each house in each street were personally invited to participate in the survey. Those agreeing to participate were given a hard-copy of the survey, to be completed and collected at an agreed time. If residents could not be contacted in person after repeated attempts, they were invited to participate by a letter placed in their letter box. Interested residents then contacted the researcher, who forwarded a survey with a stamped, self-addressed envelope for its return. All participants received a small native plant in appreciation of their efforts.

2.5. Analysis

Data were analysed with SPSS 22 (IBM, Arendonk, USA) and NVivo (QSR International Pty Ltd, Burlington, USA).

Mean satisfaction with the street of residence and with the various elements of that street was determined for the aggregated data. Before undertaking correlations of street satisfaction with satisfaction with different street elements, assumptions of normality were tested using histograms and *Q-Q* plots. As assumptions of normality were not met, correlation analyses were non-parametric.

Categorical data from open-ended questions exploring appreciation of existing streetscapes, suggestions for their improvement, and reasons for satisfaction with them, and also from questions exploring reasons for preference of streetscapes with or without raingardens, were imported to NVivo for analysis. Word frequency queries of aggregated data generated word clouds and tabulations of summary data. Themes were identified from these data by assertion analysis, relating to adjectives, i.e. how things are characterized and the frequency with which such things are characterized in a certain way, and by designation analysis, relating to nouns, revealing what is noticed and the frequency of such notice. Themes are illustrated with selected quotes.

3. RESULTS

3.1. Respondent profile

In all, 139 residents from the eight streets completed surveys. This sample resembled the residents of Greater Melbourne in the gender split but age groups from 25 to 64 were slightly over-represented, and those aged 18-24 slightly under-represented. In terms of education and training, the respondents had a higher level of education, with fewer qualifications in engineering, society and culture and the creative arts, and more qualifications in agriculture and environmental and related studies. Amongst employment types, there were many more professionals in the study and proportionately fewer managers, clerical and administrative, and sales workers, machinery operators and drivers and labourers. Nevertheless, these differences in profile are not considered substantial and so the results of this study can be generalized to the population of Greater Melbourne.

3.2. Streetscape attributes that contribute to satisfaction

Satisfaction of respondents with their street of residency, some of which had raingardens and some did not, was slight to moderate. Mean satisfaction varied from a low of 4.40 (s.d.1.34) to a high of 5.73 (s.d. 1.42) (Table 1).

Satisfaction with the street of residency correlated most commonly with street trees, nature strip, gutter and footpath (Table 2). Identification of themes in respondents' comments about their satisfaction with their street, its appearance and suggestions to improve it enriched interpretation of these correlations.

Table 1. Mean (s.d.) satisfaction with street of residency and landscape elements of that street. 1, very dissatisfied; 2, moderately dissatisfied; 3, slightly dissatisfied; 4, neutral; 5, slightly satisfied; 6, moderately satisfied; 7, strongly satisfied.

Street of residence	Mean satisfaction (s.d.)					
	Satisfaction with street	Satisfaction with street trees	Satisfaction with nature strip	Satisfaction with guttering	Satisfaction with footpath	Satisfaction with on-street parking
Cremorne St, Richmond (*N*=12)	4.58 (1.31)	4.25 (1.36)	4.00 (1.81)	4.67 (1.56)	4.08 (1.44)	3.17 (1.70)
Cubitt St, Richmond (*N*=19)	5.26 (1.20)	3.00 (1.63)	2.61 (1.65)	4.00 (1.37)	4.05 (1.39)	3.26 (1.85)
Tate/Parker St, Pascoe Vale (*N*=11)	5.73 (1.42)	5.00 (1.61)	5.45 (1.64)	6.55 (0.52)	6.18 (1.47)	4.82 (1.83)
Somerset St, Pascoe Vale (*N*=5)	4.40 (1.34)	5.20 (1.30)	4.80 (1.30)	5.20 (1.64)	3.00 (0.82)	1.40 (0.55)
Sherwood Ave, Chelsea (*N*=14)	5.21 (1.53)	4.67 (2.02)	5.00 (1.51)	5.53 (1.55)	5.40 (1.45)	3.07 (1.98)
Woodbine Gve, Chelsea (*N*=11)	5.00 (1.10)	4.82 (1.83)	4.09 (1.58)	5.00 (1.25)	4.82 (1.89)	5.00 (1.55)
Heath Ave, Mt Evelyn (*N*=29)	5.47 (1.22)	4.66 (1.54)	4.63 (1.47)	4.83 (1.32)	4.40 (1.52)	3.10 (1.88)
Rangeview Rd, Mt Evelyn (*N*=32)	5.64 (1.06)	4.94 (1.56)	4.91 (1.40)	5.53 (1.13)	4.85 (1.81)	4.44 (1.91)

Table 2. Correlation of satisfaction with street of residency and satisfaction with different elements of that street. Spearman's rho statistic is given, with significance of the correlation at *p*=0.01 or *p*=0.05. Noteworthy correlations are indicated in bold

Street of residence	Correlation coefficient (ρ)				
	Satisfaction with street and satisfaction with street trees	Satisfaction with street and satisfaction with nature strip	Satisfaction with street and satisfaction with guttering	Satisfaction with street and satisfaction with footpath	Satisfaction with street and satisfaction with parking
Cremorne St, Richmond	**0.577****	0.347	**0.637***	**0.682***	0.304
Cubitt St, Richmond	**0.509***	**0.524***	-0.255	-0.124	0.210
Tate/Parker St, Pascoe Vale	0.496	0.559	**0.670***	**0.606***	0.432
Somerset St, Pascoe Vale	0.177	-0.108	-0.460	-0.500	0.152
Sherwood Ave, Chelsea	**0.693****	**0.747****	**0.817****	**0.695****	0.416
Woodbine Gve, Chelsea	**0.679****	0.226	0.400	-0.304	**0.709***
Heath Ave, Mt Evelyn	**0.476****	0.133	0.030	0.320	0.189
Rangeview Rd, Mt Evelyn	**0.628****	**0.597****	0.187	**0.544****	0.096

Amongst the residents of the eight streets, themes underlying satisfaction, or more commonly dissatisfaction, with the street of residence were 'trees', 'vegetation', 'maintenance' and 'parking' (Table 3). Street trees contributed to satisfaction with a street. The simple presence of street trees was sufficient for satisfaction in some streets, whereas, in others, the selection of tree species was also important. Although raingardens might be acceptable in the streetscape, the choice of plants within them was criticized as messy. Poor maintenance of the streets in general and the raingardens in particular was noted. Traffic issues that influenced street satisfaction were congestion and parking. Residents wanted access to on-street parking for themselves or their visitors. Raingardens and commuters' vehicles that limited the residents' parking contributed to dissatisfaction.
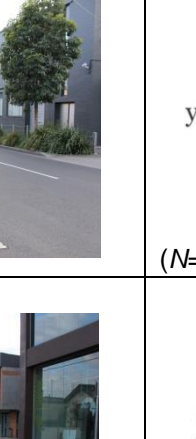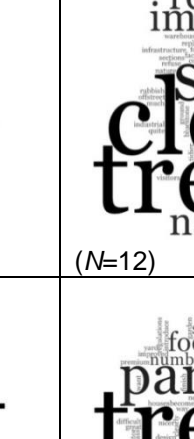
Table 3. Themes underlying (dis)satisfaction with streetscapes

Street	Themes underlying (dis)satisfaction	Illustrative comments
Cremorne St, Richmond (N=12)	Traffic issues - congestion and parking; rubbish collection	"Parking times, no parking for visitors, traffic at lights"
Cubitt St, Richmond (N=19)	Car parking; lack of street trees and vegetation	"Should have more trees, more places for friends to park, more visitor parking" "There is little/no room for on -street parking. We accept this as inner city living but would like more trees on the existing footpaths. Parking is at a premium so we do not want to see road space being taken for any purpose"
Tate/Parker St, Pascoe Vale (N=11)	Car parking; maintenance of raingardens and nature strips	"The introduction of higher density living I find causes no ownership of the streetscape. Nature strips are uncared for, lawn left to grow long. There are rented houses in Parker Street and the nature strips are left unmowed (sic) making the street look messy. While I like the idea of raingardens, the tussock planting is messy. it browns off in summer. I would rather more appealing plants to be planted such as Grevillea, etc. Flowering gums and leafy trees set the street off. The native frangipanis are scraggly looking when growing and the crepe myrtles seem to be slow getting established. Due to Parker Street and the streets that run off it, there can be congestion at peak times. Train travellers also use our street for parking in"
Somerset St, Pascoe Vale (N=5)	Car parking	"Council needs to deal with parking - not enough space"
Sherwood Ave, Chelsea (N=14)	Car parking	"I really like the raingarden - it looks good and helps to slow down traffic - but it does create safety issues with off-street parking (especially as there are many units in that street) and is particularly bad when it is "bin" night/day" 'the raingardens take up the road is dangerous".
Woodbine Gve, Chelsea (N=11)	Increased density; traffic speed	"I do notice the stormwater drain out the front, gathers all the rubbish from the street, many times on overflow" "it has a pleasant & wide feel, glad its green & rather clean, overall pleased"
Heath Ave, Mt Evelyn (N=29)	Vegetation – trees, raingardens	"only that we have the watergarden. its an eyesore. many plants around the edge have died. the garden collects all the rubbish from the street which i have to then collect + put in my green waste bin at cost to me" "I would like a footpath on my side of the street, I would like the raingardens to be neater" "trees: they changed it and i don't like it. the raingardens do not look OK"
Rangeview Rd, Mt Evelyn (N=32)	Street trees; maintenance	"would like more trees on nature strip" "i am satisfied with my street and i am pleased to see that some raingardens are being constructed at the moment"

3.3. Streetscape attributes that contributed to favourable perceptions

Attitudes towards the appearance of the street on which each respondent lived varied, both between residents in a particular street and between residents of different streets. Word frequency analysis of these categorical data revealed common streetscape attributes that contributed to favourable perceptions, across respondents and across streets, and how the appearance of each street could be improved. In the word clouds generated from these analyses, the size of the word is related to the frequency with which that word was used by respondents. The larger the word, the more important is that attribute to perception. From these attributes, themes could be identified. Thus, themes in streetscape preference and its improvement related to street trees and vegetation, parking and maintenance (Table 4). Whether the residents liked their street or not, there was general consensus that street appearance could be improved by planting more trees and other vegetation (including more flowering plants), providing on-street parking, particularly in inner-city locations, but limiting commuter parking elsewhere, and attending to better maintenance, e.g. tree pruning, lawn mowing, removal of graffiti and rubbish and repairing footpaths. Some respondents thought raingardens improved the appearance of a street; others did not. Suggestions to improve raingardens included different plant selection, more careful pruning and rubbish removal. Some respondents thought removal of raingardens entirely would improve the appearance of the street.

Table 4. Word clouds revealing dominant themes in attitudes towards the appearance of a street of residency and suggestions for its improvement.

Street	Attitudes towards appearance of street	Suggestions for improvement
Cremorne Street, Richmond	(*N*=12)	(*N*=12)
Cubitt Street, Richmond	(*N*=19)	(*N*=19)
Tate/Parker Street, Pascoe Vale	(*N*=11)	(*N*=11)
Somerset Street, Pascoe Vale	(*N*=4)	(*N*=4)
Sherwood Avenue, Chelsea	(*N*=16)	(*N*=14)

Woodbine Grove, Chelsea		
	(*N*=10)	(*N*=10)
Heath Avenue, Mt Evelyn		
	(*N*=26)	(*N*=23)
Rangeview Road, Mt Evelyn		
	(*N*=32)	(*N*=26)

3.4. Desirable physical attributes of raingardens in residential streets

Interpretation of the qualitative data from open-ended questions in which respondents explained their reasons for preferring one of two streetscapes in Moonee Ponds and in Mentone revealed the desirable physical attributes of each streetscape (Table 5). In the data from which these word clouds were generated, the photo numbers, i.e. 20a, 20b, 21a and 21b, occurred with high frequency and so are prominent in the word clouds. However, attention should be directed to the adjectives and nouns in the word clouds, which identify and describe street elements important in preference. From these adjectives and nouns, themes were revealed. Thus, whether the streetscape had a raingarden or not, the themes underlying preference for the streetscapes in both suburbs were vegetation and maintenance. Parking was also important in preference for the Moonee Ponds streetscapes, which are in a higher density suburb closer to the city. Naturalness was also important in preference for the Mentone streetscapes, which are in a less dense suburb more distant from the city.

The theme of vegetation related to plant selection and tree growth. Respondents preferred a lush green streetscape with established trees. Streetscapes with a raingarden were perceived to be more interesting, although not all liked the choice of plants. Some respondents thought the plants in the raingardens looked messy, raising issues of their maintenance. Maintenance was also a concern in streetscapes without raingardens, reflected in the street's untidiness or apparent lack of care.

Table 5. Word clouds representing reasons for preference for each streetscape, with or without raingardens, in Moonee Ponds and Mentone.

Streetscape	Photo	Word cloud representing reasons for preference
Moonee Ponds	Photo No. 20a	
	Photo No. 20b	
Mentone	Photo 21a	
	Photo 21b	

4. DISCUSSION

Streetscape elements do influence satisfaction with streetscapes in suburban Melbourne suburbs. Physical landscape attributes *are* important in satisfaction, as suggested by Stedman (2003). In this study, satisfaction with the street of residency was variously a function of street trees, the nature strip, the gutter and/or the footpath. All four street elements are affected when raingardens are designed for retrofit into existing suburban streets. Ongoing raingarden management can also impact these elements. Thus, these street elements need to be considered carefully in the design and management of raingardens to ensure continued, or enhanced, satisfaction with the street of residency. Maintaining street satisfaction is likely to be important to the acceptance of retrofitted raingardens by the street's residents. Designing raingardens that meet the requirements for street satisfaction, regardless of street, will contribute to broader community acceptance.

Desirable attributes for raingardens across all residential streets were large, well-established trees with a lush green understorey. Plant selection was important: plants suitable for raingardens in one location might not be suitable in another. Plants that might be perceived as messy should be avoided, or appropriate maintenance regimes instituted to ensure that plants always look cared for and that dense plantings flourish. A broader palate of trees and understorey plants should be considered, including flowering native and exotic plants. Only 50% of raingarden vegetation needs to function in stormwater treatment (Payne et al. 2015). This provides the opportunity to include 50% of planting that functions aesthetically. Loss of on-street car parking in some streets should be avoided.

Context is critical to the design of a raingarden. In this study, preferred attributes of streetscapes with raingardens varied with context. What was preferred in one street might not be preferred in another. Thus, raingardens should be designed for a specific location. A raingarden designed for one location is unlikely to be appropriate for another, quite different, location. In residential streets, the street itself provides the context for the raingarden, and the preferences of the residents of that street should be considered. The raingarden design should address the particular issues of tree and understorey plant selection, parking needs and maintenance, specific to the street, in order to ensure that the residents appreciate the raingarden and accept it. Context should guide how to resolve these issues. Various approaches are available to understand the context of a raingarden, by engaging with the community through different forms of citizen participation (Callahan 2007). If community engagement is not possible, an alternative way of understanding context is to conduct a site visit and simply stroll down the particular street. Many of the residents' preferences for their streetscape will be visible in their own front gardens, providing insight into plant selection, planting style, the need for on-street parking and a desirable level of maintenance. This information can then be applied in the design of the retrofitted raingarden.

5. CONCLUSION

Context is critical to the design of raingardens to be retrofitted into a specific street. A raingarden designed for one location is unlikely to be appropriate for another, quite different, location. Issues that should be addressed in the design of raingardens to satisfy residents' expectations for their street are tree selection, selection of understorey plants, traffic congestion, parking provision, and raingarden maintenance. Context guides the resolution of these issues. It can be understood simply by conducting a site visit, during which many of the residents' landscape preferences are revealed in their own gardens, to guide the design of the raingarden. Retrofitted raingardens that contribute to street satisfaction are more likely to be accepted, thereby facilitating the adoption of WSUD.

6. ACKNOWLEDGMENTS

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An Australian Government Initiative

- Survey, with 139 participants resident in streets +/− raingardens, in four Melbourne suburbs

- Six pairs of streetscapes, +/− raingardens
  - Four pairs assessed for satisfaction, both quantitatively and qualitatively
  - Two pairs assessed for preference, both quantitatively and qualitatively

An Australian Government Initiative

CRC for
Water Sensitive Cities

Pascoe Vale

Richmond

Mt Evelyn

Chelsea

Street of residence	Mean (s.d.) satisfaction					
	Satisfaction with street	Satisfaction with street trees	Satisfaction with nature strip	Satisfaction with guttering	Satisfaction with footpath	Satisfaction with on–street parking
Cremorne St, Richmond (N=12)	4.58 (1.31)	4.25 (1.36)	4.00 (1.81)	4.67 (1.56)	4.08 (1.44)	3.17 (1.70)
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Heath Ave, Mt Evelyn (N=29)	5.47 (1.22)	4.66 (1.54)	4.63 (1.47)	4.83 (1.32)	4.40 (1.52)	3.10 (1.88)
Rangeview Rd, Mt Evelyn (N=32)	5.64 (1.06)	4.94 (1.56)	4.91 (1.40)	5.53 (1.13)	4.85 (1.81)	4.44 (1.91)

	Street	Raingardens	Themes underlying (dis)satisfaction
	Cremorne St, Richmond (*N*=12)	Yes	1. Traffic issues – congestion and parking; rubbish collection
	Cubitt St, Richmond (*N*=19)	No	1. Car parking 2. Lack of street trees and vegetation
	Tate/Parker St, Pascoe Vale (*N*=11)	Yes	1. Car parking 2. Maintenance of raingardens and nature strips
	Somerset St, Pascoe Vale (*N*=5)	No	1. Car parking
	Sherwood Ave, Chelsea (*N*=14)	Yes	1. Car parking
	Woodbine Gve, Chelsea (*N*=11)	No	1. Increased density 2. Traffic speed
	Heath Ave, Mt Evelyn (*N*=29)	Yes	1. Vegetation – trees, raingardens
	Rangeview Rd, Mt Evelyn (*N*=32)	No	1. Street trees 2. Maintenance

Relationship of street satisfaction with street elements

Street of residence	Correlation coefficient (ρ)				
	Satisfaction with street and satisfaction with street trees	Satisfaction with street and satisfaction with nature strip	Satisfaction with street and satisfaction with guttering	Satisfaction with street and satisfaction with footpath	Satisfaction with street and satisfaction with parking
Cremorne St, Richmond (N=12)	0.577**	0.347	0.637*	0.682*	0.304
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Woodbine Gve, Chelsea (N=11)	0.679**	0.226	0.400	–0.304	0.709*
Heath Ave, Mt Evelyn (N=29)	0.476**	0.133	0.030	0.320	0.189
Rangeview Rd, Mt Evelyn (N=32)	0.628**	0.597**	0.187	0.544**	0.096

Streetscape	Street name	Raingardens installed	Attitudes towards appearance of street of residency	Suggestions for improvement
	Cremorne Street, Richmond	Yes		
	Cubitt Street, Richmond	No		
	Tate/Parker Streets, Pascoe Vale	Yes		
	Somerset Street, Pascoe Vale	No		

Moonee Ponds streetscape	Raingarden	Reasons for preference
	Yes	
	No	

- Street elements do influence satisfaction with streetscapes in suburban Melbourne suburbs.
- Satisfaction with street of residency was influenced by:
  - street trees,
  - nature strip,
  - gutter, and
  - footpath.
- Ongoing raingarden management is also important.
- Maintaining street satisfaction is likely to be important to acceptance of retrofitted raingardens by street's residents. Designing raingardens that meet requirements for street satisfaction, regardless of street, will contribute to broader community acceptance.

- Desirable attributes for raingardens across all streets:
    - large, well–established trees,
    - lush green understorey.
- Appropriate plant selection is important:
    - Avoid 'messy' plants,
- Establish good maintenance regimes.
- Loss of on–street car parking should be avoided.

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- Context is critical to raingarden design.
- Raingardens should be designed for specific location.
- In residential streets, street itself provides context, and preferences of residents of that street should be considered.
- Residents' preferences can be revealed through:
    - community engagement or
    - conducting site visit.

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