

## **DECISION REPORT**

**REPORT TITLE:** FUTURE DIRECTIONS FOR FOOTPATHS  
**ITEM NUMBER:** 78  
**DATE OF MEETING:** 17 SEPTEMBER 2007  
**AUTHOR:** PETER SMITH  
**JOB TITLE:** MANAGER ASSETS  
**RESPONSIBLE OFFICER:** CRAIG DANIEL  
**JOB TITLE:** GENERAL MANAGER URBAN SERVICES  
**COMMUNITY GOAL:** 1.2 Enhancing the well-being of the community through facilitating the provision of appropriate services and facilities and opportunities for involvement.  
4.2 Ensure the ongoing maintenance and development of the physical infrastructure of the City by meeting the agreed service requirements of the construction and maintenance program for footways, roads and drainage.

**REPRESENTORS:** NIL  
**ATTACHMENTS:** 1) EVALUATION MATRIX OF PAVING MATERIALS  
2) BROCHURE ON TRIPSTOP PRODUCT  
3) TREE REPORT

---

### **PURPOSE**

This report deals with the issues being faced by the City of Unley with respect to the damage, subsequent liability and the life cycle costs of maintaining the footpath network and seeks to provide an evaluation of the options for Council's consideration.

In addition this report discusses Water Sensitive Urban Design ("WSUD") principles and their application in the urban environment and recommends Council further pursues such principles as opportunities arise.

### **RECOMMENDATION**

**MOVED:** **SECONDED:**

That:

1. The report be received.

2. The use of concrete pavers for the footpath network be continued except where it is determined that an alternative footpath treatment should be used adjacent to a street tree.
  3. The Administration are authorised to implement the alternative treatment (Option 3) adjacent to street trees that are determined to present a risk to assets or the community.
  4. The Administration continue to explore opportunities for the inclusion of Water Sensitive Urban design elements within all new infrastructure projects.
- 

## **BACKGROUND**

In the early 1980's the City of Unley undertook two major programs of redevelopment to ensure improved amenity to the residents of Unley:

- A greening of Unley through extensive street tree planting; and
- Replacement of footpaths with concrete pavers.

While this decision has significantly improved the social and environmental amenity of the Council area it has come at a cost. This cost in the main relates to the damage to Council infrastructure (kerbing and footpaths) and an increased potential for injury (property and person) and subsequent liability for Council.

When Council Administration undertook an audit of the footpath network in 2006/07 it identified the quantum of this risk resulting in an additional allocation of \$100,000 to the footpath maintenance budget in 2007/08.

This liability and the Council's ability to fund these works was discussed with the Local Government Mutual Liability Scheme earlier this year (2007). The Scheme indicated that providing Council has a program in place to address the risks within its budget constraints then it would be covered by the scheme.

On the 19 March 2007 the City Services Committee of Council considered a report on footpaths and as a result of this report Council resolved in part that:

4. *A further report be provided to Council prior to works commencing in 07/08 on the options for the delivery of a sustainable asset management plan for footpaths. This report should investigate:*
  - *The type of material used for footpaths.*
  - *The risks associated with footpaths and the materials used.*
  - *The full life cycle cost of maintaining the footpath network.*
  - *Options on a solution to the current conflict between footpaths and street trees.*

## **COMMUNITY ENGAGEMENT**

There has been no formal consultation with the community on this matter. However as part of the trial programme being conducted in Cambridge Street, Unley, which has been established to trial alternative material and treatment of footpaths the following has occurred or is proposed:

- A letter has been sent to all residents in close proximity to the trial (both sides of street) informing them of proposal;
- proposed story in Unley Life; and
- proposed Online web based survey for community comment.

The outcomes of this feedback along with those of Elected Members and the physical outcomes of the trial will inform a preferred treatment of footpaths where a need is identified.

## **DISCUSSION**

The use of footpaths as a means of commuting between nodes of destination is widely recognised and an accepted means of transport within the City of Unley. Given this, the City of Unley has chosen to establish a network of footpaths in excess of 325 kilometres in length. This network prior to the early 1980's consisted mainly of bitumen. With the increased affordability and availability of concrete pavers the city chose to implement a program of footpath replacement (pavers instead of bitumen). This decision, while being based on delivering a superior product (footpaths) that provided improved visual amenity and an expected reduction in maintenance has in effect created a significant financial (maintenance and risk) liability for Council.

An evaluation of the footpath network conducted in 2006/07 concluded that this damage can be attributed to two main causes:

- Tree roots uplifting pavers and bitumen; and
- Installation of services within the footpath.

While the latter of these can be controlled through improved reinstatement criteria and discussions with utilities (gas and telecommunications) the predominant issue is that caused as a result of the 23,000 street trees planted in Council's road reserve. A significant number (10,000 plus) were planted in the 1980's as part of a greening program and are now reaching an age and size that is causing some pavers in close proximity to the trees to lift.

In some cases this conflict between trees and infrastructure is as a result of the narrow road reserves within the City of Unley which often sees street verges (area between property boundary and back of kerb) being less than 2 metres wide.

Given the minimum requirement to ensure disability access on a path is 1.2 metres it leaves little space for even small plants let alone mature trees. In hindsight it would be fair to suggest that these trees would not be planted with today's knowledge of the damage and risk that these plantings have caused.

Given that the community or Elected Members are unlikely to accept a mass removal of planted trees within the City of Unley investigations have been undertaken into the interface between street trees and infrastructure.

It is important to note that concrete pavers are still considered the ideal footpath treatment for a range of reasons. They have significant street appeal, are long wearing, cost effective and easy to install and maintain. The issue is not the paver but how the paver interacts with tree roots. Other products such as bitumen are also negatively affected by tree roots. Therefore while there is not the need to cease using pavers as the preferred footpath treatment there is the need to identify a solution and substitute to pavers around street trees that are particularly invasive and where the verge is narrow.

1. **Alternative materials for footpaths adjacent street trees** – an extensive search of the internet, discussions with the Concrete Masonry Association of Australia (CMAA) and discussions with University of South Australia (UniSA) have identified a number of products that could be suitable as an alternative material to the current concrete pavers used within the footpath network adjacent difficult trees. The criteria used in determining these alternative materials included:

- Cost to supply and lay per square metre;
- The ability of the material to blend with existing pavers;
- Structural capacity of the material;
- Suitability around trees and the ability of the material to withstand upheaval from tree roots;
- The life cycle cost of the material (life expectancy, cost to maintain); and
- Opportunities to use material as a medium for storage or transfer of water runoff from footpath.

The materials chosen as part of this review included:

- Concrete;
- Bitumen;
- Recycled rubber (poured insitu);
- Epoxy impregnated porous pavement; and
- Recycled rubber pavers.

An evaluation of the materials selected can be reviewed in Attachment 1. Colour treated concrete combined with tripstop has been identified as the preferred solution. In recommending this it should be noted that all materials (given the rigid nature of the products) face the same challenges when placed adjacent to street trees. Only one product (recycled rubber) could be considered in isolation (without other complimentary products like Tripstop). While this is seen as the most flexible product its life expectancy and cost suggest that it would only be used in circumstances where no other product can be used. Therefore from a life cycle cost perspective concrete with additional technology (Tripstop) is seen as the best solution (option 3).

The matrix referred to in Attachment 1 does evaluate issues such as porous pavements but alternative investigations have been undertaken with respect to a philosophy termed, Water Sensitive Urban Design (WSUD) which seeks to capture and reuse existing stormwater runoff (in this case from footpaths) and either store for future use or provide a water source for adjacent street verge vegetation. While it is considered impractical to undertake this within the general footpath network for reasons of costs, structural capacity and the existence of utility services, opportunities are being explored where it is appropriate and cost effective to incorporate these principles into future infrastructure and streetscapes. Examples of this are the design of Owen and Halmon Street and the construction of stage 1 of George/Duthy Street. Further discussion on opportunities for WSUD will be presented later in the report.

2. **New technology for incorporating into footpath construction** – research into footpath construction has revealed limited advances in the technology associated with the construction of footpaths. While discussions have been held with a number of local and interstate Councils (options used) and suppliers into various additives such as polymers (bitumen), strengthening agents (concrete) and alternative products (rubber) all of these options have not generally been adopted as an alternative to traditional footpath construction. The only product that is seen to provide any solution and has been adopted by numerous Councils (refer Attachment 2) is Tripstop. While this report favours the use of this product in certain circumstances, it will not be the panacea to all issues. Given this, a number of solutions such as the use of recycled rubber (tiles or insitu construction) may also be appropriate in providing a safe footpath network.
3. **Appropriate tree species and treatment and around infrastructure** – the use of trees within the urban streetscape environment is destined to cause conflict with other road infrastructure (footpaths, water table and roads) due to their close proximity. Given the community of Unley values the amenity provided by this urban forest it will be necessary to strike a balance that ensures trees are maintained while ensuring that infrastructure damage is at worst reduced and where possible eliminated. The recent drought being experienced in Australia has further exacerbated the damage to infrastructure as tree roots search for moisture closer to the surface.

While it is less than desirable to accommodate trees in narrow street verges as is the practice in the City of Unley and many other councils throughout Australia it is believed that a compromise can be achieved through the use of a variety of solutions in the establishment of new streetscapes or the replacement of existing trees. These options include:

- Selection of appropriate tree species;
- Use of root barrier products (new tree planting only);
- Use of alternative footpath products around trees;
- Providing a source of water at the lower tree root zone so as to encourage root growth at a lower level (away from infrastructure) by either direct water application via a pipe or providing stormwater storage at this root depth (WSUD principle); and
- Changes to the streetscape by narrowing road width (were possible) to provide a wider street verge for root growth.

A more detailed analysis of the issues associated with the growth of trees in urban streetscapes is contained in Attachment 3.

4. **Opportunities for Water Sensitive Urban Design** (“WSUD”)– the use of WSUD in developing solutions to allow street trees to co-exist with other street infrastructure should be explored whenever Council undertakes major infrastructure works within its road network. It should be noted that not all options will be viable due to:

- A lack of suitable infrastructure;
- Width of street;
- Cost of implementation; and
- Gradient of street infrastructure.

Engineering designs, where possible, should try to integrate the various street infrastructure (footpaths, verge and kerb and water table) so that water is not only treated to a higher quality through bio-filtration or bio-remediation but also provides an opportunity to store and reuse water for street trees. The depth of this stored water will also encourage tree root growth downwards (to the source of moisture) and not to the surface as is the current situation (seeking moisture underneath paved footpath).

If WSUD is adopted some of the opportunities that exist could include:

- Capturing storm water to supply vegetated traffic island, and traffic calming devices with water from either kerb and water or swales;
- Integrating stormwater capture from footpath and swales to supply street trees and vegetated verges (greening of verge with the use of drought resistant plants);
- Redirecting existing storm water from household roofs to individual street trees; and street verge gardens (drought resistant plantings only).
- Improving water quality prior to its eventual disposal to the storm water system

While the use of WSUD is to be encouraged it will not be practical or viable in a number of situations. If these principles of WSUD are to be implemented the Council needs to be aware that its delivery is often associated with a financial impost. This impost however may be offset through tangible (reduced maintenance cost) and non tangible benefits such as visual amenity through greener verges within the City of Unley. This approach should be considered in major streetscape and infrastructure upgrades.

## **ANALYSIS OF OPTIONS**

### **Option 1 – Continue existing use of concrete pavers around street trees**

That Council continue to use concrete pavers as the only method of replacing its aging footpath network and it allocates additional funds each year to address the ongoing maintenance issues associated with this option.

## Option 2– Choose from a range of alternative footpath material around street trees

This option looks at the five materials investigated in this report with respect to tensile strength, flexibility, shear strength and life cycle costs and concludes that while recycled rubber is the best option with respect to flexibility and sheer strength its life cycle cost and tensile strength suggest that this product would only be used in circumstances were all other options had failed or were not practical. If this option were adopted then it would only be incorporated adjacent to trees that are identified as causing issues and traditional pavers would be used in the remaining footpath network.

## Option 3– Choose colour treated concrete combined with technology (Tripstop) around street trees

This options looks to use the positive aspect of the materials researched in option 2 and combine this with another innovation, Tripstop. If Tripstop is incorporated the recommended material with respect to flexibility and sheer strength, its life cycle cost and tensile strength would be concrete. While a number of the other materials (bitumen and porous pavements) have been used with Tripstop they do not offer the same opportunity to rework the material as concrete provides should upheaval occur as a result of tree root infestation. Therefore the lifecycle costs are considerably higher on these other options. If this option were adopted then it would only be incorporated adjacent to trees that are identified as causing issues and traditional pavers would be used in the remaining footpath network.

In regards to when a treatment will be utilised it will be when

- Council's Arborist's advice suggests that due to the type and age of tree and its proximity to the footway there is likely to be tree root infestation and the lifting of pavers
- There has been a previous and ongoing history of maintenance due to damage to the existing bitumen footway prior to replacement.
- That significant and ongoing maintenance around trees to an existing paved footway with an asset life expectancy of greater than 10 years.

### **Recommended Option**

It is recommended that Options 3 be the preferred future option for the City of Unley's footpath network until such time as conclusive outcomes can be obtained from the current trial being conducted on Cambridge Street Unley.

## **POLICY IMPLICATIONS**

### **Financial**

The cost associated with Option 3 are considered to be negligible from a whole of life costing perspective as the cost of the existing concrete paving is \$32.90/m<sup>2</sup> with an asset life of 30 years compared to the use of a coloured concrete slab with "Tripstop" at \$46.70.10/m<sup>2</sup> for a 50 year life expectancy. Given that this treatment will only be used at specific locations it is not expected to have a significant impact on current or future budgets.

In respect to WSUD it is not expected that this would or could be implemented across the City but is more suited to a project based approach. As previously indicated in this report the inclusion of WSUD will come at a cost dearer than the traditional street treatment which is estimated at \$90/lineal metre (kerb and water table) versus the cost of an integrated WSUD street verge which is estimated to cost in the order of \$140/lineal metre. If this type of project is to be considered it could be incorporated into the design and estimating of the project for Council's consideration prior to adopting the budget.

### **Environmental / Social / Economic**

The implementation of Option 3 will have initial economic impact mitigated over the life cycle. Longer term it is hoped maintenance costs will be gradually reduced. It will however have a positive effect on the social amenity of the City by providing a safer and visually appealing footpath network for the community to enjoy.

WSUD has the potential to provide significant environmental and social benefit to the City (in areas implemented) by providing improved stormwater quality and reduced flows to the existing stormwater network through the use of WSUD principles such as bio-filtration beds. However careful consideration must be given to its application to ensure it delivers meaningful outcomes.

### **CONCLUSION**

In summary the report has investigated a number of opportunities to ensure an integrated approach to infrastructure (street trees, footpaths and kerb and water table). These investigations have concluded that there is no specific solution that will address all the issues discussed in the report (best materials, reduction in damage to infrastructure and water reuse within the street environment) and each situation needs to be assessed on its merits. However by employing concrete and tripstop treatments around trees likely to or causing damage to footpaths Council can continue to:

- Deliver in accordance with sound asset management principles;
- Maintain the visual amenity of the street and
- Best manage public and Council risk.