Report

River Torrens Linear Park Trail Assessment

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Local Government Association of South Australia
Report
River Torrens Linear Park Trail Assessment

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1. Introduction

Echelon Australia in conjunction with Tonkin Consulting were commissioned by the Local Government Association (LGA) of South Australia, on behalf of the SA Government and the 9 relevant Councils, to undertake a general safety and risk assessment of the River Torrens Linear Park Trail.

The River Torrens Linear Park extends for approximately 35 kilometres from the Gorge Weir in the Adelaide Hills to Gulf St Vincent. The River Torrens flows through nine Council areas, including the City of Adelaide, and generally forms the boundary between the Council areas.

On the eastern side of the City of Adelaide, the River Torrens is bounded by the:
- Adelaide Hills Council
- City of Tea Tree Gully
- Campbelltown City Council
- City of Pt Adelaide Enfield
- City of Norwood, Payneham & St Peters
- Corporation of the Town of Walkerville

On the western side of the City of Adelaide, the River Torrens is bounded by the:
- City of Charles Sturt
- City of West Torrens

Note:
The River Torrens Linear Park Trail logo shown in this document has been conceived as part of the River Torrens Linear Park Trail Signage Plan. The aim is to create a clear “Iconic” image related to the Linear Park.
The Assessment

This assessment, which includes consultation and liaison with some relevant stakeholders where considered necessary, is limited to the land component of the River Torrens Linear Park, and in particular to the pedestrian and bicycle path network generally referred to in this report as the “Trail”. It also takes into consideration infrastructure directly associated with the Trail.

The assessment does not consider the waterway or other developed or undeveloped areas within the Linear Park (such as picnic areas, barbeques, playgrounds and toilets), except to the extent that they are relevant to the network review of the Trail. The assessment does not include the paths linked to the O-Bahn Busway.

Further, the assessment does not identify and/or prioritise individual risks nor identify specific recommendations and solutions in all cases. Rather, the main outcome of the assessment is the identification of network deficiencies along the Trail and identification of those issues/hazards, which require further investigation.

The assessment involves:

- Reviewing the Trail network within the River Torrens Linear Park by walking the 70 kilometres (i.e. approximately 35 km of Trail along each side of the river) of the shared-use path making up the Trail. Such review to take into account the dual purpose of the Trail without compromising the stormwater catchment and management purpose of the River Torrens and Linear Park.

- Identifying potential public safety issues relative to the Trail and any infrastructure associated with the Trail (e.g. seating, barriers, holding rails etc.) taking into account the purpose of the Trail and its natural surrounds.

- Inspecting all formal public access/egress points within Linear Park (including walking trails, steps, stairs, ramps) not forming part of the Trail but providing public access within Linear Park.

- Assessing the adequacy of the safety regimes (including warning signs) currently implemented and/or installed along the Trail, including their consistency across the entire length of the Trail.

- Providing comment as to the Trail meeting acceptable standards where applicable. To this end, it should be noted and acknowledged that sections of the Trail do not (and in many instances cannot) comply with current engineering standards or the requirements of the Disability Discrimination Act.

- Recording site identification points with photographs and a mobile GIS unit to produce GIS mapping plans of the Trail.

The outcomes of the assessment provide a broad overview of the general safety concerns/issues associated with the Trail and identify locations that may require subsequent and more detailed investigation.
2. Preamble

The River Torrens, which has an overall length of some 85 kilometres, commences at Mount Pleasant in the Mount Lofty Ranges before flowing through the Adelaide Hills entering the Adelaide Plains just below the Gorge Weir at Athelstone. From there, it runs in a westerly direction across the Adelaide Plains, a distance of some 35 kilometres, before entering St Vincent's Gulf at Henley Beach South/West Beach.

The river is primarily a stormwater channel responsible for directing stormwater from its catchment area to the sea. A large expanse of metropolitan Adelaide and the central Adelaide Hills area lie within the River Torrens Catchment, an area of just over 620 square kilometres.

The idea of a River Torrens Linear Park was envisaged in the 1960s. To this end, a concept plan was developed in the 1970s with construction of Linear Park being undertaken in the 1980s and 1990s. The River Torrens Linear Park, which integrates a diverse range of functions including recreational use, stormwater management, flood mitigation and transportation corridors, was the first Linear Park developed in Australia.

The River Torrens Linear Park has been developed as an open space corridor providing a valuable recreational asset and a natural habitat for flora and fauna. It has been designed to respect the environmental, ecological and biodiversity qualities of the area whilst providing a contrast between the river and the adjacent urban environment.

The land comprising River Torrens Linear Park is in various ownerships. The State Government owns around 60% of the land whilst Local Government authorities own some 39% of the land. The remainder of the land comprising various small allotments is held in private ownership.

Linear Park has recently been provided protection through the enactment of the River Torrens Linear Park Act 2006. The purpose of the Act is to provide for the protection of the River Torrens Linear Park as a world-class asset to be preserved as an urban park for the benefit of present and future generations. In particular, the Act is designed to ensure no part of Linear Park can be sold.

It is noted however, there is no legislation that imposes control and/or management of the river on any particular entity. As a consequence, the various Councils through which the River Torrens Linear Park travels have generally taken responsibility for the care, control and maintenance of the Linear Park.
The Councils have undertaken this responsibility without any formal agreement with the State Government or the private owners.

Both the State Government and Local Government see the River Torrens Linear Park as being one of Adelaide’s most highly regarded and utilised regional open spaces. They recognise its importance as a recreational facility of high value to the State and for its tourism and physical activity aspects. They are both keen to see Linear Park retained to offer a variety of interests and activities to all South Australians and visitors to the State.

A main component of the River Torrens Linear Park is a pedestrian and bicycle path network generally referred to in this report as the “Trail”. This Trail has been created primarily as a shared use facility catering for recreational users. It provides many access points from the local street network to the park as well as numerous river-crossing points throughout its length. In more recent times its use for commuter travel by cyclists as an alternative to the road network has increased. This additional shared use requires caution and courtesy to be exercised by all users of the Trail.

Over the last 30 years, it has been necessary for the Trail network to undergo a range of changes. These changes have been in response to meeting community needs and to accommodate the increase in the various activities and user groups utilising Linear Park. In addition to activities associated with the Trail, other developments have also taken place within the Linear Park including the construction of picnic and barbeque areas, playgrounds and toilet facilities. These activities have resulted in sections of the Trail being maintained and upgraded independently by the various Councils.

This has resulted in the lack of a co-ordinated approach to the overall management of Linear Park and the Trail resulting in a lack of consistency and uniformity in the development of the Trail and its infrastructure.

In compiling this report, it should be noted that a detailed assessment of the Trail has not been undertaken and should not be considered as being a compliance audit. Rather, the process should be seen as undertaking a “network” review. Although some risks are noted and are the subject of recommendations, the majority of the comments identify network issues. To this end, individual organisations will need to consider whether they should, either alone or in conjunction with others, conduct further investigations.

The report endeavours to balance the desire to have an environment that still retains its natural appeal and provides many and varied recreational opportunities and stormwater management with the need to have proper risk management. To this end, it recognises the difficulties for authorities in providing facilities catering for all user groups in an environment that is largely dictated by nature as to the topography and geography of the land comprising the River Torrens Linear Park.
The report has also been prepared in a legal environment where, under the South Australian Civil Liability Act, it is accepted that those people who manage and maintain these types of trails do not owe a duty of care to warn users of obvious risks (Section 38), neither will they be liable for injury suffered as a result of the materialisation of an inherent risk (Section 39).

This report contains specific recommendations as to steps that should be undertaken to ensure a collaborative and co-ordinated approach to the management of risks throughout the Linear Park in order that its unique qualities and amenities are able to be best utilised for the South Australian community. It is intended that this report will be made available to the State Government, Local Government and the public generally.
3. Methodology

3.1 Background Review

A review of relevant background reports and plans have been undertaken to develop an appreciation of the history to the River Torrens Linear Park and the overarching policies and directions for the development of the River Torrens Linear Park 'Trail'.

3.2 Consultation

Echelon Australia undertook the consultation process with key stakeholders however, it should be noted that the assessment does not include community consultation. The details of the consultation are outlined in Section 5.

Key Stakeholders
Meetings and discussions have been held with the following organisations to gain an insight into policies and directions and to identify views and concerns/issues regarding the River Torrens Linear Park.

- Local Government Association
- Planning SA;
- The Office for Cycling and Walking (OC&W)
- Adelaide Hills Council, City of Tea Tree Gully, Campbelltown City Council, City of Pt Adelaide Enfield, City of Norwood, Payneham & St Peters, Corporation of the Town of Walkerville, City of Adelaide, City of Charles Sturt, City of West Torrens;
- Bicycle Institute of South Australia (BISA); and
- Bicycle SA.

3.3 Site Assessment

Network Assessment
The network assessment is a broad overview of the River Torrens Linear Park network of Trails in its entirety and the dual use as shared use pedestrian and bicycle paths. It includes only areas directly related to the Trail and all formal access/egress points to the Linear Trail. (The O-Bahn Busway trail links are excluded.)
The various categories identified in the report refer to the components that together constitute the Trail formation. Any suggested recommendations identify potential hazards and/or safety concerns and outline measures that might be considered in future and more detailed investigations associated with the Linear Park and the Trail.

**Council Area Assessment**
More detailed information collected as a part of the review will separately be categorised by Council area for discussion with the individual Councils. It will identify in general terms, those locations that may require subsequent and/or more detailed investigation by the individual Council and/or State Government.
4. Background Review

**River Torrens Study Report, 1979**
This report included an overall master plan and various management strategies for the River Torrens. The report provided the State and Local Governments with a co-ordinated plan for the development of the River Torrens and its environs as a Linear Park, recreation area and open space for Adelaide.

The report, which included descriptions of the influence of cultural and natural systems on the river and its future development, also outlined the results of a recreation study. Further, it detailed development plans and guidelines, a staging strategy, cost estimates and management and monitoring guidelines for the upgrade of the river and its environs.

**River Torrens Flood Mitigation Study, 1980**
This report comprised a detailed examination of the flooding history, flood potential, options for and preferred mitigation measures and cost estimates.

**River Torrens Linear Park and Flood Mitigation Scheme, 1981**
Based on the above two reports, agreement on the combined River Torrens Linear Park and Flood Mitigation Scheme was reached between the Government and the then 12 riparian Councils. The Parliamentary Standing Committee on Public Works approved the Scheme based upon the recommendation in 1981. At the same time as this was being undertaken, the proposals for the O-Bahn Busway were being prepared and integrated with the River Torrens Linear Park Study.

The South Australian Government and the riparian Councils provided funding for the Scheme at that time. During implementation of the Scheme, the Commonwealth Government, through the Federal Water Resources Assistance Programme, provided financial assistance for flood mitigation works.

Construction of Linear Park from Hackney Road to OG Road, Klemzig, was undertaken by the Northeast Busway Authority. These works provided an integrated pedestrian and cycle network to connect to the Linear Park in addition to flood mitigation and Linear Park development works.
The completion of the River Torrens Scheme provided protection for urban areas from floods up to an estimated 1 in 200 year mitigated event, as well as linking the coast to the foothills with a recreational area comprising natural and more formal park facilities for active and passive recreation.

The completed River Torrens Linear Park and Mitigation Scheme is an outstanding asset in terms of flood protection providing a continuous recreation and habitat zone covering more than 35 km bisecting the Adelaide metropolitan area.

River Torrens Linear Park – Management Plan, 1993
Part 2 of this plan detailed the “Management and Maintenance” considerations for Linear Park. It was intended that the plan would form the basis of an agreement for the management of Linear Park. The report included:

- management approach;
- maintenance zones;
- maintenance procedures and standards;
- pedestrian and bicycle path management; and
- park furniture and structures.

River Torrens Linear Park Path Study Network, 1993
Also in 1993 a “Path Network Study” report was undertaken in consultation with local Councils and interest groups, with the view to reviewing the function and operation of the River Torrens Linear Park and O-Bahn Busway bicycle path networks. The purpose being to identify areas where improvements could be made, to recommend remedial treatments and to develop an overall strategy in response to increase usage levels.

River Torrens Catchment Water Management Board – Torrens Taskforce
The River Torrens Catchment Water Management Board was established in 1995. A decade of that Board's operations have been documented in a report "A Catchment Journey to Integrated Natural Resources Management 1995-2005". The report addresses the successes in cleaning up the Torrens catchment and the future challenges still to be met to resolve the area's long-standing and difficult rural and urban water resources issues.

In 2006 the Torrens Task Force was established as part of the Natural Resources Management Board to replace the River Torrens Catchment Water Management Board. The Task Force seeks to build upon the work that has already been done or had commenced under the Catchment Board.
The draft “River Torrens Linear Park Trail Signage Plan” has been developed in conjunction with the Department for Transport, Energy and Infrastructure (DTEI), the Local Government Association (LGA), the eight riparian Councils with signs planned for their area and other relevant groups including the SA Tourism Commission, Adelaide and Mt Lofty Ranges Natural Resources Board, Bicycle Institute of SA and Bicycle SA.

The State Government is the lead agency for this project as the River Torrens Linear Park Trail crosses a number of Council boundaries. The project was identified as a key project through the Central Sector Regional Recreation, Sport and Open Space Strategy in 2000.

Over many years, users of the Trail and their representative groups (Bicycle Institute of SA, Bicycle SA) have raised the need for consistent, quality signage that assists in location identification and the provision of other important information (e.g. expected user behaviour, distance to key points etc.).

State Government funding for the signs in each Local Government area is contingent on Councils agreeing to take responsibility for the ongoing maintenance of the signs once they are installed.

A consistent signage suite has been designed for the River Torrens Linear Park Trail to respond to feedback by users and Councils regarding issues of navigation, safety and user conflict. The project includes development of three levels of signage (i.e. information station signs, exit signs, trail indicator signs) together with strategies for pathway junction line marking and a brochure/map. As part of the management strategy:

- trail information stations will be located every 1 km where possible, with variations of up to 250m where a more appropriate siting has been identified;
- exit Signs will be installed at all main roads in locations where there is no Information Station and an exit exists;
- trail indicators will be used in those locations where paths meet in order to confirm which path is the primary trail; and
- at junctions with secondary paths, two 6m lengths of unbroken white lines are to extend 12m from the junction on both the primary and secondary trail and give way line markings will be included on all the secondary path junctions.

*NOTE: The proposed signage does not include hazard or warning signs.*
SA Water - Torrens Pipeline Project, 2007

Since the 1870s, water has been transferred from the Torrens Gorge Weir to the Hope Valley Reservoir via an aqueduct system. The aqueduct is ageing and is subject to evaporation and leaks requiring increased maintenance. To replace the ageing aqueduct, a buried gravity assisted pipeline will be laid in the Linear Park.

The new pipeline will start approximately 800 metres from the Gorge Weir on the River Torrens and connect to the Hope Valley Reservoir via an existing tunnel. The project will secure a quality water supply for more than 85,000 households in Adelaide's northeastern suburbs.

Construction started in May 2007 with completion expected by mid 2008.

NOTE: Sections of the Trail in the City of Tea tree Gully were not accessible at the time of the assessment due to construction barricades through that section of Linear Park.
5. Consultation

Prior to the physical assessment of the River Torrens Linear Park being undertaken, meetings were held with key personnel from each of the relevant riparian Councils regarding the extent of Councils’ involvement or responsibility for the Linear Park, and in particular, the Trail. Discussions related to:

- the existence of Council plans and/or maps of Linear Park;
- the identification of land ownership (e.g. State, Council, private);
- the existence of any relevant agreements with the State or other owners with regard to the care, control or management of Linear Park;
- Councils’ classification of the land;
- the existence (or otherwise) of “community land” management plans;
- inspection and maintenance responsibilities; and
- any agreements with third parties as to the care and maintenance of Linear Park and/or the Trail.

From the information provided it was clear that:

- Councils have extensive maps and plans of Linear Park relevant to their Council area;
- Councils are able to identify the ownership of the land comprising Linear Park within their area;
- no agreements exist between the State and Councils as to the care, control and management of State owned land or infrastructure;
- albeit there are no agreements relating to the land, Councils have generally treated all land comprising Linear Park as “community land” pursuant to the Local Government Act 1999;
- with regard to community land management plans, a number of Councils have included the land comprising Linear Park within their overall management plans whilst some Councils have created specific Linear Park management plans;
- Councils have generally accepted a management and maintenance role of Linear Park as evidenced by their management plans; and
- several Councils have maintenance contracts with third parties to undertake the maintenance activities on behalf of the Council (e.g. grass cutting, vegetation clearing, general maintenance etc.).
6. Network Assessment

The network assessment is a broad overview of the River Torrens Linear Park network of Trails in its entirety and the dual use as shared use pedestrian and bicycle paths. It includes only areas directly related to the Trail and all formal access/egress points to the Linear Trail. (The O-Bahn Busway trail links are excluded.)

Categorised in this section are the components that form the Trail, and where relevant, suggested recommendations. It is acknowledged within this report that many sections of the shared use pedestrian and bicycle paths comprising the Trail do not comply with present day design and construction standards for shared use facilities. It is also acknowledged that, because of the nature of the terrain of Linear Park (i.e. topography, geography, natural environment and the desire to keep it as natural as possible) it is not possible to achieve many of the design and construction standards that would otherwise apply.

It is accepted that disability and restricted mobility access are important components to be considered in providing access and recreational experiences for the broadest possible user group. It is clear however, that the standards relevant to the provision of disability access have not been achieved and are not achievable in many areas due to the nature and terrain of the Linear Park (as outlined above) and therefore not specifically addressed in this report.

Notwithstanding the topographical and environmental limitations imposed on Linear Park (as outlined elsewhere in this report), and in particular the implications for the shared use paths that form the Trail, the Trail has been designated as part of the Bikedirect network for its entire length. Bikedirect is a network of bicycle routes that has been developed to encourage cycling by providing a variety of options for cyclists with different needs and abilities. The network identifies main roads, bicycle lanes, local streets and off-road paths/trails within the Adelaide metropolitan area.

The relevant guidelines and standards for the design and construction of path facilities for pedestrians and cyclists is the Austroads “Guide to Traffic Engineering Practice: Part 13 – Pedestrians” and Austroads “Guide to Traffic Engineering Practice: Part 14 – Bicycles”. These guidelines form the basis of a number of the comments provided throughout the following Network Assessment.
6.1 Path Alignment

The vertical and horizontal alignment, the widths of paths and the clearances from adjacent obstructions are vital to the safe operation of a path.

A desirable shared use path alignment should consist of straight sections and large radius curves with such an alignment providing for good sight lines. The minimum preferred radius for a shared use path is 30 metres, however, where other factors such as the topography of the area or physical features (e.g. trees) intervene then the radius may be reduced to a minimum of 15 metres. Curves with a radius less than 15 metres are considered to be “sharp” and should be avoided wherever possible. Other factors that should be considered are path gradient / slope, crossfall and superelevation.

Poor path alignment and/or placement of physical items near to the path and the overgrowth of vegetation can significantly reduce path sight distances. For safe travel along a path users must be able to see through a curve for a sufficient distance, particularly cyclists to allow sufficient time to avoid conflict with other path users.

Adequate horizontal and vertical clearance from the Trail to objects/obstructions is important for safe operation. The recommended clearance distances between pedestrian/bicycle paths and objects/obstructions along the paths are desirably a lateral clearance of 1.0 metre and a vertical clearance of 2.4 metres minimum.

Along the length of the Trail there are variations in the alignment of the path. Given the topography of a number of sections of the Trail along the River Torrens combined with various infrastructure and vegetation adjacent to the path, the alignment may not achieve optimum levels.

Recommendations

It is suggested that further investigation be undertaken into reviewing the alignment of the Trail, particularly in the more confined stretches of the river and where the natural topography results in steeper slopes.

Investigation should include the feasibility of increasing sharp curves/bends to provide a more suitable and safe alignment of the Trail.

Clearance to object/obstructions should be assessed and appropriate remedial measures taken to provide adequate lateral and vertical clearance along the Trail.

Periodical inspection should be undertaken to maintain vegetation encroaching into the path.
6.2 Path Width

The operational characteristics and the level of demand for both pedestrian and cyclist use, including the presence of dog walkers, prams and other mobility assisted users should be determined to identify a suitable path width.

To minimise the risk of conflict between users, a shared use path should be of an adequate width to accommodate the level and type of use. This is particularly important in high use areas where additional width will improve safety by:

- reducing the conflict between path users;
- increasing the distance between the path and fixed objects; and
- increasing the distance to embankments adjacent to the path.

The desirable width for a shared use path is between 2.0 metres and 4.0 metres. The width is dependant on the purpose of the path and its expected level of use. Ideally, a recreational shared use path that is frequently and concurrently used in both directions should be 3.5 metres.

Along the length of the Trail there are many variations in the width of the paths. As part of the assessment a number of arbitrary measurements were taken by way of comparison. It was noted that some path widths were as narrow as 1.5 metres even though the path was designated as being shared use, whilst in some areas path widths were as wide 3.5 metres. Generally, the path widths along the greater proportion of Trail were recorded as being between 2 metres and 3 metres wide.

Recommendations

It is suggested that further investigation be undertaken into reviewing the adequacy of the existing path widths specifically taking into account the “shared use” nature of the paths and the increased usage by commuters in some areas. Existing sections of narrow path that are designated as “shared use” should be upgraded where feasible to an adequate shared use path width.

6.3 Path Surface

The design, construction and maintenance standards of a shared use pedestrian / bicycle path are generally based on the requirements of cyclists. This is because facilities for cyclists require a higher standard of design and construction than do facilities provided for pedestrians.

Cycle paths require a relatively smooth surface that provides a safe and comfortable ride and adequate traction in wet weather. Paths should also be designed and constructed to take account of usage by maintenance vehicles.
Path edges should be maintained flush with the adjacent ground surface and where possible protected to prevent a breakdown of the surface. This is particularly important where maintenance vehicles (e.g. trucks, mowers, sweepers) are required to travel along the Trail during maintenance activities associated with the River Torrens Linear Park.

Surface problems may create a problem to some cyclists, particularly those cyclists with narrow tyres on their bicycles.

Level differences between the formed paths (e.g. bitumen, concrete or paved) and the adjacent surfaces were also noted in some areas, often associated with some of the narrower paths. This was seen as creating a problem, particularly where cyclists may be “forced” to leave the edge of the path however, and can also cause problems for pedestrians or other path users.

Some eroded path edges were also noted in several areas. This was more prevalent where service vehicles also access the path and where there is a level difference from the edge of the path down to the adjacent natural surface shoulder.

**Recommendations**

That a general review be undertaken of path inspection and maintenance practices to ensure that longitudinal cracks, drop-offs from the edges of paths and broken edges are identified and rectified.

### 6.4 Path Slopes / Gradients

The gradient of a shared use facility is a critical factor, the steeper the gradient, the greater the safety risk. Path gradients and the maximum recommended distance over which they apply should ideally be provided for where practical in accordance with relevant standards.

The assessment did not involve an engineering evaluation of the Trail to current standards and guidelines. Sample measurements were taken however, of some of the steeper gradients throughout the length of the Trail using an electronic spirit level. This demonstrates the difficulty in providing a shared use facility that meets design standards in such terrain as that which exists within the River Torrens Linear Park.

Measurements in excess of current recommended guidelines were common along the length of the Trail, with some gradients exceeding 20% (1 in 5 grade).

At a number of exit / entry points the path link to the Trail is divided in two to provide access in both directions along the Trail.
Recommendations

It is suggested that further investigations be undertaken relating to the current gradients and slopes of the paths and path entry/exit points to the street network. Such a review should assess:

- the feasibility of reducing the gradients;
  - by realignment of the path; or
  - by relocation of the path;
- rationalisation of the number of entry / exit links to adjacent streets, particularly those where the pathway from the street is excessively steep.

6.5 Path Crossfalls / Superelevation

It is accepted that along the Trail the most suitable method of constructing the shared used pedestrian / bicycle path is by providing a one-way crossfall of the path towards the river. When using this method, a crossfall of 2% (1 in 50) to 3% (1 in 33) would be generally accepted as being the optimum.

In addition, curves and bends should be constructed with a positive superelevation so that they can be comfortably negotiated. On a shared use pedestrian / bicycle path, the degree of superelevation on a curve or bend should not ideally exceed 2.5% (1 in 40) whilst 1% (1 in 100) is preferred.

The assessment did not involve an engineering evaluation of the Trail with respect to current standards and guidelines, however sample measurements were taken of some of the more significant crossfall and superelevation issues noted along the Trail using an electronic spirit level. This provided a means of identifying and demonstrating the difficulty in providing a shared use facility that meets design standards in such terrain as that which exists within the River Torrens Linear Park.

Measurements in excess of current recommended guidelines were common along the length of the Trail, with some crossfall and adverse superelevation grades. A number of these were associated with steep gradients, bends and curves leading to the river and where the Trail is alongside the river, particularly at a number of bridge underpasses.

Recommendations

It is suggested that further investigation be undertaken into reviewing the existing path crossfalls and adverse superelevation grades in conjunction with further assessment associated with other recommendations contained within this report.

Consideration may be given to the feasibility of reducing adverse gradients to provide a more suitable and safe alignment of the Trail. This would be dependant on the features of the River.
6.6 Batters / Banks

The installation of a fence or barrier adjacent to a path is desirable where the path is located in close proximity to a steep batter or significant fall. Particular consideration should be given to situations where a batter or fall is adjacent to a narrow shared use path where a cyclist or pedestrian may have to unexpectedly leave the path to avoid conflict with each other.

With regard to the River Torrens Linear Park, where the shared use path is below the 1:20 ARI flood level of the river, the installation of fences or barriers may be unsuitable as they may act as debris traps which may cause severe damage to the infrastructure and/or result in a significant increase in the flooding potential of surrounding areas.

It was noted that a variety of fences and barriers have been provided along the length of the Trail with many of these having been installed in line with the guidelines. There were instances however, where the type of fence installed (e.g. 3 strand wire) does not specifically comply with the guidelines.

**Recommendation**

The use of several of the types of fences and barriers adjacent to the Trail should be reviewed in line with appropriate guidelines and standards. Note that it may be necessary to give further consideration to the appropriateness of current standards (relative to safety within the public realm) to the Linear Park environment.

Several steeper batters and banks adjacent to the pathway and not within the 1:20 ARI flood level should be assessed regarding the need for a fence or barrier.

**Refer also to Section 6.13 for comments relating to Fences and Barriers**

6.7 Steps / Stairs / Ramps

In addition to the Trail and its numerous access/exit points from the adjoining street network, access to and within the River Torrens Linear Park is provided by several other means depending on the nature of the terrain. Ramps, stepped ramps and steps are among the formal means of access provided throughout Linear Park whilst natural tracks and unmade paths provide informal connections between the main path and points of interest.

Ideally, whilst access points should be ramped to allow convenient movement and access by disabled persons, in a number of locations along the River Torrens Linear Park this is not possible. In these circumstances, alternative means of access have been provided.
During the early development of Linear Park, in order to provide a means of access to and within Linear Park, a jarrah sleeper and cement stabilised stepped ramp was designed to provide access to points along the river. The design for the stepped ramp took into account and catered for the variations in the gradient of the various slopes to be traversed. Similarly, a design for jarrah timber steps where the slope was steeper was also developed.

Several step and stepped ramp designs have been incorporated throughout the length of Linear Park, many without the benefit of handrails. In many cases, there are steps or stepped ramps provided that do not appear to currently provide access to any particular feature, with many appearing to finish at a “dead end”.

Further, many of the sleepers forming the treads and edge beams of the steps and stepped ramps have deteriorated such that the timber itself may now pose a risk to users. A number of these steps and ramps are directly associated with pedestrian access/exit points to/from Linear Park to adjoining streets.

**Recommendation**

It is recommended that a detailed inspection of all access steps and stepped ramps throughout Linear Park be undertaken and where they are not considered to be of further use, they should be removed. Those steps and ramps that are to remain should be further assessed and be upgraded (including the provision of handrails) and maintained to an acceptable standard.

### 6.8 Low Level Bridges

A structural evaluation of the low level bridges was not undertaken as part of this assessment, however all bridges were generally observed to be in reasonable condition although evidence of loose decking planks was noted in a couple of instances.

Because of the type and nature of the timber used, the timber decks of low-level bridges generally become slippery when wet. Ideally path approaches to low level bridges, particularly for cyclists, should be as straight as possible to minimise the hazard at the entry approach to bridges.

During periods of high water flow, debris (trees, reeds and other vegetation) and silt may build up against the bridge structure and or across the bridge or walkway deck. Additionally, in wet conditions after periods of rain it is likely that the surface will become slippery.
Of particular note with the design specifications for the low level bridges is the fact that there is no provision for the installation of handrails. The reason being that significant debris build-up could occur against the handrails during periods of high water flow. In such an event the handrails may not be capable of withstanding the flood loads which may increase the flood exposure to adjoining areas or cause the bridge structure to collapse.

Because of the slippery nature of low-level bridges, particularly when wet, it is considered necessary to install warning signs at the approach to a bridge warning of the likely danger. This is seen as being particularly important where the approach to the bridge is preceded by a curve or bend or at the end of a significant slope.

At the time of the assessment there were several instances of loose debris caught against the deck or lying on the deck. There were also several bridges with silt washed across the entry to the bridge from the path.

It was also noted that a number of the low level bridges along the river have paths that adjoin the bridge with sharp curves or bends immediately preceding the entry point. In some instances, the curve or bend on the approach to the bridge is also at the bottom of a steep gradient leading to the bridge.

**Warning Signs**

Generally it was found that there is little consistency with the installation of warning signs on approaches to low-level bridges. In some instances ‘Caution Slippery When Wet’ warning signs have been installed whilst a number of bridges were noted with no advance warnings.

**Bollards**

Generally locked removable bollards were found to be located on the northern side of the river only, it is assumed that these are to prevent through vehicle access and allows for maintenance vehicle access only.

**Other bridge protection**

In some instances post and rail ‘wing wall’ protection has been provided on the approach to low-level bridges. These wing walls are generally associated with approaches via steeper gradients.

**Recommendations**

It is recommended that bridges be inspected regularly and any defects in the timber decking, edge kickboards or other components that have been damaged be repaired or replaced as necessary.

It is further recommended that an investigation be undertaken into the approach grades and angles to low level bridges and improvements made where achievable.
Also where appropriate, safety measures should be taken to reduce other approach risks to low-level bridges and signs installed giving prior warning of slippery surfaces.

Further, a structural assessment should be undertaken following all rain events that result in the level of the river to rise and water to flow over the surface of the bridges. Debris and silt deposited against the bridges or over the decking should also be periodically removed.

Bollards should be adequately highlighted to ensure visibility and reduce the potential safety hazard of users running into them.

6.9 Informal River Crossing Points

There are a number of “informal” river crossing points along the length of the Trail, more particularly associated with the section of the river to the east of the City of Adelaide.

These informal crossing points are generally in the form of weirs that have been constructed to dam back sections of the river. Whilst not intended as crossing points, access may be gained to the weirs with further access being made across them.

In addition, there are several rock abutments located at strategic locations across the river acting as water calming devices. Again, it is clear that these “informal” crossing points could be used to cross the river. This presents a safety risk for a number of reasons. Firstly, the water may be fast flowing, deep and the bank and surface may be slippery. Secondly, informal paths have been formed from the formal Trail to these rocks with bank erosion likely to occur as a result.

Recommendations

It is suggested that further investigation be undertaken with regard to providing protection and preventing access to all “informal” crossing points across the river.

Further, an assessment should be undertaken into the frequency of the formal crossing points that currently exist and determine any need to provide additional low-level bridges to improve access along and across the river within Linear Park.
6.10 Timber Boardwalks / Landings

A structural evaluation of the timber boardwalks and landings was not undertaken as part of this assessment, however, they were generally observed to be in reasonable condition.

As with the low-level bridge crossings, the timber boardwalks and landings forming part of the Trail are likely to collect debris and silt may build up on the deck. Additionally, in wet conditions it is likely that the surface would become slippery.

There are a number of timber boardwalks that have post and rail protection on one side and the other side nearest to the bank has an edge kickboard only. In some instances there is a gap between the edge of the boardwalk and the bank.

In several locations along the river there are a number of timber landings over the water. These landings do not have any protection at the edge and seating has been provided near to the edge.

**Recommendations**

It is suggested that further investigation be undertaken into the safety risk associated with the timber landings, the bank condition adjacent to these landings and the access paths.

All timber boardwalks and landings should be inspected regularly and any timber decking or other components that are loose or have been damaged be repaired or replaced as necessary.

Debris and silt deposited over the decking should be periodically removed.

6.11 Street Entry / Exits

There are numerous entry / exit points from the road network linking into Linear Park and the Trail network. There is a wide variation in the treatment at these entry / exit points including where they have been specifically designed to cater for cyclists. The treatments include the use of a wide variety of signs, a varying use of bollards and holding rails, an inconsistent application of pavement markings and a range of kerb access ramp types.

The general signage associated with Linear Park, and the Trail in particular, has been reviewed as part of the River Torrens Linear Park Trail Signage Plan with proposed new signage developed for the Trail.
Recommendations
Kerb ramps should be provided at all formalised entry / exit points and installed in accordance with relevant standards whilst holding rails should be provided centrally and adequately delineated, particularly where there is a likelihood that cyclists will have to stop at intersections with roadways or footpaths.

6.12 Restricting Access

It has been necessary in many locations, including entry / exit points into the River Torrens Linear Park and across the low-level bridges, to prevent unauthorised vehicle access. This has been achieved by various means including the use of bollards, removable bollards, gates, barriers and chains.

In using various devices, it is important that the device itself does not create a hazard to users of the Trail network. To this end, all of these devices should be highlighted and clearly visible at all times.

In several locations, the use of bollards together with holding rails at entry / exit points reduces the access width considerably. This presents problems for cyclists as well as access for pram and possibly wheelchair / buggy users.

Ideally, a holding rail should be installed centrally along the path and bollards should be sufficiently spaced to prevent vehicle access but allow unrestricted access to Trail users as should bollards placed at entries to low level bridges.

Where a barrier or chain is used to restrict access it is important that the existence of the device is clearly marked. This is particularly important in areas where access to the shared use path is likely to occur at night. Alternative provision for shared use path access should be provided where barriers and chains are locked.

Recommendations
It is suggested that further investigation be undertaken into the access at entry /exit points and ensure that appropriate measures are installed that restrict vehicle access whilst also maintaining adequate access and width for path users at all times. These devices should be highlighted and clearly visible at all times.

Kerb ramps or combined vehicle access crossovers should be provided in all instances. Where vehicle access barriers are installed and generally locked, alternative Trail access should be provided.
6.13 Fences and Barriers

Where it is proposed to use fences or barriers in association with bicycle paths or shared use paths, consideration should be given to the following factors:

- fence elements (e.g. posts, railings etc.) should be designed to minimise the possibility of cyclists snagging their handlebars or pedals on the barrier;
- wherever possible, the ends of fences should be a minimum of 1 metre from the riding surface but may taper closer to the path if required;
- fences should be appropriately delineated by signs and reflective tape;
- fence railings likely to have (or develop) splinters, burrs, sharp or rough edges or surfaces should be avoided;

The following fence types are not recommended for use within 1 metre of a bicycle path or shared use path:

- treated pine log – these are often constructed with numerous exposed ends and are generally too low to be used adjacent to bicycle paths;
- chain mesh – this type of fence may catch pedals if placed too close to the riding surface;
- post and wire – these often have exposed elements (e.g. broken wires).

As identified in Section 6.6, many of the fences and barriers in use along the length of the Linear Park Trail may not necessarily comply with the above guidelines.

There is a lack of consistency in the type and/or construction of fences, barriers or balustrades installed at the top of steep embankments throughout the length of Linear Park. For example, fences and balustrades comprising three-strand wire, timber log and mesh, swimming pool safety fencing and pine and rail were noted. In addition, where the fences or barriers were installed, they did not always provide a continuous barrier to prevent accidental entry to parts of the embankment.

**Recommendation**

All fences and balustrades at the top of steep embankments should be reviewed to ensure consistency and to provide a continuous physical barrier to prevent accidental entry to the embankment.

6.14 Facilities and Equipment

Whilst not directly related to the Trail, a number of buildings and items of equipment such as heritage items or items of historical significance have been retained within the River Torrens Linear Park. The retention and protection of these items is an important component of the character of Linear Park.
To assist with their preservation, the buildings and items of equipment have generally been made secure to minimise damage and/or vandalism.

Many of these items of interest are not located in close proximity to the shared use pedestrian/bicycle path forming the Linear Park Trail and therefore were not assessed as part of the project. However, where the item was located adjacent to or was an integral part of the Trail a visual inspection was undertaken. No items inspected were seen as posing a risk to public safety although access from the shared use path to some of the items had not been maintained or a formal means of access did not exist.

Recommendations
All items of heritage and/or historical significance displayed throughout Linear Park should be provided with a formal means of access. Where the item is adjacent to the Trail and/or access is invited from the Trail, formal paths should be provided and maintained, as should the various items of equipment.

6.15 Lighting

The provision of public lighting on shared use paths depends on the nature of the facility and its expected use at night as bicycle headlights generally provide insufficient illumination at speeds above 5 km/h (walking speed). In the case of the River Torrens Linear Park, lighting may also minimise the risk of vandalism and encourage the use of parts of the shared use pedestrian/bicycle facility at night.

In general, the lighting of paths can be categorised as follows:
- paths associated with promenades or other centres of night-time activity (e.g. the seaside, river banks, city centre) where a high standard of public lighting is desirable to create an attractive environment;
- cycle paths used predominantly for commuting where, during certain times of the year, cyclists have no alternative but to ride during dawn, dusk or hours of darkness. Lighting of such paths may be justified if there is significant use at night whilst conversely, the lack of lighting may adversely affect the use of a facility at night;
- recreational paths. Where recreational paths are used primarily during daylight hours, the cost of lighting them is generally not justified unless the path is likely to attract sufficient night-time use to warrant lighting it, at least at locations of increased hazard.

Where continuous lighting along a path is difficult to justify, it may be appropriate to only light the locations such as:
- intersections with other paths or roads;
- sharp curves and bends and steep gradients;
- ramps to structures and portals to tunnels and subways;
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- where clearance to obstructions is minimal;
- where pedestrian numbers are high;
- locations with special security problems; and special features such as stairs etc.

There is some inconsistent lighting pattern along the length of the River Torrens Linear Park, including the shared use pedestrian / bicycle path (the Trail). In some Council areas the shared use path has been provided with extensive lighting whilst minimal lighting has been provided in other Council areas.

This inconsistency includes the provision of lighting on either side of the river with the lighting alternating between the two sides. In these instances, its provision is not necessarily consistent with the amount of use of a particular section of the Trail.

**Recommendation**

It should be noted in this context that the trail assessment was done during daylight hours. As a consequence, there was no specific assessment undertaken of the night time lighting including its effectiveness or whether lights were working or not. A small cross-sectional check of lights taken after dark in several different areas however, indicated that the majority of lights in those areas were working.

### 6.16 Drainage Structures

With the River Torrens acting as a major stormwater channel for a significant part of the Adelaide Hills and eastern suburbs, there are a significant number of pipes, culverts and channels entering the river from various creeks and stormwater inlets. Many of the pipe and culvert entry points into the river are of large diameter, sufficient to allow public access for some distance back along the drainage network.

At a number of locations along the river, it is clearly evident (e.g. by way of graffiti etc.) that members of the public are gaining access into these pipes, culverts, and creek and stormwater inlets. This is seen as a public safety issue for several reasons, not the least being entry into an area that can be defined as a “confined space”.

**Recommendation**

Further investigation be undertaken with a view to restricting / minimising access into the various pipes, culverts, creek and stormwater outlets entering the River Torrens without affecting the integrity of the stormwater channels.

This recommendation should also be extended to the provision of Gross Pollutant Traps along the river. As for Stormwater Inlets (above), further investigation should be undertaken with a view to restricting / minimising access into the various pipes, culverts, creek and stormwater outlets entering the river via various Gross Pollutant Traps.
6.17 Maintenance

Vegetation Encroachment
As with the requirements for clearance distances from obstructions, it is essential that path widths be maintained by pruning and clearing back vegetation encroaching over the path. This is particularly important where the path width is less than optimal to allow greater room for cyclists to pass other cyclists or pedestrians. Clearing back vegetation may greatly improve line of sight requirements.

It was noted during the assessment that many of the issues associated with Linear Park, and the Trail in particular, were related to maintenance. Besides those issues identified elsewhere in this report, vegetation encroaching over and onto the Trail such that it greatly reduces lines of sight is a maintenance issue.

Debris and Litter
Good maintenance of shared used pedestrian / bicycle paths is important to the safety of both cyclists and pedestrians. This is particularly important in areas where trees and shrubs overhang the pathways and drop leaves and litter onto the path. Regular inspections and sweeping of the paths is required to remove debris such as sand, gravel, sticks or other litter.

The incidence of debris and litter across and on the path system was noted in most areas. There was little evidence to suggest that this was an integral part of any particular maintenance program associated with the management of the Trail.

Bank Erosion
Whilst matters relating to the river itself were not a part of the assessment brief for this report, it was nevertheless noted that bank erosion was continuing in several sections along the river.

Some areas of erosion is making the Trail more vulnerable to the river with the erosion severely encroaching towards the area of the Trail. Unless the bank erosion issue is addressed the Trail may need to be relocated which will not be an easy task in some areas.

Graffiti / Vandalism
Graffiti was noted to be a problem in several areas of the River Torrens Linear Park. Most notable was associated with the undersides of bridges and underpasses, stormwater pipe outlets and signs.

Whilst some structures along Linear Park have been subject to various forms of graffiti art, which is generally accepted as minimising other forms of graffiti, there was evidence that this art had been over painted and defaced with other graffiti.
Whilst there was minimal evidence of vandalism and/or damage to property along the Trail, it was noticed that a number of signposts were standing with no signs attached. There were also instances of signs having been turned around to face in the wrong direction including a number of “Shared Path” and “End Shared Path” signs.

**Recommendation**

It is recommended that the ongoing maintenance of Linear Park, including the Trail and other aspects as outlined above, be investigated as part of a future management strategy. It is further recommended that the management strategy should address the differences in approach to inspection and maintenance practices that are currently occurring along the length of Linear Park.
It is proposed that a meeting of the individual Councils is undertaken to discuss the different issues that the Councils might address in their respective Council areas. This will enable Councils to have their own input into the setting of priorities, and the timing of the implementation of any works, against the background of each Council's Asset Management Plan.

State Government involvement in such a meeting would assist in confirming approaches which would benefit from consistency along the length of the trail and in identifying priorities for State involvement.
8. Summary

The primary objective for State and Local Government is to ensure that the Linear Park continues to develop and is maintained as a whole entity so that it is retained as a significant conservation and recreation area, with a high standard of flood protection within metropolitan Adelaide and respects the environmental, ecological and biodiversity qualities of the area.

As the network of paths forming the Trail within the River Torrens Linear Park have been developed for the benefit of the community at large, but in particular, to serve the needs of pedestrians and cyclists, it is essential that the Trail is maintained to ensure a convenient and accessible environment for both user groups and the recreational amenity is maintained to the highest appropriate standard.

Alternative modes of transport will contribute to a reduction in transport related emissions and will contribute to healthier lifestyles. The provision of facilities for pedestrians and cyclists - including shared use paths, safe crossings, a continuous and practical network of routes and trip facilities is an essential part of the continuing development and planning processes required for the River Torrens Linear Park.

The functions of the Linear Park for storm water management and flood mitigation must also be recognised and factored into all strategic management of the Linear Park and Trail.

The following strategic recommendations are made:

1. That State and Local Government and community stakeholders note that the Linear Park is a natural environment, which cannot reasonably be redesigned or engineered to fully mitigate risks, associated with accessing or interacting with the park.

2. That the Minister for Urban Development and Planning in consultation with the LGA initiates action to establish a suitable representative management mechanism through the SA Public Space Advisory Committee (or alternative sub committee mechanism) to:

   • review all previous studies and reports regarding the Linear Park including but not limited to, the River Torrens Study report 1979, and the River Torrens Linear Park- Management Plan 1993, in order to establish a formal agreement between State and Local Government for land management responsibilities of the park; and
• develop and undertake overall strategic management responsibility for the entire 35 km of the Linear Park.

3. That the SA Public Space Advisory Committee (or alternative sub committee mechanism) in collaboration with the LGA, establish a coordinated management approach to prioritise actions required to address risk elements identified in the report in respect to:

• Pedestrian and bicycle path management.
• River crossings
• Park furniture and structures (including bridges and landing areas)
• Signage
• Inspection, Maintenance procedures and standards

4. Having regard to priorities emerging from the approach in recommendation 3 a clear funding regime should be developed including access to the State Open Space Program with specific funding available for the River Torrens Linear Park. The regime should incorporate agreed funding contributions by State and Local governments respectively for both capital and maintenance tasks.

5. That State Government and local Council establish Linear Park local action plans that:

• reflect that the Linear Park is a natural environment which cannot reasonably be redesigned or engineered to fully mitigate risks associated with accessing or interacting with the park
• recognise the collective land ownership (State and Local Government) of the Linear Park and be consistent with overall strategic management processes including consistency across boundaries.
• Include, but not be limited to, identification of prioritised actions to be taken which will address issues identified in the network assessment within their respective boundaries.

6. That as a matter of priority presentations are undertaken to the SA Public Space Advisory Committee (or alternative sub committee mechanism) and each of the 9 riparian Councils (and the LGA) to assist with establishment of local action plans to address risk locations within their respective responsibilities. SA Public Space Advisory Committee representation (or alternative sub committee mechanism) should be in attendance at the Council presentations in recognition of the collective ownership issues and to maintain strategic consistency across boundaries.
7. That in consideration of the diverse range of functions of the Linear Park which include, recreation, storm water management, flood mitigation and transport corridors, the Minister for Urban Development and Planning give consideration to allocating funds from the Planning & Development Fund to the River Torrens Linear Park to assist the immediate objectives of recommendation 3 and 6 (aimed at development of co-ordinated action plans) through the State Open Space Program.

8. The Minister, LGA and relevant councils conduct a similar review of the River Torrens Linear Park every 10 years to ensure that stages of the park are not allow to become run down or overgrown to the detriment of the park as a whole.