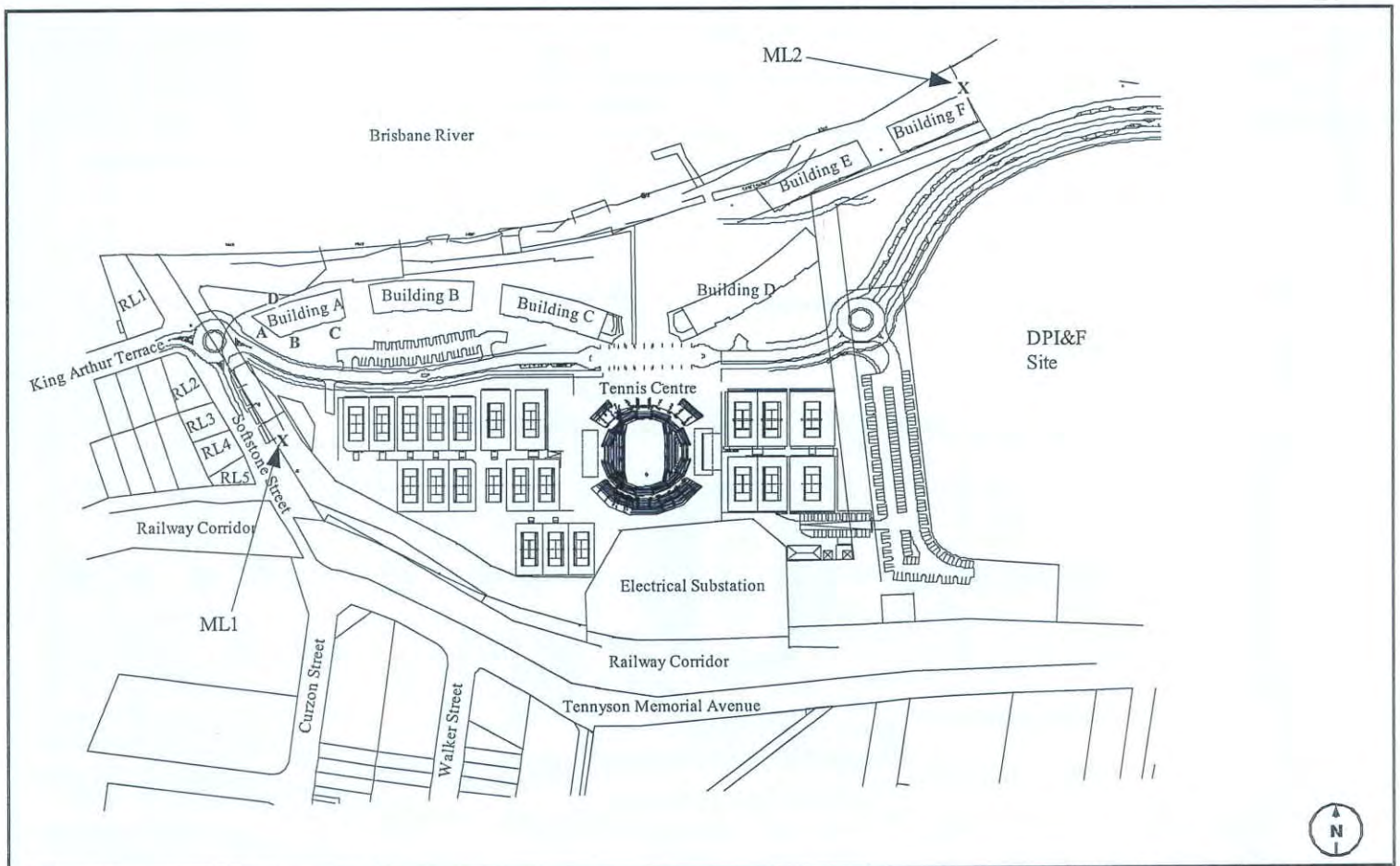
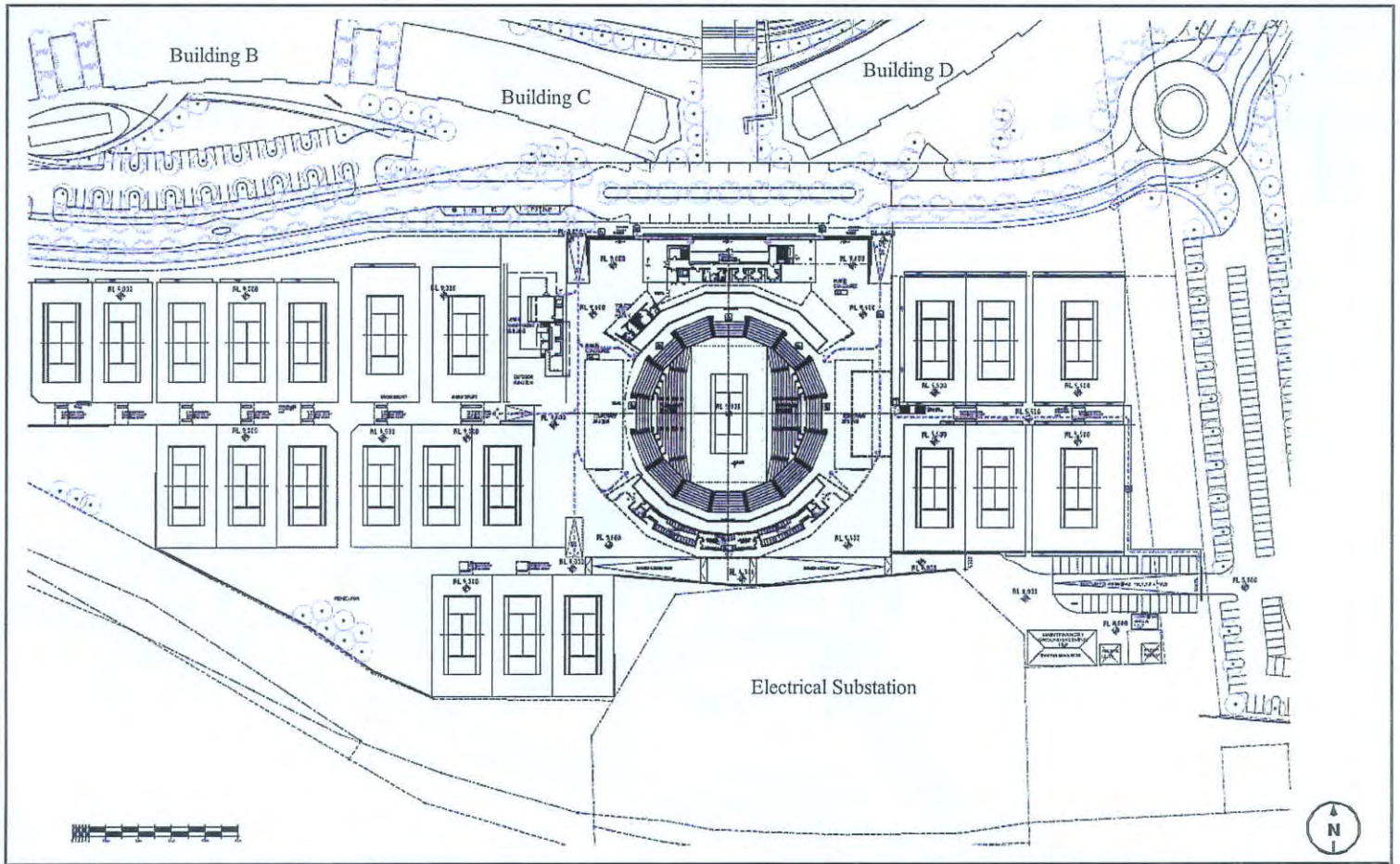
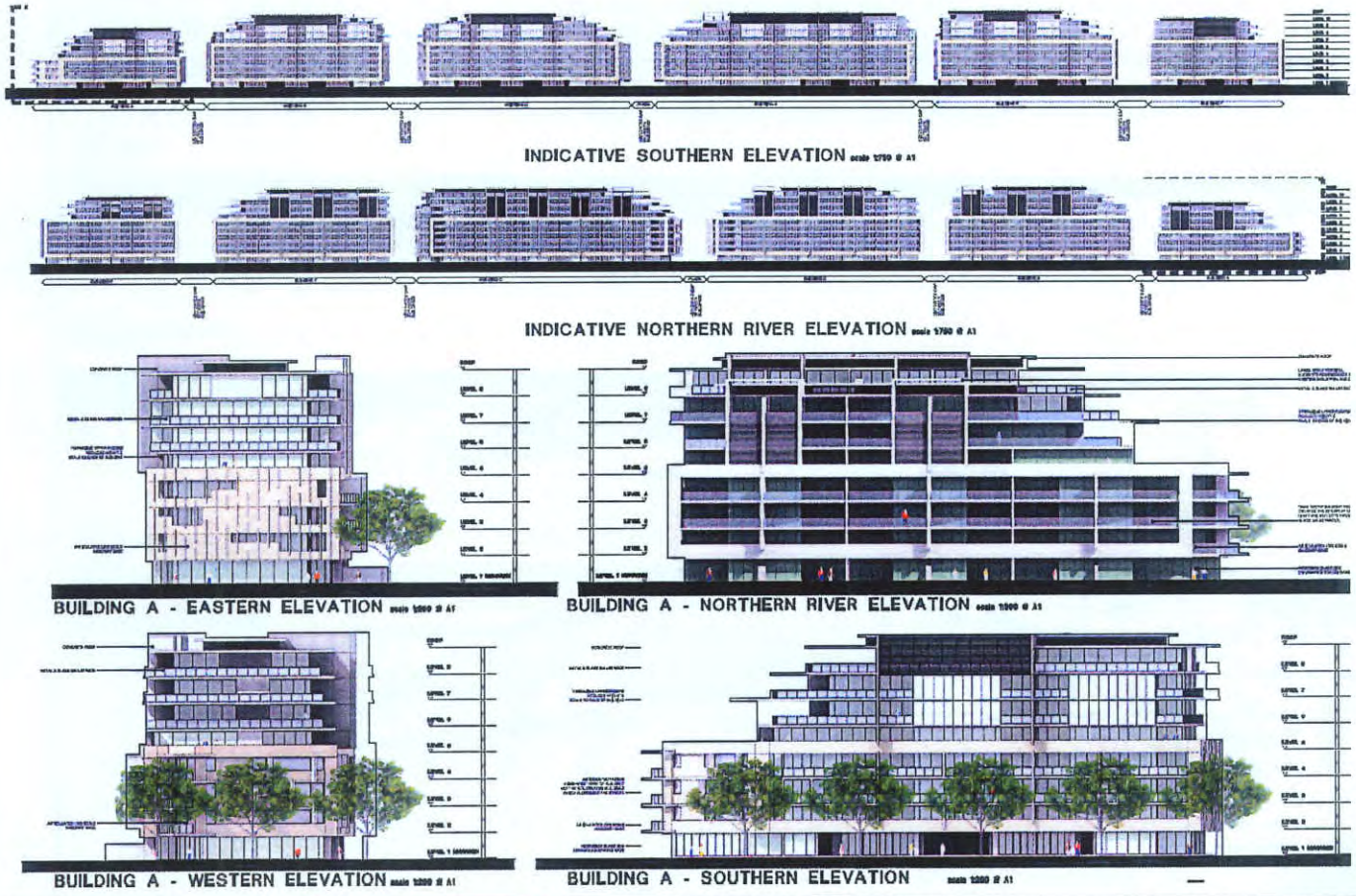


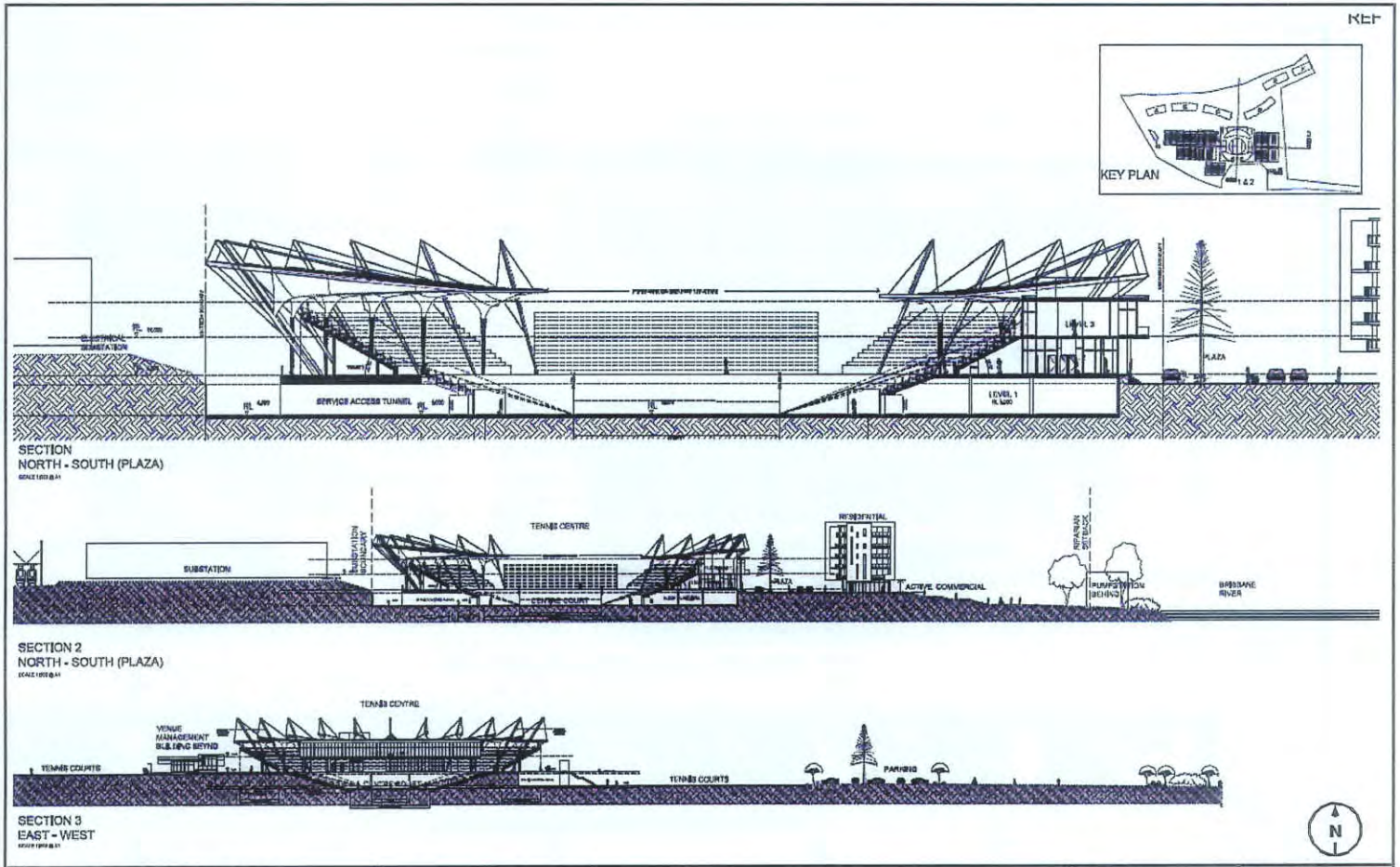
Palmer Acoustics Pty Ltd Acoustic Engineers & Scientists	Title: Locality Plan	Sketch No.: 1	Project Number: 2319
24 Mexicanus Drive Park Ridge, QLD 4125 Australia Ph (07) 3802 2155 Fax (07) 3802 2166	Project: State Tennis Centre	Date: 11/10/05	Scale: NTS



Palmer Acoustics Pty Ltd Acoustic Engineers & Scientists	Title: Tennis Stadium Floor Plan	Sketch No.: 2	Project Number: 2319
24 Mexicanus Drive Park Ridge, QLD 4125 Australia Ph (07) 3802 2155 Fax (07) 3802 2166	Project: State Tennis Centre	Date: 11/10/05	Scale: NTS



Palmer Acoustics Pty Ltd Acoustic Engineers & Scientists	Title: Residential Elevation Plan	Sketch No.: 3	Project Number: 2319
24 Mexicanus Drive Park Ridge, QLD 4125 Australia Ph (07) 3802 2155 Fax (07) 3802 2166	Project: State Tennis Centre	Date: 11/10/05	Scale: NTS



Palmer Acoustics Pty Ltd Acoustic Engineers & Scientists	Title: Section Plan	Sketch No.: 4	Project Number: 2319
24 Mexicanus Drive Park Ridge, QLD 4125 Australia Ph (07) 3802 2155 Fax (07) 3802 2166	Project: State Tennis Centre	Date: 11/10/05	Scale: NTS

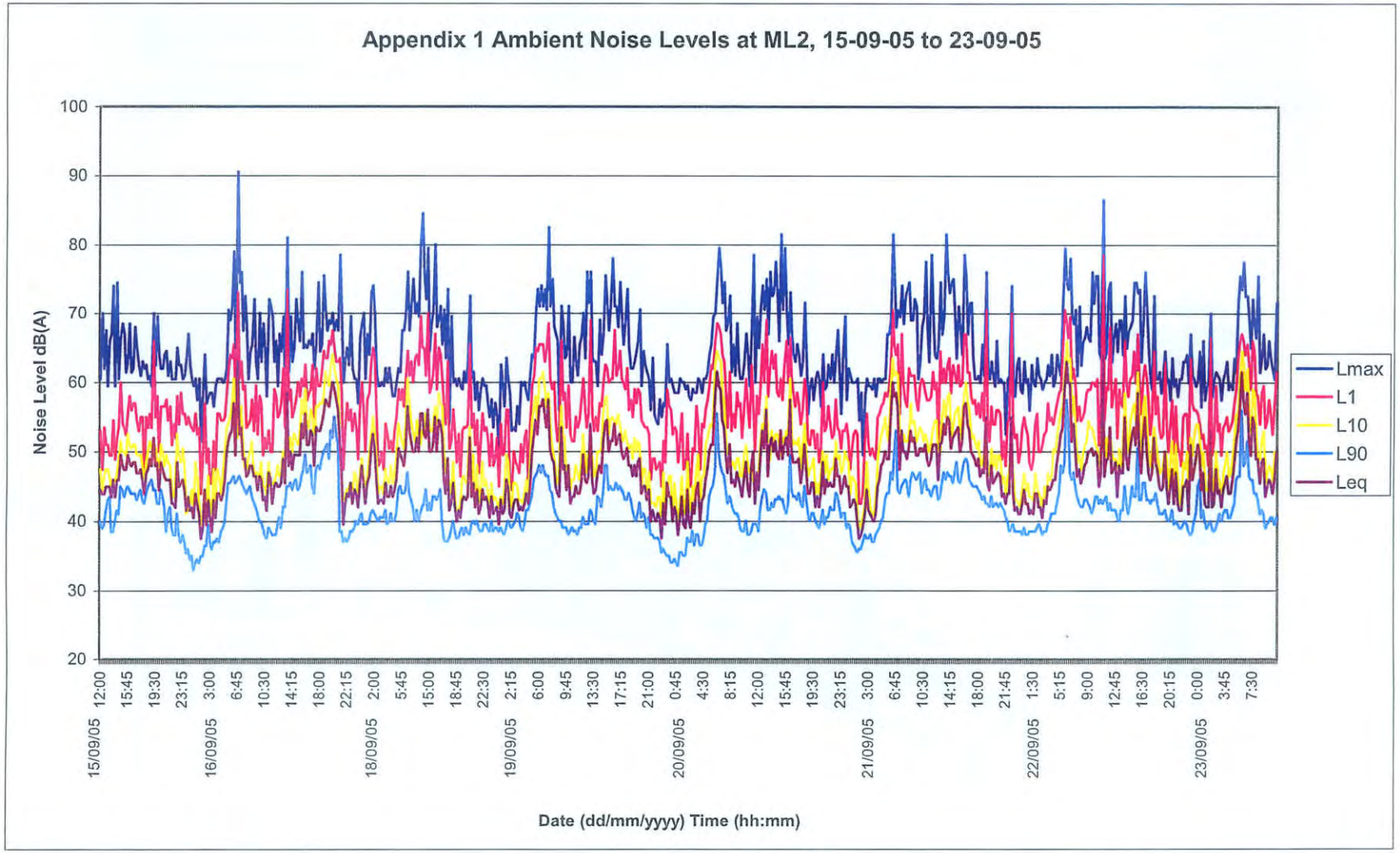
	Approx. Area of Parkland
Stage 1	2,413sqm
Stage 2	4,936sqm
Stage 3	4,669sqm
Stage 4	2,422sqm
Stage 5	4,233sqm
Total	18,673sqm

	Approx. Area of Residential Lots
Stage 1	4,178sqm Residential 5,122sqm Easements
Stage 2	8,646sqm
Stage 3	4,723sqm
Stage 4	5,883sqm
Stage 5	3,128sqm
Stage 6	1,922sqm
Total	31,610sqm Including Easements

Note 1: All areas are calculated from information taken from original survey drawing and are measured from the High Water Mark. (Refer Lawson Surveys Drawing 15110 Issue A Dated 5.11.2003) and are subject to resurvey.

Note 2: Individual areas are approximate only.

Palmer Acoustics Pty Ltd Acoustic Engineers & Scientists	Title: Staging Plan	Sketch No.: 5	Project Number: 2319
24 Mexicanus Drive Park Ridge, QLD 4125 Australia Ph (07) 3802 2155 Fax (07) 3802 2166	Project: State Tennis Centre	Date: 11/10/05	Scale: NTS


Appendix 1 Ambient Noise Levels at ML2, 15-09-05 to 23-09-05
Noise Level dB(A)
100
90
80
70
60
50
40
30
20
Lmax
L1
L10
L90
Leq
15/09/05 12:00
15:45
19:30
23:15
16/09/05 3:00
6:45
10:30
14:15
18:00
22:15
18/09/05 2:00
5:45
15:00
18:45
22:30
19/09/05 2:15
6:00
9:45
13:30
17:15
21:00
20/09/05 0:45
4:30
8:15
12:00
15:45
19:30
23:15
21/09/05 3:00
6:45
10:30
14:15
18:00
21:45
22/09/05 1:30
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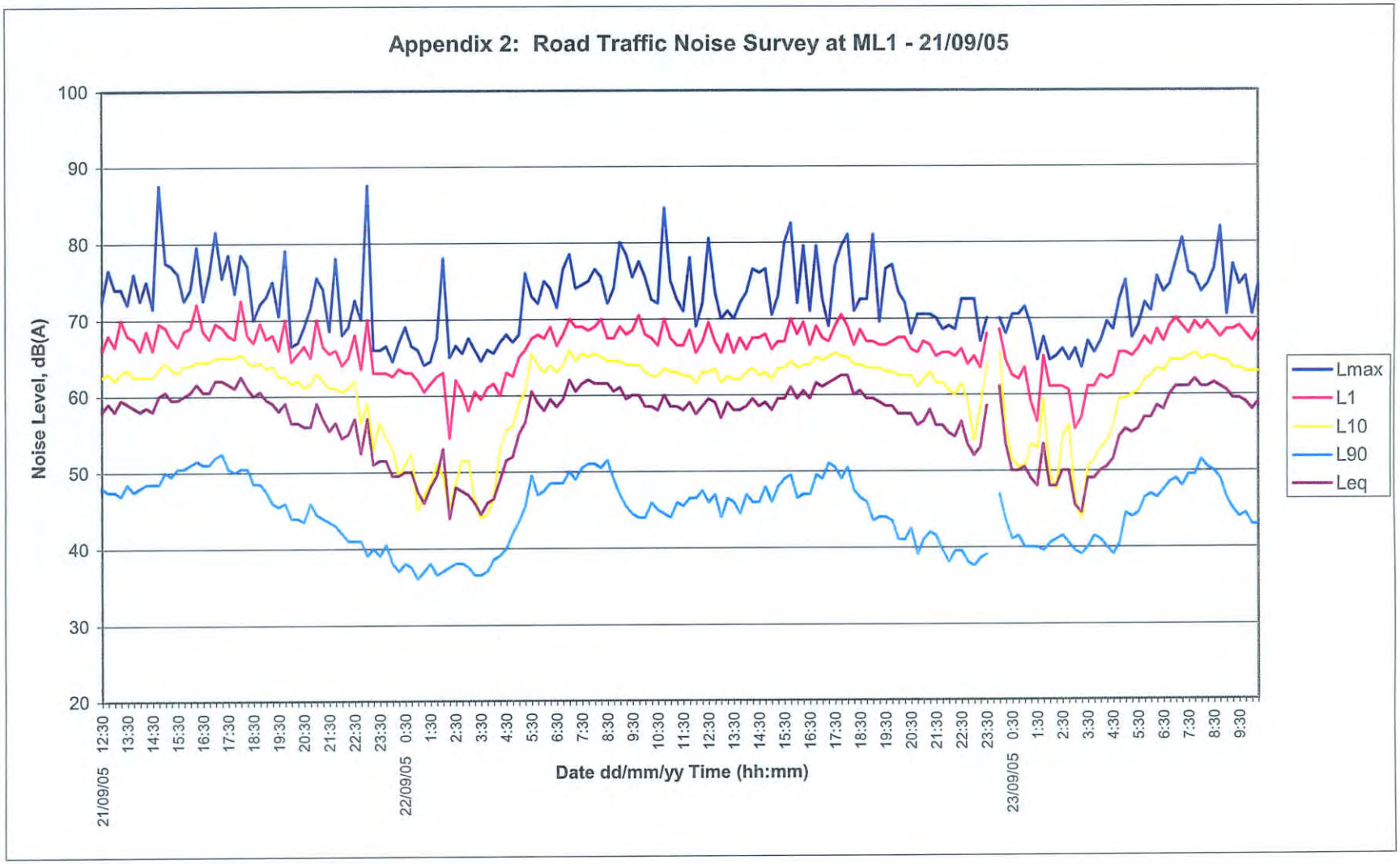
20:15
23/09/05 0:00
3:45
7:30
Date (dd/mm/yyyy) Time (hh:mm)


Appendix 2: Road Traffic Noise Survey at ML1 - 21/09/05
Noise Level, dB(A)
100
90
80
70
60
50
40
30
20
Lmax
L1
L10
L90
Leq
Date dd/mm/yy Time (hh:mm)
21/09/05
22/09/05
23/09/05

APPENDIX M – COMMUNITY CONSULTATION

APPENDIX M – COMMUNITY CONSULTATION

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APPENDIX M – COMMUNITY CONSULTATION

2.1 Background

In June 2005 Mirvac was announced as the preferred developer of the new State Tennis Centre and associated residential development. The site will be redeveloped to provide an international class tennis facility with a 7,000 seat capacity centre court (5,500 permanent and space for 1,500 temporary). An additional 22 match and training courts will also be constructed providing the three 'grand slam' surfaces- grass, clay and acrylic hard court.

As part of the development of a concept for the site, Mirvac prepared a consultation strategy setting out the consultation methodologies, processes and activities. This strategy has prepared by Mirvac, with input from the Department of Local Government, Planning, Sport & Recreation, and sets out the way forward for consultation for the development of the site.

The consultation process will be implemented by Mirvac and Promedia, Mirvac's consultation consultants. Dedicated Stakeholder Liaison Representatives have been appointed to manage the consultation strategy and to act as the primary point of contact for stakeholders. This role will be promoted to the community in all consultation material.

This process will compliment the formal public notification process under IPA.

This report summarises the consultation methodologies and approaches outlined in the strategy, the results of consultation activities to date and addresses the principles of the Consultation Planning Scheme Policy.

2.2 Consultation Methodology & Processes

2.2.1 Methodology

The methodology is based on a continuous process of communication and consultation to build stakeholder relationships:

- Consultation based on stakeholder information requirements e.g. local resident concerns relating to noise and dust during demolition and remediation
- Communicate based on emerging communities of interest e.g. local resident associations
- Manage emerging issues using communication tools and techniques targeted to each group e.g. one-to-one briefings with Councilors
- Evaluate outcomes based on stakeholder information needs .

This methodology is illustrated in the diagram below.

It is noted that the diagram represents a continuous cycle of information and each phase of activity relates to maintaining secure and transparent relationships with all stakeholder types, while noting that different stakeholders require a different frequency, level and intensity of communication.

2.2.2 Consultation Process

The process of implementing a community consultation and communication strategy for TRD involves a number of key stages and these are described below.

Stage 1 - Stakeholder identification:

A comprehensive list of broad stakeholder groups has been developed in including:

- BCC, State Government, Commonwealth Government, Site specific stakeholders, site users, media, residents and business, transport interest groups, local area stakeholders, others.
- An initial ranking of stakeholders.

It is noted that stakeholder analysis and ranking is an integral part of the early works and post-construction phases of the project and that rankings are likely to change throughout the life of the project

Stage 2 – Stakeholder analysis: development of a stakeholder matrix based on:

- Residential demographics, interest group agendas, elected representative agendas and concerns, general public awareness and media profiles based on coverage following the announcement
- Build dialogue with local residents immediately adjacent to the development
- Identify key member of the Tennyson Resident's Association
- Develop relationships with community and sporting associations in the area
- Maintain regular contact with construction sub contractors

The stakeholder matrix will be maintained by Mirvac and Promedia and reviewed regularly.

Stage 3 – Stakeholder profiles

Using the matrix, the next stage of stakeholder management involves identifying broad communities of interest between stakeholder groups and the 'stake' each stakeholder group holds in the development process:

- Previous behaviour – existing interests, agendas and issue
- Links to others stakeholder groups – relationships between stakeholder groups and how this might build into a 'community of interest'
- Proposed action – including activities completed, responsibility for activities and the specific form that stakeholder communication will take e.g. letter, meeting etc.

These headings will be used to build detailed stakeholder profiles for each stakeholder group.

Stage 4 - Identification of consultation and communication techniques

Using the stakeholder analysis and stakeholder profiles, consultation and communication techniques can be matched to the requirements of each stakeholder group. The broad list of techniques available includes:

- letters (direct mail)
- brochures/newsletters/information sheets
- website
- public displays
- private briefings for key stakeholders
- media releases/briefings/site tours
- open days
- community liaison committee
- dissemination of collated issues and response to those issues
- community feedback day
- background briefings
- photo opportunities

2.2.3 Resolution of Stakeholder Issues and Enquiries

Issues or enquiries raised during the community consultation process by stakeholders will be answered and addressed within a timely manner.

An issue register will be developed which will address:

- Date, stakeholder group, issue owner and background to the issue
- Priority of the issue and its likely impact: high, medium, low
- Recommended tools and techniques to manage the issue
- Discussion of how issue will be addressed either through further information or via considering amendments to scheme.
- Status of the issue following consultation and remediation including status: open, closed, pending

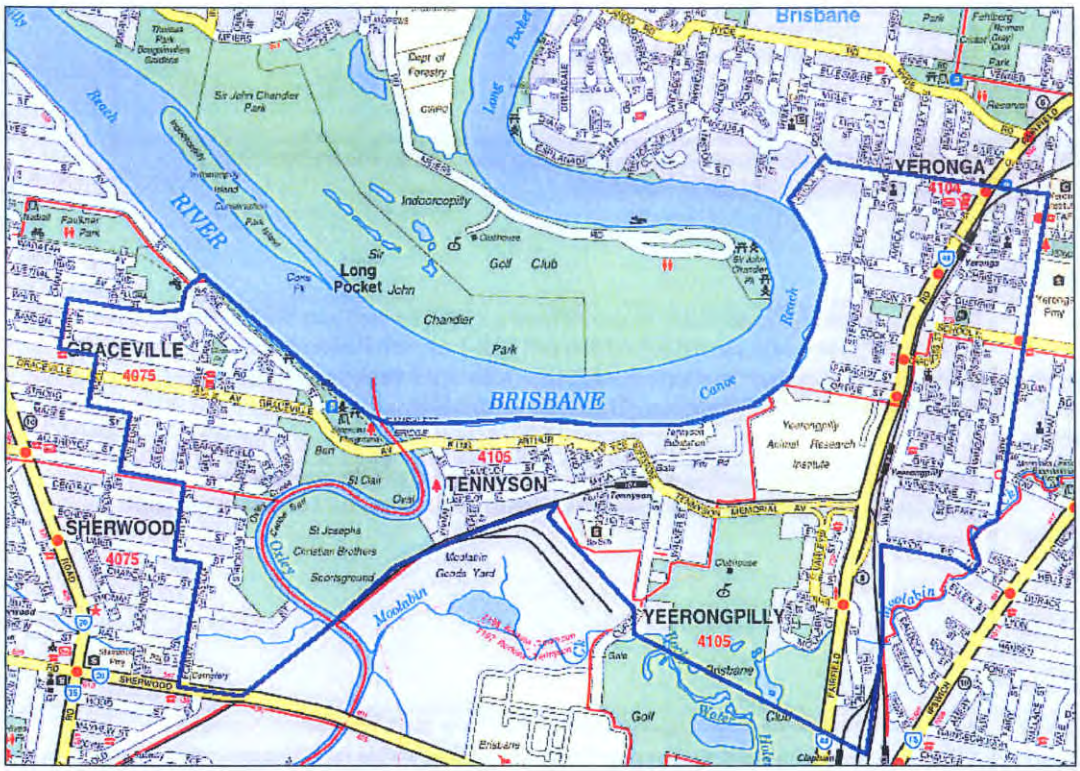
2.2.4 Consultation Planning Scheme Policy

The following section addresses the Consultation Planning Scheme Policy and how the core principles are achieved.

No.	Principle	How Principles are Achieved
1.	People affected have the right	The area defined for consultation includes the surrounding suburbs and relevant stakeholders and groups outside these areas have been nominated. The local consultation

	to participate	area is identified in Figure 1.
2.	Consultation should be interesting & well resourced.	A range of consultation activities are identified in the Consultation Process outlined above will be carried out by Mirvac and Promedia.
3.	Consultation should commence early in the development	Mirvac's consultation process commenced shortly after Mirvac was announced as the preferred developer of the site in June 2005.
4.	History of previous consultation should be considered	Being a large prominent site many proposals have been put forward over the site. Most recently the State Government (QDLGPSR) met with Tennyson Residents Association to discuss their thoughts on the sites redevelopment. Mirvac's consultation process has considered the nature and outcomes of this prior consultation.
5.	The purpose, expected outcomes and decision making process should be communicated.	The objectives and consultation processes are defined in the different consultation mechanisms as appropriate. Each stage has a specific focus within the overall consultation process.
6.	A diversity of consultation techniques should be implemented	A range of consultation techniques are identified below in the 'Consultation Activities' sections. A wide range of techniques have been undertaken to date including an open evening, establishing the website and 1300 hotline number, small group meetings, newsletter distribution and displays in the local library.
7.	Consultation objectives should be matched with appropriate techniques	The consultation process described above demonstrates the intent to identify and analyse stakeholders and then set out a range of techniques to meet the requirements and issues identified.
8.	The consultation programme should be continually evaluated	Each time project materials are issued; audience evaluation techniques will be included to assess the effectiveness of project messages and positioning: • Tear-off response slips on project newsletters • Feedback forms at Open Days, public displays • Web-based questionnaire and email feedback form • Feedback via the 1300 number, including regularly updated Q&A's Information gathered from evaluation will be fed into the stakeholder issues database to ensure it is timely and up to date.
9.	Participants should be informed how their issues have been addressed.	Feedback is provided to participants in a variety of means depending on the consultation technique being used. For example, we aim to respond to all queries on the 1300 number or emails via the website within 48 hours. Similarly, after the Open Evening a follow up letter was sent was sent which summarised the outcomes of the meeting and discussed how issues would be addressed by Mirvac.

Figure 1: Local Catchment area defined for Consultation



2.3 Consultation Activities

2.3.1 Consultation Phases and Activities

The following consultation and communication activities have been identified.

1. Pre-announcement Phase Activities:

   - Establish 1300 telephone, email, post and fax information and feedback points for the duration of the project
   - Establishment and ongoing maintenance of stakeholder database
   - Agreement on media and content approvals process
   - Initial profiling of stakeholder groups following consultation
   - Library Open Day.

2. 'Early Works' Phase Activities:

   - Elected representative and departmental briefings
   - Stakeholder letters and stakeholder meetings/briefings advising of the development opportunities to provide feedback
   - Stakeholder meetings were appropriate arranged with key stakeholders to introduce the development and workshop any issues of concern or points of interest

- Production of media articles aimed at generating awareness in the broader community
- Provision of proactive information to the media
- Newsletter distribution in the immediate area surrounding the development

3. Pre-construction Phase Activities:

- Co-ordination of on-site media photo opportunities with key State Government and Tennis Queensland representatives and other stakeholders deemed appropriate.
- Produce regular Quest Newspaper advertorial columns (Southern News)
- Produce and distribute TRD newsletter to suburbs surrounding the Tennyson site
- Update project web site providing development details, updates on progress, conceptual images etc
- Stakeholder letters and advising of the development, the consultation programme and opportunities to view the plan.
- Library open day.

4. Construction Phase Activities:

- Elected representative briefings
- Construction notification letters to advise stakeholders and residents of the commencement of construction, timeframe for completion of milestones, possible traffic, noise or other disruptions that may result and completion of project milestones
- Production of media articles advising the commencement of construction and the completion of significant project milestones
- On-site media photo opportunities.
- Sod-turning ceremony involving the Premier and Treasurer and other key Government representatives and stakeholders to signify the start of work.
- Produce and distribute TRD newsletter to suburbs surrounding the Tennyson site
- Update project web site to advise of construction progress, along with milestone timing information
- Continue with regular TRA contact

5. Post-construction Phase Activities:

- Production of media articles to announce the completion of the development and promote the features of the new facilities
- Produce and distribute TRD newsletter to advise residents in the broader area of completion of the development and promote the new facilities
- Produce media features for metropolitan and local papers featuring the benefits of the State Tennis Centre
- Consider local residents Open Day to tour the site prior to launch
- Develop media launch/official opening (coordinate with SRQ and TQ)
- Ensure consultation activities are refined and continued into the post-launch phase

2.3.2 Consultation and Responses to Date

Early Responses

Issues raised by residents so far include:

Traffic

- Construction traffic routes
- Subcontractor parking
- Timing of Fairfield Rd intersection

Visual impact

- Concern about heights of buildings and their impact on the visual amenity of the area
- Visual impact of lighting towers
- Impact to current sight lines to the Brisbane River for selected properties

Noise

- Construction noise
- Operating hours

Other

- Construction dust

Operational impact

- Increased traffic in local streets
- Concern about impact of buses on the local area on event days
- Concern about 'parking out' of local residential streets
- Potential apathy about the use of public transport to reach the venue
- Impact of major event spectator noise on surrounding properties
- Concern about patron behaviour if licensed bars are included in the development or STC
- Impact of noise on surrounding properties during normal operations
- Impact of lighting spill in surrounding properties
- Concern about litter generated by event patrons
- Operating hours concerns – impact of early morning and evening use
- Comparisons to a Suncorp stadium through media or community opposition

Newsletter Distribution

A series of newsletters will be produced and distributed to residents in the local consultation area identified in Figure 1. The first newsletter was produced in September 2005 and is attached in Appendix 2. The next newsletter is programmed for distribution in November/December 2005.

Tennyson Residents Association Meeting

Approximately 120 people attended an Open Evening targeted at the Tennyson Residents Association and residents who had expressed concern about specific issues though the website and 1300 number. Issues raised at the meeting included:

- Traffic management, local parking and routes during construction
- The provision of a public boat ramp
- Traffic routes during the operation of the State Tennis Centre
- Future plans for the Animal Research Institute site
- Local parking when the State Tennis Centre becomes operational
- Proposed bus set-down and pick-up areas in Softstone Street
- Impact of the entrance and exit to the State Tennis Centre on Ortive Street
- Proposed changes and upgrades to local public transport.

These issues have been fed back to the project team to be addressed, where appropriate, as the master planning progresses.

Fairfield Library Display

A display was held at the Fairfield Library from 26 September to 2 October, 2005. This was promoted in the September newsletter attached in Schedule 2. The display included boards describing the proposed development and providing contact details. Feedback forms and a feedback box were provided and 1 feedback form was received.

2.4 Summary

In summary this report has described the consultation process Mirvac is undertaking for the Tennyson Riverside Development.

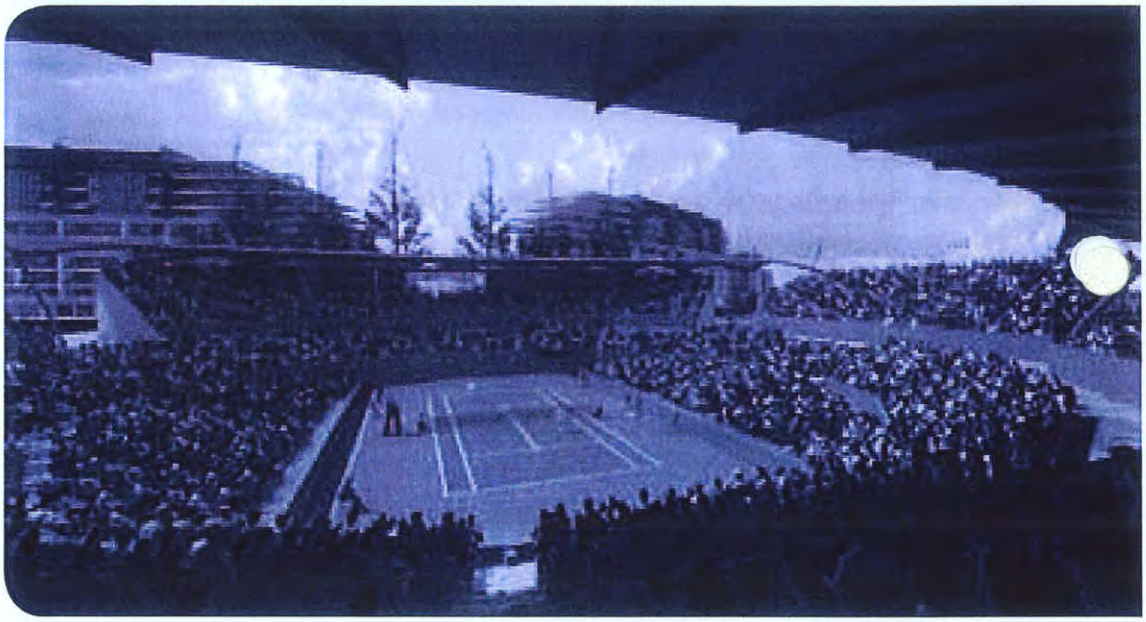
The process of consultation for the project is an ongoing one. Initial consultation has been undertaken which has raised a number of issues to be considered in the development.

Based on the methodologies outlined in this report, the consultation process will continue throughout the development process from the submission of the Development Application, commencement of demolition and remediation and construction.

Newsletter

TENNIS@TENNYSON

ISSUE 01 SEP 2005



New State Tennis Centre

"It is fantastic for the State and for tennis."

Ashley Cooper
President, Tennis Queensland

The announcement of a new State Tennis Centre in Brisbane is already having a positive impact on tennis at grass roots level, according to the President of Tennis Queensland, Ashley Cooper.

Mr Cooper said he recently attended a junior player's camp at Rockhampton and was thrilled to see the enthusiasm and excitement the young players were showing towards the new centre.

"It is every young player's dream to ultimately play on centre court and these kids are thrilled that Queensland will once again have a centre where they can achieve their ultimate goal," he said.

Mr Cooper, who won Wimbledon in 1958 and also took out the Australian and US Open championships, has been President of Tennis Queensland for the past nine months and was Vice President for six years before that.

"I got involved with Tennis Queensland with the specific goal of trying to see a new State Tennis Centre become a reality," he said.

He said the State Tennis Centre would be the only one in Australia with three grand slam surfaces and it would attract major tournaments to the State.

"Since Milton closed there is no doubt that tennis in Queensland has slipped because there simply are not the courts available to see the sport grow," he said.

"There has been nothing of significance built in 20 years and this new centre, which will be world class, will lift the profile of the game, provide a breeding ground for young up and coming champions and clearly put Queensland back on the tennis map nationally and eventually internationally.

Facts at a glance

The State Tennis Centre

Designed by internationally recognised stadium designers HOK + Sport + Events and The Mirvac Group's in-house architectural practice, HPA Pty Ltd.

Home of the Queensland Academy of Sport's tennis program.

The State Tennis Centre will include:

> A 5,500 seat centre court with capacity for 1,500 extra seats.

> 22 International Tennis Federation standard match and training courts including two grass courts, four clay courts and 16 hard courts.

> Administrative, commercial and support facilities including change rooms, pro shop, café, media facilities and function rooms.

> Administrative offices for Tennis Queensland.

Associated Development

> Developed by leading national property company The Mirvac Group with over thirty-three years of integrated property experience.

The associated development consists of:

> Approximately 385 high quality apartments in six buildings.

> Extensive public landscaped parklands, bikeways and pathways for jogging and walking.

> Provides public access to this stretch of the Brisbane River for the first time.

Project Timeline*

Oct 2003 State Government and Tennis Queensland identify requirement for new State Tennis Centre and call for development proposals.

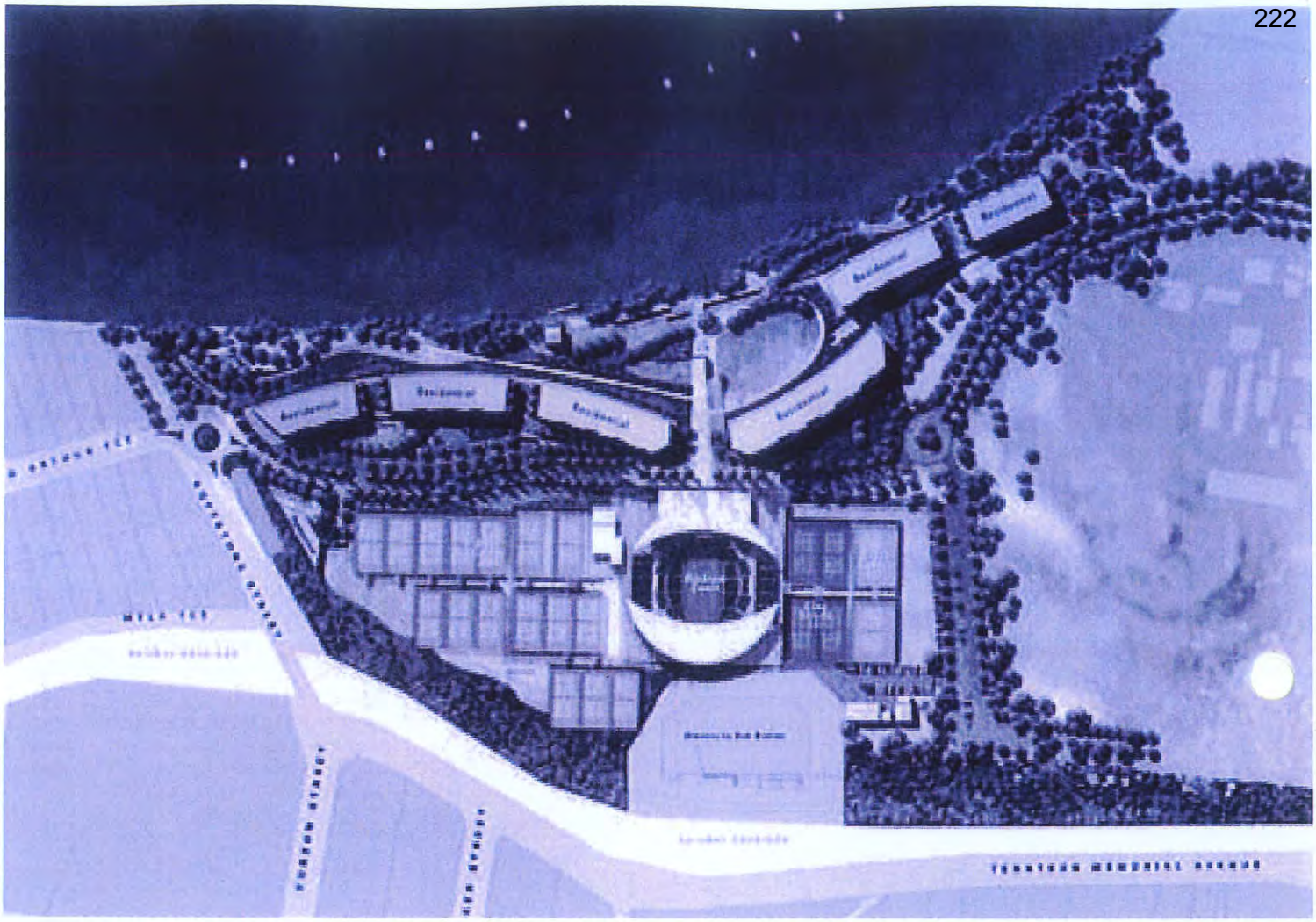
Jun 2004 Shortlisting of three developers.

Jun 2005 Mirvac announced as the preferred developer for the Tennyson Riverside Development.

Dec 2005 Commencement of demolition. of existing power station and site remediation.

Dec 2008 Completion of first stage; comprising of the State Tennis Centre, Plaza, 120 residential apartments and extensive parklands.

* Future dates are approximate.



Tennis the winner with new centre

The disused Tennyson Power Station site will be transformed into a world standard tennis facility linked to a fully integrated luxury riverfront residential precinct.

The site will be the home of a new State Tennis Centre – the first purpose-built facility in Australia which will feature all three 'grand slam' surfaces, grass, clay and acrylic hard courts.

It will include an international-standard acrylic hardcourt centre court with capacity to accommodate 7000 spectators, and 22 International Tennis Federation standard match and training courts including 16 acrylic hardcourts, four clay courts and two grass courts.

In addition administrative, commercial and support facilities including change rooms, a pro-shop, café, media facilities, function rooms and the administrative offices for Tennis Queensland will be included. The centre is expected to be completed in December 2008 and operational early in 2009.

The State Government recently announced its selection of national development company Mirvac as preferred developer of the new State Tennis Centre and the associated residential precinct.

Mirvac's proposal for the 12 hectare site includes the development of 385 residential units on the currently decommissioned and unused power station site. This integrated project will also provide public access to the Brisbane riverfront and improvements to local infrastructure including pedestrian and bicycle pathways.

The residential development will comprise six buildings, all positioned in a manner to minimise any visual impact on the surrounding area.

"The end result will be a $540 million fully integrated residential and recreational precinct where people will be able to enjoy one of the best living environments in the world," said Mirvac's Queensland CEO Chris Freeman.

"They will enjoy luxury accommodation and access to tennis, rowing, golf, gymnasiums, swimming pools, running and walking tracks and the sophistication of coffee shops and retail outlets."

Demolition and site remediation works are expected to start on site in December this year and be complete in October 2006.

Mirvac is committed to undertaking a comprehensive community consultation process prior to works starting on-site. Mirvac will keep local residents, businesses, community groups and other key stakeholders updated on the construction program and will be active in addressing community concerns to minimise the impact on the surrounding area during construction and once the development is complete.

Mr Freeman said Mirvac had engaged international designers of stadiums HOK+Sport+Venues who worked in conjunction with Mirvac's own in-house architects HPA to help evolve the vision for the new State Tennis Centre.

Australian tennis icon John Newcombe was also engaged in the planning stages to ensure that the best outcome is delivered from both a players and a coaches perspective, said Mr Freeman.

Queensland has a distinguished tennis history and has produced some of the world's best tennis players.

Why does Queensland need a new state tennis centre?

Chris Freeman
CEO, Mirvac Queensland

However, tennis in Queensland has been adversely affected by the absence of a principal tennis development venue since the closure of the long-time 'home' of Queensland tennis, Frew Park at Milton in 1999.

Tennis in Queensland has experienced significant increases in participation in recent years, but this interest has been tempered by a reduction in the number of tennis facilities throughout the State.

Tennis Queensland, which identified the Tennyson Power Station site as the ideal location for a new State Tennis Centre, estimates 300 tennis courts used for fixtures, tournament play and social purposes have been lost in Queensland over the past 20 years.

The State Tennis Centre will provide an important addition to the State's inventory of sport and recreation facilities

The new State Tennis Centre will assist in addressing the declining availability of courts in Queensland.

The State Tennis Centre will provide an important addition to the State's inventory of sport and recreation facilities, which will provide further opportunities for the community to participate in sport and active recreation.

It is important to the development of the State's future tennis champions and will provide an important impetus for the future development of tennis state wide.

Tennis Queensland says it will use the new centre for coaching and training elite players and squads and it will also be the home of the Queensland Academy of Sport's tennis program.

The Queensland Government, through Sport and Recreation Queensland, will own the State Tennis Centre and will enter into an operating agreement with Tennis Queensland to operate the centre. The cost of court hire and the scheduling of tournaments will be determined by the operator and will not be known until the centre is open.

Traffic and Parking Solutions

Minimising the impact of the Tennyson Riverside Development on local residents and businesses is a major priority and Mirvac will ensure strategies are implemented to minimise any impact both during construction and after the facility is complete.

As a result of community consultation, the State Government has approved vehicular, pedestrian and bicycle access to the Tennyson Riverside Development site through the adjoining Animal Research Institute site.

Improvements to public transport infrastructure, on-site parking and vehicle access through the development have been designed to minimise traffic volume on existing streets and encourage the use of public transport.

Mirvac will work closely with the Brisbane City Council, Queensland Rail and the Government to minimise any impacts on neighbouring residents and businesses.

The proposed Tennyson Riverside Development includes 138 on-site parking spaces for the State Tennis Centre in addition to adequate basement carparking for residents and on grade visitor parking for each apartment building. This will minimise parking problems in nearby streets.

When the State Tennis Centre is completed and operational it is expected that the majority of visitors for major events will travel by train and bus.

An overhead walkway will be built over Fairfield Road to provide access from the Yeerongpilly Railway Station to a pedestrian walkway connecting with the Tennyson Riverside Development. A multi-bay bus set down area on Softstone Street will support the site on event days.

These public transport infrastructure improvements will also benefit the local community and businesses.

Impacts during demolition and construction

The demolition of the existing power station will be undertaken as part of the Tennyson Riverside Development to improve the amenity and future layout of facilities.

It is expected that work on site will commence in December 2005 and be completed in October 2006. The power station will be demolished gradually with demolished material being crushed on-site, stockpiled and recycled as fill, while scrap steel will be transported off-site and disposed of appropriately.

The building is in a derelict state and it is not heritage listed. The State Government is engaging Mirvac to demolish the power station and remediate the site.

Its removal will enable testing of the land for contamination and site remediation so that future development can occur on a fully remediated site.

The demolition will be undertaken with regard to the highest standards of safety, planning and management and with expert oversight and certification where required.

In line with the requirements of the State Government, Mirvac will implement strategies to minimise noise, vibration, dust and traffic impacts and mitigate against other potentially negative impacts during demolition and construction.

Mirvac will comply with all the requirements of the Environmental Protection Agency, the Brisbane City Council, Queensland Transport and all other regulatory authorities in the demolition and construction phase.

A comprehensive community consultation program will be implemented with all local residents, businesses, community groups and other stakeholders to ensure they are fully informed and kept up to date during each stage of the development.

Fairfield Library Tennyson Display

A model of the State Tennis Centre and associated riverside development will be on display at the Fairfield Library from Friday August 26 – September 2.

Fairfield Library is located in the Fairfield Gardens Shopping Centre in Fairfield Road. Hours are as follows:

Tuesday/Wednesday	10am-6pm
Thursday	9am-7pm
Friday	10am-5pm
Saturday	9am-2pm

For details please phone 07 3403 8615

TENNIS@TENNYSON

BCC.064.0229

"We have an uncompromising commitment to quality, architectural excellence and creating living spaces for people which deliver the optimum lifestyle."

Mirvac's proud development record

Mirvac's selection by the Government as the preferred developer of the Tennyson Riverside Development including the new State Tennis Centre is the latest in a long line of high quality and successful projects the company has undertaken in Brisbane.

A publicly listed, fully integrated property company with more than three decades of experience nationally, Mirvac has undertaken some of Brisbane's most high profile developments.

Riverfront projects such as Cutter's Landing at New Farm, Waterline at Bulimba and Mariner's Reach at Newstead have all been remarkable successes for the company.

In the future Newstead Riverpark, on the river at Newstead and the Tennyson Riverside Development, will continue the Mirvac tradition for high quality residential development with exemplary recreational facilities.

"Mirvac takes a great deal of pride in what it creates and we become an integral part of the local community in whatever area where we are active," said Mirvac Queensland CEO Chris Freeman.

"The Tennyson Riverside Development represents a generational opportunity to create a facility for the people of Queensland which will combine lifestyle, recreation, fitness, entertainment and living in a way never before achieved.

"We are totally committed to working with the State Government, Tennis Queensland and the broader community to make Tennyson something the whole of Queensland can be proud of."

Mirvac's Queensland Projects

Current Projects

Cutters Landing New Farm

Ephraim Island Gold Coast

Waterline Bulimba

Park Hill Village Murarrie

Mossvale on Manly Wakerley

Moggill Heights Moggill

Newstead Riverpark Newstead

Historical projects

Beaches Gold Coast

Quay West Brisbane CBD

The Sebel Suites Brisbane CBD

Grosvenor Brisbane CBD

Greenwich New Farm

Portside Bulimba

Mariner's Reach Newstead

The Arbour on Grey Southbank *including Publicis Mojo House, Southbank and Little Stanley Street,* South Bank

Liberty on Tedder Gold Coast

Ormiston Springs Ormiston

Hetherington Close Sunnybank

Kawana Shopping World Sunshine Coast

189 Grey Street South Bank

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APPENDIX N – STATE COASTAL PLAN

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2.0 Introduction

Overview

The State Coastal Management Plan (State Coastal Plan) has been developed under the Coastal Management and Protection Act, 1995 (the Act). It describes how the coastal zone and its resources are to be managed and has statutory effect under the Act. Further, the State Coastal Plan has the effect of a State Planning Policy under the Integrated Planning Act, 1997. It is implemented by State and Local Governments in making decisions on relevant planning and land management activities in the coastal zone that may adversely impact on coastal resources.

This report addresses the relevant outcomes, principles and policies of the State Coastal Plan in relation to the Tennyson Riverside Development and includes relevant initiatives being considered by Mirvac.

The project involves the development of a new State Tennis Centre (STC) and the Tennyson Residential Development (TRD) on the site of the former Tennyson Powerhouse located on Tennyson Memorial Avenue and Softstone Street Tennyson. The development includes the following components:

State Tennis Centre

- World class tennis centre with a 7,000 seat capacity
- 22 match and training courts (grass, clay and acrylic hard court "grand slam" surfaces)
- Facilities for community tennis
- Tennis Queensland Headquarters
- Home base for Queensland Academy of Sports tennis program
- Car parking

Residential, Retail and Commercial Development

- 6 residential apartment buildings (385 apartments)
- Retail and commercial space on the lower floor
- Gymnasium
- Swimming pool/s
- Car parking.

Site Description

At the time of lodgement it is anticipated that a reserve for sport and recreational purposes will have been granted to the Department of Local Government, Planning, Sport and Recreation over the subject site.

The real property description of the reserve is:

Lot 1 on SP 164685

County Stanley

Parish Yeerongpilly

Title Reference: 49104467.

It is expected that the following easements will be registered on the reserve at the time of application:

Queensland Electricity Transmission Corporation Limited (Powerlink)

- Easement B on SP 184023 benefiting Lot 2 on SP164685 for electricity and access purposes.

Energex Limited

- Easement A on SP184022 for electricity purposes
- Easement B on SP184023 for electricity purposes
- Easement C on SP184024 for electricity purposes

Lot 566 on SP 104107, which accommodates the Department of Primary Industries and Fisheries Animal Research Institute (DPI&F site), is included in the subject application only for the purposes of the following components of the development:

- The main access road to the proposed development is from Fairfield Road;
- The pedestrian/cycleway which connects the proposed main access road to the foreshore area of the subject site;
- The pedestrian pathway connecting the main access road to the proposed overbridge to Yeerongpilly Railway Station at the Fairfield Road frontage of the site; and
- Car parking associated with the State Tennis Centre.

Other than an amended access arrangement to the Institute, no changes to the Institute activities are proposed as part of this application.

The site is bounded by the Brisbane River to the north, Softstone Street and the eastern end of King Arthur Terrace to the west, the Corinda Yeerongpilly Rail corridor and Tennyson Memorial Drive to the south and the DPI&F site to the east. The site upon which the State Tennis Centre and proposed residential development is to be developed currently contains the now decommissioned Tennyson Power Station and other ancillary buildings and structures.

The area on the DPI ARI site that is proposed to be developed to accommodate the proposed access road is presently mostly paddock for animals used in Institute activities.

Figure 1 in Appendix A provides an aerial photograph of the site.

2.1 Compliance with State Coastal Management Plan

It is recognised that the use and development of the coastal zone must occur in an ecologically sustainable manner. The State Coastal Plan seeks to provide principles and guidelines in the management of development within the coastal zone. The following explanation provides details to demonstrate how the works proposed by Mirvac for the Tennyson Riverside Development meet those principles. Each of the ten Coastal Management Outcomes has been addressed with an explanation of how the development meets the relevant principles and policies where they apply.

2.1.1 Coastal Use and Development

Coastal Management Outcome – Use and development of the coastal zone occurs in an ecologically sustainable manner.

A major aim of Mirvac aim to incorporate best practice and explore opportunities for sustainable large scale development/redevelopment projects. The design and construction of the STC and the Multi-Unit Residential Development are to adopt the following ESD principles:

- Passive design;
- Energy conservation;
- Water conservation;
- Minimisation of fossil fuel usage associated with transport;
- Preservation of natural features;
- Protect and improve biodiversity;
- Building materials conservation;
- Waste minimisation; and
- Enhancement of indoor air quality.

To date, a preliminary assessment of potential ESD initiatives has been undertaken with a number of potential initiatives identified. The preliminary assessment of potential inclusions has been developed via a number of ESD workshops, discussions with Cutters Landing and Riverpark personnel and based on the experience of the specialist consultants on the ESD Committee.

To date the initiatives identified for assessment include:

APPENDIX N – STATE COASTAL PLAN

PASSIVE DESIGN

Design for climate
Choosing a site
Orientation
Passive solar heating
Passive cooling
Insulation
Thermal Mass
Glazing
Shading
Rating Tools

WATER USE

Reducing water demand
Rainwater
Wastewater re-use
Stormwater
Outdoor water use
Sewer Mining

MATERIALS USE

Embodied Energy
Waste Minimisation
Indoor Air Quality
Construction Systems
Biodiversity off-site
Re-use Recycling of Demolition Materials

ENERGY USE

White goods
Hot water service
Solar hot water
Heating and cooling
Lighting
Renewable energy general
Photovoltaic systems
Wind systems
Micro hydro/Tidal systems
Batteries and inverters

SITE IMPACTS

Biodiversity on site
Erosion and Sediment control
Noise control
Sustainable landscape
Rehabilitate Riparian Zone

OTHER IMPACTS

Streets and Communities
Transport
Health and Safety
The adaptable house

MISCELLANEOUS

Monitoring
Marketing

A number of the above ESD initiatives comply with the Coastal Management Outcomes and Principles for coastal use and development. These initiatives are detailed in the relevant sections in this report.

2.1.1.1 Areas of State Significance

The site is not classified as an "area of state significance".

2.1.1.2 Settlement Pattern and Design

The site upon which the STC and proposed residential development is to be developed currently contains the now decommissioned Tennyson Power Station and other ancillary buildings and structures. The residential component consists of six residential apartment buildings (385 apartments) retail and commercial space on the lower floor. The redevelopment of this former industrial site meets the policy goal of the State Coastal Plan that favours consolidation of urban areas on the coast and development within existing urban areas.

The design will improve the marine environment of the Brisbane River via incorporating the following features:

- Water sensitive urban design principles that will improve the quality of stormwater entering the River
- Rehabilitation of the riparian zone
- Sustainable landscape design

The public will be able to access the site along the river bank via walkways and cycle ways and will be able to use public sporting facilities and open space areas.

2.1.1.3 Coastal Dependent Land Uses

Not applicable to this development.

2.1.1.4 Canals and dry land marinas

Not applicable to this development.

2.1.1.5 Maritime infrastructure

Maritime infrastructure such as jetties, pontoons, ramps, harbours or ports are not planned for this development.

The development will include the removal of an existing wharf which will allow regrowth of mangroves in this area. A public walkway will be constructed along the banks of the River. There will be a need to stabilise an eroded section of the River bank via a revetment wall. The walkway will be above this section of the Riverbank. These works will be in a limited area and Mirvac aim to construct these works above the MHWS boundary. These works will improve the riparian and marine environment in the long term via encouraging regrowth of mangroves and stopping erosion. The public will be able to access a section of the Brisbane River that was previously an industrial site and inaccessible to the public.

2.1.1.6 Extractive Industry

Not applicable to this development.

2.1.1.7 Mining and petroleum activities

Not applicable to this development.

2.1.1.8 Dredging

Not applicable to this development.

2.1.1.9 Reclamation

Not applicable to this development.

2.1.1.11 Tourism and Recreational Activities

The development will increase the recreational and tourism opportunities in the area. Improvements to and rehabilitation of the riparian and marine environment will likely enhance the experience of residents and visitors. The surrounding areas are residential and the redevelopment of this site from industrial to commercial and residential is compatible with the existing surrounding land use.

The landscape measures to improve the riparian zone and extensive landscaping using native plants will increase biodiversity on the site and surrounding areas. The public will be able to access the site via walkways and cycle ways and will be able to use sporting facilities and open space areas resulting in a diversity of tourism and recreational opportunities.

2.1.1.12 Rural Land Uses

Not applicable to this development.

2.1.1.13 Managing Water Resources

Mirvac do not propose to extract waters from the Brisbane River or any groundwater resources. Further, the proposal will include a suite of water quality improvement devices to ensure discharge quality from the site meets or exceeds relevant water quality objectives. Mirvac are investigating appropriate reuse options for waters generated on the site such as landscaping irrigation, toilet flushing, car washing and the like.

With regard to Acid Sulphate Soils, Mirvac propose that an ASS Investigation be undertaken in accordance with the Queensland Acid Sulphate Soils Investigation Team (QASSIT) Guidelines. This will involve the collection of field samples and laboratory analysis of the samples to accurately quantify potential impacts. This analysis is being undertaken as part of a comprehensive contamination assessment and remediation process for the entire site.

2.1.1.14 Fishing

Not applicable to this development.

2.1.1.15 Aquaculture

Not applicable to this development.

2.1.2 Physical Coastal Processes

Coastal Management Outcome – The coast is managed to allow natural fluctuations to occur, including any that occur as a result of climate change and sea level rise, and provide protection for life and property.

2.1.2.1 Adaptation to Climate Change

As the site is approximately 25 kms from the coastline it is not considered that it is within a highly vulnerable location in terms of impacts of the enhanced greenhouse effect on the coast. However, as the development is on the banks of the Brisbane River in a tidally influenced zone there may be some impact as a result of more extensive storm tide flooding.

Detailed flood studies including modelling of the Brisbane River have been undertaken by Mirvac's consultants. The outcomes of these investigations are to be included in the concept and detailed civil engineering design stages.

2.1.2.2 Erosion Prone Areas

Currently there is a small section of the riverbank that is currently undergoing active erosion. Mirvac propose as part of the development to incorporate stabilisation works as part of the public walkway construction. These works will be in a limited area and Mirvac aim to construct these works above the MHWS boundary. The remainder of the tidal zone is relatively densely vegetated with mangroves providing a level of protection from bank erosion.

Mirvac also propose to undertake restoration works within the riparian and tidal zones that incorporate the removal of redundant infrastructure, weed and litter removal and the dedication of the zone as public infrastructure. As such, it is not anticipated that the site will be vulnerable to erosion or encroachment from tidal waters within the 50 year planning cycle.

2.1.2.3 Shoreline Erosion Management

The detailed design has not been finalised however at this time it is assumed that a gabion revetment wall will be required along the eroded section of the riverbank as discussed in Section 2.2.2. Some fill may be required to be placed behind the revetment wall where the erosion has progressed landward. An alternative option is to construct a raised boardwalk without a revetment wall, however, as the river bank has suffered considerable erosion in places it was deemed important to stabilise the bank, to stop further erosion.

2.1.2.4 Coastal Hazards

As discussed in Section 2.2.1, detailed flood studies including modelling of the Brisbane River have been undertaken by Mirvac's consultants. The outcomes of these investigations are to be included in the concept and detailed civil engineering design stages. This will ensure the risks associated with coastal hazards at this site are recognised and appropriately addressed.

2.1.2.5 Beach Protection Structures

Not applicable to this development.

2.1.3 Public Access to the Coast

Coastal Management Outcome – Opportunities for public access to the coast are maintained and enhanced, consistent with the conservation of coastal resources and provision of public safety.

Public access to the site will be greatly improved allowing access for pedestrians and cyclists to the riverbank. An improved transport network to the site will be developed. The public will be able to walk or cycle along the pathways adjacent to the riverbank and will be able to access public open space areas.

Mirvac do not however, propose the inclusion of any infrastructure that enables direct access to the shoreline such as boat ramps or jetties. Concept and detailed design of the project will incorporate the values of the riparian communities associated with the site.

2.1.3.1 Future Need for Access

As this policy relates to foreshore areas of coastal waters only it is not applicable to this development.

2.1.3.2 Design of Access

As the development is not adjacent to the coast and does not restrict or impact on access to the coast, it is considered that this policy is not applicable. However, in relation to the reach of the river bordered by the site, Mirvac do not propose the inclusion of any infrastructure that enables direct access to the shoreline such as boat ramps or jetties.

2.1.3.3 Coastal Road Network

Not applicable to this development.

2.1.3.4 Vehicle Use on Beaches

Not applicable to this development.

2.1.4 Water Quality

Coastal Management Outcome – Water quality in the coastal zone is maintained at a standard that protects and maintains coastal ecosystems and their ability to support human use.

It is considered unlikely that the development will negatively impact on coastal ecosystems. However, the proposal will include a suite of water quality improvement devices to ensure discharge quality from the site meets or exceeds relevant water quality objectives. Wherever possible, waters generated on the site will be utilised on-site via appropriate reuse options such as landscaping irrigation, toilet flushing, car washing and the like.

A comprehensive stormwater quality investigation is being undertaken to determine the appropriate treatment train of improvement devices for the site. A stormwater Quality Management Plan will be prepared for the site.

2.1.4.1 Water Quality Management

As above, Mirvac propose to include a suite of water quality improvement devices to ensure discharge quality from the site meets or exceeds relevant water quality objectives. A Stormwater Quality Management Plan will be prepared for the site.

Preliminary investigation into site water quality improvement opportunities includes the following measures:

- Bioretention of stormwater for biofiltration;
- Grass swales for nutrient uptake and gross pollutant removal
- Storage and reuse throughout the site;
- Gross pollutant traps;
- Rehabilitation and restoration of the riparian zone that will improve the natural filtration processes of surface water prior to entering the Brisbane River.

2.1.4.2 Wastewater Discharges to Coastal Waters

Mirvac do not propose to discharge any wastewater to the Brisbane River. However, wastewater reuse options are currently being investigated for use on site. These include the treatment and reuse of grey water for non potable uses such as toilet flushing, car washing, and irrigation

As the reclaimed water will be reticulated and used in public areas it will be treated to the highest possible standard (Class A).

Run off from the used reclaimed water will be managed to ensure there is no run off, spray drift or percolation to groundwater. A Recycled Water Safety Plan will be prepared in accordance with the *Queensland Guidelines for the Safe Use of Recycled Water (ch 6).*

2.1.4.3 Waste Disposal Facilities

This is not applicable to this development as there will be no public waste disposal facilities, such as landfill sites, on site. Waste disposal facilities will be restricted to public litter and recycling containers and general storage areas for domestic and commercial waste. However it is proposed that the development will follow the Environment Protection (waste management) Policy waste management hierarchy i.e.

- Waste avoidance;
- Waste reuse;
- Waste recycling;
- Energy recovery; and
- Waste disposal.

2.1.4.4 Stormwater Management

As described in Section 2.4.1, site storm water quality will be managed by a Stormwater Quality Management Plan that incorporates an appropriate treatment train of stormwater quality devices and systems.

2.1.4.2 Groundwater Quality

Not applicable to this development.

2.1.4.3 Acid Sulphate Soils

A review of the Department of Natural Resources, Mines and Energy (DNRM&E) 1:100,000 Acid Sulfate Soils Series maps which provide a severity rating for known Acid Sulfate areas incorporated the site within the Category of "Land Not Assessed". As such, an additional review of Brisbane City Council's (BCC) Acid Sulfate Soils Map for Brisbane City indicated that the site held a Hazard Rating of 1 - Extremely Low, with a small component of Hazard Rating 2 - Low along the river frontage.

Mirvac propose that an ASS Investigation be undertaken in accordance with the Queensland Acid Sulfate Soils Investigation Team (QASSIT) Guidelines. This will involve the collection of field samples and laboratory analysis of the samples to accurately quantify potential impacts.
This analysis is being undertaken as part of a comprehensive contamination assessment and remediation process for the entire site.

Based on the analytical results of the ASS investigation, an Acid Sulfate Soil Management Plan may be required. It is likely that the Acid Sulphate Soil Management Plan would include:

- Liming Rates;
- Stockpile Management;
- Stormwater Management;
- Bunding Requirements; and
- General Management Strategies.

2.1.5 Indigenous Traditional Owner Cultural Resources

Coastal Management Outcome – The living culture of Indigenous Traditional Owners and their connection with cultural resources within the coastal zone is valued and continues for future generations of Indigenous Traditional Owners.

Due to the highly disturbed nature of the site, it is unlikely that Indigenous Cultural Heritage will be an issue at this site. However, Mirvac understand that the Brisbane River and its riparian corridor is important to indigenous groups and as such, their proposal to retain and enhance the riparian corridor and the subsequent handover as public open space will ensure the long term retention of this asset and it's values.

2.1.6 Cultural Heritage

Coastal Management Outcome – Places, buildings and objects with important cultural heritage values located on the coast are appreciated, conserved, managed and passed on to future generations.

2.1.6.1 Areas of State Significance (Cultural Heritage)

There are no known areas of State Significance within the proposal site.

2.1.6.2 Cultural Heritage

Mirvac recognises that the site holds some European Cultural Heritage value and as such have incorporated into their concept design the inclusion of aspects of the Power Station and its infrastructure including a riverside Pump House, control boards and the potential reuse of structural componentry of the existing building within site landscaping.

2.1.7 Coastal Landscapes

Coastal Management Outcomes – The scenic and cultural values associated with coastal landscapes are protected.

The area has been heavily disturbed, most recently being used as a coal fired Power Station. The redevelopment of the area will enhance the coastal landscape via rehabilitation and restoration of the riparian zone. The development will transform an industrial site to a site that is compatible with the current land uses. The scenic values of the coastal zone in the area will be enhanced and will be able to be accessed by the public.

2.1.7.1 Areas of State Significance (Scenic Coastal Landscapes)

Not applicable to this development.

2.1.7.2 Other Coastal Landscape Values

Not applicable to this development.

2.1.8 Conserving Nature

Coastal Management Outcome – Coastal ecosystems, including their ecological processes, opportunities for survival, biological diversity and potential for continuing evolutionary adaptation, are maintained, enhanced and restored.

Ecological assets and values of the site have been comprehensively investigated by Lambert & Rehbein's ecologist including the development of an inventory of flora and fauna species present on site. Ecological functions, as well as the overall ecological health of the site was also noted. Prior to this assessment, a preliminary ecological assessment was also undertaken by Lambert and Rehbein on June 18th, 2004.

The recent Ecological Assessment determined that the area within the proposed development site of greatest ecological significance is the riparian vegetation community that aligns the Brisbane River. This encompasses both the lower bank that is dominated by mangroves and the upper bank that is vegetated by canopy species including several large Forest Red Gums. It was noted, however, that this area was infested with exotic species and would benefit from rehabilitation as part of the development. The tidal area of the lower bank would also benefit from the removal of the extensive amount of rubbish that had accumulated there.

The riparian vegetation was determined to be significant for the following reasons:

- the habitat it provides to fauna (including food resources, cover, protection and nesting / denning sites);
- the potential role it has as a wildlife movement corridor;
- the role it plays in riverbank stabilisation; and
- the role it plays in buffering pollutants before they enter the river.

All other areas on site are of relatively low ecological significance.

Mirvac propose to address the ecological values of the site through an appropriate level of environmental management and planning. Currently, this includes:

- In order to preserve habitat and biodiversity values of the site, riparian vegetation will be retained to the greatest extent possible. Where possible, the Forest Red Gums aligning the upper bank will be retained particularly the hollow bearing Forest Red Gum highlighted in this report;
- Vegetation to be retained will be clearly identified during the demolition and construction stages of the development so that unnecessary damage that may affect the health of this vegetation is avoided;
- Infrastructure Planning will be designed to minimise the requirement to remove mangroves or other vegetation. Under the current design, mangrove removal is limited to individual trees growing within, or at the outflow of existing stormwater infrastructure, and vegetation in the area of the proposed revetment/bank stabilisation works. All mangrove clearance works will only be conducted in accordance with an approved Marine Plants Permit. Mirvac's approach to minimising vegetation clearance will ensure the ongoing provision for the movement of wildlife through the riparian corridor;
- Vegetation removal will be offset and compensated for by extensive site landscaping. Landscaping is to incorporate the use of a diversity of local, native species that will provide food resources to fauna and maintain and enhance site biodiversity values;
- Mirvac propose as part of this development to rehabilitate the Riparian Corridor to improve ecosystem function and health. This will entail the removal of exotic species, revegetation using local, native species and the removal of litter. Rehabilitation works will also promote bank stabilisation and to stop erosion;

Further, and in order to preserve water quality of the Brisbane River and minimise impacts on aquatic ecosystems during both the construction and operational phases of the development, Mirvac have undertaken comprehensive stormwater quality and quantity investigations to determine potential impacts on water quality of the site and the Brisbane River Catchment. Based on the outcomes of these investigations, Mirvac propose to:

- Incorporate design principles with a focus on water-sensitive urban design and sustainability concepts throughout the project;
- Develop a Construction Environmental Management Plan (CEMP) to manage environmental issues and impacts associated with the site re-development;
- Develop and implement an Erosion and Sediment Control Plan for the development;
- Develop a Site Based Stormwater Management Plan for the site for quality and quantity management.

2.1.8.1 Areas of State Significance (Natural Resources)

Not applicable to this development

2.1.8.2 Coastal Wetlands

Not applicable to this development

2.1.8.3 Biodiversity

Biodiversity can be evaluated by determining the number of species (flora and fauna) present within a given area. On the proposed development site, the area of highest biodiversity value is the riparian corridor that aligns the Brisbane River. This area displayed a variety of flora species that provided habitat to a suite of fauna.

Through the proposed restoration and rehabilitation of the riparian corridor and the integration of ESD principles throughout all stages of this development, it is foreseeable that the site wide biodiversity assets will be enhanced. That is, the values of the riparian corridor are maintained and enhanced, and areas with minimal values or few assets, such as the areas of mown grassland, be addressed through appropriate landscaping initiatives.

Measures proposed to achieve this are described above under Section 2.8.

2.1.8.4 Rehabilitation of Coastal Resources

Mirvac propose the restoration and rehabilitation of the riparian corridor as part of this development. Measures proposed to achieve this are described above under Section 2.8.

2.1.8.5 Pest species management

The Ecological Assessment determined that the site has been highly altered from its original condition and native vegetation is limited across the site and mainly restricted to the riparian corridor.

The Ecological Assessment determined the following:

- The main vegetation community occurring on site is mown, open grassland that surrounds the Power Station main building. Unmanaged, rank grasslands occur on the periphery of open grassland areas and generally include weed species such as Rhodes Grass and Guinea Grass (*Megathyrsus maximum*). Planted landscape trees including Brushbox (*Lophostemon confertus*), Orchid Tree (*Bauhinia variegata*) and Mango (*Mangifera indica*) are also present over the site.

- Major weed species identified on site include Cobbler's Pegs (*Bidens pilosa*), Siratro (*Macroptilium atropurpureum*), Mile-a-minute (*Ipomoea cairica*), Glycine (*Neontonia wightii*), Corky Passion Vine (*Passiflora suberosa*), Cadaghi (*Corymbia torelliana*), Castor Oil Plant (*Ricinus communis*), Broadleaf Pepper Tree (*Schinus terebinthifolia*), Easter Cassia (*Senna pendula*), Guinea Grass and Green Cestrum (*Cestrum parqui*). Weeds are present in every vegetation community as can be expected in this disturbed environment.

- The riparian vegetation has been degraded by a high diversity of weed species that form the understorey of this community. Dominant weeds include Guinea Grass, Balloon Vine (Cardiospermum grandiflorum) and Chinese Elm (Celtis sinensis). Weeds tend not to proliferate within the tidally influenced areas of the lower bank, however are prolific along the upper river bank.

- Being a disturbed urban area pest animals are likely to include cats, rats, mice and some bird species that are common urban pests. It is not viewed that these animals will have a significant impact on the already disturbed site. As the area is developed there will be a reduction in habitat that is conducive to ground dwelling pest animals.

As discussed, Mirvac propose the rehabilitation of the riparian corridor and extensive landscaping of the balance of the site. Measures proposed to achieve this are described above under Section 2.8.

2.1.9 Coordinated Management

Coastal Management Outcome – Coastal management is coordinated and integrated across all levels of government and within the community.

This response forms part of Mirvac's detailed Development Application for the site. The Development Application includes a raft of supporting documentation aimed at addressing the range of issues associated with the site and the proposed development. The process is to be coordinated under the Integrated Development Approval Process. As such, Mirvac believe that the Tennyson Riverside Development project planning meets the above Coordinated Management objective.

2.1.9.1 Regional Coastal Management Plans

The development is consistent with South East Queensland Coastal Regional Management Plan.

2.1.9.2 Coordinated Management of Jurisdictions

Not applicable to this development.

2.1.9.3 State Land on the Coast

The proposal complies with the requirements of the Queensland State Government for the redevelopment of the site into the State Tennis Centre and Residential Development.

2.1.9.4 Private use of State Land on the Coast

The proposal complies with the requirements of the Queensland State Government for the redevelopment of the site into the State Tennis Centre and Residential Development.

2.1.9.5 Control Districts

Not applicable to this development.

2.1.10 Research and Information

Coastal Management Outcome – Research programs, and data and information collection and management focus on, support and enhance effective coastal management.

2.1.10.1 Information Management

Mirvac have undertaken a number of specialist investigations and assessments as part of the pre-feasibility and feasibility processes for this development. During concept planning additional investigations have been undertaken on issues such a Flood Investigations, Ecological, Contamination, and Civil Infrastructure Assessments and the like. The outcomes of these investigations will be provided as supporting documentation to the Development Application.

2.1.10.2 Inter-Agency Coordination

Not applicable to the Proponent.

2.1.10.3 Monitoring

Not applicable to the Proponent.

2.2 CONCLUSION

The proposed Tennyson Riverside Re-development incorporates the development of the State Tennis Centre and Residential Apartments. The site is bounded on its north by a reach of the Brisbane River. The site is a former industrial site and therefore it has been highly disturbed. Derelict buildings and operational areas dominate much of the site. The site's most significant ecological asset is the riparian corridor and Brisbane River interface.

The proposed development will include measures to improve the riparian and tidal zone along the Brisbane River improving ecosystem function and health. Impacts on the Brisbane River from untreated stormwater will be reduced via a range of "water sensitive urban design" initiatives.

The public will be able to access the site via walkways and cycleways and will be able to utilise public open space areas. The scenic and recreational amenity of the site will be greatly improved via appropriate landscape design and rehabilitation of degraded areas.

Current planning incorporates a range of options that will improve the coastal resources adjacent to the site and provide a valuable community amenity and residential precinct consistent with the surrounding land use. As such, the proposal is in compliance with the State Coastal Management Plan and meets all relevant outcomes, principles and policies as they apply to development in urban areas within the coastal zone.

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3.1 Urban Design Report

3.1.1 Introduction

The site referred to as "Tennyson Riverside Development" (TRD) is approximately 12ha and has in the order of 550m of Brisbane River frontage. As a disused Power Station site, it became surplus to the Queensland Government's needs and was subsequently identified as an ideal site to accommodate a new, world class tennis facility for the people of Brisbane, and more importantly Queensland.

Mirvac's masterplan for the TRD site is the outcome of an extensive iterative design process (developed from the Governments brief) with the Department of Local Government, Planning, Sport and Recreation.

This report seeks to demonstrate the intent and rationale of a thoroughly coherent, analysed masterplan which appears simple yet is underpinned by complex researched analysis. The intent is to inform the reader of the reasoning that is behind the accompanying masterplan. The rationale is based on the understanding of the site's contextual relationships, planning constraints and opportunities, and the concerns of all stakeholders.

The masterplan seeks to create a coherent vision, a process that has taken over two years of careful analysis and planning. The vision of the masterplan is to create a memorable landscaped environment befitting of its social and physical context, into which built forms are delicately placed. The vision will engender a new focus of respite and civic pride for the people of Brisbane, built on solid economic, social and environmental planning principles.

3.1.2 Site Context

The Tennyson Riverside Development site is located on the disused Tennyson Power Station land, in the suburb of Tennyson. Tennyson is an inner city suburb approximately 6kms south of Brisbane CBD. The suburb is characterised by a mixture of traditional timber houses, contemporary smaller lot dwellings, larger prestige riverfront houses (on the renowned King Arthur Terrace), a golf course and a mix of light industrial zones.

The TRD site is immediately bordered by myriad uses, such as:

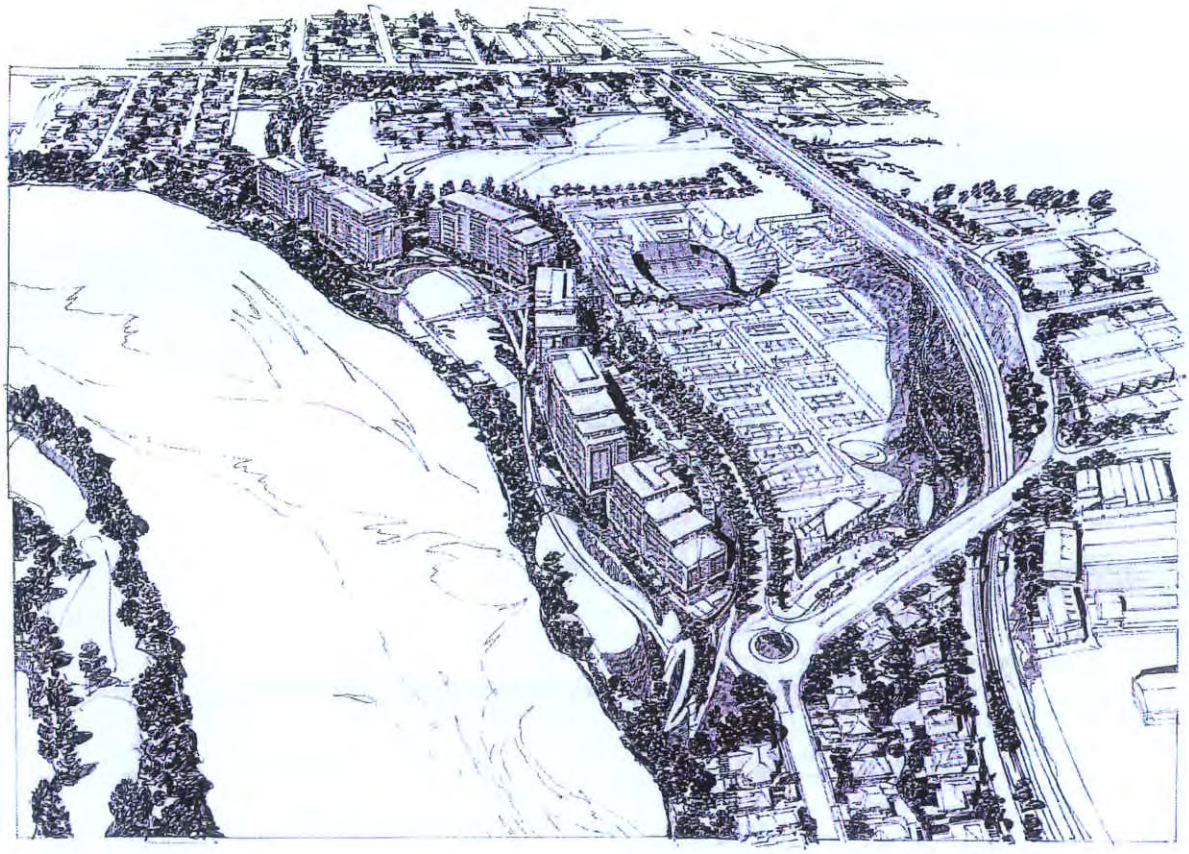
- an animal research institute to the east
- a relatively new electrical substation to the immediate south
- a passenger and freight railway line to the south, bounded by Tennyson Memorial Avenue
- Softstone Street to the west, and
- Brisbane River to the north.

Within a greater surrounding context, the TRD site straddles the two established riverside suburbs of Yeronga towards the north east, and Tennyson/Graceville to the west, with Yeerongpilly to the south. The site is also a junction between two of Brisbane's prominent golf courses – on the northern bank of the Brisbane River is the Indooroopilly Golf Club, and the Brisbane Golf Club lies to the south of Tennyson Memorial Avenue.

The site is currently well serviced by public transport, which makes it ideal for the location of a significant sporting venue. A district bus stop is located on Softstone Street, Tennyson Railway Station is located to the west and the major station of Yeerongpilly to the east.

Other activities surrounding the site are industrial and logistic uses to the nearby south and Rocklea Markets to the distant south west.

Hence the TRD site is an intersection point for a wide range of residential, recreational, industrial and institutional uses. It therefore offers a excellent opportunity to integrate these and is an opportunity to ameliorate the "torn" residential fabric of Yeronga /Tennyson/ Graceville.



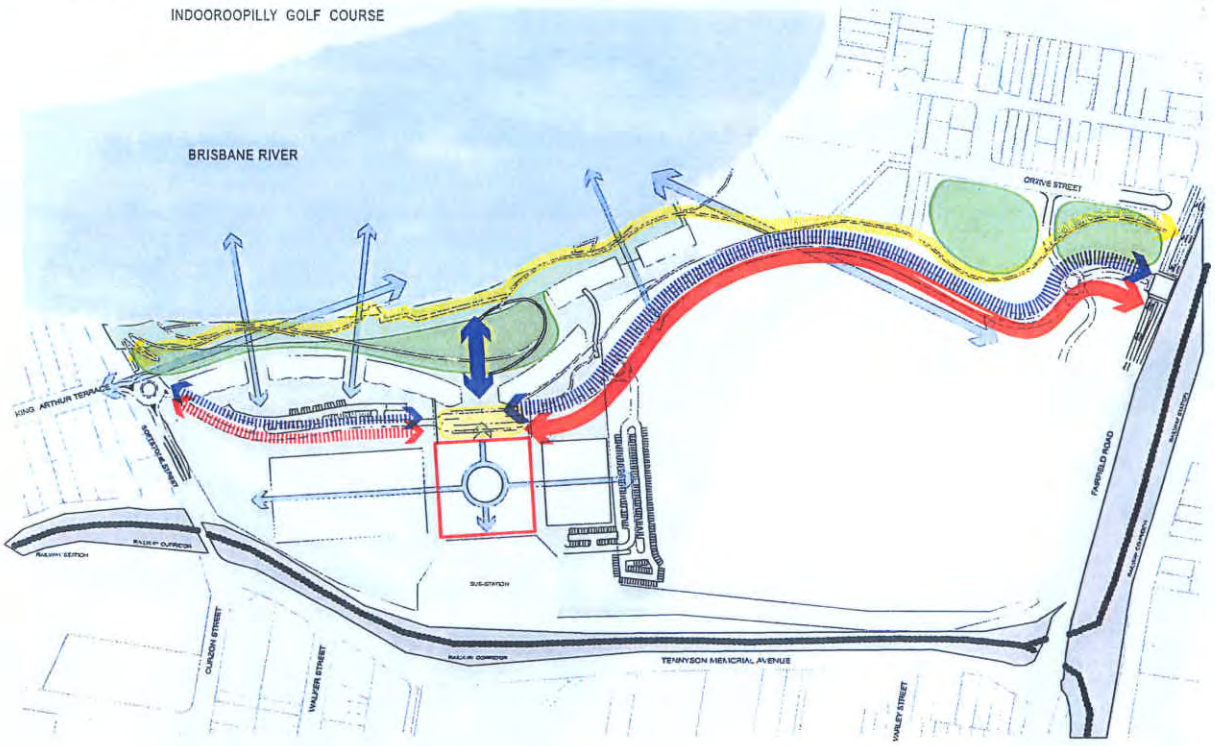
3.1.3 Site Opportunities & Constraints

The context of the TRD site presents rewarding opportunities that are unparalleled in Brisbane. It allows Mirvac/HPA an opportunity to integrate the urban residential fabric, whilst providing a new riverfront parkland, as well as site a world class sporting facility within this overall context.

Opportunities

Opportunities offered by the site are:

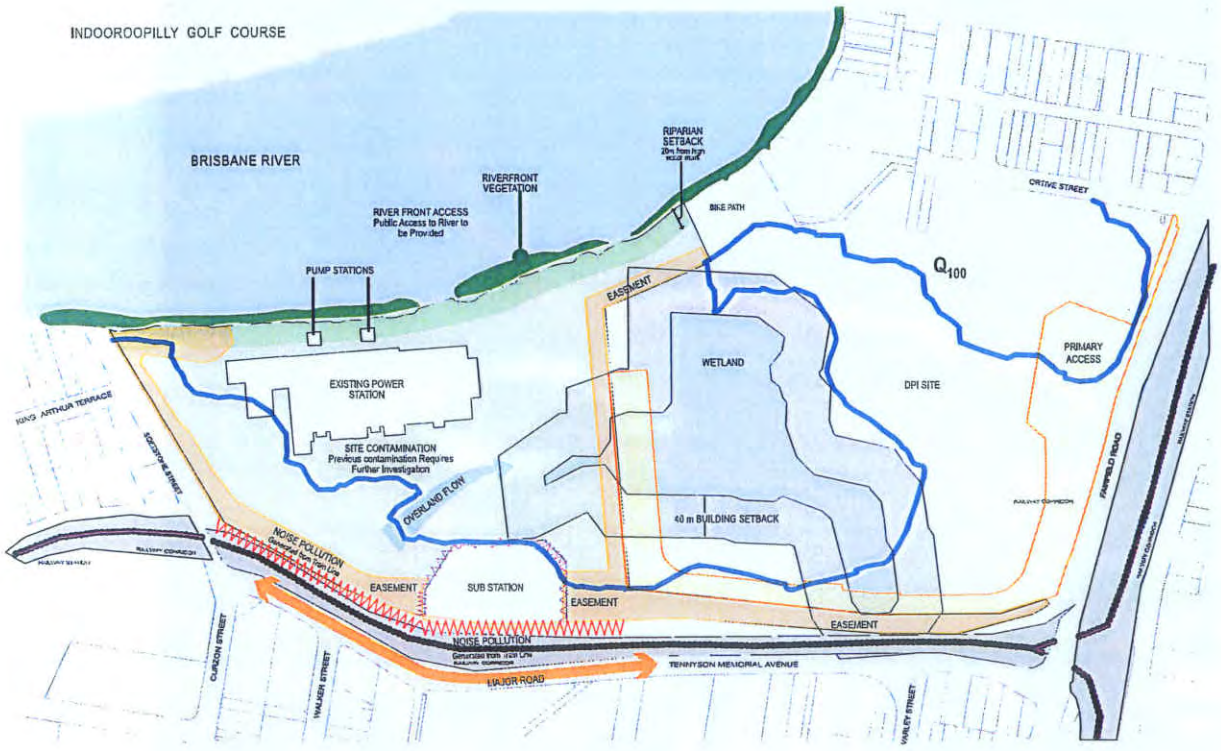
- The location of a world class tennis facility available for community use on a normal day to day basis
- A new riverfront public parkland stretching the full length of the site's boundary
- A large riverfront focal park area
- A civic plaza area
- Riverwalk linkages between all facilities and residences
- A riverfront cycle-way path between Tennyson and Yeronga
- Revitalisation of disused redundant public assets
- Improved physical and visual connectivities and permeabilities into and through the site
- Potential catalyst for future revitalisation of the adjoining Animal Research Institute site
- Improved pedestrian connectivities to existing railway station
- Accommodation of future dwellings to meet anticipated urban growth
- Creation of a sporting precinct within the inner city context, and
- A north facing riverfront site.



Constraints

Some of the constraints that require mitigation are:

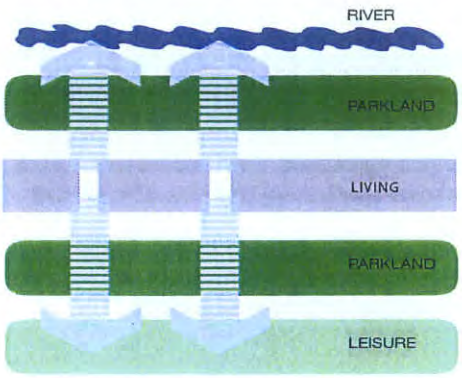
- Operational electrical substation to the south
- Major high voltage cables to the south, east and west
- Poor visual and acoustic amenity of the railway tracks to the south
- Part of the site is impacted by inundation from the Brisbane River in a Q100 flood event
- Limited traffic access points into the site
- Overland flow.



3.1.4 The Masterplan Concept

The masterplan vision is the creation of a landscaped environment, based on simple and coherent planning principles. It is centred around the ideals of designing generous, enjoyable and memorable riverfront parkland where vistas, pedestrian and cyclist connectivities, tree lined streets, expansive landscaped areas and carefully considered built form allows for legibility and permeability.

The masterplan is structured on horizontal layers of uses, interwoven with roads, pedestrian and visual axes.



Starting from the Brisbane River, the first layer comprises water edged recreational space, followed by the insertion of a new public riverfront park with enhanced river access, experiences and enjoyment as the second layer.

The third layer, sandwiched between the riverfront parkland and the State Tennis Centre is the "living" layer, a critical strata which adds life, vitality and variety to the overall landscaped area.

The fourth layer, being the State Tennis Centre, is a different recreational space which acts as a mitigation buffer to the poor visual and acoustic amenities of the substation and railway line, and contributes to the activity levels of the whole site.

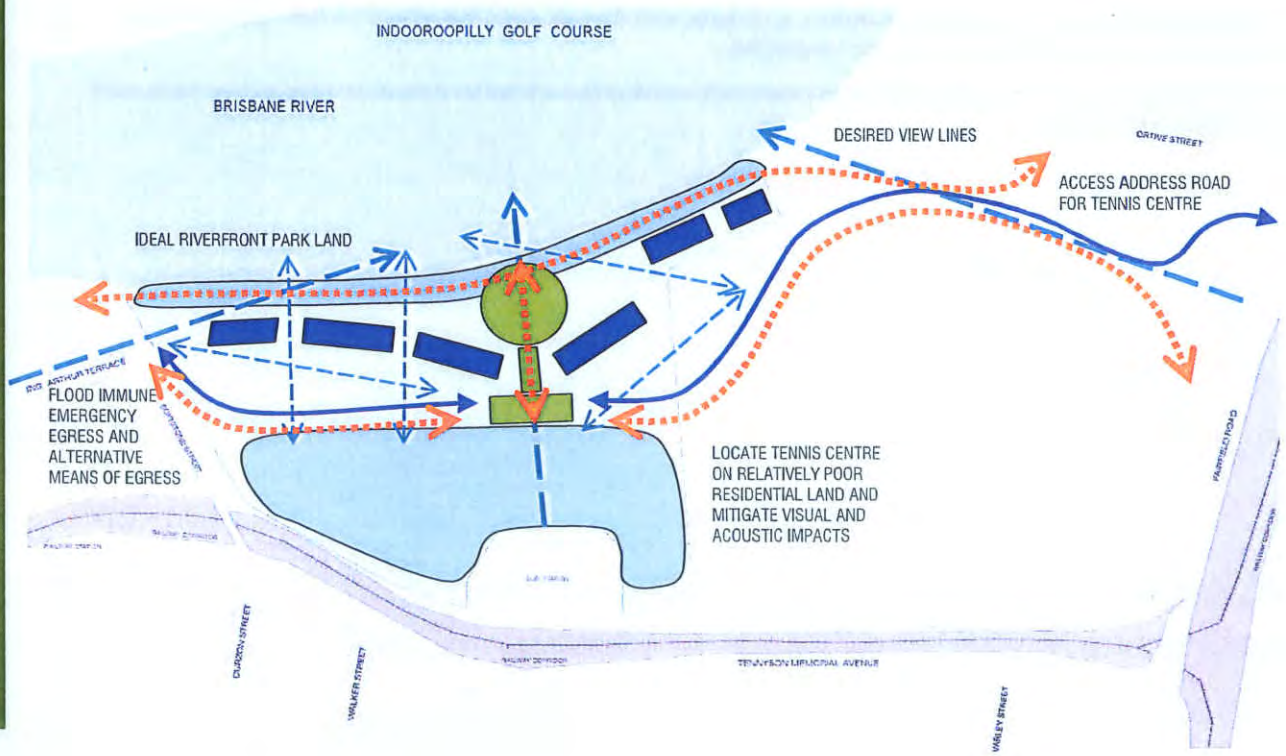
Urban connectivities, such as pedestrian walkways, cycle paths, road linkages, major and minor view axes, criss-cross these layers, binding the composition into a cohesive masterplan.

Other building elements of masterplanning are not necessarily visible; they are based on the understanding and resolution of all the stakeholders' concerns.

The masterplan seeks to resolve any additional traffic impacts on King Arthur Terrace, Softstone Street and Tennyson Memorial Avenue with the creation of a new 30m wide tree lined road accessed from Fairfield Road. This road provides the primary address to the State Tennis Centre.

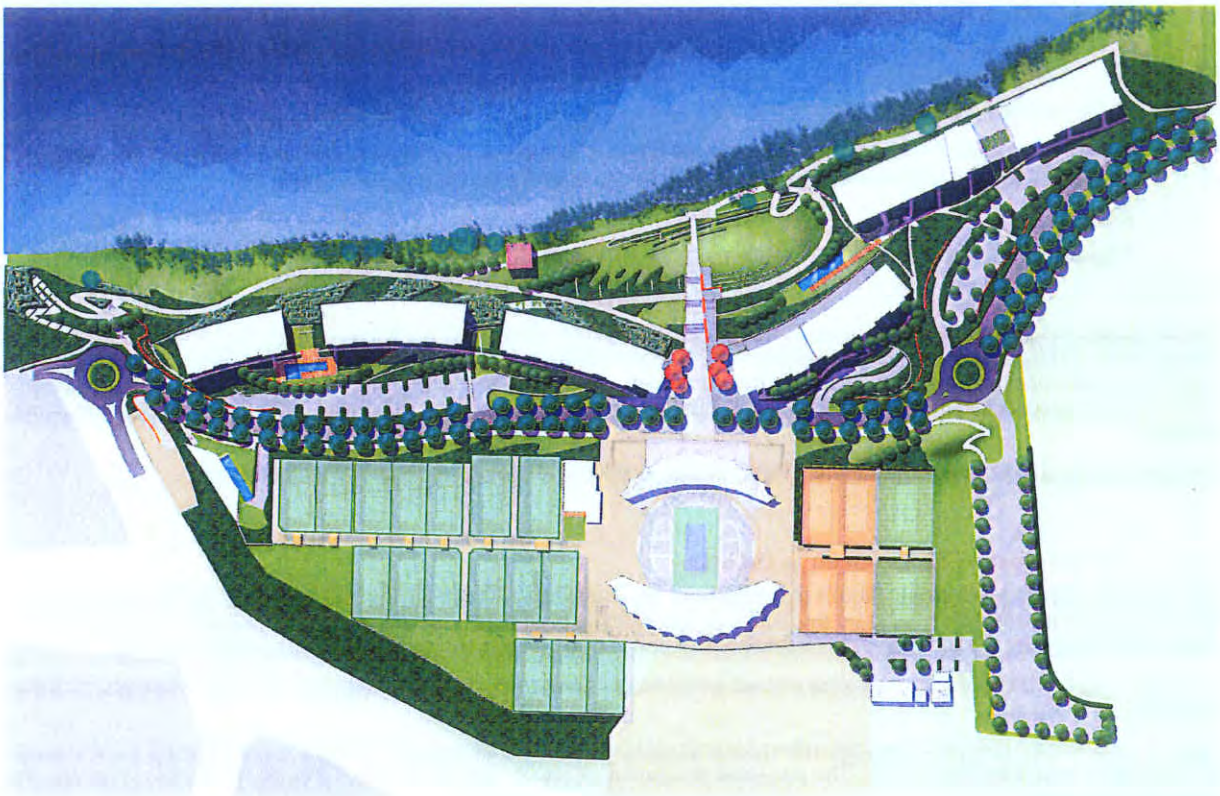
Enhancements encapsulated within the site include:

1. A linear riverfront park (extending the length of the river frontage) and a large focal park sited on the axis of the State Tennis Centre. The park accommodates combined pedestrian and cycle paths to facilitate the full public enjoyment of the Brisbane River, and connectivity from Tennyson and Yeronga.
2. Creation of a shared pedestrian/vehicle plaza as a forecourt space to the State Tennis Centre, which continues as a grand access path towards the river. This path and the plaza are flanked by small convenient commercial uses, which further activate the plaza.
3. Variation of street setbacks to enhance the landscape concept.
4. Improved pedestrian access to Yeerongpilly Railway Station as part of the transport infrastructure spending.



3.1.5 Elements of the Masterplan

The masterplan consists primarily of four components; the State Tennis Centre's tennis courts and stadium, residential buildings, a singular road connection, and the landscaping that weaves through these elements.



LANDSCAPE DESIGN PRINCIPLES

3.2.1 Introduction

The landscape design for the Tennyson Riverside Development (TRD) will be of fundamental importance in establishing the scale, comfort, quality and sense of place of the project. This report builds on the site-wide masterplanning structure and intent outlined in the Design Report, and will show how the landscape design has been carefully developed to create a memorable, fully integrated development.

The scope of landscape works extends across the TRD site and includes the following public and private open space components:

- Public and Semi-Public
- Riverside park, equitable access from Softstone Street, playspace, bus drop-off, boulevard road, on-street and clustered parking, central plaza, terraced lawn, STC concourse, avenues and viewing lawns.
- Private
- Residential swimming pools, courtyards, plazas, walkways and gardens.

The landscape design for the site is underpinned by the philosophy of creating a subtropical parkland setting for the State Tennis Centre (STC) and Associated Development. The report briefly outlines the key aspects of the site's setting and history which have influenced the landscape design principles and masterplan. The masterplan is then presented, and details of the STC and Associated Development described and illustrated. The report concludes with a brief overview of proposed material palettes.

Detailed responses to Council codes and the Public Riverside Facilities Manuel are attached as appendices.

3.2.2 Site Context - The Landscape Setting

The selection of this river frontage site for the location of the State Tennis Centre and new riverside residential community is the starting point in creating a setting for the facility that is distinctively Brisbane. The Brisbane River location and Brisbane's subtropical climate are the two major characteristics that will distinguish this facility from others around the world.

The team's approach to defining the public domain is influenced heavily by the site's contextual qualities, which increase the sense of scale of the site.

Figure 1 identifies the broader contextual influences impacting on the site, including the elevated views out to Mt Coot-tha, the Brisbane River and the City beyond. The proposed parkland also adds to the 'necklace' of publicly accessible green spaces along the river edge.

Figure 2 demonstrates the immediate land use patterns that contribute to the existing qualities of the site and its adjoining neighbourhoods. The mix of established, historical residential areas against rail-side industrial uses and green spaces makes for an interesting visual mix. The local benefits of contributing new public Riverside open space in this area are also made obvious.

3.2.3 Site History - The Landscape Layers

The identity of the Tennyson Riverside Development site is driven by the relationship between land and river and the alteration of the landscape over time. Figure 3 illustrates the various uses of the site over five broad historical phases. The table is then expanded to show how design references have been drawn from these historical layers, how they are reinvented as landscape design elements, and where in the development they are proposed to be used.

Figure 1 Landscape Setting - City Wide

Figure 2 Landscape Setting - Local Context

DESIGN LAYERS

Past site uses informing the landscape design process

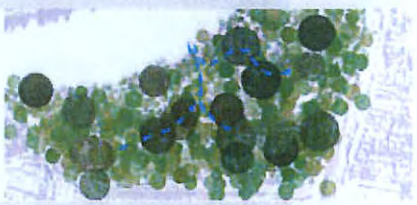
Period	History	Diagrammatic
Pre settlement	• dominant rainforest of ferns, orchids, stag horns, iron barks, bloodwoods and mahogany • local tribes of Aborigines chose site for access to water and fishing • 1823 - three timber traders arrived – after tense encounter borrowed a canoe to continue exploring the river. The bush on the St Lucia side of the river was so thick that they returned to the Tennyson side and lived with the tribe for some time.	
Post settlement	• 1840s - timber felled and floated downstream for buildings in town • Favoured location for weekend camping and fishing - the suburb has a long history of river edge recreation • rainforest eventually cleared of timber and farming, industry and a residential community established over next 100 years • Area known as "Softstone" due to the presence of coal and later re-named after English poet Lord Tennyson	
Power station	• Tennyson Power Station established 1950s • site chosen for ease of access to cooling water and Ipswich coal • supplied electricity and energy to the south-west region until taken out of service in 1986 - a relic of the industrialisation and growth of Brisbane • 'heroic' architecture, with brick cladding to imported steel frame	
Tennis	• Reintroduce public recreational facility • Unique sub-tropical design integrating qualities of world's great tennis centres	
Future	• Reintroduce public riverfront access • Integrate environmentally sound design solutions	

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Figure 3 Past site uses informing the landscape design process

Reference	Interpretation	Landscape elements	Potential location
			state tennis centre / plaza / site entries / residential / river front park
Pre settlement			
	Tightly woven vegetation, untouched landscape	Softscape – concentrated in key spots Species – glossy greens, dense canopy, shade	
Post settlement			
	Western land management – land clearing, cropping, monoculture, formalised patterns Riverside recreation	Broad softscape – form, texture, patterns	
Power station			
	Function – power Structure, materials Circuitry Presence and absence	Erosion of building by river landform Parts of building kept in public spaces Re use bricks Re-interpret former grid focused on powerhouse site	
Tennis			
	Wimbledon green Live, play, relax Public access to broader landscape	Hedges and perfect grass Monoculture planting and formal expression in soft and hardscape Parkland	
Future			
	E S D Bio remediation Species selection Recycling materials	Water use, recycled water Lighting features Furniture	

3.2.4 Landscape Design Strategy

Vision

The landscape design is underpinned by the philosophy of creating a subtropical parkland setting for the State Tennis Centre and Associated Development that embraces its layered, contextual landscape setting, including its strong relationship with the Brisbane River. The contemporary design celebrates the site's history, to create a living and recreation destination with a distinctive identity.

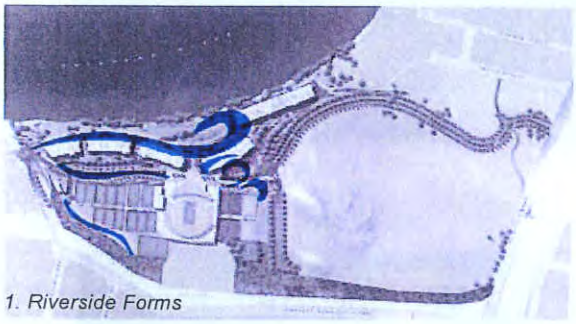
Design Layers

The landscape design for the Tennyson Riverside Development has been developed from an understanding of the many layers that comprise the site's landscape qualities, history and future. This approach ensures that no single design reference point dominates the landscape and that a rich story can be told at appropriate locations across the site.

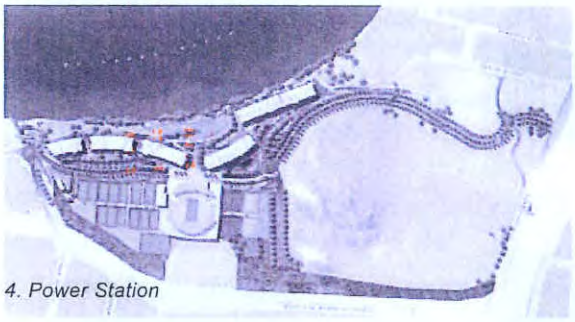
The major land and spatial forms of the landscape design reference the flow of the river through their organic forms. This concept reinforces the primacy of the riverfront location, contrasts the strong geometry of the remnant historic architecture, and highlights the Power House's necessary riverside location to obtain cooling water. This reference is also important in its contemporary context; highlighting the river as a key asset to the functioning of the proposed facility as a recreation destination.

The following diagrams illustrate the key design elements that provide site-wide structure to the landscape.:

1. Riverside Forms – curvilinear forms across the site
2. Landscape Character – rainforest structure species create a unifying framework
3. Boulevard – linking the STC, Associated Development, public realm and wider community
4. Power Station – past use remembered by subtle use of lights and markers on the building grid
5. Transformations – demolished building materials re-used, stormwater harvested



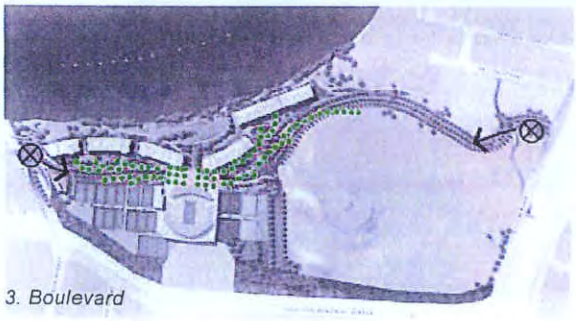
1. Riverside Forms



4. Power Station

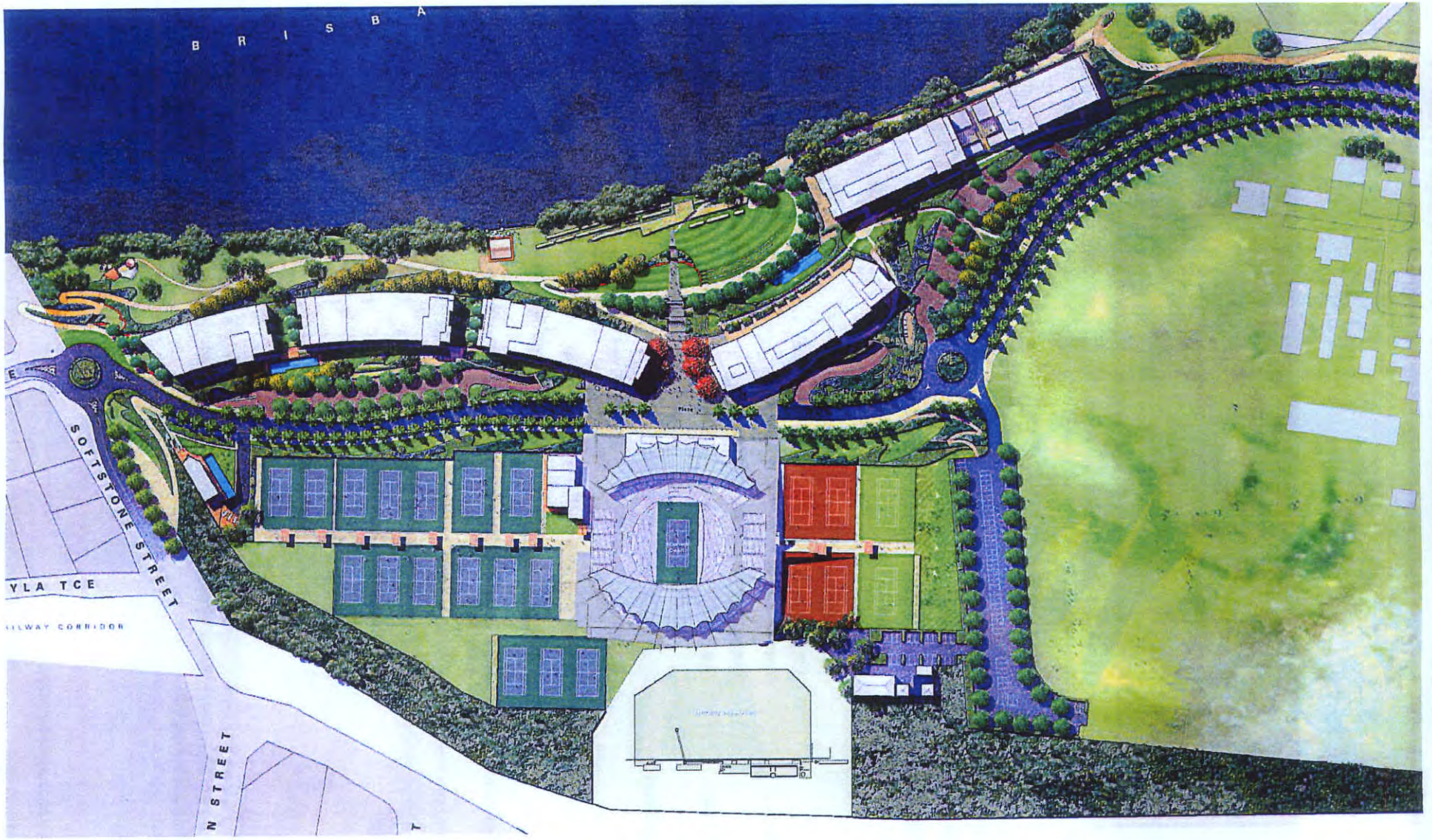
2. Landscape Character

5. Transformations



3. Boulevard

Figure 4 Design Strategy Elements



TRD Landscape Masterplan

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MATERIALS PALETTE

Location	Application	Proposed Material
Vehicular pavements		
Boulevard	Road pavement	Asphalt
Plaza	Shared vehicular/pedestrian pavement	Coloured concrete
	Accents	Stone or coloured concrete
Tennis "event mode" parking	Road pavement	Asphalt
Visitor parking clusters	Road pavement	Coloured Concrete
Pedestrian pavements		
Parkland	Grand staircase	Coloured concrete , stone
	Pump station	Existing concrete, sawcut
	Pedestrian / Cycleways	Coloured concrete
	Private park access paths	Decomposed granite, mulch
Boulevard	Footpaths	Coloured concrete
Plaza	Shared vehicular/pedestrian pavement	Coloured concrete
Residential precinct	Access paths	Coloured Concrete
Furniture and Structures		
Parkland	Structures	Combination of recycled and new materials – steel, brick, timber
	Seat walls/amphitheatre steps	Insitu coloured concrete
	Play space	Custom designed elements within integrated play environments
Plaza, parkland and residential	Furniture – seats, bins, balustrades, drinking fountains	Custom designed suite complementing the project and site character
Tennis centre, parkland and residential	Landscape retaining walls	Gabion walls containing recycled power station bricks
Integrated artwork - to be further developed		
Tennis Centre	Possible "tennis" theme	

The materials palette for Tennyson Riverside Development draws upon the layers of history of the site. The nature and colours of the materials coordinate across the landscape by reflecting the alluvial deposits of the river edge, the industrial materials of the Power station and the pre settlement character of the site.

Figure 5 Landscape Masterplan

3.2.5 State Tennis Centre - Urban Design

Design Concept

The landscape concept for the State Tennis Centre is one of a manicured garden setting similar to that of the great international tennis venues such as Wimbledon. The principal components of the STC landscape are lawns and hedges.

Boulevard

The sinuous approach to the State Tennis Centre along the spine road from Fairfield Road reinforces the concept of the parkland setting through its form, the introduction of a planted median, and the triple boulevard of trees. The distinctive tree species proposed is *Araucaria cunninghamia* (Hoop Pine). These trees have a bold form, their scale is appropriate to that of the adjacent architecture, and they refer to the original vegetation of the site pre-settlers. Entry features on both Softstone Street and Fairfield Road will highlight the arrival to the State Tennis Centre precinct. As part of the design, signage will ensure that the facility is legible to its users, and is integrated throughout the site as a whole.

The tree planting and open spaces along the approach spine provide both an integrating element between the State Tennis Centre and the residential buildings, while also creating a buffer. Pedestrian and cycle paths are provided along the spine road, allowing good connectivity with public transport and the surrounding area. In event mode the section of the boulevard between the State Tennis Centre and Softstone Street can be closed to all vehicles except those of residents, allowing pedestrian priority.

Arrival Plaza

The arrival plaza has a strong connection to the river, and is softened by the incorporation of trees. The plaza complements the State Tennis Centre elevation without screening it from the river and parkland. The paving pattern is orientated towards the river, with the central spine and its relationship to the former Power House grid highlighted. To the Boulevard frontage, large lawn areas are proposed. Their scale is appropriate to that of the State Tennis Centre itself, and they provide a lush green foreground. These allow flexibility of function, and can accommodate large numbers of people.

STC Stadium + Courts

The STC stadium has been designed as a truly subtropical indoor / outdoor space that is shaded and breezy, and from which the occupant looks out into the landscape and the sunshine.

It is intended that the stadium is a well integrated structure within the overall parkland setting.

The proposed manicured lawns and hedging are also visually consistent with many of the grand homestead gardens still found in this area.

The Venue Management Building is the "day to day" operational node of the tennis centre. Not only will the public be able to book courts, the building also incorporates a pro-shop, cafe, a commercial kitchen and office space. The building has line of sight to all hard courts and is adjacent to show courts for ease of spectator viewing. The built form of the Venue Management Building is crisp and contemporary, in keeping with the STC stadium, yet not distracting from it.

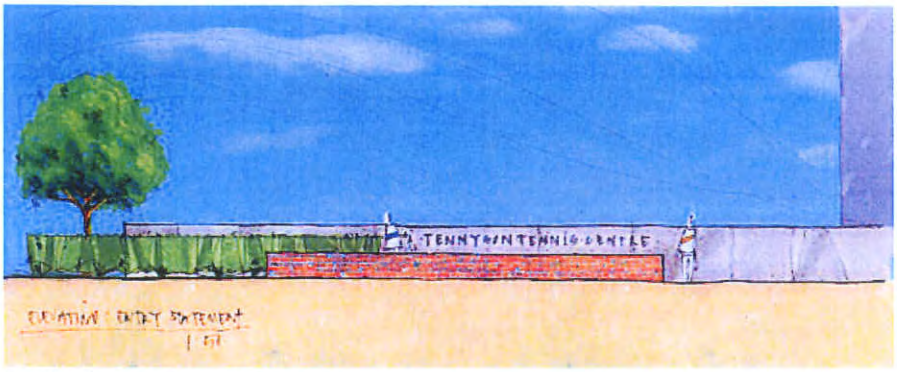
Two point four metre high hedges are proposed to the ends of the outer tennis courts to not only reinforce the circulation spine but also screen players from the visual distraction of movement outside the courts. *Backhousia citriodora* (Lemon Ironwood) is proposed as the hedge species. Although typically seen as a tree, this is one of the only native species that can successfully create a hedge of this height. The plants have dense soft grey green foliage, attractive white flowers and lemon scented foliage. Shade structures are proposed between courts where space permits. These structures will be planted with *Pandorea jasminoides* (Bower Vine), an evergreen climber with white flowers.

Viewing Terraces

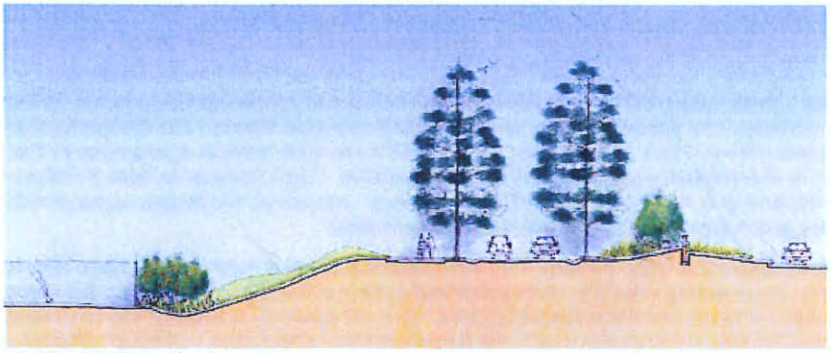
Within the State Tennis Centre enclosure picnic lawns are proposed. Two generous open lawn areas, one flat and the other gently sloping, allow viewing of the western courts, and can be utilised in a variety of ways during event mode.

Southern Interface

Trees to provide shade and buffer planting are proposed to the south to screen the road and rail corridor, and the Powerlink sub station. At the south of the STC stadium, curvilinear retaining walls supporting hardy planting will also screen the Powerlink facility.



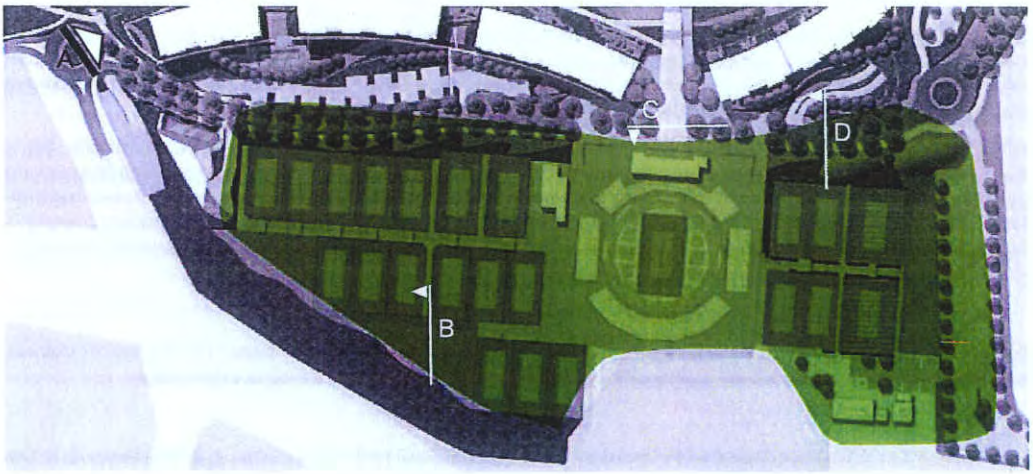
Section A - STC Entry Statement



Section D - Entry Boulevard

Section C - STC Entry plaza

Section B - Picnic Lawn



STC Entry plaza

3.2.6 The Asscociated Development - Urban Design

Design Concept

Landscape proposals prepared for the Associated Development focus on the concept of successfully integrating a new community within a contemporary, parkland setting by the River. The site's subtropical setting, its strong relationship to the river and its rich, multi-layered history has been combined to create a community setting with a distinctive identity.

Riverside Park

The proposed Riverside Park will re-introduce public access to a part of the River that has been 'off limits' for generations. The site's broader contextual setting also places it in a much larger landscape, with views across Indooroopilly Golf Course towards the city, and long views up and down-stream.

Spatial hierarchy within the park has been determined to match its adjoining land use and its linear, riverside setting. Existing mangroves and mature trees along the river edge are a valuable asset and are substantially retained within the proposed design. Views of the river are provided at intervals along the length of the park with minimal disturbance to this existing vegetation. The organic flowing forms of the landscape reference the river and are appropriate for the linearity of the park. The forms create spaces of various sizes to accommodate different uses; small intimate spaces allow quiet contemplation and picnics, while larger spaces allow games or large social gatherings. The wave form is gentler towards the ends of the park with momentum building towards the central open space where the activity is focussed. At this point the landform, parkland walls and grand staircase come together in a dramatic interplay of forms that signify the arrival at the central space within the park, directly connected to the State Tennis Centre Plaza. The central open space within the riverside park has a strong relationship to the State Tennis Centre and is a complementary space.

The western end uses its elevated position to incorporate a look out and play area into the ramped park access path. The promenade path, running parallel to the River, connects into a central lawn - a large, unstructured open space necessary for a park of this size. Bio-retention gardens between the lawn and River serve to demonstrate one of the development's ESD initiatives. The eastern end of the park, again ramping up from the River terrace, contains a quiet pause point looking out across the River

The park is three dimensional in its design, with spaces created by the sculptural landforms, and also by wrapping the landscape over significant walls, suggestive of an historic ruin melting into the landscape with time. Spaces are created at elevated positions above and enclosed by, these walls to take advantage of views to the river. The landforms within the park have been carefully sculpted to soften the interface between the residential buildings and the open space, providing a backdrop of undulating swathes of native grasses. The level change of 4.5 metres between the parkland and the residential podium, necessary to achieve flood immunity; creates a successful separation between the public and private spaces along the riverfront.

The terraced lawn is designed around the concept of an eddy; a point along the river bank at which water is swept in, slowed, and allowed to pause before moving down stream. The space encourages people to gather and socialise informally, and also allows the opportunity for formal gatherings. The space opens out to the river, with a bold landform and swathes of grasses and planting enclosing it to the rear, and shade provided by trees. Equitable access between the Tennis Centre and the river is achieved through 1:35 gradient paths that curve around the amphitheatre and also connect across to the west.

Within the riverside park and central park, riparian tree species are proposed to support the existing species and give the area a distinctive riparian feel. The trees will sit in open grassed areas, with swathes of native grasses on the sculptural landforms. The grass movement with the breeze will be suggestive of the flow of the river.

At the river edge, one of the original Pump Houses is retained for possible use as an interpretation centre. This building could also function as a riverside café.

The majority of the water chutes originally used to return water from the Power House to the river, have been retained as a focal feature within the park. The chutes are woven into the structure of the landscape by filling, planting and incorporating into the proposed bioretention stormwater treatment systems. In most locations the concrete edges of the channel will be visible amongst the planting

Arrival

The eastern edge of the Power House site lies on the central axis between the State Tennis Centre and the river. The geometry of the spine through the central open space has been set up to create a strong series of spaces relating the State Tennis Centre to the river, while also referencing the site's recent history. The arrival plaza to the State Tennis Centre extends towards the river and is framed by two residential buildings. At plaza level within the base of the residential buildings, commercial activities such as cafes are proposed to enliven the space and take advantage of the views to the river; shade and interest are provided by groups of trees within hard pavements to allow maximum circulation. In this location *Delonix regia* (Poinciana) would be an appropriate species that supports the subtropical character of the landscape design and outdoor eating within the plaza by providing a good shade canopy in summer with floral interest, and being deciduous allowing the winter sun through. As the spaces descend into each other from the State Tennis Centre arrival plaza, views are afforded towards the river. The axis terminates in a viewing platform at the river's edge allowing views out to the river. This is possible location for a River Cat stop in the future, supporting the concept of accessing the Tennis Centre by public transport, and encouraging its use by the local community.

Access + Circulation

Improving public access to the River is a key priority of this project. Pedestrian/ cyclist paths through the site have been designed to conform to AS1428, with minimum 1:20 grades. The interconnected path system that weaves through the riverside park and connects to the DPI site, and through to the local community, promotes this as a recreational lifestyle precinct accommodating walking, running, and cycling. Direct pedestrian and cycle connections with the adjacent areas are provided along the central spine road, with connections from this to the parkland and the river. Shared paths will be 3m wide, excluding lateral clearances. The public circulation system for pedestrians and cyclists has three key components:

- the River edge promenade
- the Boulevard – central circulation spine with shared, off-street pedestrian/ cyclist path
- the Arrival Plaza – the major gathering space

At either end of the linear park, barbecue and picnic spots are proposed. These locations allow them to be most easily accessed by residents from the surrounding communities, while also distributing the activity nodes throughout the linear space. To the western end a play area is proposed. This location is the most accessible to Softstone Street and Tennyson. The structures within the play area take advantage of the slope to the back of the park with a series of slides and play structures set into the contours. The ramp at this end of the park ensures that equitable access is provided to the parkland and River from Softstone Street. The alignment and proposed levels of the riveredge promenade allow passive surveillance from residential buildings.

Residential Buildings + Gym

The residential buildings have been positioned within the landscape in a way that responds to the parkland character of the site. The building forms curve in response to the organic forms of the landscape, and wrap around the central open space strengthening its spatial form. The mass of the buildings has been broken down to allow views through to the river.

Landscaped gardens using subtropical species to provide shade and interest, and swimming pools are provided for the residents. These landscape spaces also serve the purpose of softening the residential buildings within the parkland. Predominantly native plant species are proposed; selected for their texture, colour of flowers, scent, or attractiveness to fauna. As a general principal of the design, areas of softscape have been maximised to allow rainwater penetration and minimise site runoff.

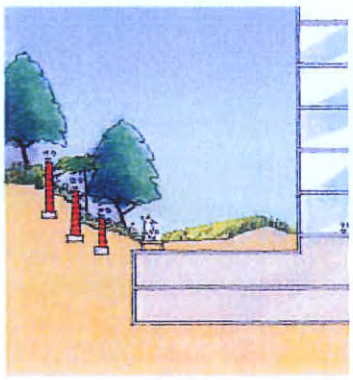
The easements to the boundary of the site will be planted with large screen planting shrubs. Although trees cannot be planted over the electical easements and have been avoided shrub planting will be valuable in screening the road and rail corridor from the site. In line with restrictions for the easement, any planting would be removable, and any additional mounding to achieve the required levels will been kept to less than one metre. A secondary path system takes residents from each building entry to the Boulevard, visitor parking and common recreation areas.

Planting + Materials Palette

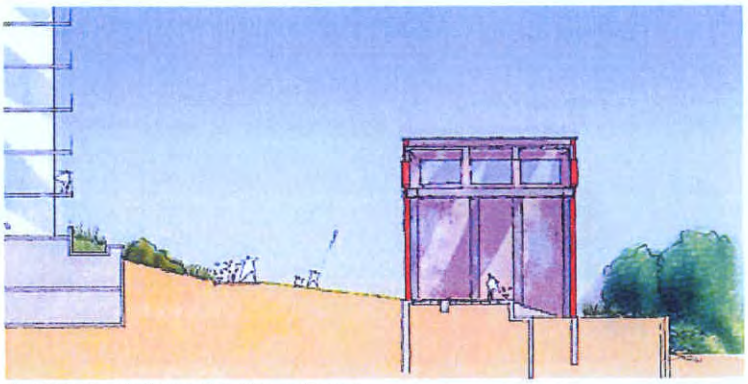
The proposed planting scheme will primarily be local riparian species with a blend of hardy exotics referencing the surrounding suburbs. The Riverside Park planting strategy utilises robust, low maintenance species suited to this riparian corridor. All public garden areas are easy to access for maintenance and will be contoured to harness site overland flow, thus reducing irrigation requirements. Solid, robust elements reflecting the infrastructural nature of the site's former use are to be used in the new palette of materials proposed for the site. Lighting will be provided throughout the site with feature lighting highlighting key spaces. The strategy proposes low level lighting within the riverside parkland and broader public domain, allowing extended use of public areas beyond the daylight hours. Low level, solar fixtures are also proposed on the column grid of the powerhouse, as it overlaps with the Central Plaza. This element provides a subtle interpretation of the former building's function in a more contemporary, resource-minded way.

Crime Prevention Through Environmental Design Planning Scheme Policy

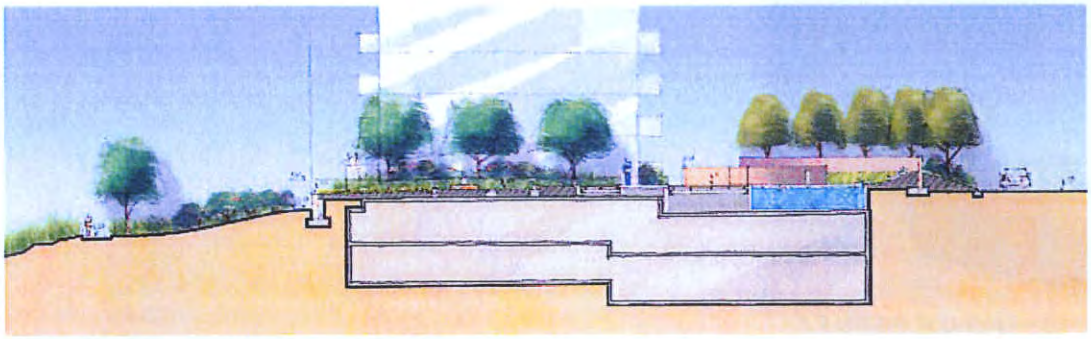
CPTED principles will be adopted in the design of public areas. Casual surveillance of public spaces is afforded by the mix of uses (residential, tennis centre, commercial) that will see people using the TRD throughout the day, week and year. The planning and detailed design of the public spaces will ensure visibility is maintained. The use of level changes, lighting, material selection and planting design will be carefully considered to ensure that the public areas are a vital, safe, and inviting component of the overall development.



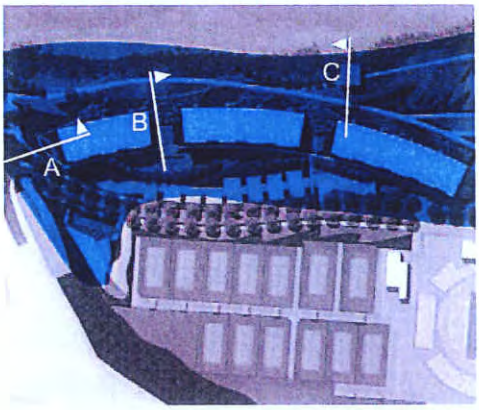
Section A - Wall to Building A

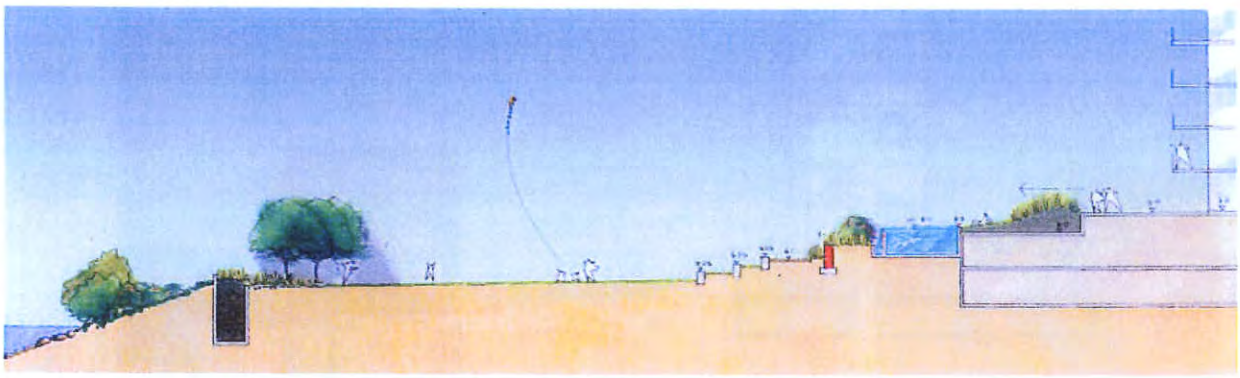


Section C - Building C + Pump House
Pump House to be retained. Final use to be determined

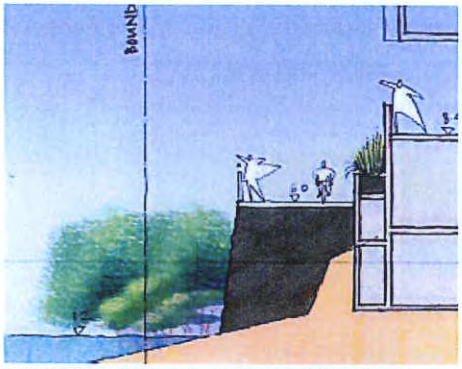


Section B - Building A+B Pool

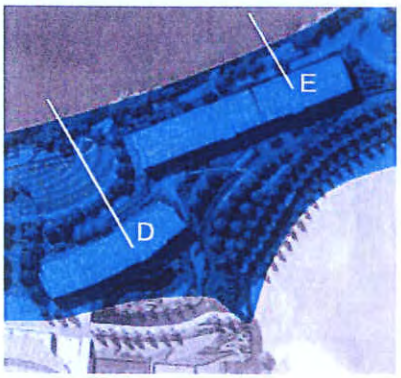




Section D - Terraced lawn



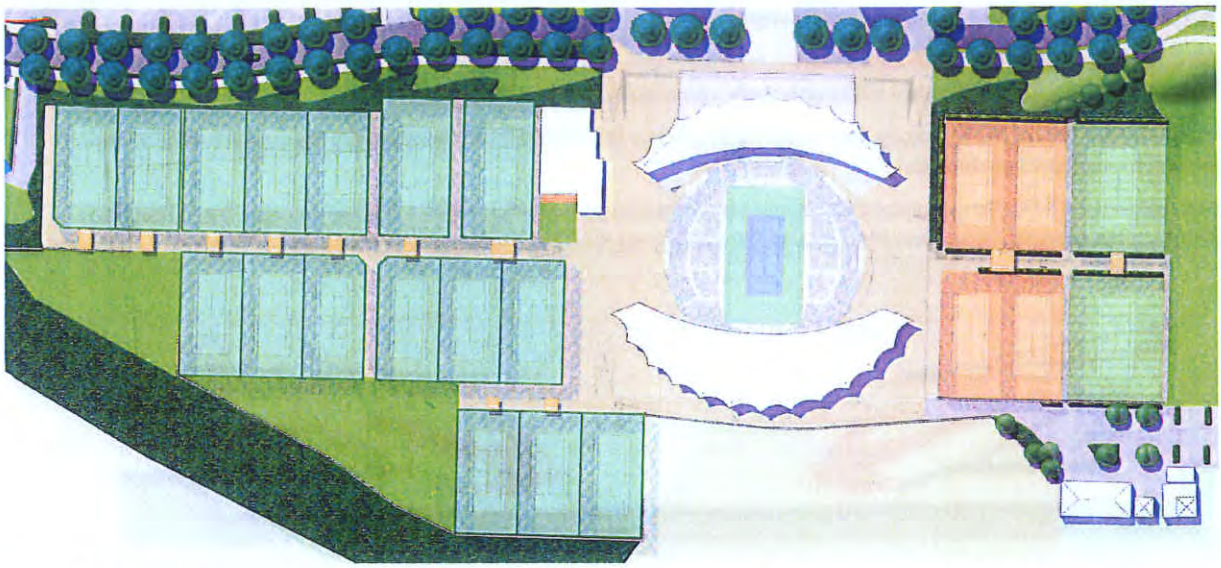
Section E - Riverside walkway at Building E,F



3.3 State Tennis Centre Concept

3.3.1 Introduction

The proposed State Tennis Centre (STC) in Tennyson will be an international-standard, fully integrated facility that will attract and host major tennis events. It will also be the only dedicated state tennis facility in Australia to feature all three grand slam surfaces.



The STC will provide twenty-three courts – sixteen hard courts, four clay courts, two grass courts and the stadium itself.

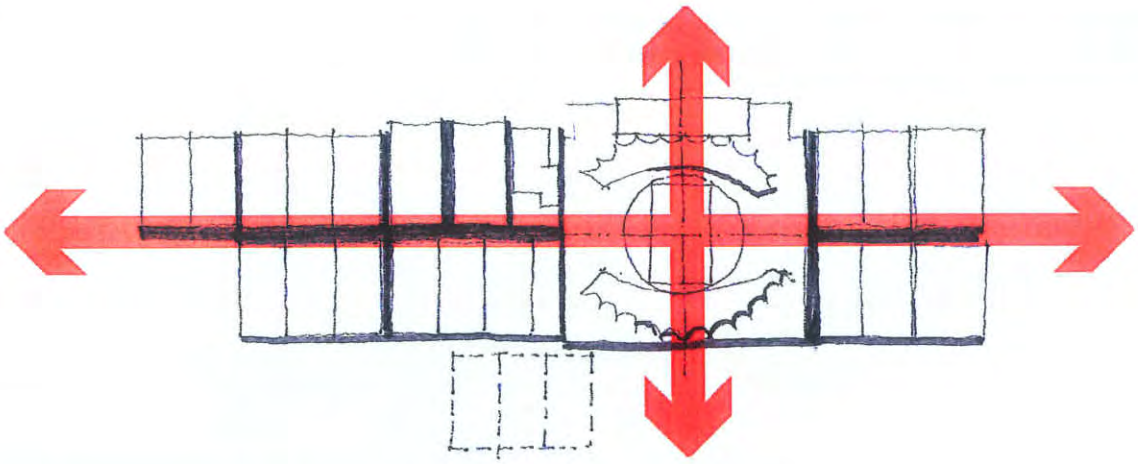
The centre court will seat up to 7000 spectators, and is designed to convert to any of the playing surfaces.

The STC concept presented by Mirvac responds to the south-east Queensland subtropical environment and its relaxed, outdoor lifestyle. It creates a world-class tennis venue within a garden setting, with pedestrian avenues between the courts, extensive landscaping throughout the site, and strong vistas to the centre court from all outer courts.

The STC's modern support facilities, associated infrastructure and services are designed to meet future needs and cope with the operational demands of major tennis tournaments.

3.3.2 Design Philosophy

In the masterplan vision, the centre court is the focal point of a landscaped, hierarchical ladder pattern of courts that extends east and west.



The strong east-west axis of the ladder establishes a clear differentiation between front-of-house activities and back-of-house activities. The orientation of the courts is also designed to minimise glare and wind tunnelling.

The STC north-south axis is an ordering device that influences the location of the plaza, the plaza extension towards the riverfront park and placement of the riverfront park. The axis also influences the way in which the residential buildings are placed. The buildings sinuously curve towards and away from the STC.

The STC's centre court pavilion will be a striking feature when viewed from the Brisbane River and road approaches to the site.

The planning vision of this design follows the great traditions of Wimbledon, Roland Garros and Flinders Park in creating an event destination that celebrates tennis and its culture.

Arrangement and Orientation of Courts

The masterplan for the STC creates a subtropical oasis within a new urban environment.

Within the design of the ladder running east-west and linked by a landscaped spine, the courts are arranged typically in pairs, separated by north-south pathways.

As the focus of the STC, the centre court (including the administration building) creates a destination and control point for activities in both normal day use and event mode. The centre court will be countersunk to create a tennis 'theatre'.

All courts are orientated on a north-south axis. The clay and grass courts are to the east of the centre court, in a six-court ladder arrangement. This location allows additional security of the courts and recognises the specific care and maintenance requirements of these surfaces. Back of house access is provided via a clear route to the groundskeeper's store in the south-east corner of the site.

The two show courts (courts 1 and 2) accommodate 300 spectators and are directly west of the centre court. During event mode, they share the centre court's spectator facilities.

The remaining fourteen match courts, comprising double and triple court blocks, are to the west of the show courts. Although the courts are individually fenced to meet requirements of the design brief, they have been grouped so that fences may be removed to allow coaching to occur over multiple courts.

In response to the hierarchical arrangement of the court types, the north-south landscaped spines have varied widths – from six metres at their widest around the show courts to two metres around the match courts.

A picnic lawn at the south-west corner is a green space and formal garden suitable for everyday use or during events. For example, the picnic lawn could be used as a crèche area during the day to encourage parents to use the facilities, while during an event it could be used to create a village atmosphere.

3.3.4 Pedestrian and Vehicular Access

The clear delineation between back-of-house and front -of-house activities complements the security of the precinct. Access to the back-of-house areas is both separate and controlled. During tournaments, the secured entrance for players will be via the north-east entry and lifts (cordoned off at these times). It is also envisaged that the logistics compound for major events will be located in the south-east corner to allow separate access for service vehicles.

Public access to the STC is controlled by the site perimeter and the location of the centre court.

3.3.5 Equity of Access

The STC will be designed and constructed to be accessible to all people, including those with disabilities. The complex will comply with the relevant requirements of Australian Standard AS 1428 part 1 and 2, and with reference to the Disability Discrimination Act 1992, the Disability Services Act 1992 and the Anti-Discrimination Act 1991.

Generally there are specific areas that have been identified as crucial to satisfying the needs of patrons with disabilities. These include path of travel, ingress/egress, ticketing, seating accommodation, toilet facilities, food and drink services, and communication systems.

The path of travel will be a continuous accessible path within the STC boundary, from entry points to all designated disabled seating and facilities. In addition, specific provision will be made for wheelchair tennis players.

In general, one percent of the seating capacity will be designed to accommodate people with disabilities – one half will be given to wheelchair spaces, and one half will be given to 'enhanced amenity' seats. All wheelchair seats will have a companion seat located immediately adjacent, and spaces will be evenly distributed around the seating bowl at concourse level.

3.3.6 Event Overlay

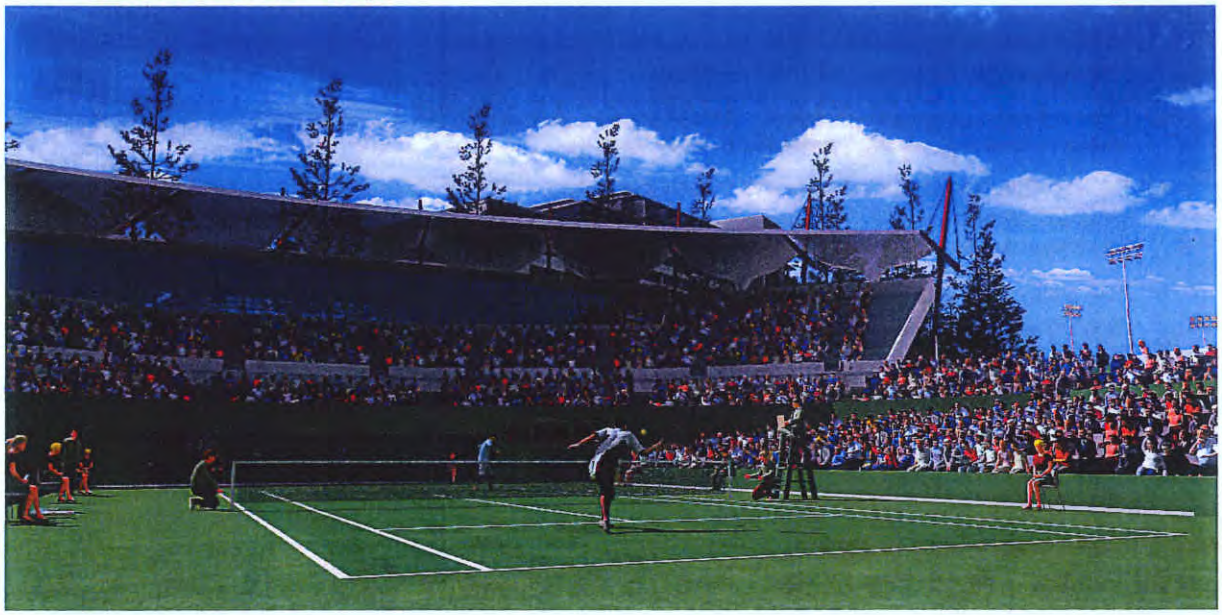
The masterplanning of the STC has carefully assessed and addressed the demands of a major tennis event, including the needs of players, spectators, VIPs, officials, media, sponsors and event organisers. Solutions can be seamlessly integrated into both the building structures and the open space areas immediately adjacent to the courts. Pedestrian and traffic flows are designed to avoid congestion and maintain maximum segregation between different user groups.

3.3.7 Transport Planning

The efficient planning and management of transport and traffic issues are paramount to the success of the STC, both during normal operations and more particularly during event mode. These issues are addressed in detail in the Traffic report.

3.4 Centre Court

3.4.1 Introduction to the Design



The centre court's contemporary and Queensland-inspired design achieves the masterplan objective of creating a world-class lightweight tennis pavilion structure within a subtropical garden – a unique piece of architecture that reflects the climate and lifestyle of Brisbane and south-east Queensland.

The subtropical theme is complemented by the elevated concourse or podium that wraps around the permanent centre court seating.

Permanent seating is covered by a translucent roof that permits light in but shields spectators from the sun's harshest rays.

The following principles are incorporated into the design of the centre court:

- The centre court is countersunk into the plaza, creating a tennis theatre. This concept will provide the atmospheric acoustics to enhance the experience and the effect of the centre court.
- The countersinking of the centre court reduces the mass of the entire centre court structure. It also allows a dedicated service level to be incorporated under the public level to avoid conflict between back of house and front of house activities.
- Providing an integrated shade structure defines the centre court and enhances the roofing over the permanent seats.
- The absence of full height building facades creates a more open setting for the centre court structure, reducing its apparent mass.
- Tennis Queensland facilities are located in a glass pavilion set within the centre court structure. The pavilion extends beyond, offering views to the river and creating an entry statement into the STC.
- Day-to-day administration facilities are located in a lightweight structure to the west of the centre court.

3.4.2 Seating Bowl and Temporary Seats

The seating bowl of the centre court is designed with the following principles:

- All seats are in close proximity to the centre court, with the permanent seats within a 29 metre zone from the centre of the court and the temporary seats within 42metres.
- The permanent seating bowl comprises a 16 equal-sided polygon (hexdecagon). This format creates an amphitheatre setting with all seats focused towards the centre of the court.
- The minimum sightline criteria adopted is c=60 for the lower seating bowl adjacent to the court tramlines, with the focal point defined as the nearside tramline of the doubles court. Due to the configuration of the seating bowl, this equates to an average sightline criteria of c=90.
- Row depths are 850mm minimum with a maximum 20 seats between aisles. A minimum seat spacing of 500mm centre to centre has been adopted for the permanent seats.
- Vomitories and aisles are designed in accordance with the recommendations in the Guide to the Safety at Sports Grounds (The Green Guide).
- Provision for temporary, readily-available seating has been made so there is no need for special sections or bespoke units. This is an important consideration when considering the costs associated with providing temporary overlay for a tournament such as a Davis Cup tie.

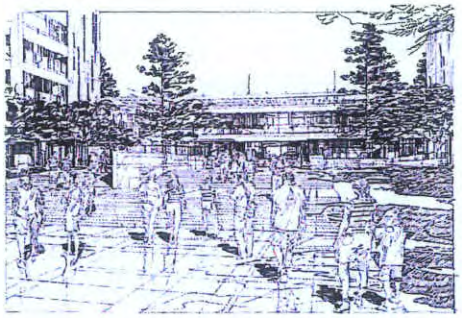
3.4.3 Segregation of User Groups

Access and egress from the STC is designed to avoid conflict between different user groups.

Two lifts and two staircases are provided in the administration pavilion. They service the first floor offices and function rooms and the court level player facilities. The stairs comply with fire escape regulations, and one lift is designed for stretcher access.

Building and room layouts ensure flexible use of areas on a daily basis as well as allowing for future refurbishment and remodelling. Future development was a consideration in planning the site, and flexibility for adaptation will maximise potential opportunities.

During major events, when segregation is more important, the design allows for separate entries for players, spectators, VIPs, sponsors, officials and the media.



Spectators enter the centre court precinct at turnstiles at the north-west corner. VIPs, officials and players collect in the central space at entry level beneath the elevated administration pavilion. Officials and VIPs use the western lift and stairs to access facilities at first floor level, while players use the eastern lift to access their facilities and change rooms at court level.

3.4.4 Spectator Group Support Facilities

Merchandising - Pro shop

A tennis pro shop and racquet re-string facilities are at ground entry level within the Venue Management Building. The pro shop's prominent location in the building will be convenient for users of the STC, because it is from this direction that most will approach. The pro shop will be visible on approach by foot or by car.

Café

Café style facilities are provided at ground entry level within the Venue Management Building. The café will operate primarily as a servery counter from where players, spectators and staff may purchase food and drink for consumption.

The concept is to keep the café servery as sensibly sized as possible so it can be staffed by one person. The food consumption area (overlooking the show courts) remains spacious and flexible in its use.

Banking and ATMs

Two ATMs are proposed within the STC for use during operating hours.

3.4.5 Player Support Facilities

- Change rooms/toilets are provided at centre court level, directly below the entrance area. From here, players have easy access to the centre court surface.
- A gymnasium is located immediately beside the change rooms at centre court level. This opens out to the centre court during day-to-day mode for the convenience of players.
- Drinking fountains are strategically placed around the centre court and outside court areas, specifically in food consumption zones and areas of high use.

3.5 Event Mode

3.5.1 Principles of Overlay

The design of the STC ensures that the complex is prepared and able to meet the increased demands during major events. This includes the requirements of players, spectators, VIPs, officials, media, sponsors and event organisers.

3.5.2 Overlay Design Objectives

The design process for the overlay assures that the STC can accommodate temporary facilities such as seating, toilets, food and beverage outlets, medical services, merchandising stores and broadcast facilities.

Managing large crowds can be the single biggest challenge in organising a major event, therefore the overlay planning strategy adopted by this design ensures that the STC has the ability to move large crowds smoothly and safely through dedicated areas. Aisle widths, vomitory or access points and concourse widths have all been calculated to allow for the free flow of spectators at peak capacity. The opportunity to create entertainment zones, such as the picnic lawn at the rear of the centre court, may also be used to manage large crowds.

Amenities are spread evenly across the site, and circulation paths are designed to maintain pedestrian flows and prevent congestion.

3.5.3 Establishing Exclusive and Controlled Routes for Key Constituent Groups

- Circulation Principles
    - Segregate different user groups
    - Ensure the safety of patrons during an emergency
    - Minimise congestion points
    - Separate entry and egress points
    - Avoid conflicting circulation flow paths
    - Calculate widths of openings to the seating bowls and circulation paths
- General Entry Access

General entry access to the STC during event mode is via temporary turnstiles installed immediately adjacent to the pro shop at the western side of the administration pavilion. While most patrons will hold tickets for major events, provision is made for satellite ticketing stations along the pedestrian approaches to centre court.

Once spectators pass through the ticket turnstiles, they will filter around the periphery of the seating area in an anti-clockwise direction. If temporary seating is in place, the movement will occur just outside the stadium structure (ie. for a 7000 seat event).

Post-event and emergency exits for spectators are via these same access points. Egress from the ticketed area is at the opposite end of the administration pavilion. This is separated from the main patron access point to avoid the risk of congestion in the most heavily trafficked areas.

3.5.4 Defined Security Perimeter

The clear delineation of the STC masterplan and the ladder arrangement of courts help to create a secure precinct for the whole facility while it is in event mode. The site has naturally secure boundaries to the south and west because of the location of the railway corridor and road. The ARI facility borders the site to the east.

Secure compounds that house temporary overlay facilities (such as sponsor areas, broadcast van space or media centre) will each have its own temporary line of security.

At the centre of the whole precinct is the ticketed event area. This is bordered to the north by turnstiles and the administration pavilion; at the western edge by the west side of the show courts; and at the eastern side by the podium of the centre court.

3.5.5 Logical Arrangement of Operational Compounds

Temporary compounds may be established while the STC is in event mode. They cater for the needs of user and operational groups that cannot be accommodated in the permanent buildings:

- Broadcast facilities, outside broadcast vans, TV and radio crew compounds and patrons' car parking, are located to the east of centre court.
- In an area to the north-east of the centre court enclosure is the catering compound, briefing and mustering area for temporary staff, volunteer and ball boy facilities, media centre and area for officials, police and security.
- VIP hospitality, corporate lounge and dining areas, sponsors' lounge and dining areas, and players' lounge and dining areas will be housed in marquee style accommodation on the practice courts west of the centre court.

3.5.6 Overlay – Temporary Seats

The centre court seating bowl design allows up to 1500 temporary seats to be installed. Because temporary seating will be required infrequently and for short periods, it was necessary to consider the following in the design for their installation:

- readily available configurations
- inexpensive seating types and configurations
- standardised profiles
- easily installed and removed seating.

Access to the temporary seats is via the same entrances to the permanent seating. This controls the number of patron access/egress points to the seating areas and minimises interference with the players' sightlines.

3.5.7 Sports Lighting

The outer court and show court lighting will be designed to national and international standards and in accordance with AS 2560.2.1 – 2003 and Tennis Australia Technical Instruction – Lighting for outdoor tennis.

Light poles at the court boundary are cantilevered towards the court centre to provide an even distribution of light over the playing surface. Horizontal illuminance will be a minimum 2000 lux at 1.0 m above the playing surface.

Centre court and show court lighting will have the same performance as outside courts, but with the capability to be adapted to TV broadcasting with temporary additional professional colour TV broadcast lighting for tennis. (Colour TV coverage, average maintained vertical illuminance EV; 2000 lux for the main and 1000 lux for secondary cameras.)

3.6 Environment

3.6.1 Player and Spectator Comfort

Sun shade, glare and rain

The centre court's permanent seats are protected from both sun and rain by a translucent roof. The roofing provides 100 percent drip-line coverage to 2700 permanent seats, as well as glare resistance and sun shade to patrons.

Passive Ventilation / Natural Ventilation

The centre court, seating and shaded concourses rely totally on natural ventilation. The roof shelters spectators from the harshest of the sun's rays while allowing air movement to create a naturally ventilated and comfortable outdoor environment.

3.6.2 ESD Approach to Design and Sustainability

Mirvac is committed to being an industry leader in introducing new technology and practical measures related to sustainability.

Sustainable practices are integral to Mirvac's culture of excellence – to achieve high quality best practice in all that we do.

The masterplan maximises the opportunity to provide buildings that represent contemporary best practice for sustainable design.

The masterplan has addressed sustainable design elements that are intrinsically linked to planning, including:

- water sensitive urban design
- amenity of external spaces
- passive climate control opportunities for indoor and outdoor amenity
- flexible sustainable infrastructure for waste management and reuse.

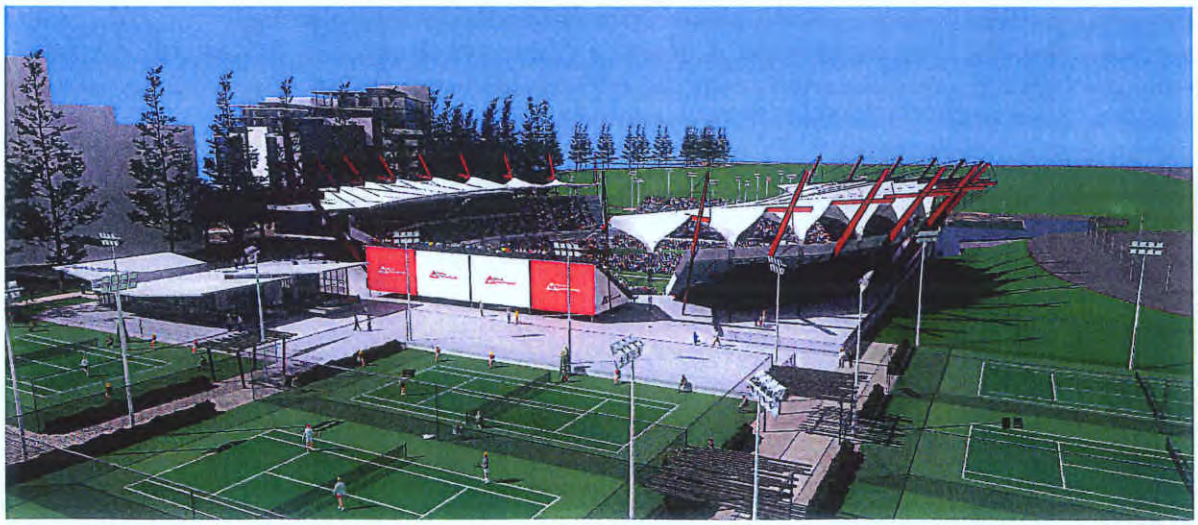
It is anticipated that guidelines will be developed for delivering building designs that ensure that the sustainability potential of the masterplan scheme is fully explored.

3.6.3 Built Form

The presentation of the site's built form can impact greatly on the environmental qualities of the development. The orientation of the proposed centre court structure is important to ensure that all indoor work spaces and gathering areas maximise the areas of exposed façade to the north. The dedicated permanent facilities in the complex will be detailed with this feature in mind.

The STC layout is designed to minimise overshadowing, especially from the centre court. This will promote natural lighting in the indoor environment as well as add to the quality of space outside. The tennis courts will be orientated so that low level sun does not pose a problem to either players or spectators.

Acoustic attenuation between the tennis centre and the residential component of the development will be carefully detailed to minimise the transfer of ambient noise, especially during major events.



3.7 Art Built In

3.7.1 Project Appreciation

The Mirvac project team is committed to working with talented and professional Queensland artists. By integrating artwork into the design development stage of the project, we can create a unique and exciting synergy of sport and art.

The Queensland Government's Art Built-in Policy requires public art to be included within the STC. It is understood that this will be the first major public-private partnership to include an Art Built-in program.

The proposed STC design lends itself to a holistic approach to integrating art within the building fabric. It will provide a rare opportunity for an artist to respond creatively to the architectural design and approach, and work in collaboration with the architects and engineers. This will allow a truly integrated project that reflects the full spirit of the State Government's Art Built-in policy.

3.7.2 Art Built-in Policy Appreciation

To ensure that the public art component of this project reflects the objectives and best practice as outlined in the Art Built-in Policy and Guidelines, the Mirvac team will include experienced public art advisers.

The key objectives of the Art Built-in Policy are:

- a commitment to enhancing the quality of the public environment in Queensland and ensuring that cultural and artistic expertise is integral in the shaping of our civic culture, and
- the facilitation of employment opportunities for Queensland artists and economic benefits for related industries.

In support of the Policy, we propose to deliver the 2% for art obligation with the commissioning of artworks of artistic excellence. This initiative to support the career development of emerging Queensland artists closely complements one of the objectives of the STC, which is to support the development of talented, future sporting champions.

3.7.3 Key Elements

We plan to engage artists to work with our architectural and landscape team on the STC development. A lead artist will be engaged at the start of the design development stage to work collaboratively with the architectural team. The commission will be to create a significant integrated work for the exterior of the centre court pavilion. This approach will ensure that the artwork is truly built in.

Other emerging artists may be commissioned to create artworks for the surrounding court areas and associated public spaces. The artists will be asked to engage, through Tennis Queensland, with tennis players. This will allow them to develop artwork that explores the dynamics of tennis (for instance, developing concepts that express movement, balance, fluidity, coordination and endurance of the human body).

A Public Art Advisory Group (PAAG) will be established as required by the Art Built-in toolkit, to oversee the project's decision-making process. The PAAG will comprise stakeholders from the Public Art Agency, Department of Local Government, Planning, Sport and Recreation, Tennis Queensland and the Mirvac team. An expression of interest process will be undertaken as part of the public art procurement strategy to ensure equity and a transparency in selecting both a lead artist and emerging artists.

3.8 Residential Built Form

In establishing a building language for the apartment component of the development, inspiration has been drawn on three macro level elements. These are:

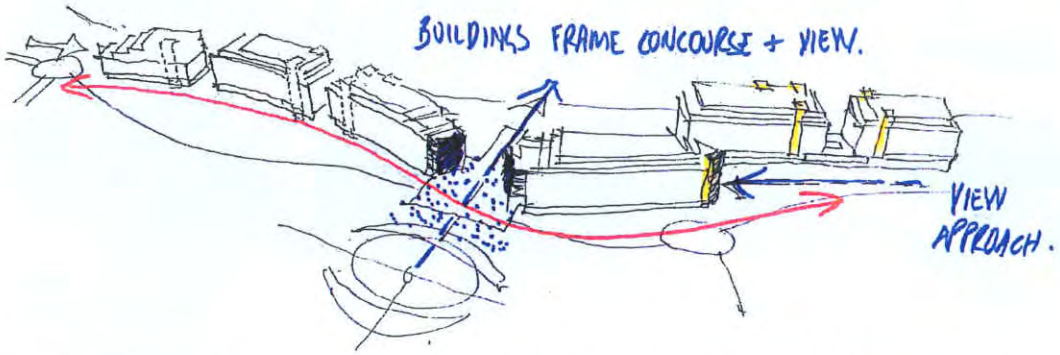
- The nature and form of the master plan along with the opportunities and constraints this provides
- The existing power station on the site
- Sweeping flow of the Brisbane River.

This has developed in the following manner:

3.8.1 The Site Context and Masterplanning

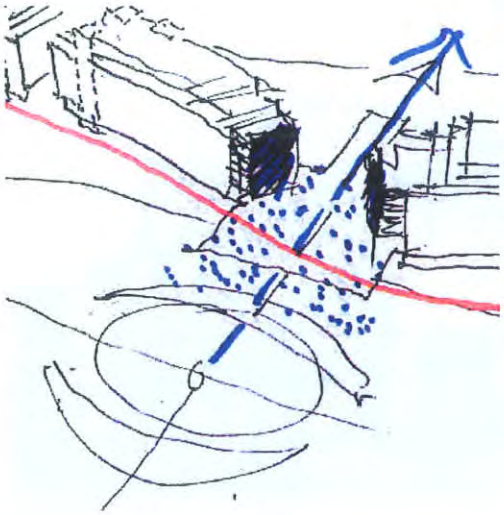
Masterplan

The masterplan lays the residential buildings out in a fluid curve alongside the water and landscape. The curves of the residential buildings mimic the organic form of the rivers, which contrasts with the orthogonal layout of the tennis courts.



The curved form relates to the site and movement paths as well as view corridors where the buildings peel into or out of view. The nature of this curve groups the buildings together as a family, and as such we see a common language of components which can be used across all the buildings. This provides the development a cohesive appearance, yet the language can be expressed in varying ways so as to allow for individual expression where required.

The arrival point at the State Tennis Centre Plaza area signals the use of built form which interacts with the public nature of the space, as well as enhancing the north-south axis generated by the centre court. The built form here is thus a mixture of elements which relate to views, amenity of public use (eg retail and parklands) as well as consideration of adjacent private areas.



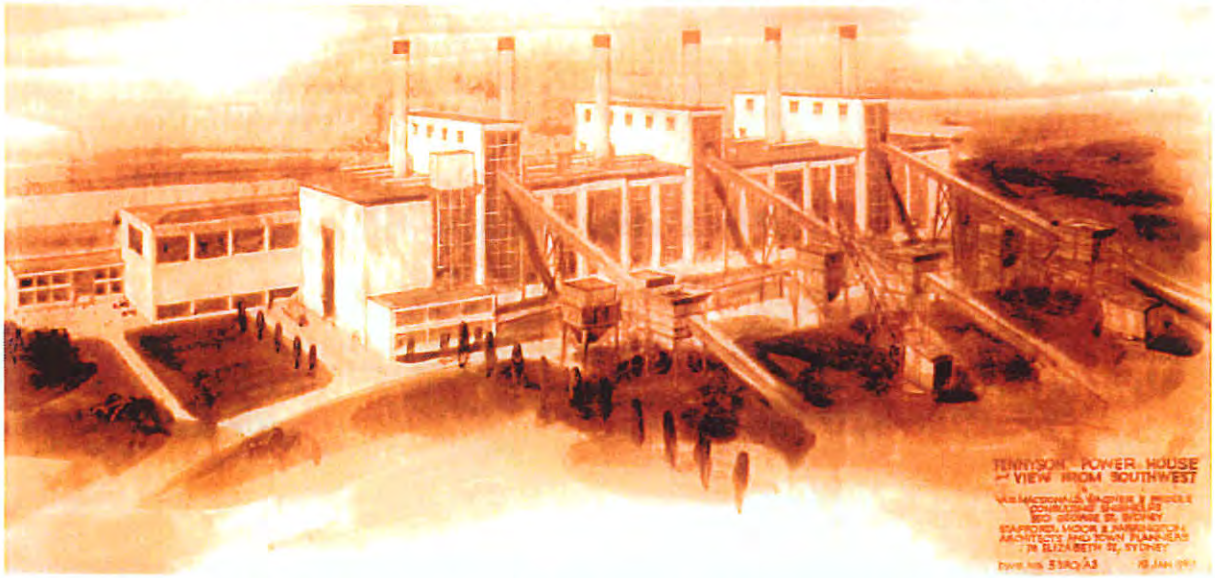
Distribution of the language elements across the site seeks to create a sense of history as well as cohesion amongst the parts (eg the Hopper and Hull elements as described below), while relating to each building's relationship to its location and surrounds in the overall development.

This distribution of the language references the existing building (particularly the grouping of the three Hopper elements), as well as addressing building entry, views and movement paths.

Built form also relates to points of arrival which address approaches to the site. The arrival process from both the east and the west will be greeted by suitable marker structures.

3.8.2 The Existing Power Station Building

The powerful image of the Power Station provided strong reference points for the proposed apartment building language.



An analysis of the existing building reveals strong maritime references,with the monumental scale of the power station approximating that of the great ocean liners.

At the forefront of the existing language is the interplay between the vertical Hoppers and the horizontal base - the Hull. These two elements dominate the form and respond to their accommodation within, where the tall Hoppers provided the height for coal storage, and the lower horizontal Hull housed the wide open space for the associated plant and staff.

There is also interplay between light and heavy elements – both in terms of form and materials. Solid masonry provides the strength of the heavy elements, while the steel and glass components combine to open up the light areas within the body of the "Hopper" and horizontal "Hull".

Although the function of the accommodation within the existing structure is vastly different to the proposed apartments, the language is appropriate in providing cohesive form, clear articulation and a reference to history, designed to the contemporary context.

The principles behind developing this building language are:

- Provide a clear design direction
- Deliver cohesion to the master plan and development as a whole
- Articulate the apartment buildings in such a manner so as to unite the form and accommodation functions in a rational and visually appealing manner

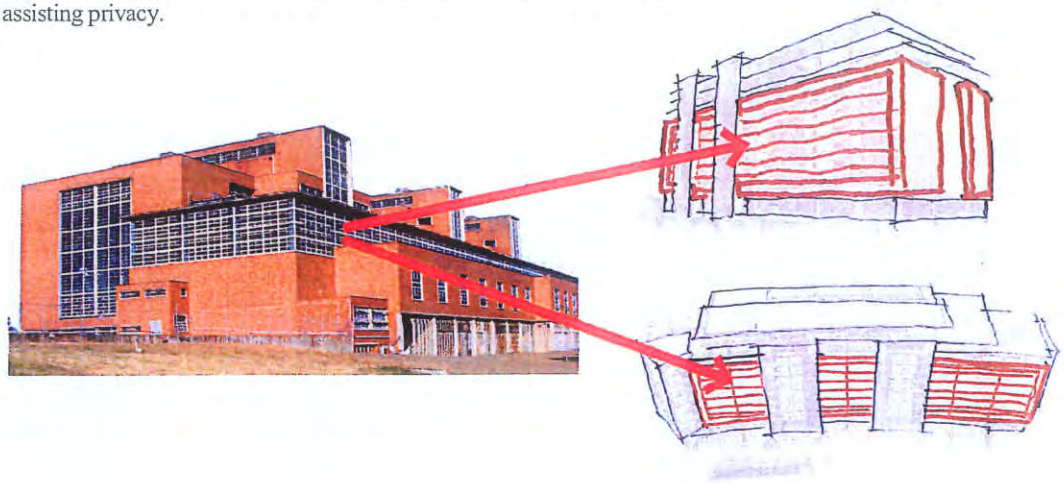
Interpretation of these language elements is as follows:

The Draft

This is the component of the building which relates to the ground plane. The opportunity to express the Hull element over, as floating above a flowing landscaped plane, is explored where possible. Building entry elements are identified within this Draft zone by the use of marker structures and the scale of the space. Integrated carefully amongst these flowing planes is a concourse for pedestrian movement and access.

The Hull

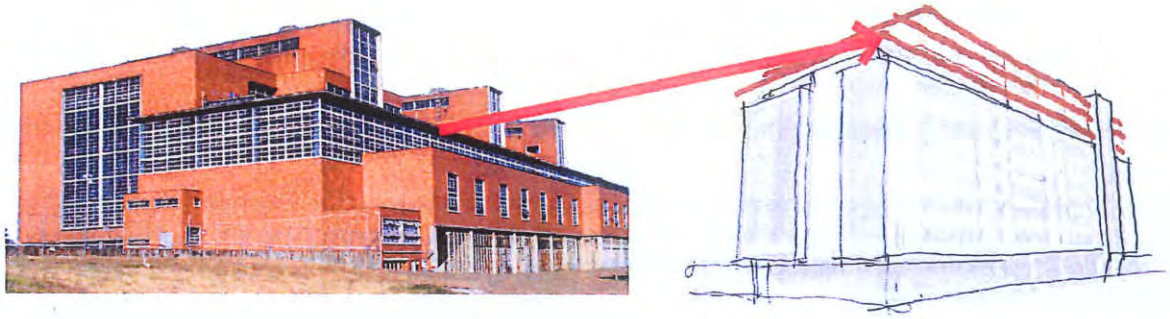
Formed as a horizontal framed element by means of an edge thickening, this element houses the bulk of the typical floors of each building. The horizontal nature of the building is scaled by this component which helps articulate the building into a more solid lower section below the upper floor terraces, which become lighter elements over. There is thus a proportioning of the height and bulk of the building into a tripartite system (entry Draft under, middle section Hull and Terraces over). The nature of the infill to this Hull element varies from glazed/solid balustrade to windows and screens. The end conditions of the Hull are treated in such a fashion so as to engage with view opportunities where possible, or close down where cross viewing might become an issue, thus assisting privacy.



The Terrace

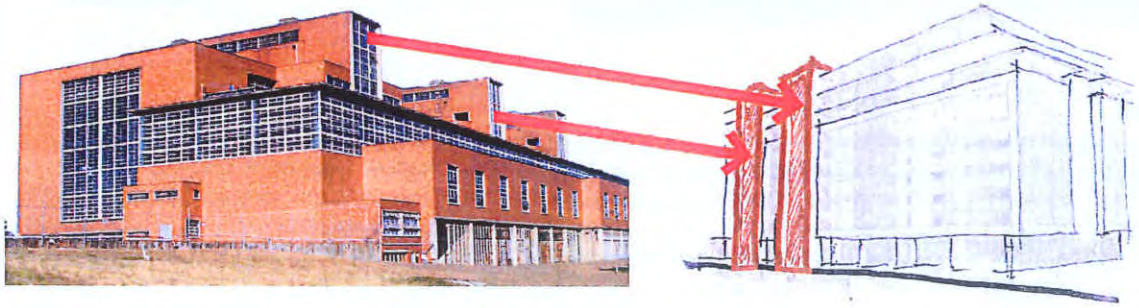
At the upper levels of the building, the nature of the accommodation gradually changes to larger units with greater viewing opportunities. This is expressed through opening up the building corners and stepping back where suitable. This stepping is also explored where suited to the master plan in terms of modulating building scale and mass, minimising impacts of view lines and adjoining lower scale buildings.

A lighter more open top utilising the Terrace element will thus complete the tripartite horizontal building language through which the vertical Hopper element will pass.



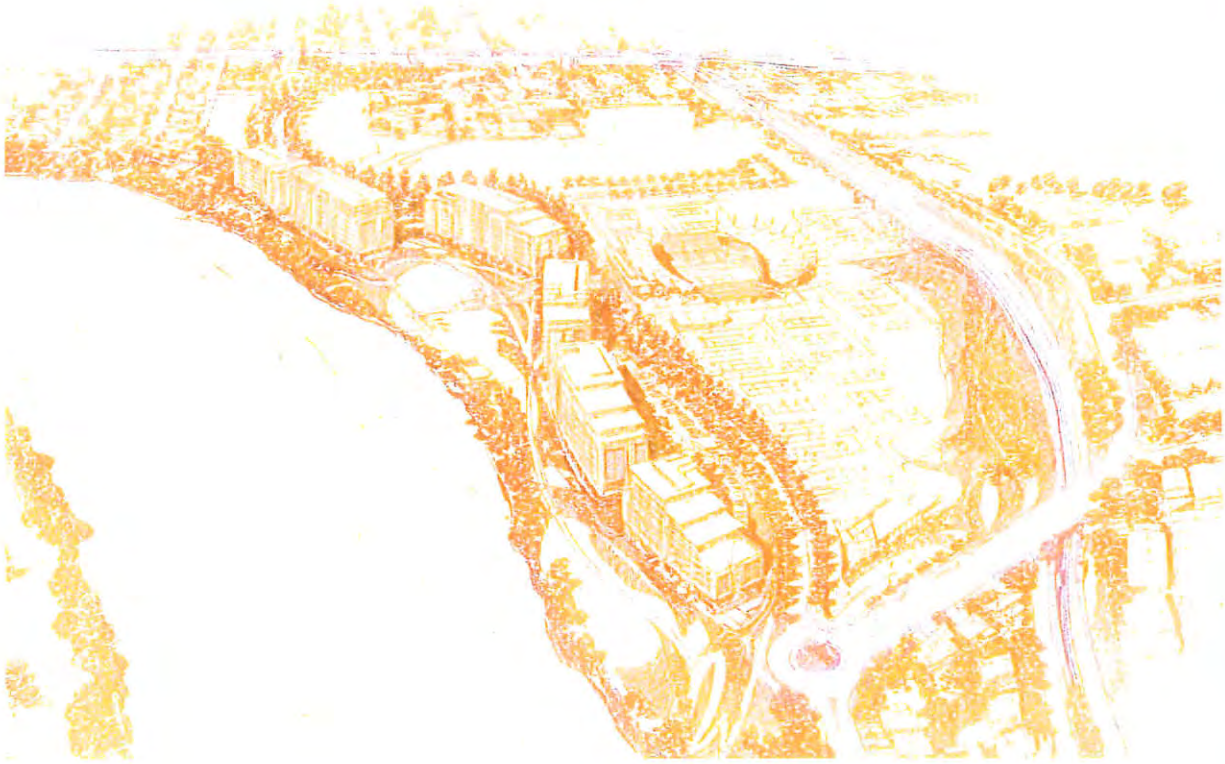
The Hopper

This element will generally express itself as a vertical marker with glazing, screens or open outdoor living spaces contained within its solid edge frame. The vertical nature of this element is an important component of the building language as it provides a strong contrast to the generally horizontal nature of the body of the buildings, and thus creates good articulation of the building at key points. The additional height of the Hopper element further modulates the horizontal roof line. These elements are located on both the river side and State Tennis Centre side of the apartment component of the development in key locations. Distribution of this element across the site sees some reference to the existing building in terms of loose groupings of three in certain instances.



3.9 Conclusion

As demonstrated, a rigorous process of analysis and implementation of good urban design principals has yielded a comprehensive and coherent Landscaped Masterplan. It is a vision that incorporates a new international standard tennis facility, significant riverside parkland and quality residential dwellings. These facilities are interwoven with visual access and physically permeable areas. Significantly the vision creates a framework to "mend" the "torn" urban residential fabric. The Tennyson Riverside Development will be a memorable place for the people of Brisbane and Queensland.



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4.1 Introduction

4.1.1 Background

Mirvac propose to develop the Tennyson Riverside Development, on the site formally occupied by the Tennyson Power Station. The development will generally consist of the State Tennis Centre and associated facilities and residential apartments. TTM have been engaged to prepare a report assessing the traffic engineering elements of the proposal. This report will support a town planning application to be lodged with Brisbane City Council.

The issues to be addressed within the scope of this report include:

- Access arrangements
- Internal road network
- Car parking provisions
- Car park design
- Service vehicle facilities
- Impact on external road network
- Transport management for the State Tennis Centre

In preparing this report, TTM have undertaken traffic surveys at key intersections and inspected the site to observe existing traffic conditions on the external road network

4.1.2 Site Location

The subject site is described as :

- Lot 1 on SP 164685
- County Stanley
- Parish Indooroopilly

A locality plan showing the approximate location of the site is shown in Fig 1.

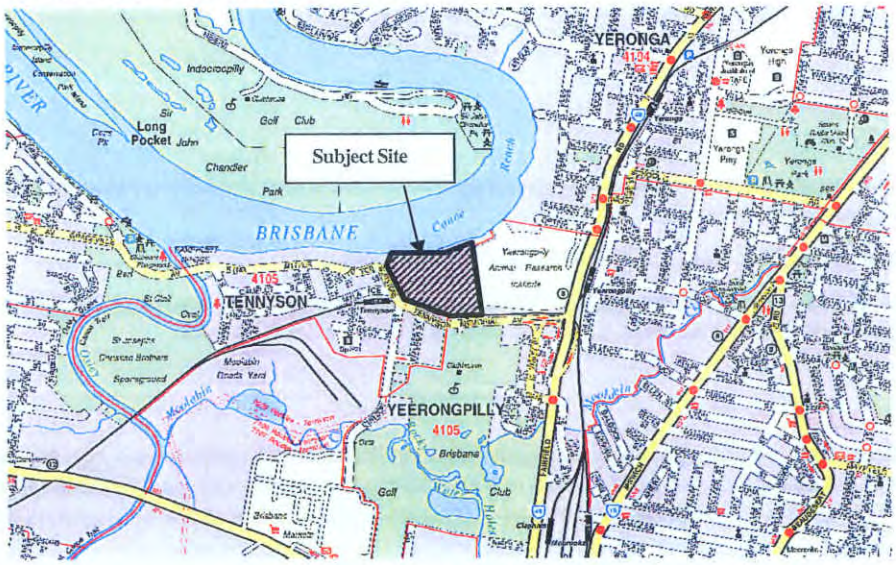

Fig 1 Locality Plan

4.2 Proposed Development

4.2.1 Description of Development

The proposed development consists of two distinct elements – the State Tennis Centre and the residential apartments. The details of each component are described as follows:

State Tennis Centre

The State Tennis Centre will consist of 23 courts. This includes a centre court, with a hardcourt surface and the capability of accommodating the temporary installation of natural grass or clay playing surfaces, 16 hard courts, four clay training courts and two natural grass courts. The centre court will have 5,500 permanent seats, with capacity to accommodate an additional 1500 temporary seats for special events.

Residential

This application involves a development permit for the first three stages of the residential development comprising buildings D, E & F. These stages include 200 apartments. The proposed apartment mix for these buildings is shown in Table 1:

Table 1 Apartment Mix

Apartment Type	No. Apartments
2 Bedrooms	66
3 Bedrooms	116
4 Bedrooms	18
Total	200

The application is also seeking preliminary approval for the overall development comprising 385 apartments. Therefore, it is necessary to consider the ultimate development with respect to the access intersections and the impacts on the external road network.

Retail

The development plan also includes a 100m^2 GFA retail tenancy in building D. A similar size retail tenancy is also proposed for building C.

4.2.2 Proposed Access Arrangements

The proposed points of access are:

- Signalised intersection with Fairfield Road approximately 70m south of Ortive Street (the proposal involves the closure of the Ortive Street intersection;
- Roundabout at the corner of King Arthur Terrace and Softstone Street.

An internal public road is proposed that will link the access points on Softstone Street and Fairfield Road. Access to the residential apartment buildings and the State tennis centre will be located on the new internal road.

4.2.3 Proposed Car Parking

The development plan provides 163 parking spaces dedicated for the State Tennis Centre. Of these car parks 24 spaces will be located in a secure area for venue management staff. A total of 400 parking spaces are provided for the residents of apartment buildings D, E and F, with an additional 49 visitor parking spaces provided in a dedicated on-grade visitor parking area.

4.3 Existing Transport Infrastructure

4.3.1 Existing Road Network

The key characteristics for the roads surrounding the site are summarised in Table 1.

Table 1 Existing Road Characteristics

Road	Classification
King Arthur Terrace	District Access Route
Softstone Street	District Access Route
Tennyson Memorial Avenue	Suburban Route
Fairfield Road	Arterial Route

Curzon Street intersects with Tennyson Memorial Avenue immediately south of the rail overpass. This intersection is controlled by traffic signals. Curzon Street provides access to the Brisbane Markets.

Ortive Street provides access to the Animal Research Institute and also services a small residential catchment to the north of the institute. The intersection of Fairfield Road and Ortive Street is also controlled by traffic signals.

4.3.2 Existing Public Transport

Rail

The site is conveniently located to two train stations. The Tennyson Station and the Yeerongpilly Station are both within 800m walking distance of the subject site, which is considered the threshold for utilisation of heavy rail services.

The Yeerongpilly Station is on the Beenleigh Line, which offers frequent services in both directions throughout the day. The Tennyson station is located on the South Brisbane Line connection to Corinda. Services via the Tennyson Station are limited.

Bus

Both Fairfield Road and Tennyson Memorial Avenue are bus routes. Bus stops are located on Softstone Street immediately to the south of the entry to the proposed roundabout, whilst stops are located on Fairfield Road near Ortive Street.

4.3.3 Existing Pedestrian / Bicycle Facilities

On- road bicycle lanes are provided on Graceville Avenue, however there are no bicycle lanes designated on roads in the vicinity of the site.

4.3.4 Transport Infrastructure Planning

There are no current plans by Brisbane City Council to upgrade the road network in the vicinity of the subject site, however the Green Bridge connection to the University of Queensland may influence the traffic volumes in the major roads surrounding the site. That is, King Arthur Terrace is heavily utilised as a link to the University for residents in the south – eastern regions of Brisbane.

4.4 Existing Traffic Volumes

4.4.1 Peak Hour Traffic Volumes

TTM conducted traffic surveys at the intersection of Tennyson Memorial Avenue / Curzon Street and Fairfield Road / Ortive Street. The results of these surveys are shown in Figure 2.

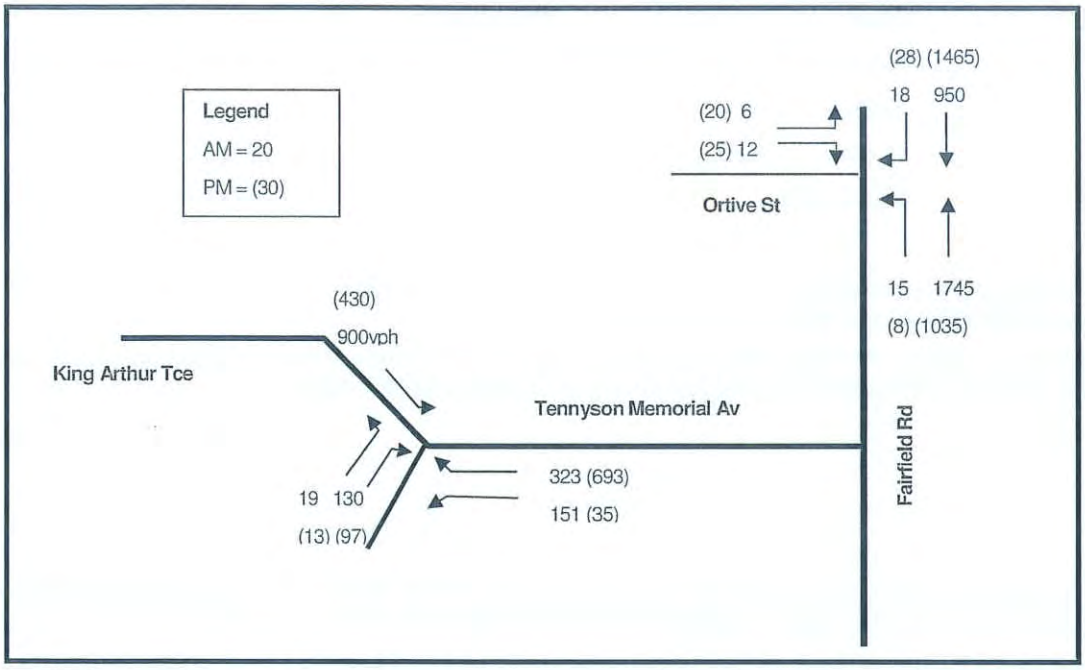

Fig 2 Existing Peak Hour Traffic Volumes (vph)

4.4.2 Daily Traffic Volumes

An automatic traffic counter was placed on King Arthur Terrace immediately west of the Pamphlett Bridge. The average daily traffic volume recorded was 11,200vpd.

It is estimated from the peak hour surveys that the daily traffic volume on Fairfield Road, to the south of Ortive Street, is in the order of 25,000vpd.

4.5 Future Transport Demand

4.5.1 Development Traffic Generation

The estimated traffic generation associated with the residential apartments and the tennis centre are shown in Table 3. The traffic generation for the residential component has been based on the overall development of 385 apartments.

The traffic generation rate adopted for the tennis centre has been sourced from the RTA Guide to Traffic Generating Development, whilst the traffic generation rate for the residential component is based on the DMR Road Planning and Design Manual. Both of these sources are widely accepted as the most reliable in terms of traffic data.

The daily and peak hour traffic volumes are shown in Tables 2 and 3 respectively.

Table 2 Daily Traffic Generation

Use	Rate	Qty / Area	Volume
Residential	4vpd / unit	385 units	1540vpd
Tennis Centre	45vpd / court	23 courts	1035vpd
Total			2575vpd

Table 3 Peak Hour Traffic Generation

Use	Rate	Qty / Area	Volume
Residential	0.4vph / unit	385 units	154vph
Tennis Centre	4vph / court	23 courts	92vph
Total			246vph

4.5.2 Development Traffic Distribution

The distribution associated with residential traffic is expected to be different to the tennis centre. That is, the residential traffic will be more predominantly city bound, whereas it is expected that the tennis centre will generally attract trips equally from the surrounding catchment. The assumed residential traffic distribution and tennis centre traffic distribution, based on the characteristics of the surrounding catchments, are shown in below:

Residential Traffic Distribution

- 25% - West via King Arthur Tce
- 65% - North via Fairfield Rd
- 10% - South via Fairfield Rd

Tennis Centre Traffic Distribution

- 45% - West via King Arthur Tce
- 45% - North via Fairfield Rd
- 10% - South via Fairfield Rd

The following directional splits have been adopted for the peak hour traffic periods:

Use	Period	Inbound	Outbound
Residential	AM	25%	75%
	PM	75%	25%
Tennis Centre	AM	nil	nil
	PM	80%	20%

It has been assumed that the traffic generation associated with the tennis centre on a weekday morning peak traffic period will be negligible, and that the primary traffic generating period will be in the evening when competition and social court hire occurs.

The resultant development traffic volumes based on the directional splits described above and the distribution outlined for each of the uses are shown in Fig 3.

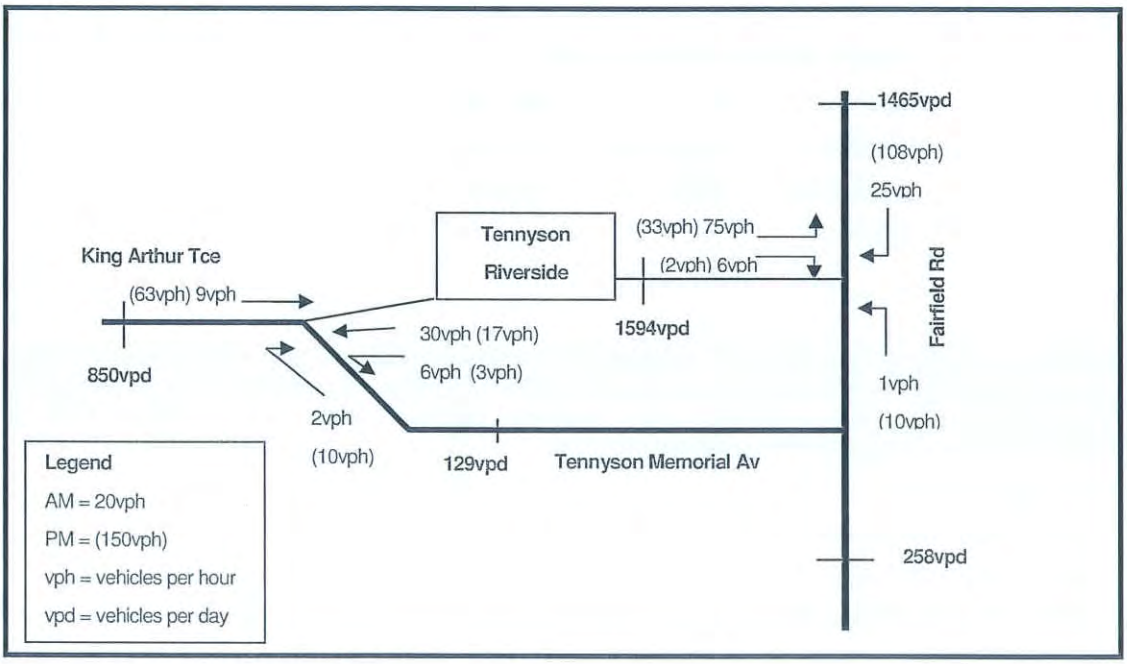

Fig 3 Development Traffic Volumes – Peak & Daily

4.5.3 Future Traffic Volumes

The future traffic volumes at the access intersections are shown in Figure 4. The future base volumes on Fairfield Road have been based on a 2%pa growth rate to the year 2018 (10 years after completion of development). A 3%pa growth rate has been applied to the Softstone Street traffic.

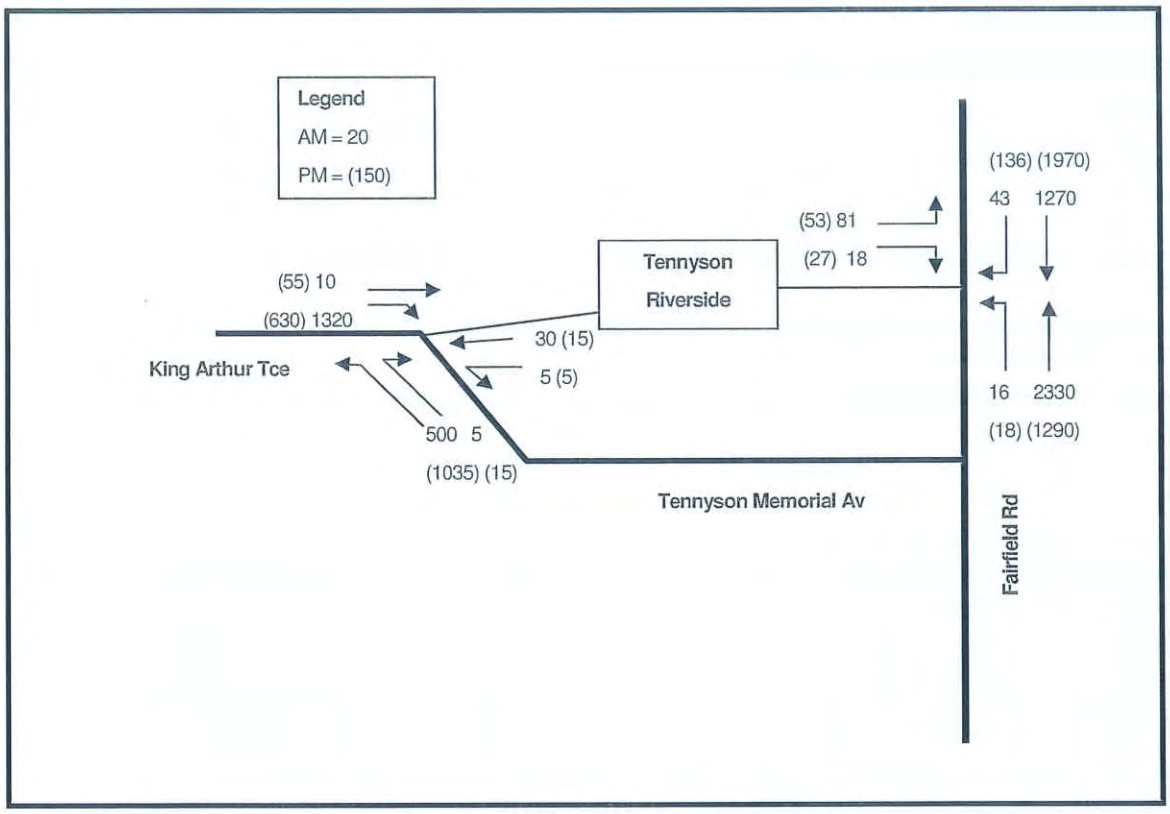

Fig 4 Future (2018) Peak Hour Traffic Volumes (vph)
With Development Traffic (includes Ortive Street traffic)

4.6 Road Network Performance

4.6.1 Access Intersections

TTM have examined the performance of the two access intersections under future traffic conditions (year 2018), with the development traffic included.

The aaSidra results of the analysis are contained in the attachments.

The Fairfield Road access intersection will operate with a maximum degree of saturation of 88% (southern approach -through) in the AM peak in the year 2018 and 83% (northern approach - through) in the PM peak. Delays on the western approach (access to the Tennis Centre) will be in the order of 30 – 40 sec in the peak traffic periods. It is intended that the signal phasing be programmed such that this level of delay is maintained during the peak periods to further discourage the internal road as a through route for non – development traffic. The right turn into the development from the northern approach should also be discouraged by maintaining a delay that encourages external traffic to utilise the existing road system as opposed to the internal roadway.

The Softstone Street intersection will operate with a maximum degree of saturation of 87% (western approach) in the AM peak and 71% (southern approach) in the PM peak.

In summary, the results indicate that both intersections will operate at an acceptable level of service for at least the ten year design horizon.

4.6.2 Mid Block Capacity

In terms of mid block capacity, the primary issue relates to the volume of traffic on King Arthur Terrace – Graceville Avenue. The existing daily volume on King Arthur Terrace is 11,200vpd. The proposed development will distribute an additional 850vpd in this direction. This equates to 12,050vpd, with the development traffic included.

A significant proportion of the existing traffic utilising King Arthur Terrace – Graceville Avenue is destined for the University of Queensland. This is evident by the significant reduction in traffic during University holidays. The growth in traffic using this route is therefore effected by the lack of capacity in the road network through Indooroopilly. The Walter Taylor Bridge is a two lane bridge operates at capacity and the intersections between Coonan Street and Lambert Road are also operating at capacity.

There are also a number of transport initiatives being undertaken by Brisbane City Council that will impact on the level of University traffic using King Arthur Terrace. The construction of the Green Bridge from Dutton Park to the University and the future construction of the bridge between South Brisbane and Milton will further enhance the accessibility of the University for students and employees originating from the southern and eastern suburbs that may normally use King Arthur Terrace.

As such, future traffic volumes on King Arthur Terrace – Graceville Avenue are unlikely to exceed 15,000vpd in the future, even with the proposed development traffic, which is consistent with the threshold for a District Access Route.

4.7 Site Access and Internal Road Network

4.7.1 Proposed Access System

The proposed access system for the State Tennis Centre and associated development is based on providing safe and efficient access to the site whilst minimising impact on the surrounding road network. This philosophy generated the need for two access points to service the site. The primary link to the east through the Animal Research Institute site to Fairfield Road has been complimented with a secondary link to Softstone Street on the western side of the site.

The Fairfield Road access is the "address" and entry statement for the State Tennis Centre.

The proposed strategy for access on Fairfield Road is via a signalized intersection located approximately 70m from Ortive Street. It is proposed that the existing signalised intersection at Ortive Street be terminated with Ortive Street converted to a cul-de-sac. Terminating Ortive Street with a cul-de-sac and diverting the local traffic to the new access road was considered necessary to provide the residents of the Ortive Street catchment the full range of turn movements to / from Fairfield Road. That is, if Ortive Street intersection with Fairfield was retained, turn movements would need to be limited to left in / left out only.

The access to the Animal Research Institute site will be incorporated into the roundabout located on the main access road. The proposed roundabout will ensure efficient access / egress for traffic generated by the Animal Research Institute

The access intersection on Softstone Street is to be located at the intersection with King Arthur Terrace. It is proposed to control the traffic movements at the intersection with a roundabout. A roundabout at this location is considered the best form of control as it not only provides for safe and efficient access in and out of the site, particularly for the right turn movements, but it will also control vehicle speeds around the bend.

The secondary access to Softstone Street is considered necessary to provide for a more efficient distribution of traffic to and from the site. There will be a proportion of traffic travelling to / from the west regardless of the location of the access points. Therefore, if only the Fairfield Road access was to be provided, traffic travelling to / from the west would be forced on a circuitous route along Tennyson Memorial Avenue and Fairfield Road. It is noted that having the secondary access will not affect the level of traffic using King Arthur Terrace as this traffic will travel this route regardless of the location of the access as there are no real alternatives.

4.7.2 Internal Layout

The internal road network and parking arrangements are based on separating the tennis centre traffic from the traffic associated with the balance of development on the site. The parking for the tennis centre is located on the eastern side of the centre whilst the residential parking will be located in basements.

Traffic generated by both the tennis centre and the residential component of the development will have the ability to access the site from both Fairfield Road and the Softstone Street. The boulevard style assess road to Fairfield Road will form the primary access route to the site.

Access to the basement car park for building D, E and F is located immediately to the east of the plaza area on the northern side of the internal road. This driveway will provide access to 400 low turn-over parking spaces from a minor road. In accordance with the TAPS Policy a Type C1 driveway is required.

Access to the tennis centre car park and the visitor parking area for the residential apartments will be provided at the roundabout located on the internal road approximately 80m to the east of the plaza. The intersection of these car park access roads and the internal road forms a four – leg roundabout, although the exit from the visitor car park is located a further 110m to the east (one way traffic flow through the visitor car park proposed).

The plaza area in front of the tennis centre will be the primary focus with respect to discouraging non – local traffic from travelling between Fairfield Road and King Arthur Terrace via the internal road system.

It is intended that this feature will be designed to give the impression that the "public road" terminates at each end of the plaza, and that only local traffic can travel through the plaza. This "traffic calming" function will be achieved by a combination of urban design measures that will compliment the function of the plaza as the main pedestrian entry to the tennis centre.

The design will be based on the plaza being constructed as a raised platform with alternative pavement treatments utilised throughout. It is also intended that landscaping (hard and soft) be undertaken that creates a visual barrier from one side of the

plaza to the other. Appropriately located bollards (removable) will also be utilized to constrict the traffic area to create a significantly reduced speed environment. It is recommended that signage be installed either side of the plaza advising that entry to the plaza is for local traffic only and that this signage be combined with directional signage to the tennis centre and residential parking, to further give the impression that non – local traffic should not access this area.

The plaza treatment will be complimented with additional calming devises along the access road. These devices will take the form a roundabout control at intersections and mid block slow points (horizontal displacement). The mid - block slow points will be located at approximately 120m spacing. Again removable bollards will be utilised in conjunction with the devices. This will allow speeds to be controlled during day to day operation, whilst during event mode the bollards can be removed to allow coaches to negotiate the devices.

4.8 Car Parking Requirements

4.8.1 BCC Requirements

The minimum parking requirements for the proposed uses, in accordance with the Table 12 of the TAPS Policy are shown in Table 4:

Table 4 BCC Minimum Parking Requirements

Use	Rate	Qty	Req.
Tennis Centre	6 spaces / crt	23 crts	138 spaces
Residential	1.5 spaces / unit*	200 apt's	300 spaces
Retail	3 spaces / 50m^2 GFA	100m^2	6 spaces

* Note: The proposed apartments are greater than 75m^2 and located in excess of 200m from the nearest railway station, therefore the higher parking rate for multi – unit dwelling as nominated in Table 12 of the TAPS Policy has been adopted for the residential component.

Section 5 of the TAPS Policy states that the number of parking spaces calculated in accordance with Table 12 is the minimum number of off – street parking spaces to be provided by the development.

Whilst the TAPS Policy does not specify a rate for visitor parking for multi – unit dwellings, it is accepted that 0.25 spaces per apartments is generally applied. This equates to a requirement of 50 visitor parking spaces for the residential component of the development.

4.8.2 Proposed Parking Supply

The parking provided for each component of the development is summarised as follows:

Tennis Centre

The parking supply proposed for the tennis centre includes 138 public parking spaces and 25 secured parking spaces for venue management, equating to a total parking supply of 163 spaces. The proposed parking supply therefore exceeds the parking requirement of 138 spaces.

Residential

The parking supply proposed for buildings D, E and F is 400 resident spaces (2 spaces per unit) and 49 visitor spaces.

The resident parking supply satisfies the minimum requirement of 250 spaces (excludes the visitor spaces), and is considered consistent with market demands associated with residential development of this quality.

The visitor parking supply is 1 space less than the requirement, however this is not considered a significant issue, as there will be additional on-street parking available in the plaza area and along the internal road.

The proposed parking supply therefore complies with the Council minimum requirements for each of the proposed uses within the development.

Retail

The retail component of the development is considered to be ancillary to the other uses proposed within the site, and as such it is expected that the additional parking demand generated will be negligible, and capable of being accommodated within the on – street parking along the internal road, including the plaza.

4.8.3 Proposed Car Park Design

The proposed car parks for both components of the development are based on the key design criteria specified in the TAPS Code.

The residential car park is a Class 3 facility, which requires a minimum width of parking bay dimensions of 2.6m. The tennis centre car park is considered a Class 2 facility, which requires a minimum width of parking bay of 2.5m. The parking bays throughout the development are a minimum of 2.6m wide x 5.4m long and the parking aisles are a minimum of 6.2m wide.

The ramp grades within the car park will be designed such that the maximum grade does no exceed 1 in 6.

4.9 Service Vehicle Facilities

4.9.1 Tennis Centre

The TAPS Policy does not specify service vehicle requirements for sporting facilities as proposed.

It is intended that the plaza area will be utilised as the primary delivery area during the normal day to day operation of the tennis centre. It is expected that a majority of deliveries will be made during the day when the tennis centre and surrounding residential precinct will be relatively in-active, hence there will be minimal potential for conflicts with other traffic and pedestrian movements at the entry to the tennis centre.

Refuse collection and specific deliveries for the tennis centre in larger vehicles (eg equipment for a championship) will be undertaken in the car park adjacent to the maintenance shed at the south – eastern corner of the tennis centre.

4.9.2 Residential

The TAPS Policy requires that the residential component of the development provide refuse collection and furniture delivery vehicles to access the site, although dedicated parking bays are not required.

HPA Architects are currently working with City Waste Services on a refuse collection strategy for the residential component of the development. Two strategies are currently being considered. One strategy involves 660 litre bins being located throughout the basement car park. Building management would be responsible for transferring these bins using across to a compactor located adjacent to the gymnasium on the southern side of the internal road as frequently as necessary. Mechanical lifting devices would be installed to unload the bins into the compactor. The Council refuse vehicle would then reverse from the internal road into a bay adjacent to the compactor, load the bin and exit the site in a forward motion.

The alternative strategy is to provide $2m^3$ bins in the basement. These bins would be collected from bin corrals located adjacent to the car park access road or adjacent to the visitor car park.

There are issues to be resolved with these strategies. Once a final strategy is adopted, plans will be submitted to City Waste Services for approval. As stated above, City Waste Services have been involved in identifying the possible strategies for refuse collection.

With respect to furniture delivery trucks (LRV), it is intended that the vehicle will park on the roadway through the visitor car park. There will be locations on this roadway where it will be possible for the truck to park without restricting access / egress for visitors. The truck will be able to enter and exit the car park in a forward motion.

4.10 Event Transport Management

TTM have prepared an indicative Transport Management Plan (TMP) to demonstrate that safe and efficient access to the Tennyson Riverside Development is possible during various modes of operation for the State Tennis Centre without creating an adverse impact on the amenity for the surrounding residential areas. Although not required at this stage, a comprehensive transport strategy and plan is required to be developed by Mirvac in conjunction with the relevant authorities and to the satisfaction of the State and Council.

The TMP has been separated into categories representative of the various modes of operation for the centre as each will require a different level of transport management.

The TMP consists of the following elements:

- Plan Framework
- Vehicular Access Plan
- Pedestrian Access Plan
- Public Transport Plan
- Parking Plan
- Information / Communication Plan

4.10.1 Plan Framework

Definition of Modes of Operation

The various modes of operation as per the brief are listed as follows:

- Tier 1 - Davis Cup Tie
- Tier 2 - Fed Cup / International / State Titles
- Tier 3 - Satellite/Challenger/State C'hips
- Tier 4 - Normal Day to Day Mode

Plans for Tier 3 and 4 will not require any specific management actions other than the transport system that exists or proposed as part of the development plan for the entire site.

Tiers 1 and 2 will require specific actions and temporary works to be undertaken to ensure that the level of patronage can be accommodated.

Coordination / Management

A Coordination Group will be required to ensure that the management plans associated with each mode of operation is implemented and that the ongoing effectiveness of the plan is monitored. The group would include members from the following organisations:

- Tennis Queensland
- Venue Operator
- Translink
- Police
- Brisbane City Council
- Tennyson Riverside Development Resident Body Corporate

Modal Split

The modal split for patrons attending the various events at the State Tennis Centre dictate the type and scale of actions required as part of the management plan. The mode split targets for Tier 1 and 2 operation are shown below.

Mode	Tier 1		Tier 2	
	(7000 crowd)		(3000 crowd)	
	%	No.	%	No.
Train	45%	3150	45%	1200
Bus	20%	1400	20%	450
Taxi	10%	700	10%	300
Coach	10%	700	10%	300
Mini Bus	5%	350	5%	150
Private Car				
Park & Walk	5%	350	5%	150
Drop Off	5%	350	5%	150
Park On-site	Prohibited		Prohibited	

Each element of the overall traffic management plan described in the following sections is based on achieving the mode split targets tabulated above. These targets have been based on similar modal splits achieved at other sporting venues such as Suncorp Stadium and Brisbane Cricket Ground. The mode splits are based on Transport Management Plans that have been implemented successfully at these other high profile sporting venues.

Developing an Information and Communication Plan is considered the critical element in terms of achieving the mode split targets during event mode. It is considered essential that all prospective patrons are well informed about the transport arrangements for a major event at the tennis centre when purchasing tickets and are constantly reminded during the lead up to the event via all forms of media.

It is emphasised that it will be imperative for the coordination group to monitor the effectiveness of the management plan, in particular the mode splits, and modify the plan if necessary.

4.10.2 Vehicular Access Plan - Private Vehicles

Tier 1 and Tier 2 Operation

During the major Tier 1 event mode, all on – site parking dedicated to the tennis centre will be reserved for officials and VIP's, therefore the general public will not be permitted access to the tennis centre by private vehicle during the major event mode of operation, apart from vehicles transporting disabled patrons.

During this mode of operation for the tennis centre, the residents of the apartments within the site will be allocated a parking permit that will allow them access / egress to the basement car park at any time during the event.

For a Tier 2 event, the parking on site will be available to the public however it is proposed that the internal road will be restricted at the western end of the plaza to ensure that tennis centre traffic utilize the Fairfield Road access and not the Softstone Street access.

Tier 3 and Tier 4 Operation

There will be no measures imposed during Tier 3 and Tier 4 modes of operation. All private vehicle traffic will be permitted to use both access points and circulate through the entire site in both directions

4.10.3 Vehicular Access Plan - VIP's and Taxi's

Tier 1 and Tier 2 Operation

During the major event mode, access for the Tennis Centre for VIP's and taxis will be restricted to the access route from Fairfield Road. The internal road will be restricted at the western end of the plaza by way of a temporary bollard system. Signage and traffic controllers will also be along the access route from Softstone Street to ensure traffic is adequately directed around the site. Residents and visitors to residents will be permitted access, however during a major event, the residential precinct will form part of the resident parking scheme.

The purpose for restricting the access to / from one direction is to:

- Ensure safe and efficient drop – off / pick up of VIP's in the Plaza area.
- Maximise separation between tennis centre traffic and residential traffic

Tier 3 and Tier 4 Operation

During the normal mode of operation there will not be a demand for VIP access to the tennis centre. Taxis will be able to utilize the drop off / pick up zone in the plaza area. Both access points will be available and taxis will be permitted to circulate through the site.

The drop off zone on the southern side of the plaza (adjacent to the stadium) will be covered to protect patrons.

4.10.4 Vehicular Access Plan - Mini Buses & Coaches

Tier 1 and Tier 2 Operation

Private mini-buses and coaches transporting spectators will be permitted to enter the site during major event mode and drop off at designated locations along the boulevard from Fairfield Road. Given that the events are generally over a period of a full day, coaches and mini – buses will be required to find remote parking areas between drop off and pick up times. Generally coach drivers have preferred locations to park during these types of events, however if necessary these coaches could park remote to the site at locations pre - arranged by the tennis centre.

Coaches and mini – buses transporting players and entourages and officials will be permitted to drop off and pick up in the plaza area. These vehicles will be able to access the site via either Fairfield Road or Softstone Street (traffic controllers will guide player coaches through to plaza).

Tier 3 and Tier 4 Operation

Any coaches or mini – buses arriving at the site during these modes of operation will be able to access via either Fairfield Road or Softstone Street and utilize the plaza area for drop off / pick up.

4.10.5 Vehicular Access Plan - Service Vehicles

Tier 1 and Tier 2 Operation

It is envisaged that all deliveries associated with a major event will be undertaken prior to the commencement of the event. All service vehicles required to access the site during event will be directed by traffic controllers / security to appropriate, pre-arranged loading areas.

Tier 3 and Tier 4 Operation

The plaza area will be used as the primary delivery zone during day to day operations.

Refuse collection for the tennis centre will be undertaken adjacent to the maintenance shed at the rear of the main stadium. It is also expected that the delivery of maintenance material will also be undertaken in this location.

Refuse collection for the residential precinct as described previously in this report.

4.10.6 Vehicular Access Plan - Emergency Vehicles

The provision of access points at both Fairfield Road and Softstone Street and the internal road that circulates through the entire site ensures a high level of accessibility for all types of emergency vehicles during both normal operations and major event modes.

4.10.7 Pedestrian Access Plan

Tier 1 and Tier 2 Operation

A majority of spectators arriving and departing the tennis centre during the major event modes will be required to walk from the external public transport nodes.

Whilst the site is in closer to the Tennyson Train Station than the Yeerongpilly Station, the services through this station are extremely infrequent, hence the transport plan has focussed on the Yeerongpilly Station in terms of the primary public transport node servicing an event at the tennis centre. This station has service running every 20 – 30 minutes in both directions during the peak periods and the station has significantly greater platform capacity than the Tennyson Station and also has significantly higher standard of pedestrian accessible. It was considered more appropriate to further improve the Yeerongpilly Station than undertake major works at the Tennyson Station, particularly given the limited number of patrons that would use the station due to the limited services.

The plan for pedestrian access for each of the public transport nodes is summarised as follows:

Yeroongpilly Station

Spectators walking to / from the Yeroongpilly Station will cross Fairfield Road via the pedestrian overpass. Once across Fairfield Road and into the site, spectators will use the pedestrian / bicycle corridor to the tennis centre. This is a distance of approximately 600m, which is considered a reasonable walking distance given spectators will be at the centre for a long period for a major event.

The internal road from Fairfield Road to the Tennis Centre has been specifically designed to incorporate a 4.0m pathway to accommodate the pedestrian demands generated by the Tennis centre during major event mode.

It is proposed that signage be installed at the rail station to identify the tennis centre and also to direct patrons along the pedestrian corridor.

Softstone Street Bus Set Down Areas

The pedestrian link from the bus set down facility proposed on the Softstone Street frontage will be via the internal road, which during the major event, will have restricted vehicle access. Pedestrian "milling" areas are to be provided adjacent to the bus set down area to ensure orderly access to the buses post event.

Tier 3 and Tier 4 Operation

The pedestrian demands generated by the normal operation of the tennis centre and the residential precinct will not necessitate the works other than those described above.

4.10.8 Parking Plan

Tier 1 and Tier 2 Operation

The on-site parking provided within the tennis centre will be reserved for VIP's, corporate guests and officials only. The general public will not be permitted to park inside the tennis centre during a Tier 1 or Tier 2 event. Also, due to the surrounding area being predominantly a residential catchment it is not considered appropriate that on-street parking be permitted, apart from the Curzon Street precinct, which primarily service industrial development, hence on –street parking in this precinct is not as sensitive, particular if the event occurs on a weekend.

The primary component of the Parking Plan for the Tier 1 and Tier 2 events is to implement a temporary Resident Parking Scheme which bans parking for all apart from residents and one visitor per house during the times of a major event. As the Tier 1 and Tier 2 events will occur once or twice per year, it is considered practical to introduce a temporary scheme of this nature. The resident parking scheme will also include the residential precinct within the Tennyson Riverside Development.

The proposed cordon for the resident parking scheme is shown in Figure 5.

Fig 5 Resident Parking Scheme Cordon

Tier 3 and Tier 4 Operation

Parking is provided for all elements of the development in accordance with the Brisbane City Council Transport Access Parking and Servicing Code as outlined in Section 1.5. This parking provision is considered adequate to satisfy the demands for all components of the development for Tier 3 and Tier 4 operation.

The 162 spaces provided for the tennis centre, include 24 spaces in a secure parking area for venue management.

4.10.9 Public Transport Plan

Tier 1 and Tier 2 Operation

The elements of the Public Transport Plan are summarised as follows:

Subsidised Ticketing

As the Tier 1 and Tier 2 events will only be conducted one to two times per year, it is feasible to incorporate the cost of public transport into the price of the admission ticket. This would give all patrons attending the major event with a pre-purchased ticket (assumed that a major event will sell –out prior to event) access to bus and rail transport at no extra cost.

Bus Transport

The bus patronage target for a Tier 1 event is 1400 patrons. This relates to 20 buses attending the site (this excludes the existing bus services that operate on routes adjacent to the site).

Brisbane Transport has indicated that special services would be provided from the nodes that are utilized for other major sporting events (such as the Bronco's and Lion's). These nodes are:

- Chermside Shopping Centre
- Garden City Shopping Centre
- Eight Mile Plains Bus way Station
- City

It is envisaged that Indooroopilly Shopping Town and Corinda Station could also be utilized as a node for pick up and drop off.

It is assumed that the bus arrivals would be split 50% from each direction and that buses would commence arriving 90min prior to an event. This relates to a bus arriving every 9 min which is sufficient time to unload passengers and depart prior to the arrival of the next bus. As such there will never be more than one bus at the bus stop at any one time at the start of the event. The proposed indented bus facility will be capable of accommodating 4 buses at a time.

Following the event it is expected that buses will store in a location that allows quick arrival post event.

Tier 2 events will require approximately 6 buses. Special bus services would not be required for the Tier 2 event as existing service could accommodate the additional patronage.

Rail Transport

The train patronage target for a Tier 1 event is 3150 patrons. This relates to 4.5 trains.

Given that an event would commence in the morning and finish in the evening, spectators would be travelling in the opposite direction of the peak commuter demands on the existing train services, hence would be expected that there would be spare capacity in the existing services which are scheduled every half and hour on the Beenleigh line via the Yeroongpilly station.

The public transport element of the TMP has been focussed on the Yeerongpilly Station, as opposed to the Tennyson Station, due to the significantly higher frequency of services utilising Yeerongpilly Station. The platform capacity of the Yeerongpilly Station is also far greater than the Tennyson Station. The combination of these factors therefore enables the Yeerongpilly Station to accommodate the estimated demands associated with event mode, without significant modifications to the existing facilities at the station. Special services and a significant upgrade of the existing facilities would be required to the Tennyson Station for it to be the primary focus of the TMP.

It is expected that a proportion of the rail patrons will arrive at the Corinda Station and transfer to a bus to access the tennis centre.

Taxi

During major event mode, the southern side of the internal road to the east of the roundabout will be utilized as a taxi rank. This rank will be capable of accommodating a minimum of 20 taxis at a time. Taxis will be required to enter via the Fairfield Road access, drop off in the taxi zone and exit to Fairfield Road via a U-turn at the roundabout to the east of the plaza area. To avoid delays for patrons departing post event it is envisaged that taxis will queue along the entry boulevard to ensure a constant flow of taxis.

A Tier 1 event will generate the need for 700 patrons to travel by taxi, which equates to approximately 230 taxis, assuming 3 pers / taxi. This relates to each of the 20 spaces turning over every 8 minutes for arrivals.

Coach and Mini - Bus

It is estimated that approximately 25 coaches / mini buses will drop patrons off during the Tier 1 event. The indented parking bays along the access road from Fairfield Road that are not allocated as taxi drop off zones will be utilised for the coach / mini – bus drop off.

Tier 3 and Tier 4 Operation

The site is well situated with respect to bus and rail which will ensure that both residents and tennis patrons have the option of public transport as opposed to private vehicle travel.

4.10.10 Information / Communication Plan

Tier 1 and Tier 2 Operation

It is recommended that an Information and Communication Plan is prepared by the operator to ensure that attendees for the major events are well informed about the transport arrangements for the events. This may involve newspaper, television and radio advertising. All marketing material should also include information with respect to the transport arrangements. The advertising should include information that:

- Indicates that no parking will be available on-site (except for residents)
- Parking will be banned in surrounding streets for visitors to the tennis centre
- Free public transport will be available with a pre-purchased ticket

- Location of public transport nodes
- Information number to contact for details of transport

4.10.11 Flexibility of Proposed Strategy

As stated previously the proposed transport management plan for the major event mode is based on modal splits achieved at other major sporting venues in Brisbane, however the Coordination Committee may need to modify the plan if mode splits are not achieved. Alternative strategies that could be implemented are:

- Satellite car parks with shuttle buses linking to the tennis centre.
- Additional Shuttle buses from Corinda Station
- Special ferry services from the city
- Additional train services via Tennyson Station

4.11 Conclusions & Recommendations

It is concluded from the assessment of the traffic aspects of the proposed development that:

- The access arrangements can be effectively integrated with the external road network without creating any adverse impact;
- The roundabout at the Softstone Street access and the traffic signals at the Fairfield Road access will operate at an acceptable level of service and will provide safe an efficient access to the subject development;
- The internal road linking the site to Fairfield Road, and also connecting to Softstone Street, will be treated with devices that will create a significant deterrent for non - local traffic to use the route as a "rat run" between King Arthur Terrace and Fairfield Road.
- The proposed parking supply satisfies Council's minimum requirement for both the uses proposed, even without including the parking on the internal road system.
- The car park design for both the residential and the tennis centre comply with the minimum dimensions specified in the TAPS Policy.
- Refuse collection and furniture truck facilities provided in the development plan for the residential component are adequate to meet the access requirements for such vehicles. The servicing for the tennis centre will be distributed between the plaza and an area at the rear of the main stadium.
- A Transport Management Plan can be implemented for a major event at the tennis centre that does not compromise amenity for local residents in terms of parking intrusion or traffic congestion in the surrounding area.

In view of the conclusions summarised above, there are no traffic engineering reasons that the proposed development should not be granted the relevant approvals.

ATTACHMENTS

Transport, Access, Parking and Servicing Code

	Performance Criteria		Acceptable Solutions	Proposal
P1	Development with high traffic generating potential must give suitable consideration to transport/land use issues	**A1**	For any development with: • more than 500 low turnover (employee) parking spaces or 200 high turnover (customer or visitor) parking spaces OR, • access to any roads other than minor roads OR, • a driveway within 100m of a signalised intersection The transport impacts of the proposal are addressed in accordance with the **Transport, Access, Parking and Servicing Planning Scheme Policy**	The transport impacts of the development have been assessed and it is concluded that the traffic generated by the subject site will not have an adverse impact on the surrounding road network.
P2	The development must be designed to encourage customers and employees to walk, cycle or use public transport to and from the development instead of using a car	**A2**	The proposal provides convenient and safe, pedestrian and cyclist facilities for access from existing and proposed public transport facilities and public areas.	The proposed development provides pedestrian / bicycle linkages through the site to the Yeerongpilly Train Station and to bus stops located on Fairfield Road and Softstone Street.
P3	The development must be located on roads identified in the City's Road Hierarchy as appropriate for that type and size of development and/or must be located appropriately in relation to public transport facilities to encourage their use	**A3**	The proposal is self or code assessable in the Area in which the site is located. Land uses that are consistent with walk-up access will be favoured	The internal road proposed to service the development is linked to Softstone Street (District Access) via a roundabout controlled intersection and Fairfield Road (Arterial) via a signalised intersection. The location of the site in relation to the adjoining roads is considered acceptable, particularly given the standard of controls proposed at the access points. The site is also located within walking distance of the Yeeroongpilly train station and bust stops on both Fairfield Road and Softstone Street.

	Performance Criteria		Acceptable Solutions	Proposal
P4	Relevant development must not compromise the functions of particular roads as indicated in the City's Road Hierarchy	**A4.1**	There is no direct access to motorways or arterial routes	The site does propose an access to and arterial route (Fairfield Rd) however traffic signals will be relocated from Ortive Street to the access. As such the function of Fairfield Road will not be compromised. The secondary access is provided on Softstone Street which is a District Access route.
		A4.2	Major traffic generators are only accessed from district or suburban roads	
P5	Development must not impact adversely on the safety or operations of the road system	**A5.1**	One vehicle footpath crossing is provided in accordance with the design vehicle table and site access design guidelines in the **Transport, Access, Parking and Servicing Planning Scheme Policy**	Access to the external road network will be via two formally controlled intersections at the eastern and western ends of the internal road, which is considered acceptable given the size of the proposed development. Access to the State Tennis Centre car park and the residential car park will be via minor intersections with the internal road system.
		A5.2	A vehicle manoeuvring area is provided on site in accordance with the design vehicle table and servicing layout design guidelines in the **Transport, Access, Parking and Servicing Planning Scheme Policy** so that the design vehicle can enter and leave the site in a forward gear	Servicing for the tennis centre will be undertaken from the plaza area or in a designated area at the rear of the main stadium. Furniture delivery trucks for the residential component will park in the visitor car park aisle and will enter and exit this area in a forward motion. The refuse collection process for the apartments has not finalised, however an option being reviewed may involve the RCV reversing from the internal road into a collection area. Given the internal road will be designated as a "minor road", one reverse manoeuvre is acceptable in accordance with the TAPS Policy.

	Performance Criteria		Acceptable Solutions	Proposal
P6	Access, parking and servicing must not reduce the amenity of lands in the vicinity of the site	**A6.1**	Vehicular site access is located in accordance with the site access design guidelines in the **Transport, Access, Parking and Servicing Planning Scheme Policy**	The location of the access intersections on Fairfield Road and Softstone Street, are such that the function of the external roads are not compromised. The location of the access intersections to the State Tennis Centre and the residential car park are considered acceptable in accordance with the access design guidelines.
		A6.2	Vehicle site access is provided in accordance with a Standard Non-residential Vehicle Crossing, in Section 3.5.2 of the **Transport, Access, Parking and Servicing Planning Scheme Policy**	Access to the State Tennis Centre car park and the residential car park will be via minor intersections with the internal road system.
Vehicle Parking				
P7	The layout of development must achieve adequate provision for on-site vehicle parking that is clearly defined, safe and easily accessible and must be designed to contain potential adverse impacts within the site Vehicle parking: • must not detract from the aesthetics or amenity of an Area • must discourage on-street parking where parking has adverse traffic management safety or amenity impacts • must be consistent with convenient pedestrian and cyclist access	**A7.1**	Parking bays, maneuvering areas and driveways are designed with the dimensions and to the standards set out in the carparking table and carparking layout design guidelines in the **Transport, Access, Parking and Servicing Planning Scheme Policy**	The car park layout complies with the key design criteria specified in TAPS Policy.
		A7.2	For development for any of the uses listed in column 1 of the carparking table, on-site carparking complies with column 2 of that table in the **Transport, Access, Parking and Servicing Planning Scheme Policy**, except for non-residential development in the City Centre or City Frame	The proposed parking supply for both the State Tennis Centre and the residential apartments satisfy the minimum parking requirements specified in the TAPS Policy. It is not considered necessary to provide dedicated parking for the retail component as it is considered ancillary to the other uses on the site.
		A7.3	On-site carparking numbers for development in the City Centre or City Frame as indicated on *Map A - City Centre and City Frame Areas* do not exceed 1 car space for every 200sqm of gross floor area for any development other than multi-unit dwellings	NA

Performance Criteria		Acceptable Solutions		Proposal
		A7.4	The number of carparking spaces as required by the carparking table is provided. Two per cent of that number of carparking spaces are provided as marked and signed areas for motorcycles, with a minimum of 1 space, each measuring 2.5m by 1.35m	The proposed parking supply exceeds the minimum requirements, therefore motorcycles can utilise standard parking spaces when necessary. Dedicated motorcycle spaces are not considered appropriate for multi dwelling residential developments.
P8	Vehicle parking must have no adverse impact on the residents of adjoining sites in terms of noise, odour or run-off	**A8**	Carparks are screened from any nearby sensitive receiving environment and stormwater from the carpark does not flow directly into that sensitive receiving environment	The parking areas are not located in the vicinity of any sensitive receiving areas. Stormwater flow from the car park will be controlled appropriately so as to avoid sensitive receiving areas.
Servicing				
P9	The layout of development must achieve adequate provision for servicing on site that is clearly defined, safe and easily accessible and must be designed to contain potential adverse impacts of servicing within the site Servicing must be located to discourage on- street loading and must not detract from the aesthetics or amenity of an Area	**A9.1**	Servicing facilities are provided on-site in accordance with the design vehicle table in the **Transport, Access, Parking and Servicing Planning Scheme Policy**	The service vehicle facilities for the State Tennis Centre are provided within the plaza area the stadium and also at the rear of the car park area. The retail component will also utilise the plaza for service vehicle deliveries. Facilities for Refuse and furniture trucks are provided within the residential component of the development which satisfies the TAPS Policy.
		A9.2	Loading/unloading facilities and associated vehicle maneuvering areas on-site are designed in accordance with the servicing layout design guidelines in the **Transport, Access, Parking and Servicing Planning Scheme Policy**	All service vehicles are capable of manoeuvring within designated areas and will not impact on the safety or efficiency of internal traffic movements.
Where involving a material change of use to a shop or office with a gfa over 2500m²				
P10	The proposal must provide adequately for bicycle access to the site and movement within the site, and for secure and	**A10**	Bicycle parking facilities and cyclist facilities are designed and constructed in accordance with AUSTROAD's *Traffic Engineering Practice*, Part 14-Bicycles	NA

	Performance Criteria	Acceptable Solutions	Proposal
	convenient bicycle parking and storage, that: • is located close to the building's pedestrian entrance • is obvious, and easily and safely accessible from outside the site • does not impact adversely on visual amenity does not impede the movement of pedestrians or other vehicles		
P11	Adequate bicycle parking, shower cubicles and lockers must be provided to meet the needs of users and to encourage bicycle use by the users of an office or shop	**A11.1** Employees of an office or shop have: • 1 bicycle space per 500m^2 of gfa • 1 locker per 2 bicycle parking spaces • 1 shower cubicle with ancillary change rooms per ten bicycle spaces, with a minimum of 1 shower, with provision for both females and males **A11.2** Customers of an office have 1 bicycle parking space per 750m^2 of gfa **A11.3** Customers of a shop have 1 bicycle parking space per 500m^2 of gfa, with a minimum of 10 spaces	NA

Movement Summary

Fairfield Rd Access

Future AM with development traffic

Signalised - Fixed time **Cycle Time = 90 seconds**

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
South Approach										
1	L	20	0.0	0.879	25.3	LOS C	282	0.83	0.97	43.4
2	T	2330	5.0	0.874	17.1	LOS B	283	0.83	0.86	47.7
Approach		**2351**	**5.0**	**0.874**	**17.2**	**LOS B**	**283**	**0.83**	**0.86**	**47.7**
North Approach										
8	T	1270	5.0	0.473	6.0	LOS A	85	0.47	0.42	55.0
9	R	45	0.0	0.492	43.7	LOS D	17	0.90	0.80	36.2
Approach		**1316**	**4.9**	**0.492**	**7.3**	**LOS A**	**85**	**0.48**	**0.44**	**54.1**
West Approach										
10	L	80	0.0	0.242	43.2	LOS D	26	0.90	0.77	36.3
12	R	15	0.0	0.045	41.4	LOS D	5	0.86	0.70	36.9
Approach		**95**	**0.0**	**0.242**	**42.9**	**LOS D**	**26**	**0.89**	**0.76**	**36.4**
All Vehicles		**3762**	**4.8**	**0.879**	**14.4**	**LOS B**	**283**	**0.71**	**0.71**	**49.3**

Pedestrian Movements

Mov No	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
51	50	37.4	LOS D	0	0.91	0.91
57	50	6.4	LOS A	0	0.38	0.38
All Peds	**100**	**21.9**	**LOS C**	**0**	**0.64**	**0.64**

Movement Summary

Fairfield Rd Access

Future PM with development traffic

Signalised - Fixed time **Cycle Time = 70 seconds**

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
South Approach										
1	L	20	0.0	0.549	16.1	LOS B	89	0.61	0.81	48.3
2	T	1290	5.0	0.552	7.9	LOS A	89	0.61	0.55	53.6
Approach		**1311**	**5.0**	**0.552**	**8.1**	**LOS A**	**89**	**0.61**	**0.55**	**53.5**
North Approach										
8	T	1970	5.0	0.829	15.1	LOS B	187	0.84	0.84	48.9
9	R	130	0.0	0.610	27.1	LOS C	32	0.81	0.85	42.6
Approach		**2101**	**4.7**	**0.829**	**15.8**	**LOS B**	**187**	**0.84**	**0.84**	**48.5**
West Approach										
10	L	50	0.0	0.118	31.7	LOS C	12	0.83	0.74	40.6
12	R	30	0.0	0.071	31.2	LOS C	8	0.81	0.72	40.8
Approach		**80**	**0.0**	**0.118**	**31.5**	**LOS C**	**12**	**0.82**	**0.73**	**40.7**
All Vehicles		**3492**	**4.7**	**0.829**	**13.3**	**LOS B**	**187**	**0.75**	**0.73**	**50.0**

Pedestrian Movements

Mov No	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
51	50	27.5	LOS C	0	0.89	0.89
57	50	8.3	LOS A	0	0.49	0.49
All Peds	**100**	**17.9**	**LOS B**	**0**	**0.69**	**0.69**

Movement Summary

Sofstone Access Intersection

Future AM Peak with development traffic

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
South Approach										
1	L	556	0.0	0.372	7.0	LOS A	23	0.21	0.53	53.6
1	R	6	0.0	0.372	7.0	LOS A	23	0.21	0.53	53.6
Approach		**562**	**0.0**	**0.372**	**7.0**	**LOS A**	**23**	**0.21**	**0.53**	**53.6**
East Approach										
4	L	6	0.0	0.151	34.3	LOS C	8	1.00	0.94	39.6
4	T	33	0.0	0.151	34.3	LOS C	8	1.00	0.94	39.6
Approach		**39**	**0.0**	**0.151**	**34.3**	**LOS C**	**8**	**1.00**	**0.94**	**39.6**
West Approach										
10	T	11	0.0	0.866	11.1	LOS B	160	0.18	0.63	51.2
10	R	1467	0.0	0.866	11.1	LOS B	160	0.18	0.63	51.2
Approach		**1478**	**0.0**	**0.866**	**11.1**	**LOS B**	**160**	**0.18**	**0.63**	**51.2**
All Vehicles		**2079**	**0.0**	**0.866**	**10.4**	**LOS B**	**160**	**0.20**	**0.61**	**51.5**

Movement Summary

Sofstone Access Intersection

Future PM Peak with development traffic

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
South Approach										
1	L	1150	0.0	0.710	7.0	LOS A	73	0.22	0.51	53.6
1	R	17	0.0	0.710	7.0	LOS A	73	0.22	0.51	53.6
Approach		**1167**	**0.0**	**0.710**	**7.0**	**LOS A**	**73**	**0.22**	**0.51**	**53.6**
East Approach										
4	L	6	0.0	0.030	10.1	LOS B	1	0.64	0.65	52.1
4	T	17	0.0	0.030	10.1	LOS B	1	0.64	0.65	52.1
Approach		**23**	**0.0**	**0.030**	**10.1**	**LOS B**	**1**	**0.64**	**0.65**	**52.1**
West Approach										
10	T	61	0.0	0.469	10.7	LOS B	28	0.13	0.65	51.5
10	R	700	0.0	0.469	10.7	LOS B	28	0.13	0.65	51.5
Approach		**761**	**0.0**	**0.469**	**10.7**	**LOS B**	**28**	**0.13**	**0.65**	**51.5**
All Vehicles		**1951**	**0.0**	**0.710**	**8.5**	**LOS A**	**73**	**0.19**	**0.57**	**52.7**

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5.1 INTRODUCTION

The Tennyson Riverside Development involves the redevelopment of the former Tennyson Powerhouse into a multi-use development. The site is approximately 12 hectares in area with approximately 50% of that land being dedicated to a new State Tennis Centre (STC) and the remaining portion for a residential development along the riverbank of the Brisbane River.

Lambert & Rehbein have been commissioned by Mirvac Pty Ltd to undertake investigations into the proposed engineering servicing of the development and prepare an Engineering Services Report for inclusion in the Development Application submission to Brisbane City Council.

5.2 SITE DESCRIPTION

At the time of lodgement it is anticipated that a reserve for sport and recreational purposes will have been granted to the Department of Local Government, Planning, Sport and Recreation over the subject site.

The real property description of the reserve is:

Lot 1 on SP 164685

County Stanley

Parish Yeerongpilly

Title Reference: 49104467.

It is expected that the following easements will be registered on the reserve at the time of application:

Queensland Electricity Transmission Corporation Limited (Powerlink)

- Easement B on SP 184023 benefiting Lot 2 on SP164685 for electricity and access purposes.

Energex Limited

- Easement A on SP184022 for electricity purposes
- Easement B on SP184023 for electricity purposes
- Easement C on SP184024 for electricity purposes

Lot 566 on SP 104107, which accommodates the Department of Primary Industries and Fisheries Animal Research Institute (DPI&F site), is included in the subject application only for the purposes of the following components of the development:

- The main access road to the proposed development is from Fairfield Road;
- The pedestrian/cycleway which connects the proposed main access road to the foreshore area of the subject site;
- The pedestrian pathway connecting the main access road to the proposed overbridge to Yeerongpilly Railway Station at the Fairfield Road frontage of the site; and
- Car parking associated with the State Tennis Centre.

Other than an amended access arrangement to the Institute, no changes to the Institute activities are proposed as part of this application.

The site is bounded by the Brisbane River to the north, Softstone Street and the eastern end of King Arthur Terrace to the west, the Corinda Yeerongpilly Rail corridor and Tennyson Memorial Drive to the south and the DPI&F site to the east.

The site upon which the State Tennis Centre and proposed residential development is to be developed currently contains the now decommissioned Tennyson Power Station and other ancillary buildings and structures.

5.3 STORMWATER DRAINAGE

5.3.1 Existing Conditions

Power Station Drainage

Based on design drawings of the existing power station prepared by The Queensland Electricity Generating Board, there is extensive existing stormwater drainage servicing the subject site. For existing conditions, the subject site can be subdivided into two main stormwater catchments as shown on catchment plan B04254-SK51 (Refer to Appendix A). The southern section of the site (catchment B) including some roofwater from the main power station building discharges to an existing 1050mm diameter stormwater pipe traversing the site. The existing 1050mm diameter stormwater pipe is discussed in more detail in subsequent sections of this report. The northern section of the site (catchment A) discharges directly to the Brisbane River via a number of outlets.

From inspection of the site, survey information and design drawings of the existing power station, there are a number of existing stormwater outlets from the site discharging to the Brisbane River ranging in size from 375mm diameter to 900mm diameter.

There is also an existing rectangular open channel approximately 4 metres wide by 4 metres deep discharging to the Brisbane River. We understand that the open channel was originally used for discharge of coolant water during operation of the power station.

Existing Stormwater Pipe Traversing Site

Based on Bi-map and as constructed information obtained from Council, there is an existing Council stormwater pipe located between Tennyson Memorial Avenue and the Brisbane River. This pipe traverses the south eastern section of the site and the western section of the Animal Research Institute (ARI) located to the east of the subject site. The segment of the pipe traversing the subject site is 1050mm in diameter with the pipe size increasing to 1200mm, 1350mm and 1500mm within the ARI site before discharging to the Brisbane River.

Stormwater from a total catchment area of approximately 26 hectares is collected by this stormwater system. This includes stormwater from the southern section of the site, the western section of the ARI site, and an external upstream catchment to the south of the site. Catchment plan B04254-SK52 (Refer to Appendix A) shows the particular catchments discharging to this existing drainage network.

The external catchment is approximately 8.6 hectares and grades to a trapped sag located in Tennyson Memorial Avenue where it is collected and conveyed under an existing rail corridor and through the subject site. Based on limited survey information and as constructed data, the existing railway line is located at approximately RL12.0m AHD while the trapped sag in Tennyson Memorial Avenue is located at approximately RL9.0m AHD. Therefore the existing railway line detains stormwater runoff in Tennyson Memorial Avenue once the capacity of the existing stormwater pipe is reached. The Q10 runoff generated by the external catchment has been estimated as 2.69m^3/s. Please refer to the calculations in Appendix A.

Internal catchment B shown on plan B04254-SK51 also contributes runoff to this system. It consists of approximately 2.4ha of impervious area and 5.0ha of pervious area. The Q10 flows generated by the two catchment are 1.28m^3/s and 1.49m^3/s respectively, totalling 2.77m^3/s. Please refer to the calculations in Appendix A.

An existing depression located on the ARI property extends into the subject site, directing stormwater runoff towards an inlet structure located within the ARI site. This runoff is then collected and discharged to the Brisbane River through the above mentioned drainage. The contributing catchment is approximately 10.9ha and consists of open space and existing building infrastructure. The Q10 runoff generated has been calculated as 2.6m^3/s. Overall the cumulative Q10 peak flow calculated for the existing drainage system is 5.4m^3/s. Please refer to the calculations in Appendix A.

Existing Stormwater Pipe Traversing Animal Research Institute Site

An existing stormwater pipe traversing the northern portion of the ARI property collects stormwater from catchments to the north of the ARI site and to the east of Fairfield Road. Three catchments contribute to this drainage system and are shown on catchment plan B04254-53 (Refer Appendix A). Catchment A1 (4.3ha) and A2 (10.0ha) incorporate existing residential areas located to the north and east, while catchment A3 (7.1ha) is the contributing catchment from within the ARI site. Calculations for the runoff generated by each catchment are included in Appendix A. The calculated combined peak flow generated for a Q10 event is 5.6m^3/s.

5.3.2 Proposed Conditions

General

It is proposed to discharge all stormwater for the subject site directly to the Brisbane River utilising the existing outlets located within the site. Sketch plans B04254-SK55 & SK56 (Refer Appendix A) show the proposed drainage system. Runoff from the STC, the Residential Precinct and the road network will be collected and treated prior to discharge. GHD have been commissioned to investigate adequate water quality treatment devices and procedures for each precinct of the site. Their report is included as Volume 6 of this submission.

External Catchment

It is proposed to divert the existing 1050mm diameter Council stormwater pipe traversing the subject site. A new 1200mm diameter stormwater pipe will be provided through the subject site to cater for the upstream catchment to the south of the site and the existing drainage from the existing Electrical Substation for the local 10 year ARI storm event. The proposed 1200mm diameter stormwater pipe will connect to the existing stormwater pipe on the northern side of the existing rail corridor. This will achieve a 'non-worsening effect' on the existing upstream catchment as required by Council. Drainage from the western portion of the STC site will also be discharged to this system following treatment as shown on plan B04254-SK55 (Refer Appendix A).

State Tennis Centre

Two piped connections will be provided to service the STC with treatment of runoff occurring prior to discharging into the council owned infrastructure. The western portion of the STC site will be collected and discharged to the north directly to the Brisbane River via the 1200mm diameter pipe from the external catchment. The eastern portion will be collected and discharged to the existing drainage infrastructure that traverses the ARI site. Piped drainage within the STC will be designed to cater for a 20 year ARI in accordance with the State Government design brief. Cardno Young have been commissioned to provide detailed drainage design internal to the STC precinct.

The eastern catchment is shown on the proposed development catchment plan B04254-SK54. It consists of the main stadium area, the clay/grass courts and the parking area located to the east of the site. The existing catchment from the ARI site discharging to the existing depression mentioned earlier is also included but is reduced in size due to the proposed access roadworks. The total post development Q10 flow, including the ARI site has been calculated as $2.20m^3/s$. This is a reduction of $3.22m^3/s$, or approximately 60%, in comparison with the current flows to this system of $5.42m^3/s$. As such, the current drainage network is sufficient to convey this portion of the site and the adjacent property adequately.

Overland flow drainage generated on the western catchment of the STC site during major storm events will be collected by the road network and discharged overland to the Brisbane River via a designated overland flow path located between buildings C & D. The eastern catchment will flow into the natural depression located on the ARI site. Overland flow drainage within the STC will be designed to cater for a 50 year ARI in accordance with the State Government design brief. Sketch plan B04254-SK55 shows the location of the overland flow paths.

Residential Precinct

Runoff from the carpark areas of the Residential component of the development will be collected and treated prior to connection to the Council owned infrastructure and subsequently be discharged to the Brisbane River. The runoff captured from building roof areas is considered as clean and will not be included in the treatment train. Runoff from buildings A, B, and C will be directed to an existing 450mm diameter outlet located to the north west of the site. Buildings E and F will be collected similarly and discharged to the Brisbane River via an existing 375mm diameter outlet. Building D will be serviced by a new 375mm diameter pipe and connected to the proposed 1200mm diameter piped drainage system. As mentioned earlier, runoff from each building is considered clean and will not require treatment prior to discharge.

Building E will be constructed over the existing drainage channel located to the north of the site. This drainage channel will be removed and replaced with pipework located clear of building works and of sufficient capacity to convey drainage from the developed site. It is intended to construct the new pipe outlet near the existing jetty which is to be removed so as to minimise any disturbance of the river bank.

Road Network

Stormwater runoff from the road network will be collected and treated prior to discharge to the Brisbane River. The piped system will collect and convey runoff up to and including a Q10 storm event. Overland flow drainage will be conveyed along the road network to the overland flow paths identified earlier.

The access road linking the site to Fairfield Road will drain towards the central median area. The median will be used for treatment of runoff prior to collection and discharge to the Brisbane River.

The Softstone Street access will be conventional two way cross fall with drainage pits along both sides of the carriageway. This runoff will be piped through a GPT and then outlet to a landscaped treatment area located to the north of Building C. For storm events above a Q3 month event, runoff will bypass the low flow outlet and discharge directly to the Brisbane River. Sketch plan B04254-SK55 & SK56 show the proposed drainage network.

Existing Stormwater Pipe Traversing Animal Research Institute Site

Although the existing drainage system located to the north of the ARI site is not being utilised for the proposed development, the proposed access road will reduce the drainage catchment area A3 from 7.1ha to 3.6ha with the balance area being collected and diverted by the access road to a separate discharge point to the Brisbane River. There is a small increase in impervious area (approximately 0.3ha) contributing to this existing drainage system by way of a small catchment associated with the access road between Fairfield Road and the first roundabout. The net effect of these changes is a reduction of 0.7m^3/s (5.6m^3/s pre development c.f 4.9m^3/s post development) in Q10 flow delivered to the existing drainage system. Please refer to Appendix A for calculations.

On Site Detention

Based on limited survey information and assumptions made on the proposed site layout, there is a slight increase in impervious area over the subject site and therefore an increase in stormwater discharge. However it is considered that detention is not required on site as the stormwater from the site is discharging directly to the Brisbane River and does not affect any existing downstream stormwater infrastructure. It should also be noted that during a storm event the peak discharge from the site will occur hours before the peak discharge would occur in the Brisbane River. Therefore the increase in peak discharge from the site will have no effect on flooding levels or peak discharge in the Brisbane River.

As mentioned earlier, overland flow runoff from the eastern portion of the STC site will be directed to the depression located on the ARI site. Once the capacity of the receiving pipe has been reached, water will begin to pond within the depression. It should be noted that due to the low elevation of the depression in comparison to the surrounding topography, ponding would also occur in the depression when water levels in the Brisbane River are elevated. From survey information, the base of the depression is located at approximately RL 4.0m AHD. Brisbane City Council has advised that the 20 year ARI flood level for the Brisbane River is 4.4m AHD at the site. Therefore storms greater than a 20 year ARI flood event will cause ponding in the depression from backwater effects. It has been demonstrated earlier that the proposed development will reduce the quantity of stormwater runoff directed towards the ARI site. Hence this will achieve a 'non-worsening effect' on the ARI site.

GHD have been commissioned to carry out flood modelling and flood storage analysis for the proposed development. Their report is included as Volume 6 of this submission.

5.4 ROADWORKS

The proposed primary access to the development is from a new signalised intersection to be constructed along Fairfield Road approximately 70m to the south of Ortive Street. A new road will be constructed from the intersection, through the Animal Research Institute (ARI) and into the subject site. A secondary access is proposed from the intersection of Softstone Street and King Arthur Terrace. The existing intersection will be upgraded to a three leg roundabout.

5.4.1 Primary Access

The proposed primary access to the development is from a new signalised intersection to be constructed along Fairfield Road approximately 70m to the south of Ortive Street. Sketch plan B04254-SK58 (Refer Appendix C) shows the proposed configuration of this intersection. A new road will be constructed from the intersection, through the Animal Research Institute (ARI) and into the subject site.

This road will be provided with immunity from the Brisbane River Q50 flood level of RL 6.6. Please refer to plan B04254-SK50 in Appendix C for preliminary road grading details.

5.4.2 Secondary Access

The proposed secondary access to the site located at the intersection of Softstone Street & King Arthur Terrace will be in the form of a 3-leg roundabout. The roundabout will require suitable geometry to cater for the existing traffic which includes buses and possibly semi trailer vehicles.

This secondary access is located above the nominated Brisbane River Q100 flood level of RL 7.9 for the site and will provide flood free access for the site as required by Brisbane City Council Development Guidelines.

5.4.3 Access to Ortive Street

The existing intersection of Ortive Street and Fairfield Road is to be closed to facilitate the new intersection for the primary access road. It is proposed to provide access to Ortive Street from the new roundabout on the primary access road. The sag point of this access will be located at RL 7.7 which is 200mm below the nominated Brisbane River Q100 flood level of RL 7.9 for the site. However this depth of water is considered acceptable and will still provide for flood free access to the existing residences in Ortive Street as required by Brisbane City Council Development Guidelines.

5.4.4 Access to ARI Site

The existing access to the ARI Site Facilities is from Ortive Street. This access is to be relocated to access from the new roundabout on the primary access road.

5.4.5 Access to Existing Substation

Vehicular access to the existing electrical substation is currently provided via a sealed road located between a point adjacent to the main site entry off Softstone Street and the western boundary of the substation along the southern boundary of the site. This access is proposed to be maintained in the proposed development.

Further details of proposed road widths and traffic control arrangements are detailed in the Traffic Investigation prepared by TTM included as Volume 4 of this submission.

5.5 SEWER RETICULATION

5.5.1 Existing Conditions

Bi map information obtained from Council indicates that existing sewer infrastructure is located within the vicinity of the site and includes:

- An existing 225mm diameter gravity main running along the southern side of Tennyson Memorial Avenue within the road reserve and private property. This main then heads south across the Brisbane Golf Club grounds approximately 130m to the east of the subject sites eastern property boundary and eventually connects to the existing 525mm diameter Moolabin Creek Branch Sewer.
- An existing 150mm diameter gravity main running along the western side of Softstone Street.
- An existing private pump station and associated 100mm diameter rising main located in the Animal Research Institute (ARI) property to the east of the site. The existing 100mm diameter private rising main currently runs across Tennyson Memorial Avenue, through the Brisbane Golf Club grounds, along Palomar Road eventually discharging to an existing gravity sewer manhole at the intersection of Palomar Road and Moolabin Crescent. The gravity main then connects to the existing 525mm diameter Moolabin Creek Branch Sewer.

Bi map information obtained from Council indicates that there is currently no provision for the connection of sewer discharge from the site to Council's sewer reticulation system. From as constructed information of the site and site visits it is evident that the effluent was previously treated on site by means such as septic systems, chlorination and discharge to the Brisbane River.

5.5.2 Proposed Development

It is proposed to provide a Council standard gravity reticulation main, pump station and rising main to service both the STC and the residential components of the site. Construction of this infrastructure will be necessary to service both components of the development.

The B.C.C gravity system will consist of a 150mm diameter gravity sewer main which will generally be located along the new access road and partly through the STC site. Individual property connection branches will be provided from the main for each site. This general intent is detailed on sketch plan B04254 – SK57(Refer to Appendix B) with final detailed design to be completed at the operational works stage.

The gravity main will discharge into a Council pumping station located in the south east corner of the site. Permanent access to this pump station will be maintained by way of easement over the carpark area of the STC. A rising main will then transfer the discharge from the pump station under the electricity easement, railway line and Tennyson Memorial Avenue to a discharge maintenance hole located on the southern side on Tennyson Memorial Avenue. A 6m wide easement will be provided over the rising main where it traverses private property as required by Brisbane City Council Water and Sewerage Reticulation Standards.

This discharge maintenance hole will then transfer the sewer under gravity to the existing 225mm diameter system to the 525mm diameter Moolabin Creek Branch Sewer.

Preliminary investigations into the 225mm diameter main located along Tennyson Memorial Avenue and through the Golf Club show that a section (approximately 110m) of the main between MH69592 (Point B) and MH124003 (Point C) consists of a 150mm diameter pipe. This section is located approximately 300m upstream of the 525mm diameter Moolabin Creek Branch Sewer. MH69592 is a junction maintenance hole that receives discharge from the Light Industrial and Brisbane Golf Club catchment areas and a large residential catchment located to east of Fairfield Road. Sketch Plan B04254 – SK57 shows the contributing catchments used in the calculations and the section of 150mm main in question.

Preliminary calculations have been undertaken to determine approximate catchments and subsequent flows discharging into this system. Please refer to Appendix B for the calculations. The results indicate that the 225mm system upstream of the junction maintenance hole MH69592 has sufficient capacity to convey flows generated by the developed subject site in addition to the current flows utilising this system (note that any future development of the Animal Research Institute site has not been included). The remaining downstream portion of the 225mm diameter main and the section of 150mm diameter main do not have sufficient capacity.

As private dwellings are connected to the existing main, it is not possible to replace the existing 150mm/225mm pipes with 300mm diameter pipe work without constructing maintenance holes for each existing property connection as required by Brisbane City Council Water and Sewerage Reticulation Standards. Therefore the proposed solution is to construct an additional 300mm diameter sewer to the 525 Moolabin Creek Branch Sewer as shown on Sketch Plan B04254 – SK57. This system could be located within the roadway of Allawah St and Moolabin Crescent and discharge into MH120795. We note that Moolabin Crescent is an unformed road reserve and is currently part of a larger surrounding parkland area. There appear to be no major obstructions within the proposed new sewer alignment corridor.

It is proposed to credit these augmentation works to the existing external sewer mains against the sewer headworks contributions for the development.

5.6 WATER RETICULATION

5.6.1 Existing Conditions

Bi – map information obtained from Council indicates that there is extensive water supply infrastructure surrounding the site. This includes:

- An existing 300mm diameter cast iron main running along the northern side of the Tennyson Memorial Avenue road reserve that terminates at the intersection of Softstone and Curzon Streets.
- A 225mm diameter cast iron main branches off at this location and runs along Softstone Street further servicing 150mm and 100mm mains in surrounding streets.
- An existing 300mm diameter cast iron main located under the roadway in Fairfield Road.
- Two existing water service connections provided to the site, one 150mm and one 100mm in size, from the existing mains in Softstone Street.

5.6.2 Proposed Development

It is proposed to provide a new Council water main along the length of the new access road. This will link the existing water mains located in Fairfield Road and Softstone Street. Connections for the STC and residential components will be provided from this new main as required. It is anticipated that the size of this main will be a 150 or 200mm diameter pipe subject to further detailed deisgn. It is anticipated that no augmentation of existing external mains will be necessary.

5.7 CONCLUSION

Lambert & Rehbein have been commissioned by Mirvac Pty Ltd to undertake investigations into the proposed engineering servicing of the Tennyson Riverside Development and to prepare an Engineering Services Report for inclusion in the Development Application submission to Brisbane City Council.

From the investigations undertaken it is concluded that services are available or can be provided to adequately cater for the requirements of the proposed development.

APPENDIX A

Stormwater Drainage Catchment Plans & Calculations

PRE-DEVELOPMENT
EX ∅1050 / ∅1200

EXT. U/S CATCHMENT

A = 8.2ha tc = 17 minutes
(Tennyson Memorial Ave)

	C	I	Q
Q_{10}	0.88	134	2.69m^3/s
Q_{20}	0.93	156	3.28m^3/s

SITE – EXISTING INTERNAL CATCHMENTS

A = 2.43ha tc = 5minutes
Area B (Imp)

	C	I	Q
Q_{10}	0.88	215	1.28m^3/s
Q_{20}	0.93	248	1.55m^3/s

A = 5.04ha tc = 15minutes
Area B (Perv)

	C	I	Q
Q_{10}	0.75	142	1.49m^3/s
Q_{20}	0.79	164	1.81m^3/s

ARI EXISTING
(to 1050 ∅)

A = 10.9ha tc = 25minutes
Assume $^1/_3$ developed – C_{10} = 0.88
$^2/_3$ open Space – C_{10} = 0.7

C_{10} comb. = $\frac{0.88}{3} + \frac{0.7 \times 2}{3}$ = **0.76**

	C	I	Q
Q_{10}	0.76	113	2.60m^3/s
Q_{20}	0.80	131	3.17m^3/s

TOTAL PRE DEVELOPMENT FLOWS

1050 ∅ Q_{10} = (Ext. Catch) + (Site Internal [imp]) + (Site Internal [perv]) + ARI

Area	tc	Q_{10}	Q_{20}
Ex	17	2.69	3.28
SI	5	1.28	1.55
SP	15	1.49	1.81
ARI	25	2.60	3.17

tc = 5 $Q_{10} = (\frac{5}{17} \times 2.69) + 1.28 + (\frac{5}{15} \times 1.49) + (\frac{5}{25} \times 2.60)$ = 3.09m³/s

tc = 10 $Q_{10} = (\frac{10}{17} \times 2.69) + (\frac{10}{15} \times 1.49) + (\frac{10}{25} \times 2.60)$ = 3.62m³/s

tc = 15 $Q_{10} = (\frac{15}{17} \times 2.69) + 1.49 + (\frac{15}{25} \times 2.60)$ **= 5.42m³/s**

tc = 17 $Q_{10} = 2.69 + (\frac{17}{25} \times 2.60)$ = 4.46m³/s

Max Q_{10} = 5.42m³/s

Q_{20}

tc = 5 $Q_{20} = (\frac{5}{17} \times 3.28) + 1.55 + (\frac{5}{15} \times 1.81) + (\frac{5}{25} \times 3.17)$ = 3.75m³/s

tc = 10 $Q_{20} = (\frac{10}{17} \times 3.28) + (\frac{10}{15} \times 1.81) + (\frac{10}{25} \times 3.17)$ = 4.41m³/s

tc = 15 $Q_{20} = (\frac{15}{17} \times 3.28) + 1.81 + (\frac{15}{25} \times 3.17)$ **= 6.61m³/s**

tc = 17 $Q_{20} = 3.28 + (\frac{17}{25} \times 3.17)$ = 5.44m³/s

Max Q_{20} = 6.61m³/s

POST DEVELOPMENT
Ex ∅1050 / ∅1200

EXT. U/S CATCHMENT
Will bypass through new network - Q = 0

SITE – PROPOSED INTERNAL CATCHMENT

A = 2.15ha tc = 5 minutes
Impervious

	C	I	Q
Q_{10}	0.9	215	1.16m³/s
Q_{20}	0.95	248	1.41m³/s

A = 1.31ha tc = 10 minutes
Pervious

	C	I	Q
Q_{10}	0.75	167	0.46m³/s
Q_{20}	0.79	192	0.55m³/s

ARI

A = 9.23ha tc = 25 minutes

	C	I	Q
Q_{10}	0.76	113	2.20m^3/s
Q_{20}	0.80	131	2.69m^3/s

TOTAL POST DEVELOPMENT FLOWS

Q = (Site Internal [SI] {imp}) + (Site Internal [SP] {Perv}) + ARI

Area	tc	Q_{10}	Q_{20}
SI	5	1.16	1.41
SP	10	0.46	0.55
ARI	25	2.20	2.69

Q_{10}

tc = 5 $Q_{10} = 1.16 + (\frac{5}{10} \times 0.46) + (\frac{5}{25} \times 2.20)$ = 1.83m^3/s

tc = 10 $Q_{10} = 0.46 + (\frac{10}{25} \times 2.20)$ = 1.34m^3/s

tc = 25 Q_{10} **= 2.20m^3/s**

Max Q_{10} = 2.20m^3/s

Q_{20}

tc = 5 $Q_{20} = 1.41 + (\frac{5}{10} \times 0.55) + (\frac{5}{25} \times 2.69)$ = 2.23m^3/s

tc = 10 $Q_{20} = 0.55 + (\frac{10}{25} \times 2.69)$ = 1.62m^3/s

tc = 25 Q_{20} **= 2.69m^3/s**

Max Q_{10} = 2.69m^3/s

PRE-DEVELOPMENT
DRAINAGE THROUGH ARI SITE FROM FAIRFIELD ROAD

ARI Existing

A_1 = 4.3ha C_{10} = 0.79 tc = 10 minutes I = 167mm/hr

$\rightarrow Q_{10}$ = 1.58m^3/s

A_2 = 10.0ha C_{10} = 0.79 tc = 13 minutes I = 150mm/hr

$\rightarrow Q_{10}$ = 3.29m^3/s

A_3 = 7.11ha C_{10} = 0.80 tc = 15 minutes I = 142mm/hr

$\rightarrow Q_{10}$ = 2.24m^3/s

@ Point A

tc = 5 $Q_{10} = (\frac{5}{10} \times 1.58) + (\frac{5}{13} \times 3.29) + (\frac{5}{15} \times 2.24)$ = 2.80m^3/s

tc = 10 $Q_{10} = 1.58 + (\frac{10}{13} \times 3.29) + (\frac{10}{15} \times 2.24)$ **= 5.60m^3/s**

tc = 13 $Q_{10} = 3.29 + (\frac{13}{15} \times 2.24)$ = 5.23m^3/s

tc = 15 Q_{10} = = 2.24m^3/s

Max Q_{10} = 5.60m^3/s

POST DEVELOPMENT
DRAINAGE THROUGH ARI SITE FROM FAIRFIELD ROAD

ARI
(Fairfield Road)
Catchment A3 reduced by 3.48ha (Cut off by new access)

- Post Dev A3 = 3.63ha I = 142mm/hr
∴ Q_{10} = 1.15m^3/s

A_1 & A_2 Flows same as Pre-Dev ie. $Q_{10}A_1$ =1.58 m^3/s; $Q_{10}A_2$ =3.29 m^3/s

New Road (A4) A = 0.3ha C_{10} = 0.9 tc = 5 minutes I = 215mm/hr
Q_{10} = 0.16m^3/s

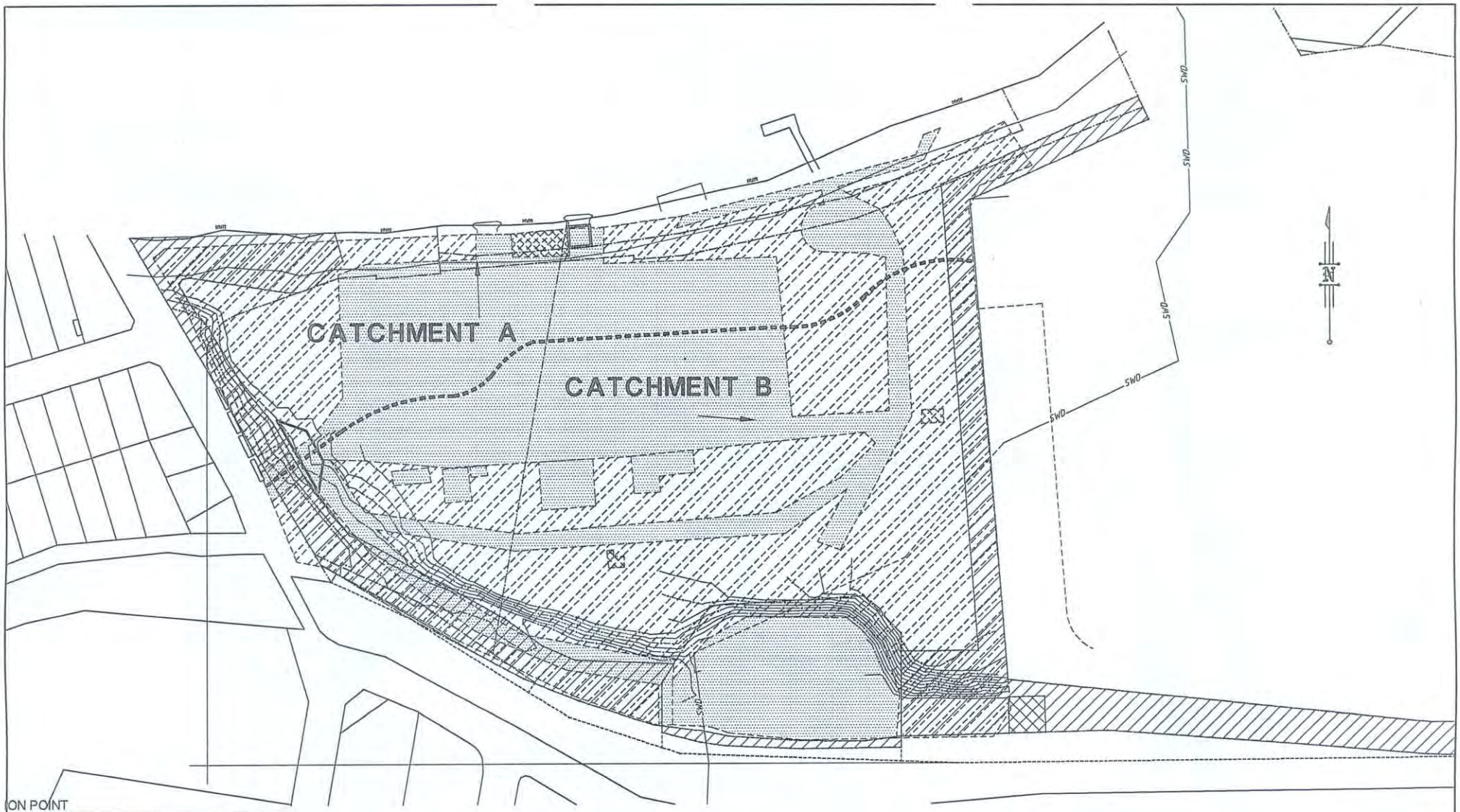
@ Point A

tc = 5 $Q_{10} = (\frac{5}{10} \times 1.58) + (\frac{5}{13} \times 3.29) + (\frac{5}{15} \times 1.15) + 0.16$ = 2.60m^3/s

tc = 10 $Q_{10} = 1.58 + (\frac{10}{13} \times 3.29) + (\frac{10}{15} \times 1.15)$ **= 4.88m^3/s**

tc = 13 $Q_{10} = 3.29 + (\frac{13}{15} \times 1.15)$ = 4.29m^3/s

Max Q_{10} = 4.88m^3/s



ON POINT

LEGEND - STORMWATER CATCHMENT

- CATCHMENT BOUNDARY
- SURFACE FLOW
- PERVIOUS AREA
- IMPERVIOUS AREA

EXISTING CATCHMENT PLAN

0 10 20 30m
SCALE 1 : 1000

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION PURPOSES

No.	Date	By	Amendment	Checked
B	12-18-85	M.J.	A1 ISSUE	
A	15-09-05	A.J.	ORIGINAL ISSUE	

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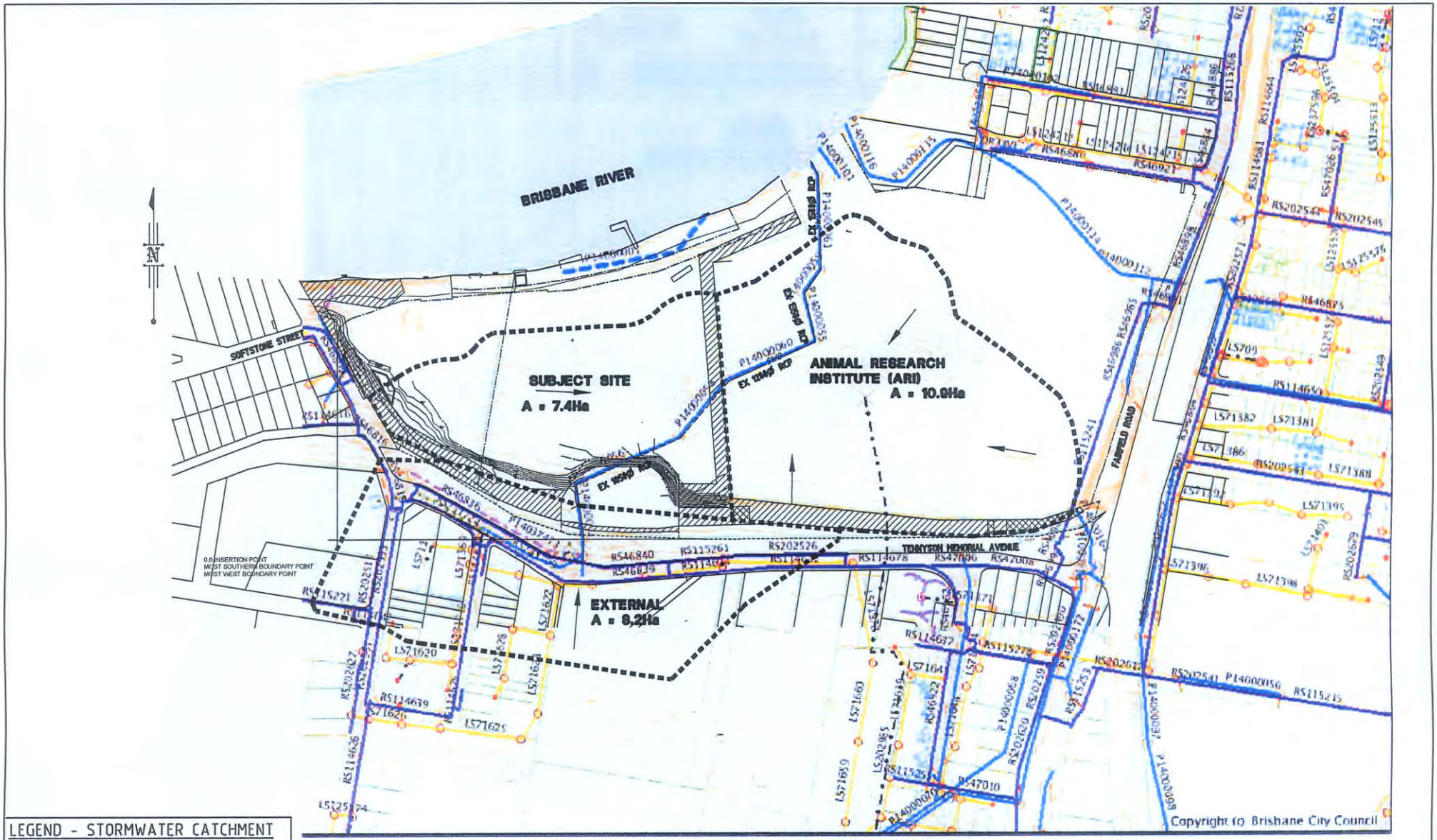
Project: TENNYSON REDEVELOPMENT
Title: EXISTING INTERNAL CATCHMENT PLAN
Client: *MIRVAC*
Draftsperson: A.J.
Designer: M.J.
Scale: AS SHOWN
Checked:
Approved: A. PEZZUTTI RPEQ No. 6302
Date: 15-09-05
Sheet Size: A1
Drawing No.: B04254-SK51
A / B

BCC.064.0333



EXISTING CATCHMENT PLAN

SCALE 1 : 2000

LEGEND - STORMWATER CATCHMENT

- CATCHMENT BOUNDARY
- SURFACE FLOW
- EXISTING STORMWATER DRAINAGE
- EXISTING SURFACE CONTOUR

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION PURPOSES

No.	Date	By	Amendment	Checked
B	12-10-05	M.J.	A1 ISSUE	
A	15-09-05	A.J.	ORIGINAL ISSUE	

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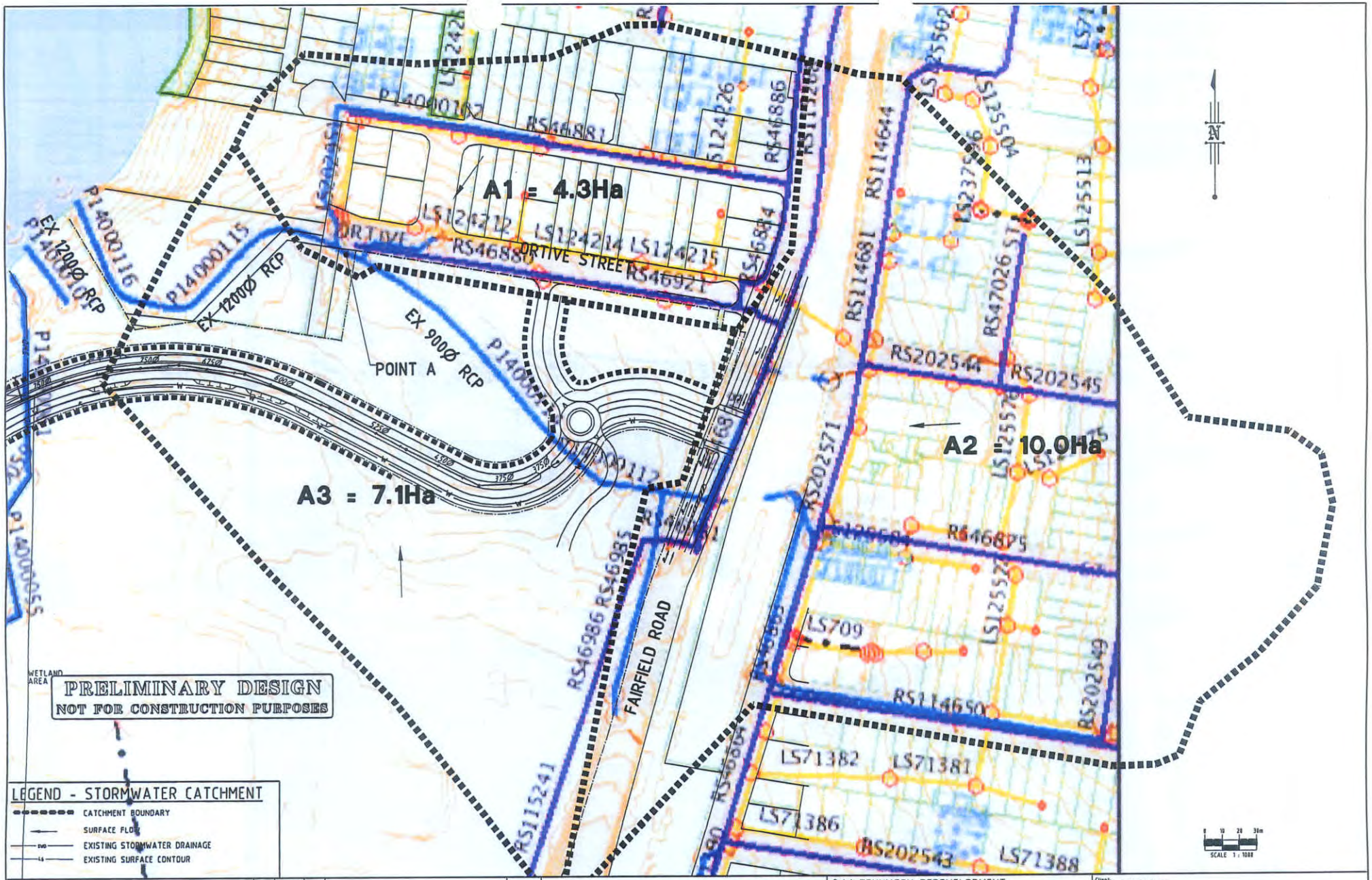
Project: TENNYSON REDEVELOPMENT
Title: EXISTING CATCHMENT PLAN
Client: MIRVAC
Draftsperson: A.J.
Designer: M.J.
Scale: AS SHOWN
Checked:
Approved: A. PEZZUTTI RPEQ No: 6382
Date: 15-09-05
Sheet Size: A1
Drawing No.: B04254-SK52
A B

BCC.064.0334



No.	Date	By	Amendment	Checked
B	12-10-05	M.J.	A1 ISSUE	
A	15-09-05	A.J.	ORIGINAL ISSUE	

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Project: TENNYSON REDEVELOPMENT

Title: EXISTING ARI DRAINAGE CATCHMENT PLAN

Client: MIRVAC

Draftsperson: A.J.
Designer: M.J.
Scale: AS SHOWN
Checked:
Approved: A. PEZZUTTI RPEQ No. 6302
Date: 15-09-05
Sheet Size: A1
Drawing No.: B04254-SK53
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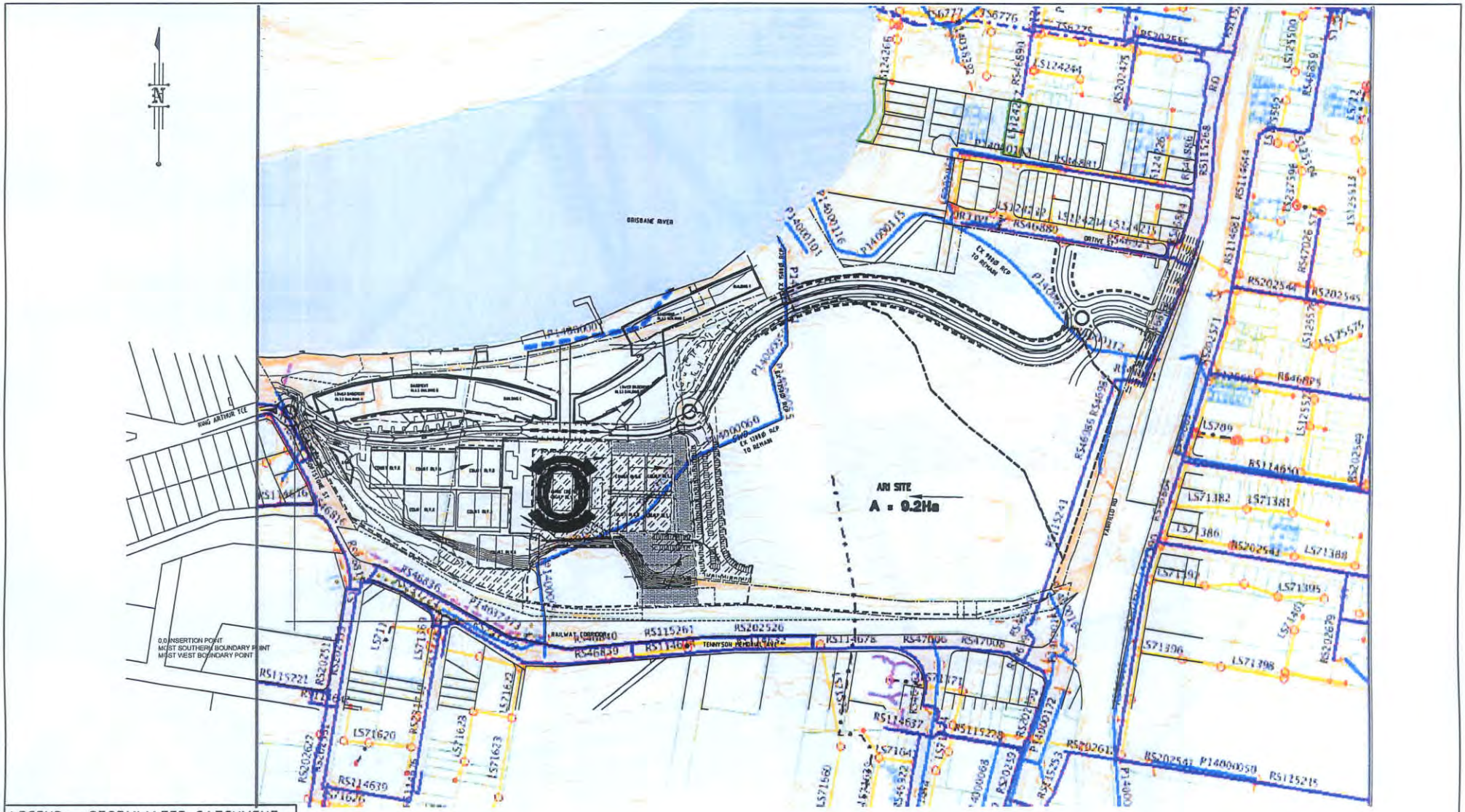

LEGEND - STORMWATER CATCHMENT

- CATCHMENT BOUNDARY
- SURFACE FLOW
- PERVIOUS AREA (1.3Ha)
- IMPERVIOUS AREA (2.2Ha)

PROPOSED CATCHMENT PLAN

SCALE 1 : 2000

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION PURPOSES

No.	Date	By	Amendment	Checked
B	12-10-05	M.J.	A1 ISSUE	
A	15-09-05	A.J.	ORIGINAL ISSUE	

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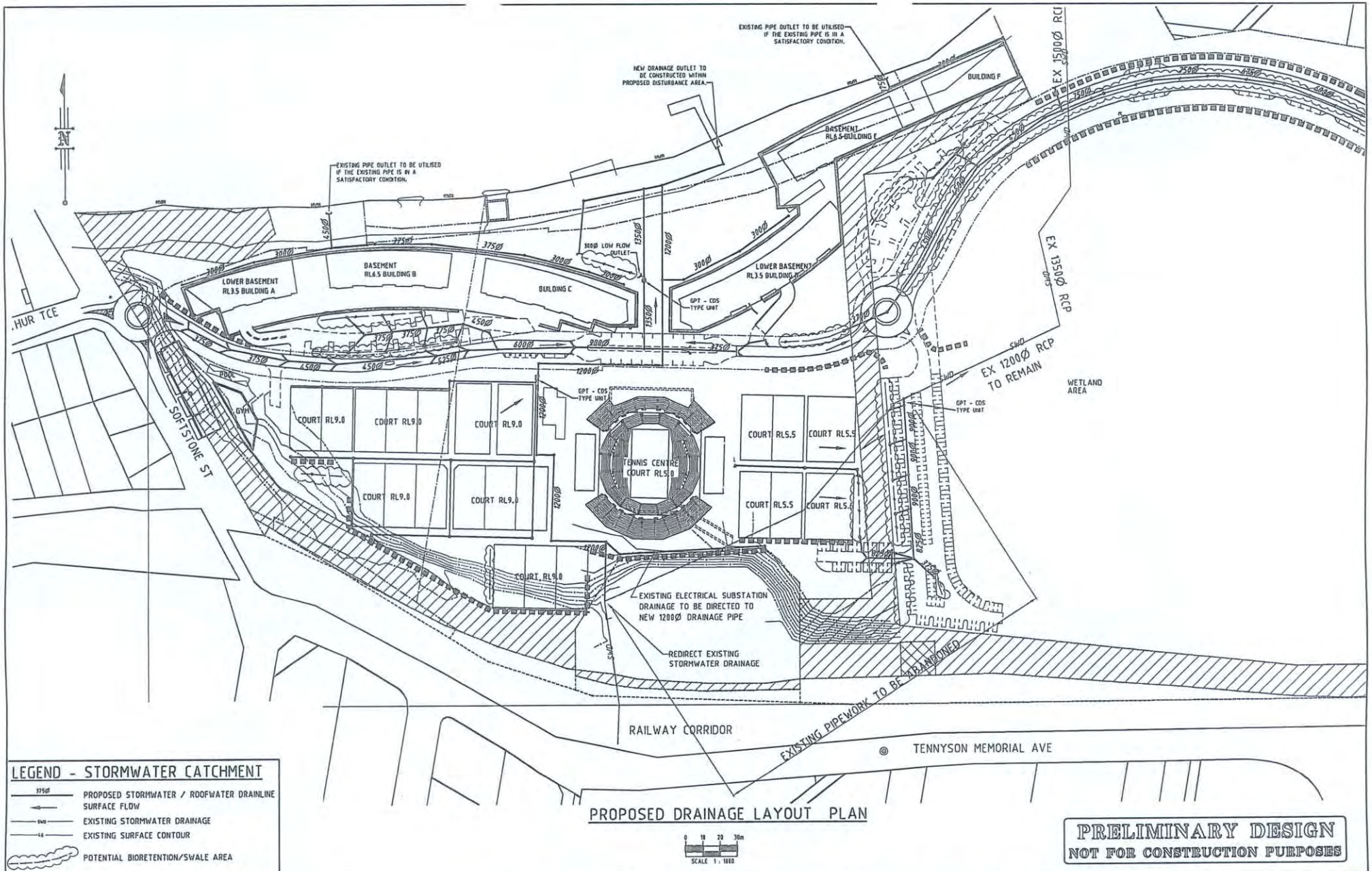
Project: TENNYSON REDEVELOPMENT
Title: PROPOSED CATCHMENT PLAN
Client: MIRVAC
Draftsperson: A.J.
Designer: M.J.
Checked:
Approved: A. PEZZUTTI RPEQ No. 6302
Scale: AS SHOWN
Date: 15-09-05
Sheet Size: A1
Drawing No. B04254-SK54
A
B

BCC.064.0336



No.	Date	By	Amendment	Checked
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A	15-09-05	A.J.	ORIGINAL ISSUE	

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Project: TENNYSON REDEVELOPMENT
Client: MIRVAC
Title: PROPOSED SITE DRAINAGE LAYOUT PLAN SHEET 1 OF 2
Draftsperson: A.J.
Designer: M.J.
Scale: AS SHOWN
Checked:
Approved: A. PEZZUTTI RPEQ No. 6302
Date: 15-09-05
Sheet Size: A1
Drawing No.: B04254-SK55
A B

BCC.064.0337

LEGEND - STORMWATER CATCHMENT

- 375Ø — PROPOSED STORMWATER / ROOFWATER DRAINLINE
- ← SURFACE FLOW
- SWD — EXISTING STORMWATER DRAINAGE
- 45 — EXISTING SURFACE CONTOUR

PROPOSED CATCHMENT PLAN

0 10 20 30m
SCALE 1 : 1000

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION PURPOSES

No.	Date	By	Amendment	Checked
B	13-10-05	M.J.	A1 ISSUE	
A	15-09-05	A.J.	ORIGINAL ISSUE	

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Project: TENNYSON REDEVELOPMENT
Title: PROPOSED SITE DRAINAGE LAYOUT PLAN SHEET 1 OF 2
Client: MIRVAC
Draftsperson: A.J.
Designer: M.J.
Scale: AS SHOWN
Checked:
Approved: A. PEZZUTTI RPEQ No. 6302
Date: 15-09-05
Sheet Size: A1
Drawing No.: B04254-SK56
A / B

BCC.064.0338

APPENDIX B

Sewer Reticulation Plans & Calculations

SEWER REVIEW CALCULATIONS

EXISTING SEWER LOADS

Approx. 170 Res. A Lots Contribute to Point A
Of these ≈ 130 Res A Lots are Upstream of Ø225 at Point B
ie. Serviced by Ø150 prior to discharge into Ø225 at Point C (MH 69592)

from Water Resources Guidelines Point A- 3.1EP / 3 bedroom house
- 3.1 x 170 = 527EP

Point B - 3.1 x 130 = 403EP

Estimated Approx. 14ha of Light Industry / Commercial

BCC Water & Sewerage Guidelines - 20EP/ha Light Industrial
- 14 x 20 = 280EP

TOTAL EXISTING EP AT POINT A = 527 + 280 = **807EP**
TOTAL EXISTING EP AT POINT B = 403 + 280 = **683EP**

PROPOSED DEVELOPMENT

Units:- 140 x 2 B/Room – 2.4EP/unit (Water Resources Guidelines) = 336EP
205 x 3 B/Room – 3.1EP/unit (Water Resources Guidelines) = 636EP
40 x 4 B/Room – Assume 3.8EP/unit = 152EP

TOTAL NO. OF UNITS = 385

TOTAL RESIDENTIAL EP = 336 + 636 + 152 = **1124EP**

SPECIAL USE AREA (STC)

From BCC Water & Sewerage Guidelines (Sport & Rec.) – 10EP/ha
TOTAL EP for Site Approx. 4.2ha = 42EP

TOTAL ADDITIONAL EP FOR DEVELOPED SITE = **1166EP**

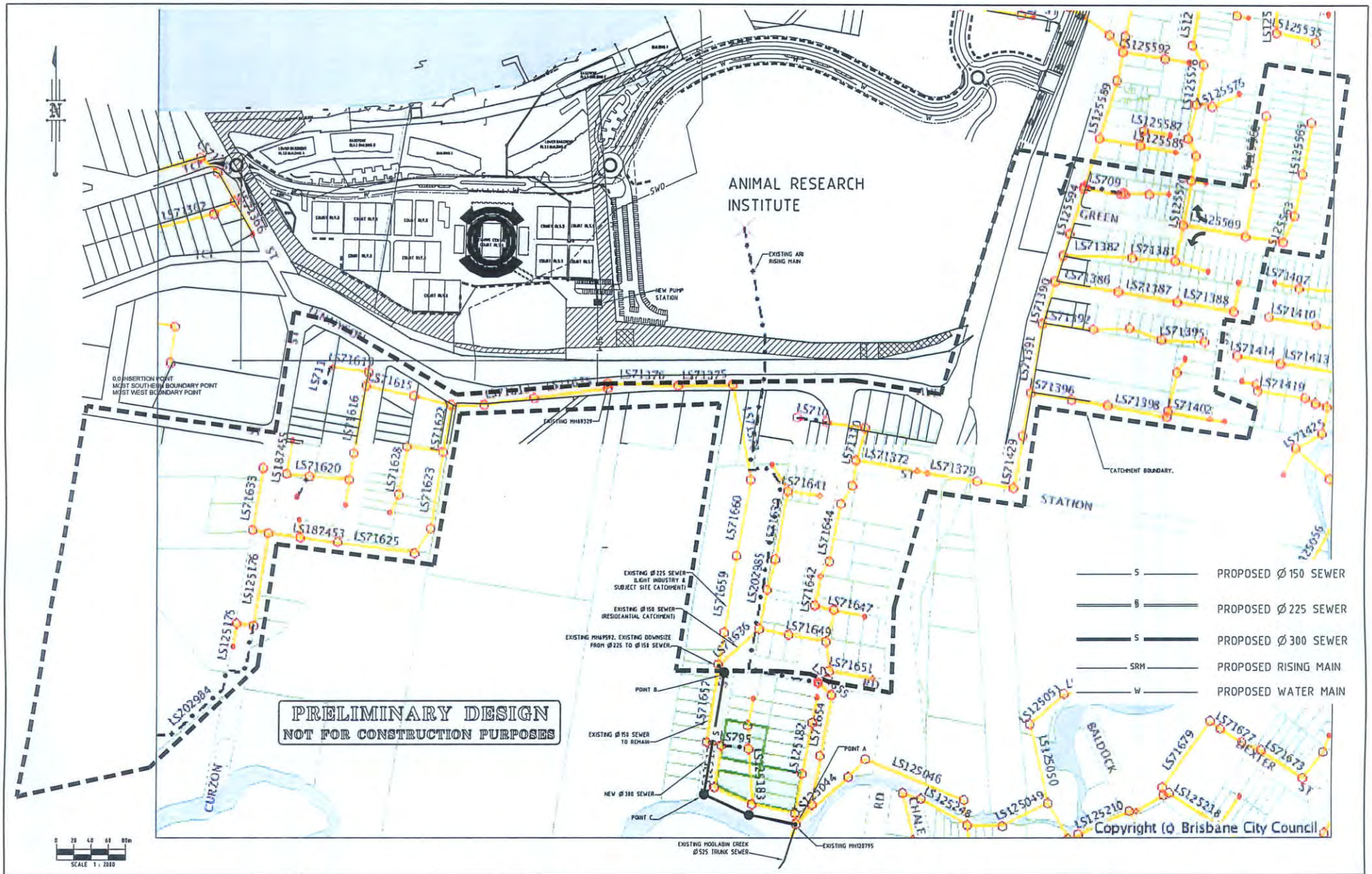
TOTAL FLOWS = EXISTING + DEVELOPED

TOTAL EP to 150Ø down stream of Point B = 683 + 1166 = **1849EP**
The max allowable flow for 150Ø in accordance with BCC Water & Sewerage Guidelines = 300EP

TOTAL EP to 150Ø up stream of Point B = 280 + 1166 = **1446EP**
TOTAL EP to 150Ø down stream of Point C = 807 + 1166 = **1973EP**
The max allowable flow for 225Ø in accordance with BCC Water & Sewerage Guidelines = 1867EP

Therefore

- existing 150Ø pipe down stream of point B is under sized for developed site
- existing 225Ø pipe up stream of point B is satisfactory for developed site
- existing 225Ø pipe down stream of point C is under sized for developed site



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A	15-09-05	M.J.	ORIGINAL ISSUE	

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Project: TENNYSON REDEVELOPMENT

Title: SEWERAGE RETICULATION LAYOUT AND CATCHMENT PLAN

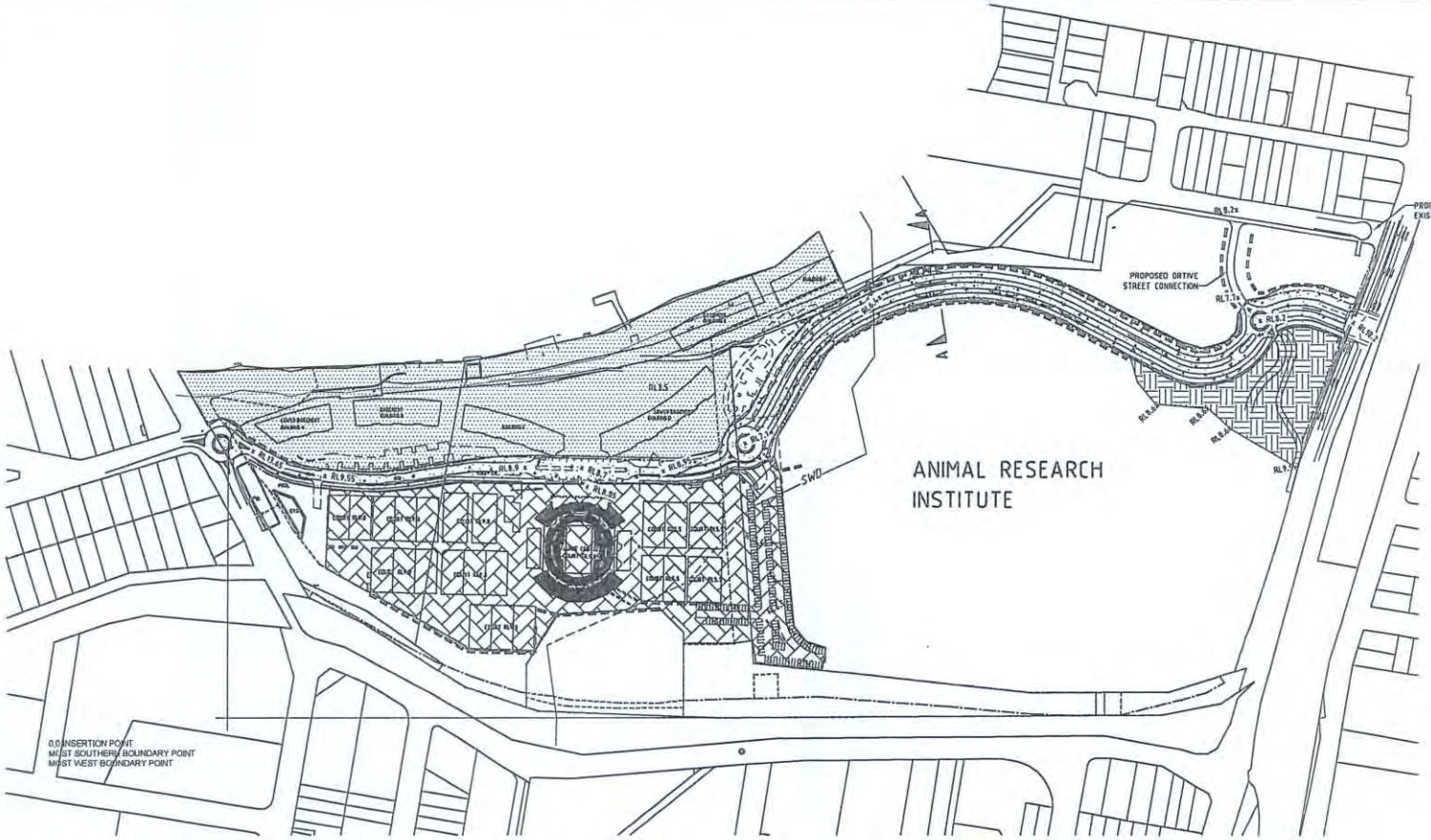
Client: MIRVAC

Draftsperson: A.J.	Checked:	Sheet Size: A1	Drawing No.: B04254-SK57
Designer: M.J.	Approved: A. PEZZUTTI RPEQ No. 6302		
Scale: 1:2000	Date: 08-07-04	A	B

BCC.064.0342

APPENDIX C

Proposed Roadworks Layout

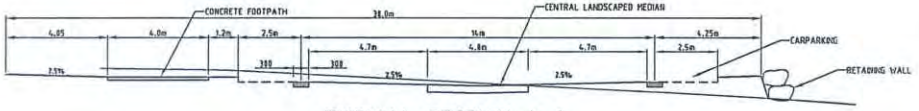


LAYOUT PLAN

0 20 40 60 80m
SCALE 1 : 2000

TRANSPORT & ACCESS WORKS
RESIDENTIAL DEVELOPMENT
TENNIS CENTRE
EXTENT OF FILL AT ENTRY
RETAINING WALL
ROAD FLOW
RL6.4x PRELIMINARY DESIGN ROAD LEVEL

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION PURPOSES



TYPICAL SECTION A-A

0 2 4 6 8m
SCALE 1 : 200

No.	Date	By	Amendment	Checked
C	31-11-05	A.J.	BOULDER WALL REMOVED	
B	12-10-05	M.J.	AT ISSUE	
A	10-10-05	A.J.	ISSUE FOR REPORT	

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Project: TENNYSON REDEVELOPMENT
Title: PRELIMINARY ROAD LAYOUT PLAN
Client: MIRVAC
Draftsperson: M.J.
Designer: M.J.
Scale: 1:2000
Checked:
Approved: A. PEZZUTTI RPEQ No. 6302
Date: 08-07-04
Sheet Size: A1
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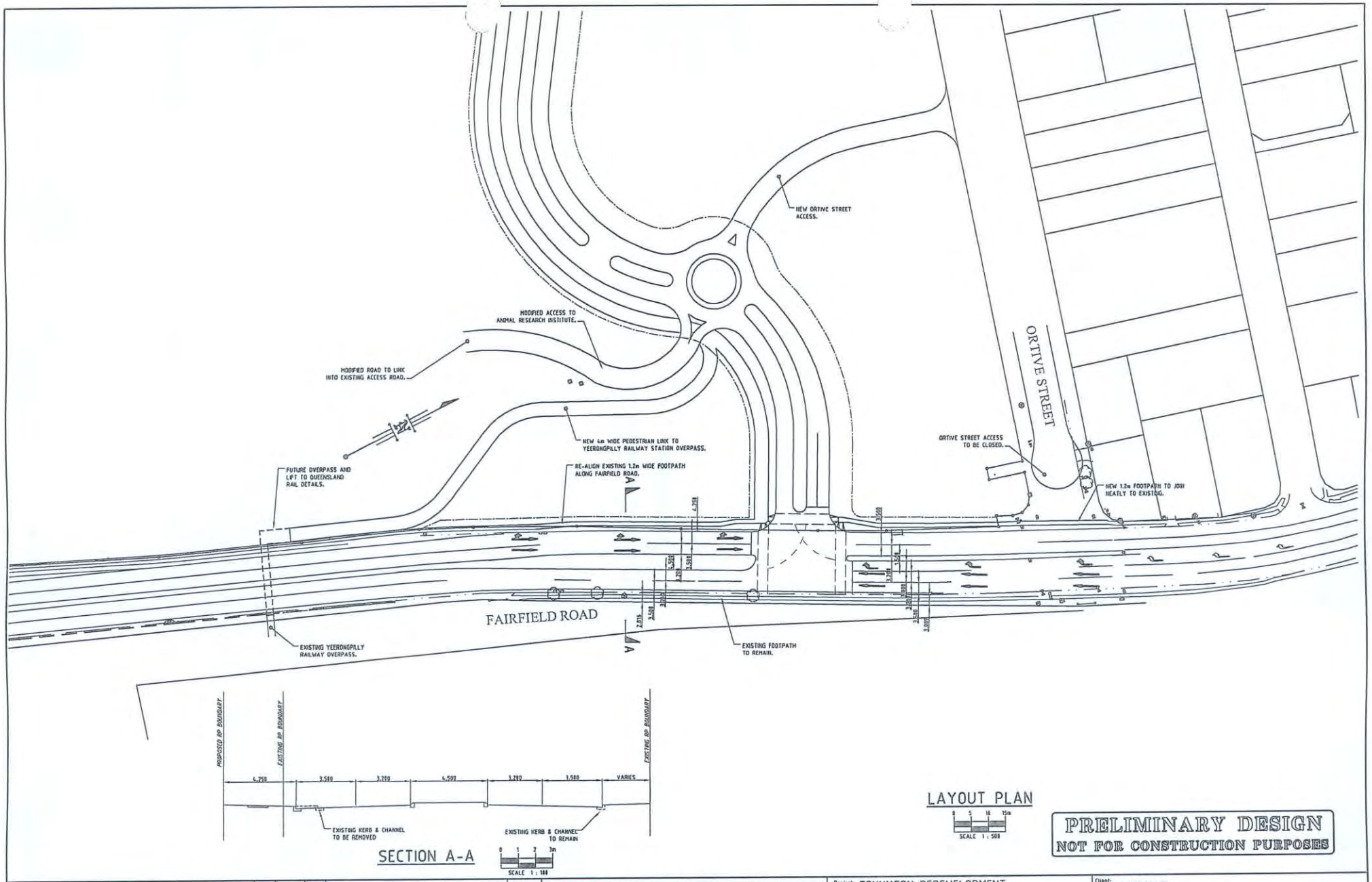

SECTION A-A

SCALE 1 : 100

LAYOUT PLAN

SCALE 1 : 500

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION PURPOSES

No.	Date	By	Amendment	Checked
A	28-10-05	M.J.	ORIGINAL ISSUE	

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Project: TENNYSON REDEVELOPMENT

Title: PRELIMINARY FAIRFIELD ROAD INTERSECTION DETAIL PLAN

Client: *MIRVAC*

Draftsperson:	Checked:	Sheet Size	Drawing No.
M.J.		A1	B04254-SK58
Designer: M.J.	Approved: A. PEZZUTTI RPEQ No. 6382		
Scale: 1:500	Date: 08-07-04	A	

BCC.064.0345

APPENDIX D

Services, Works & Infrastructure Code

SERVICES, WORKS AND INFRASTRUCTURE CODE
Performance Criteria and Acceptable Solution

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P1	Land used for urban purposes must be serviced adequately with regard to water, waste disposal, drainage, telecommunication and energy.	A1	The land is provided with: • reticulated water, sewerage, drainage, electricity and telecommunication services. • gas service where reasonable.	✓	Connections to existing sewerage reticulation, water reticulation, stormwater drainage, electricity and telecommunication services are available. Please refer to Engineering Services Report (Volume 5 of this submission) prepared by Lambert & Rehbein.	
P2	Frontage to the site must provide the following to an appropriate standard: • an effective, high quality paved roadway. • an effective high quality roadway kerb and channel. • safe, high quality crossings over channels and walkways.	A2	The following are provided or already exist at the frontage of the site, to the standard that would have applied if the development formed part of a new subdivision: • concrete kerb and channel. • forming and grading to walkways. • crossing over channel and walkways.	✓	New kerb and channel and concrete pathways are to be provided to the new roadway servicing the site. These will be linked with existing infrastructure in Softstone Street and Fairfield Road. A new bus bay and associated path will be provided in Softstone Street.	

Solution: ✓ = Acceptable Solution
✓ PC = Satisfies Performance Criteria Directly
A/S = Alternative Solution
N/A = Not applicable to this proposal

SERVICES, WORKS AND INFRASTRUCTURE CODE
Performance Criteria and Acceptable Solution

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
• safe, accessible high quality bikeways. • a safe, accessible, high quality public walkway compatible and integrated with the surrounding environment. • provision of and alteration to required public utilities.	• a constructed bikeway. • a constructed walkway, minimum 1.2m wide and full width from the property line to the kerb in multipurpose centres. • reconstruction of any damaged public walkway in concrete. • construction of the carriageway. • payment of costs for required alterations to public utility mains, services or installations. • construction of and required alterations to public utility mains, services or installation. • drainage works. • installation of electrical conduits.		Existing services will be relocated as required to accommodate these works. Please refer to Engineering Services Report (Volume 5 of this submission) prepared by Lambert & Rehbein.	
• effective drainage. • appropriate conduits to facilitate the provision of required street lighting systems and traffic signals.				

Solution: ✓ = Acceptable Solution
✓ PC = Satisfies Performance Criteria Directly
A/S = Alternative Solution
N/A = Not applicable to this proposal

APPENDIX E

Filling & Excavation Code

FILLING AND EXCAVATION CODE
Performance Criteria and Acceptable Solution

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P1	Filling or excavation must not impact adversely on visual amenity or the stability of land. **Note:** Retaining wall construction will also need to comply with Section 4 of Schedule 5 of the Standard Building Regulations 1993 and embankment gradients will need to comply with Section 5 of Schedule 5 of the Standard Building Regulations 1993.	A1.1	A retaining wall is set back at least half the height of the wall from any boundary of the site.	A/S	Retaining walls higher than 1.5m will be incorporated into the State Tennis Centre. The majority of these walls are internal and not located on external boundaries. Where they are located on external boundaries it is in cut and adjacent to the rail corridor. Therefore there is little impact on adjoining properties. Retaining walls will be incorporated into the residential component of the development. These will generally be less than 1.5m in height and are part of a detailed landscape design that will soften the visual impact of these walls. Further details will be provided as part of the landscape design.	
		A1.2	Retaining walls over 1.5m are stepped 0.75m for every 1.5m in height, terraced and landscaped.	✓		
		A1.3	Retaining wall finishes that present to adjoining land are of a high quality appearance and compatible with surrounding development.	✓		
P2	Filling or excavation must not result in any contamination of land or waters.	A2.1	For filling, only clean fill is used.	✓	This will be noted in our design documentation.	
		A2.2	For excavation, no contaminated material is excavated, or acid sulphate soil or contaminant disturbed.	A/S	Contaminated soils will be managed in accordance with the Site Remediation Plan. Acid sulphate soil will be managed in accordance with the ASS Management Plan	
		A2.3	For excavation or filling acid sulphate soils are not affected by changes to the site's hydrology.	✓	Acid sulphate soil will be managed in accordance with the ASS Management Plan	
		A2.4	The site is not on the contaminated land register.	A/S	The site is to be removed from the contaminated land register by way of a Site Remediation Plan.	

Solution: ✓ = Acceptable Solution
✓ PC = Satisfies Performance Criteria Directly
A/S = Alternative Solution
N/A = Not applicable to this proposal

FILLING AND EXCAVATION CODE
Performance Criteria and Acceptable Solution

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P3 Filling or excavation must not cause any increase in flooding or drainage problems.	**A3.1**	No filling or excavation is located. • In any waterway corridor as shown on the Planning Scheme Maps and defined in the definitions. • Within the waterway corridor or, if there is no waterway corridor, within the 100 year ARI extent • In any wetland as shown on the Planning Scheme Maps and defined in the definitions.	A/S	Filling is proposed within a wetland area located on the ARI site. However the significance of this wetland is further discussed in the Ecological Assessment Report (Volume 7 of this submission)	
	A3.2	Filling or excavation does not cause ponding on the site or on nearby land.	✓	Please refer to the Engineering Services Report (Volume 5 of this submission) prepared by Lambert & Rehbein.	
	A3.3	Any increase in flooding will not adversely affect the safety or use of any adjoining site and land upstream and downstream.	✓	There is no increase in flooding.	
	A3.4	Any changes to run-off characteristics resulting from filling for storm events, up to at least the 2 year ARI design storm, are minimised in an ecologically sensitive manner.	✓		
	A3.5	Filling or excavation does not adversely affect the flow of water in any overland flow path.	✓	Please refer to the Flooding & Stormwater Quality Management Report (Volume 6 of this submission)	

Solution: ✓ = Acceptable Solution
✓ PC = Satisfies Performance Criteria Directly
A/S = Alternative Solution
N/A = Not applicable to this proposal

FILLING AND EXCAVATION CODE
Performance Criteria and Acceptable Solution

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
			Note: Compliance with Acceptable Solutions A3.1 to A3.5 can be demonstrated through the submission of a report detailing: • Calculations for flood modelling of the riparian zone, including ground cover, understorey and canopy vegetation. • Management strategies to prevent adverse flooding and minimise changes to run-off characteristics consistent with Council's current **Subdivision and Development Guidelines 1997** and Environmental Best Management Practice for Waterways and Wetlands 1996.			
P4	Filling or excavation must not adversely affect environmental values in receiving waterways or wetlands. **Note:** For guidance on stormwater management refer to the **Management of Urban Stormwater Quality Planning Scheme Policy.**	**A4**	Filling or excavation complies with the **Stormwater Management Code and Council's Erosion and Sediment Control Standard.**	✓	Appropriate Erosion and Sediment Control measures will be implemented around earthworks during construction.	

Solution: ✓ = Acceptable Solution
✓ PC = Satisfies Performance Criteria Directly
A/S = Alternative Solution
N/A = Not applicable to this proposal

FILLING AND EXCAVATION CODE
Performance Criteria and Acceptable Solution

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P5	Emissions of air pollutants from filling or excavation, particularly dust, must not have a significant environmental harm or nuisance impacts. **Note:** For guidance on the assessment of air quality, refer to the **Air Quality Planning Scheme Policy**.	A5.1	No dust emissions extend beyond the boundary of the site.	✓	Standard industry measures are to be implemented.	
		A5.2	No other air emissions, including odours, are detectable at the boundary of the site.	✓		
		A5.3	A management plan for control of dust and air emissions is prepared and implemented.	✓		
P6	Emissions of noise must not cause significant environmental harm or nuisance impacts. **Note:** For guidance on the assessment of air quality, refer to the Air Quality Planning Scheme Policy.	A6.1	The total duration of filling or excavation operations does not exceed four weeks.	A/S	Filling and excavation operations will exceed 4 weeks in total however the works will be staged which will assist to minimise this duration. Access will also be via major roadways and will be designed to minimise the affect on the amenity of any adjoining residential uses.	
		A6.2	Filling or excavation operations occur only between 7am to 6pm Monday to Saturday.	✓		
P7	Traffic generated by filling or excavation must not impact on the amenity of the surrounding area.	A7.1	Haul routes used for transportation of fill to or from the site only use Major Roads.	✓	Access will be provided from major roadways with the proposed routes designed to minimise impacts on existing residential uses in the vicinity of the site. Further details are to be provided at operational works stage.	
		A7.2	Truck movement generated by filling or excavation do not exceed 20 truck movements per day.	A/S		
		A7.3	Truck movements generated by filling or excavation do not occur for longer than 4 weeks.	A/S	Filling and excavation operations will exceed 4 weeks in total however the works will be staged which will assist to minimise this duration. Access will also be via major roadways and will minimise the affect on the amenity of any adjoining residential uses.	

Solution: ✓ = Acceptable Solution
✓ PC = Satisfies Performance Criteria Directly
A/S = Alternative Solution
N/A = Not applicable to this proposal

APPENDIX F

Erosion Hazard Assessment

TABLE OF CONTENTS

APPENDICES

6.1 Introduction

GHD have been commissioned by Mirvac Queensland to provide advise and analysis in respect to Brisbane River flooding and stormwater quality for the redevelopment of the former Tennyson Power Station, Tennyson. In respect to Brisbane River flooding this report addresses the potential impact of the proposed development on the function of the Brisbane River and consequently, upon upstream and downstream properties. The impact of River flooding upon the development (eg. provision of appropriate flood immunity and safe access/egress to various elements of the proposed development) is addressed in Volume 5.

This report outlines the issues, assessment, potential impacts and proposed mitigation methods to be adopted and incorporated into the proposed development.

The proposed development is located on the banks and within a confined floodplain backwater area of the Brisbane River. The development also encroaches into the Brisbane River Corridor.

Accordingly, the provisions of the Stormwater Management Code of the Brisbane City Plan are applicable, and the development proposal responds to the Performance Criteria by presenting Acceptable Solutions to relevant Criteria.

BCC have estimated that 1974 peak flood level to be 10.8m AHD, also that.the Wivenhoe Dam has reduced the 100 year ARI river flood at the site. Brisbane City Council have provided a Defined Flood Level (DFL) of 7.9m AHD for a 100 year flood for planning purposes. The DFL differs from the Brisbane River flood modelling results which can be seen in Section 6.3.3, all reference to the 100 year flood level are in relation to the DFL with the exception of Section 6.3.3 which refers to the Brisbane River flood model.

6.1.1 Site Description

At the time of lodgement it is anticipated that a reserve for sport and recreational purposes will have been granted to the Department of Local Government, Planning, Sport and Recreation over the subject site.

The real property description of the reserve is Lot 1 on SP 164685, County Stanley, Parish Yeerongpilly, Title Reference: 49104467.

It is expected that the following easements will be registered on the reserve at the time of application:

Queensland Electricity Transmission Corporation Limited (Powerlink)

- Easement B on SP 184023 benefiting Lot 2 on SP164685 for electricity and access purposes.

Energex Limited

- Easement A on SP184022 for electricity purposes
- Easement B on SP184023 for electricity purposes
- Easement C on SP184024 for electricity purposes

Lot 566 on SP 104107, which accommodates the Department of Primary Industries and Fisheries Animal Research Institute (DPI&F site), is included in the subject application only for the purposes of the following components of the development:

- The main access road to the proposed development is from Fairfield Road;
- The pedestrian/cycleway which connects the proposed main access road to the foreshore area of the subject site;
- The pedestrian pathway connecting the main access road to the proposed overbridge to Yeerongpilly Railway Station at the Fairfield Road frontage of the site; and
- Car parking associated with the State Tennis Centre.

Other than an amended access arrangement to the Institute, no changes to the Institute activities are proposed as part of this application.

The site is bounded by the Brisbane River to the north, Softstone Street and the eastern end of King Arthur Terrace to the west, the Corinda Yeerongpilly Rail corridor and Tennyson Memorial Drive to the south and the DPI&F site to the east.

The site upon which the State Tennis Centre and proposed residential development is to be developed currently contains the now decommissioned Tennyson Power Station and other ancillary buildings and structures.

The southern part of the subject site also contains an electricity substation adjacent to the site's southern boundary. This is covered by existing Easement A on SP 165945.

The area on the DPI site that is proposed to be developed to accommodate the proposed access road is presently mostly paddock for animals used in DPI activities.

6.1.2 Existing Site Description in Relation to Brisbane River Flooding

The proposed Tennyson Riverside Development Site will occupy the site of the now derelict Tennyson Power Station, on the south side of the River. See Master Plan.

The site grades from the River High Astronomical Tide (HAT) level of 1.8mAHD to levels generally in the order of 12.0 mAHD.

Portions of the site, together with portions of the abutting Lot 566 on SP 104107, which accommodates the Department of Primary Industries and Fisheries Animal Research Institute (DPI&F), form an 'off stream' ineffective-flow-area or backwater (the site floodplain) to the Brisbane River of approximately 7.5 Ha in area. Figure 6.1-1 shows the existing site conditions and the 100 year ARI flood extents on the site. Figure 6.1-1also shows the flow paths of major Brisbane River floods onto the site.

High ground and the existing power plant building (including eastward extensions of its fill platform) effectively block flood waters below 7.9 mAHD from entering the site from the River at the upstream boundary of the site. Other high ground approximately 120m downstream of the existing building fill platform forms the downstream extent of the site floodplain connection to the river. The site floodplain connection to the River is also further confined by three existing buildings which obstruct flow onto the floodplain (southern portions of site).

Existing floodplain storage on the site for 100 year ARI floods is approximately 111,400 m^3.

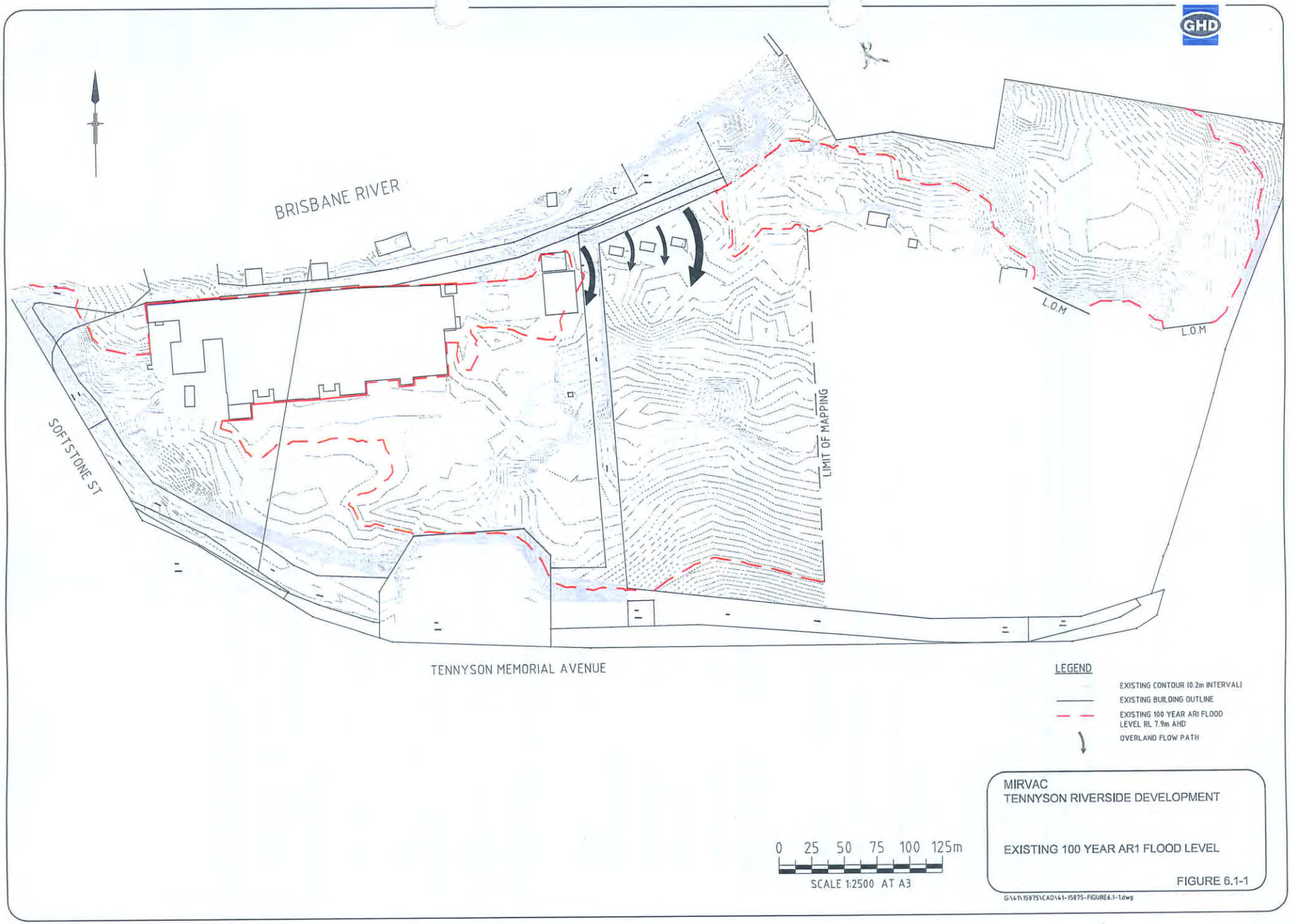
The primary hydrologic and hydraulic functions of the Brisbane River that are potentially impacted due to development are:

- Floodplain storage; and
- Flood conveyance.

The general requirement in respect of these functions is to cause 'no worsening' of flood condition on other properties due to increase in flood peak flow rate or flood levels.

In order that the development meets BCC's Urban Management Division Subdivision and Development Guidelines (Part B Design Requirements) in respect of flood immunity, various habitable and on-habitable uses are required to be above flood levels of varying magnitudes. These are:

- 100 year ARI level + 0.5m and 100 year ARI level + 0.3m respectively for habitable and non-habitable Residential uses;
- 100 year ARI level + 0.5m and 100 year ARI level respectively for Industrial / Commercial developments; and
- For car parking, the minimum design levels are equivalent to 20 year ARI flood level.


BRISBANE RIVER
SOFTSTONE ST
TENNYSON MEMORIAL AVENUE
LIMIT OF MAPPING
L.O.M
L.O.M
LEGEND
EXISTING CONTOUR (0.2m INTERVAL)
EXISTING BUILDING OUTLINE
EXISTING 100 YEAR ARI FLOOD LEVEL RL 7.9m AHD
OVERLAND FLOW PATH
0 25 50 75 100 125m
SCALE 1:2500 AT A3
MIRVAC
TENNYSON RIVERSIDE DEVELOPMENT
EXISTING 100 YEAR AR1 FLOOD LEVEL
FIGURE 6.1-1
G:\41\15075\CAD\41-15075-FIGURE6.1-1.dwg

6.2 Brisbane River Flood Impacts

6.2.1 Impact of Proposed Works on Site Floodplain Storage

In order to accommodate the proposed development and, at the same time meet the Part B Design Requirements in respect of flood immunity, a combination of site filling and cut will be required. Such earthworks alter the pattern of flooding on the site and floodplain storage available on the site. Refer Figure 6.1-2 showing inundation extent post development.

A digital comparison of digital elevation models representing both the existing site (derived from site survey) and preliminary site design surface, against a level surface of RL7.9mAHD (the flood level defined by BCC) has provided an assessment of pre and post development floodplain storage volume. The difference between the pre and post development floodplain storage volumes gives an estimate of the impact of the development in terms of gain (or loss) of floodplain storage.

Table 6.1 below, shows the results of this comparison for the existing site and preliminary proposed development design surface. 'Off site' in Table 6.1 refers to portions of the DPI&F site accommodating proposed works only. In this respect, it should be noted that the floodplain storage values given for the 'Off site' area are not the total existing storage available on the DPI&F site. The balance of the DPI&F site contains no proposed works, hence there is no change in floodplain storage on that portion of the DPI&F site, and it is not relevant to this application.

Table 6.2-1 Comparison of Pre and Post Development Floodplain Storage

	Volume from Surface to 7.9m AHD		
Reference Surface	**Off Site (m^3)**	**On Site (m^3)**	**Total (m^3)**
Existing Surface (Pre Development)	132918	111420	244338 (sum) 244354 (from model)
Developed Surface (Post Development)	138601	69766	208367 (sum)
Total Loss/Gain	5683 (gain of storage)	-41654 (loss of storage)	-35971 (loss of storage)

The above analysis of the net effect of site cut and fill shows that a loss of floodplain storage of approximately 40000 m^3 will result on the site.

Analysis of total works on both the subject site and on DPI&F land shows that loss of floodplain storage will be approximately 36,000 m^3.

Such storage volume represents a minimal percentage of total available floodplain storage in this reach of the Brisbane River. Additionally, the site floodplain, as shown in Figure 6.1-1 is restricted in its connection to the River, hence its effectiveness in contributing to floodplain storage available during the rising limb of a flood hydrograph is limited.

Further, the minimal loss of floodplain storage (approximately 36,000 m^3) represents only 0.0015% of the total volume of flood water below 7.9m AHD (approximately 2.4 x 10^9 m^3 as taken from BCC supplied data) at this point in the River.

Accordingly, due to:

- Minimal loss of floodplain storage; and
- The relative 'disconnectedness' of the site floodplain from the River,

it is expected that the proposed development will have no measurable adverse impact upon flood afflux or peak flood flow rate due to loss of floodplain storage.

6.3 Brisbane River Flow Conveyance

6.3.1 Existing Brisbane River Flow Conveyance

The southern limit of the existing active flow area of the Brisbane River is defined by an alignment consisting of:

- High ground on the River frontage at western site boundary;
- Existing power plant building and its extended fill platform to the east (downstream);
- Three existing buildings east of main power plant building; and
- High ground approximately 120m east (downstream) of the existing building fill platform.

Figure 6.3-2 shows this alignment and the features that form the boundary between the active Brisbane River flow path and the inactive flow area of the site floodplain.

Existing conveyance flood conveyance at the fringe of the active flow area is further constrained by the presence of:

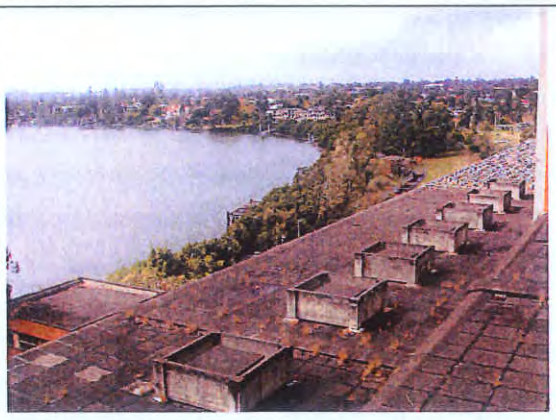
- Two existing pump station buildings and other small buildings;
- Existing jetty structure; and
- Existing riparian vegetation along the River frontage.

These structures can be seen in Figure 6.3-1.

1. Existing Pump Station Buildings.

2. Existing Riparian Vegetation near pump station buildings (upstream).

3. View from top of Power Station shows area of floodplain connection to River and alignment of three existing buildings (white) that for part of active flow area boundary.



4. View of Power Station showing Pump Station (lower left), Jetty (mid image) and Riparian Vegetation.

Figure 6.3-1 Site Photos Showing obstructions at fringe of active flow area

6.3.2 Proposed River Flow Conveyance

The Master Plan and Figure 6.3-3 show that the proposed locations for Buildings A, B, C, & D do not project 'forward' into existing active flow path of Brisbane River beyond that of the existing Power Station building. Further, it can be seen for the Master Plan that the positions of Buildings A & C are set back slightly from the alignment of the existing Power Station building, and thus will have the effect of increasing the available active flow width of the River in this location.

It should be noted that Buildings C & D are substantially set back from the existing Power Station building – retaining wall alignment which constrain River active flow area at this point. The proposed development includes removal of the existing constraint to flow width and lowering of the over bank levels to form a public park. These works will have the effect of increasing the available active flow area above that currently existing, thereby contributing to a possible increase in available flow conveyance and an easing of flood levels.

Comparison of the Master Plan and Figure 6.3-3 shows that Buildings E & F project 'forward' of the alignment of the existing active flow path boundary with the inactive flow of the site floodplain. This projection is at its maximum at Building E, and is approximately 40 m into the obstructed, 'high friction', and low velocity (refer Figure 6.3-3) fringe of the active flow path of the River.

The location of Building E corresponds with cross section Ch 1041230 in BCC's hydraulic (Mike11) model of the River (see Appendix B). An analysis of the Brisbane River cross sectional area (taken from BCC Mike11 model), and proposed site development at the point of maximum encroachment (Building E) is shown in Figure 6.3-2. The analysis shows that reduction of existing flow cross sectional area within the active flow zone, due to proposed development, is approximately 5% in respect to the DFL.

Such reduction in active flow area where velocities are lowest (due to increased friction and various obstructions discussed above) is not expected to result in afflux that will cause worsening of flooding to upstream properties.

In order to demonstrate any potential afflux effect due to the proposed development, a portion of Brisbane City Council's Brisbane River Mike11 hydraulic model has been acquired; amended and run. Section 6.3.3 describes the approach and results of this modelling.

6.3.3 Brisbane River Hydraulic Analysis

Brisbane City Council has provided a truncated portion of its Mike11 hydraulic model of the Brisbane River to allow analysis of effects of Buildings C, D, E, and F in the fringe of the River active flow area. This model covers Brisbane River Chainage 1038600 to 1043725 (see Appendix A) with the development affecting Chainages 1041010 and 1041230.

6.3.3.1 Mike 11 Model

MIKE 11 is a fully dynamic one-dimensional hydraulic modelling package developed by the Danish Hydraulics Institute. The model is used for the simulation of river, channel and floodplain systems. The model performs unsteady flow calculations and is recommended for use only in the sub-critical flow regime.

Mike 11Version 1999b was used to run the truncated Brisbane River model. Boundary conditions were supplied by BCC. A hydrograph was provided for Chainage 1038600 (see Appendix C) and tailwater levels were provided for Chainage 1043725 (see Appendix D). The hyrdograph was also provided for Oxley Creek.

6.3.3.2 Changes to Model

The BCC provided model was initially modified to include the derelict power station building (see Appendix E), as this will be the limit of the flow conveyance at Chainage 1041010 for the existing scenario.

Chainage 1041010 and 1041230 were then modified (see Appendix E) for the proposed scenario which involved:

- Removing the power station from the existing conditions;
- Adding Building B to Chainage 1041010; and
- Adding Building E to Chainage 1041230.

6.3.3.3 Results

Table 6.3-1 shows the resulting maximum water levels for the 100 year ARI storm event at the chainages provided in the truncated BCC model. The BCC supplied results are the water levels resulting from the model as supplied directly from BCC with no modifications. The existing water levels are the results of the scenario with the powerstation building included, and the proposed results included the removal of the powerstation building and the insertion of the proposed buildings as stated in 6.3.3.2.

As can be seen in Table 6.3-1 there is no difference in water level between the BCC supplied data and the (modifed) existing scenario model (see also Appendix E). It can therefore be concluded that the insertion of the powerstation building has little or no affect on the conveyance of floodwaters for a 100-year flood. It should be noted however that location of the bank markers in the

BCC supplied model indicate that there is flow conveyance behind the existing powerstation building (x=300.6m) whereas the limit of flow conveyance is infact in front of the powerstation building (x=826.3).

It can be assumed that the Mike 11 Model water level results are not accurate to the mm therefore the results presented above can be rounded to the nearest 10mm. As the change in water level between the proposed results and the BCC provided results for a 100-year flood are less than 5mm it can be expected that the impact is no change in afflux. It can be seen in the results that the water level decreases over the modified cross sections Chainage 1041010 and 1041230, which is contrary to what was expected therefore it could be concluded that there was a small instability in the model.

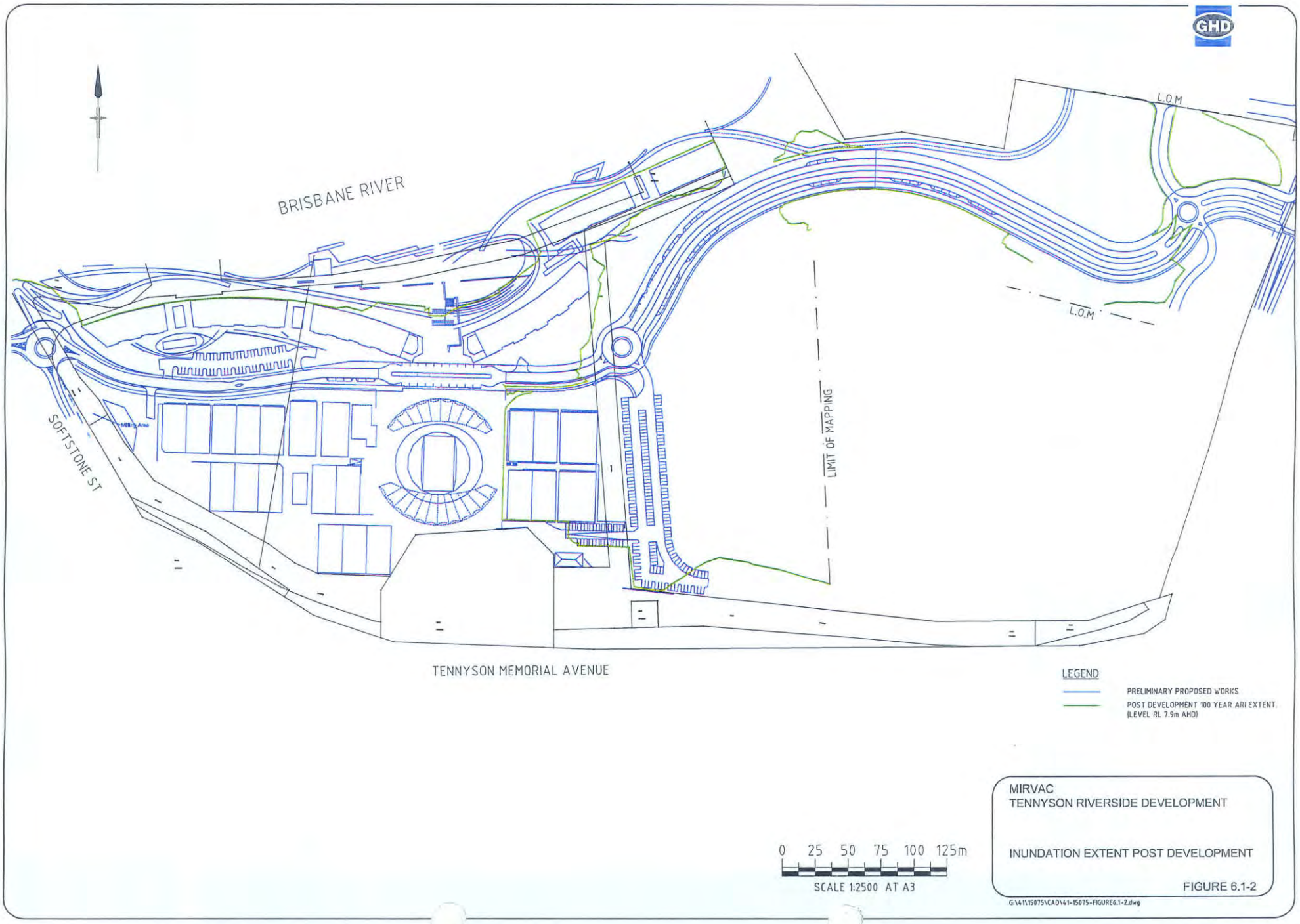
The 50-year flood was also modelled and results again displayed a small instability with water levels increasing and decreasing contrary to expectation, in this case the change in water level was only 1mm and can therefore be ignored.

In conclusion the proposed development will have negligible or no affect on the existing floodwater conveyance of the Brisbane River for the 50 and 100 year flood. There will be negligible or no incease in flood water level due to the development of Lots 1 and 2 on RP 100860, Lot 1 on RP37962, Lot 663 on SL 2532, Lot 1 on RL6147, and Part of Lot 566 on SP104107.

Table 6.3-1 Maximum 100 year ARI Water Level Results

Chainage	Maximum 100 year ARI Water Level (m AHD)			Proposed results minus BCC results (m)
	BCC Supplied	Existing	Proposed	
BNE 1038600.00	7.086	7.086	7.086	0
BNE 1039100.00	7.052	7.052	7.052	0
BNE 1039200.00	7.052	7.052	7.052	0
BNE 1039200.00	7.052	7.052	7.052	0
BNE 1039565.00	7.049	7.049	7.049	0
BNE 1039670.00	7.051	7.051	7.052	0.001
BNE 1039670.00	7.051	7.051	7.052	0.001
BNE 1039828.00	7.052	7.052	7.052	0
BNE 1039828.00	7.052	7.052	7.052	0
BNE 1040090.00	7.044	7.044	7.045	0.001
BNE 1040250.00	7.014	7.014	7.015	0.001
BNE 1040250.00	7.014	7.014	7.015	0.001
BNE 1040490.00	6.948	6.948	6.948	0
BNE 1041010.00	6.973	6.973	6.972	-0.001
BNE 1041230.00	6.945	6.945	6.941	-0.004
BNE 1041460.00	6.897	6.897	6.897	0
BNE 1041700.00	6.893	6.893	6.893	0
BNE 1041960.00	6.783	6.783	6.783	0
BNE 1042235.00	6.649	6.649	6.649	0
BNE 1042500.00	6.605	6.605	6.605	0
BNE 1042500.00	6.605	6.605	6.605	0
BNE 1042515.00	6.603	6.603	6.603	0
BNE 1042910.00	6.458	6.458	6.458	0
BNE 1043010.00	6.408	6.408	6.408	0
BNE 1043010.00	6.408	6.408	6.408	0
BNE 1043080.00	6.373	6.373	6.373	0
BNE 1043110.00	6.361	6.361	6.361	0
BNE 1043110.00	6.361	6.361	6.361	0
BNE 1043725.00	6.157	6.157	6.157	0
OXLEY 599400.00	7.052	7.052	7.053	0.001
OXLEY 600000.00	7.052	7.052	7.052	0
STLUCIALINK1 0.00	7.052	7.052	7.052	0
STLUCIALINK1 1050.00	6.361	6.361	6.361	0
STLUCIALINK2 0.00	7.051	7.051	7.052	0.001

STLUCIALINK2 1050.00	6.408	6.408	6.408	0
STLUCIALINK3 0.00	7.014	7.014	7.015	0.001
STLUCIALINK3 850.00	6.605	6.605	6.605	0
BNE 1038600.00	7.086	7.086	7.086	0
BNE 1039100.00	7.052	7.052	7.052	0


BRISBANE RIVER
L.O.M
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LIMIT OF MAPPING
SOFTSTONE ST
TENNYSON MEMORIAL AVENUE
LEGEND
PRELIMINARY PROPOSED WORKS
POST DEVELOPMENT 100 YEAR ARI EXTENT (LEVEL RL 7.9m AHD)
0 25 50 75 100 125m
SCALE 1:2500 AT A3
MIRVAC
TENNYSON RIVERSIDE DEVELOPMENT
INUNDATION EXTENT POST DEVELOPMENT
FIGURE 6.1-2
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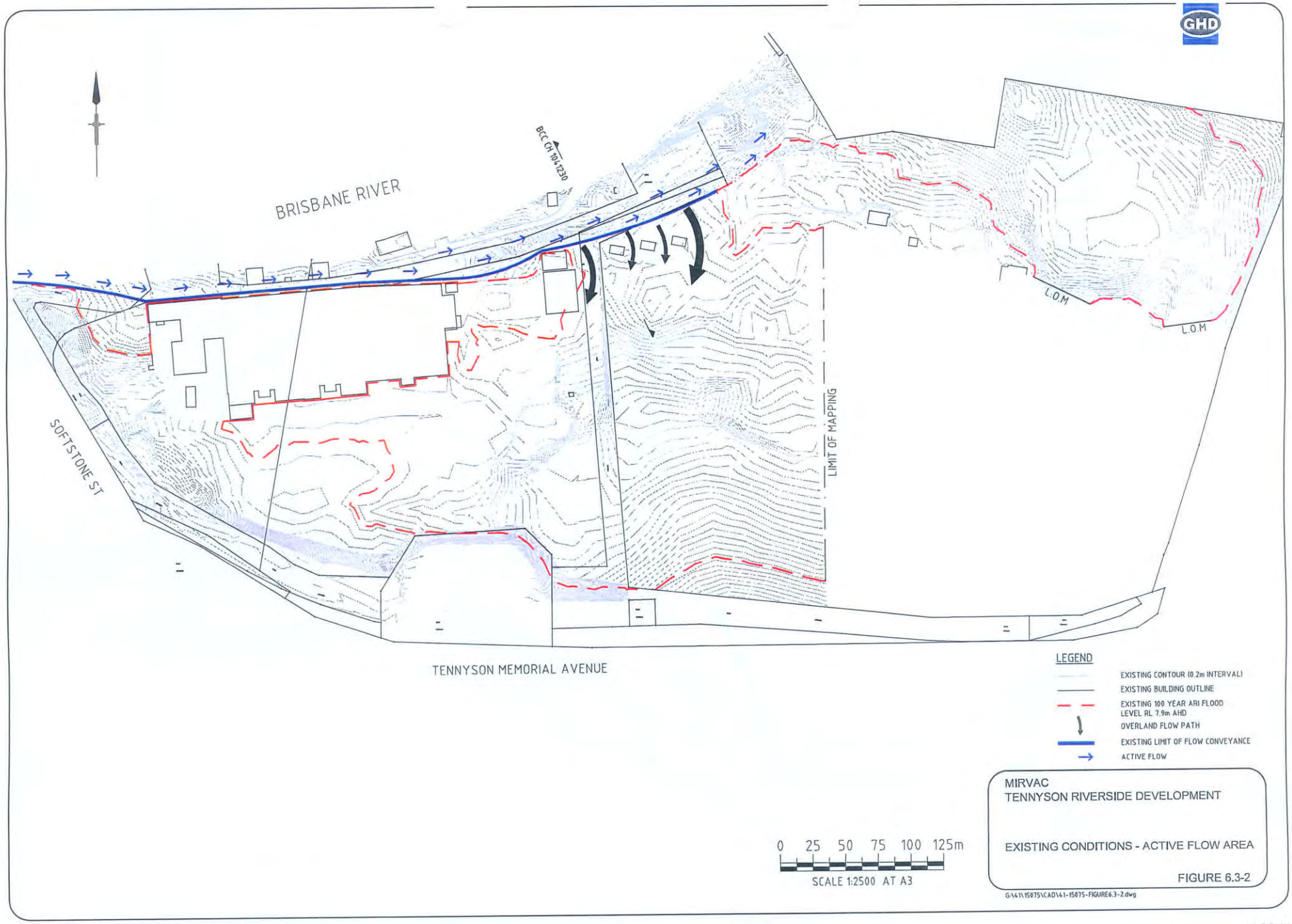
BRISBANE RIVER
BCC CH 1041230
SOFTSTONE ST
TENNYSON MEMORIAL AVENUE
LIMIT OF MAPPING
L.O.M
L.O.M
LEGEND
EXISTING CONTOUR (0.2m INTERVAL)
EXISTING BUILDING OUTLINE
EXISTING 100 YEAR ARI FLOOD LEVEL RL 7.9m AHD
OVERLAND FLOW PATH
EXISTING LIMIT OF FLOW CONVEYANCE
ACTIVE FLOW
0 25 50 75 100 125m
SCALE 1:2500 AT A3
MIRVAC
TENNYSON RIVERSIDE DEVELOPMENT
EXISTING CONDITIONS - ACTIVE FLOW AREA
FIGURE 6.3-2
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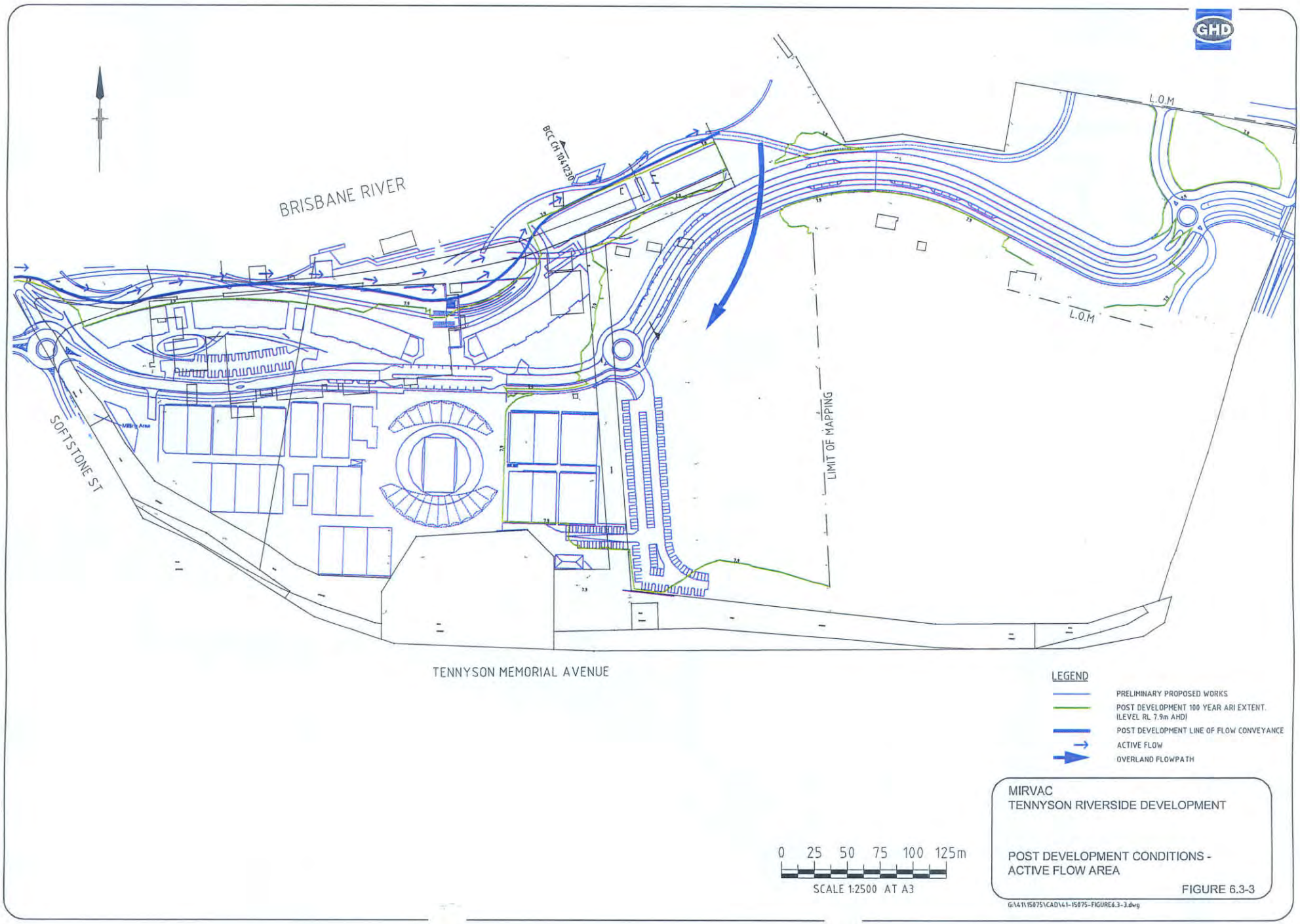
BRISBANE RIVER
BCC CH 104230
L.O.M
L.O.M
LIMIT OF MAPPING
SOFTSTONE ST
TENNYSON MEMORIAL AVENUE
LEGEND
PRELIMINARY PROPOSED WORKS
POST DEVELOPMENT 100 YEAR ARI EXTENT. (LEVEL RL 7.9m AHD)
POST DEVELOPMENT LINE OF FLOW CONVEYANCE
ACTIVE FLOW
OVERLAND FLOWPATH
0 25 50 75 100 125m
SCALE 1:2500 AT A3
MIRVAC
TENNYSON RIVERSIDE DEVELOPMENT
POST DEVELOPMENT CONDITIONS - ACTIVE FLOW AREA
FIGURE 6.3-3
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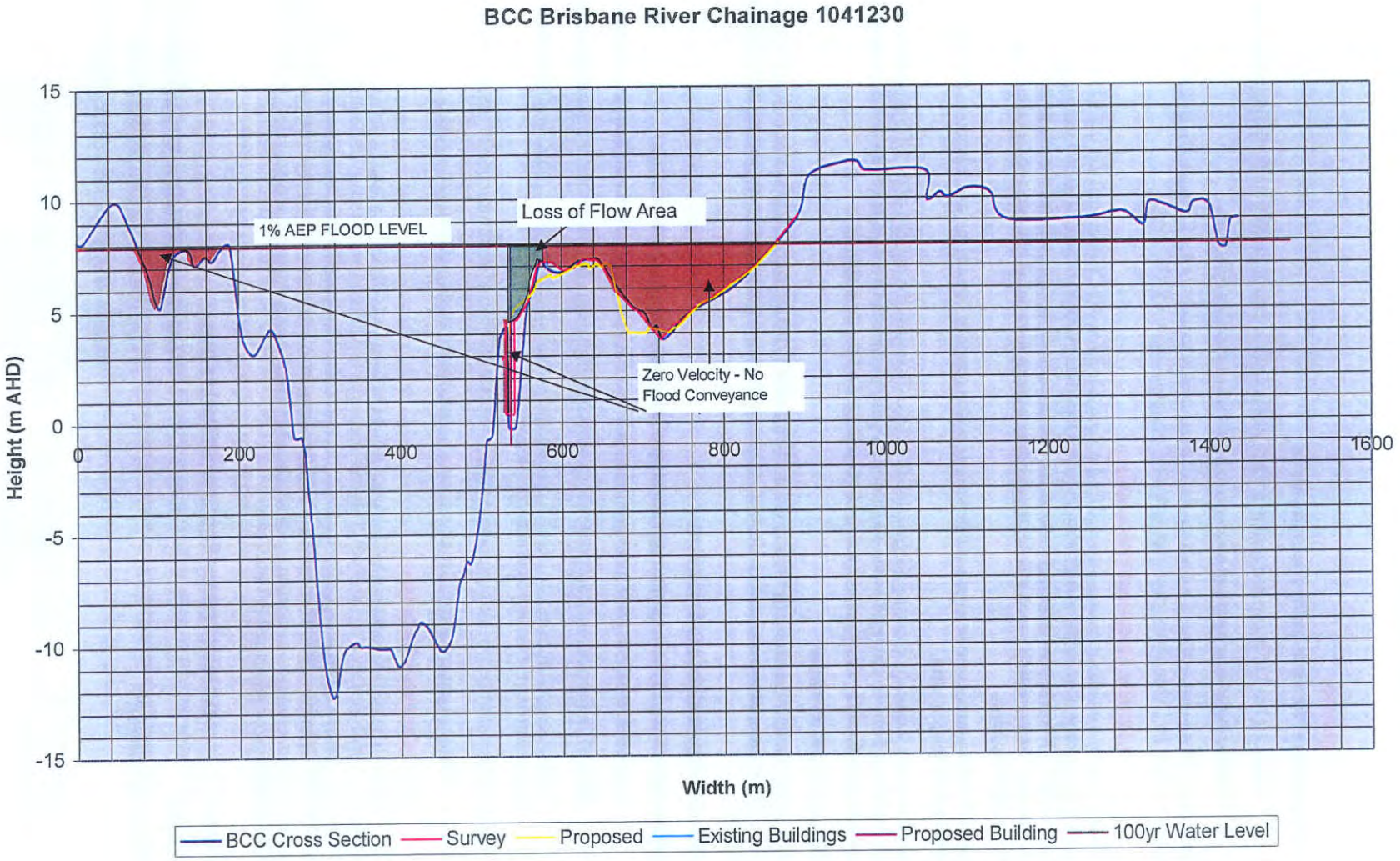
Figure 6.3-4 Flood Conveyance Area



6.4 Water Quality

6.4.1 Background

The overall aims of the water quality assessment are to:

- Assess the level of stormwater quality infrastructure required to treat runoff from the development; and
- Propose stormwater treatment measures to meet the water quality objectives.

This section of the report outlines the development of water quality models for the Tennyson Riverside Development catchment using the Model for Urban Stormwater Improvement Conceptualisation MUSIC model.

6.4.2 Water Quality Treatment Philosophy

The water quality treatment measures proposed for the Tennyson Riverside Development aim to treat the site stormwater three-month ARI discharge to meet the overall Water Quality Objectives (WQOs) requirements. All water quality and quantity requirements will be addressed internally to the development, as no downstream treatment is available prior to the receiving environment. The stormwater runoff will be treated before entering the trunk stormwater network which will discharge directly into the Brisbane River.

Runoff from frequent recurrence events will be retained within retention depressions, and infiltrate to the environment or stormwater drainage system.

Runoff from less frequently occurring (larger rainfall) events will surpass the capacity of the infiltration and retention depressions. This runoff will firstly be conveyed by the overflow flow gully pits into the stormwater system, and once the gully pit capacity has been reached, will be conveyed by overland flow paths and off the development.

Upstream Runoff Diversion

Water quality treatment measures for this site will not be affected by the requirements to treat stormwater from upstream catchments, as the upstream catchment is diverted into the underground stormwater system and will flow under the site directly to the River.

Catchment Opportunities and Constraints

Potential constraints with respect to the implementation of stormwater quality controls include:

- Insufficient change in grade for implementation of proprietary style Gross Pollutant Traps in most areas;
- Most of the pervious areas are public access areas with high usage, and not usable for treatment area; and
- Each property titleholder is to have a separate stormwater management system, which involves treating stormwater before entering the underground drainage network.

Key opportunities identified for the catchment in relation to the application of stormwater quality control measures include:

- Landscaped gardens and road reserve areas are available for location of treatment measures.

6.4.3 Water Quality Objectives

The Tennyson Riverside Development site is located in the Planning Unit 'BN/340 Yeronga' in the Brisbane Waterways Strategy Plan (Brisbane City Council 2000). This unit discharges into the freshwater section of the Brisbane River. The performance of the proposed water quality treatment measures have been compared to the *Brisbane City Council Guidelines - Water Quality Objectives 2000.* The WQOs are obtained from Set A Environmental Values (EVs) (i.e. the environmental value is that of a modified ecosystem maintaining wildlife, cultural heritage, visual recreation, industry, stock and irrigation). The WQOs for Set A of EVs are summarised in Table 6.4-1.

Table 6.4-1 WQOs for Brisbane City Council (Tidal Estuary)

Pollutant	Water Quality Objective Median Values
Suspended Solids (SS)	15 mg/l for combined wet and dry periods 90%ile<100 mg/l for wet weather periods
Total Phosphorus (TP)	0.07 mg/l
Total Nitrogen (TN)	0.65 mg/l

6.4.4 Water Quality Treatment Options

The selection of treatment controls for the study area will depend on a wide range of criteria. Common stormwater treatment methods should be assessed against a number of categories with particular emphasis on the following:

- Availability of suitable sites and site topography;
- Available hydraulic head loss at the selected site;
- Site geology;
- Site groundwater levels;
- Effectiveness of the treatment measure to achieve desired pollutant retention;
- Compatibility with existing site constraints;
- Aquatic and wild-life habitat;
- Public safety;
- Capital cost and maintenance; and
- Aesthetic appeal.

For this investigation a distributed treatment philosophy is proposed, with gross pollutant traps (litter only), and bioretention filters in the form of basins, landscaped gardens and kerb gardens. These devices will be incorporated throughout the development site.

Presently the bioretention locations presented are indicative only. The final layout will depend upon issues to be resolved during detail design including those listed above.

6.4.5 Water Quality Modelling

To evaluate stormwater quality within the catchment, a water quality model of the catchment was developed using MUSIC, the Model for Urban Stormwater Improvement Conceptualisation, developed by CRC for Catchment Hydrology. The model was run under MUSIC version 3.01.

MUSIC provides the ability to simulate both quantity and quality of runoff from catchments ranging from a single house block up to many square kilometres, and the effect of a wide range of treatment facilities on the quantity and quality of runoff downstream using a range of time steps from daily down to 6 minutes.

Model Data

Climate

Climate data for the catchment was sourced from the MUSIC Database using the rainfall and PET values for Brisbane. The period 1980 to 1990 represented the rainfall variability of the whole data set and was thus selected. The MUSIC warm-up option of groundwater storages recharge was used. Pan-evaporation data was also provided and used to derive average monthly values.

Rainfall/Runoff

Catchment runoff volumes were estimated using Brisbane City Council default rainfall/runoff parameters for the MUSIC land use classes (Brisbane City Council, 2003). The catchments for the treatment devices were broken into various types of land uses, the layout of these catchments can be seen in Appendix F.

Table 6.4-2 Catchment Parameters

Catchment	Land Use	Surface Area	Fraction Impervious
Tennis Centre - Stadium East	Commercial	0.80	1
Tennis Centre - Stadium West	Commercial	0.32	1
Tennis Centre - Hard Courts	Modified *	1.16	1
Tennis Centre - Hard Courts Access	Commercial	0.18	1
Tennis Centre – Clay Courts	Rural Residential	0.34	1

Tennis Centre – Grass Courts	Rural Residential	0.25	0
Brisbane City Council –Road East	Urban Residential	1.28	1
Brisbane City Council –Road Centre East	Urban Residential	0.75	1
Brisbane City Council –Road West	Urban Residential	0.5	1
Brisbane City Council –Road Centre West	Urban Residential	0.21	1
Brisbane City Council -Parkland	Rural Residential	2.33	0.06
Gymnasium	Commercial	0.18	0.64
Residential Lot (excl roof area)	Rural Residential	2.035	0.3
Additional Car parking	Urban Residential	0.24	1
Tennis Centre East	Rural Residential	0.35	0.1
Tennis Centre West	Rural Residential	0.11	0.1
Picnic Area 1	Rural Residential	0.12	0.1
Picnic Area 2	Rural Residential	0.18	0.1
Picnic Area 3	Rural Residential	0.07	0.1
Tennis Centre Carpark 1	Commercial	0.23	1.0
Tennis Centre Carpark 2	Commercial	0.54	1.0

*The tennis centre hard courts have been assumed to generate little or no pollutants due to the regular cleaning of the courts.

6.4.6 Pollutant Export

Similarly, the pollutant export equations given by Brisbane City Council (Brisbane City Council, 2003) were used as default values. These are summarized in Table 6.4-5.

Table 6.4-3 Average Monthly Pan Evaporation

Month	Pan Evaporation (mm)
January	195
February	165
March	180
April	195
May	155
June	165
July	120
August	85
September	75
October	80
November	95
December	120

Table 6.4-4 MUSIC Rainfall / Runoff Parameters

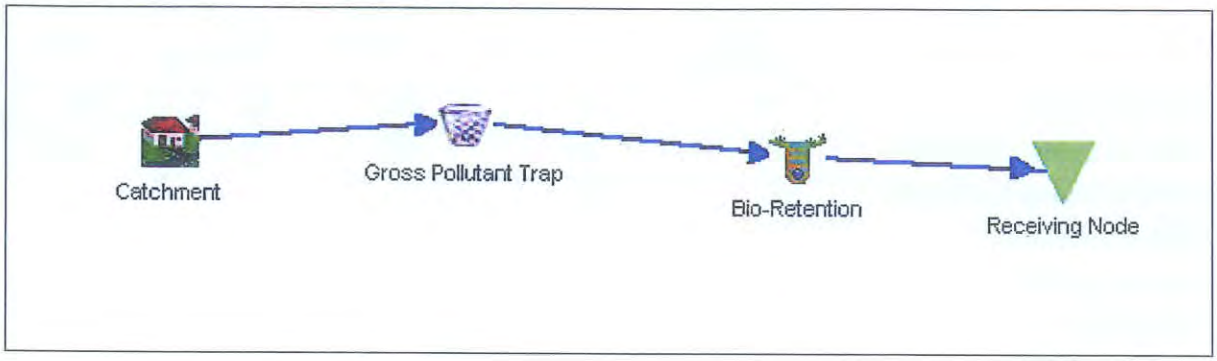
Parameter	Urban Residential	Commercial	Industrial	Rural Residential	Forest
Field Capacity (mm)	200	80	80	80	80
Infiltration Capacity Coefficient a	50	200	200	200	200
Infiltration Capacity Coefficient b	1	1	1	1	1
Rainfall Threshold (mm)	1	1	1	1	1
Soil Capacity (mm)	400	120	120	120	120
Initial Storage (%)	10	25	25	25	25
Daily Recharge Rate (%)	25	25	25	25	25
Daily Drainage Rate (%)	5	5	5	5	5
Initial Depth (mm)	50	50	50	50	50

Table 6.4-5 MUSIC Base and Storm flow Concentration Parameters

		TSS (Log_{10} mg/l)		Total Phosphorus (Log_{10} mg/l)		Total Nitrogen (Log_{10} mg/l))	
Source Node		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Urban Residential	Mean	1.00	2.18	-0.97	-0.47	0.20	0.26
	Std Deviation	0.34	0.39	0.31	0.31	0.20	0.23
Commercial	Mean	0.78	2.16	-0.60	-0.39	0.32	0.37
	Std Deviation	0.39	0.38	0.50	0.34	0.30	0.34
Industrial	Mean	0.78	1.92	-1.11	-0.59	0.14	0.25
	Std Deviation	0.45	0.44	0.48	0.36	0.20	0.32
Rural Residential	Mean	0.53	2.26	-1.54	-0.56	-0.52	0.32
	Std Deviation	0.24	0.51	0.38	0.28	0.39	0.30
Agricultural	Mean	1.40	2.30	-0.88	-0.27	0.07	0.59
	Std Deviation	0.31	0.31	0.13	0.30	0.13	0.26
Forested	Mean	0.51	1.90	-1.79	-1.10	-0.59	-0.075
	Std Deviation	0.28	0.20	0.28	0.22	0.22	0.24

An example of the model layout is shown in Figure 6.4-1.

Figure 6.4-1 General MUSIC Model Layout



6.4.7 Sizing of Bioretention Treatment Devices

In order to treat the site stormwater runoff to meet Council water quality objectives, a number of treatment devices have been proposed to reduce the pollutant loading and overall concentrations of pollutants in the stormwater runoff. Bioretention devices have been proposed predominantly due to their high total nitrogen removal efficiency. Proprietary style gross pollutant traps have been proposed where bioretention devices were impractical which have generally good suspended solids removal and gross pollutant removal. The table below contains details of the proposed bioretention devices including required surface are, depth and filter material properties.

Table 6.4-6 Bioretention Device Sizes

Catchment	Device No.	Extended Detention Depth (m)	Surface Area (m^2)	Filter Area (m^2)	Filter Depth (m)	Hydraulic Conductivity (mm/h)	Particle Diameter (mm)
State Tennis Centre	1	0.25	300	300	1.0	100	0.3
	2	0.25	500	500	1.0	100	0.3
	3	0.25	300	300	1.0	100	0.3
	4	0.25	300	300	1.0	100	0.3
	5	0.25	300	300	1.0	100	0.3
	6	0.25	500	500	1.0	100	0.3
Brisbane City Council	1	0.25	500	500	1.0	100	0.3
	2	0.25	250	250	0.8	100	0.3
	3	0.25	200	200	0.8	100	0.3
Gymnasium	1	0.25	200	200	1.0	100	0.3
Residential	1	0.25	300	300	0.8	100	0.3
	2	0.25	300	300	1.0	100	0.3

Proprietary style gross pollutant traps (CDS or similar) are also proposed throughout the site. See proposed site drainage layout plan Drwg No B04254-SK55 (Appendix A of Volume 5) for details of proposed storm water quality treatment layout.

6.4.8 Results

In all cases the Brisbane City Council defined water quality objectives are met. The median concentrations of Total Suspended Solids (TSS), Total Phosphorous (TP) and Total Nitrogen (TN) for each catchment are shown in Table 6.4-7.

Table 6.4-7 Resulting Median Pollutant Concentrations for each Catchment

Catchment	TSS mg/L	TP mg/L	TN mg/L
State Tennis Centre	0.304	0.009	0.193
Brisbane City Council	7.24	0.007	0.155
Gymnasium	0.00	0.000	0.040
Residential	0.178	0.008	0.162
WQO	**15**	**0.07**	**0.65**

Table 6.4-7 demonstrates that the currently proposed biofiltration and gross pollutant trap combinations provide substantial over performance in all development catchments when compared with Brisbane City Council water quality objectives.

Pollutant load reductions are also in the order of, or in excess of desirable industry standards. Expected pollutant load reductions are presented Table 6.4-8.

Table 6.4-8 Treatment Train Effectiveness (Pollutant Load Reduction) for each Catchment

	Pollutant Load Reduction %		
Catchment	**TSS**	**TP**	**TN**
State Tennis Centre	77.7	63.7	47.0
Brisbane City Council	79.3	68.8	51.8
Gymnasium	98.5	89.6	72.2
Residential	80.6	71.1	54.2

As can be seen from Table 6.4-7 the Brisbane City Council water quality objectives have been met and exceeded for each catchment area. The proposal is to provide stormwater quality treatment up to the extent contained within this preliminary analysis. Over performance achieved with this preliminary proposal does allow for some possible rationalisation of finally adopted stormwater quality treatment, so long as ultimate compliance with BCC WQOs can be demonstrated.

6.5 Conclusion

The impact of the proposed development in respect of Brisbane River flooding, and discharge stormwater quality have been assessed and, where necessary, mitigation measures have been proposed.

The proposed development does result in minimal loss of floodplain storage, however the loss represents only approximately 0.0015% of a design 100 year ARI flood volume in this reach of the river. Such minimal loss is unlikely to result in any measurable increase in either peak flood flow rate or peak flood levels in the vicinity of the site or in downstream reaches.

Portions of the proposed development allow for an increase above the existing Brisbane River flood flow area at the site, while some portions of proposed development result in marginal decrease in available flood flow area. The net effect is expected to be that no measurable afflux will result from the development as currently proposed.

Hydraulic modelling (making use of Brisbane City Council's existing Brisbane River hydraulic model) of the effect of the proposed development upon Brisbane River flood conveyance has been undertaken. The results confirmed that the proposed development will have negligible or no affect on the existing floodwater conveyance of the Brisbane River for the 50 and 100 year flood. There will be negligible or no incease in flood water level due to the development of Lots 1 and 2 on RP 100860, Lot 1 on RP37962, Lot 663 on SL 2532, Lot 1 on RL6147, and Part of Lot 566 on SP104107.

The proposed development will not have an adverse affect on the Brisbane River water quality. Proposed bioretention devices and gross pollutant traps will be implemented to treat site stormwater runoff for low flows. The proposed treatment measures over perform with respect to stormwater quality treatment in comparison to the water quality objectives and are therefore conservative. Hence, there is opportunity to fine tune and rationalise the proposed layout in the detail design phase.

6.6 References

Draft Australian Runoff Quality Guidelines, 2003. Institute of Engineers Australia

Guidelines for Pollutant Export Modelling in Brisbane Version 7 (Revision 1) (2003). Supplement to Brisbane City Council Water Quality Management Guidelines.

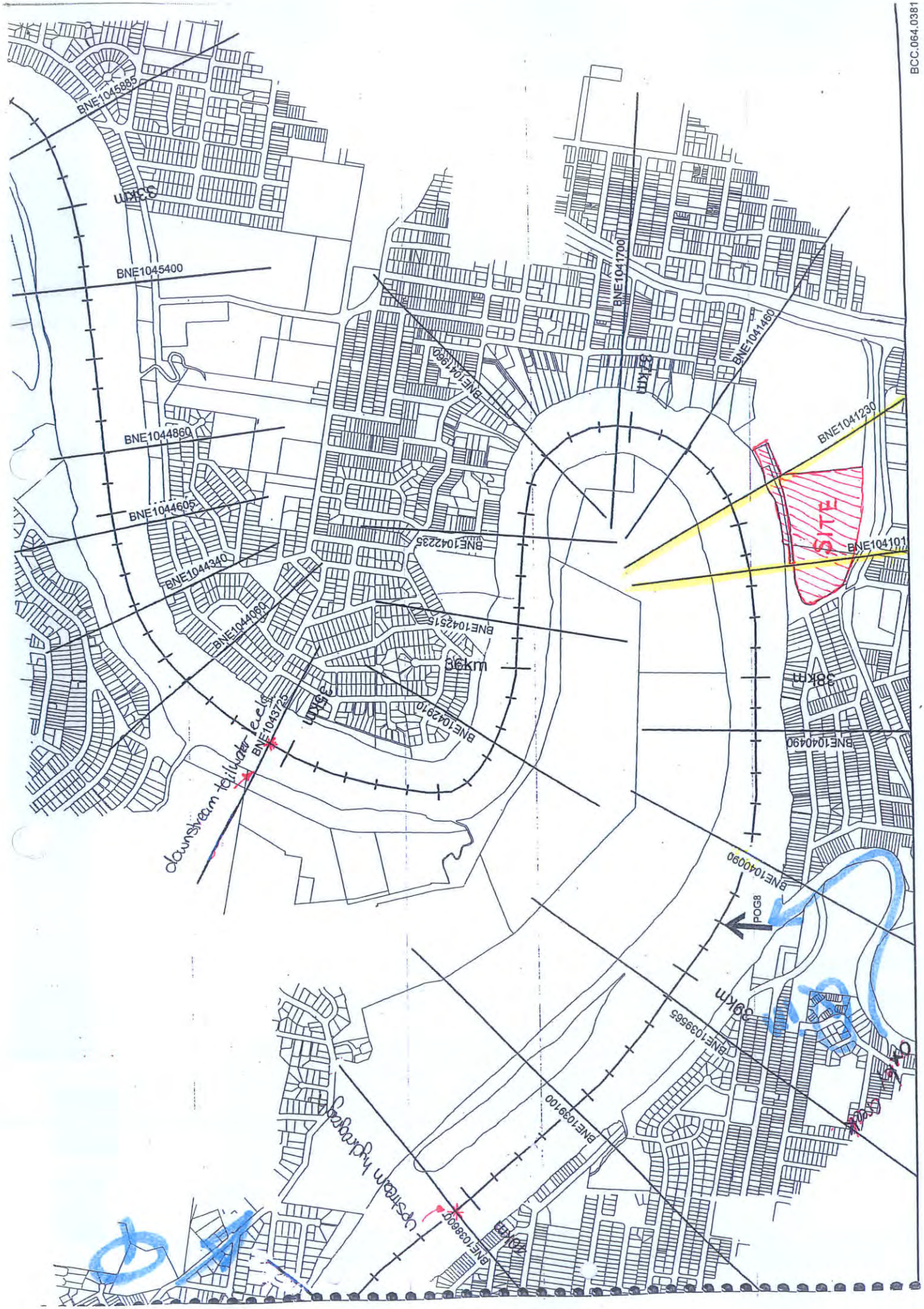
Brisbane City Council, 2000a. Brisbane City Council's Water Quality Management Guidelines, Version 1.

Brisbane City Council, 2000b. Guideline on Identifying and Applying Water Quality Objectives in Brisbane City, Version 1.

Brisbane City Council 2000c, Subdivision and Development Guideline.

Appendix A

BCC Mike 11 Model Cross Section Locations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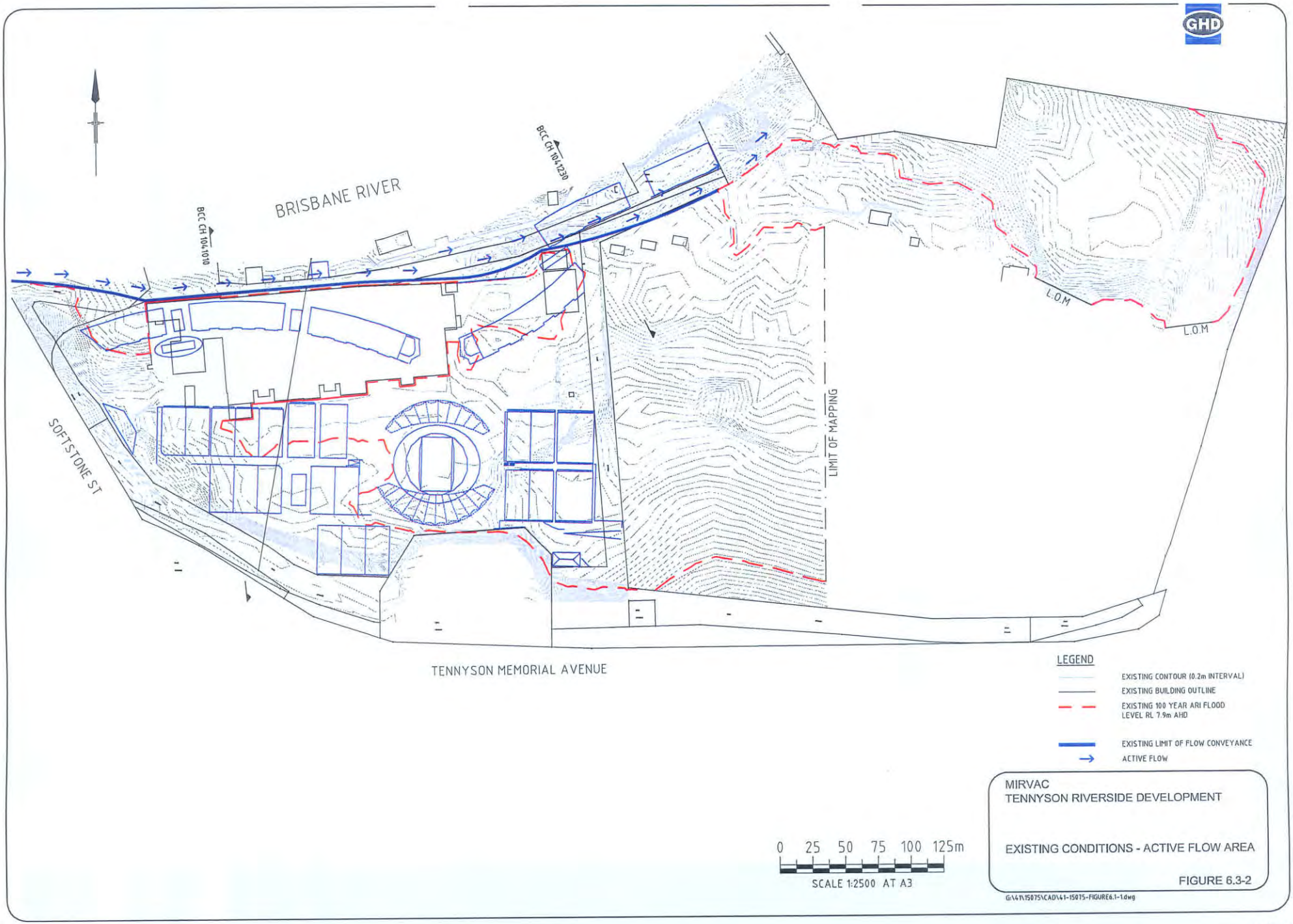
35km
BNE1042910
36km
BNE1042515
BNE1042235
BNE1041960
BNE1041700
37km
BNE1041460
BNE1041230
SITE
BNE104101
38km
BNE1040490
BNE1040090
POS8
39km
BNE1039365
BNE1039100
upstream tailwater level
BNE1038602
40km

Appendix B

Site Layout with Mike 11 Chainages


BRISBANE RIVER
BCC CH 104.1010
BCC CH 104.1230
SOFTSTONE ST
TENNYSON MEMORIAL AVENUE
LIMIT OF MAPPING
L.O.M
L.O.M
LEGEND
EXISTING CONTOUR (0.2m INTERVAL)
EXISTING BUILDING OUTLINE
EXISTING 100 YEAR ARI FLOOD LEVEL RL 7.9m AHD
EXISTING LIMIT OF FLOW CONVEYANCE
ACTIVE FLOW
0 25 50 75 100 125m
SCALE 1:2500 AT A3
MIRVAC
TENNYSON RIVERSIDE DEVELOPMENT
EXISTING CONDITIONS - ACTIVE FLOW AREA
FIGURE 6.3-2
G:\41\15075\CAD\41-15075-FIGURE6.1-1.dwg

Appendix C

Upstream Hydrograph for Mike 11 Model

Design.RES11	Q100	Hydrograph at	BNE 1038342.50								
	m3/s										
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1/01/1999 10:00	13.701	2/01/1999 15:00	3492.301	3/01/1999 20:00	5536.943	5/01/1999 1:00	5545.209	6/01/1999 6:00	4461.803	7/01/1999 11:00	4044.605
1/01/1999 10:30	-860.533	2/01/1999 15:30	3524.118	3/01/1999 20:30	5552.296	5/01/1999 1:30	5547.335	6/01/1999 6:30	4445.87	7/01/1999 11:30	4038.641
1/01/1999 11:00	-689.534	2/01/1999 16:00	3564.363	3/01/1999 21:00	5555.768	5/01/1999 2:00	5549.135	6/01/1999 7:00	4430.417	7/01/1999 12:00	4031.66
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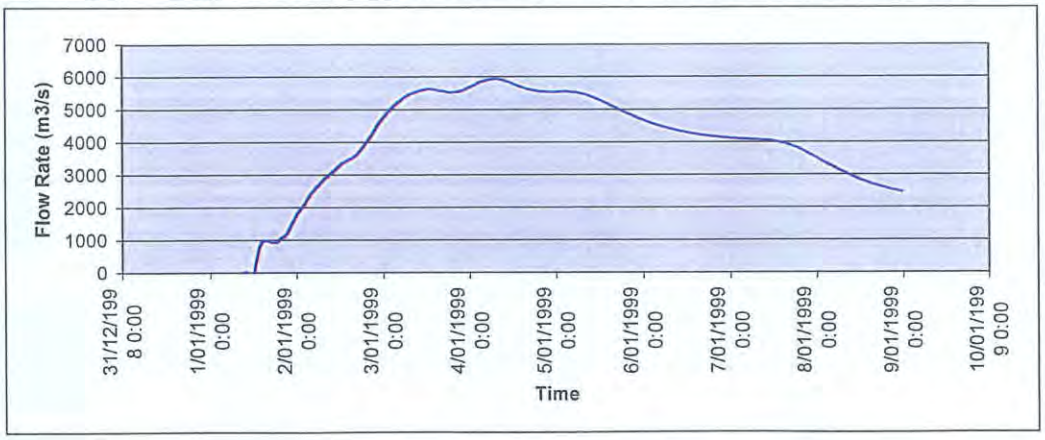

Appendix D

Tailwater Conditions for Mike 11 Model

Design.RES11	Q100	Water Level at	BNE 1043725.00								
	m										
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1/01/1999 10:00	0.29	2/01/1999 15:00	3.745	3/01/1999 20:00	6.037	5/01/1999 1:00	5.777	6/01/1999 6:00	4.735	7/01/1999 11:00	4.073
1/01/1999 10:30	0.932	2/01/1999 15:30	3.806	3/01/1999 20:30	6.046	5/01/1999 1:30	5.771	6/01/1999 6:30	4.712	7/01/1999 11:30	4.068
1/01/1999 11:00	1.1	2/01/1999 16:00	3.867	3/01/1999 21:00	6.05	5/01/1999 2:00	5.765	6/01/1999 7:00	4.688	7/01/1999 12:00	4.063
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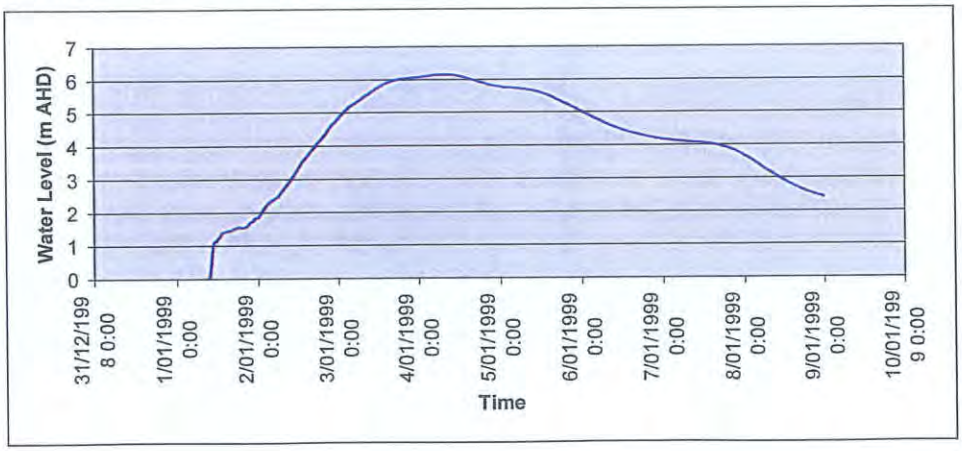
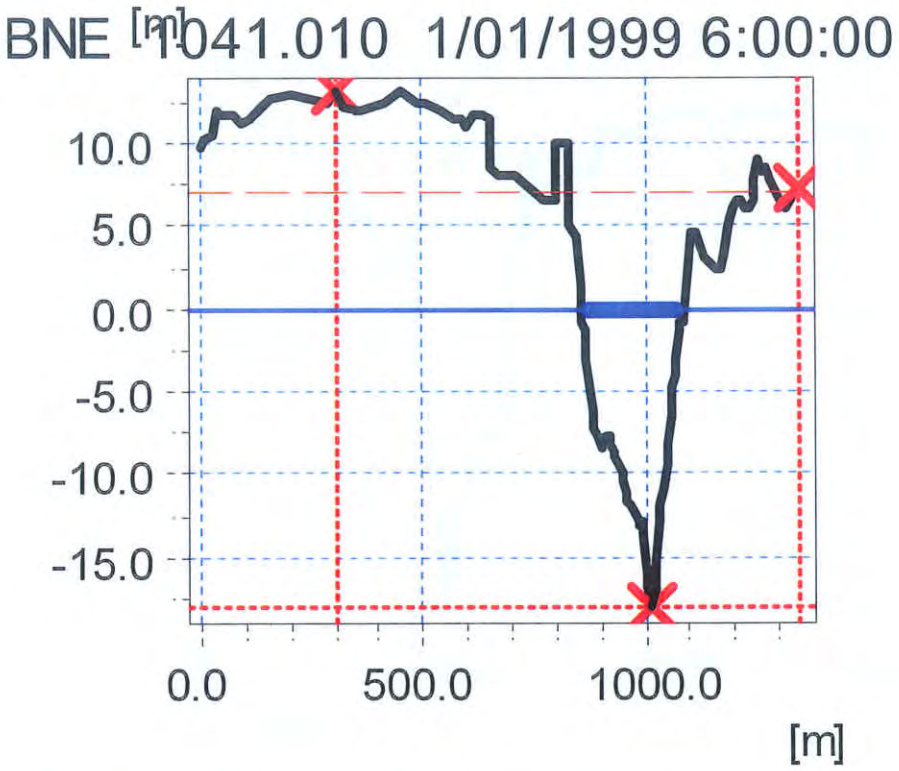


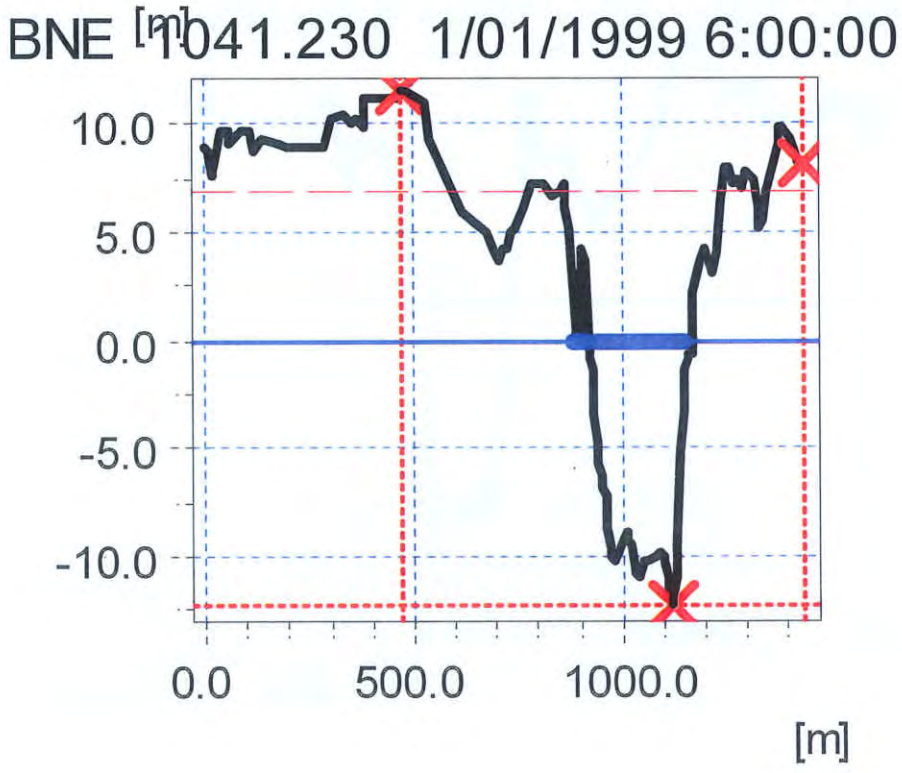
Appendix E

Cross Sections Existing and Proposed for Chainages 1041010 & 1041230

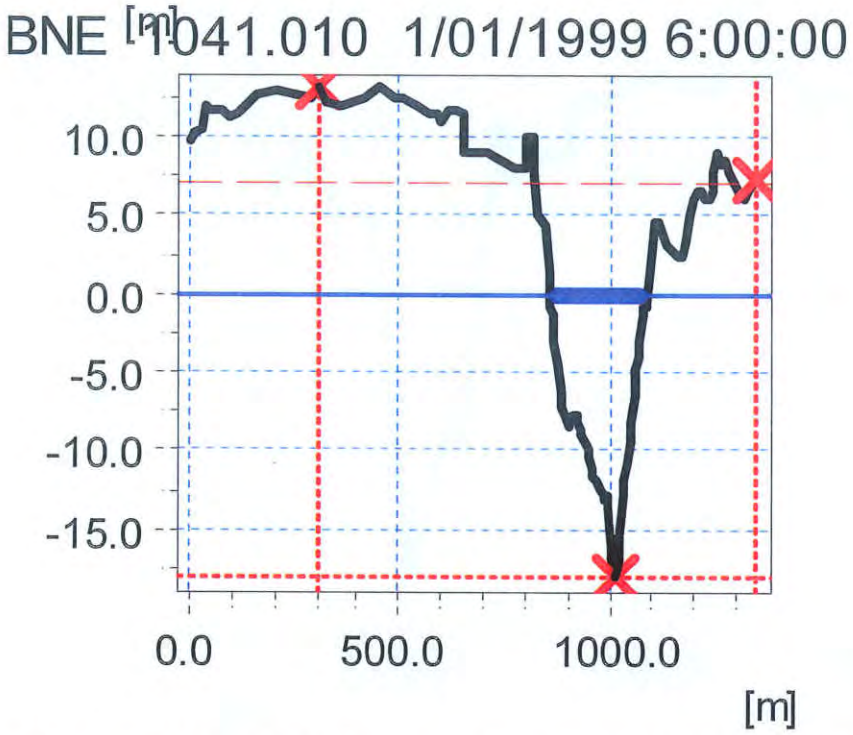
100 year ARI flood level – Existing Conditions – Chainage 1041010



100 year ARI flood level – Existing Conditions – Chainage 1041230



100 year ARI flood level – Proposed Conditions – Chainage 1041010



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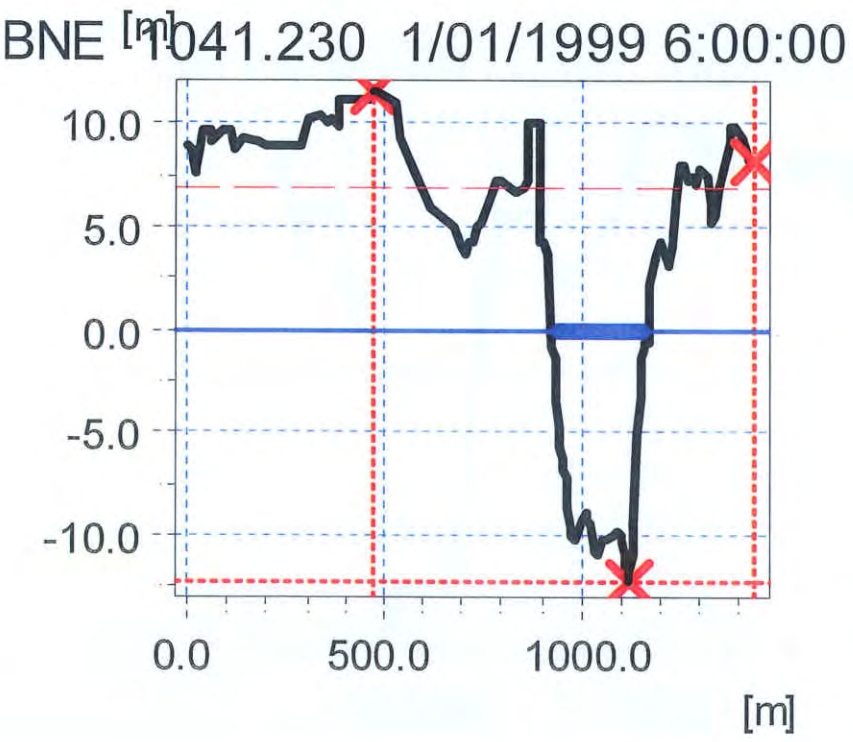
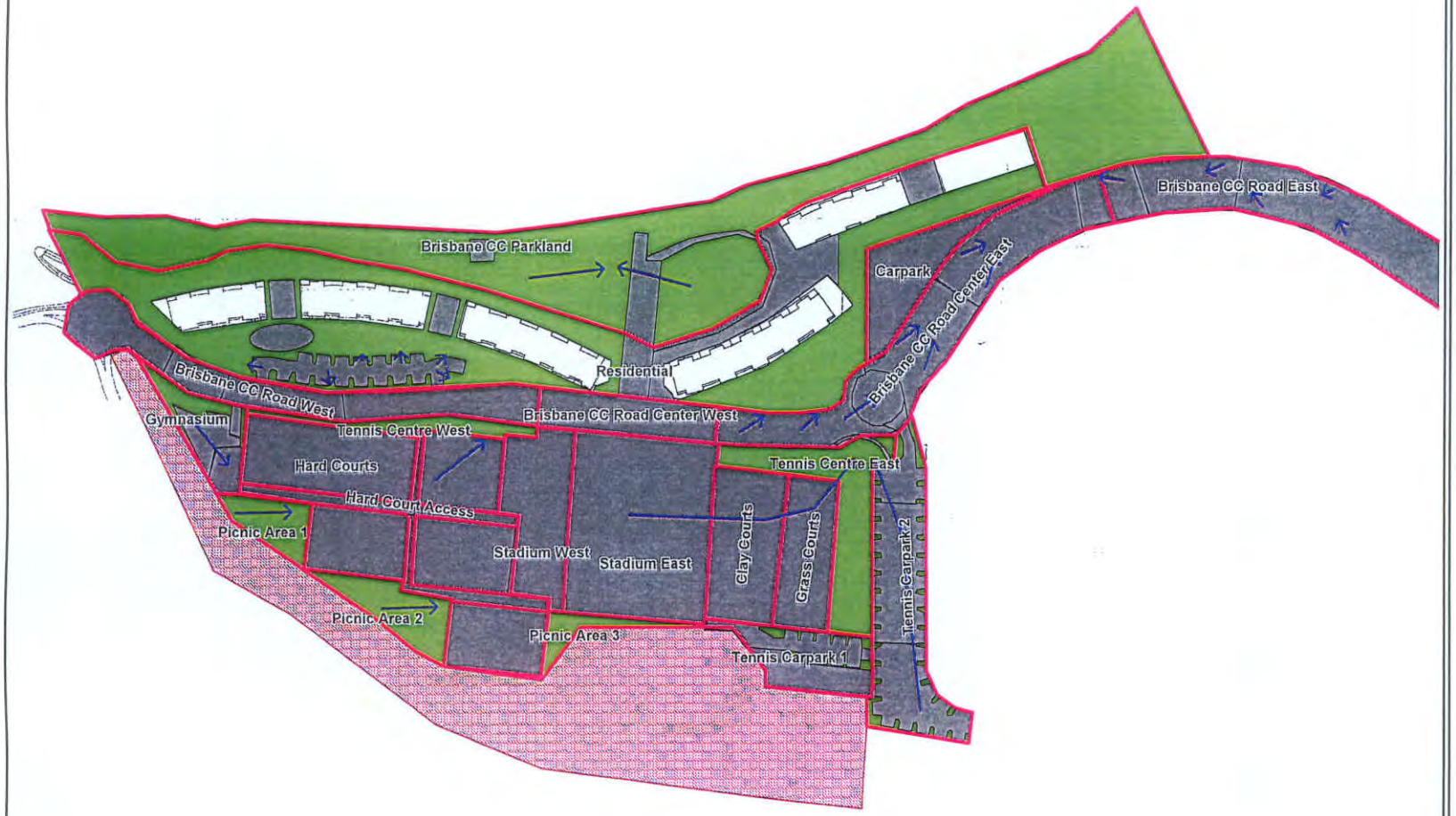


Appendix F

MUSIC Catchments

TENNYSON RIVERSIDE DEVELOPMENT

Appendix F
MUSIC Catchments



Flow Direction

MUSIC Source Node Boundary

Pervious Area

Impervious Area

External Catchment

North

G:\41\15075\MapInfo\MUSIC.WOR

Appendix G

Stormwater Management Code

STORMWATER MANAGEMENT CODE

Stormwater Management Code		
Performance Criteria	**Acceptable Solutions**	**Assessment**
General		
P1 The planning of the stormwater management system must provide for the integrated management of stormwater in order to: ▪ Minimise flooding ▪ protect and enhance environmental values of receiving waters ▪ maximise the use of water sensitive urban design principles ▪ maximise the use of natural waterway corridors and natural channel design principles ▪ maximise community benefit ▪ minimise public safety risk	A1.1 The proposal complies with the **Subdivision and Development Guidelines.** A1.2 A Site Based Stormwater Management Plan (SBSMP) is prepared for all major and minor stormwater management measures. The SBSMP must provide the following where applicable: ▪ an underground and/or open drain/overland flow path network maximising the use of natural channel design and water sensitive urban design principles ▪ make provision for detention/retention storage basins ▪ an Erosion and Sediment Control (ESC) Program where required by Council's **Erosion and Sediment Control Standard** ▪ retention of natural waterway corridors ▪ public safety factors and risk management measures ▪ an acceptable level of flood immunity A1.3 The proposal complies with any Stormwater Management Plan (SMP), Local Stormwater Management Plan (LSMP) or Waterways Management Plan (WMP) prepared by Council. *Note:* *The **Subdivision and Development Guidelines** provide guidance on the level of information required for different development types*	The proposal will comply with the **Subdivision and Development Guidelines** - Acceptable Solution A1.1 Refer relevant Performance Criteria below for more detail in respect of flooding, protection of receiving waters, and use of WSUD.

Performance Criteria	Acceptable Solutions	Assessment
Flooding		
P1 The proposed stormwater management system or site works must not adversely impact on flooding or drainage of properties that are upstream, downstream or adjacent to the subject site.	A1 The proposal meets the requirements of Council's **Subdivision and Development Guidelines** and does not result in an increase in flood level or flood duration on upstream, downstream or adjacent properties. *Note:* *Compliance with this acceptable solution can be demonstrated by the submission of a hydraulic and hydrology report (as part of a SBSMP) identifying potential flooding impacts on upstream, downstream or adjacent properties.*	In respect of Brisbane River flooding, the development will comply with the **Subdivision and Development Guidelines** – Acceptable Solution A1. **Volume 6** of this submission discusses issues relating to the impact of the proposed development on Brisbane River flood levels. Volume 6 provides analysis supporting the proposition that the proposed development will have no measurable impact upon flood afflux or peak flow rate due to loss of flood storage, and therefore cause no adverse impact on upstream, downstream, or adjacent properties. Volume 5 of this submission discusses issues relating to the impact of the proposed development on upstream properties. In particular Volume 5 demonstrates that there are no impacts on properties and drainage systems upstream of the railway line.
P2 The drainage network must provide capacity to safely convey stormwater run-off resulting from relevant design storm events taking into account increased run-off from roof drainage.	A2.1 The design demonstrates that a drainage network will be provided that will comply with Council's **Subdivision and Development Guidelines** *Note:* *Compliance with this acceptable solution can be demonstrated by identifying the conceptual drainage requirements for the proposal in a SBSMP.* A2.2 The design allows sufficient area to provide for a drainage network that will comply with Council's **Subdivision and Development Guidelines.** *Note:* *Compliance with this acceptable solution can be demonstrated*	A drainage network compliant with **Council's Subdivision & Development Guidelines** is to be provided for the development. Volume 5 of this submission provides descriptions and preliminary design details for the proposed drainage network.

Performance Criteria	Acceptable Solutions	Assessment
	by the submission of a hydraulic and hydrology report (as part of a SBSMP) identifying the area required to accommodate the drainage network.	

Performance Criteria	Acceptable Solutions	Assessment
P3 Development design must reduce property damage and, where applicable, ensure public safety by ensuring that the development levels are set above the relevant design flood level or storm surge level.	A3.1 All development is located above minimum flood immunity levels in accordance with Council's **Subdivision and Development Guidelines.** *Note:* *Compliance with this acceptable solution can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a SBSMP).* A3.2 Road access is provided in accordance with the flood immunity levels identified in Council's **Subdivision and Development Guidelines.** *Note:* *Compliance with this acceptable solution can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels.*	Flooding performance criteria will comply with the **Subdivision and Development Guidelines** – Acceptable Solution A3.1 Brisbane River flood levels at the site for the 100 and 20 year ARI event are 7.9m and 4.4m AHD respectively. The following floor levels have been proposed throughout the development: ❖ Residential first floor levels for Buildings D, E & F are at 9.5, 8.4 & 8.4 mAHD respectively; ❖ Residential first floor levels for Buildings A, B & C are at 9.5 mAHD; ❖ Residential Basement Carpark entrances 8.8mAHD (min); ❖ Residential surface level carparking for Buildings A, B & C 9.0mAHD (min) ❖ Residential surface level carparking for Buildings D, E & F 7.0mAHD (min) ❖ Tennis Centre Stadium concourse and associated habitable areas are at 9.6 mAHD; ❖ Tennis Centre Hard Courts are at 9.0 mAHD; ❖ Tennis Centre Clay and Grass Courts are at 5.5 mAHD; ❖ Tennis Centre carpark at 4.4mAHD (min); ❖ Gymnasium floor level and associated carpark/service area at 9.0 mAHD; and ❖ Road levels vary between 14.2 and 6.5mAHD. Flood free access will be provided. This is detailed in Volume 5 of this submission. There are no major overland flow paths from external catchments affecting the site. The existing railway line located along the southern boundary of the site serves as a barrier to overland flow. Overland flow paths are further detailed in Volume 5 of this submission.

Performance Criteria	Acceptable Solutions	Assessment
P4 Any channel works that are part of the development, major drainage works or flood mitigation works must maintain and/or enhance the environmental values of the waterway corridor or drainage corridor.	A4 Design and construction of channel works incorporate water sensitive urban design and natural channel design features which will comply with: ▪ Council's Subdivision and Development Guidelines, and; ▪ where applicable any SMP, LSMP or WMP prepared by Council. *Note:* *Compliance with this acceptable solution can be demonstrated by the provision of conceptual details of any channel works (as part of a SBSMP).*	N/A – No major channel works are proposed as part of the development.

Performance Criteria	Acceptable Solutions	Assessment
P5 Erosion treatment works along waterway banks and associated drainage structures must maintain or enhance the environmental values of waterways.	A5 Design and construction of erosion treatment features incorporate natural channel design features which will comply with: ▪ Council's Subdivision and Development Guidelines, and ▪ Council's Urban Creek Erosion – Guidelines for Selecting Remedial Works *Note:* *Compliance with this acceptable solution can be demonstrated by the provision of conceptual details of any erosion treatment works (as part of a SBSMP).*	Erosion treatment measures will be provided to the bank of the Brisbane River where disturbances are proposed. Generally the majority of the riparian vegetation is to be retained. Please refer to Volume 7 of this submission for further details.
P6 Bridges and culverts provided for flood immunity to minimise traffic disruption must improve public safety and allow for fauna movement and recreation corridors where these needs are identified.	A6 The design complies with Council's Subdivision and Development Guidelines. *Note:* *Compliance with this acceptable solution can be demonstrated by the provision of conceptual details of any bridge or culvert works (as part of a SBSMP).*	No bridge or major culvert structures are proposed as part of the development. A cross road culvert of very minor nature will be provided under the new road link to Ortive Street. This is very minor in nature and will be designed in accordance with Council's Subdivision & Development Guidelines. The requirement for fauna movement and recreation corridors is not considered necessary in this instance.
P7 The design and construction of detention and retention storage features must: ▪ achieve acceptable impacts on environmental values; ▪ provide for recreational use where possible; ▪ achieve acceptable risk to public safety and property.	A7 The design complies with Council's Subdivision and Development Guidelines and where applicable any SMP, LSMP, or WMP prepared by Council. *Note:* *Compliance with this acceptable solution can be demonstrated by the provision of conceptual details of any detention and retention storage features (as part of a SBSMP).*	N/A – As there is minimal increase in impervious area and discharge will be directly to the Brisbane River no detention or retention storage is proposed for the development.

Performance Criteria	Acceptable Solutions	Assessment
Water Quality and Drainage **Low Risk Development**		
P1 Water quality impacts must be minimised using best practice techniques.	A1.1 The design provides for stormwater quality best management practices that are sufficient to treat the target pollutants and will comply with the Council's Subdivision and Development Guidelines. *Note:* *Compliance with this acceptable solution can be demonstrated by indicating the areas that are to be set aside for water quality best management practices. For most development this can be achieved by determining pollutant loads using hand calculations as set out in Council's Guidelines for Pollutant Export Modelling in Brisbane and identifying the type and size of stormwater quality best management practices based on their efficiencies identified in Council's Subdivision and Development Guidelines.* A1.2 Stormwater quality best management practices are design, constructed and maintained in accordance with Council's Subdivision and Development Guidelines. *Note* *Compliance with this acceptable solution can be demonstrated by providing conceptual detail of how stormwater quality will be managed (as part of a SBSMP).*	N/A
P2 Release of sediment laden stormwater is minimised.	A2 All development complies with Council's Erosion and Sediment Control Standard. *Note:* *Compliance with this acceptable solution can be demonstrated by providing conceptual details of how the requirements of Council's Erosion and Sediment Control Standard will be met (conceptual SBSMP). This will generally be conditioned and may require the submission of a subsequent detailed SBSMP for operational works.*	N/A

Performance Criteria	Acceptable Solutions	Assessment
High risk development		
P3 Environmental values and water quality objectives of receiving waters within or downstream of the proposal are protected or enhanced.	A3.1 Relevant water quality objectives for receiving waters are identified and site specific discharge standards met. *Note:* *Compliance with this acceptable solution may be demonstrated by following the process outlined in the Management of Urban Stormwater Quality Planning Scheme Policy. This can be documented in a SBSMP.* A3.2 The design provides for stormwater quality best management practices that are sufficient to treat the target pollutants and will comply with Council's Subdivision and Development Guidelines. A3.3 Stormwater quality best management practices are designed, constructed and maintained in accordance with Council's Subdivision and Development Guidelines. *Note:* *Compliance with this acceptable solution can be demonstrated by providing conceptual detail of how stormwater quality will be managed (as part of a SBSMP).*	All P3 high risk development - water quality and drainage performance criteria will comply with the **Management of Urban Stormwater Quality Planning Scheme Policy** as outlined in the **Brisbane City Plan 2000** and the **Water Quality Management Guidelines 2000** as outlined in Section C of the **Subdivision and Development Guidelines.** Acceptable Solution A3.1 will be satisfied. Environmental values and water quality objectives of the receiving waters are identified in the **Guideline on Identifying and Applying Water Quality Objectives in Brisbane City.** **MUSIC** modelling has been undertaken to determine suitable stormwater management devices and to demonstrate that site specific discharge standards are expected to be met. The modelling was undertaken in accordance with **Guidelines for Pollutant Export Modelling in Brisbane Version 7 Draft.** Results of the MUSIC modelling and conceptual details of the stormwater quality management system/devices can be found in Volume 6, Volume 3 (Urban Design), and Volume 5 (Engineering Services) of this submission.
P4 Release of sediment laden stormwater is minimised.	A4 All development complies with Council's Erosion and Sediment Control Standard. *Note:* *Compliance with this performance criteria / acceptable solution can be demonstrated by providing conceptual details of how the requirements of Council's Erosion and Sediment Control Standard will be met (conceptual SBSMP). This will generally*	Preliminary details of proposed Erosion & Sediment Control measures are included in Volume 5 of this submission. Further details of erosion & sediment control measures will be provided at the detailed design phase. An Erosion Hazard Assessment has been completed for this development and is included in Volume 5 of this submission.

Performance Criteria	Acceptable Solutions	Assessment
	be conditioned and may require the submission of a subsequent detailed SBSMP for operational works.	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
	• within 30m horizontal distance from high water mark for land in the Environmental Protection or Rural Areas. Or • within 20m horizontal distance from high water mark for other land.	N/A x	**Landscaping will be required within 20 metres of high water mark due to the nature of the existing levels and River bank conditions.**	
P3 Retaining walls are designed to minimise the extent of earthworks required and present attractively to public viewing areas such as the Brisbane River, Brisbane riverside walkways and paths, or Brisbane River bridge crossings.	A3.1 Retaining walls are: • not constructed within 30m horizontal distance from high water mark for land in the Environmental Protection or Rural Areas. Or	x	**No retaining walls are intended to be constructed close to the river, however the pedestrian link from the proposed Softstone Street roundabout to the river walkway will require retaining due to a change in the existing levels and the constraint of nil excavation across existing electrical easements. Similarly, the disabled pedestrian ramp from the river walkway up to the plaza level of the adjacent Building D will require some retaining structures within the river corridor.**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
RIPARIAN LANDSCAPE						
P1	Valued habitats, remnant riparian vegetation and mature examples of appropriate planted tree species must be conserved and protected.	A1	Native vegetation within the Brisbane River or Waterway Corridor is incorporated as part of any development proposal and landscaping involves the sustainable removal of weed species. *Note:* *This may be demonstrated by the submission of a landscape plan as detailed in the Brisbane River Corridor Planning Scheme Policy.*	✓	**The mangrove community aligning the Brisbane River will be incorporated into the development although some of this vegetation may be removed. This work would be conducted under an approved Marine Plants Permit.** **The Landscape Plan does not extend into the mangrove community, but to the top of the riverbank.**	
P2	Reshaping of the landform (e.g. to create terraced areas, steps and ramps) must minimise the extent of earthworks required, minimise removal/clearing of native and riparian vegetation and be consistent with the desired character of the Precinct in which the site is located.	A2	Landscaping or site works proposed on land wholly or partly within the Brisbane River Corridor or a Waterway Corridor, which is intended to create terraces stepping down to the water, do not occur:			

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
	Or • located where they will be screened from view of the Brisbane River by vegetation subject to a Vegetation Protection Order, Voluntary Conservation Agreement or topographic features such as high river banks.	N/A		
	A3.3 Fencing erected in the Brisbane River Corridor is less than 2m in height.	N/A	**No fencing is proposed**	
	A3.4 River walls: • ARE NOT CONSTRUCTED IN PRECINCT 1. • are designed and constructed consistent with surrounding approved river walls in Precincts 2, 3, 4 and 5 (refer to Public Riverside Facilities Design and Maintenance Manual). • are no higher than the existing approved height or ground level (as defined in this plan) of the land. • do not involve the alteration of existing river walls.	✓	**River walls will be engineered structures consistent with recently constructed and approved river walls.**	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
	A3.2 Tennis Courts and swimming pools located between buildings and the Brisbane River are: • located and designed to minimise the need for retaining walls with the maximum height of retaining walls limited to 1m. • located landward of a minimum 6m landscaped strip which covers the full width of the site and includes planting as required for general landscaped areas in A2.2. Note: This landscaped area forms part of the required proportion of landscape area outlined in A2.1. • not within 30m horizontal distance of high water mark for land in the Environmental Protection or Rural Areas. Or • not within 20m horizontal distance of high water mark for other land.	N/A N/A ✓ N/A x	**Tennis courts will be located behind buildings that front the Brisbane River.** **Landscaping will be required within 20 metres of high water mark.**	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
River walls must minimise impacts on the character of the area and precinct and must be designed as follows: • the natural form of the riverbanks in Precinct 1 must be maintained. • river wall design and materials in Precincts 3 and 4 must complement the intended character of the Precinct. • river walls are designed to manage river bank stabilisation so to control erosion.	Within Precincts 2, 3 and 4 minor structures within the Brisbane River Corridor do not exceed: • 3m in height. • $40m^2$ site cover for all roofed structures, including $20m^2$ for unenclosed roofed structures such as pergolas. Note: Ancillary structures and buildings include: • *outdoor living structures such as decks (roofed or unroofed), gazebos, poolside shelters, garden pavilions, and green-houses and glass-houses.* • *roofed play areas for children.* • *buildings and other structures for activities necessarily associated with the use of the Brisbane River.* • *garages and carports.*	✓	**Where possible, pedestrian/cycle paths will be maintained at existing ground levels. River walls will only be constructed within the property boundaries and only then to stabilise the river bank from further erosion and to permit construction of pedestrian/cycle pathways.**	

Fencing materials and design must minimise: • impacts on the Brisbane River's landscape values. • impedance to the flow of floodwaters or to fauna movement. • destructive of native vegetation for its erection.		✓	**Ecological Report prepared by Lambert and Rehbein identified riparian community as the only potential fauna movement corridor on site. Design will not impede movement by significantly removing vegetation in this corridor. Minimal vegetation clearance will be required to accommodate the proposed development. This will however be offset by extensive landscaping and rehabilitation.**	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
In Precinct 1 ancillary buildings and structures, tennis courts and swimming pools must only locate in the corridor where there is no other alternative site on the lot, and where designed to be unobtrusive and take into account the surrounding landscape. Tennis courts and swimming pools must minimise impacts on the character of the area and precinct and be heavily landscaped in Precincts 2, 3 and 4.	Or - for any precinct, located where they will be screened from view of the Brisbane River by vegetation subject to a Vegetation Protection Order or Voluntary Conservation Agreement or topographic features such as high banks. - constructed of materials that are durable, of low visual impact, visually recessive and complementary to the surrounding buildings.	✓ ✓	**The proposed development incorporates the State Tennis Centre that will be positioned behind residential development and not immediately adjacent to the Brisbane River. Landscaping has been incorporated in to development design (refer to Landscape Plan developed by EDAW).** **The proposal minimises the construction of any new ancillary structures, tennis courts, swimming pools and fences within the Brisbane River Corridor.**	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
	A2.2 The landscaped area includes: • at least one tree that will grow to a height of at least 5m for every 20m^2 of landscaped area. • a minimum of 50% garden area planted with ground cover and shrubs of various growth forms. • a maximum of 50% grassed/lawn area.	✓	**The proposed Landscape Plan complies with these proportions.** **Refer to Landscape Plan developed by Edaw Gillespies.**	
	A2.3 Hardstand areas, minor buildings and structures are limited to the following site cover of the land between buildings and the Brisbane River: • 30% in Precinct 1. • 50% in Precincts 2 and 4. • 70% in Precincts 3 and 5.	✓	**Proposed Landscape Plan by Edaw Gillespies does not exceed the percent allocation for Precinct 2.**	
P3 Ancillary buildings and structures must: • enhance the character and amenity of their site and surrounding area. • not adversely impact upon the riparian landscape. • minimise their visual impact on the Brisbane River's landscape values.	A3.1 Ancillary buildings and structures are: • not located over water. • located and of a size: - consistent with Table 1 in Precincts 1, 2 and 4. Or - consistent in height, scale/bulk and setbacks with ancillary buildings and structures on the site in Precincts 3 and 5.	x	**Revetment structures will be required along the Stage 1 residential site to enable public access. These will be contained within the site boundary.**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
	In Precincts 2, 3, 4 and 5 setbacks must be no less than the setbacks of buildings sharing a common boundary. In these circumstances buildings must be of a similar height and bulk to these adjoining buildings, substantially shielded from view of the Brisbane River by vegetation and ancillary structures between the main building and the Brisbane River must be restricted to minimise impacts on the Brisbane River's landscape values.			N/A	**Building heights are consistent with height of present Power Station. There are no immediate neighbours – however buildings step down to four storeys at ends and to central plaza view corridor. This PC is addressed in detail in the Impact Assessment Report in Volume 2**	
	In the City Centre, setbacks must maintain the existing building line and minimise impacts on the Brisbane River's landscape values.			N/A		
P2	Land between buildings and the Brisbane River is dominated by landscaped areas which preserve the landscape characteristics of the area.	A2.1	The minimum proportion of the land between buildings and the Brisbane River that is provided as landscaped area is: • 70% in Precinct 1. • 50% in Precincts 2 and 4. • 30% in Precincts 3 and 5.	✓	**The site is in Precinct 2, and land between buildings and the Brisbane River will be landscaped beyond this percentage.** **Refer to Landscape Plan developed by Edaw Gillespies.**	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
LOCATION AND DESIGN OF BUILDINGS, STRUCTURES AND ACTIVITIES				
P1 For sites within the Brisbane River Corridor, and fronting the Brisbane River, the attractive appearance of the Brisbane River and its banks, when viewed from the Brisbane River, from development near the Brisbane River, or from other public vantage points, must be maintained and enhanced. Materials used for buildings and structures must complement surrounding buildings, the visual character of the area and the character of the precinct. In Precinct 1, buildings must not locate within the corridor and must be minimised to maintain landscape values.	A1.1 Buildings, parking and servicing areas, placing of materials, goods or solid waste, storage areas and filling or excavation are not located: • within 30m horizontal distance of high water mark in Precinct 1 Or • within 20m horizontal distance of high water mark in Precincts 2, 3, 4 or 5 A1.2 Reclamation of land does not occur in Precincts 1, 2, 3 or 4, or on residential land in Precinct 5.	x ✓ ✓	**The site is located in Precinct 2. This PC and AS are addressed in further detail in the Impact Assessment Report in Volume 2** **An average distance of 35 metres has been achieved between buildings and the river. Building edges that fall close to the river incorporate stepping and landscape elements to reduce visual impact and soften the building edges.** **No reclamation of land will be required**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
OPEN SPACE/RECREATION/RIPARIAN AMENITY						
P1	Where a development site has frontage to a Waterway or the Brisbane River or contains a Waterway, land required by Council for open space/ recreation (community land) or public access, must focus on that Waterway or the Brisbane River where applicable. *Note:* *The Brisbane River Corridor Planning Scheme Policy provides guidance on meeting this Performance Criteria.*	A1	No Acceptable Solution is prescribed.	✓	**Land required by Council for open space/ recreation (community land) or public access will focus on the Brisbane River. Mirvac Queensland propose to develop areas fronting the Brisbane River into public open space. This land would be transferred to Council ownership.**	
P2	Open space / recreation areas must contribute positively to managing flooding impacts, protecting water quality, preserving or enhancing ecological processes and maintaining/enhancing amenity.	A2	No acceptable Solution is prescribed.	✓	**Detailed flood, ecological, stormwater quality and quantity assessments are being prepared for the site. Design development will rely heavily on this information in proposed layout and function.**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P3	The proposal must provide for ongoing maintenance of any works or planting required to ensure that impacts on the ecology of waterways or the Brisbane River, or on riparian vegetation, are minimised both during and after construction.	A3.1	A maintenance program is approved by Council and implemented.	✓	**A maintenance period of 6 months will be incorporated into the Landscape sub-contract.**	
		A3.2	A performance bond and agreement is lodged with Council to ensure the approved maintenance program is implemented.	x	**To be arranged with BCC at a later date.**	
P4	Where a site includes degraded land identified for rehabilitation in a Catchment Management Plan, SMP, WMP or a rehabilitation plan approved by Council, it must be implemented and maintained at the landowner's expense.	A4.1	A rehabilitation plan is approved by Council and implemented.	x	**A Rehabilitation Plan has not been developed at this stage, however Landscape Plan prepared by Edaw Gillespies incorporates local species that would improve site habitat values.**	
		A4.2	A performance bond and agreement is lodged with Council to ensure the ongoing maintenance of rehabilitation works.	x	**To be arranged with BCC at a later date.**	

P2	Waterfront land must be preserved for public use where relevant.	A2	Land in a Waterway Corridor or Brisbane River Corridor is transferred into public ownership in accordance with the relevant Contributions Planning Scheme Policies, where that land is required for ecological, open space or recreation function, including: • public use. • access for maintenance. • linking core and remnant habitat areas. • protecting water quality and ecological processes. • other public benefit.	✓	**Mirvac Queensland Projects Pty Ltd proposes that the land between the proposed residential buildings and the river will be transferred into public ownership for public use (incorporating walkways and bikeways). Although some sections of the mangrove community may be impacted, Mirvac Queensland purpose for the majority of riparian vegetation to be retained which will allow the protection of ecological values and functions, including water quality.** **Significant stormwater quality and quantity planning and infrastructure is proposed as part of this development.**	

7.2.3 Waterway Code

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
GENERAL				
P1 The natural functions of Waterways as landscape and environmental corridors must be preserved.	A1 No vegetation is disturbed on land: • in the Green Space Areas. • covered by a Vegetation Protection Order or Voluntary Conservation Agreement. • designated in a Local Plan as being an area subject to environmental and scenic constraint. • identified in the Natural Assets Planning Scheme Policy.	✓	**No land on site is designated as Green Space Area, covered by a Vegetation Protection Order or a Voluntary Conservation Agreement or designated in a Local Plan as being an area subject to environmental and scenic constraint. There is no land identified in the Natural Assets Planning Scheme Policy, however, Wetland, Waterway and Significant Native Vegetation is designated on site under the NALL.** **Land within BCC designated Waterway Corridor will be incorporated in proposed development.**	

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P3 Proposals must be designed to protect wetland values through maintenance of hydrological regimes, including water quantity, water quality and wet/dry phases, during and after construction.	A3.1 The use complies with the Biodiversity Code, and the Stormwater Management Code, and the Waterway Code and with the Management of Urban Stormwater Quality Planning Scheme Policy.	✓	**Refer to relevant Code responses completed by Lambert and Rehbein.**	

7.2.2 Wetland Code

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P1	Wetlands must be adequately protected from the impacts of adjacent development.	A1	Development is set back: • 40m from the maximum water level of a freshwater wetland. • 100m from the Highest Astronomical Tide line of a tidal wetland.	x	**Due to site constraints the proposed development falls within the 40 metre distance of the wetland communities identified on site. The wetland community identified on site (not that aligning the Brisbane River) may become inundated in heavy rainfall events, however it comprises cleared and degraded land used for grazing. The designation does not display the characteristics generally expected of wetland communities.** **Due to site constraints the proposed development falls within 100 metres from the HAT of NALL WEV tidal wetland vegetation designated for the mangrove community aligning the Brisbane River.**	
		A1.2	The use complies with the Biodiversity Code.	✓	**Refer to Lambert and Rehbein response to Biodiversity Code.**	
P2	Ecological features and processes associated with the wetland must be protected, managed and restored where necessary, to ensure their long term viability.	A2	The use complies with all relevant Acceptable Solutions in the Biodiversity Code.	✓	**Refer to Lambert and Rehbein response to Biodiversity Code.**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
INFORMATION						
P6	Ecological assessment information accompanying applications must be comprehensive, competent and adequate.	A6	Ecological assessment information accompanying an application is consistent with the principles and procedures contained or referenced in the Brisbane City Council Ecological Assessment Guidelines 1998. Brisbane City Council Fire Management Guidelines 1998, Natural Assets Planning Scheme Policy, Management of Urban Stormwater Quality Planning Scheme Policy and the Environmental Impact Assessment Planning Scheme Policy.	✓	**The Ecological Assessment B04254ER001 prepared by Lambert and Rehbein is consistent with the principles and procedures contained or referenced in the Brisbane City Council Ecological Assessment Guidelines 1998.**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
P4	The design and management of the proposal must ensure that significant biodiversity areas will be provided with ongoing protection.	A4.1	Areas supporting significant ecological features and/or processes are transferred to community ownership or control, e.g. Council, community group trusteeship, or community title.	✓	**The riparian corridor, identified as the most significant ecological feature on site, is to be transferred into Council ownership.**	
		Or				
		A4.2	Areas supporting significant ecological features and/or processes are included in the Conservation Area or included under a protective covenant.	N/A		
WATERWAYS AND WETLANDS						
P5	Ecological features and processes associated with waterways and wetlands must not be significantly and adversely impacted by changes in hydrological regimes, including wet/dry regimes.	A5	Impacts on the surface and ground water flow patterns of the subject waterway or wetlands are minimised. **Note:** **Information used to demonstrate the above is collected and presented in accordance with the principles and procedures of the Stormwater Management Code, the Management of Urban Stormwater Quality Planning Scheme Policy and the Environmental Impact Assessment Planning Scheme Policy.**	✓	**Detailed flood, stormwater quality and quantity assessments and planning are currently being developed to address and manage surface and groundwater flow patterns, quality and quantity.**	

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTIONS		SOLUTIONS	COMMENTS	COUNCIL USE ONLY
		A1.5	The proposal meets the management intent for any Significant Flora Species, Significant Fauna Species or Significant Vegetation Communities, as defined in the Natural Assets Planning Scheme Policy, or in any existing Council Conservation Action Statements, Natural Area Management Plans or other relevant conservation or management plans.	✓	**Lambert and Rehbein's Ecological Assessment outlines measures that may be incorporated into the development that will protect flora and fauna species on site. It is noted that no BCC Significant Flora, Fauna species or vegetation communities were identified during the site assessment as occurring on site.**	
P2	Ecological corridors within or adjacent to the site must be identified and retained to create, maintain and/or improve connectivity between habitat areas and to allow wildlife movement between habitat areas.	A2	The design and management of ecological corridors is consistent with the principles contained in the Brisbane City Council Ecological Assessment Guidelines 1998.	✓	**Lambert and Rehbein's Ecological Assessment identified the riparian vegetation as the only potential wildlife corridor present on site. This report recommended measures that may be undertaken to preserve the corridor value of this community.**	
P3	The management of fire must maintain and/or enhance biodiversity.	A3.1	Clearing for fire management does not occur outside Building Location Plans, accessways and areas required for essential infrastructure and services.	N/A		
		Or				
		A3.2	Where clearing is proposed outside of areas described in A3.1, a Fire Management Plan demonstrating the protection of biodiversity is provided. The Plan is consistent with the principles contained in the Brisbane City Council Fire Management Guidelines and Ecological Assessment Guidelines 1998.	**N/A**		

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
	A1.4 Disturbed significant habitat areas are rehabilitated through revegetation and restoration that assists in maintaining and improving biodiversity values. A rehabilitation plan is prepared and implemented, consistent with the format and principles contained in the Brisbane City Council Ecological Assessment Guidelines 1998.	✓	**A Rehabilitation Plan has not been developed at this stage, however Landscape Plan prepared by Edaw Gillespies incorporates local species that would improve site habitat values.**	

7.2.1 Biodiversity Code

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	SOLUTIONS	COMMENTS	COUNCIL USE ONLY
GENERAL				
P1 Ecological features and processes on or adjacent to the site, including those identified in the Natural Assets Planning Scheme Policy, must be protected, managed and restored, where necessary, to ensure their long term viability.	A1.1 Ecological features and processes likely to be affected by the proposal are identified, evaluated and protected. Local knowledge is accessed where available.	✓	**An Ecological Report (Lambert and Rehbein B04253ER001), in line with BCC Ecological Assessment Guidelines 1998, was prepared for the proposed development. All ecological features on site, including those identified by NALL were identified.**	
	A1.2 Potential impacts, including edge effects, on ecological features and processes are identified, assessed and protected.	✓	**The Ecological Report identified potential impacts to ecological features of site and outlined recommended mitigation measures to be implemented.**	
Note: **Brisbane City Council Ecological Assessment Guidelines 1998 provides guidance on demonstrating compliance with this part of the Code.**	A1.3 Development layout and planning retains, protects and manages the ecological features and processes identified on or adjacent to the site, such as fauna and flora habitat areas, ecological corridors, habitat trees, waterways (in-stream habitats), riparian zones and wetlands.	✓	**Proposed planning aims to maintain and enhance the riparian corridor which has been identified as the most significant ecological feature of the site. This area provides a potential fauna movement corridor, is of habitat value, and assists in maintaining water quality values of the Brisbane River.**	

7.1 INTRODUCTION

Lambert and Rehbein was commissioned by Mirvac Queensland Projects Pty Ltd to undertake a City Plan Code Assessment Report to assist with Brisbane City Council (BCC) Development Approval of the proposed redevelopment of 4 Softstone Street, Tennyson, formally the Tennyson Power Station. The site is proposed to be redeveloped to incorporate a State Tennis Centre and residential development. The development will be accessed by a new road that will exit Fairfield Road and traverse the Department of Primary Industry Animal Research Institute (DPI ARI) to the east of the site. There will be vegetation clearance required to accommodate the development and the new access road. Vegetation clearance may also be required along the riverfront to accommodate proposed infrastructure.

The site, encompassing Lot 1 on RP 100860 and Lot 663 on SL2532, covers an area of approximately 12 hectares. The DPI ARI site is described as Lot 566 on SP 104107.

The *BCC City Plan 2004* provides Codes that are used as baseline regulations against which development proposals are assessed. Codes relevant to the site are:

- Biodiversity Code;
- Waterway Code; and
- Wetland Code.

7.2 CODE ASSESSMENTS

The following sections detail Lambert & Rehbein's assessment of the proposed development against the BCC Biodiversity, Wetland and Waterway Codes.

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APPENDIX D

Code Assessments

Extinct in the Wild (XW), Vulnerable (V) and Threatened (includes taxa listed as CD, CE, E, EX, V and XW).

Significant: Indicates whether a taxon is conservation significant by the display of a Y (i.e. Yes). Conservation significant species include those that are listed as rare or threatened under the Nature Conservation Act 1992 or threatened under the Environment Protection and Biodiversity Conservation Act 1999, have a management status of rare or threatened, or are listed under an international agreement (such as JAMBA, CAMBA and Bonn Convention).

When acknowledging WildNet Data please use the following:

Environmental Protection Agency (2005) WildNet. (Database).
Environmental Protection Agency, Brisbane. 1 September 2005

monocots	Poaceae	Cynodon nlemfuensis var. nlemfuensis			IU
monocots	Poaceae	Digitaria breviglumis		C	U
monocots	Poaceae	Digitaria ciliaris	summer grass		IU
monocots	Poaceae	Digitaria didactyla	Queensland blue couch		IU
monocots	Poaceae	Digitaria violascens	bastard summergrass		IU
monocots	Poaceae	Echinochloa colona	awnless barnyard grass		IU
monocots	Poaceae	Eragrostis brownii	Brown's lovegrass	C	U
monocots	Poaceae	Eragrostis cilianensis			IU
monocots	Poaceae	Eragrostis mexicana	Mexican lovegrass		IU
monocots	Poaceae	Eragrostis spartinoides		C	U
monocots	Poaceae	Eragrostis tenuifolia	elastic grass		IU
monocots	Poaceae	Eustachys distichophylla	evergreen chloris		IU
monocots	Poaceae	Leptochloa decipiens		C	U
monocots	Poaceae	Megathyrsus maximus var. maximus			IU
monocots	Poaceae	Melinis repens	red natal grass		IU
monocots	Poaceae	Paspalum dilatatum	paspalum		IU
monocots	Poaceae	Paspalum urvillei	vasey grass		IU
monocots	Poaceae	Phalaris paradoxa	paradoxa grass		IU
monocots	Poaceae	Poa annua	annual poa		IU
monocots	Poaceae	Setaria parviflora	slender pigeon grass		IU
monocots	Poaceae	Setaria sphacelata var. sericea			IU
monocots	Poaceae	Sorghum arundinaceum	Rhodesian Sudan grass		IU
monocots	Poaceae	Sorghum halepense	Johnson grass		IU
monocots	Poaceae	Sporobolus africanus	Parramatta grass		IU
monocots	Poaceae	Sporobolus elongatus		C	U
monocots	Pontederiaceae	Eichhornia crassipes	water hyacinth		IU
mosses	Ptychomitriaceae	Ptychomitrium australe		C	U
	Hemerocallidaceae	Dianella longifolia var. longifolia		C	U
	Hemerocallidaceae	Dianella revoluta var. revoluta		C	U
green algae	Chlorophyceae	Chara fibrosa		C	U

NCA Status - Indicates the conservation status of each taxon under the *Nature Conservation Act 1992*.NCA
The codes are; Extinct in the wild (PE), Endangered (E), Vulnerable (V), Rare (R),
Near threatened (NT) Least concern (C) or Not Protected ( ).
Endemicity: Queensland Endemic (Q), Intranational (QA), Regional Endemic (QI),
Not Endemic to Australia (QAI), Vagrant (International) (VI), Vagrant (Intranational) (VA),
Vagrant (Unknown) (VU), Introduced (International) (II), Introduced (Intranational) (IA), Introduced (Unknown) (IU),
Exotic (International) (XI), Exotic (Intranational) (XA), Exotic (Unknown) (XU) or Unknown
(U)

EPBC status: Environment Protection and Biodiversity Conservation Act 1999.
Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX),

higher dicots	Rutaceae	Flindersia australis	crow's ash	C	U
higher dicots	Rutaceae	Flindersia xanthoxyla	yellow-wood	C	U
higher dicots	Sapindaceae	Cardiospermum grandiflorum	heart seed vine		IU
higher dicots	Sapindaceae	Guioa semiglauca	guioa	C	U
higher dicots	Solanaceae	Cestrum parqui	green cestrum		IU
higher dicots	Solanaceae	Hyoscyamus albus			IU
higher dicots	Solanaceae	Petunia axillaris	petunia		IU
higher dicots	Solanaceae	Solanum americanum			IU
higher dicots	Solanaceae	Solanum americanum subsp. nodiflorum			IU
higher dicots	Solanaceae	Solanum chrysotrichum			IU
higher dicots	Solanaceae	Solanum mauritianum	wild tobacco		IU
higher dicots	Solanaceae	Solanum stelligerum	devil's needles	C	U
higher dicots	Sterculiaceae	Brachychiton acerifolius	flame tree	C	U
higher dicots	Tropaeolaceae	Tropaeolum majus	garden nasturtium		IU
higher dicots	Ulmaceae	Celtis sinensis	Chinese elm		IU
higher dicots	Urticaceae	Pilea microphylla	military fern		IU
higher dicots	Verbenaceae	Duranta erecta	duranta		IU
higher dicots	Verbenaceae	Lantana camara var. camara			IU
higher dicots	Verbenaceae	Verbena litoralis var. litoralis			IU
lower dicots	Lauraceae	Cinnamomum camphora	camphor laurel		IU
lower dicots	Papaveraceae	Argemone ochroleuca subsp. ochroleuca	mexican poppy		IU
lower dicots	Ranunculaceae	Ranunculus sceleratus subsp. sceleratus			IU
monocots	Alliaceae	Nothoscordum borbonicum			IU
monocots	Amaryllidaceae	Crinum pedunculatum	river lily	C	U
monocots	Araceae	Alocasia brisbanensis		C	U
monocots	Asparagaceae	Asparagus africanus			IU
monocots	Asparagaceae	Asparagus plumosus	climbing asparagus fern		IU
monocots	Asparagaceae	Asparagus virgatus			IU
monocots	Bromeliaceae	Tillandsia usneoides			IU
monocots	Cannaceae	Canna indica	Indian shot		IU
monocots	Cyperaceae	Bolboschoenus fluviatilis		C	U
monocots	Cyperaceae	Cyperus albostriatus			IU
monocots	Cyperaceae	Cyperus difformis	rice sedge	C	U
monocots	Cyperaceae	Cyperus involucratus			IU
monocots	Cyperaceae	Cyperus iria		C	U
monocots	Cyperaceae	Cyperus polystachyos var. polystachyos		C	U
monocots	Cyperaceae	Cyperus sphaeroideus		C	U
monocots	Poaceae	Aristida vagans		C	U
monocots	Poaceae	Bothriochloa insculpta			IU
monocots	Poaceae	Briza minor	shivery grass		IU
monocots	Poaceae	Chloris gayana	rhodes grass		IU

		atropurpureum					
higher dicots	Fabaceae	Melilotus indicus	hexham scent				IU
higher dicots	Fabaceae	Neonotonia wightii var. wightii					IU
higher dicots	Fabaceae	Pultenaea retusa		C			U
higher dicots	Fabaceae	Tephrosia glomeruliflora	pink tephrosia				IU
higher dicots	Fabaceae	Tipuana tipu	tipuana				IU
higher dicots	Fabaceae	Trifolium campestre var. campestre					IU
higher dicots	Fabaceae	Trifolium dubium	yellow sucking clover				IU
higher dicots	Fabaceae	Trifolium glomeratum	clustered clover				IU
higher dicots	Fabaceae	Trifolium repens var. repens	white clover				IU
higher dicots	Gentianaceae	Centaurium spicatum	spike centaury	C			U
higher dicots	Goodeniaceae	Goodenia rotundifolia		C			U
higher dicots	Lamiaceae	Stachys arvensis	stagger weed				IU
higher dicots	Lythraceae	Heimia salicifolia					IU
higher dicots	Malvaceae	Malvastrum coromandelianum	prickly malvastrum				IU
higher dicots	Malvaceae	Malvaviscus arboreus					IU
higher dicots	Malvaceae	Sida rhombifolia					IU
higher dicots	Mimosaceae	Leucaena leucocephala subsp. leucocephala					IU
higher dicots	Moraceae	Morus alba	white mulberry				IU
higher dicots	Myrtaceae	Austromyrtus gonoclada		C	E	Y	U
higher dicots	Myrtaceae	Backhousia myrtifolia	carrol	C			U
higher dicots	Myrtaceae	Eucalyptus crebra	narrow-leaved red ironbark	C			U
higher dicots	Myrtaceae	Eucalyptus major	mountain grey gum	C			U
higher dicots	Myrtaceae	Gossia gonoclada		E		Y	U
higher dicots	Myrtaceae	Lophostemon confertus	brush box	C			U
higher dicots	Myrtaceae	Melaleuca bracteata		C			U
higher dicots	Myrtaceae	Psidium guajava	guava				IU
higher dicots	Ochnaceae	Ochna serrulata	ochna				IU
higher dicots	Oleaceae	Notelaea longifolia forma glabra		C			U
higher dicots	Oxalidaceae	Oxalis debilis var. corymbosa	pink shamrock				IU
higher dicots	Oxalidaceae	Oxalis thompsoniae		C			U
higher dicots	Passifloraceae	Passiflora suberosa	corky passion flower				IU
higher dicots	Polygonaceae	Rumex brownii	swamp dock	C			U
higher dicots	Polygonaceae	Rumex crispus	curled dock				IU
higher dicots	Polygonaceae	Rumex x pratensis					IU
higher dicots	Portulacaceae	Portulaca pilosa subsp. pilosa		C			U
higher dicots	Rosaceae	Prunus persica var. persica					IU
higher dicots	Rubiaceae	Coffea arabica	Arabian coffee				IU
higher dicots	Rubiaceae	Psydrax odorata forma buxifolia		C			U

higher dicots	Asteraceae	Emilia sonchifolia var. sonchifolia			IU
higher dicots	Asteraceae	Enydra fluctuans		C	U
higher dicots	Asteraceae	Gamochaeta americana			IU
higher dicots	Asteraceae	Senecio hispidulus		C	U
higher dicots	Asteraceae	Soliva sessilis			IU
higher dicots	Asteraceae	Sphagneticola trilobata			IU
higher dicots	Asteraceae	Tithonia diversifolia	Japanese sunflower		IU
higher dicots	Asteraceae	Tridax procumbens	tridax daisy		IU
higher dicots	Asteraceae	Wollastonia biflora		C	U
higher dicots	Asteraceae	Youngia japonica		C	U
higher dicots	Balsaminaceae	Impatiens walleriana	balsam		IU
higher dicots	Bignoniaceae	Jacaranda mimosifolia	jacaranda		IU
higher dicots	Bignoniaceae	Macfadyena unguis-cati	cat's claw creeper		IU
higher dicots	Bignoniaceae	Pandorea sp. (Ipswich K.A.Williams 86020)		C	U
higher dicots	Bignoniaceae	Pyrostegia venusta			IU
higher dicots	Bignoniaceae	Tecoma stans	tecoma		IU
higher dicots	Brassicaceae	Capsella bursapastoris	shepherd's purse		IU
higher dicots	Brassicaceae	Cardamine flexuosa	wood bittercress		IU
higher dicots	Brassicaceae	Cardamine hirsuta	common bittercress		IU
higher dicots	Brassicaceae	Lepidium didymum			IU
higher dicots	Brassicaceae	Raphanus raphanistrum	wild radish		IU
higher dicots	Caesalpiniaceae	Bauhinia variegata			IU
higher dicots	Capparaceae	Capparis arborea	brush caper berry	C	U
higher dicots	Caprifoliaceae	Lonicera japonica	Japanese honeysuckle		IU
higher dicots	Caryophyllaceae	Drymaria cordata subsp. cordata			IU
higher dicots	Caryophyllaceae	Silene gallica var. gallica	French catchfly		IU
higher dicots	Chenopodiaceae	Chenopodium album	fat-hen		IU
higher dicots	Chenopodiaceae	Chenopodium carinatum	green crumbweed	C	U
higher dicots	Chenopodiaceae	Einadia hastata		C	U
higher dicots	Convolvulaceae	Evolvulus alsinoides var. decumbens		C	U
higher dicots	Convolvulaceae	Ipomoea cairica			IU
higher dicots	Convolvulaceae	Ipomoea indica	blue morning-glory		IU
higher dicots	Crassulaceae	Bryophyllum pinnatum	resurrection plant		IU
higher dicots	Epacridaceae	Leucopogon juniperinus	prickly heath	C	U
higher dicots	Euphorbiaceae	Chamaesyce hirta	asthma plant		IU
higher dicots	Euphorbiaceae	Chamaesyce prostrata	red caustic weed		IU
higher dicots	Euphorbiaceae	Excoecaria agallocha	milky mangrove	C	U
higher dicots	Euphorbiaceae	Glochidion ferdinandi		C	U
higher dicots	Euphorbiaceae	Mallotus claoxyloides	green kamala	C	U
higher dicots	Fabaceae	Austrodolichos errabundus		C	U
higher dicots	Fabaceae	Crotalaria lanceolata subsp. lanceolata			IU
higher dicots	Fabaceae	Cullen tenax	emu-foot	C	U
higher dicots	Fabaceae	Desmodium incanum			IU
higher dicots	Fabaceae	Macroptilium	siratro		IU

reptiles	Elapidae	Hemiaspis signata	black-bellied swamp snake	C		QA
reptiles	Elapidae	Pseudechis porphyriacus	red-bellied black snake	C		QA
reptiles	Elapidae	Pseudonaja textilis	eastern brown snake	C		QA
reptiles	Elapidae	Rhinoplocephalus nigrescens	eastern small-eyed snake	C		QA
reptiles	Scincidae	Cryptoblepharus virgatus		C		QA
reptiles	Scincidae	Ctenotus robustus		C		QA
reptiles	Scincidae	Ctenotus taeniolatus	copper-tailed skink	C		QA
reptiles	Scincidae	Lampropholis delicata		C		QA
reptiles	Scincidae	Tiliqua scincoides	eastern blue-tongued lizard	C		QA
reptiles	Varanidae	Varanus varius	lace monitor	C		QA
sac fungi	Lecanoraceae	Lecanora argentata		C		U
sac fungi	Parmeliaceae	Canoparmelia aptata		C		U
sac fungi	Parmeliaceae	Parmotrema crinitum		C		U
sac fungi	Parmeliaceae	Parmotrema tinctorum		C		U
sac fungi	Pertusariaceae	Pertusaria undulata		C		U
sac fungi	Physciaceae	Dirinaria applanata		C		U
sac fungi	Physciaceae	Hafellia curatellae		C		U
sac fungi	Physciaceae	Heterodermia speciosa		C		U
sac fungi	Physciaceae	Hyperphyscia adglutinata		C		U
sac fungi	Physciaceae	Physcia tribacoides		C		U
higher dicots	Acanthaceae	Rostellularia obtusa		C		U
higher dicots	Acanthaceae	Ruellia squarrosa				IU
higher dicots	Acanthaceae	Thunbergia alata	black-eyed Susan			IU
higher dicots	Amaranthaceae	Alternanthera philoxeroides				IU
higher dicots	Amaranthaceae	Amaranthus viridis	green amaranth			IU
higher dicots	Apiaceae	Apium prostratum var. filiforme - A.prostratum var. prostratum		C		U
higher dicots	Apiaceae	Lilaeopsis brisbanica		E	Y	U
higher dicots	Apocynaceae	Cascabela thevetia	yellow oleander			IU
higher dicots	Araliaceae	Schefflera arboricola				IU
higher dicots	Asteraceae	Ageratum houstonianum	blue billygoat weed			IU
higher dicots	Asteraceae	Ambrosia confertiflora	burr ragweed			IU
higher dicots	Asteraceae	Ambrosia psilostachya	perennial ragweed			IU
higher dicots	Asteraceae	Artemisia verlotiorum				IU
higher dicots	Asteraceae	Aster subulatus	wild aster			IU
higher dicots	Asteraceae	Bidens pilosa				IU
higher dicots	Asteraceae	Calyptocarpus vialis	creeping cinderella weed			IU
higher dicots	Asteraceae	Chrysocephalum apiculatum	yellow buttons	C		U
higher dicots	Asteraceae	Conyza sumatrensis	tall fleabane			IU
higher dicots	Asteraceae	Cotula australis	common cotula	C		U
higher dicots	Asteraceae	Cyanthillium cinereum		C		U

birds	Sturnidae	Acridotheres tristis	common myna				II
birds	Sturnidae	Sturnus vulgaris	common starling				II
birds	Sylviidae	Acrocephalus stentoreus	clamorous reed-warbler	C			QAI
birds	Sylviidae	Cisticola exilis	golden-headed cisticola	C			QAI
birds	Sylviidae	Megalurus timoriensis	tawny grassbird	C			QAI
birds	Threskiornithidae	Platalea flavipes	yellow-billed spoonbill	C			QA
birds	Threskiornithidae	Platalea regia	royal spoonbill	C			QAI
birds	Threskiornithidae	Threskiornis molucca	Australian white ibis	C			QAI
birds	Threskiornithidae	Threskiornis spinicollis	straw-necked ibis	C			QAI
birds	Zosteropidae	Zosterops lateralis	silvereye	C			QAI
bony fish	Poeciliidae	Gambusia holbrooki	mosquitofish				II
insects	Nymphalidae	Acraea andromacha andromacha	glasswing				QAI
insects	Nymphalidae	Danaus plexippus plexippus	monarch				QAI
insects	Nymphalidae	Euploea core corinna	common crow				QA
insects	Nymphalidae	Polyura sempronius sempronius	tailed emperor				QA
insects	Papilionidae	Graphium sarpedon choredon	blue triangle				QAI
insects	Pieridae	Catopsilia pomona pomona	lemon migrant				QAI
insects	Pieridae	Eurema hecabe phoebus	large grass-yellow				QA
insects	Pieridae	Pieris rapae	cabbage white				QAI
mammals	Leporidae	Lepus capensis	brown hare				II
mammals	Macropodidae	Macropus dorsalis	black-striped wallaby	C			QA
mammals	Macropodidae	Macropus rufogriseus	red-necked wallaby	C			QA
mammals	Peramelidae	Isoodon macrourus	northern brown bandicoot	C			QAI
mammals	Pteropodidae	Pteropus alecto	black flying-fox	C			QAI
mammals	Pteropodidae	Pteropus poliocephalus	grey-headed flying-fox	C	V	Y	QA
mammals	Pteropodidae	Pteropus scapulatus	little red flying-fox	C			QAI
mammals	Tachyglossidae	Tachyglossus aculeatus	short-beaked echidna	C			QAI
mammals	Vespertilionidae	Chalinolobus morio	chocolate wattled bat	C			QA
reptiles	Agamidae	Physignathus lesueurii	eastern water dragon	C			QA
reptiles	Agamidae	Pogona barbata	bearded dragon	C			QA
reptiles	Boidae	Morelia spilota	carpet python	C			QA
reptiles	Chelidae	Chelodina expansa	broad-shelled river turtle	C			QA
reptiles	Chelidae	Emydura macquarii krefftii	Krefft's river turtle	C			QA
reptiles	Colubridae	Dendrelaphis punctulata	common tree snake	C			QA
reptiles	Colubridae	Tropidonophis mairii	freshwater snake	C			QA

birds	Pardalotidae	Acanthiza chrysorrhoa	yellow-rumped thornbill	C		QA
birds	Pardalotidae	Acanthiza reguloides	buff-rumped thornbill	C		QA
birds	Pardalotidae	Gerygone levigaster	mangrove gerygone	C		QAI
birds	Pardalotidae	Gerygone olivacea	white-throated gerygone	C		QAI
birds	Pardalotidae	Pardalotus striatus	striated pardalote	C		QA
birds	Pardalotidae	Sericornis frontalis	white-browed scrubwren	C		QA
birds	Passeridae	Lonchura castaneothorax	chestnut-breasted mannikin	C		QAI
birds	Passeridae	Lonchura punctulata	nutmeg mannikin			II
birds	Passeridae	Passer domesticus	house sparrow			II
birds	Passeridae	Taeniopygia bichenovii	double-barred finch	C		QA
birds	Pelecanidae	Pelecanus conspicillatus	Australian pelican	C		QAI
birds	Petroicidae	Petroica rosea	rose robin	C		QA
birds	Phalacrocoracidae	Phalacrocorax carbo	great cormorant	C		QAI
birds	Phalacrocoracidae	Phalacrocorax sulcirostris	little black cormorant	C		QA
birds	Phasianidae	Coturnix ypsilophora	brown quail	C		QAI
birds	Pittidae	Pitta versicolor	noisy pitta	C		QAI
birds	Podargidae	Podargus strigoides	tawny frogmouth	C		QA
birds	Podicipedidae	Tachybaptus novaehollandiae	Australasian grebe	C		QAI
birds	Pomatostomidae	Pomatostomus temporalis	grey-crowned babbler	C		QAI
birds	Psittacidae	Alisterus scapularis	Australian king-parrot	C		QA
birds	Psittacidae	Neophema pulchella	turquoise parrot	R	Y	QA
birds	Psittacidae	Platycercus adscitus	pale-headed rosella	C		QA
birds	Psittacidae	Platycercus elegans	crimson rosella	C		QA
birds	Psittacidae	Platycercus eximius	eastern rosella	C		QA
birds	Psittacidae	Psephotus haematonotus	red-rumped parrot	C		QA
birds	Psittacidae	Trichoglossus chlorolepidotus	scaly-breasted lorikeet	C		QA
birds	Psittacidae	Trichoglossus haematodus haematodus	rainbow lorikeet	C		QAI
birds	Rallidae	Gallinula tenebrosa	dusky moorhen	C		QAI
birds	Rallidae	Gallirallus philippensis	buff-banded rail	C		QAI
birds	Rallidae	Porphyrio porphyrio	purple swamphen	C		QAI
birds	Rallidae	Porzana pusilla	Baillon's crake	C		QAI
birds	Rallidae	Rallus pectoralis	Lewin's rail	R	Y	QAI
birds	Recurvirostridae	Himantopus himantopus	black-winged stilt	C		QAI
birds	Recurvirostridae	Recurvirostra novaehollandiae	red-necked avocet	C		QA
birds	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper	C	Y	QAI
birds	Scolopacidae	Gallinago hardwickii	Latham's snipe	C	Y	QAI
birds	Scolopacidae	Tringa glareola	wood sandpiper	C	Y	QAI
birds	Strigidae	Ninox novaeseelandiae	southern boobook	C		QAI

birds	Dicruridae	Monarcha melanopsis	black-faced monarch	C		QAI
birds	Dicruridae	Monarcha trivirgatus	spectacled monarch	C		QAI
birds	Dicruridae	Myiagra inquieta	restless flycatcher	C		QA
birds	Dicruridae	Myiagra rubecula	leaden flycatcher	C		QAI
birds	Dicruridae	Rhipidura fuliginosa	grey fantail	C		QAI
birds	Dicruridae	Rhipidura leucophrys	willie wagtail	C		QAI
birds	Falconidae	Falco cenchroides	nankeen kestrel	C	Y	QAI
birds	Falconidae	Falco longipennis	Australian hobby	C	Y	QAI
birds	Falconidae	Falco peregrinus	peregrine falcon	C		QAI
birds	Glareolidae	Stiltia isabella	Australian pratincole	C		QA
birds	Halcyonidae	Dacelo novaeguineae	laughing kookaburra	C		QA
birds	Halcyonidae	Todiramphus macleayii	forest kingfisher	C		QAI
birds	Halcyonidae	Todiramphus sanctus	sacred kingfisher	C		QAI
birds	Hirundinidae	Cheramoeca leucosternus	white-backed swallow	C		QA
birds	Hirundinidae	Hirundo ariel	fairy martin	C		QA
birds	Hirundinidae	Hirundo neoxena	welcome swallow	C		QAI
birds	Hirundinidae	Hirundo nigricans	tree martin	C		QAI
birds	Jacanidae	Irediparra gallinacea	comb-crested jacana	C		QAI
birds	Laridae	Larus novaehollandiae	silver gull	C		QAI
birds	Laridae	Sterna nilotica	gull-billed tern	C		QAI
birds	Maluridae	Malurus cyaneus	superb fairy-wren	C		QA
birds	Maluridae	Malurus lamberti	variegated fairy-wren	C		QA
birds	Maluridae	Malurus melanocephalus	red-backed fairy-wren	C		QA
birds	Megapodiidae	Alectura lathami	Australian brush-turkey	C		QA
birds	Meliphagidae	Acanthagenys rufogularis	spiny-cheeked honeyeater	C		QA
birds	Meliphagidae	Anthochaera chrysoptera	little wattlebird	C		QA
birds	Meliphagidae	Entomyzon cyanotis	blue-faced honeyeater	C		QAI
birds	Meliphagidae	Lichmera indistincta	brown honeyeater	C		QA
birds	Meliphagidae	Manorina melanocephala	noisy miner	C		QA
birds	Meliphagidae	Meliphaga lewinii	Lewin's honeyeater	C		QA
birds	Meliphagidae	Melithreptus albogularis	white-throated honeyeater	C		QAI
birds	Meliphagidae	Myzomela sanguinolenta	scarlet honeyeater	C		QA
birds	Meliphagidae	Philemon citreogularis	little friarbird	C		QAI
birds	Meliphagidae	Philemon corniculatus	noisy friarbird	C		QAI
birds	Meliphagidae	Plectorhyncha lanceolata	striped honeyeater	C		QA
birds	Meropidae	Merops ornatus	rainbow bee-eater	C	Y	QAI
birds	Motacillidae	Anthus novaeseelandiae	Richard's pipit	C		QAI
birds	Oriolidae	Oriolus sagittatus	olive-backed oriole	C		QAI
birds	Oriolidae	Sphecotheres viridis	figbird	C		QAI
birds	Pachycephalidae	Pachycephala rufiventris	rufous whistler	C		QAI

birds	Ardeidae	Egretta garzetta	little egret	C		QAI
birds	Ardeidae	Egretta novaehollandiae	white-faced heron	C		QAI
birds	Ardeidae	Ixobrychus flavicollis	black bittern	C		QAI
birds	Ardeidae	Nycticorax caledonicus	nankeen night heron	C		QAI
birds	Artamidae	Artamus leucorynchus	white-breasted woodswallow	C		QA
birds	Artamidae	Cracticus nigrogularis	pied butcherbird	C		QA
birds	Artamidae	Cracticus torquatus	grey butcherbird	C		QA
birds	Artamidae	Gymnorhina tibicen	Australian magpie	C		QAI
birds	Burhinidae	Burhinus grallarius	bush stone-curlew	C		QAI
birds	Cacatuidae	Cacatua galerita	sulphur-crested cockatoo	C		QAI
birds	Cacatuidae	Cacatua roseicapilla	galah	C		QA
birds	Cacatuidae	Cacatua sanguinea	little corella	C		QAI
birds	Cacatuidae	Nymphicus hollandicus	cockatiel	C		QA
birds	Campephagidae	Coracina novaehollandiae	black-faced cuckoo-shrike	C		QAI
birds	Campephagidae	Coracina papuensis	white-bellied cuckoo-shrike	C		QAI
birds	Campephagidae	Lalage sueurii	white-winged triller	C		QAI
birds	Centropodidae	Centropus phasianinus	pheasant coucal	C		QA
birds	Charadriidae	Erythrogonys cinctus	red-kneed dotterel	C		QA
birds	Charadriidae	Vanellus miles novaehollandiae	masked lapwing (southern subspecies)	C		QA
birds	Charadriidae	Vanellus tricolor	banded lapwing	C		QA
birds	Ciconiidae	Ephippiorhynchus asiaticus	black-necked stork	R	Y	QAI
birds	Columbidae	Columba leucomela	white-headed pigeon	C		QA
birds	Columbidae	Columba livia	rock dove			II
birds	Columbidae	Ocyphaps lophotes	crested pigeon	C		QA
birds	Columbidae	Phaps chalcoptera	common bronzewing	C		QA
birds	Columbidae	Ptilinopus superbus	superb fruit-dove	C		QAI
birds	Columbidae	Streptopelia chinensis	spotted turtle-dove			II
birds	Coraciidae	Eurystomus orientalis	dollarbird	C		QAI
birds	Corcoracidae	Struthidea cinerea	apostlebird	C		QA
birds	Corvidae	Corvus orru	Torresian crow	C		QAI
birds	Cuculidae	Cacomantis flabelliformis	fan-tailed cuckoo	C		QAI
birds	Cuculidae	Chrysococcyx basalis	Horsfield's bronze-cuckoo	C		QAI
birds	Cuculidae	Chrysococcyx lucidus	shining bronze-cuckoo	C		QAI
birds	Cuculidae	Cuculus pallidus	pallid cuckoo	C		QAI
birds	Cuculidae	Eudynamys scolopacea	common koel	C		QAI
birds	Cuculidae	Scythrops novaehollandiae	channel-billed cuckoo	C		QAI
birds	Dicaeidae	Dicaeum hirundinaceum	mistletoebird	C		QAI
birds	Dicruridae	Dicrurus bracteatus	spangled drongo	C		QAI
birds	Dicruridae	Grallina cyanoleuca	magpie-lark	C		QAI

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

WildNet

Latitude between: -27.5441551494391 and -27.5080418543286
Longitude between: 152.985344297895 and 153.025849084747
Distance: 2
Area around Tennyson

Class	Family	Scientific Name	Common Name	NCA	EPBC	Sig	End
amphibians	Bufonidae	Bufo marinus	cane toad				II
amphibians	Hylidae	Cyclorana brevipes	superb collared frog	C			QA
amphibians	Hylidae	Litoria caerulea	common green treefrog	C			QAI
amphibians	Hylidae	Litoria fallax	eastern sedgefrog	C			QA
amphibians	Hylidae	Litoria peronii	emerald spotted treefrog	C			QA
amphibians	Hylidae	Litoria rubella	ruddy treefrog	C			QAI
birds	Accipitridae	Accipiter cirrhocephalus	collared sparrowhawk	C			QAI
birds	Accipitridae	Accipiter fasciatus	brown goshawk	C			QAI
birds	Accipitridae	Accipiter novaehollandiae	grey goshawk	R		Y	QAI
birds	Accipitridae	Aquila audax	wedge-tailed eagle	C			QAI
birds	Accipitridae	Aviceda subcristata	Pacific baza	C			QAI
birds	Accipitridae	Circus assimilis	spotted harrier	C			QA
birds	Accipitridae	Elanus axillaris	black-shouldered kite	C			QAI
birds	Accipitridae	Haliaeetus leucogaster	white-bellied sea-eagle	C		Y	QAI
birds	Accipitridae	Haliastur indus	brahminy kite	C			QAI
birds	Accipitridae	Hieraaetus morphnoides	little eagle	C			QAI
birds	Anatidae	Anas platyrhynchos	mallard			Y	IU
birds	Anatidae	Anas superciliosa	Pacific black duck	C			QAI
birds	Anatidae	Chenonetta jubata	Australian wood duck	C			QA
birds	Anatidae	Cygnus atratus	black swan	C			QA
birds	Anatidae	Dendrocygna eytoni	plumed whistling-duck	C			QA
birds	Anatidae	Malacorhynchus membranaceus	pink-eared duck	C			QA
birds	Anhingidae	Anhinga melanogaster	darter	C			QAI
birds	Apodidae	Hirundapus caudacutus	white-throated needletail	C		Y	QAI
birds	Ardeidae	Ardea alba	great egret	C		Y	QAI
birds	Ardeidae	Ardea ibis	cattle egret	C		Y	QAI
birds	Ardeidae	Ardea intermedia	intermediate egret	C			QAI
birds	Ardeidae	Ardea pacifica	white-necked heron	C			QA
birds	Ardeidae	Botaurus poiciloptilus	Australasian bittern	C			QAI
birds	Ardeidae	Butorides striatus	striated heron	C			QAI

Mammals	Vespertilionidae	Miniopterus	schreibersii		UQ Tunnel	7-Nov-85
Mammals	Vespertilionidae	Miniopterus	schreibersii		UQ, Brisbane	
Mammals	Vespertilionidae	Myotis	macropus		UQ Tunnel	12-Sep-85
Mammals	Vespertilionidae	Myotis	macropus		UQ St Lucia, River Tunnel, Brisbane	24-Aug-86
Mammals	Vespertilionidae	Scotorepens	greyii		Yeerongpilly, ARI	18-Feb-75
Mammals	Vespertilionidae	Scotorepens	greyii		Brisbane, St Lucia	11-Mar-81
Mammals	Vespertilionidae	Scotorepens	orion		Brisbane, Yeronga	0
Mammals	Vespertilionidae	Scotorepens	sp		Taringa	30-Apr-87
Mammals	Canidae	Canis	lupus	dingo	Brisbane, Indooroopilly, Fig Tree Pocket	0
Mammals	Mustelidae	Mustela	putorius		Brisbane, Indooroopilly	21-Dec-72
Mammals	Bovidae	Bos	taurus		Brisbane, Indooroopilly	0
Mammals	Muridae	Hydromys	chrysogaster		Chelmer Reach, Indooroopilly Island	22-May-95
Mammals	Muridae	Hydromys	chrysogaster		Brisbane, Indooroopilly	0
Mammals	Muridae	Hydromys	chrysogaster		Brisbane R, Chelmer	0
Mammals	Muridae	Rattus	norvegicus		Brisbane, Indooroopilly, in shed	1-Dec-69
Mammals	Muridae	Rattus	rattus		Brisbane, Indooroopilly	26-Oct-64
Mammals	Muridae	Rattus	rattus		Taringa	26-Feb-70
Mammals	Muridae	Rattus	rattus		Indooroopilly	2-Feb-91
Mammals	Muridae	Rattus	rattus		Brisbane, Indooroopilly	Apr-73
Mammals	Muridae	Rattus	rattus		Brisbane, St Lucia	0
Mammals	Muridae	Rattus	rattus		Brisbane, Dutton Park	0
Mammals	Leporidae	Lepus	capensis		Brisbane, Indooroopilly	Sep-80

Mammals	Peramelidae	Isoodon	macrourus	Brisbane, Yeronga	0
Mammals	Phascolarctidae	Phascolarctos	cinereus	Brisbane, Yeronga	Jun-89
Mammals	Petauridae	Petaurus	norfolcensis	Brisbane, Indoorpilly	14-Sep-65
Mammals	Petauridae	Petaurus	norfolcensis	Brisbane, Indooroopilly	0
Mammals	Petauridae	Petaurus	norfolcensis	Brisbane, Taringa	0
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Taringa	6-Oct-52
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Taringa	22-Jun-65
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Indooroopilly,cnr Moggil Rd & Bourbon St	28-Oct-70
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Coronation Dr, opp Arnotts Biscuits	15-Jan-73
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Pamphlet Bridge	3-Nov-73
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Toowong	25-Jul-90
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Moorooka, nr Toohey Forest	23-Jan-92
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Taringa East, 31 Ruskin St	17-Apr-94
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, St Lucia	0
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Indooroopilly	0
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Taringa	0
Mammals	Pseudocheiridae	Pseudocheirus	peregrinus	Brisbane, Yeronga	0
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Taringa	14-Jun-54
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Taringa, Taringa Pde	29-Jun-69
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Indooroopilly (probably)	23-Jun-74
Mammals	Phalangeridae	Trichosurus	vulpecula	Sherwood, Oxley Rd	20-May-75
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Indooroopilly	7-Jul-76
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Indooroopilly,2/239 Lambert Rd, Parkside	7-Jul-76
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Yeronga	17-Feb-87
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Yeronga RSPCA	15-May-87
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Taringa	0
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Indooroopilly	0
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Dutton Park	0
Mammals	Phalangeridae	Trichosurus	vulpecula	Brisbane, Sherwood	0
Mammals	Macropodidae	Wallabia	bicolor	Brisbane, Indooroopilly, Russell Tce	31-Aug-70
Mammals	Macropodidae	Wallabia	bicolor	Brisbane, Indooroopilly	18-Jun-75
Mammals	Pteropodidae	Pteropus	alecto	Brisbane, Indooroopilly Is	Mar-70
Mammals	Pteropodidae	Pteropus	poliocephalus	Graceville, Brisbane	7-Jan-83
Mammals	Pteropodidae	Pteropus	poliocephalus	Brisbane, Taringa	0
Mammals	Pteropodidae	Pteropus	sp	Brisbane, Indooroopilly Is	24-Jan-72
Mammals	Vespertilionidae	Miniopterus	australis	Brisbane, Dutton Park	0

Birds	MELIPHAGIDAE	Manorina	melanocephala	melanocephala	Indooroopilly, Brisbane	9-Nov-59
Birds	MELIPHAGIDAE	Manorina	melanocephala	melanocephala	St Lucia, Brisbane	late 1969
Birds	MELIPHAGIDAE	Manorina	melanocephala	melanocephala	Indooroopilly, Brisbane	29-May-72
Birds	MELIPHAGIDAE	Manorina	melanocephala	melanocephala	Taringa, Brisbane	Oct-78
Birds	MELIPHAGIDAE	Myzomela	sanguinolenta	sanguinolenta	Toowong, Brisbane	12-Sep-09
Birds	MELIPHAGIDAE	Philemon	citreogularis	citreogularis	Indooroopilly, Brisbane	-0-
Birds	MELIPHAGIDAE	Philemon	corniculatus	corniculatus	Taringa, Brisbane	10-Nov-85
Birds	MELIPHAGIDAE	Philemon	corniculatus	corniculatus	Corinda, Brisbane	1979
Birds	ESTRILDIDAE	Lonchura	castaneothorax	castaneothorax	Corinda, Brisbane	-0-
Birds	PASSERIDAE	Passer	domesticus	domesticus	Yeronga, Brisbane	25-Jul-72
Birds	PASSERIDAE	Passer	domesticus	domesticus	Yeronga, Brisbane	27-Jul-72
Birds	STURNIDAE	Sturnus	vulgaris	vulgaris	Sherwood, Brisbane	-0-
Birds	ORIOLIDAE	Oriolus	sagittatus	sagittatus	St Lucia, Brisbane	12-Feb-75
Birds	ORIOLIDAE	Oriolus	sagittatus	sagittatus	St Lucia, Brisbane	3-Nov-80
Birds	ORIOLIDAE	Sphecotheres	viridis	vieilloti	Tennyson, Brisbane	26-Feb-68
Birds	ORIOLIDAE	Sphecotheres	viridis	vieilloti	Toowong, Brisbane	20-Apr-72
Birds	ORIOLIDAE	Sphecotheres	viridis	vieilloti	Toowong, Brisbane	4-Dec-87
Birds	DICRURIDAE	Dicrurus	bracteatus	bracteatus	Indooroopilly, Brisbane	22-May-80
Birds	GRALLINIDAE	Grallina	cyanoleuca	-0-	St Lucia, Brisbane	7-Aug-84
Birds	CRACTICIDAE	Cracticus	torquatus	torquatus	Indooroopilly, Brisbane	7-Nov-74
Birds	CRACTICIDAE	Gymnorhina	tibicen	tibicen	Indooroopilly, Brisbane	21-Jul-59
Birds	CRACTICIDAE	Gymnorhina	tibicen	tibicen	Toowong, Brisbane	-0-
Birds	PTILONORHYNCHIDAE	Sericulus	chrysocephalus	-0-	St Lucia, Brisbane	19-Jun-62
Birds	CORVIDAE	Corvus	orru	cecilae	Indooroopilly, Brisbane	8-Oct-76
Mammals	Tachyglossidae	Tachyglossus	aculeatus		Brisbane, Long Pocket, CSIRO	24-Mar-74
Mammals	Tachyglossidae	Tachyglossus	aculeatus		Brisbane, Indooroopilly	0
Mammals	Tachyglossidae	Tachyglossus	aculeatus		Brisbane, Toowong area	0
Mammals	Dasyuridae	Phascogale	tapoatafa		Brisbane, Taringa	0
Mammals	Dasyuridae	Sminthopsis	murina		Indooroopilly	16-Oct-90
Mammals	Peramelidae	Isoodon	macrourus	RUBECULUS	Brisbane, Indooroopilly	0
Mammals	Peramelidae	Isoodon	macrourus		Brisbane, Indooroopilly	12-Aug-71
Mammals	Peramelidae	Isoodon	macrourus		Brisbane, Taringa	22-Apr-72
Mammals	Peramelidae	Isoodon	macrourus		Brisbane, Indooroopilly	6-Mar-73
Mammals	Peramelidae	Isoodon	macrourus		Brisbane, Indoorpilly	0
Mammals	Peramelidae	Isoodon	macrourus		Brisbane, Indooroopilly	0
Mammals	Peramelidae	Isoodon	macrourus		Brisbane, Moorooka	0

Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Indooroopilly, Brisbane	10-Apr-68
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Toowong, Brisbane	5-Nov-70
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Indooroopilly, Brisbane	Jan-81
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Taringa, Brisbane	9-Nov-81
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Corinda, Brisbane	28-Oct-91
Birds	CORACIIDAE	Eurystomus	orientalis	pacificus	Taringa, Brisbane	28-Dec-38
Birds	CORACIIDAE	Eurystomus	orientalis	pacificus	Corinda, Brisbane	16-Jan-58
Birds	CORACIIDAE	Eurystomus	orientalis	pacificus	Yeronga, Brisbane	19-Dec-63
Birds	CORACIIDAE	Eurystomus	orientalis	pacificus	Taringa, Brisbane	29-Dec-64
Birds	CORACIIDAE	Eurystomus	orientalis	pacificus	Indooroopilly, Brisbane	Dec-80
Birds	PITTIDAE	Pitta	versicolor	versicolor	Tennyson, Brisbane	May 1891
Birds	HIRUNDINIDAE	Hirundo	neoxena	neoxena	Indooroopilly, Brisbane	6-Oct-85
Birds	CAMPEPHAGIDAE	Coracina	novaehollandiae	-0-	Toowong, Brisbane	4-Jul-82
Birds	CAMPEPHAGIDAE	Coracina	novaehollandiae	melanops	Tennyson, Brisbane	2-Sep-65
Birds	CAMPEPHAGIDAE	Lalage	tricolor	-0-	Indooroopilly, Brisbane	Nov-72
Birds	SYLVIIDAE	Acrocephalus	stentoreus	australis	Oxley Ck, Brisbane	9-Sep-12
Birds	SYLVIIDAE	Acrocephalus	stentoreus	australis	Oxley Ck, Brisbane	-0-
Birds	SYLVIIDAE	Cincloramphus	cruralis	-0-	Toowong, Brisbane	23 Jan 1899
Birds	MALURIDAE	Malurus	melanocephalus	melanocephalus	St Lucia, Brisbane	4-Aug-84
Birds	ACANTHIZIDAE	Gerygone	olivacea	olivacea	Toowong, Brisbane	12-Oct-11
Birds	ACANTHIZIDAE	Sericornis	citreogularis		Yeronga	2-Apr-98
Birds	MONARCHIDAE	Monarcha	melanopsis	-0-	Indooroopilly, Brisbane	27-Mar-72
Birds	MONARCHIDAE	Monarcha	trivirgatus	-0-	Taringa, Brisbane	31-Aug-91
Birds	PETROICIDAE	Petroica	rosea	-0-	St Lucia, Uni of Qld	22/04/1993
Birds	PETROICIDAE	Petroica	rosea		Oxley Creek, Acacia Ridge	29-May-01
Birds	PACHYCEPHALIDAE	Pachycephala	pectoralis	ashbyi	Indooroopilly, Brisbane	4-May-86
Birds	PACHYCEPHALIDAE	Psophodes	olivaceus	olivaceus	Taringa, Brisbane	7-Jul-80
Birds	DICAEIDAE	Dicaeum	hirundinaceum	hirundinaceum	Sherwood, Brisbane	6-Feb-72
Birds	ZOSTEROPIDAE	Zosterops	lateralis	-0-	Toowong, Brisbane	7-Jul-64
Birds	ZOSTEROPIDAE	Zosterops	lateralis	-0-	Moorooka, Brisbane	19-Jun-74
Birds	ZOSTEROPIDAE	Zosterops	lateralis	-0-	St Lucia, Brisbane	1979
Birds	ZOSTEROPIDAE	Zosterops	lateralis	familiaris	Moorooka, Brisbane	3-Dec-72
Birds	ZOSTEROPIDAE	Zosterops	lateralis	familiaris	Toowong, Brisbane	-0-
Birds	ZOSTEROPIDAE	Zosterops	lateralis	familiaris	Toowong Cemetary, Brisbane	-0-
Birds	ZOSTEROPIDAE	Zosterops	lateralis	lateralis	Indooroopilly, Brisbane	Jun-86
Birds	MELIPHAGIDAE	Lichmera	indistincta	ocularis	Tennyson, Brisbane	Dec-64

Birds	CUCULIDAE	Eudynamys	scolopacea	cyanocephala	Yeronga Park, Brisbane	28-Nov-58
Birds	CUCULIDAE	Eudynamys	scolopacea	cyanocephala	Indooroopilly, Brisbane	11-Mar-81
Birds	CUCULIDAE	Eudynamys	scolopacea	cyanocephala	Indooroopilly, Brisbane	1982
Birds	CENTROPODIDAE	Centropus	phasianinus	phasianinus	Indooroopilly, Brisbane	9-Oct-71
Birds	CENTROPODIDAE	Centropus	phasianinus	phasianinus	Taringa, Brisbane	21-Sep-75
Birds	CENTROPODIDAE	Centropus	phasianinus	phasianinus	Yeronga, Brisbane	19-May-91
Birds	TYTONIDAE	Tyto	alba	delicatula	Toowong, Brisbane	29-Dec-60
Birds	TYTONIDAE	Tyto	alba	delicatula	Sherwood, Brisbane	-0-
Birds	STRIGIDAE	Ninox	novaeseelandiae	boobook	Indooroopilly, Brisbane	13-Jan-54
Birds	STRIGIDAE	Ninox	novaeseelandiae	boobook	Yeronga, Brisbane	22-Jan-56
Birds	STRIGIDAE	Ninox	novaeseelandiae	boobook	Yeronga, Brisbane	2-Apr-63
Birds	STRIGIDAE	Ninox	novaeseelandiae	boobook	Yeronga, Brisbane	3-Jun-63
Birds	STRIGIDAE	Ninox	novaeseelandiae	boobook	Corinda SHS, Praten St, Corinda	3-Mar-03
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Indooroopilly, Brisbane	1-Aug-49
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Toowong, Brisbane	22-Jan-52
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Taringa, Brisbane	31-Jan-52
Birds	PODARGIDAE	Podargus	strigoides	strigoides	St Lucia, Brisbane	2-Sep-55
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Taringa, Brisbane	13-Feb-56
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Taringa, Brisbane	26-Feb-56
Birds	PODARGIDAE	Podargus	strigoides	strigoides	St Lucia, Brisbane	22-Mar-60
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Indooroopilly, Brisbane	10-Apr-70
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Sherwood Park, Brisbane	3-Mar-74
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Indooroopilly area	1982
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Taringa, Brisbane	10-Mar-84
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Taringa, Brisbane	8-May-86
Birds	PODARGIDAE	Podargus	strigoides	strigoides	Sherwood, Brisbane	-0-
Birds	CAPRIMULGIDAE	Eurostopodus	mystacalis	mystacalis	Indooroopilly, Brisbane	8-May-83
Birds	ALCEDINIDAE	Dacelo	novaeguineae	novaeguineae	Yeronga, Brisbane	27-Apr-48
Birds	ALCEDINIDAE	Dacelo	novaeguineae	novaeguineae	St Lucia, Brisbane	11-Aug-64
Birds	ALCEDINIDAE	Todiramphus	macleayii	incinctus	Toowong, Brisbane	23-Sep-60
Birds	ALCEDINIDAE	Todiramphus	macleayii	incinctus	Taringa, Brisbane	3-Aug-78
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Indooroopilly, Brisbane	20-Oct-08
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Moorooka, Brisbane	15-Jan-58
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Toowong, Brisbane	12-Apr-58
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Moorooka, Brisbane	11-Dec-58
Birds	ALCEDINIDAE	Todiramphus	sanctus	sanctus	Toowong, Brisbane	7-Oct-64

Birds	BURHINIDAE	Burhinus	grallarius	grallarius	Indooroopilly, Brisbane	8-Jan-60
Birds	BURHINIDAE	Burhinus	grallarius		St. Lucia	11-Apr-98
Birds	CHARADRIIDAE	Pluvialis	fulva	-0-	Long Pocket, Brisbane	-0-
Birds	CHARADRIIDAE	Vanellus	miles	novaehollandiae	Indooroopilly, Brisbane	15-Oct-54
Birds	CHARADRIIDAE	Vanellus	miles	novaehollandiae	Taringa, Brisbane	4-Oct-72
Birds	COLUMBIDAE	Chalcophaps	indica	chrysochlora	Toowong, Brisbane	19-Jun-78
Birds	COLUMBIDAE	Columba	livia	-0-	Toowong, Brisbane	1910
Birds	COLUMBIDAE	Geopelia	humeralis	humeralis	Toowong, Brisbane	3-Dec-11
Birds	COLUMBIDAE	Macropygia	phasianella	phasianella	Sherwood, Brisbane	29-May-74
Birds	COLUMBIDAE	Macropygia	phasianella	phasianella	Taringa, Brisbane	Jul-79
Birds	COLUMBIDAE	Ocyphaps	lophotes	lophotes	Indooroopilly, Brisbane	3-Mar-86
Birds	COLUMBIDAE	Ptilinopus	regina	regina	Corinda, Brisbane	5-Nov-73
Birds	COLUMBIDAE	Ptilinopus	regina	regina	Corinda, Brisbane	12-Oct-76
Birds	COLUMBIDAE	Ptilinopus	superbus	superbus	Indooroopilly, Brisbane	1-Apr-85
Birds	COLUMBIDAE	Streptopelia	chinensis	tigrina	Toowong, Brisbane	5-Oct-76
Birds	LORIIDAE	Trichoglossus	chlorolepidotis	-0-	Yeronga, Brisbane	9-Apr-70
Birds	LORIIDAE	Trichoglossus	chlorolepidotis	-0-	Indooroopilly, Brisbane	5-May-72
Birds	LORIIDAE	Trichoglossus	chlorolepidotis	-0-	Indooroopilly, Brisbane	4-Aug-89
Birds	LORIIDAE	Trichoglossus	chlorolepidotis	-0-	Indooroopilly, Brisbane	9-Oct-91
Birds	LORIIDAE	Trichoglossus	haematodus	moluccanus	Yeronga, Brisbane	11-Dec-62
Birds	LORIIDAE	Trichoglossus	haematodus	moluccanus	Tennyson, Brisbane	20-Dec-73
Birds	CACATUIDAE	Calyptorhynchus	lathami	-0-	Corinda, Brisbane	8-Mar-65
Birds	PSITTACIDAE	Platycercus	adscitus	palliceps	Tennyson, Brisbane	15-May-72
Birds	PSITTACIDAE	Platycercus	adscitus	palliceps	Indooroopilly, Brisbane	3-Feb-86
Birds	PSITTACIDAE	Platycercus	adscitus	palliceps	Taringa, Brisbane	24-Jun-86
Birds	PSITTACIDAE	Platycercus	adscitus	palliceps	Taringa	1989
Birds	PSITTACIDAE	Platycercus	adscitus		Pratten St, Corinda	12-Jul-01
Birds	CUCULIDAE	Cacomantis	flabelliformis	prionurus	Tennyson, Brisbane	10-Jul-64
Birds	CUCULIDAE	Cacomantis	flabelliformis	prionurus	Toowong, Brisbane	5-Aug-69
Birds	CUCULIDAE	Cacomantis	flabelliformis	prionurus	Indooroopilly, Brisbane	4-Feb-71
Birds	CUCULIDAE	Cacomantis	flabelliformis	prionurus	Toowong, Brisbane	14-Jun-74
Birds	CUCULIDAE	Cacomantis	flabelliformis	prionurus	Indooroopilly, Brisbane	1982
Birds	CUCULIDAE	Cacomantis	flabelliformis	prionurus	Taringa, Brisbane	6-Dec-85
Birds	CUCULIDAE	Chrysococcyx	lucidus	lucidus	Taringa, Brisbane	15-Apr-84
Birds	CUCULIDAE	Chrysococcyx	lucidus	plagosus	Tennyson, Brisbane	10-Jul-64
Birds	CUCULIDAE	Cuculus	saturatus	-0-	St Lucia, Brisbane	12-Jan-72

Reptiles	ELAPIDAE	Pseudonaja	textilis		Brisbane, Sherwood	0
Reptiles	ELAPIDAE	Pseudonaja	textilis		Brisbane, Yeronga W	0
Reptiles	ELAPIDAE	Pseudonaja	textilis		Brisbane, Graceville	0
Birds	PROCELLARIIDAE	Macronectes	giganteus		Brisbane, Sherwood	0
Birds	PROCELLARIIDAE	Puffinus	pacificus	royanus	Indooroopilly, Brisbane R	28-Apr-76
Birds	ARDEIDAE	Ardea	novaehollandiae	novaehollandiae	St Lucia, Brisbane	29-Jul-59
Birds	ARDEIDAE	Ardea	novaehollandiae	novaehollandiae	Toowong, Brisbane	16-Apr-79
Birds	ARDEIDAE	Nycticorax	caledonicus	hilli	St Lucia, Brisbane	9-Oct-55
Birds	ARDEIDAE	Nycticorax	caledonicus	hilli	St Lucia, Brisbane	6-Sep-57
Birds	ANATIDAE	Anas	superciliosa	rogersi	Toowong, Brisbane	2-Nov-62
Birds	ANATIDAE	Anas	superciliosa	rogersi	Indooroopilly, Brisbane	14-Oct-64
Birds	ANATIDAE	Cygnus	atratus	-0-	Indooroopilly, Brisbane	13-Feb-47
Birds	ACCIPITRIDAE	Accipiter	fasciatus	fasciatus	Toowong, Brisbane	-0-
Birds	ACCIPITRIDAE	Aquila	audax	audax	Indooroopilly, Brisbane	-0-
Birds	ACCIPITRIDAE	Aviceda	subcristata	subcristata	Toowong, Brisbane	19-Jul-82
Birds	ACCIPITRIDAE	Haliaeetus	leucogaster	-0-	Brisbane R, Corinda	-0-
Birds	ACCIPITRIDAE	Haliastur	sphenurus	sphenurus	Corinda, Brisbane	28-Aug-47
Birds	FALCONIDAE	Falco	cenchroides	cenchroides	Yeronga, Brisbane	1982
Birds	FALCONIDAE	Falco	longipennis	longipennis	Toowong, Brisbane	11-Aug-80
Birds	FALCONIDAE	Falco	longipennis	longipennis	Yeronga, Brisbane	29-Sep-86
Birds	FALCONIDAE	Falco	longipennis		Castle St, Fairfield	25-Dec-99
Birds	FALCONIDAE	Falco	peregrinus		School & Ipswich Rds., Yeronga	22-Mar-95
Birds	MEGAPODIIDAE	Alectura	lathami	lathami	Indooroopilly, Brisbane	18-Nov-77
Birds	MEGAPODIIDAE	Alectura	lathami	lathami	Indooroopilly, Brisbane	11-Oct-78
Birds	MEGAPODIIDAE	Alectura	lathami	lathami	Indooroopilly, Brisbane	Sep-88
Birds	MEGAPODIIDAE	Alectura	lathami	lathami	Indooroopilly, Brisbane	-0-
Birds	PHASIANIDAE	Coturnix	ypsilophora	australis	Corinda, Brisbane	22-Feb-77
Birds	TURNICIDAE	Turnix	varia	varia	Indooroopilly, Brisbane	20-May-58
Birds	RALLIDAE	Gallinula	tenebrosa	tenebrosa	Dutton Park, Brisbane	7-Mar-49
Birds	RALLIDAE	Gallinula	tenebrosa	tenebrosa	Fairfield, Brisbane	20-Jun-49
Birds	RALLIDAE	Gallinula	tenebrosa	tenebrosa	Yeronga, Brisbane	8-Nov-72
Birds	RALLIDAE	Gallirallus	philippensis	assimilis	St Lucia, Brisbane	22-Sep-58
Birds	RALLIDAE	Gallirallus	philippensis	assimilis	Toowong, Brisbane	12-Nov-80
Birds	RALLIDAE	Porphyrio	porphyrio	melanotus	Yeronga, Brisbane	22-May-62
Birds	RALLIDAE	Porphyrio	porphyrio	melanotus	Yeronga, Brisbane	23-Apr-72
Birds	RALLIDAE	Porzana	tabuensis		Rocklea, nr Suscat St	19-Feb-04

Reptiles	COLUBRIDAE	Dendrelaphis	punctulata	Crichton St, Yeerongpilly	7-Apr-01
Reptiles	COLUBRIDAE	Dendrelaphis	punctulata	Brisbane, Chelmer	0
Reptiles	COLUBRIDAE	Tropidonophis	mairii	Long Pocket, Brisbane	20-Feb-70
Reptiles	COLUBRIDAE	Tropidonophis	mairii	Brisbane, St Lucia	0
Reptiles	COLUBRIDAE	Tropidonophis	mairii	S Brisbane, nr Annerley	0
Reptiles	COLUBRIDAE	Tropidonophis	mairii	Brisbane, Graceville	0
Reptiles	COLUBRIDAE	Tropidonophis	mairii	Brisbane, Chelmer	0
Reptiles	ELAPIDAE	Cacophis	harriettae	St Lucia, Brisbane	27-Feb-96
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Taringa, Ellerslie Cres	15-Feb-99
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Taringa	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Brookfield, Gap Ck Rd	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Sherwood	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Chelmer	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Annerley	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Graceville	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Darra, Brisbane	0
Reptiles	ELAPIDAE	Cacophis	harriettae	Brisbane, Yeronga	0
Reptiles	ELAPIDAE	Cacophis	krefftii	Brisbane, Fairfield	6-Nov-98
Reptiles	ELAPIDAE	Cryptophis	nigrescens	Brookfield, Gap Ck Rd	0
Reptiles	ELAPIDAE	Cryptophis	nigrescens	S Brisbane, nr Annerley	0
Reptiles	ELAPIDAE	Demansia	psammophis	Brisbane, Graceville	12-Oct-73
Reptiles	ELAPIDAE	Demansia	psammophis	Brisbane, St Lucia	0
Reptiles	ELAPIDAE	Demansia	psammophis	Brisbane, Sherwood	0
Reptiles	ELAPIDAE	Demansia	psammophis	Brisbane, Yeronga	0
Reptiles	ELAPIDAE	Demansia	psammophis	Brisbane, Chelmer, R Tce	0
Reptiles	ELAPIDAE	Demansia	psammophis	Brisbane, Chelmer	0
Reptiles	ELAPIDAE	Hemiaspis	signata	Brisbane, Taringa	0
Reptiles	ELAPIDAE	Hemiaspis	signata	Brisbane, St Lucia	0
Reptiles	ELAPIDAE	Hemiaspis	signata	Brisbane, Chelmer	0
Reptiles	ELAPIDAE	Hemiaspis	signata	Brisbane, Graceville	0
Reptiles	ELAPIDAE	Hoplocephalus	bitorquatus	Darra	0
Reptiles	ELAPIDAE	Pseudechis	porphyriacus	Darra, Brisbane	0
Reptiles	ELAPIDAE	Pseudonaja	textilis	Graceville, 209 Graceville Ave	11-Oct-75
Reptiles	ELAPIDAE	Pseudonaja	textilis	Brisbane, Yeronga W	6-Oct-89
Reptiles	ELAPIDAE	Pseudonaja	textilis	Yeronga West, Brisbane	9-Oct-89
Reptiles	ELAPIDAE	Pseudonaja	textilis	Brisbane, St Lucia, Uni	0

Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, St Lucia, Uni Grounds	12-Oct-61
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, St Lucia	15-Oct-61
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, St Lucia, Uni Grounds	5-Dec-61
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, Taringa, 11 Tyne St	30-Nov-69
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, Taringa	12-Sep-71
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, Fig Tree Pocket, Roedean St	11-Jan-83
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, Fig Tree Pocket, Roedean St	11-Mar-83
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, St Lucia, Qld Uni	6-Aug-87
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, St Lucia	0
Reptiles	SCINCIDAE	Lampropholis	delicata	Brisbane, Annerley	0
Reptiles	SCINCIDAE	Ophioscincus	ophioscincus	Brisbane, Long Pocket, CSIRO Laboratories	0
Reptiles	SCINCIDAE	Ophioscincus	ophioscincus	Brisbane, Chelmer	0
Reptiles	SCINCIDAE	Tiliqua	scincoides	Brisbane, Sherwood	11-Sep-84
Reptiles	SCINCIDAE	Tiliqua	scincoides	Brisbane, Yeronga	0
Reptiles	AGAMIDAE	Physignathus	lesueurii	Brisbane, Yeronga	13-Mar-69
Reptiles	AGAMIDAE	Physignathus	lesueurii	Brisbane, Taringa	0
Reptiles	AGAMIDAE	Physignathus	lesueurii	Brisbane, Oxley Ck	0
Reptiles	AGAMIDAE	Pogona	barbata	Brisbane, St Lucia	20-Nov-77
Reptiles	AGAMIDAE	Pogona	barbata	Brisbane, Fig Tree Pocket, 4 Mandalay St	9-Jan-90
Reptiles	AGAMIDAE	Pogona	barbata	St Lucia, nr Seddon Bldg	18-Sep-90
Reptiles	AGAMIDAE	Pogona	barbata	St Lucia, Central Ave	10-Aug-92
Reptiles	AGAMIDAE	Pogona	barbata	Fairfield Gardens Shopping Centre	5-Sep-98
Reptiles	AGAMIDAE	Pogona	barbata	Rinora St, Corinda	13-Sep-01
Reptiles	AGAMIDAE	Pogona	barbata	Brisbane, Taringa	0
Reptiles	AGAMIDAE	Pogona	barbata	Brisbane, Graceville	0
Reptiles	VARANIDAE	Varanus	gouldii	Brisbane, St Lucia	0
Reptiles	TYPHLOPIDAE	Ramphotyphlops	ligatus	Brisbane, St Lucia	0
Reptiles	Pythonidae	Morelia	spilota	Brisbane, St Lucia	20-Oct-82
Reptiles	Pythonidae	Morelia	spilota	Orsova Rd, Yeronga	23-Sep-01
Reptiles	Pythonidae	Morelia	spilota	Brisbane, Taringa	0
Reptiles	Pythonidae	Morelia	spilota	Brisbane, Yeronga	0
Reptiles	Pythonidae	Morelia	spilota	Yeerongpilly	0
Reptiles	Pythonidae	Morelia	spilota	Darra, Brisbane	0
Reptiles	COLUBRIDAE	Boiga	irregularis	Brisbane, St Lucia	0
Reptiles	COLUBRIDAE	Boiga	irregularis	Brisbane, Taringa	0
Reptiles	COLUBRIDAE	Dendrelaphis	punctulata	Brookfield, Gap Ck Rd	6-Jun-71

Reptiles	SCINCIDAE	Carlia	foliorum		Brisbane, Fig Tree Pocket, Roedean St	1-Dec-82
Reptiles	SCINCIDAE	Carlia	pectoralis	pectoralis	Brisbane, St Lucia	12-Aug-61
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, St Lucia	29-Jul-61
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, St Lucia	30-Jul-61
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, St Lucia	12-Aug-61
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, St Lucia	4-Oct-61
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, St Lucia	14-Oct-61
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, St Lucia	23-Oct-62
Reptiles	SCINCIDAE	Carlia	vivax		Brisbane, Taringa, Tyne St	0
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	30-Jul-61
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	2-Aug-61
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	6-Aug-61
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	19-Aug-61
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	17-Sep-61
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	5-Apr-73
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, St Lucia	22-Feb-83
Reptiles	SCINCIDAE	Cryptoblepharus	virgatus		Brisbane, Fig Tree Pocket, Roedean St	0
Reptiles	SCINCIDAE	Ctenotus	robustus		Brisbane, St Lucia	0
Reptiles	SCINCIDAE	Ctenotus	robustus		Brisbane, Chelmer	0
Reptiles	SCINCIDAE	Ctenotus	robustus		Yerongpilly, Animal Research Institute	0
Reptiles	SCINCIDAE	Cyclodomorphus	gerrardii		Brisbane, Fig Tree Pocket, Roedean St	0
Reptiles	SCINCIDAE	Eroticoscincus	graciloides		Brisbane, Fig Tree Pocket, Roedean St	11-Jan-83
Reptiles	SCINCIDAE	Eroticoscincus	graciloides		Brisbane, Fig Tree Pocket, Roedean St	0
Reptiles	SCINCIDAE	Eulamprus	martini		Brisbane, St Lucia	2-Nov-61
Reptiles	SCINCIDAE	Eulamprus	martini		Brisbane, Annerley	0
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia, Uni Grounds	20-Apr-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia, Uni Grounds	24-Apr-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia, Uni Grounds	24-May-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia, Uni Grounds	25-May-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia	29-Jul-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia	30-Jul-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia	1-Aug-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia	2-Aug-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia	12-Aug-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia	17-Sep-61
Reptiles	SCINCIDAE	Lampropholis	delicata		Brisbane, St Lucia, Uni Grounds	11-Oct-61

Frogs	HYLIDAE	Litoria	fallax		St Lucia, Brisbane, Munroe St swamp	12-Aug-61
Frogs	HYLIDAE	Litoria	fallax		Queensland University grounds, St Lucia, Brisbane	5-Sep-61
Frogs	HYLIDAE	Litoria	fallax		Queensland University lake, St Lucia, Brisbane	4-Oct-61
Frogs	HYLIDAE	Litoria	fallax		St Lucia, Brisbane	1962
Frogs	HYLIDAE	Litoria	gracilenta		Regiment Swamp, St Lucia	18-Feb-61
Frogs	HYLIDAE	Litoria	gracilenta		Regiment Swamp, St Lucia	19-Feb-61
Frogs	HYLIDAE	Litoria	gracilenta		Regiment Swamp, St Lucia	8-Oct-61
Frogs	HYLIDAE	Litoria	gracilenta		Regiment Swamp, St Lucia	14-Mar-63
Frogs	HYLIDAE	Litoria	gracilenta		St Lucia, Brisbane	Jan-62
Frogs	HYLIDAE	Litoria	gracilenta		Rocklea, Brisbane	Feb-61
Frogs	HYLIDAE	Litoria	nasuta		Regiment Swamp, St Lucia	19-Feb-61
Frogs	HYLIDAE	Litoria	nasuta		Regiment Swamp, St Lucia	20-Feb-61
Frogs	HYLIDAE	Litoria	peronii		Taringa, Brisbane	0
Frogs	Hylidae	Litoria	wilcoxii		Toowong, Brisbane	0
Reptiles	Cheluidae	Chelodina	longicollis		Brisbane, Sherwood, Ign	0
Reptiles	Cheluidae	Elseya	latisternum		St Lucia, nr University Lake, Brisbane	14-Feb-94
Reptiles	Cheluidae	Elseya	latisternum		Brisbane R, Chelmer	0
Reptiles	Cheluidae	Emydura	macquarii	signata	Brisbane, Oxley Ck	0
Reptiles	GEKKONIDAE	Gehyra	australis		Darra, Brisbane	0
Reptiles	GEKKONIDAE	Gehyra	dubia		Darra, Brisbane	0
Reptiles	PYGOPODIDAE	Delma	plebeia		Brisbane, Graceville	0
Reptiles	PYGOPODIDAE	Lialis	burtonis		Brisbane, Taringa	0
Reptiles	PYGOPODIDAE	Lialis	burtonis		Darra, Brisbane	0
Reptiles	PYGOPODIDAE	Lialis	burtonis		Darra District	0
Reptiles	PYGOPODIDAE	Lialis	burtonis		Brisbane, Beverley Hill, Annerley	0
Reptiles	PYGOPODIDAE	Lialis	burtonis		Morooka	0
Reptiles	SCINCIDAE	Anomalopus	verreauxii		Brisbane, Taringa	0
Reptiles	SCINCIDAE	Anomalopus	verreauxii		Brookfield, Gap Ck Rd	0
Reptiles	SCINCIDAE	Anomalopus	verreauxii		Brisbane, Annerley	0
Reptiles	SCINCIDAE	Anomalopus	verreauxii		Salisbury Forestry Nursery	0
Reptiles	SCINCIDAE	Anomalopus	verreauxii		Yeerongpilly	0
Reptiles	SCINCIDAE	Calyptotis	scutirostrum		Brisbane, St Lucia, Munro St Swamp	5-Jun-61
Reptiles	SCINCIDAE	Calyptotis	scutirostrum		Brisbane, St Lucia	15-Oct-61
Reptiles	SCINCIDAE	Calyptotis	scutirostrum		Brisbane, St Lucia	21-Jul-82
Reptiles	SCINCIDAE	Calyptotis	scutirostrum		Brisbane, St Lucia, Uni Grounds	1-Jul-85
Reptiles	SCINCIDAE	Carlia	foliorum		Brisbane, St Lucia	5-Apr-73

QUEENSLAND MUSEUM DATA SEARCH RESULTS

GROUP	ORDER	FAMILY	GENUS	SPECIES	LOCALITY	DATE
Frogs	MICROHYLIDAE	Cophixalus	ornatus		Yeronga, Brisbane	5-Jan-86
Frogs	MYOBATRACHIDAE	Adelotus	brevis		St Lucia, Brisbane	8-Oct-61
Frogs	MYOBATRACHIDAE	Crinia	parinsignifera		Sherwood Rd, Rocklea	29-Jul-61
Frogs	MYOBATRACHIDAE	Crinia	parinsignifera		Sherwood Rd, Rocklea	30-Jul-61
Frogs	MYOBATRACHIDAE	Limnodynastes	ornatus		Chelmer, Brisbane	29-Oct-44
Frogs	MYOBATRACHIDAE	Limnodynastes	ornatus		Chelmer, Brisbane	0
Frogs	MYOBATRACHIDAE	Limnodynastes	ornatus		Rocklea, Brisbane	Jan-61
Frogs	MYOBATRACHIDAE	Limnodynastes	ornatus		Yeerongpilly, Brisbane	0
Frogs	MYOBATRACHIDAE	Limnodynastes	peronii		St Lucia, Brisbane, Munroe St Swamp	5-Jun-61
Frogs	MYOBATRACHIDAE	Limnodynastes	peronii		St Lucia, Brisbane, Munroe St Swamp	13-Aug-61
Frogs	MYOBATRACHIDAE	Limnodynastes	peronii		Regiment Swamp, St Lucia	8-Oct-61
Frogs	MYOBATRACHIDAE	Limnodynastes	peronii		Regiment Swamp, St Lucia	14-Oct-62
Frogs	MYOBATRACHIDAE	Limnodynastes	peronii		Regiment Swamp, St Lucia	14-Mar-63
Frogs	MYOBATRACHIDAE	Limnodynastes	peronii		Rocklea, Brisbane	Jan-61
Frogs	MYOBATRACHIDAE	Limnodynastes	tasmaniensis		St Lucia, Brisbane?	1962
Frogs	MYOBATRACHIDAE	Limnodynastes	tasmaniensis		Yeerongpilly, Brisbane	0
Frogs	MYOBATRACHIDAE	Limnodynastes	terraereginae		Chelmer, Brisbane	0
Frogs	MYOBATRACHIDAE	Pseudophryne	major		St Lucia, Brisbane, Munroe St Swamp	5-Jun-61
Frogs	MYOBATRACHIDAE	Pseudophryne	major		Munro St Swp, St Lucia, Brisbane	5-Jun-61
Frogs	MYOBATRACHIDAE	Pseudophryne	major		Yeerongpilly, Brisbane	0
Frogs	MYOBATRACHIDAE	Pseudophryne	raveni		Orchard Tce, St Lucia, Brisbane	17-Mar-61
Frogs	MYOBATRACHIDAE	Pseudophryne	raveni		St Lucia, Brisbane, Munroe St Swamp	5-Jun-61
Frogs	MYOBATRACHIDAE	Uperoleia	laevigata		Chelmer, Brisbane	0
Frogs	MYOBATRACHIDAE	Uperoleia	rugosa		Rocklea, Brisbane	Jan-61
Frogs	HYLIDAE	Cyclorana	alboguttata		Tennyson, Brisbane	0
Frogs	HYLIDAE	Litoria	caerulea		Highland Tce, St Lucia, Brisbane	21-Oct-61
Frogs	HYLIDAE	Litoria	caerulea		St Lucia, Brisbane	17-Jan-63
Frogs	HYLIDAE	Litoria	dentata		University Swamp, nr Regiment Hall, St Lucia	18-Feb-61
Frogs	HYLIDAE	Litoria	dentata		University Swamp, nr Regiment Hall, St Lucia	19-Feb-61
Frogs	HYLIDAE	Litoria	dentata		Regiment Swamp, St Lucia	20-Feb-61
Frogs	HYLIDAE	Litoria	dentata		Regiment Swamp, St Lucia	22-May-61
Frogs	HYLIDAE	Litoria	dentata		Regiment Swamp, St Lucia	8-Oct-61
Frogs	HYLIDAE	Litoria	dentata		Rocklea, Brisbane	Feb-61
Frogs	HYLIDAE	Litoria	fallax		St Lucia, Brisbane	2-Aug-61

					Brisbane River, Long Pocket. River bank, clay soil, ex Eucalyptus tereticornis flat. 1-2m tall woody herb, yellow flowers.
Angiosperm	Asteraceae	*	Tithonia diversifolia (Hemsl.) A.Gray	23JAN2000	BRISBANE RIVER, LONG POCKET Highly visible plant around Brisbane. Common.
					AGRICULTURAL RESEARCH LABORATORIES QDPI INDOOROOPILLY Agricultural Research Laboratories, QDPI Indooroopilly.
					FOOTPATH BETWEEN FORESTRY BUILDING & DLU Footpath between Forestry building and DLU. Decumbent annual. Fairly common.
Angiosperm	Poaceae	*	Digitaria violascens Link	FEB1989	
					GARDEN BED BESIDE QLD HERBARIUM Growing in garden bed beside Qld Herbarium Glasshouse, Meiers Road, Indooroopilly.
					GLASSHOUSE MEIERS RD INDOOROOPILLY (P) (C) Rampant ground cover/twiner. flowers white, turning cream with age. This taxon is naturalised in Qld & NSW.
Angiosperm	Caprifoliaceae	*	Lonicera japonica Thunb. ex Murray	13DEC1995	
					Oxley Creek, Sherwood Brisbane; Strickland Terrace. Creek bank, Melaleuca - Eucalyptus overstorey, weedy understorey.
					OXLEY CREEK, SHERWOOD BRISBANE; STRICKLAND TERRACE NR TENNYSON Naturalised vine covering 2m x 1m area. Rare.
Angiosperm	Bignoniaceae	*	Pyrostegia venusta (Ker Gawl.) Miers	02AUG2003	
					POWERHOUSE BRISBANE
Angiosperm	Brassicaceae	*	Rapistrum rugosum (L.) All.	20SEP1968	
					BRISBANE TENNYSON POWERHOUSE OUTSIDE TENNYSON
Angiosperm	Convolvulaceae	*	Cuscuta campestris Yunck.	23SEP1968	
					POWER HOUSE BRISBANE
Angiosperm	Polygonaceae		Rumex brownii Campd.	23SEP1968	
					Oxley Creek, on edge of Terrace playing field, Tennyson. On edge of creek, behind Avicennia marina.
Angiosperm	Euphorbiaceae		Excoecaria agallocha L.	20NOV1994	OXLEY CK TENNYSON Plant 2 metres tall, narrow.

					Esplanade, Brisbane River bank opposite end of Anita Street, Yeronga.
					Growing in lawn. Loamy soil.
					Small herb, annual. Foliage bright green. Fruit a burr with sharp spines.
				ESPLANADE, BRISBANE RIVER BANK OPPOSITE END OF ANITA STREET, YERONGA	Weed.
		Soliva sessilis Ruiz			Common name: bindy-eye or jo-jo weed. Native of South America.
Angiosperm Asteraceae	*	& Pav.	16SEP2002		Common in laws in the Brisbane area.
					Esplanade, Brisbane River bank opposite end of Anita Street, Yeronga.
					Riverbank in loamy soil. Climbing on Lophostemon confertus - remnant vegetation.
				ESPLANADE, BRISBANE RIVER BANK OPPOSITE END OF ANITA STREET, YERONGA	Vine climbing into tree tops. Leaves bright green, very glossy above, slightly paler & less glossy below.
		Pandorea sp. (Ipswich			Flowers creamy-yellow with maroon markings in throat.
Angiosperm Bignoniaceae		K.A.Williams 86020)	16SEP2002		Indooroopilly, Brisbane.
		Eragrostis		BRISBANE	Spontaneous in garden from sandy soil. Nearly a
Angiosperm Poaceae		spartinoides Steud.	22JAN1970	INDOOROOPILLY	single sprawling tuft.
					Brisbane River, Long Pocket - Indooroopilly.
					River bank, Eucalyptus tereticornis woodland, weedy understorey.
				BRISBANE RIVER, LONG POCKET -	Naturalised garden plant, tree 7m tall, mauve flowers.
Angiosperm Caesalpiniaceae	*	Bauhinia variegata L.	09SEP2000	INDOOROOPILLY	One tree.
					Long Pocket, Indooroopilly, near St. Lucia Golf Club.
		Bolboschoenus fluviatilis (Torr.)		LONG POCKET, INDOOROOPILLY, NEAR	Drainage line infested with weeds and tall sedges. Native, tall sedge 1-2m high.
Angiosperm Cyperaceae		Sojak	23JAN2000	ST. LUCIA GOLF CLUB	Common.
					Long Pocket, Sir John Chandler Park, Indooroopilly.
					River side, mangrove, fringing with weeds on drier band.
				LONG POCKET, SIR JOHN CHANDLER PARK,	Naturalised 5m Maberry tree with Celtis and E. tereticornis.
Angiosperm Moraceae	*	Morus alba L.	25JAN2000	INDOOROOPILLY	3 individuals plants seen.
					Brisbane River, Long Pocket, Indooroopilly.
					River bank mid terrace, Eucalyptus tereticornis woodland infested with Jacaranda & Celtis.
				BRISBANE RIVER, LONG POCKET,	Naturalised tree 6m.
		Jacaranda			
Angiosperm Bignoniaceae	*	mimosifolia D.Don	20AUG2000	INDOOROOPILLY	Occasional.

					Long Pocket Golf Course, Brisbane.
					River bank, drainage line Eucalyptus tereticornis flat.
Angiosperm Myrtaceae	*	Psidium guajava L.	23JAN2000	LONG POCKET GOLF COURSE, BRISBANE	Small tree 3m. Occasional. Long Pocket, Brisbane.
					River banks, clay soil, disturbed area, Eucalyptus tereticornis woodland.
Angiosperm Chenopodiaceae		Chenopodium carinatum R.Br.	27SEP2000	LONG POCKET, BRISBANE	Native weed, prostrate herb, annual. Occasional. Indooroopilly, Brisbane.
					Disturbed remnant of Eucalyptus forest on ridge top on shallow stoney soil.
Angiosperm Poaceae		Digitaria breviglumis (Domin) Henrard	13JAN1972	BRISBANE INDOOROOPILLY	Erect green tufts. Indooroopilly, Brisbane.
Angiosperm Fabaceae	*	Melilotus indicus (L.) All.	01NOV1968	BRISBANE INDOOROOPILLY	On waste ground. Voucher for specimen for seed for Standards Branch.
				ESPLANADE OPPOSITE ANITA STREET,YERONGA, BRISBANE - BANK OF BRISBANE RIVER	Esplanade opposite Anita Street,Yeronga, Brisbane - bank of Brisbane River. River bank in loamy soil.
Angiosperm Rosaceae	*	Prunus persica (L.) Batsch var. persica	16SEP2002		Small tree c. 2.5m tall, fruit immature. Naturalised. Uncommon. Esplanade, Brisbane River bank opposite Anita Street, Yeronga.
				ESPLANADE, BRISBANE RIVER BANK OPPOSITE ANITA STREET, YERONGA	Annual erect herb c. 40cm high. Flowers white. Weed. Common name: shepherds purse. Native of Europe.
Angiosperm Brassicaceae	*	Capsella bursapastoris (L.) Medik.	16SEP2002		Common. Esplanade, Brisbane River bank opposite end of Anita Street, Yeronga.
				ESPLANADE, BRISBANE RIVER BANK OPPOSITE END OF ANITA STREE, YERONGA	In lawn above river. Loamy soil. Prostrate to sprawling herb c. 30cm high. Weed, native of Europe.
Angiosperm Brassicaceae	*	Lepidium didymum L.	16SEP2002		Common.

				AGRICULTURAL RESEARCH LABORATORIES QDPI INDOOROOPILLY	Agricultural Research Laboratories QDPI Indooroopilly.
				FOOTPATH BETWEEN FORESTRY BUILDING & DLU	Footpath between Forestry building and DLU. Decumbent annual. Fairly common.
Angiosperm Poaceae	*	Digitaria ciliaris (Retz.) Koeler	FEB1989		
				AGRICULTURAL RESEARCH LABORATORIES QDPI INDOOROOPILLY	Agricultural Research Laboratories, QDPI Indooroopilly.
				FOOTPATH BETWEEN FORESTRY BUILDING & DLU	Footpath between Forestry building and DLU. Decumbent annual. Fairly common.
Angiosperm Poaceae	*	Eragrostis mexicana (Hornem.) Link	FEB1989		
Angiosperm Fabaceae	*	Macroptilium atropurpureum (DC.) Urb.	11NOV1968	BRISBANE INDOOROOPILLY	Indooroopilly, Brisbane. On roadside. Voucher specimen for seed for Standards Branch.
Angiosperm Rubiaceae		Psydrax odorata forma buxifolia (Benth.) S.T.Reynolds & R.J.F.Hend.	11NOV1982	INDOOROOPILLY DEPT OF PRIMARY INDUSTRIES COMPLEX BRISBANE	D.P.I. complex, Indooroopilly.
Angiosperm Bignoniaceae	*	Tecoma stans (L.) Juss. ex Kunth	14OCT1980	INDOOROOPILLY LONG POCKET	Brisbane River bank at end of Anita St, Yeronga. River bank beside park in open sunny location. Above mangroves. Herb with bluish-green leaves. Flowers range from yellow, orange to deep red. Flowers & fruit edible.
Angiosperm Tropaeolaceae	*	Tropaeolum majus L.	05AUG2000	BRISBANE RIVER BANK AT END OF ANITA ST YERONGA	Naturalised, covering a norrow band c. 50m long, beside mown area. Native of S. America. Nasturtium.
Angiosperm Araliaceae	*	Schefflera arboricola (Hayata) Merr.	05AUG2000	BRISBANE RIVER BANK AT END OF ANITA ST YERONGA	Brisbane River bank at end of Anita St, Yeronga. River bank beside park. Bushy shrub 4m high with dark green glossy leaves & orange fruit. Sap irritates the skin. 1 plant seen.

Angiosperm	Hemerocallidaceae	Dianella longifolia R.Br. var. longifolia	15OCT1968	BRISBANE INDOOROOPILLY	
Angiosperm	Hemerocallidaceae	Dianella revoluta R.Br. var. revoluta	17NOV1970	BRISBANE FIG TREE POCKET	
Angiosperm	Lamiaceae *	Stachys arvensis L.	24AUG1968	BRISBANE HIGHGATE HILL	
Angiosperm	Euphorbiaceae *	Chamaesyce prostrata (Aiton) Small	14MAR1973	YEERONGPILLY ANIMAL RESEARCH INSTITUTE	
Angiosperm	Myrtaceae	Eucalyptus major (Maiden) Blakely	22JAN1970	BRISBANE INDOOROOPILLY INDOOROOPILLY	Indooroopilly. On stony loamy soil overlying phyllite; disturbed ground.
Angiosperm	Cyperaceae *	Cyperus albostriatus Schrad.	22MAR1978	OPPOSITE QUEENSLAND HERBARIUM BRISBANE	
Angiosperm	Amaranthaceae *	Amaranthus viridis L.	05OCT1968	BRISBANE INDOOROOPILLY	
Angiosperm	Malvaceae *	Malvastrum coromandelianum (L.) Garcke	02OCT1968	BRISBANE HIGHGATE HILL	
Angiosperm	Fabaceae *	Crotalaria lanceolata E.Mey. subsp. lanceolata	06FEB1975	INDOOROOPILLY DPI COMPLEX BRISBANE	Indooroopilly, D.P.I. Complex. Voucher for seed - Standards Branch.
Angiosperm	Pontederiaceae *	Eichhornia crassipes (Mart.) Solms	29MAR1972	INDOOROOPILLY GOLF COURSE (REFSET)	
Angiosperm	Myrtaceae	Eucalyptus crebra F.Muell.	22JAN1970	BRISBANE INDOOROOPILLY	Indooroopilly. Remnant of Eucalyptus forest on stony, loamy soil overlying phyllite, +/- 20m, common. Tree +/- 25m high; with nearly black, hard, rough, deeply furrowed bark becoming smooth and pale on twigs; dull green concolorous leaves.
Angiosperm	Asteraceae *	Bidens pilosa L.	01FEB1982	BRISBANE INDOOROOPILLY	Indooroopilly. Weed in garden bed, shaded situation. Erect annual to 0.8m. Indooroopilly, Brisbane.
Angiosperm	Poaceae	Eragrostis brownii (Kunth) Nees ex Wight	13JAN1972	BRISBANE INDOOROOPILLY	Disturbed remnant of Eucalyptus forest on ridge top on shallow stony soil. Green tufts, culms oblique, spikelets greenish to purple.

		Chrysocephalum apiculatum (Labill.)		BRISBANE	Indooroopilly, Brisbane, near herbarium. In disturbed ground. Herb ca 20cm tall; leaves green above, silvery beneath, flowers bright yellow.
Angiosperm	Asteraceae	Steetz	07NOV1969	INDOOROOPILLY	Voucher for illustration by P. Cambridge.
		Cynodon nlemfuensis Vanderyst var.		OXLEY CREEK,	Oxley Creek, Sherwood.
Angiosperm	Poaceae *	nlemfuensis	JUN2002	SHERWOOD	Grass.
				BRISBANE RIVER, LONG POCKET,	Brisbane River, Long Pocket, Indooroopilly. River bank, clay soil; closed forest with overstorey of Eucalyptus tereticornis; weedy understorey. Naturalised shrub 2.3m tall.
Angiosperm	Rubiaceae *	Coffea arabica L.	20AUG2000	INDOOROOPILLY	One plant.
				INDOOROOPILLY, BRISBANE, ST LUCIA	Indooroopilly, Brisbane, St Lucia Golf Club. Drainage line, Eucalyptus tereticornis flat, clay soil. Environmental weed, creeping herb producing seeds, fertile.
Angiosperm	Asteraceae *	Sphagneticola trilobata (L.) Pruski	29JUL2000	GOLF CLUB	Common.
		Solanum americanum subsp. nodiflorum (Jacq.)		LONG POCKET	
Angiosperm	Solanaceae *	R.J.F.Hend.	22JUN1972	8KM SSW OF BRISBANE	
Angiosperm	Portulacaceae	Portulaca pilosa L. subsp. pilosa	22JUN1972	LONG POCKET 8KM SW OF BRISBANE	
		Solanum		LONG POCKET	
Angiosperm	Solanaceae *	mauritianum Scop.	22JUN1972	8KM SSW OF BRISBANE	
Angiosperm	Hemerocallidaceae	Dianella revoluta R.Br. var. revoluta	07NOV1969	BRISBANE INDOOROOPILLY	
Angiosperm	Convolvulaceae *	Ipomoea cairica (L.) Sweet	21JUN1974	BRISBANE GRACEVILLE	
Angiosperm	Epacridaceae	Leucopogon juniperinus R.Br.	01AUG1968		
				LONG POCKET INDOOROOPILLY AT SIDE OF BRISBANE RIVER OPPOSITE	
		Heimia salicifolia			
Angiosperm	Lythraceae *	Link	06NOV1972	TENNYSON POWER	Tennyson Powerhouse (Brisbane). Outside on roadside. Seed voucher specimen for Standard Branch (Dept Primary Industries).
Angiosperm	Polygonaceae *	Rumex crispus L.	23SEP1968	BRISBANE TENNYSON POWERHOUSE	(Mixed specimen, AQ695366 separated, Feb 2004)

					Long Pocket, Brisbane.
					Brisbane river banks, disturbed area, Eucalyptus tereticornis woodland.
Angiosperm Poaceae	*	Digitaria didactyla Willd.	24SEP2000	LONG POCKET, BRISBANE	Creeping grass. Common.
					Long Pocket, Brisbane River Sir John Chandler Park.
					River bank silty clay, Eucalyptus tereticornis flat.
				LONG POCKET,	Some cleared are, weedy river bank.
		Tipuana tipu (Benth.)		BRISBANE RIVER SIR	Tree 6m tall.
Angiosperm Fabaceae	*	Kuntze	23JAN2000	JOHN CHANDLER PARK	Rare (2 plants).
		Megathyrsus maximus (Jacq.)			Long Pocket, Indooroopilly, Brisbane River.
		B.K.Simon &			River bank, E. tereticornis gallery forest, with weedy understorey.
		S.W.L.Jacobs var.		LONG POCKET, INDOOROOPILLY,	Environmental weed, 1.5 - 2m tall, grass.
Angiosperm Poaceae	*	maximus	23JAN2000	BRISBANE RIVER	Common.
					Brisbane River, Long Pocket, Indooroopilly.
					River bank upper terrace, Eucalyptus tereticornis woodland/parkland.
				BRISBANE RIVER, LONG	
		Rumex brownii		POCKET,	Ground cover annual, suburban weed.
Angiosperm Polygonaceae		Campd.	20AUG2000	INDOOROOPILLY	Common.
					Long Pocket, Indooroopilly.
					Riverbanks, gully infested by vine and castor oil plant.
		Neonotonia wightii (Graham ex Wight &			Rampant vine, shady site.
		Arn.) J.A.Lackey var.		LONG POCKET,	Not fruiting in summer.
Angiosperm Fabaceae	*	wightii	23JAN2000	INDOOROOPILLY	Dominant.
				INDOOROOPILLY	
Angiosperm Cannaceae	*	Canna indica L.	03AUG1984	WITTON CK	
				BRISBANE	
		Wollastonia biflora		INDOOROOPILLY	Indooroopilly, Brisbane.
Angiosperm Asteraceae		(L.) DC.	05NOV1980	(PUBREF)	River bank. Branching herb to 2m., flowers yellow.
		Apium prostratum var. filiforme (A.Rich.) Kirk -			
		A.prostratum Labill. ex Vent. var.		BRISBANE INDOOROOPILLY	
Angiosperm Apiaceae		prostratum	05NOV1980	(PUBREF)	
					Agricultural Research Laboratories, Indooroopilly.
				INDOOROOPILLY AGRICULTURAL	Weed in lawn, creeping stolons with erect flowering branches, corolla mauve pink.
		Desmodium incanum		RESEARCH	Plants occupy only small area but have persisted for
Angiosperm Fabaceae	*	DC.	01DEC1995	LABORATORIES	many years.

					Long Pocket, Brisbane River, Sir John Chandler Park.
					River Flat, clay soil, Eucalyptus tereticornis remnant forest.
Angiosperm	Mimosaceae	*	Leucaena leucocephala (Lam.) de Wit subsp. leucocephala	23JAN2000	LONG POCKET, BRISBANE RIVER, SIR JOHN CHANDLER PARK	Weed infested understorey. Shrub 2.5m. Common.
						Brisbane River, Long Pocket. Roadside herbland.
Angiosperm	Brassicaceae	*	Cardamine hirsuta L.	09SEP2000	BRISBANE RIVER, LONG POCKET	Annual herb, with white flowers. Occasional.
						Brisbane River, Long Pocket Indooroopilly.
					BRISBANE RIVER, LONG POCKET	River bank, Celtis forming dominant canopy. Deciduous tree, 12m tall.
Angiosperm	Ulmaceae	*	Celtis sinensis Pers.	09SEP2000	INDOOROOPILLY	Occasional. Brisbane River, Indooroopilly.
						River bank, clay soil, Celtis woodland.
Angiosperm	Asparagaceae	*	Asparagus africanus Lam.	09SEP2000	BRISBANE RIVER, INDOOROOPILLY	Vigorous vine. Common. Brisbane River, Indooroopilly.
						River bank, clay soil, Eucalyptus tereticornis woodland, weedy understorey.
Angiosperm	Moraceae	*	Morus alba L.	09SEP2000	BRISBANE RIVER, INDOOROOPILLY	Tree 6m tall. Occasional. Brisbane River, Long Pocket - Indooroopilly.
						River bank, clay soil, Eucalyptus tereticornis woodland, weedy understorey.
Angiosperm	Apocynaceae	*	Cascabela thevetia (L.) Lippold	09SEP2000	BRISBANE RIVER, LONG POCKET - INDOOROOPILLY	Shrub 2m tall. Rare. Brisbane River, Indooroopilly.
						River bank, Eucalyptus tereticornis woodland.
Angiosperm	Malvaceae	*	Malvaviscus arboreus Cav.	09SEP2000	BRISBANE RIVER, INDOOROOPILLY	Shrub 1.2m. Rare. Long Pocket, Brisbane River, Sir John Chandler Park.
						River terrace, clay soil, Eucalyptus tereticornis woodland, some moving.
Angiosperm	Poaceae	*	Poa annua L.	24SEP2000	LONG POCKET, BRISBANE RIVER, SIR JOHN CHANDLER PARK	Annual weedy grass. Occasional.