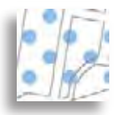

Study Area Boundary


Signature Project Opportunities


Major Change


Business As Usual


Major Road Boulevards

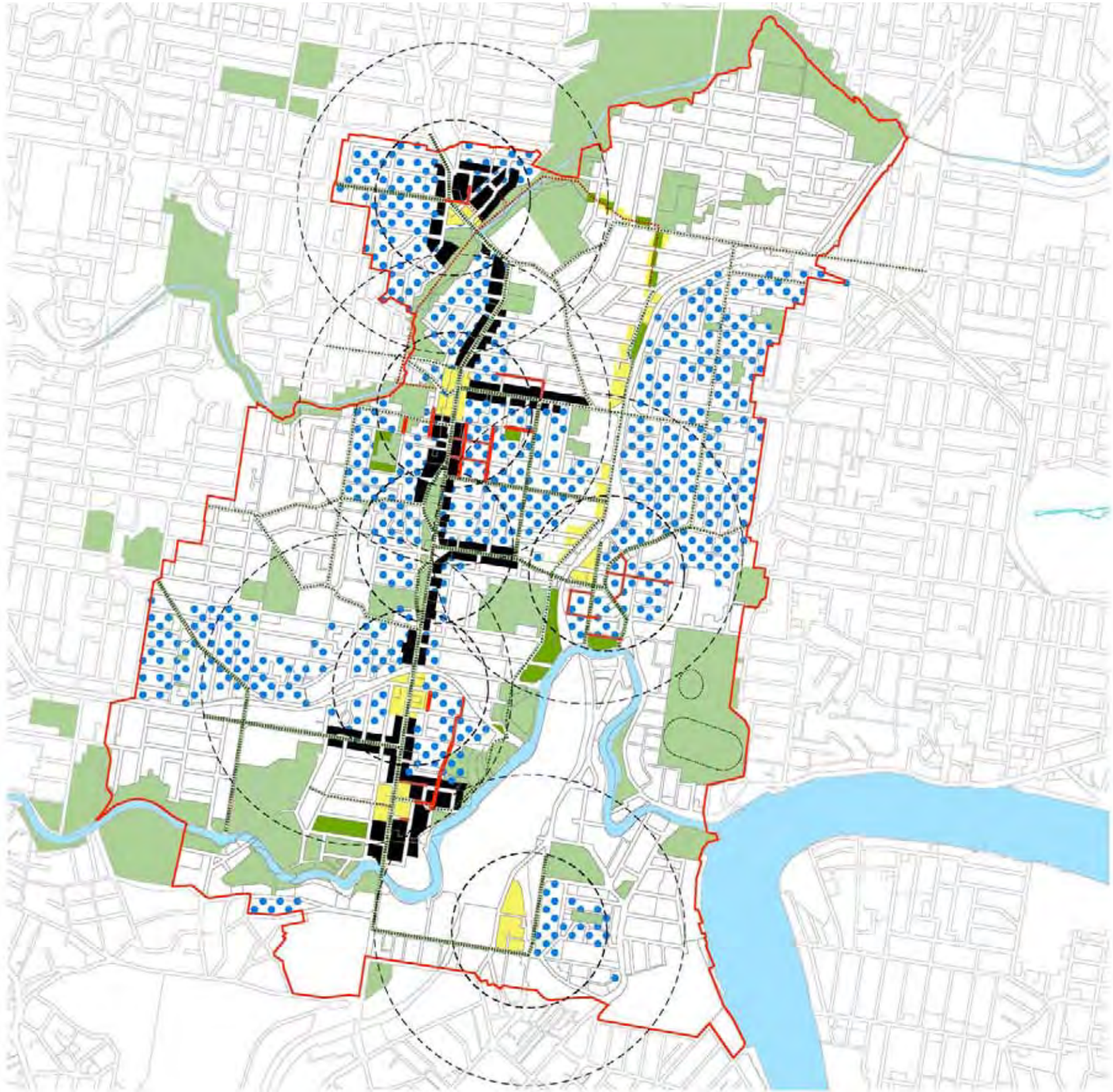

Minor Road Avenues


New Street Connections


New Pedestrian Linkage


New Park


Existing Parks



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Option 3: Infrastructure, Corridor, Signature Projects, Moderate Increase

Section 4: TOD Concept Plans

Concept Plans for TOD centres have been developed. These concepts do not show specific land-uses and densities and possible forms of development, but public realm improvements that will be needed for each place to effectively emerge as a true Transit Oriented Community. These diagrams act as 'urban design briefs' for each TOD that can inform the design process for the Airport Link and Busway Infrastructure Projects. The concept plans demonstrate the following:

- New street connections
- New pedestrian connections
- Plazas
- New open spaces
- Boulevard treatments
- Possible Busway station integration

Major through roads, Boulevard treatment

Minor Connected Streets

Pedestrian Connections

New streets

New pedestrian connection

Plazas/Bus station opportunities

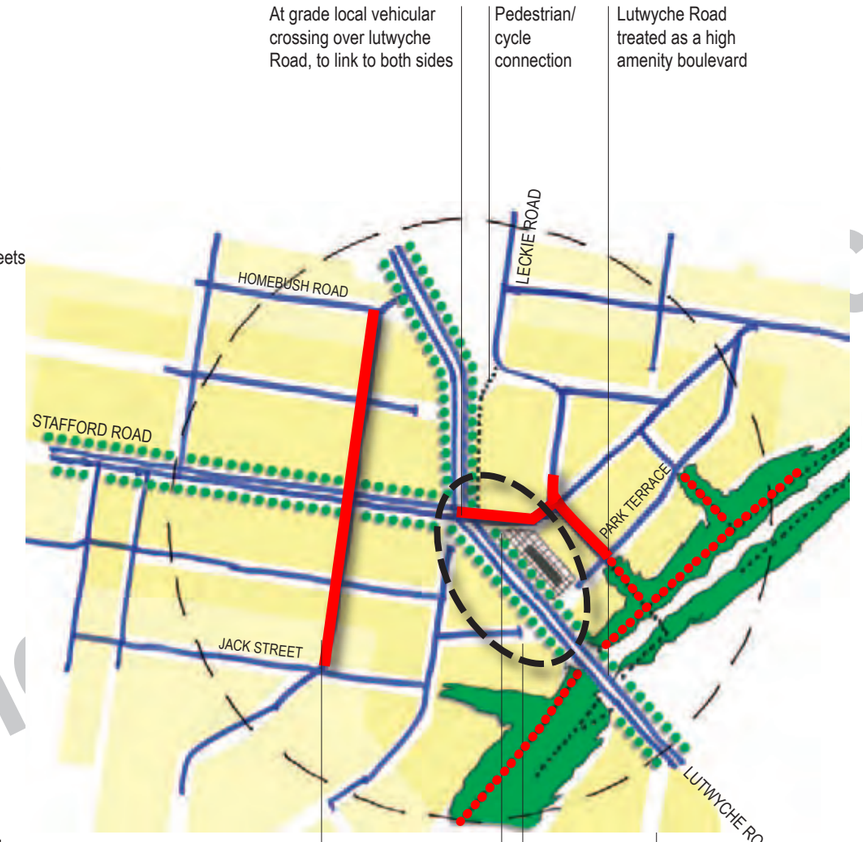
Parklands

Areas of major change

Areas of incremental change

Areas of no change

TOD signature project opportunity



At grade local vehicular crossing over lutwyche Road, to link to both sides

Pedestrian/ cycle connection

Lutwyche Road treated as a high amenity boulevard

New streets improve local connections

Busway Station and plaza located in a visible and accessible location at TOD centre near Stafford Road Intersection

Local streets closed off

Improved pedestrian and cycle links to Kedron Brook, pedestrian and cycleways on north side of corridor with a new footbridge connection

Gordon Park

Location

Gordon Park/ Kedron is located on low flat land, just north of the Kedron Brook corridor. There is a rise to the north east. The major east west connection, Stafford Road and the Airport link. The Airport link is proposed to connect into this centre.

Land-Use

The area is predominantly lower density residential within LMR zonings. There are a number of walkup apartment buildings along Stafford Road. Strips of commercial use car yards.

Connectivity

New pedestrian linkages at edge of Kedron Brook.
Local cross connections across Lutwyche Road linking Stafford Road with Lasseter Street and continuing to Park Terrace.
New North-South street connection from Jack St to Homebush Road.

Density and Built Form

Gordon Park Kedron will emerge as a significant location within the metropolitan region with excellent arterial and Airport link access as well as amenities of parklands, employment and community facilities nearby.

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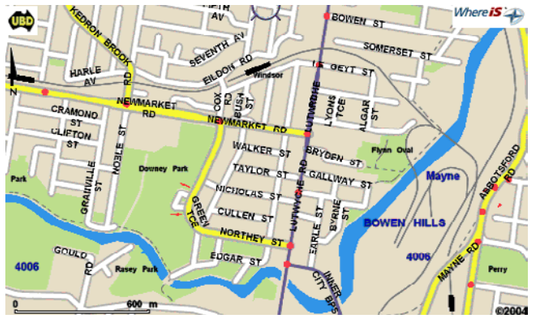
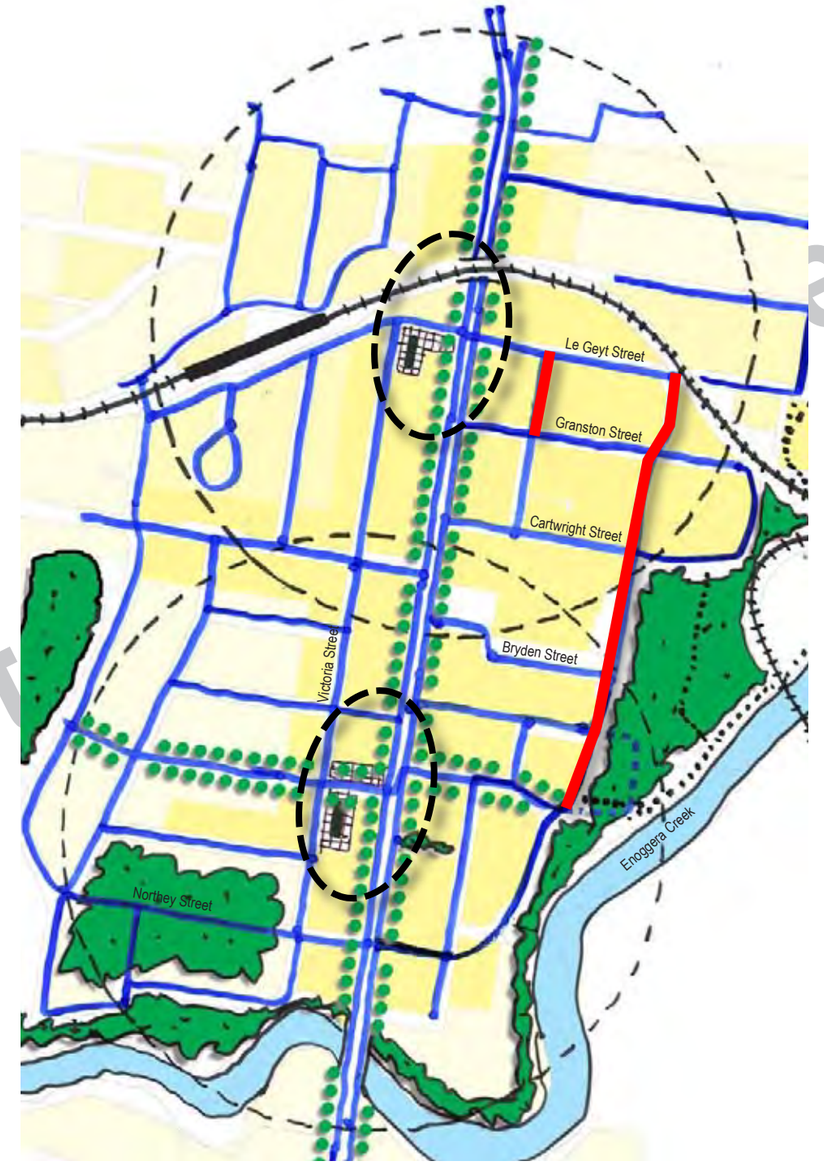
Figure 12: Gordon Park TOD Concept



- Major through roads, Boulevard treatment
- Minor Connected Streets
- Pedestrian Connections
- New streets
- New pedestrian connection
- Plazas/Bus station opportunities
- Parklands
- Areas of major change
- Areas of incremental change
- Areas of no change
- TOD signature project opportunity



Windsor and Windsor South

Location

Windsor and Windsor South is an extensive precinct in close proximity to the CBD that extends from RBH to the Ferny Grove railway line at Windsor.
Lutwyche Road acts as a spine for the is a grand street running up hill away from the City.

Land Uses

Lutwyche Road has the potential to become a grand urban boulevard with views to the City. With good access, visibility and a proximity to a major hospital, opportunities for significant businesses are available.
Residential uses can be incorporated behind facing commercial development onto new and/or improved parklands and waterway corridors.

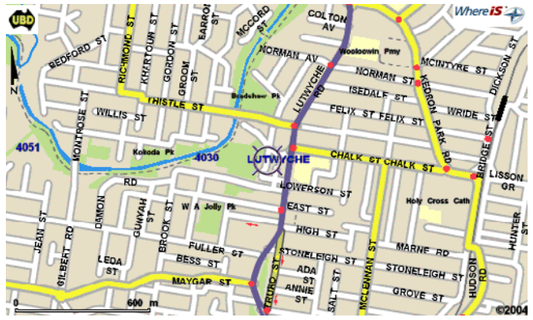
Connectivity

The eastern side of Lutwyche Road has poor north/south street connectivity. New north/south street connections are required between Le Geyt and Granston Streets along the Lyons Terrace alignmnet and between Le Geyt and Bryden Streets. along the Algar Street alignment.

Density & Built Form

High density commercial developments can directly face the new urban boulevard and lower density residential uses can be incorporated transitioning to traditional character residential precincts and heritage buildings within the precinct.

Figure 13: Windsor and Windsor South TOD Concept



Lutwyche

Location

The Lutwyche Centre straddles the major arterial of Lutwyche Road with lesser order streets intersecting Bradshaw Street and Maygar Road to the west and Chalk Street to the east. Lutwyche is situated on a relatively elevated ground and falls to the northwest to Kedron Brook and its associated extensive linear parkland network.

Land use

Lutwyche contains a large scale shopping centre and acts as the major retail centre between the Valley and Chermside. Commercial and retail uses will predominate facing Lutwyche Road with mixed uses on major cross streets. Higher density housing is sleeved in behind these uses facing onto the minor streets, parks and open spaces.

Connectivity

New North-South street connections are from Lowerson St to Stoneleigh St and High St. North-South connections are also enhanced by extending Tobruk St and Lamington St.
Pedestrian linkages around Prentice Park provide a North South link between Swinburne and Thistle Streets and an East West connection across Kedron Brook.
New parkland linkage between Laura Street and Florrie Street.

Density and Built Form

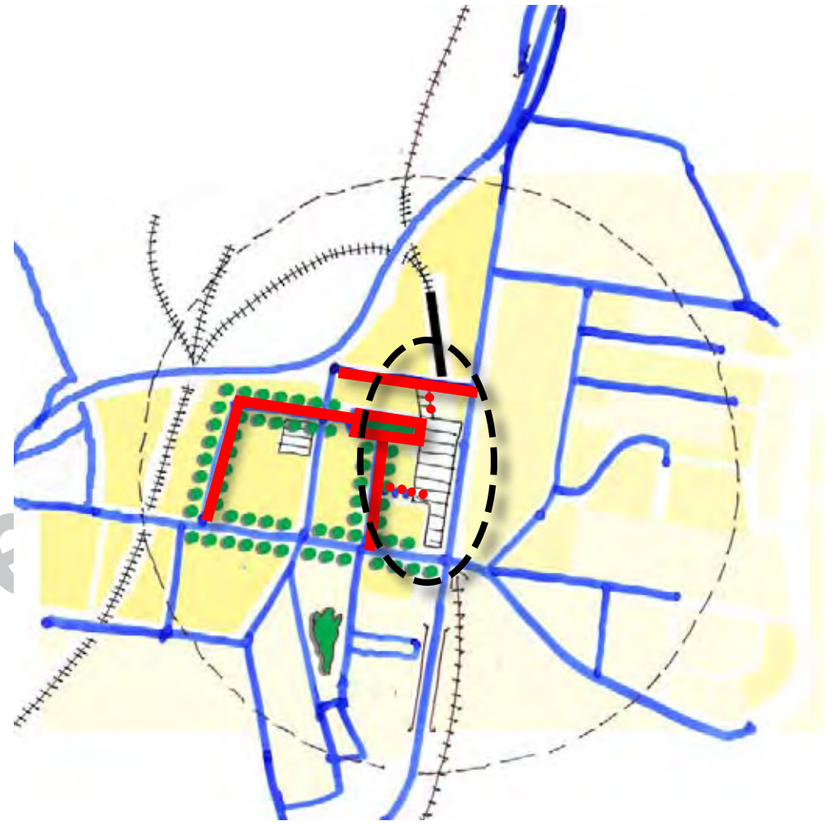
Lutwyche has potential to emerge as a significant TOD with a higher densities.
The bus station located in a prime visible and accessible location in the centre and seamlessly integrated into the centre. Lutwyche Road configured as a boulevard, incorporating transit lanes. Enlarged Prentice or WA Jolly park.

Urban Amenity

New parks associated with Tennis Centre linking Laura Street to McLennan Street. WA Jolly Park is enlarged to create more usuable open space and better urban interfaces.

Figure 14: Lutwyche TOD Concept

Figure 15: Windsor and Windsor South TOD Concept



Bowen Hills

Location

Bowen Hills is a strategic location in the inner northern Brisbane, the first railway station beyond the city centre. Areas of large scale employment are found in the area including RBH, Queensland Newspapers and Queensland Rail.

Land Uses

Bowen Hills is characterised by an established residential precinct on the east on the hill top and sides. Lower intensity industrial uses to the west and south, although Queensland Newspapers is a substantial facility. These areas are intensifying with new housing and commercial projects. The land around the station is largely vacant brownfield area.

Connectivity

Campbell Street and Abbotsford Road are primary roads in the precinct with good proximity to the ICB, the City Centre and Valley. Additional streets need to be incorporated through development located in positions to improve access from surrounding precincts for pedestrians as well as vehicles.

Density & Built Form

As one of the few 'brownfield sites' within the precinct with interfaces to railway lines, ICB and busineses rather than residential, the area has the potential for a high density development. Residential areas to the east on the hill top are effectively built out. Existing traditional houses are substantial and add to the character of the area. Mixed uses are possible but high quality employment precinct is a great opportunity.

Urban Amenity

The site does not posses intrinsic urban amenity as it is relatively low significants without views and has no interface with creek systems or parklands. The urban amenity will need to be created within the project with new parks and plazas as well as high amenity streets, avenues and boulevards. Plazas decked over railway corridor.

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Figure 16: Bowen Hills TOD Concept

Major through roads, Boulevard treatment

Minor Connected Streets

Pedestrian Connections

New improved streets

New pedestrian connections

Plazas/transit integration opportunities

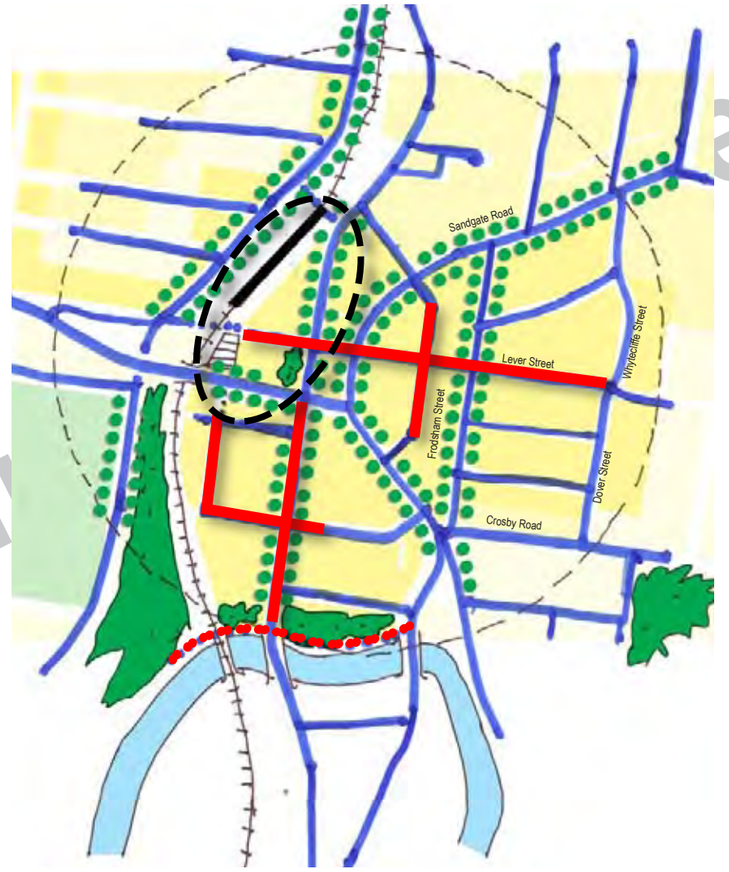
Parklands

Areas of major change

Areas of incremental change

Areas of no change

TOD signature project opportunity



Albion

Location

Albion is strategically located on a high hill top just north of Enoggera Creek, with commanding views and broad arc from south-east to north-west. The centre is located at the junction of three major streets, Sandgate Road, Abbotsford Road and Albion Road and is on the railway line making it a unique location for TOD in the north of Brisbane. The curving ridge line Main Street of Sandgate Road is quite intact with a number of distractive commercial buildings.

Land Uses

Albion has a wide range of land uses from lower grade industrial uses on lower more flood prone land to light industry. It has a relatively vibrant historic 'Main Street' with a range of commercial uses, but no supermarket, a large pub and a number of restaurants. The Centre and is usually dominated by the 30 year old, ten plus storey TAB building. The Albion TOD has the potential to evolve into a vibrant relatively high density mixed use precinct. The Flour Mill Site, recently sold, has the potential for a signature TOD integrating with the land to the south across Lever Street extension that can incorporate urban plazas and parklands. The south facing Hudson Road precinct with views to the city can emerge as a higher density residential area.

Connectivity

While the streets within Albion are interconnected, a number of one way streets limits vehicle access and compromises pedestrian connectivity. As a one way 'by pass' for traffic heading south Frodsham Street is a low ammenity street for detached housing and has poor access for businesses. It disconnects the Lever Street precinct to the east for both pedestrians and vehicles. A comprehensive movement access and network plan is needed. A number of strategic connections allowing better linkages between if precincts are proposed between Gore Street to Hudson Road. Lever Street should be two ways connecting to Sandgate Road. Frodsham Street two ways with traffic calming and signals at Lever Street.

Density & Built Form

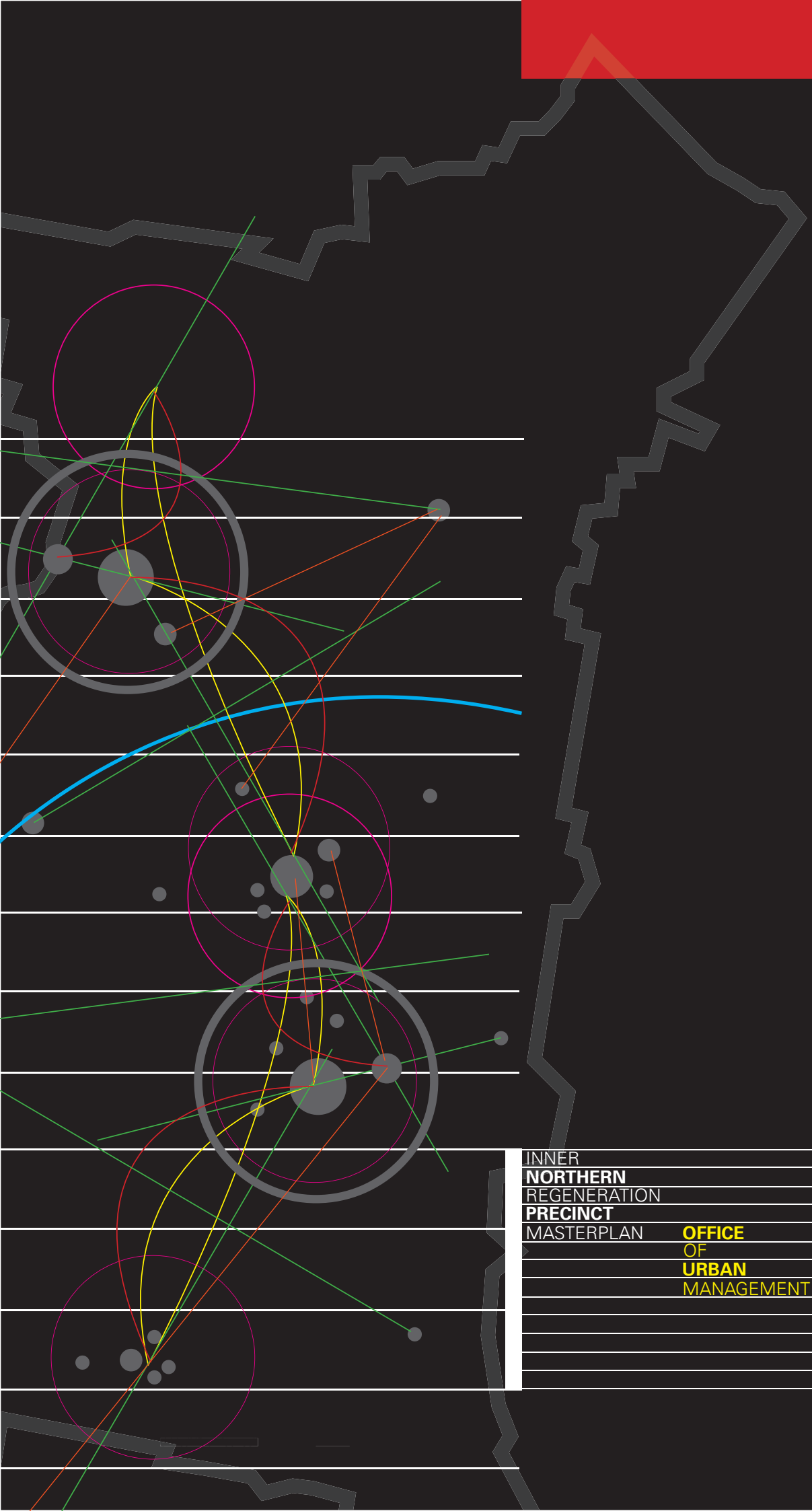
The Frodsham Street/Sandgate Road precinct extending across to Whytecliffe Street is a precinct let low scale residential and taller apartment buildings on higher land reflecting historic development patterns.

Urban Amenity

New parkland between Bimbal Street and Breakfast/Enoggera Creek with boulevard treeatments to major streets particular. The industrial use can convert to parkland over time extending a linear green corridor Windsor Park along Macdonald Road and Enoggera Creek to Flynn Oval and Windsor South.

Figure 17: Albion TOD Concept

Working Draft



INNER NORTHERN REGENERATION PRECINCT MASTERPLAN

OFFICE OF URBAN MANAGEMENT

STAGE 1 REPORT

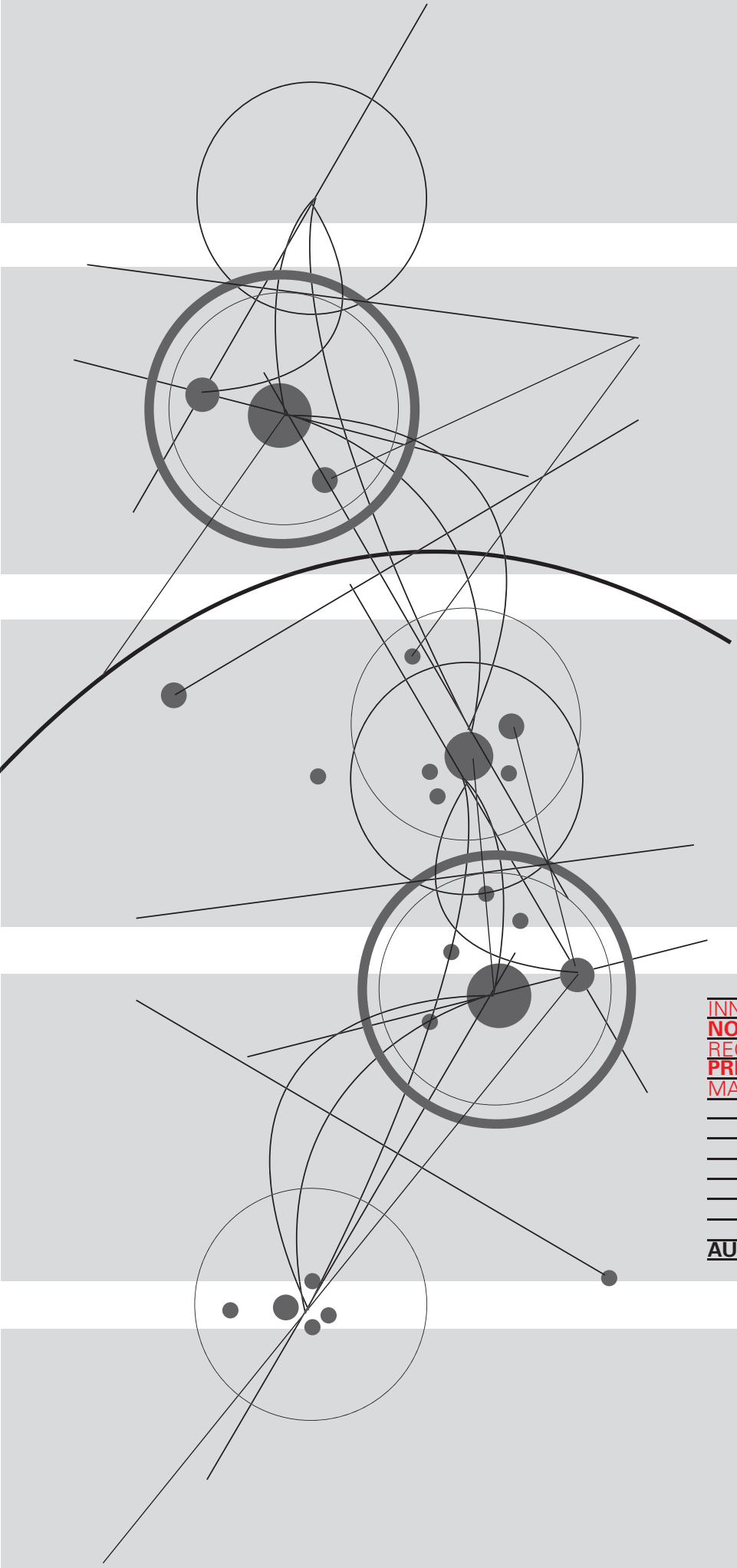
URBISJHD

MAKE NO LITTLE PLANS.

They have no magic to stir men's blood and probably themselves will not be realized.

Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency. Remember that our sons and grandsons are going to do things that would stagger us. Let your watchword be order and your beacon beauty.

Daniel Burnham (1864-1912)



INNER NORTHERN REGENERATION PRECINCT MASTERPLAN

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AUGUST2005

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Figures

Contents

Introduction

This study has been commissioned by the Office of Urban Management and comprises Stage 1 of the Inner Northern Regeneration Precinct (INRP) Masterplan. The study area is shown in Figure X and includes Brisbane's inner northern suburbs of Herston, Albion, Windsor, Wooloowin and Lutwyche.

The INRP Masterplan study involves four stages:

- Stage 1: Context Summary
- Stage 2: Transit Oriented Development
- Stage 3: Masterplan Vision and Options
- Stage 4: Development of Masterplan.

Background

Key initiatives of the South East Queensland Regional Plan are to integrate development with transport infrastructure, community services and employment and to ensure the efficient use of land allocated to urban development such as through urban consolidation. The integration of land use and transport reduces travel demands, promotes accessibility, supports the efficient use of land and infrastructure and achieves the environmental benefits of a compact development form. Transit Oriented Development (TOD) is a key mechanism for implementing these principles. The South East Queensland Regional Plan describes TOD as:

"Transit oriented developments are mixed-use residential and employment areas designed to maximize the efficient use of land through high levels of access to public transport. A transit oriented development has a walking and cycle-friendly core with a rail or bus station surrounded by relatively high-density residential development, employment or a range of mixed uses."

An interim TOD Taskforce was established with the role of developing key principles, guidelines and operational mechanisms for implementing TODs. The taskforce has identified the study area as an investigation area for TOD.

Three major transport infrastructure projects will impact upon the study area, these being the Northern Busway, Airport Link and North South By-pass Tunnel. This presents the opportunity to develop an integrated vision for the study area which recognizes opportunities for TOD development in terms of land use, property economics, transport infrastructure and community services. In particular, the scale and scope of these transport projects present once-in-a-generation conditions for remaking this part of the City in terms of providing:

- A model for South East Queensland in terms of integrated transport and urban development outcomes;
- Community enhancement through a balanced community profile, diversity of housing choices and the integrated and strategic provision of community infrastructure; and
- Urban design vision to create an exemplar for sustainable development in the 21st Century.

Stage 1

Stage 1 of the INRP Masterplan consists of a number of working papers which will inform both the development of a Masterplan vision and the subsequent stages of the project. This report consists of a series of five working papers which provide a summary of the context of the study area and include:

- A context review of the regional and local town planning and infrastructure planning frameworks affecting the study area in the form of a literature review;

- A land use review which examines the land tenure, existing land use and bio-physical characteristics of the study area and highlights potential opportunities for urban regeneration from a land use perspective;

- A community review which presents a demographic profile of the study area based on census data, outlines existing social services and community infrastructure and identifies potential community issues and impacts;

- A property economics review which provides an analysis of the property economics and development industry context for the study area and identifies opportunities from a property perspective. The economic value of redevelopment and the improved value of land potentially resulting from the provision of transport infrastructure are also considered.

In the Transit Oriented Development Catalyst Identification paper the findings of each of these working papers were analysed to identify potential TOD catalysts and their land use function.

Subsequent Stage

Stage 2 of the project involves integrating land use information to inform optimum route alignments for transport infrastructure projects under consideration, the further investigation of catalyst opportunities, establishing the desired community profile, access and mobility needs for public transport and alternative transport modes, staged development scenarios and the development of criteria for the assessment of masterplan options.

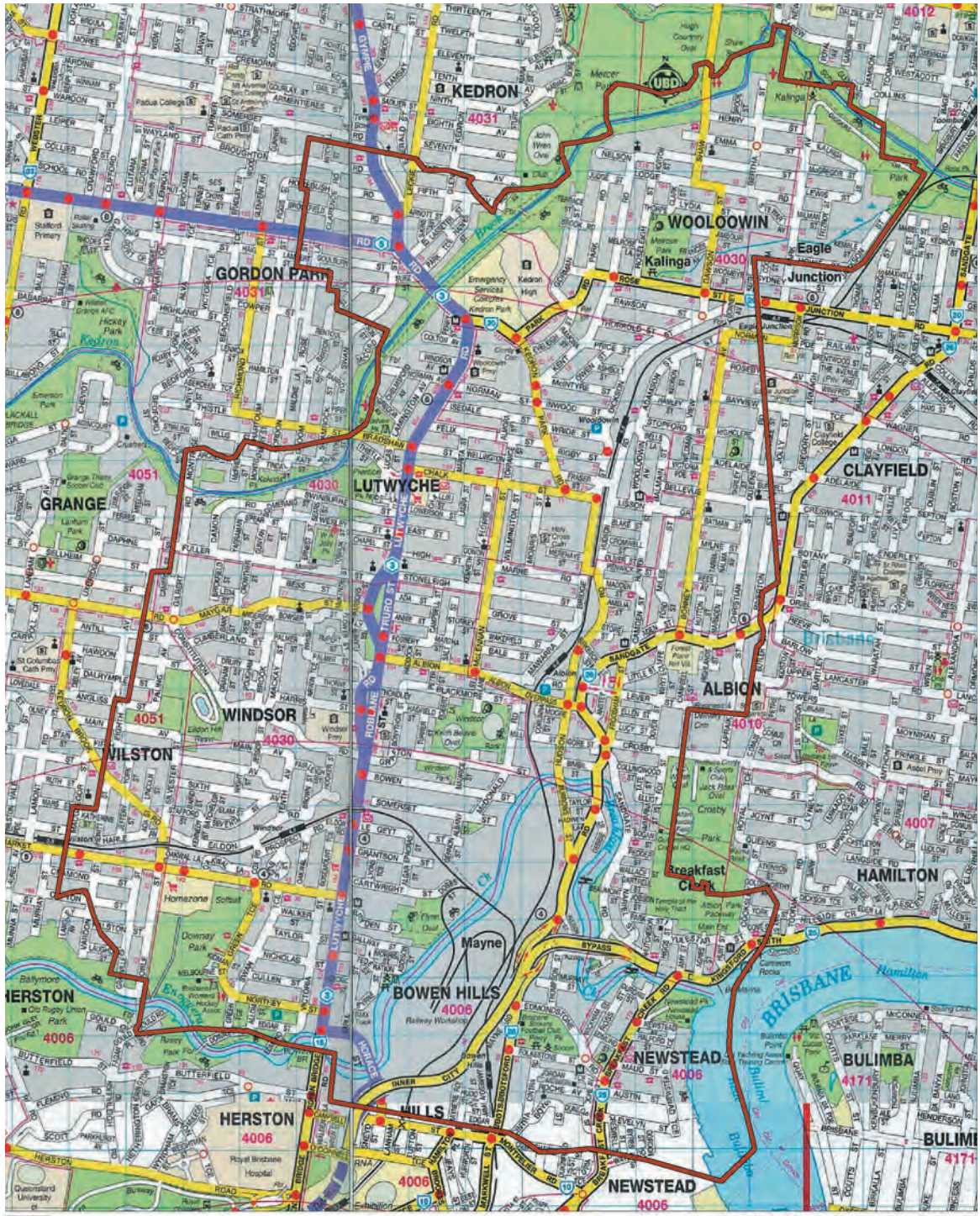
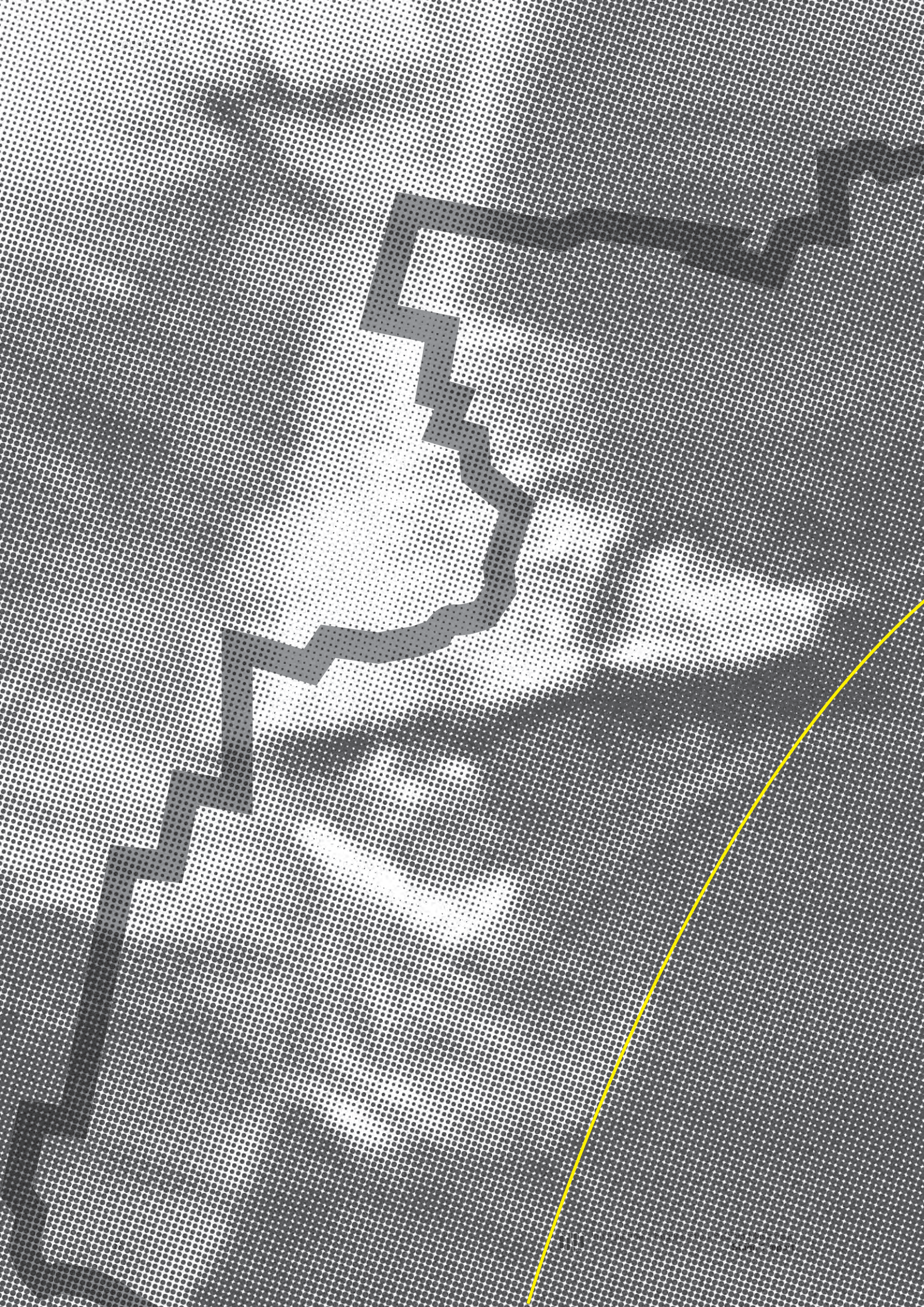
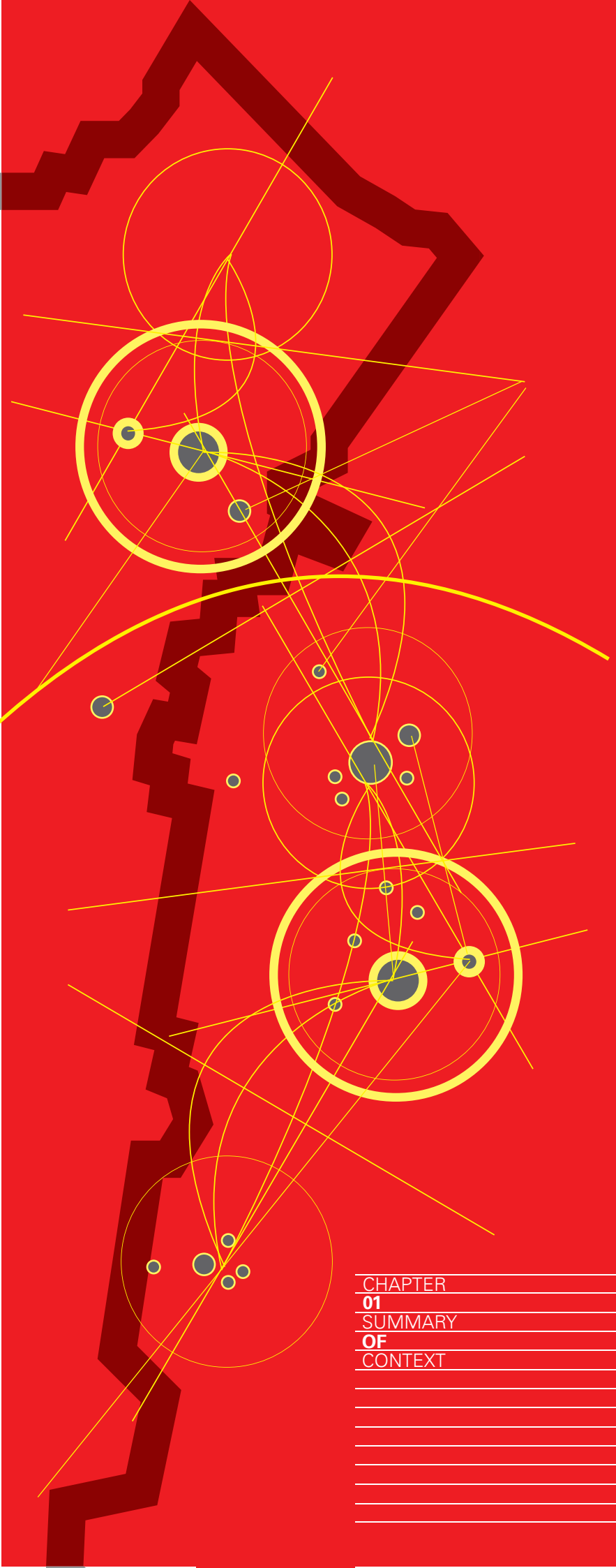


FIGURE 01 **Study Area Context**	Issue A NTS	**Office for Urban Management** **urbis**JHD . Maunsell	Inner Northern Regeneration Precinct MASTERPLAN **Stage 1 Report** August 05	





TOD's offer an alternative to traditional development patterns by providing housing, services, and employment opportunities for a diverse population in an configuration that facilitates pedestrian and transit access.

Peter Calthorpe, The Next American Metroplois
(1993, p58)

CHAPTER
01
SUMMARY
OF
CONTEXT

01

Context Review

1.0 Introduction

This working paper provides an overview of the town planning and transportation planning frameworks relevant to the study area. The regional and local planning context is reviewed together with available documentation pertaining to the major transport projects of the North-South Bypass Tunnel, the Airport Link and the Northern Busway. This context summary is intended to inform the development of the master plan vision for the area.

2.0 South East Queensland Regional Plan

2.1 Status and Purpose

On the 30 June 2005 the Queensland Government (Office of Urban Management) released the South East Queensland Regional Plan 2005-2026. The South East Queensland Regional Plan will guide growth and development in South East Queensland through to the year 2026. The Plan intends to accommodate future growth through a combination of urban consolidation, greenfield development and rural living areas.

2.2 Content of Document

The entire study area is included within the Urban Footprint (refer to Figure X) of the Regional Plan.

The South East Queensland Regional Plan outlines a variety of development types including:

- Transit Orientated Development (TOD's) which are defined as "mixed-use residential and employment areas designed to maximise the efficient use of land through high levels of access to public transport ";
- Activity Centres which are defined as "a concentration of business, employment, research, education, services, higher density living and social interaction ;
- Greenfield areas which are defined as "Areas of undeveloped land in the Urban Footprint suitable for urban development ":
- Infill Areas; and
- Industrial and Knowledge Hubs which include key industrial areas and knowledge clusters.

With regard to urban form, the Regional Plan aims to achieve a compact and sustainable urban pattern of well-planned communities. A key initiative to achieve consolidation has been the introduction of Transit Oriented Development (TODs). It is a pre-requisite that TODs:

- Are serviced by quality and high frequency public transport;
- Provide levels of development density and intensity that support public transport; and
- Provide pedestrian friendly, walkable catchments, centred around a public transport node or corridor .

In order to achieve TODs, it has been determined that the development principles set out in the table opposite should be adhered to.

2.3 Implications for IRNP Master Plan

The Regional Plan identifies Bowen Hills and Albion as locations that are currently under consideration for the development of a TOD. The principles of TODs should be considered in developing the master plan. Additionally the forthcoming master plan will need to consider the factors which determine the size and densities of TOD.

The Regional Plan states that TOD precincts will vary in size and that TOD catchments will relate to pedestrian accessibility which may be affected by factors such as topography, roads and other physical factors. Generally catchment sizes will relate to a ten minute walking distance or 600-800m.

The actual densities of TODs will need to consider site specific factors such as physical constraints, transit service frequency and infrastructure capacity as well as local character and context.

The Office of Urban Management has developed the TOD Taskforce which consists of representatives from State Government, developers and private consultants. This Taskforce is likely to provide further information and guidance on the locations of potential TODs within the coming months.

“a once in a generation opportunity”

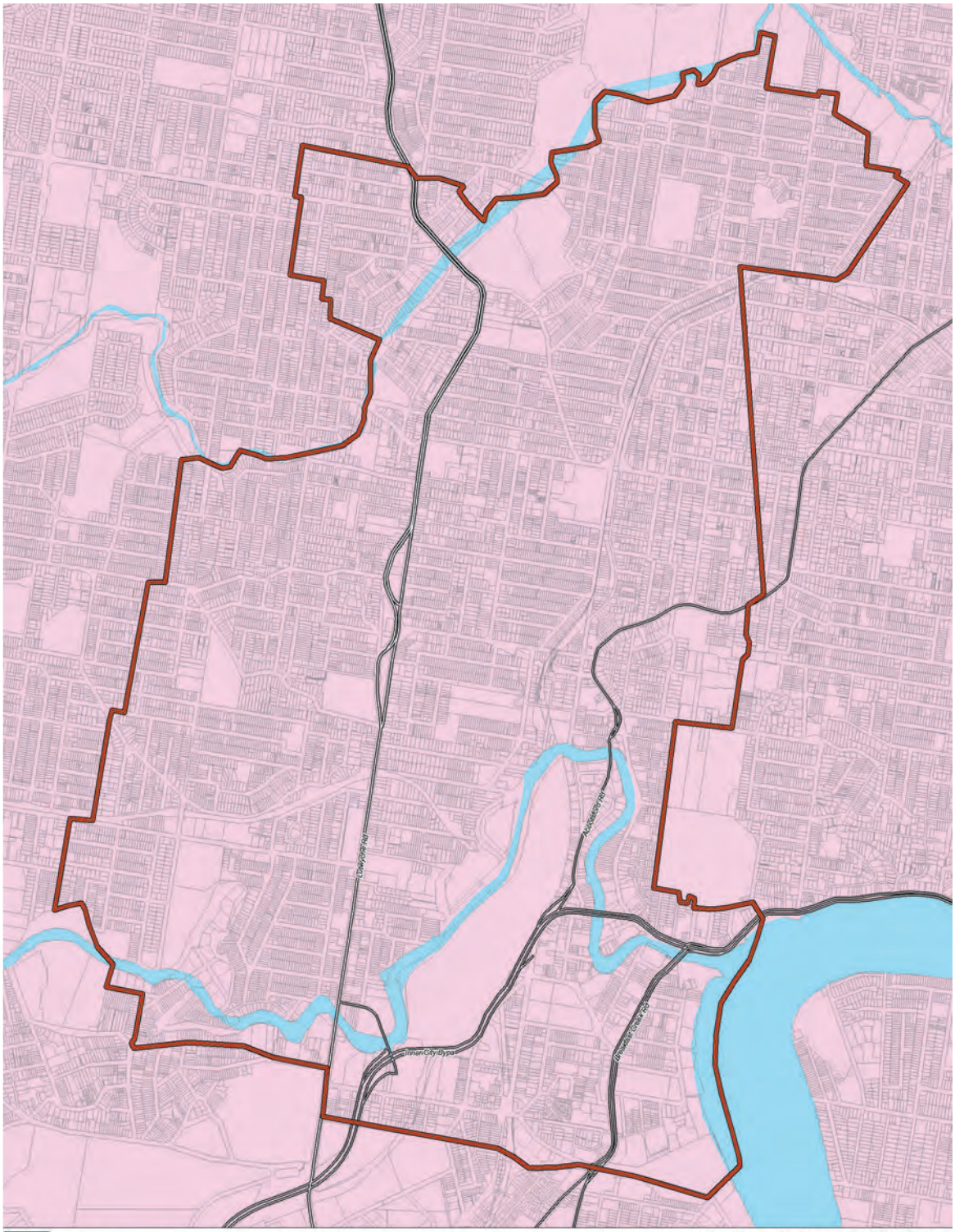


FIGURE 1.1
Study Area Context (Regional Plan)

Issue A

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MASTERPLAN
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Figgure 1.2

Location	
Level of infrastructure and services	Focus development around nodes or corridors where infrastructure capacity exists or can be created. Locations with high levels of transit service frequency should be given priority.
Level of development	Ensure transit oriented development occurs at a scale appropriate to the location.
New development	Apply transit oriented development principles in new communities where transit nodes exist or are proposed.
Land Use	
Type	Ensure transit oriented development precincts are dominated by land uses that support transit.
Density	Incorporate higher density residential uses in transit oriented development precincts to increase vitality and provide more convenient access to services and transit. Baseline density guidelines are: Activity centre: between 30 and 120 dwellings per hectare (net) or greater. Transit oriented community: between 30 and 80 dwellings per hectare (net) or greater.
Intensity	Incorporate high employment intensities and a mix of employment opportunities.
Mix	Promote an integrated mix of uses to achieve a greater variety of services.
Continuity	Encourage continuous activity in transit oriented development precincts to provide a sense of vitality and safety.
Design	
Adaptability	Ensure development delivers a built form that is robust and flexible, allowing adaptation or redevelopment over time to a variety of uses, increased densities or increased employment intensity.
Built form	Ensure development features high-quality subtropical design that maximises amenity, street activity and pedestrian connectivity.
Open space	Provide for a high-quality public realm to promote social cohesion and the development of a sense of place through design.
Integration	Ensure development precincts are designed to achieve a seamless integration between transit node and community.
Parking	Manage car parking in transit oriented development precincts to ensure it is located, designed and provided in a manner that supports walking, cycling and public transport accessibility.
Transport	
Mode share	Achieve an increased mode share for walking, cycling and public transport.
Transport efficiency	Facilitate a high level of intermodal connection.
Social	
Social mix	Provide for a mix of housing types, tenures and levels of affordability in transit oriented development precincts to promote community sustainability.

3.0 South East Queensland Infrastructure Plan

3.1 Status and Purpose of Document

The South East Queensland Infrastructure Plan 2005-2026 was adopted by the Queensland Government (Office of Urban Management) on 30 June 2005. The purpose of the Plan is to establish objectives for priority infrastructure and to plan and provide the necessary infrastructure for growth and development identified in the South East Queensland Region.

3.2 Content of Document

The Infrastructure Plan establishes the State Government's priorities with respect to the infrastructure needed to support the South East Queensland Regional Plan.

The infrastructure program is organised into three key, temporal phases as follows:

- Phase 1 – 2005-2006 to 2008-2009
- Phase 2 – 2009-2010 to 2015-2016
- Phase 3 – 2016-2017 to 2025-2026

3.2.1 Implications for IRNP Master Plan

Phase 1 of the plan identifies the requirement for the following infrastructure within the study area:

- Busways expanding along the northern spines of Brisbane to support TOD's in these corridors. The inner northern busway improvements and new busway stations may affect the study area;
- Airport Link from the northern end of the North-South Bypass Tunnel; and
- Bypass routes for more congested road links, one of these being the North-South Bypass Tunnel.

4.0 Brisbane City Plan 2000

4.1 Status and Purpose of Document

The Brisbane City Plan is the key local planning instrument controlling development within the study area. The following provides an overview of the Strategic Plan, relevant Local Plan and Area classifications of the City Plan which affect the study area.

4.2 Content of Document

Strategic Plan

The Brisbane City Strategic Plan includes the study area within the 'Residential Neighbourhoods' and 'Greenspace' designations (refer to Figure X). Residential Neighbourhoods are intended to contain the residential areas of Brisbane and related amenities and facilities such as convenience shopping, local parkland, schools, churches, hotels and clubs. The intent of this designation seeks to:

- Promote increases in density near high quality public transport and close to the City Centre;
- Provide for some mixed use development; and
- Co-ordinate the orderly and cost effective provision and augmentation of infrastructure.

The Greenspace designation is intended to retain the range of range of natural, semi–natural and modified environments in public and private ownership.

The study area is located on the periphery of a Major Centre (Fortitude Valley) and a Special Purpose Centre (Royal Brisbane Hospital).

Local Plans

The study area is included within five Local Plans of the City Plan (refer to Figure X). The key characteristics of these Local Plans are outlined below.

- ***Bowen Hills Local Plan*** (southern portion of study area)
  - The intent is to develop a diverse and vibrant area characterised by an integrated mix of living, employment and entertainment uses.
  - Future development will be guided by built form provisions that maintain the existing context of the area and recognise the physical dominance of the hill and protect significant views to the Walter Taylor Range.
  - The area contains excellent public transport infrastructure and intensification of development around key transport nodes such as Bowen Hills station will be encouraged.
  - The area will provide a mixture of housing, commercial and industrial uses.

- ***Newstead and Teneriffe Waterfront Local Plan*** (south-eastern portion of study area)
  - The intent of the area is to provide a diverse, vibrant and safe living environment based on a compatible mix of residential, commercial, industrial and recreational activities.
  - Building heights within the study area are to be approximately 4-6 storeys.

- ***Grange District Local Plan*** (majority of study area, contained to the western portion)
  - New housing is to remain in keeping with traditional character elements (reflecting the period between the 1870's and 1945).
  - Existing business and commercial activities on Days Road and Maygar Street must not expand.
  - The Lutwyche industrial area is intended to be an employment node for a range of industrial, service trades and business activities.
  - Wilston Village is intended to remain as a local shopping centre.
  - Lutwyche City Shopping Centre and surrounds are intended to function as a centre providing a range of retail, business, community and recreational needs.

- ***Clayfield / Wooloowin District Local Plan*** (northern portion of study area)
  - The Local Plan is intended to ensure that higher densities will continue to be concentrated around transport nodes, such as Eagle Junction and Albion Railway Stations.
  - Identifies Lutwyche Shopping Centre as an important centre for the district

and encourages office development to support its retail focus.

- Identifies that development should intensify between the Albion Railway Station and Mawarra Street.
- A small shopping hub around Wooloowin Railway Station should be developed to meet the convenience needs of residents.
- Albion shopping centre should continue to function as an entertainment/restaurant centre for the neighbourhood and further develop as a place of employment and focus for community/social services.

- ***Fortitude Valley Local Plan***
- The site is included in precinct 6 (light Street Hill Precinct). The intent of this precinct is to re-establish a community based on the remnant buildings in the area. Pedestrian and transport links to Bowen Hills station ar to be encouraged.

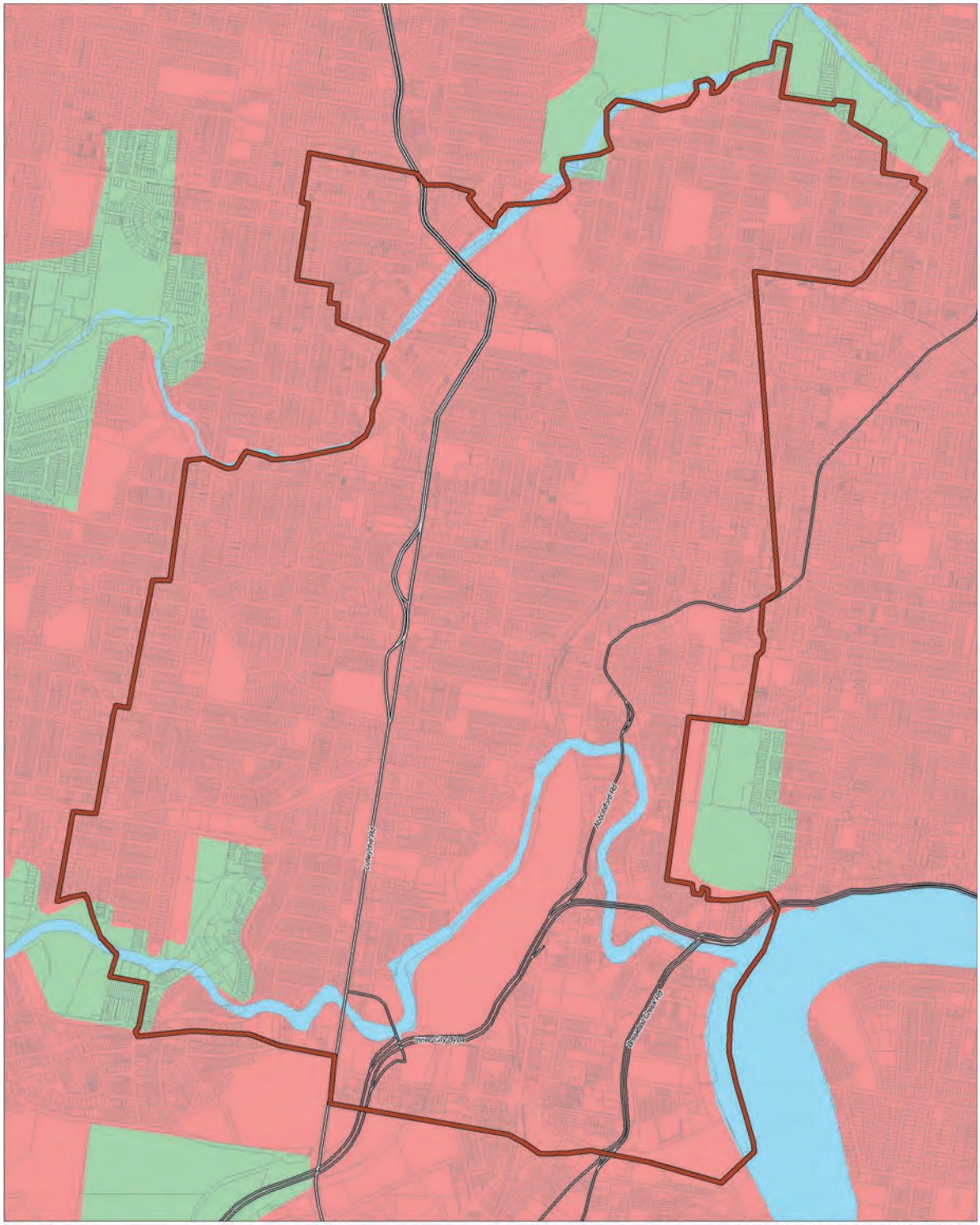

FIGURE 1.3
Residential Neighbourhoods and Green Space Designations

Issue A
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Area Classifications

There are a variety of Areas located within the study area, ranging from Multi-purpose Centre to Character Residential to Light Industry and Community Use, as illustrated in Figure X.

Large areas of Low Density Residential Areas are located within Wooloowin, west of the railway line, and in Wilston and Windsor. Low-Medium Density Residential Areas are scattered throughout the entire study area, mainly located east of the railway line in Clayfied and Wooloowin and in the suburbs of Lutwyche and Windsor. Pockets of character residential Areas are located in Windsor and Wilston and Clayfield.

Light and General Industrial Areas are most prevalent in Bowen Hills, Albion and Newstead and provide a good opportunity for renewal. There are four key areas of Multi-purpose Centres, being in Albion, Lutwyche, Kedron and Bowen Hills.

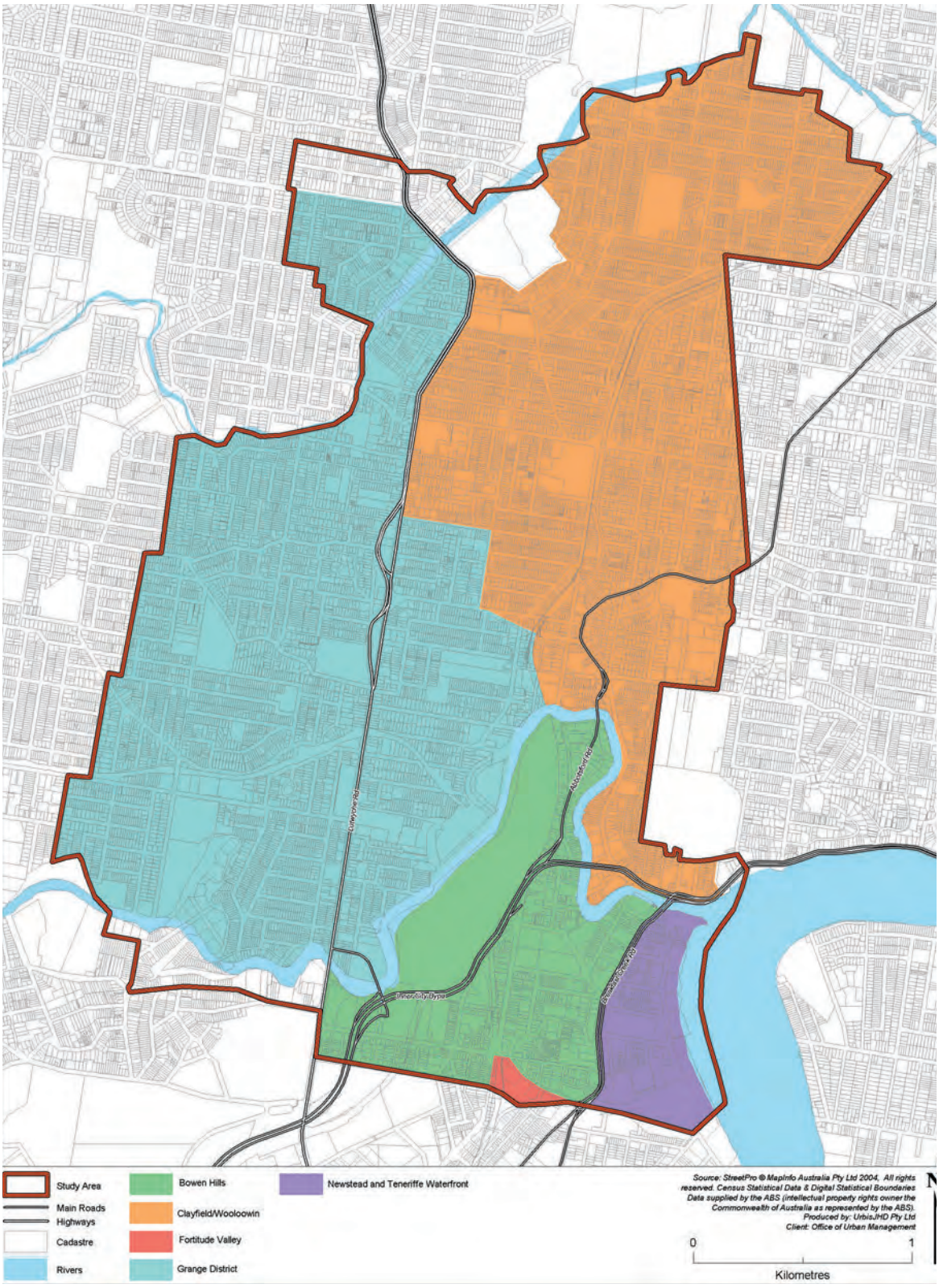

FIGURE 1.4
Local Plans within City Plan

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A summary of the intent of these Areas and the general building height limit is included in the table below. It should be noted that Local Plans can specify greater building heights than those listed in the table below, for example heights of up to 10 storeys in certain locations within Bowen Hills.

4.2.1 Implications for IRNP Master Plan

The Strategic Plan, Local Plans and Areas provide the framework for development within Brisbane City. It is recognised that the current City Plan does not fully reflect the development principles and priorities endorsed in the South East Queensland Regional Plan. As a result, the intents, controls and provisions outlined above should be used as a guide only in developing a Master Plan. Greater densities and changes in intended land use are likely to be the outcome of this Master Plan.

FIGURE 1.5
Area Classifications

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What is of note within the current City Plan, however, is that it designates a number of Multi-purpose and Special Purpose Centres which include important retail shopping or social service/employment destinations within or adjacent to the study area such as Lutwyche Shopping Centre and the Royal Brisbane Hospital.

5.0 Neighbourhood and Metropolitan Planning

5.1 Metropolitan Planning

Brisbane City Council's existing Strategic (Metropolitan) Plan was prepared in the early 1990's and as a result is not equipped to appropriately deal with the level of development and anticipated growth espoused by the Regional Plan.

Given the certainty of significant change over the next two decades, and the need to up-date the existing Strategic Plan, Brisbane City Council has committed to the re-examination of its future growth options. Metropolitan Planning, its process and framework, will effectively provide for the re-evaluation of how Brisbane is developed and will endeavour to ensure that ongoing growth and change is consistent with a broader vision, shared by the City's residents.

Metropolitan Planning will endeavour to translate the South East Queensland Regional Plan into a 'Brisbane' context and will address the broader scale structure for the Brisbane City Council Area. In particular, it will address the Regional Plan's new policy directions of a Compact City, Dwelling Targets and the Urban Footprint in addition to dealing with such issues as city form, urban consolidation, housing choice, transport, infrastructure provision, biodiversity protection and economic development to name but a few.

Metropolitan Planning provides Brisbane City Council with the opportunity to;

- Align Brisbane's City Plan time horizon with the Regional Plan (from 2011 to 2026);
- Align Council's current strategies;

Figure 1.6

Area	Intent	Building Height Limit
Light Industry	A range of light industries and warehousing that have low environmental impact.	15m
General Industry	A wide range of industries and complementary industries that meet high amenity and environmental standards.	15m
Multi-Purpose Centre 3 (Suburban Centre)	Provide a variety of services. They may be characterised by small tenancies within a limited area, or lower density larger tenancies over a broader area. They generally contain more than 6000m^2 of GFA.	2-3 storeys
Multi-Purpose Centre 4 (Convenience Centre)	Smaller centres providing local services within walking distance of residents. They generally contain less than 6000m^2 of GFA.	1-2 storeys
Special Purpose Centre	Provide for particular major activities, such as office park, sports stadium or airport.	N/A
Community Use	Land either private or publicly owned that accommodates a range of community uses, such as railway, church or utilities.	N/A
Character Residential	Accommodating primarily pre-1946 houses.	2 storeys
Low Density Residential	Detached houses, one or two storeys in height.	2 storeys
Low-Medium Density Residential	A mix of houses up to 2 storeys and two and three storey multi-unit dwellings and single unit dwellings.	3 storeys
Medium Density Residential	Located in near city locations with good access to public transport and centres. Will contain single unit dwellings and multi-unit development up to 5 storeys in height.	5 storeys
High Density Residential	Located close to the City with very good access to public transport and facilities. Located in areas with outstanding views to the central City or Brisbane River.	10 storeys
Parkland	Informal open air recreation and outdoor cultural and educational activities and may provide opportunities for informal sports or other events on a casual basis.	N/A
Sport and Recreation	Provides more formal sport and recreation and may include club buildings and off street parking facilities.	N/A

- Provide a metropolitan context for the Neighbourhood Planning consultation processes.

The Metropolitan Planning process will result in both statutory and non-statutory planning documents and will include the following key products:

- A Metropolitan Plan 2026;
- A Local Growth Management Strategy (LGMS);
- A revised City Plan.

The Metropolitan planning process assumes overlap and parallel processes with Council's Neighbourhood Planning project.

5.2 Neighbourhood Planning

Brisbane City Council's commitment to Neighbourhood Planning was enunciated in the Lord Mayor's policy "Future Brisbane: Planning for People in a Growing City". The neighbourhood planning process is a planning exercise for the whole of Brisbane and is aimed at determining how and where local growth will occur in future years.

The neighbourhood planning process will ultimately result in the development of a series of detailed plans for specific localities, which will reduce the potential future development conflicts and bring certainty to the development of Brisbane over the next 10-20 years.

To date, Neighbourhood Planning has involved substantial consultation in an effort to engage the broader community in planning for Brisbane. The sequencing and preparation of these plans will commence following the completion of the consultative phase. Once this has taken place, the Neighbourhood Plans will be integrated into City Plan and adopted as Council policy.

6.0 Integrated Regional Transport Plan for South-East Queensland

6.1 Status and Purpose of Document

The Integrated Regional Transport Plan (IRTP) was released in 1997 by Queensland Transport. It is a 25 year plan to develop and manage the transport system in a way that supports the agreed plans for accommodating the region's expected major population and employment growth.

6.2 Content of Document

The IRTP provides an overall strategic framework for transport planning in South-East Queensland (SEQ) and establishes a coordinated approach to a range of programs and activities on public transport, roads, freight, travel demand management and land-use planning. It sets targets to reduce car dependence by increasing the use of public transport, car-pooling, cycling and walking. The IRTP lists a series of opportunities to improve the transport system in SEQ and lists some 140 actions to shape the future transport system. The IRTP:

- Describes the transport challenge facing SEQ;
- Describes how the future transport system will be shaped with the inclusion of strategic actions; and
- Provides a detailed three year implementation program.

6.3 Implications for INRP Master Plan

The IRTP contains maps showing the strategic transport system development opportunities that were derived from strategic transport planning analysis. Figure 0.1 illustrates the nineteen IRTP projects (Brisbane metropolitan strategic transport opportunities) for the Brisbane metropolitan area. Some of the projects impacting on the INRP study area include:

- Increasing suburban rail capacity;
- Improve the speed flow of buses through the existing congestion between Carseldine and the Central Business District (CBD), with the implementation of the Northern Busway; and
- Enhance the public transport link from the airport to the CBD.

Figure 0.1 shows the Brisbane metropolitan strategic transport opportunities.

7.0 Transport 2007 An Action Plan for South-East Queensland

7.1 Status and Purpose of Document

This document, put out by the Queensland Government in 2001, is a medium-term action plan for SEQ that complements the 25 year Integrated Regional Transport Plan for the SEQ. Transport 2007 reassessed the challenges facing the SEQ region and gives a clear direction for the future by identifying the transport priorities to 2007. The plan represents a balanced program of transport investment in infrastructure, services, operations and policy actions to benefit all sectors of the community.

7.2 Content of Document

For Transport 2007, the SEQ region is divided into the following sub-regions: Brisbane metropolitan, Sunshine Coast, Gold Coast and Western. The Brisbane metropolitan sub-region includes the local government areas of Caboolture, Pine Rivers, Brisbane, Redland, Logan and Redcliffe. The document:

FIGURE 1.7
Brisbane Metropolitan Strategic Transport Opportunities

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- Details the changing social and travel trends affecting SEQ;

- Discusses the role and aims of Transport 2007;

- Provides an overview of the transport challenges, opportunities and solutions for each sub-region;

- Outlines future policy directions and role of each transport mode in providing SEQ with a high quality transport system by 2007; and

- Outlines development and implementation of Transport 2007, and how implementing Transport 2007 will help meet IRTP objectives.

The Brisbane metropolitan sub-region by 2007 will be facing increasing levels of congestion, and public transport improvements are required to reduce car dependency. The transport network must also support residential and industrial expansion.

7.3 Implications for INRP Master Plan

Key improvements for the Brisbane metropolitan sub-region are outlined in the plan, as well as the improvements to inner-city transport that affects the INRP study area. The improvements focus on measures to access the City by trains and buses, and for pedestrians and cyclists. The improvements include busway projects, bus priority measures, bus and rail coordination, and infrastructure for pedestrians and cyclists. Figure 1.1 shows Brisbane's inner-city transport system.

8.0 Draft TransLink Network Plan

8.1 Status and Purpose of Document

The Draft TransLink Network Plan builds on the IRTP and Transport 2007 and provides strategic direction for the delivery of public transport within SEQ. It was released in March 2005 and included a 10-year plan for developing the public transport network (2004 to 2014) as well as a three-year rolling program of public transport service and infrastructure enhancements and planning studies (2004/05 to 2006/07).

8.2 Content of Document

The TransLink Network Plan:

- Reviews key trends and challenges facing public transport and highlights the benefits of investing in public transport;

- Sets out the strategic priorities and policies

The TransLink Network Plan has been developed on a region-wide basis, including Greater Brisbane, Gold Coast and Sunshine Coast. The Greater Brisbane region includes Brisbane City.

The network strategy for services and infrastructure improvement programs for the Brisbane City sub-region are shown in Figure 2.1 and Figure 2.2. The network strategy in Brisbane City includes key links to surrounding regions and the components of the network strategy include:

- Improving inner city capacity;

- Upgrading the rail network;

- Providing bus priority corridors;

- Consolidating services into one corridor;

- Improving existing / introducing new cross-town links; and

- Constructing / upgrading key stations.

8.3 Implications for INRP Master Plan

Projects identified in the network strategy for service and infrastructure improvements for the ten-year plan and the three-year program respectively, include:

- Ten-year plan:
  - Progressively implement the Northern Busway;
  - Construct a busway station at Royal Brisbane Hospital (RBH);
  - Plan and progressively implement priority bus corridors; and
  - Upgrade the Bowen Hills train station.

- Three-year program:
  - Plan the Northern Busway from the Inner Northern Busway (INB) to Chermside;
  - Construct a busway station at the Royal Children's Hospital;
  - Investigate options to increase rail capacity, including more cross-river capacity, underground connections and new stations to address future demand;
  - Introduce new cross-town routes via the INB to improve access to places en route and facilitate transfers to/from trains at Bowen Hills and buses at busway stations; and
  - Introduce peak period routes to cater for growth in demand (RBH, QUT Kelvin Grove via INB)

The above projects need to be taken into consideration in the INRP work. They provide improved level of accessibility for pedestrians, cyclists and public transport.

for developing the network which include:

- Making services connect;
- Making services fast, frequent and reliable;
- Filling the gaps; and
- Making services easy, comfortable and safe;

- Outlines the ten-year plan and the three-year program of actions; and

- Outlines how TransLink and its partners will implement, monitor and review the Network Plan.

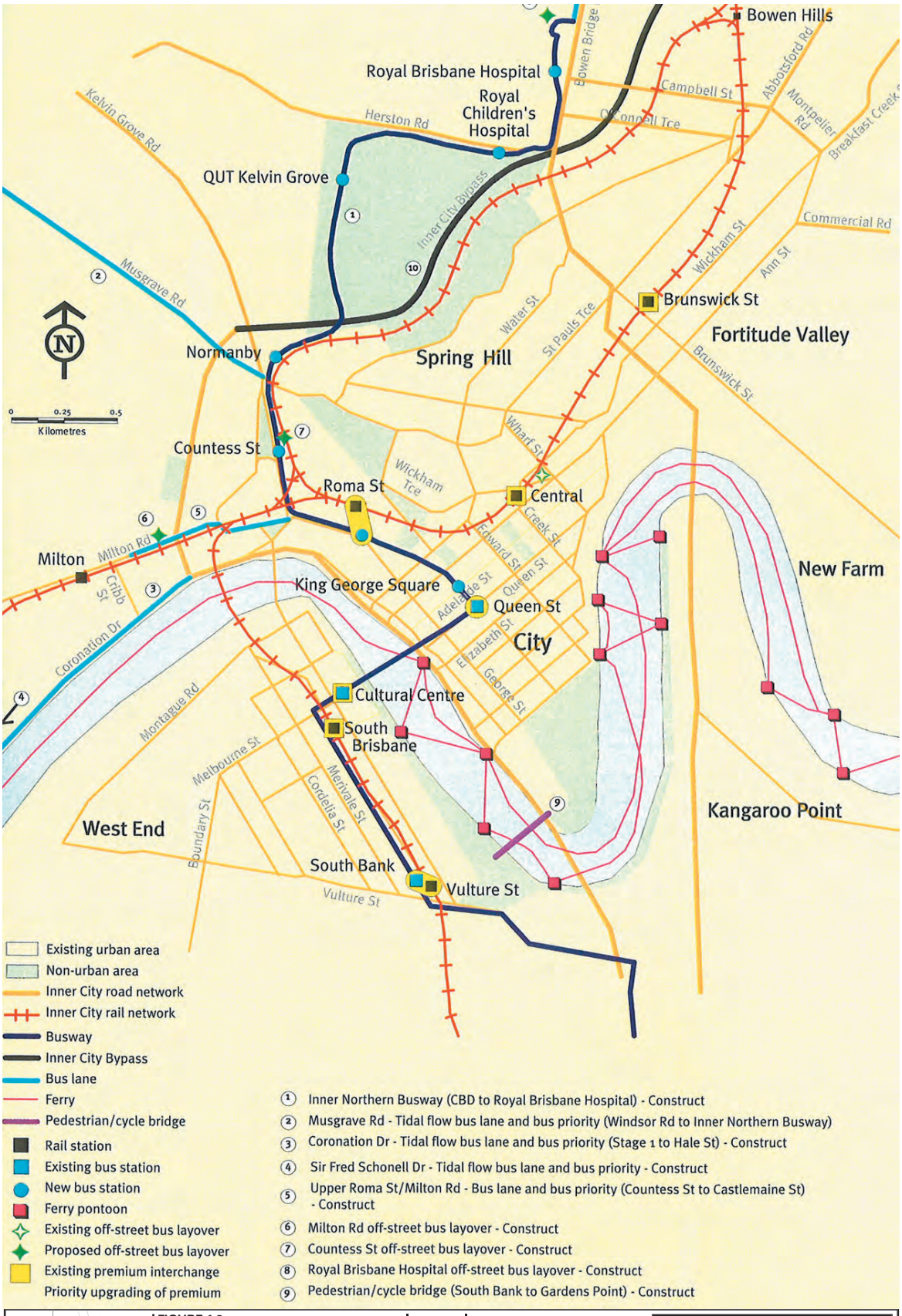

FIGURE 1.8
Brisbane Inner City Transport System (Transport 2007 Plan)

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FIGURE 1.9
Network Strategy for Services (Translink 2005)

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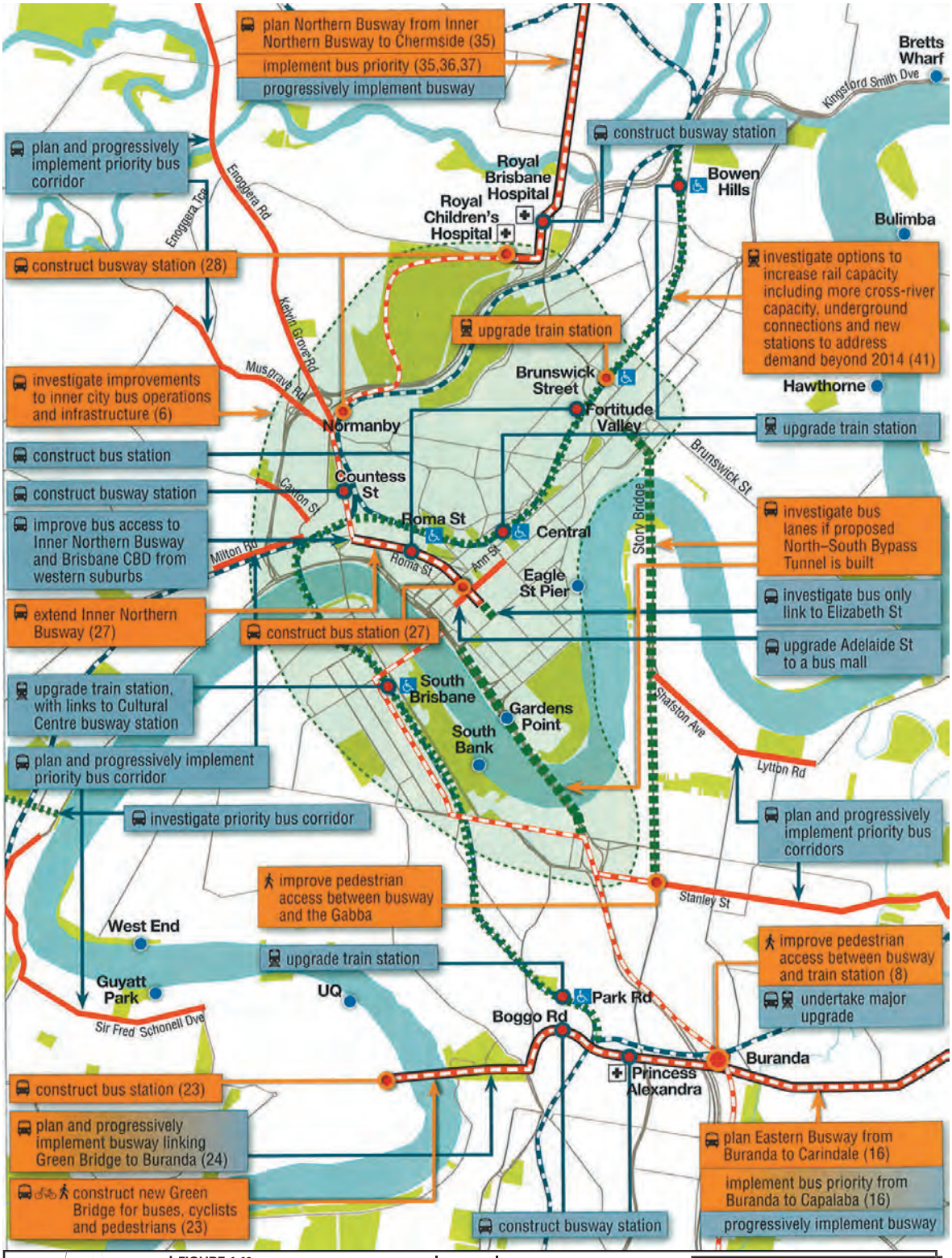

FIGURE 1.10
Infrastructure Improvement Program (Translink 2005)

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9.0 TransApex Pre-feasibility Report

9.1 Status and Purpose of Document

The key findings of the studies into the feasibility of TransApex (study commissioned in May 2004) are outlined in the report dated March 2005. TransApex proposes a series of tolled tunnels providing a ring road network around the CBD, facilitating new and more efficient traffic movements and river crossings. TransApex provides road users with an alternative route for cross-city trips, reduces congestion and frees-up surface streets.

9.2 Content of Document

The TransApex strategic context study, which preceded the pre-feasibility study, seeks to establish the strategic merit of TransApex as a sequenced delivery of tolled road links over the medium-term. It also aims to demonstrate how the project would form part of a balanced transport system, reduce congestion in the city's road network, efficiently move people and freight, and support economic development in the City of Brisbane.

The TransApex Pre-feasibility report examines the financial and technical viability of the TransApex links. The transport infrastructure links considered by the pre-feasibility study are shown in Figure 3.1.

The report addresses the pre-feasibility process which involved:

- Developing the strategic context of TransApex within the framework of delivering transport infrastructure;

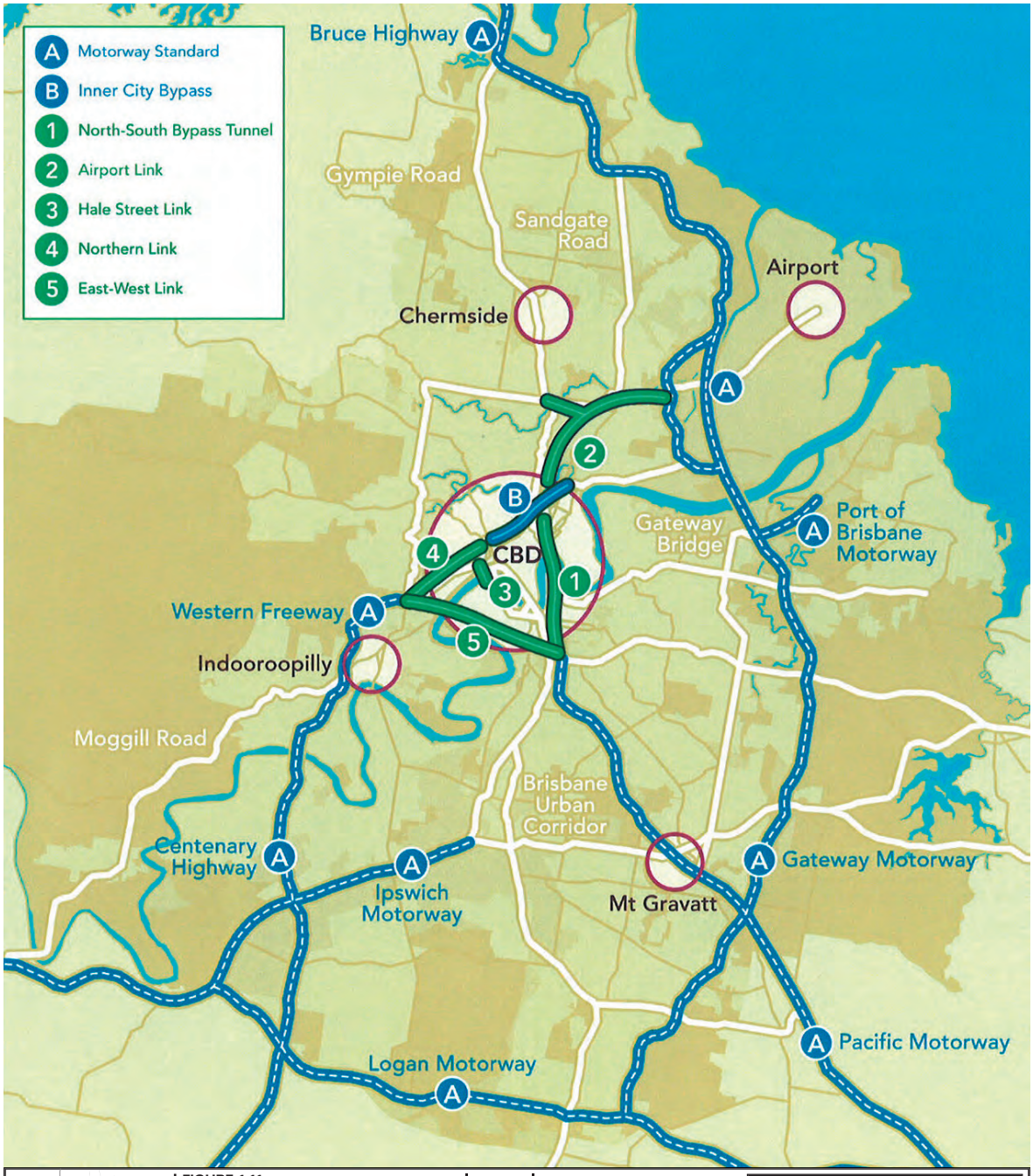

FIGURE 1.11
TransApex Pre-Feasibility
(TransApex Pre-Feasibility 2004)

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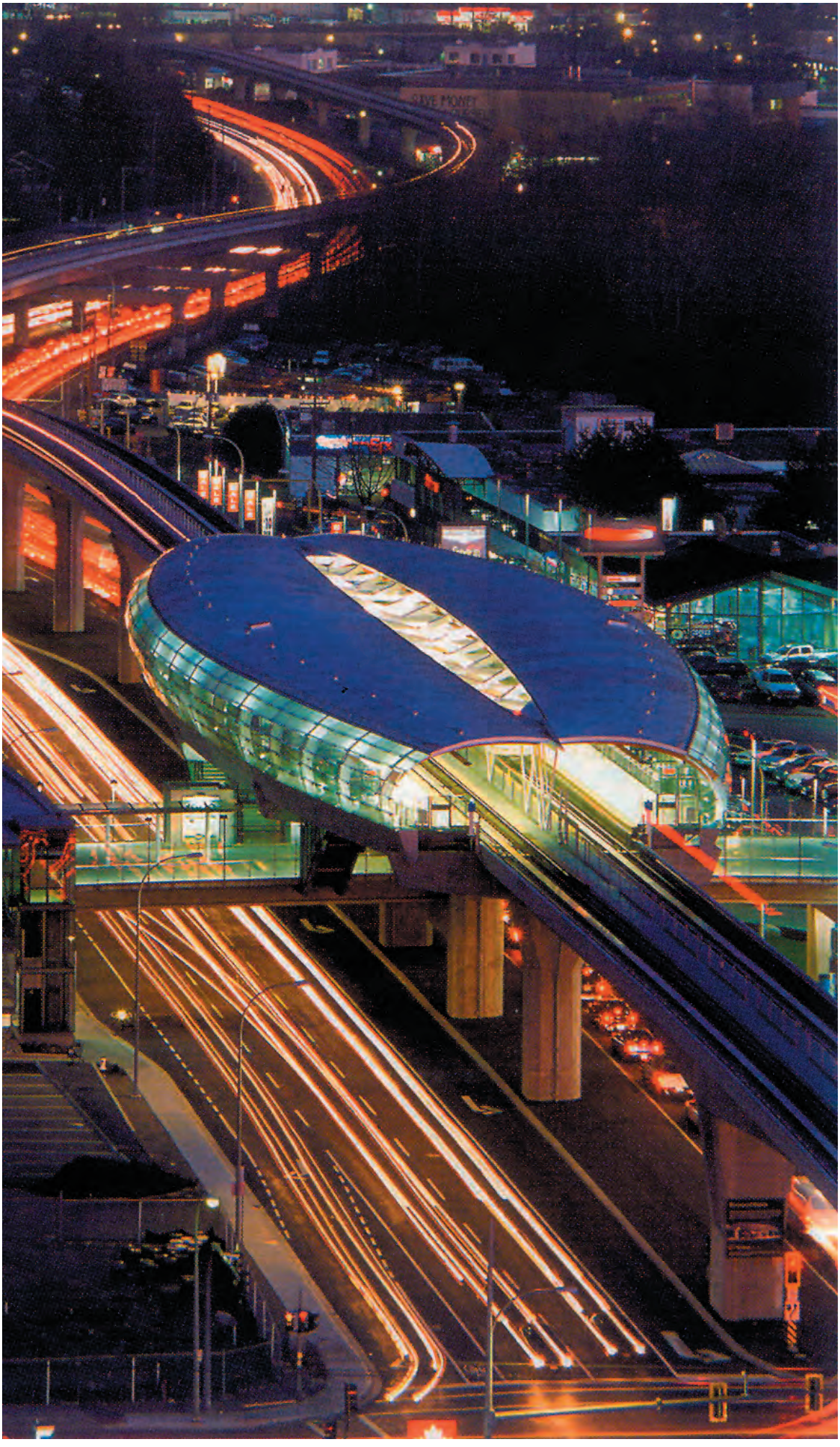

- Documenting the compatibility of TransApex with the objectives and strategies proposed for Brisbane in the Office of Urban Management's Draft South East Queensland Regional Plan (2004);

- Reporting on preliminary engineering, traffic demand modelling and financial assessments of each link in accordance with the State Government's Value for Money Framework;

- Assessing at least two alignments for each link, several connection options, and freight and non-freight options where strategically relevant;

- Reporting on the associated land-use impacts and the public transport and urban renewal opportunities created by TransApex;

- Developing concept designs to satisfy international standards for geometry and world's best practice for ventilation and safety;

- Preparing preliminary cost estimates for each alignment of each link; and

- Assessing tolling requirements, delivery schedules and financial viability based on the Public Sector Comparator and BOOT (build, own, operate and transfer) funding options.

Key findings of the pre-feasibility study include:

- TransApex is a technically feasible and financially viable opportunity to deliver transport infrastructure that addresses the growing congestion problems of Brisbane;

- TransApex would greatly improve access to "middle" and "inner-ring" areas of Brisbane, increase cross-river capacity and assist in the efficient movement of cross-city traffic;

- A "user-pays" system is appropriate for TransApex as it will contribute to construction costs, assist in the control of traffic demand and allow investors to recover financial outlays;

- The new TransApex infrastructure links across Brisbane would improve journey times through motorway standard ring road connections and reduced interruptions from traffic lights. It is anticipated that the Airport Link would allow the user to avoid fourteen sets of traffic lights when travelling from the airport to the inner-city;

- The freight industry would be a beneficiary from TransApex, especially from the combined operation of the Airport/North South Bypass Tunnel (NSBT) and Airport/ Northern links, by facilitating greater access to the air and seaports and Australia Trade Coast;

- TransApex would reduce the vehicle and time costs of travel and improve trip reliability. The savings would, over time, translate into material environmental and economic benefits for the whole community; and

- TransApex complements Council's desired land-use and economic outcomes for Brisbane as it would assist urban renewal and consolidation of inner-city areas, in turn supporting the more compact urban form identified in the Draft South East Queensland Regional Plan.

9.3 Implications for INRP Master Plan

The NSBT and the Airport Link projects impact on the INRP Masterplan Study area. The Airport Link has a greater effect and is discussed within.

The Airport Link would traverse the northern suburbs of Brisbane from Bowen Hills to Toombul, with a western connection to Gympie Road. Its primary function would be to provide an alternative high speed route to the CBD bypass network or beyond, for airport and northern suburbs traffic using the East-West Arterial and Sandgate, Gympie and Lutwyche Roads.

Preliminary assessment identified that diverting traffic to the Airport Link would:

- Allow the development of a significant bus facility along Lutwyche Road, such as the proposed Northern Busway; and

- Facilitate potential TOD at Lutwyche, Windsor and Albion.

Central and western alignment options of the Airport Link, as shown in Figure 3.3 and Figure 3.4, were identified, investigated and documented for the Airport Link as part of the pre-feasibility study. Both options were found to provide similar strategic connectivity between the NSBT and north-east and north-west connections. However, each option differed fundamentally in terms of construction and secondary levels of connectivity. Each provided different opportunities for both the north-western connection with Gympie Road and the intermediate access with Lutwyche, Albion and surrounding areas.

Figure 3.4 illustrates the key surface street opportunities such as the Northern Busway, inner-northern TODs and links to the inner-northern suburbs bikeway network. TOD sites identified include localities at Bowen Hills, Windsor East, Lutwyche, Albion, Clayfield and Toombul/Nundah.

10.0 North South Bypass Tunnel Environmental Impact Statement (Draft)

10.1 Status and Purpose of Document

The North South Bypass Tunnel (NSBT) Environmental Impact Statement (EIS) report (February 2005) describes the existing environmental conditions and subsequently

FIGURE 1.12
Airport Link - Central Option
(TransApex Pre-Feasibility 2004)

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assesses the potential impacts of implementing the tunnel. The EIS is an important tool for informing both decision-makers in the Queensland Government and the Brisbane City Council, as well as key community stakeholders and the community at large.

10.2 Content of Document

The NSBT project has undergone detailed consideration by Council, with investigations which included:

- A pre-feasibility study, completed in 2002;
- Reports from two expert taskforces which further examined the financial and technical viability of the project (these reports were tabled in 2003);

FIGURE 1.13
Airport Link - Western Option
(TransApex Pre-Feasibility 2004)

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- A detailed business case produced in 2004 and approved by the State Government in 2005; and

- An EIS, currently released to the community for public comment.

The NSBT would provide Brisbane with a direct cross-city link bypassing the CBD. It would do this by connecting Ipswich Road and the Pacific Motorway at Woolloongabba in the south, to Lutwyche Road and the Inner City Bypass at Bowen Hills in the north. Connections to and from Shafston Avenue at Kangaroo Point would

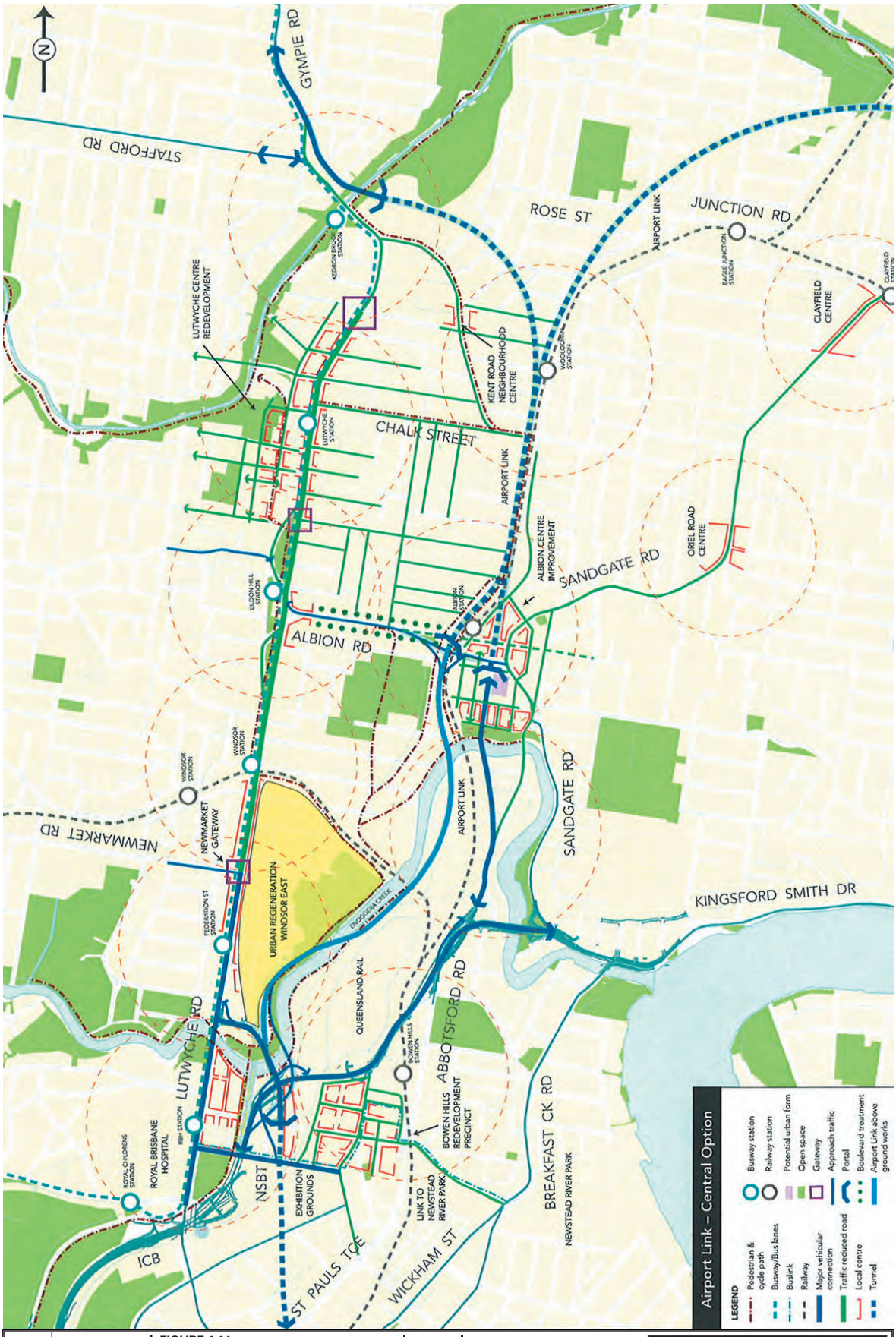

FIGURE 1.14
Airport Link - Surface Opportunities (TransApex Pre-Feasibility 2004)

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allow eastern suburbs traffic to use the tunnel, which would be approximately 5.2km long and up to 60m below the Brisbane River. Provision for a future connection with the Airport Link would be incorporated to allow future seamless integration at Bowen Hills.

10.3 Implications for INRP Master Plan

By allowing more direct cross-city trips, the NSBT would help to relieve inner-city traffic, particularly along Main Street, the Story Bridge and some areas of Fortitude Valley. It would also help to reduce fuel consumption and vehicle emissions, improving air quality along the corridor. Like other TransApex links, the NSBT would free-up inner-city surface road space, creating opportunities for other transport initiatives such as improved public transport.

The NSBT would reduce traffic congestion/ volumes on major routes and would also provide opportunities for urban improvements such as landscaping, and pedestrian and cycling connectivity.

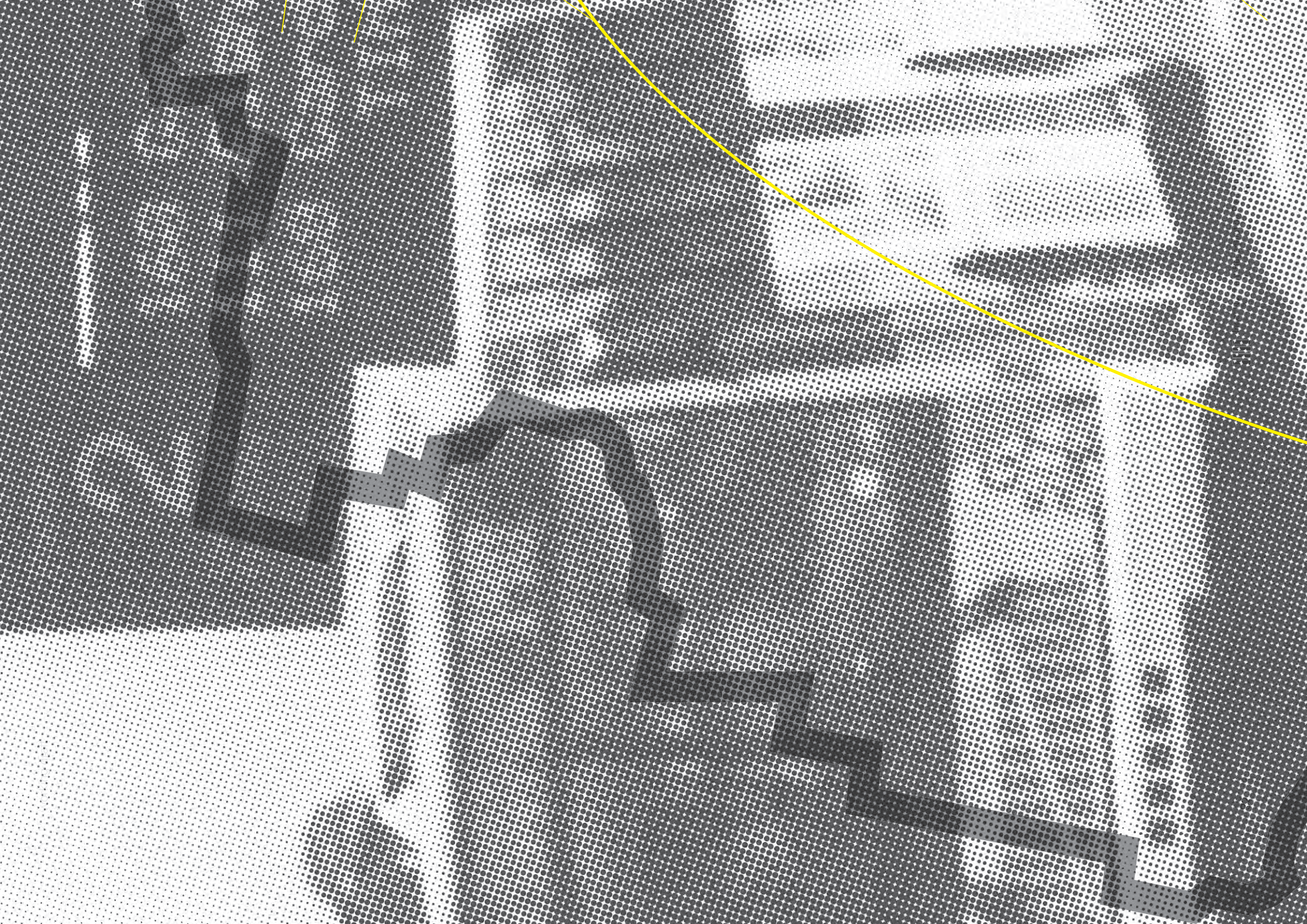
11.0 Conclusion

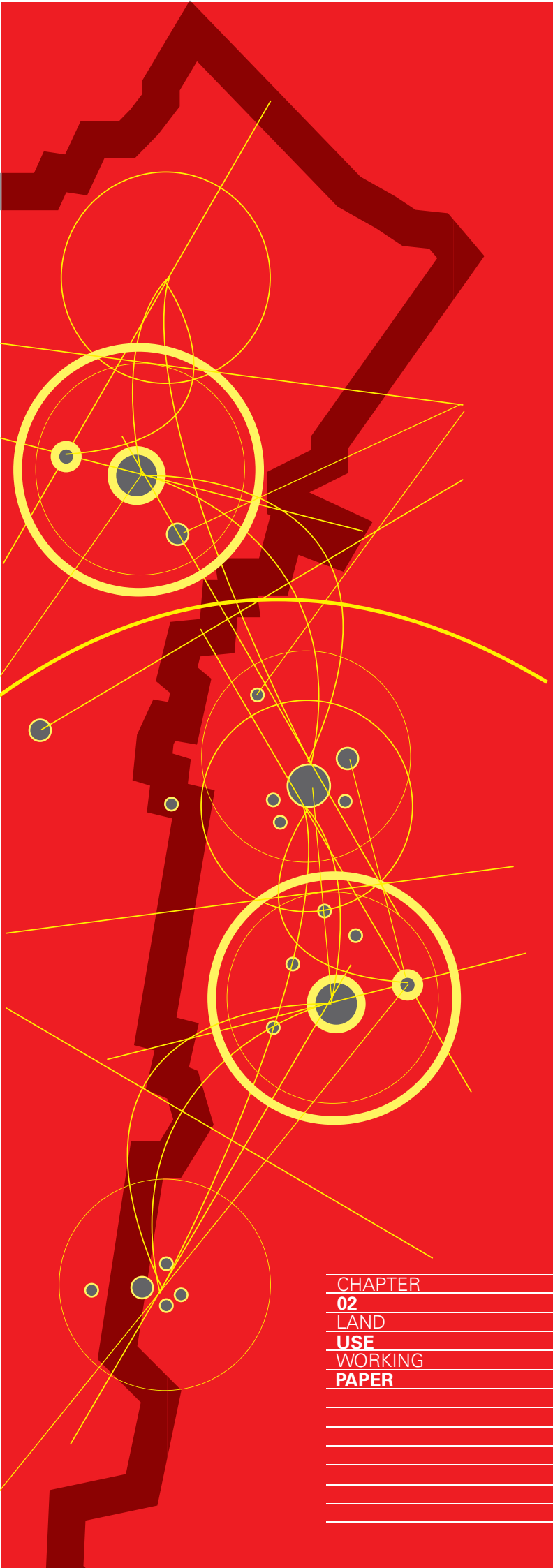
A key initiative of the South East Queensland Regional Plan is to achieve urban consolidation through TOD development around major public transport terminals and activity centres. The Regional Plan sets out a number of prerequisites and principles for TOD development which should be considered in the development of the master plan.

The existing Brisbane City Plan provides a guide to intended land use allocations within the study area, including Multi-purpose and Special-purpose Centres which form key destinations for retail shopping, employment and social services. However, changes in the density and land use provisions of the City Plan may be likely to achieve consistency with the principles and priorities of the South East Queensland Regional Plan.

The South East Queensland Inrastructure Plan and Program identifies that the study area will be affected by the key transport infrastructure projects of the Airport Link, Northern Busway and North South By-pass Tunnel. The transport infrastructure studies reviewed generally outline the following objectives and outcomes which will hold implications for the study area:

- The enhancement of the public transport link between the Brisbane Airport and CBD;
- The Airport Link will traverse the inner northern suburbs of Brisbane from Bowen Hills to Toombul thereby allowing the development of a bus facility along Lutwyche Road and facilitating potential TOD development at Lutwyche, Windsor East and Albion;
- Improvement of the suburban rail capacity;
- A focus on measures to increase the accessibility of the City by public transport;
- The planning and implementation of a Northern Busway to Chermside/Carseldine including a potential busway station at the Royal Brisbane Hospital;
- The North South By-pass Tunnel will relieve inner-City traffic.





Given that the city for a sustainable future is based on public transport, planning for density of occupation and complexity of movement will be pre-requisites for urban development.

Bryan Edwards, Rough Guide to Sustainability (2001, p107)

CHAPTER
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02

Land Use Review

1.0 Introduction

This review analyses the existing land use within the study area and examines its bio-physical characteristics, particularly with regard to identifying opportunities and constraints for urban renewal. The findings of this appraisal will inform decision making process regarding the identification of catalysts for Transit Oriented Development within the study area by highlighting potential opportunities for urban regeneration.

2.0 Existing Land Uses

Figure X broadly illustrates the eclectic mix of land uses that are prevalent within the study area. Lutwyche Road services the study area in a north/south alignment. The majority of commercial and retail activities occur along this road corridor although a number of individual small-scale centres are inter-dispersed throughout the locality.

Industrial land uses tend to occur towards the south east of the study area in the suburbs of Albion and Newstead whilst residential activities are primarily located within the suburbs of Wilston, Windsor and Lutwyche in the west in addition to Wooloowin in the north. Housing within these areas varies greatly with regard to character and intensity.

A more detailed evaluation of those land uses within the study area is as follows:

2.1 Commercial

Relatively continuous ribbon commercial and retail development has occurred along the length of Lutwyche Road. These uses are reasonably small in scale, have occurred in an ad-hoc fashion and include a diversity of tenants. A number of more intensive commercial and retailing activities have also been established along Lutwyche Road including the Lutwyche City Shopping Centre (a sub-regional centre) and the Windsor Homemaker Centre (a bulky goods centre).

Additional 'strip' development, including the Breakfast Creek Wharf and Hotel can be found along Breakfast Creek Road, spanning from the Creek itself, south towards the south-eastern limit of the study area.

A number of discrete commercial centres of varying scale can also be found within the study including;

- 'Albion Village' - situated on Sandgate Road stretching from its intersection with Crosby Road in the south to its intersection with Camden Street to the north;
- "Grange Central' - located towards the western extremity of the study area at the juncture of Days, Constitution and Gilbert Roads;
- 'Wilston Village' – also located towards the western extremity of the study area on Kedron Brook Road and McGregor Street; and
- 'Windsor Homezone' - and its associated bulky goods centres sited along Newmarket Road, spanning between its intersections with Kedron Brook Road in the west and Green Terrace in the east .

Further to the above, it is noted that a multitude of additional minor commercial and retail activities are dispersed throughout the study area. These developments are typically small in scale, are accommodated on a single land holding and primarily serve the basic daily needs of the surrounding population.

2.2 Industry

The majority of industrial activities within the study area occur within the suburb of Albion and, to a lesser extent, Newstead.

In this regard, land extending from the Albion 'five ways' along Sandgate Road (adjoining Breakfast Creek and bound by Crosby Road, the Brisbane River and Crosby Park and Albion Park Pace-way) comprises a variety of commercial and industrial businesses. These businesses include large-lot car dealerships, auto services and repairs in addition to some personal and household good retailing and construction and trade services.

Light industrial activities can be found to the north of Crosby Park between Dover and Lapraik Streets including the Readymix concrete batching plant.

Land west of Sandgate Road and Albion Village contains an unusual blend of industry sectors

and businesses. In this regard there is a high proportion of motor vehicle, retail and service businesses that are, in the main, not consistent with the 'General Industry Classification' of the land. There are two key businesses within this particular locale that dominate the surrounds, these being the Queensland TAB on Sandgate Road and the Albion Flower Mill on Hudson Road.

Land to the south of Breakfast Creek and east of Breakfast Creek Road provides for a number of light industrial and warehousing activities. An additional small pocket of industrial uses can be found within close proximity to the intersection of Lutwyche Road and Horace Street (inner city by-pass). This land includes a concrete batching plant in addition to a number of vehicle sales, repair and wrecking yards.

2.3 Residential

The majority of residential land within the study area is situated to the north of Breakfast Creek and includes the mix of dwelling types

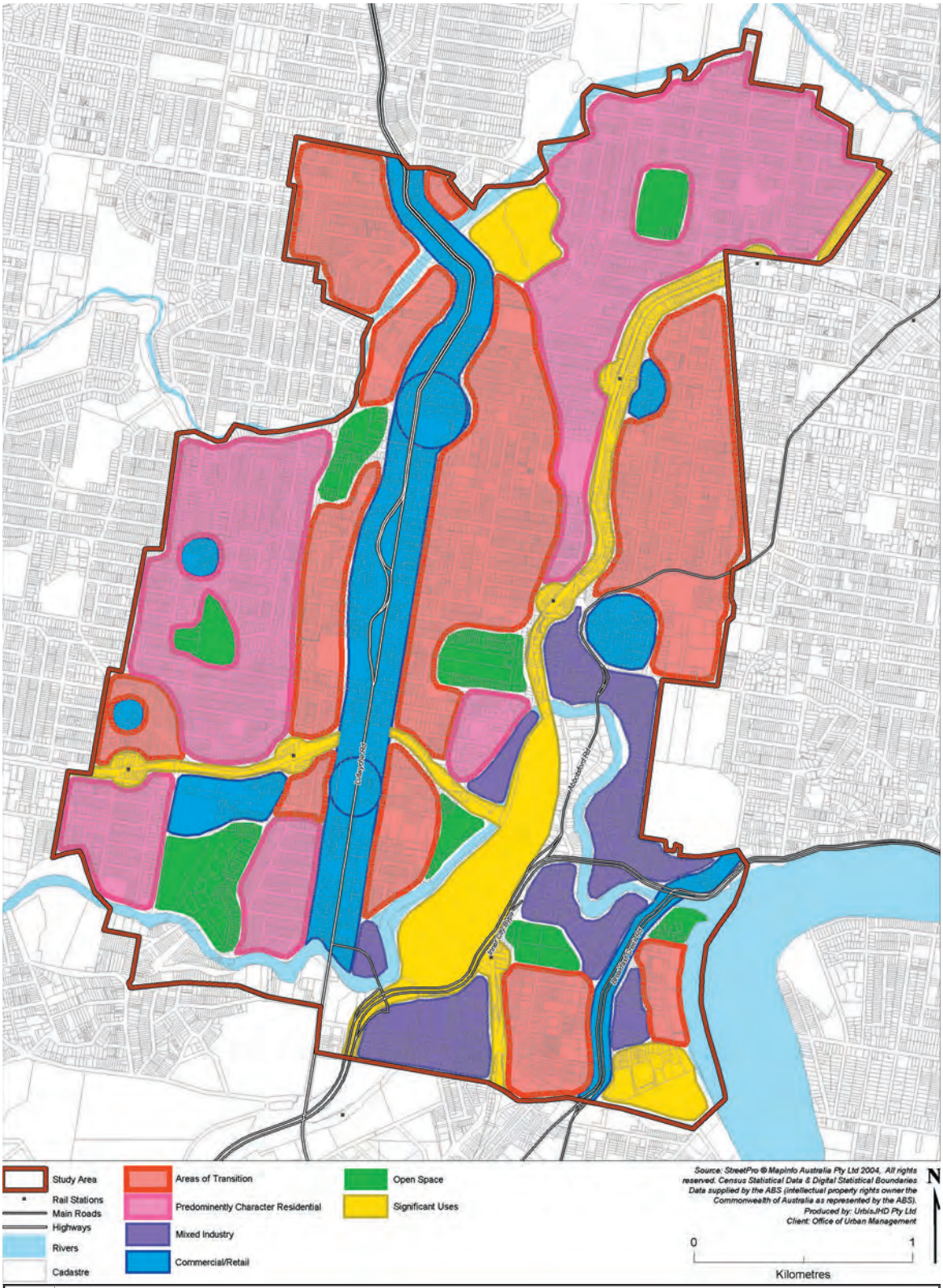

FIGURE 2.1
Land Use Mix

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typically associated with an established inner-City locality.

Large tracts of predominately single detached dwellings can be found in the suburbs of Herston and Windsor towards the south-west of the study area and Wooloowin to the north-east. The majority of such dwellings were constructed prior to 1946 and are identified as having some value with regard to character.
Comparatively higher residential densities can be found to the east and west of Lutwyche Road. This land has been developed for the purposes of multi-unit dwellings of up to three storeys to the extent that single detached dwellings are no longer dominant.

Land to the north of Albion (bound by Crosby and Junction Roads) is also experiencing transition. A number of multi-unit dwellings having been developed of late and again, single detached dwellings are no-longer considered to be the dominant housing form within this area.

A limited number of large-scale, multi-storey residential apartment buildings have been developed throughout the study area, the majority of which are generally located in Newstead, adjoining the Brisbane River. Some additional multi-storey residential buildings can be found in Newmarket (within close proximity to the Windsor Homemaker Centre) and Albion (on land bound by Little, Whytecliffe and Frodsham Streets and Sandgate Road).

2.4 Recreation & Open Space

A number of formal sporting facilities and recreational areas are located within the study area including:

- Crosby Park - situated to the east of the Albion 'five ways' and comprising private facilities including Jack Ross Oval, Vic Walsh Oval, Allan Boarder Field, Brothers Rugby Club and Queensland Cricket) and Albion Park Pace-way;

- Perry Park - located to the west of Breakfast Creek Road in Newstead and fronting Abbotsford Street. The facility accommodates the Brisbane Strikers Football Club and associated facilities;

- Downey Park - bound by Enoggera Creek and Newmarket Road and accommodating the Brisbane Women's Hockey Association, sporting fields and softball facilities. Finsbury Park hockey facilities adjoin the site to the immediate west;

- Windsor Park - located to the east of Lutwyche Road and containing Keith Beavis Oval, the Northern Suburbs District Cricket Club and the Windsor Bowls Club; and

- Kalinga Park - forming the north-eastern extremity of the study area, adjoining Kedron Brook Creek and containing a number of formal sporting ovals.

A number of additional smaller parks and reserves can be found throughout the study area that are primarily utilised for informal recreational pursuits such as picnic areas, play grounds and in some instances, boat launching facilities. Open space and conservation areas are also prevalent within the study area and are, by and large, associated with the water courses of Breakfast, Enoggera and Kedron Brook Creeks.

2.5 Additional Significant Uses

A number of significant additional uses are located within the study area including;

- The Queensland Rail Yards and Workshops in Bowen Hills;

- Newstead River Park urban renewal area;

- Emergency Services Complex – Kedron Park; and

- Royal Brisbane Hospital in Herston – Although the Royal Brisbane Hospital is located outside the bounds of the study area, the site is a major employment and social service destination within Brisbane.

3.0 Railway Precincts

Figure X identifies those railway stations that are located within the study. A detailed analysis of land within 400 metres of each of these stations has been undertaken by Brisbane City Council and is as follows:

3.1 Wilston Railway Precinct

Development within the 400 metres radius surrounding Wilston Rail Station is predominantly residential in nature, with large areas of high quality Character Residential development and a number of streetscapes that could be considered representative of high quality pre-1946 housing featuring prominently throughout. The area north of the rail line, however, is largely designated Low-Medium Density Residential, with a Demolition Control Precinct overlay extending over the majority of the area within the 400 metres radius.

A modern commercial / light industrial area is located on the eastern perimeter of this radius

and an older Light Industrial area straddles the western radius perimeter. Both of these areas are located along Newmarket Road, which runs parallel to the rail line. In addition there are existing Centres (MP4) activities along Kedron Brook Road at the northern perimeter of the Wilston railway precinct.

Existing community facilities within the Wilston Rail Station precinct include a childcare centre along Newmarket Road, Downey Park playing fields along Noble Street to the east, a large park at the end of Langley Avenue to the south, a smaller park in Katherine Street and a small church near the Kedron Brook Road / Silvester Street intersection.

3.2 Windsor Railway Precinct

Development within the 400 metres radius surrounding Windsor Rail Station is a mix of residential, commercial and light industrial uses, with areas of high quality Character Residential development and a number of streetscapes that could be considered

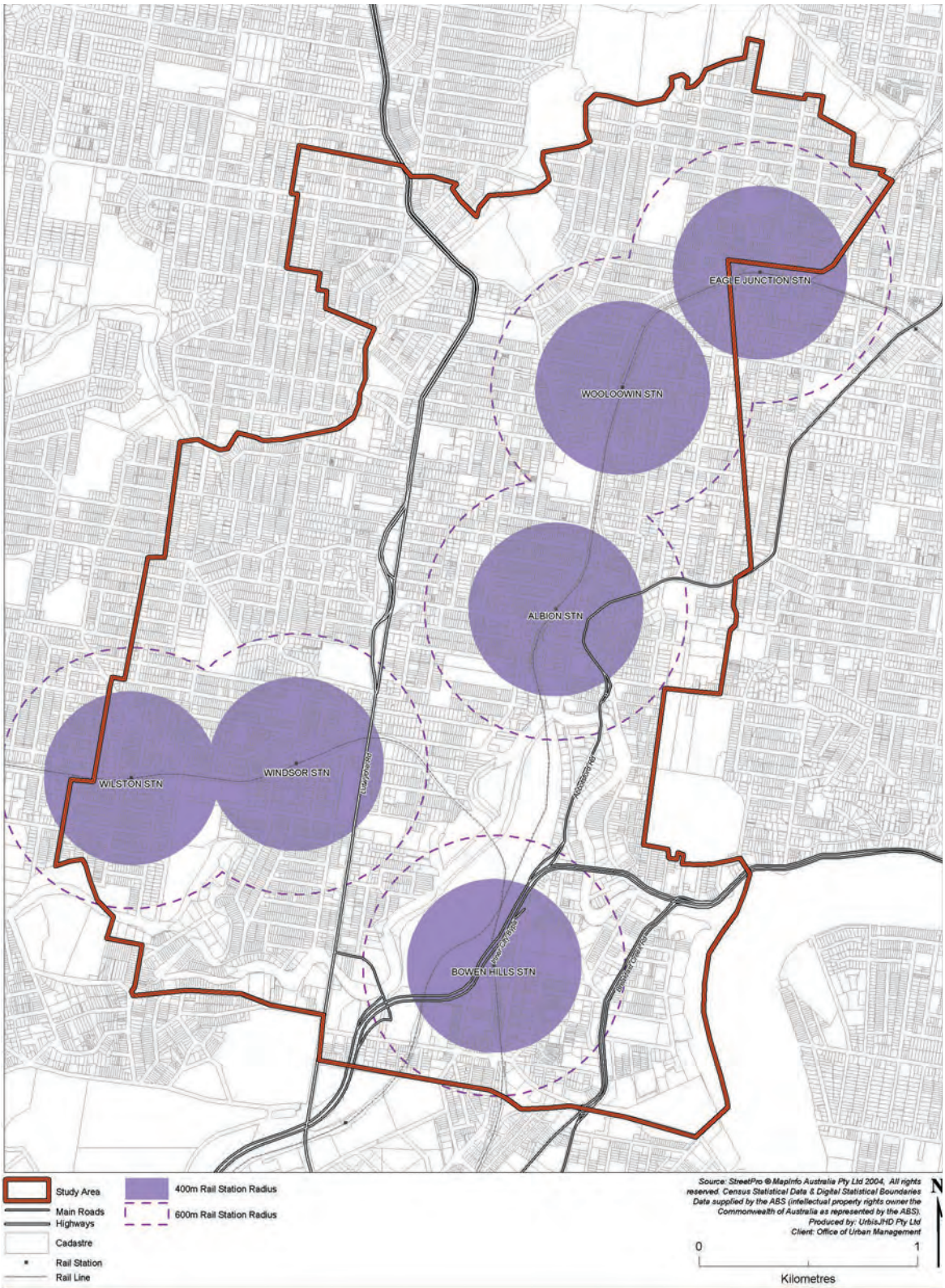

FIGURE 2.2
Railway Precincts

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representative of high quality pre-1946 housing featuring prominently throughout.

Newmarket and Lutwyche Roads support the majority of non-residential uses within the precinct but the majority of development immediately surrounding the train station and to the north is residential in nature.

Modern commercial activities occupy the majority of Lutwyche Road's eastern and western frontages, forming a major employment area for the precinct. Light industrial activities dominate the south-western sector of the precinct along Newmarket Road and represent a second employment area.

Existing community facilities within the Windsor Rail Station precinct include a primary school along Constitution Road, two churches along Newmarket Road and sports fields along Green Terrace.

3.3 Albion Railway Precinct

Development within the 400 metres radius surrounding Albion Rail Station is a broad mix of Character Residential / non-Character dwellings, multi-unit apartment buildings, Light and General Industry activities, Commercial Centres (MP3) activities and Community Use facilities. The area to the north-west of the rail station contains a number of streetscapes that could be considered representative of high quality pre-1946 housing, with a Demolition Control Precinct overlay extending over the majority of the area. The area to the east of the rail line contains a variety of commercial, industrial and residential uses centred on the major thoroughfares of Sandgate and Albion Roads.

Light Industry activities (such as scaffolding hire yards, car sales yards and automotive repair shops) exist at the southern edge of the precinct along McDonald Road and along Sandgate Road, while General Industry activities (such as warehousing and panel beaters) are prevalent to the south-east of the rail station. The major commercial centre of the Albion precinct is located around the intersection of Sandgate Road, Albion Road and Lever Street and contains Suburban Centre (MP3) activities such as restaurants, banks, real estate agents and other retail outlets.

Existing community facilities within the Albion Rail Station precinct include the Windsor Croquet and Bowls Clubs along Crosby Road; Crosby Park immediately to the south of the afore-mentioned clubs; a community hall at the corner of Albion Road and Lane Street; the Albion Seventh Day Adventist Church on the corner of McLennan and Stoneleigh Street; the Albion Peace Centre on the corner of Crosby Road and McDonald Street; and the Albion Baptist Church on the corner of McLennan Street and Albion Road.

3.4 Wooloowin Railway Precinct

Development within the 400m radius surrounding Wooloowin Rail Station is predominantly residential in nature, with large areas of high quality Character Residential development and a number of streetscapes that could be considered representative of high quality pre-1946 housing featuring prominently throughout. The area west of the rail line, however, is largely designated Low Density Residential, with a Demolition Control Precinct overlay extending over the majority of the area within the 400 metres radius.

The entire area east of the rail line is designated Low-Medium Density Residential containing a number of small, scattered Demolition Control Precinct overlays. Detached dwellings are the prevalent housing form to the west of the rail line, whereas to the east there is a mix of Character Residential, non-Character and multi-storey apartment buildings.

The precinct contains very few commercial or industrial activities, with a strip mall on Lisson Grove constituting the most extensive commercial development within the 400m radius surrounding the rail station. A small number of individual shops are scattered throughout the precinct but no industrial uses are present.

Existing community facilities within the Wooloowin Rail Station precinct include an early childhood centre on the corner of Kedron Park Road and Isedale Street; the Holy Cross Church, Boarding School and Commercial Complex along Chalk Street; and a Scout Hall on View Street.

3.5 Eagle Junction Railway Precinct

Development within the 400 metres radius surrounding Eagle Junction Rail Station is predominantly residential in nature with large areas of high quality Character Residential development and a number of streetscapes that could be considered representative of high quality pre-1946 housing featuring prominently throughout. The area north of the rail line is largely designated Low Density Residential, with a Demolition Control Precinct overlay extending over the majority of the residential sections of the precinct. The area to the south and east of the precinct is mostly Low-Medium Density Residential containing large scattered areas protected by Demolition Control Precinct overlays and a number of Cultural Heritage sites. The exception is Roseby Avenue, which

is dominated by Character Residential lots and the Eagle Junction Primary / Pre School complex.

A commercial area (containing Convenience Centre MP4 activities) extends along Junction Road between Bonney Avenue and Morrison. Two large sites (one containing a Telstra maintenance facility, the other a new multi-unit residential building under construction) occupy land between the rail line and Clarkson Street. Existing community facilities within the precinct include the Eagle Junction Primary and Pre Schools along Roseby Avenue and an Environmental Protection Area along Kemble Street.

3.6 Bowen Hills Railway Precinct

Info arrives Wednesday

4.0 Bus Routes

Figure X identifies major bus routes and associated stops within the study area. As illustrated, the majority of the inner north is well serviced by this mode of public transport with Brisbane City Council Bus Routes (both City and cross-town) provided along all major roads within the study area.

5.0 Heritage and Character

Figure X indicates those localities within the study area that are subject to Demolition Control Precincts in addition to those specific sites that contain commercial character buildings. Places identified as having local heritage significance are also identified.

5.1 Demolition Control Precincts

Large expanses of residential land within the study area are identified as having some form

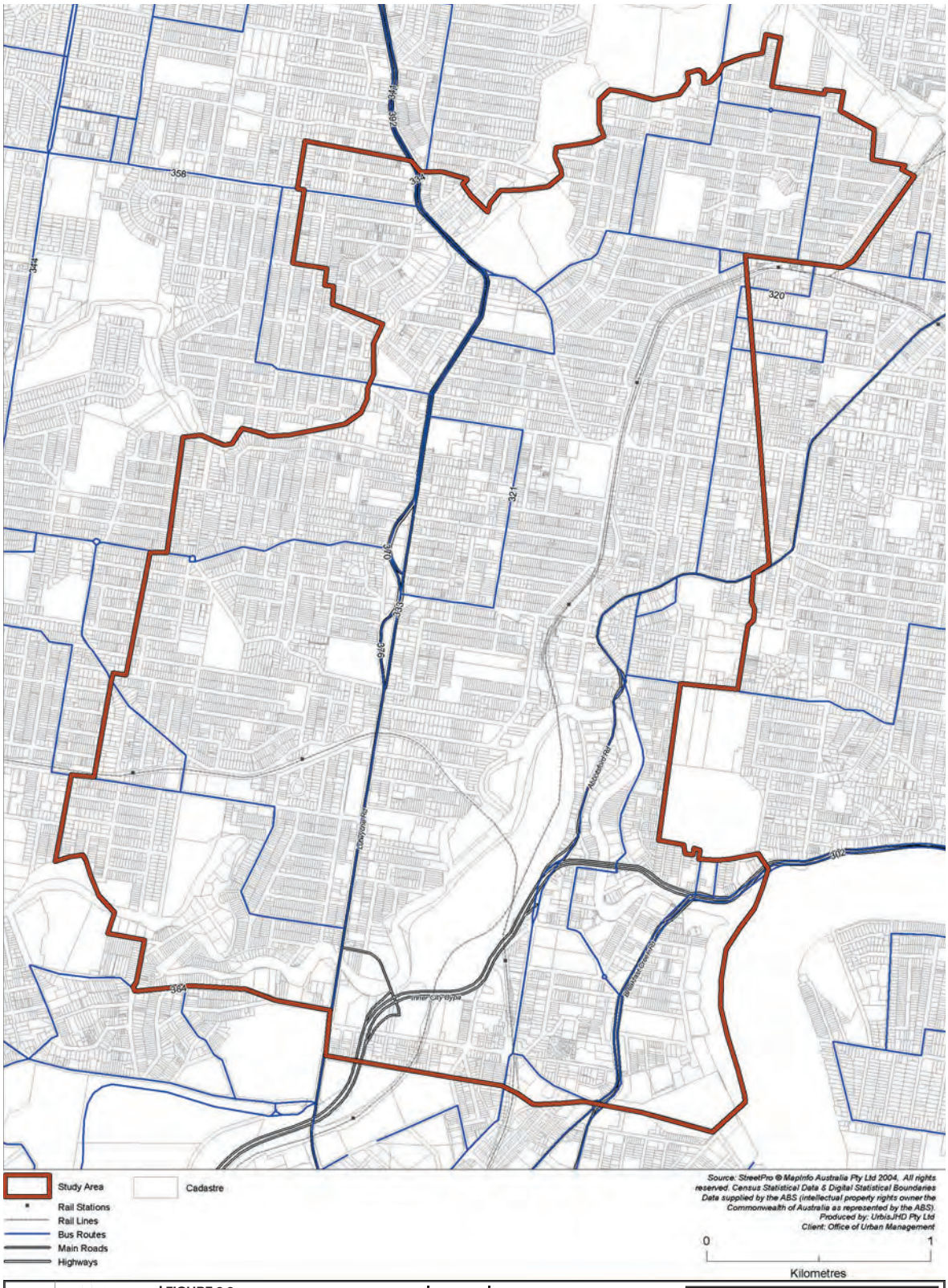

FIGURE 2.3
Bus Routes

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of value with regard to character. The suburbs of Herston, Windsor and Wooloowin are, in effect, subject to Demolition Control Precincts in their entirety.

5.2 Commercial Character Buildings

Within the study area, Commercial Character Buildings are generally located in areas that are again identified as having character value. In this regard, a concentration of Commercial Character Buildings can be found within the suburbs of Herston, Windsor and Wooloowin.

5.3 Heritage Places

A multitude of Cultural Heritage Sites are identified throughout the study area. These localities are not necessarily buildings and include amongst other things structures (such as wharfs and bridges, machinery, landscapes and site of historical importance. More notable listings include:

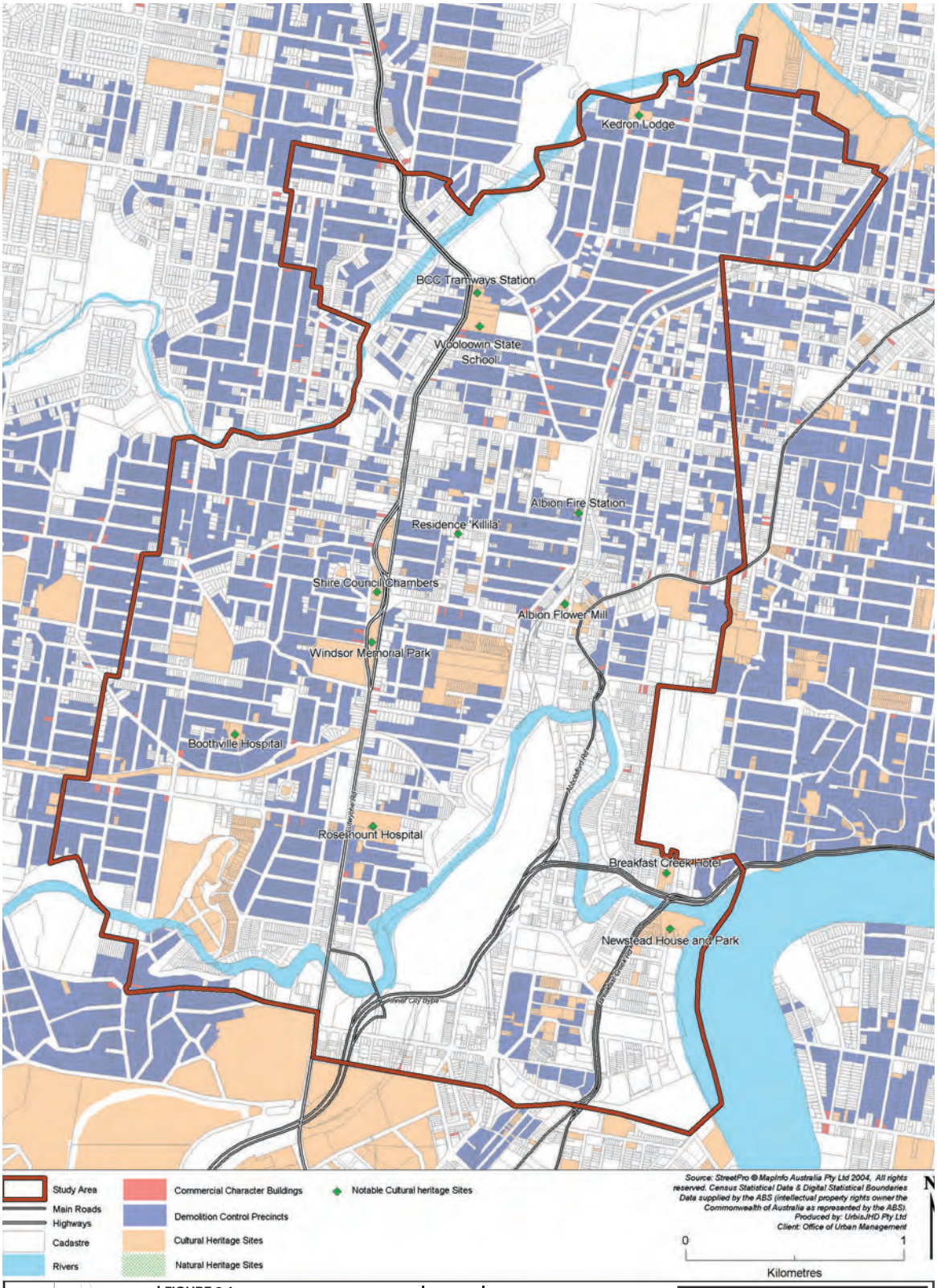

FIGURE 2.4
Heritage and Demolition Constraints

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Albion
- Breakfast Creek Hotel
- Albion Flour Mill
- St Columban's Christian Brothers College

Newstead
- Cintra House
- Newstead House and Park

Windsor
- Rosemount Hospital
- Windsor War Memorial Park
- Shire Council Chambers
- Boothville Hospital

Lutwyche
- Wooloowin State School
- Residence 'Killila'

Wooloowin
- Albion Fire Station
- Brisbane City Council Tramways Substation
- Kedron Lodge

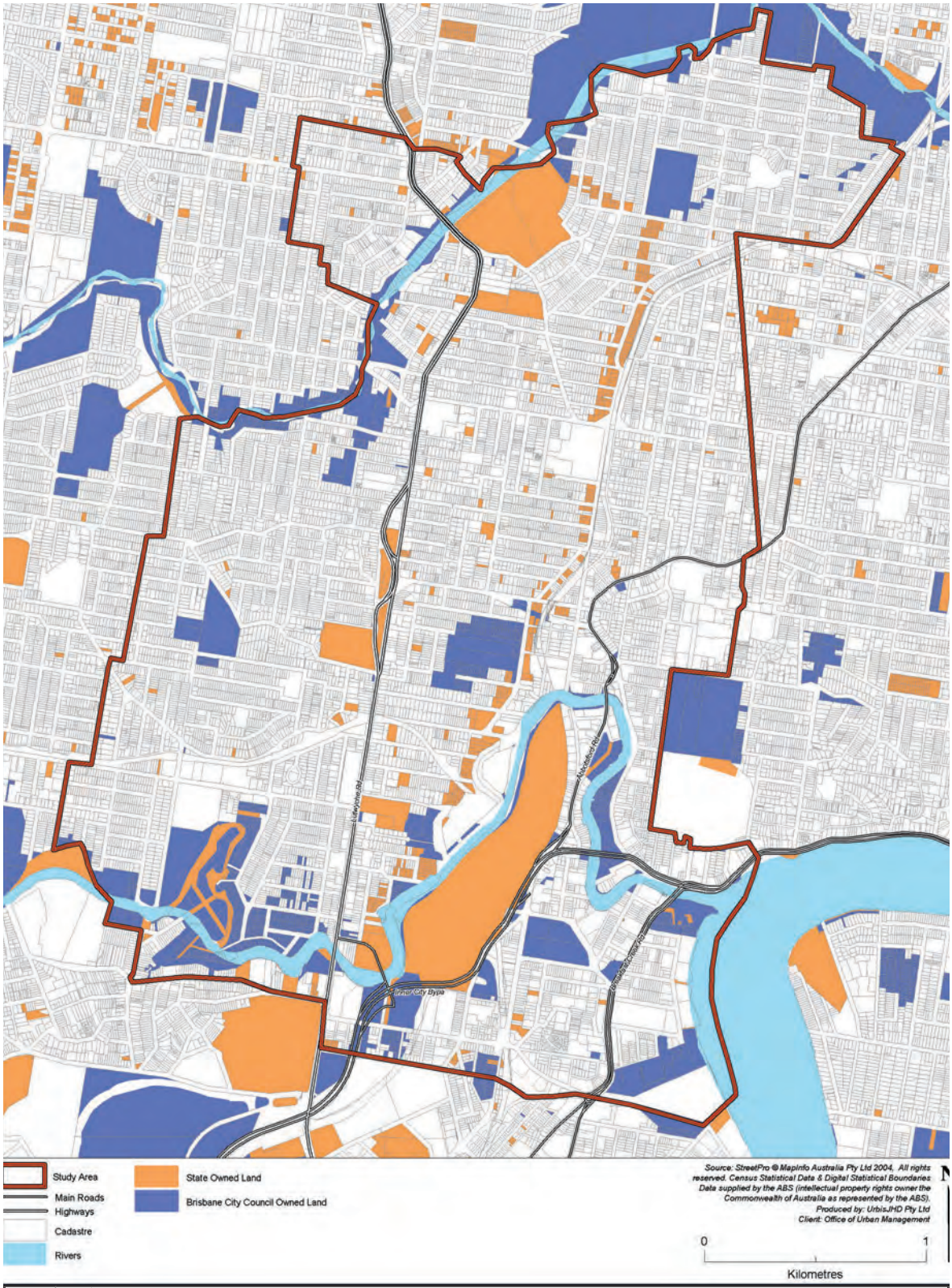

FIGURE 2.5
Key Tenure

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6.0 Tenure

Figure X indicates both State and Local Government land ownership within the study area. Sizeable land parcels under freehold title are also identified.

6.1 State Government

The majority of State Government owned land within the study area is typically associated with railway infrastructure. The railway yards and workshop in Bowen Hills comprise in excess of three hectares of State owned land whilst significant tracts adjoining this holding and extending parallel to the rail line north to Eagle Junction also fall under the control of the State Government.

Additional State Land is dispersed throughout the study area. These land parcels are associated with varying uses including, but not limited to the provision of education facilities, emergency services, road corridors, parks and reserves.

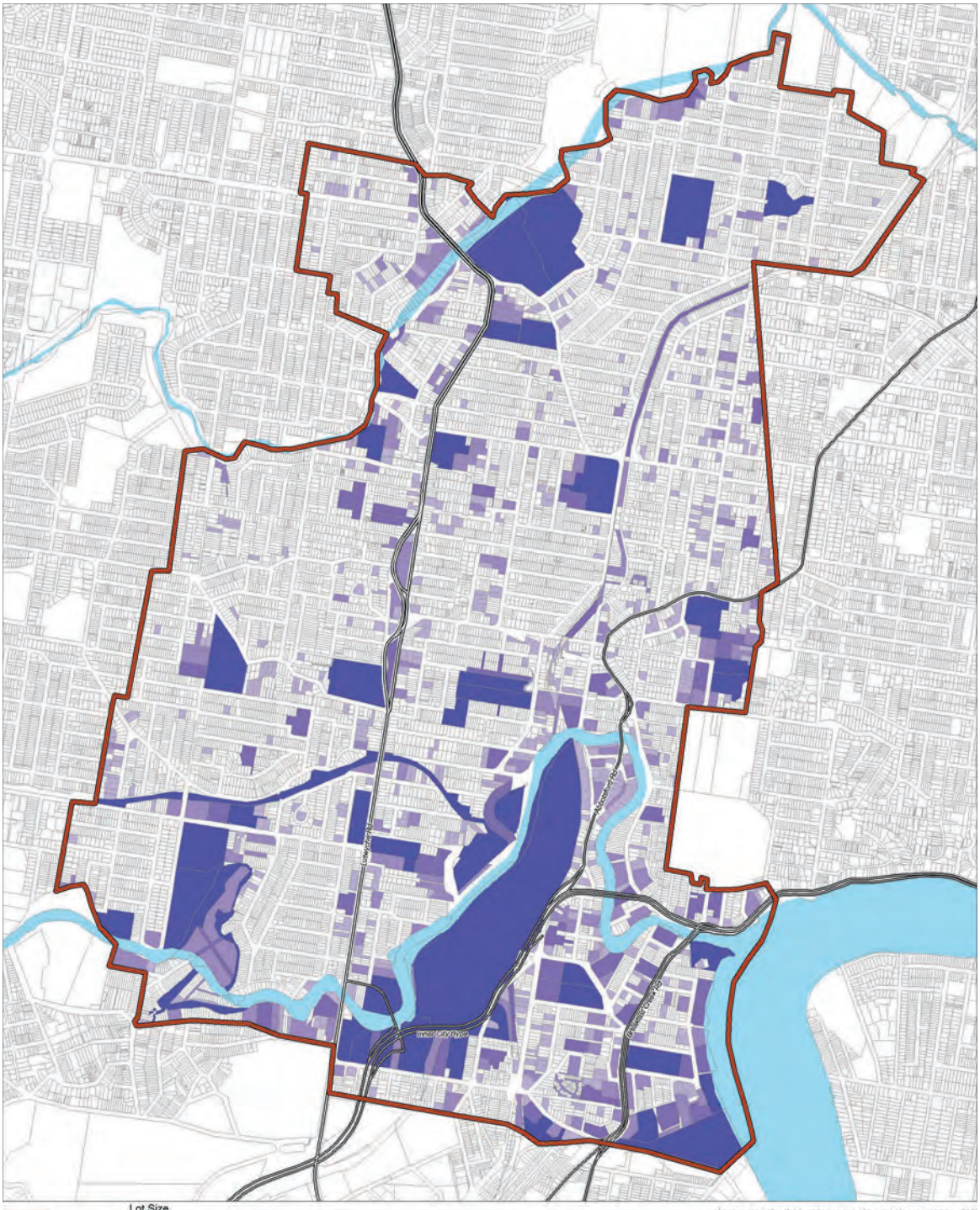

FIGURE 2.6
Lot Size

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6.2 Brisbane City Council

Land under the ownership of Brisbane City Council is generally related to the provision recreation facilities parks, community services, essential infrastructure and waterway corridors.

6.3 Large Freehold Ownership

A number of large freehold land parcels (refer figure XX) have been identified within the study area. These holdings have an area in excess of one hectare and include the Windsor Homezone and Homemaker Centres and the Lutwyche City Shopping Centre. Further sizable freehold land parcels within the study area are generally associated with the provision of private hospital, education and retirement activities.

7.0 Environment

7.1 Topography

The study area is framed by Kedron Brook Creek in the north and Enoggera and Breakfast Creeks to the south. Land adjoining these watercourses

is relatively flat. Low-lying areas can also be found within the suburb of Newstead adjoining the Brisbane River. A chain of five locally prominent hills (Sparks, Eildon, Montipelier, Tenerife and Whites hills) traverses the study area from the north-west to south-west). Refer to Figure X.

7.2 Flooding

Brisbane City Council Flood Records indicate that a significant portion of land to the north and south of the study area is susceptible to flooding. In this regard, there is a record of flooding (form of flood levels recorded from actual flood events or design [calculated] flood levels for creek and river storm surge) in the low lying areas bound adjoining Breakfast, Enoggera and Kedron Brook Creeks. Refer to Figure X.

Waterways

The waterway corridors located within the study area are associated with Breakfast, Enoggera and Kedron Brook Creeks. No

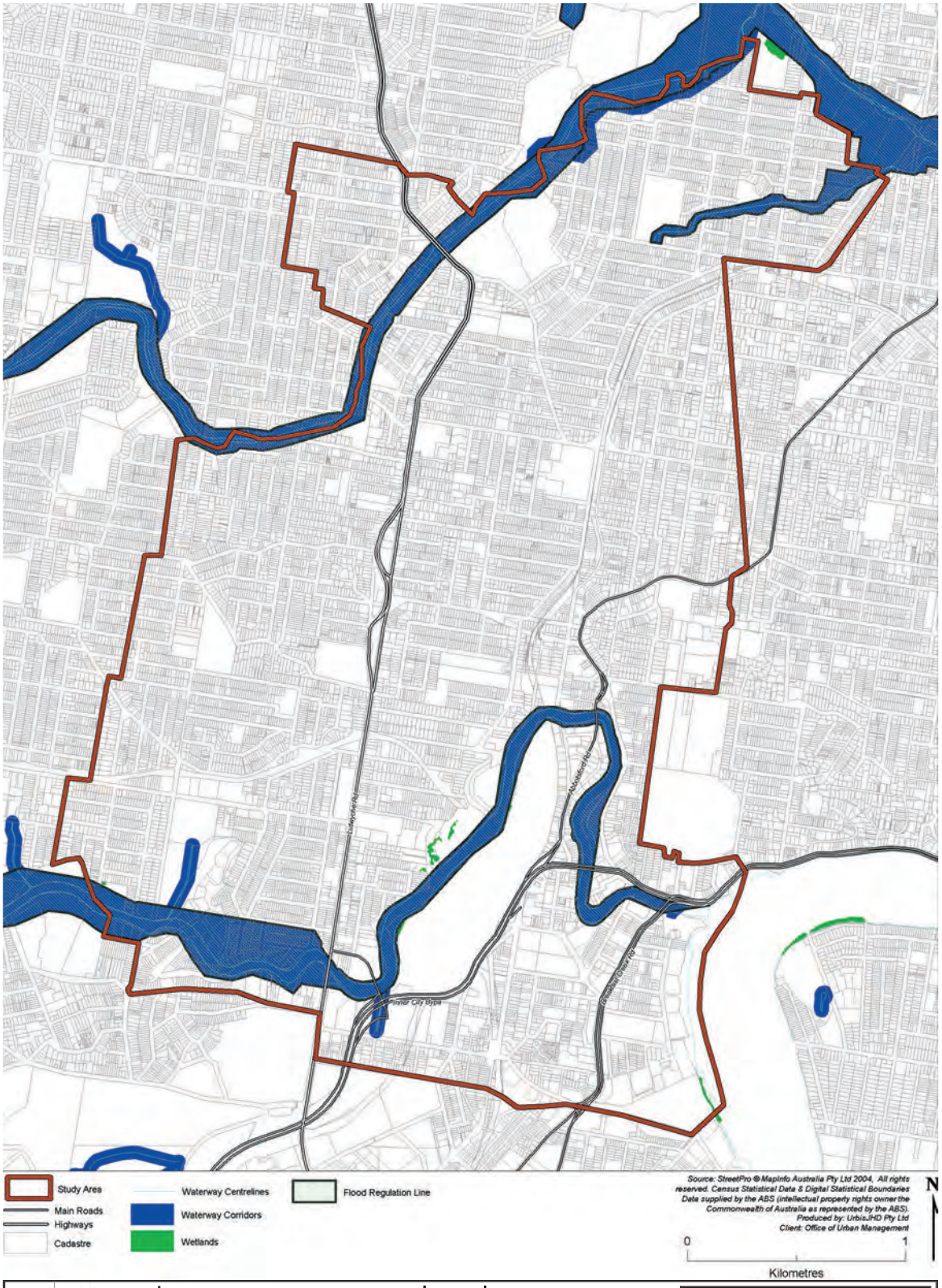

FIGURE 2.8
Flooding and Waterways

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additional waterway corridors are situated within the locality. Refer to Figure X.

7.3 Wetlands

Land immediately joining both Enoggera and Breakfast Creeks is identified as being a wetland. Flynn Oval, which is bound by Enoggera Creek to the south and Cartwright Street to the north, is also identified as containing wetlands. No additional wetlands can be found within the locality. Refer to Figure X.

7.4 Biodiversity

Eidon Hill Reservoir is identified as containing City-wide or locally significant biodiversity values whilst land to the south-west of Kalinga Park is classified as an Environmental Protection Area. Various localities throughout the study are subject to Council's Natural Assets Local Laws. Refer to Figure X.

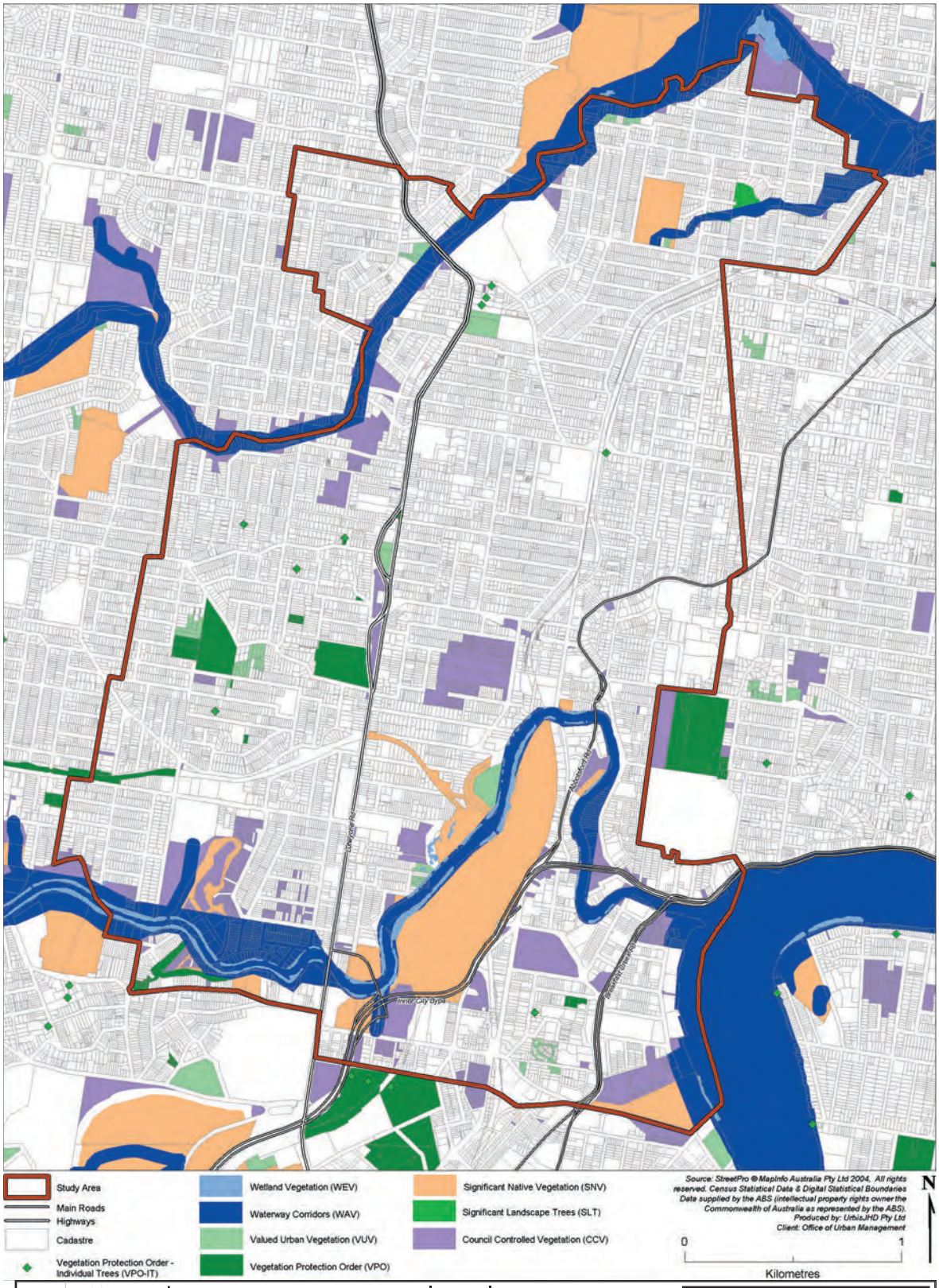

FIGURE 2.9
Bio-Diversity and Natural Assets

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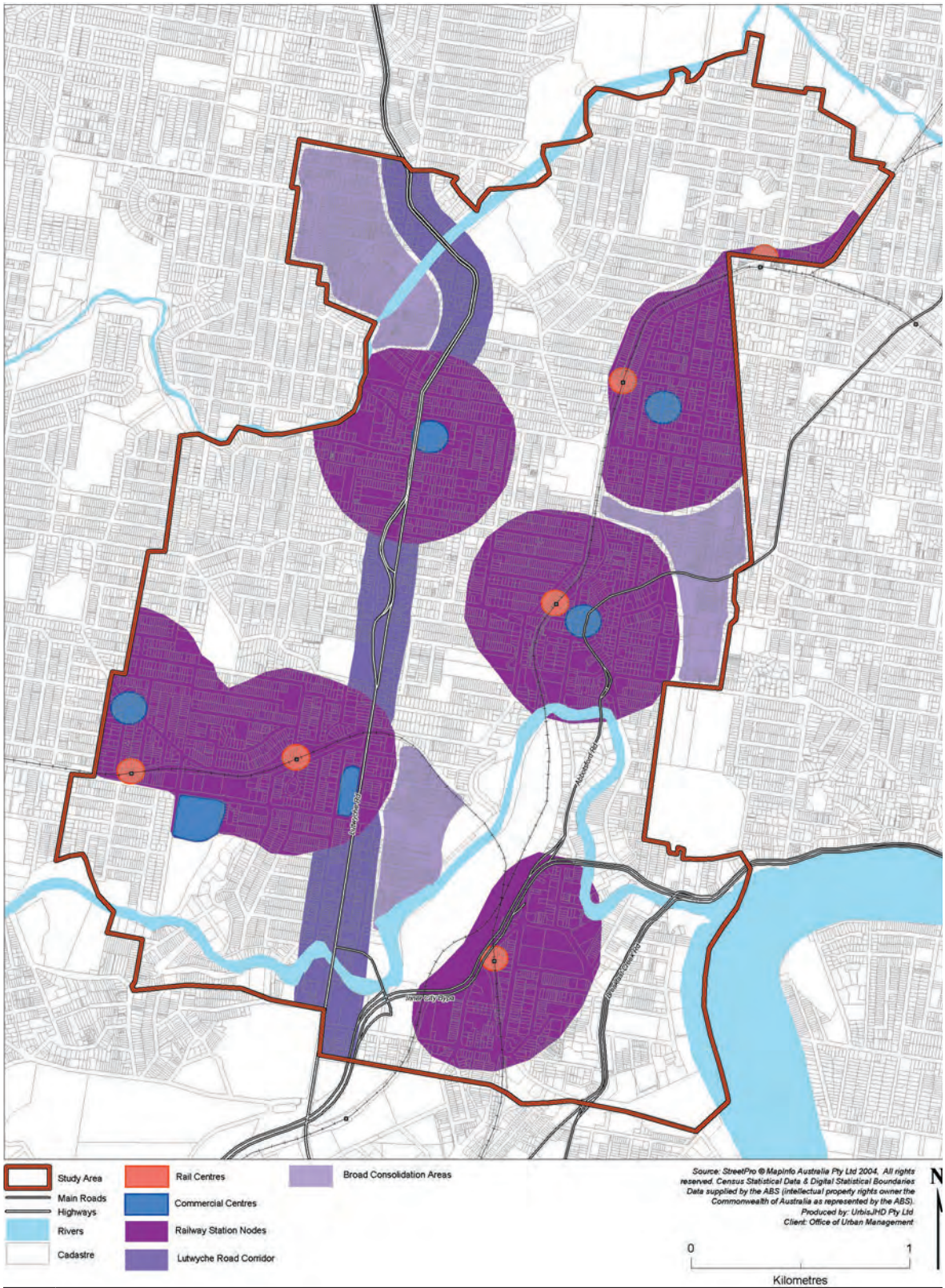

FIGURE 2.10
Potential Urban Regeneration Opportunities

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8.0 Issues and Opportunities for Consolidation

When taking into account the existing land use types within, and biophysical characteristics of, the study area it is evident that there exists both opportunities and impediments with regard to urban consolidation and the identification of catalysts for Transit Oriented Development.

9.1 Land Use and Biophysical Issues

- Significant tracts of land within the study area are located within the bounds of a Demolition Control Precinct or are identified as having important character value.

- The industrial uses within the study area are identified as being of significance to Brisbane. Accordingly the preservation of this land in inner City areas for key industries servicing the inner City may prove to be some importance.

- Large areas of low-lying land adjoining Kedron Brook, Enogerra and Breakfast Creeks have a history of flooding.

9.2 Land Use and Biophysical Opportunities

- Vast tracts of residential land to the east and west of Lutwyche Road and land to the north of Albion are currently experiencing a period of transition with single detached dwellings no longer dominant.

- The majority of those ad-hoc commercial and retail uses spanning the length of Lutwyche Road are considered to be conducive to the processes of consolidation.

- The study area is well serviced by multi modal (bus and rail) public transport.

- Although each of the railway stations within the study area vary markedly with regard to land use activities and character, Brisbane City Council, via detailed land use surveys and site analysis have identified each as having the potential for accommodating higher density redevelopment and represent ideal scenarios for achieving the introduction of transit oriented development.

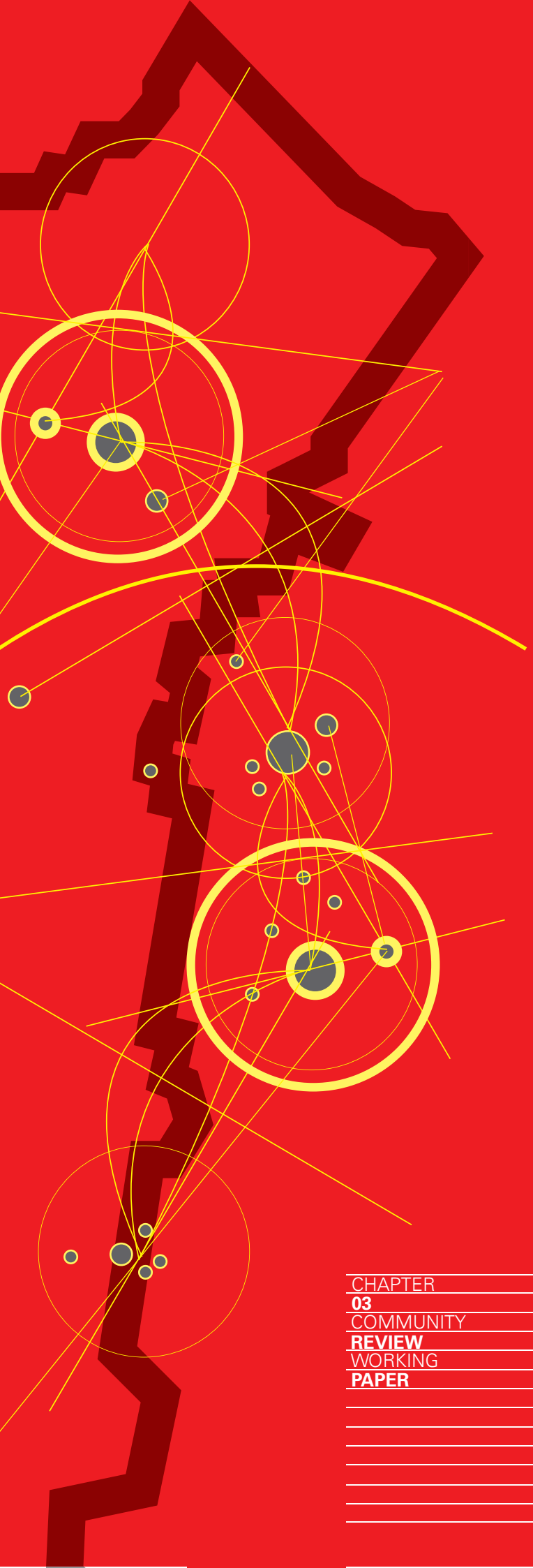
- A number of sizable freehold and government owned land parcels can be found within the study area.

- The majority of the locality is relatively unconstrained with regard to waterways, wetlands, significant vegetation and sloping land.

- A number of major centres, community facilities and the like have been established within the study area and may form potential destinations within a future consolidated area.

9.3 Potential Urban Regeneration Opportunities

From a land use review perspective only, various localities have been identified which could potentially present urban regeneration opportunities. These are shown in Figure X. These locations primarily encompass relatively accessible land surrounding railway stations, centres and Lutwyche Road itself. The North Albion/South Wooloowin area has undergone high levels of transition from detached housing to higher density residential forms and is therefore identified as having urban consolidation and redevelopment potential.



Land use, transport and employment integration plays a key role in achieving social, economic and environmental sustainability in the region. By shaping the pattern of development and influencing the location, scale, density, design and mix of land uses, integrated planning can help to create complete communities.

South Queensland Regional Plan 2005-2026.
(2005, p75)

CHAPTER
03
COMMUNITY
REVIEW
WORKING
PAPER

03

Community Review

1.0 Introduction

This community and social services review provides headline statistics for the demographic profile of the study area, an outline of existing social services and community infrastructure provision and identifies major community related issues and impacts that will need to be addressed through the preparation of the masterplan.

2.0 Demographic Profile

2.1 Population

Population growth over the last 25 years in Brisbane has averaged around 2.2% per annum, well above the Australian average of 1.3% per annum. As is the case for other capital cities in Australia, Brisbane has experienced cyclical population growth patterns from a low of around 24,000 people per annum over the period 1981-1986 and 32,400 per annum from 1991 to 1996. More recently, Brisbane has experienced even higher population growth of 41,400 people per annum over the period 2001-2003.

The pattern of growth is primarily due to the changing levels of interstate migration. Queensland, including Brisbane, has enjoyed high levels of interstate migration predominantly at the expense of the southern states.
Following a low period, which reflected an easing of economic activity in Queensland and a more buoyant economy in Victoria in particular, Queensland interstate migration levels are again trending upwards.
As a result, population growth in Queensland and Brisbane is also strengthening. As shown in the following chart, population growth to 2003 has increased by around 41,400 people per annum, significantly more than the increase of 26,000 people per annum during the late 1990's, and higher than trend growth.

Based on ABS forecasts, which assume trend levels for interstate and overseas migration and natural increase, and reflecting a recent surge in dwelling approvals, UrbisJHD expects Brisbane growth to average around 34,200 people between 2001 and 2006 and 31,300 people from 2006 to 2011.

Looking within Brisbane itself we expect the relatively high levels of development activity in the inner/middle suburbs is likely to remain, although the outer suburbs will also continue to attract a gradual increase in the share of overall population growth in Brisbane.

2.2 Socio-Economic Characteristics

The socio-economic profile of the study area population is examined and compared with the benchmarks for metropolitan Brisbane. The analysis is based on data from the 1991, 1996, and 2001 Census of Population and Housing. The most significant features are as follows:

- As at 2003 the Estimated Resident Population (ERP) for the study area was estimated at 23,161 persons or almost 1.5% of the Brisbane S.D.

- The average household size within the study area was 2.22 persons in 2001, considerably lower than that of the Brisbane Average of 2.71 persons, reflecting lower household sizes for the study area. Household sizes have marginally decreased from the 1991 level of 2.25 persons per household. During this time the Brisbane average household size decreased from 2.83 in 1991 to 2.71 persons in 2001.

Source: ABS; UrbisJHD

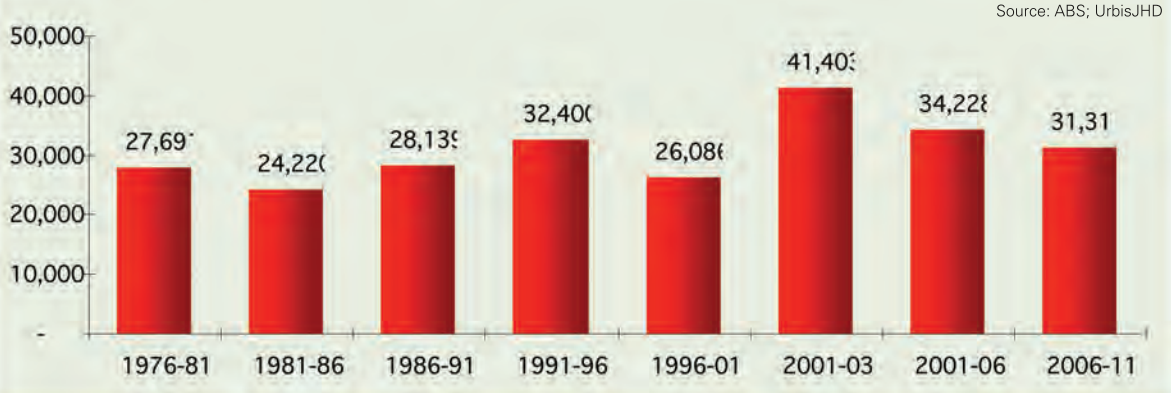


FIGURE 3.1
Brisbane Statistical Division
Annual Population Growth - 1976-2011

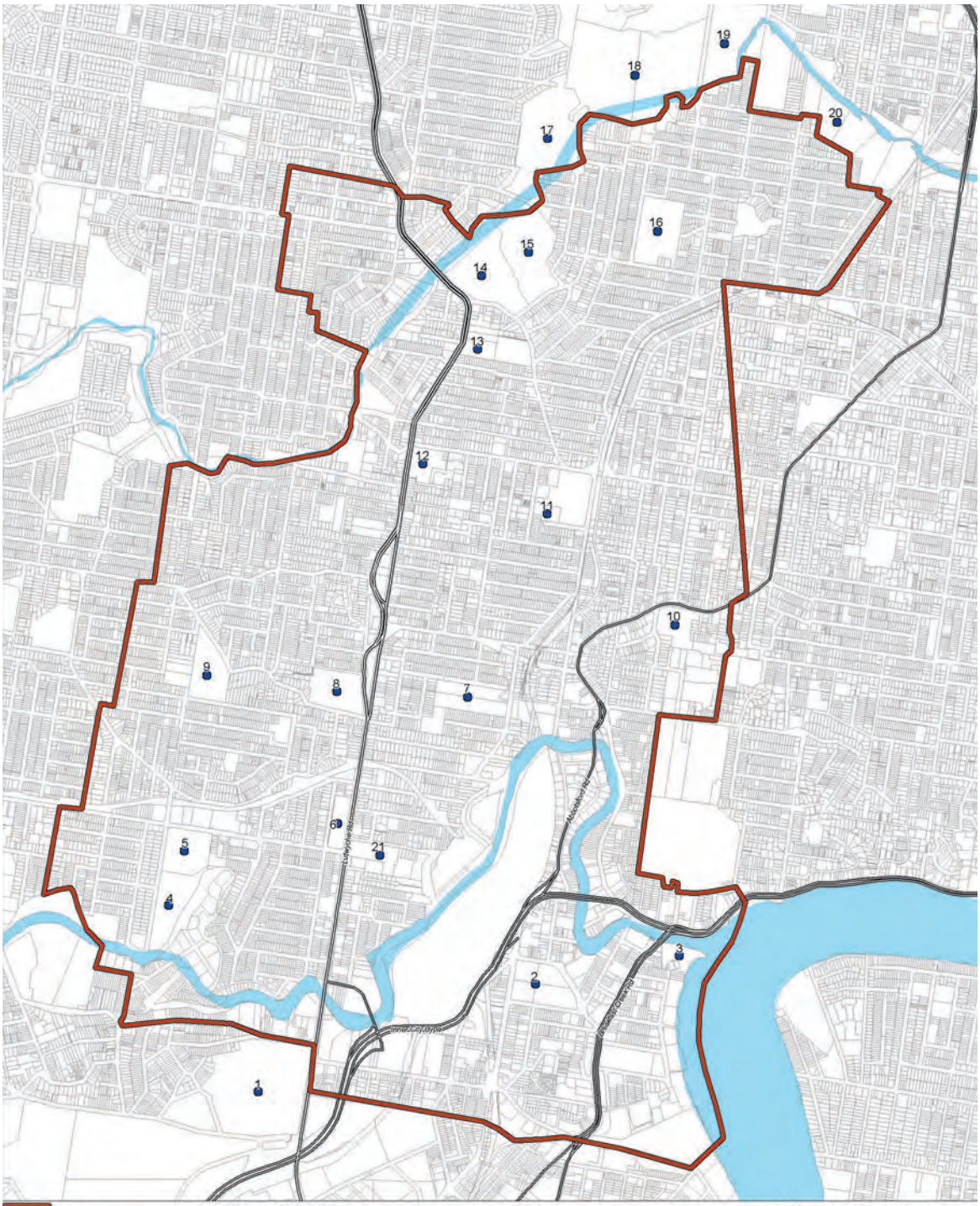


FIGURE 3.2
Community Infrastructure

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1 Dependency ratio refers to the proposrtion of the popultation between 0-14 and over 60 years.

Source: ABS Census of Population and Housing 2001; JHD Advisors

Characteristics	Study Area	Brisbane Avg
Estimated Resident Population	22,472	1,653,365
Population 2001 Census	22,054	1,627,552
Population Density (Persons per Sq.km)	1,929.0	348
Average Per Capita Income	$26,701	$20,641
Per Capita Income Variation	+29.4%	
Household Income		
$0 - $10,400	5.0%	3.9%
$10,400 - $15,600	10.0%	8.2%
$15,600 - $26,000	14.1%	17.0%
$26,000 - $36,400	12.5%	13.3%
$36,400 - $52,000	15.7%	16.9%
$52,000 - $78,000	17.6%	20.1%
$78,000 - $104,000	12.9%	12.0%
$104,000+	12.1%	8.6%
Personal Income		
Average Household Income	$59,254	$55,880
Household Income Variation	+6.0%	
Average Household Size	2.22	2.71
Usual Residents Personal Income		
$0 - $15,600	31.0%	37.2%
$15,600 - $36,400	34.5%	36.8%
$36,400 - $78,000	27.9%	22.2%
$78,000 +	6.6%	3.8%
Usual Residents Average Per Capita Income	$26,313	$20,794
Usual Residents Per Capita Income Variation	+26.5%	
Age Distribution		
Average Age	36.8	35.1
Dependency Ratio	30.7%	35.8%
Housing Status		
Owner/Purchaser	52.3%	68.3%
Renter	47.7%	31.7%
Loan Mortgage Repayments	28.2%	23.1%
Car Ownership		
% 0 Cars	17.8%	10.4%
% 1 Car	46.5%	41.3%
% 2+ Cars	35.7%	48.3%
Birthplace		
Australian Born	79.1%	78.0%
Overseas Born	20.9%	22.0%
Tertiary Education (Aged over 18 yrs)		
Bachelor Degree or Higher	24.3%	14.7%
Advanced Diploma or Associate Degree	7.4%	6.5%
Undertaking Tertiary Education	9.7%	7.1%

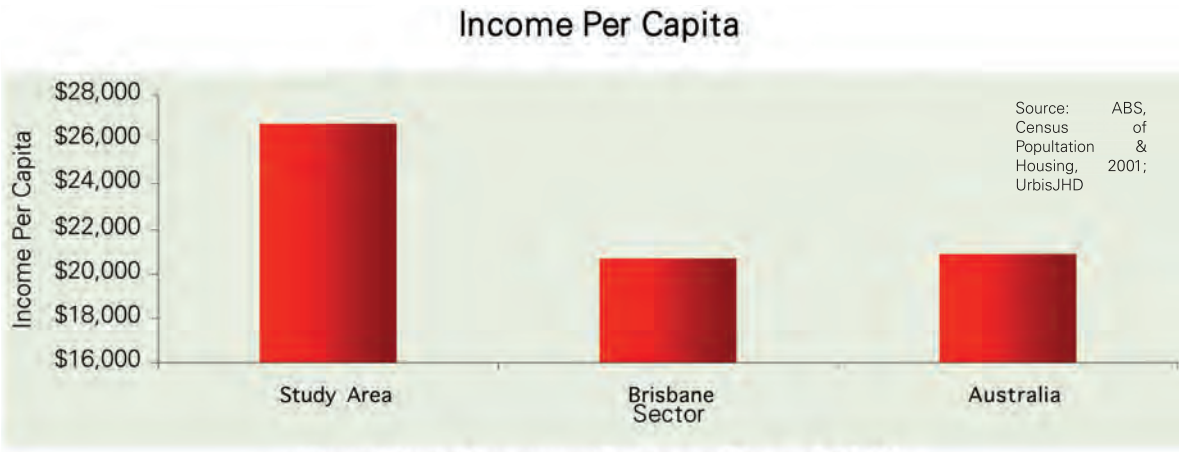
- Households within the study area are characterised as having higher than average incomes, with 12.1% of households earning over $104,000 p.a. compared with 8.6% for Brisbane. As expected the study area has a higher proportion of Professional employees (28.9%) compared with Brisbane (19.2%) and this is reflected in the average household income. The study area household income ($59,254 p.a.) is 6% above the Brisbane average ($55,880 p.a.).

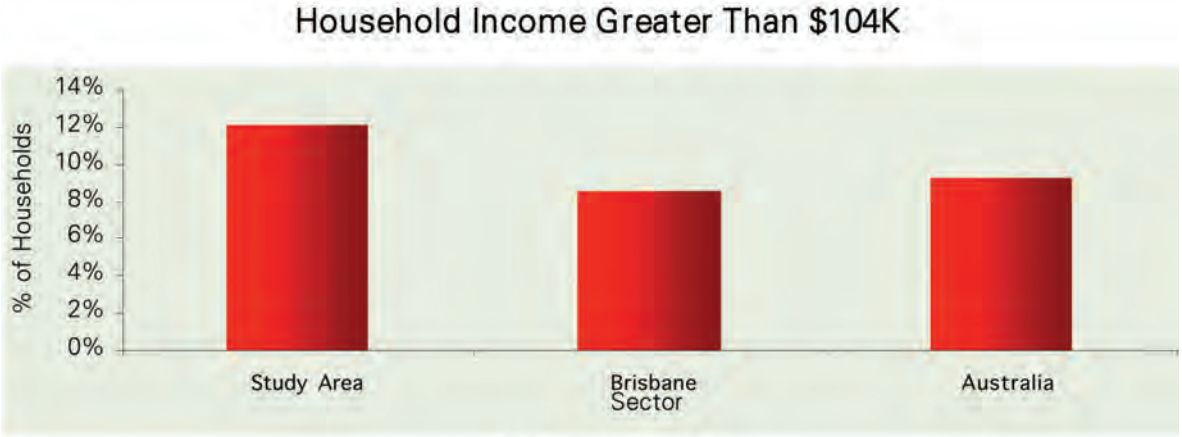
- Higher than average income levels for the study area are also reflected in the usual residents personal income, with the study area having an income variation of 26.5% above the Brisbane average.

- Home ownership levels within the study area (52.3%) are well below the Brisbane average (68.3%). The levels of home ownership decreased from 1991 (54.2%) to 1996 (51.5%) before increasing slightly to 52.3% in 2001.

- Car ownership within the study area is lower than the Brisbane average, with 35.7% of households owning 2 cars or more compared with the Brisbane average of 48.3% in 2001. Car ownership (owning 2 cars or more) increased from 30.1% in 1991 to 31.6% in 1996. Households not owning a car in the study area in 2001 (17.8%) are well above the Brisbane average of 10.4%, indicating a higher use of public transport.

- The average age in 2001 within the study area, at 36.8 years, is above the Brisbane





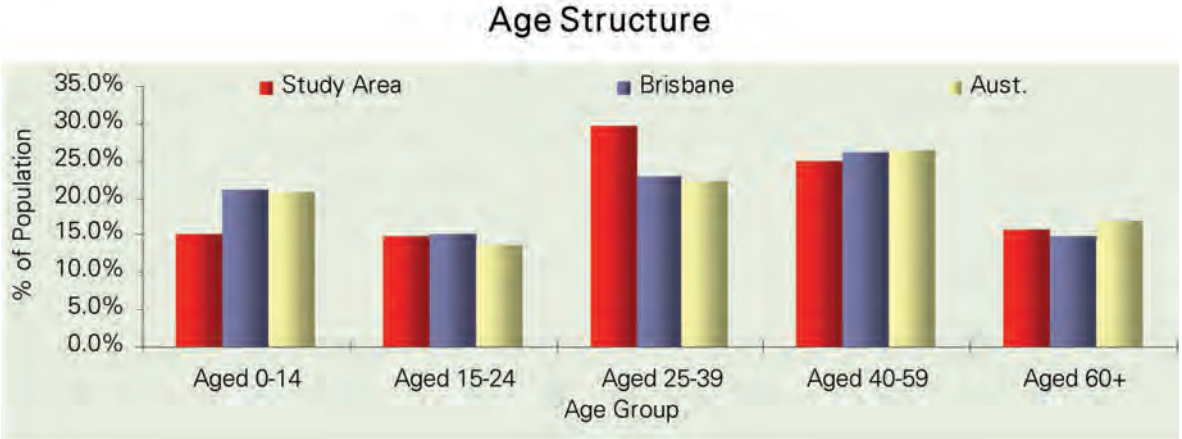


FIGURE 3.4
Key Socio-Economic Characteristics of the Study Area Population, 2001

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average of 35.1 years. The average age of study area residents has decreased since 1991 (37.6 years), contrary to the national trend, as a result of the increased medium density development which tends to attract a younger age cohort.

- Consistent with this is the fact that the study area is characterised by a high proportion of 25-39 year olds (29.6%) compared with the Brisbane average of 22.8%. The low proportion (15.1%) of children (0-14 years) compared with Brisbane (21.1%) indicates that these 25-39 year olds are singles and couples rather than families.

- Origin of birth levels are in line with the Brisbane average, however with a slightly higher level of Australian born people (79.1%) than the Brisbane average (78.0%). This has remained constant from 1991 – 2001.

Overall the socio economic characteristics suggest a high level of renters, with smaller household sizes and a slightly older population in the study area compared to that of Brisbane. Income levels are higher in the study area as a result of the high proportion of empty nesters and professional couples.

2.2 Study Area Income

We noted previously that the study area has higher average incomes than Brisbane as a whole. Within the study area some notable differences exist. The following table shows the mean taxable income of residents within each of the individual SLA's located within the study area as at June 2003 (02/03 FY). We have calculated the Queensland mean taxable income and also the study area weighted average income to provide a benchmark for comparison.

As the table demonstrates there is a wide variation of incomes levels across the study area. Within the study area Clayfield has the highest mean taxable income at $52,291p.a, 17.4% above the study area average and 38.9% higher than the QLD benchmark. Kedron recorded the lowest average taxable income at $39,653 p.a., 10.9% below the study area average however 5.3% above the QLD benchmark of $37,646 p.a. The study area as a whole has an average taxable income that is 18.3% higher than that of the QLD benchmark.

3.0 Social Services and Community Infrastructure

A brief review of the study area shows a range of existing community infrastructure.

Figure X indicates the location of the existing schools, clubs, open space and various other community infrastructure located within the study area. A detailed analysis would be required to identify whether current levels of social infrastructure provision are sufficient to meet existing demand.

The social planning challenge in the establishment of TOD sites however will be to anticipate the size and character of the incoming residential, working and visitor populations over time and the impact this will have on demands for social infrastructure. Ideally this would be achieved through identification of benchmarks for service provision within the locality and assessment of demand for particular types of social infrastructure in response to the predicted population character.

In the absence of local research, application of broad benchmarks sourced from a number of Australian studies give an indication of the type and level of social infrastructure which should be considered. The list of services and facilities at a minimum includes:

- Meeting and gathering places;
- Cultural and arts;
- Community centres and halls;
- Education services;
- Libraries;
- Health / medical services;
- Hospitals;
- Public transport;

Study Area Sector	Taxable Individuals	Mean Taxable Income ($)	Var'n from Benchmarks Study Area %	Var'n from Benchmarks QLD %
Albion	1,342	40,650	-8.7%	+8.0%
Bowen Hills, Herston, Newstead	3,844	46,481	+4.4%	+23.5%
Clayfield	6,923	52,291	+17.4%	+38.9%
Kedron	5,522	39,653	-10.9%	+5.3%
Lutwyche, Windsor, Wooloowin	5,823	41,802	-6.1%	+11.0%
Wilston	11,853	43,628	-2.0%	+15.9%
Study Area Average	24454[2]	44524	n.a.	+18.3%
QLD Average	1,622,933	37,646	-15.4%	n.a.

(1) Relates to personal income.

(2) Total Study Area.
Source ATO 2002-03; UrbisJHD

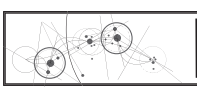

FIGURE 3.5
Study Area Average Income
Average Taxable Income (1), 2002-03

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- Pedestrian paths and cycleways;
- Parks and open space; and
- Recreational opportunities – sporting venues.

Ideally these types of services are provided at neighbourhood, local and regional levels as outlined in table X below.

The overview of social infrastructure provision within the study area shows that residents have geographic access to some of these services including schools, open space and shopping centres. It is not however possible to ascertain the adequacy of these services in terms of capacity or quality.

It is anticipated that certain elements of social infrastructure will reach capacity as a result of establishment of TODs within the study area, and expansion of these facilities and services would therefore need to be included as part of

Facility	Neighbourhood: within walking distance	Local: within 15 – 20 minutes travel time	Regional: within 1hour travel time
• Meeting and gathering places	Neighbourhood focus – may be created	Yes	Yes
• Cultural and arts		Yes	Yes
• Community centres and halls	Neighbourhood centre	Community hall	
• Education services	Primary schools	Secondary Schools	Tertiary and higher education
• Libraries	Neighbourhood outlet – may be temporary or mobile	Local outlet – through permanent facility	Regional services
• Health / medical services	Visiting health and health promotion services	Generalist medical services including GP, nursing, therapy services	Specialist services
• Hospitals		General hospital services	Specialist services
• Public transport	Within walking distance connecting to local and regional centres	Local nodes with a range of transport opportunities	
• Pedestrian paths and cycleways	Providing neighbourhood linkages	Providing connection with local facilities	Providing connections with major transport nodes with connections to regional services and facilities
• Parks and open space	Neighbourhood open space passive activities and children's play areas	Active sport activities	Major attractions – passive and active recreation
Recreational opportunities – sporting venues	Passive informal	Active formal	Elite level activities

planning service provision within the study area. It is also anticipated that TOD development will generate the need for new services and facilities which similarly will need to be planned in order to create the desired future character of the TOD.

Planning for provision of these services should ideally also consider the following principles for social sustainability and effective social infrastructure provision:

- Timely provision of public domain;
- Location and provision of community facilities based on principles of social equity and social diversity;
- Provision of goods and services within easy walking distance of transport nodes to reduce car dependence and social isolation;
- Provision of recreational facilities in open space areas;
- Co-location of community services and facilities to create vibrant communities;
- Community participation in the planning process;
- Accessibility to services and facilities for all (including younger people, older people and those with limited mobility);
- Connectivity / integration with existing community and the wider area;
- Protection and enhancement of natural assets to enhance quality of life.

In addition to consideration and provision of social infrastructure it will also be important that provision of human services is part of the strategic planning process for TODs. Again this should be undertaken in response to the anticipated future character of the population and include consideration of services such as child care, family support, aged support services and the like.

4.0 Issues and implications

Overall the study area has an older population resident mainly in medium to low density housing. The demographic profile for the study area shows a community primarily comprising older family households and young professional households. The most significant characteristic of the profile is the divide between household types which is evidenced by the significant range in household incomes, some of the highest income as well as the lowest income households are located in this area. This divide in household types is further emphasised by the lower proportion of home ownership and higher proportions of rental households suggesting that there may be more transient populations in some localities of the study area.

The marked difference in character of the built form of a TOD within the study will lead to significant changes in the character of these sites. By definition a successful TOD will change the existing locality in the following ways:

- Increased number of people working in the expanded services and commercial activities established within the area;
- Increased residential population attracted by – high quality recreation and social services, vibrant and active centres, good access to transport;
- Increased activity within the TOD as a result of social and economic development of the area;
- Increase in pedestrian and vehicle traffic;
- Increase in visitor numbers attracted by the charter and services offered by the TOD itself;
- Increase in availability of higher density housing;
- Increase in diversity of housing.

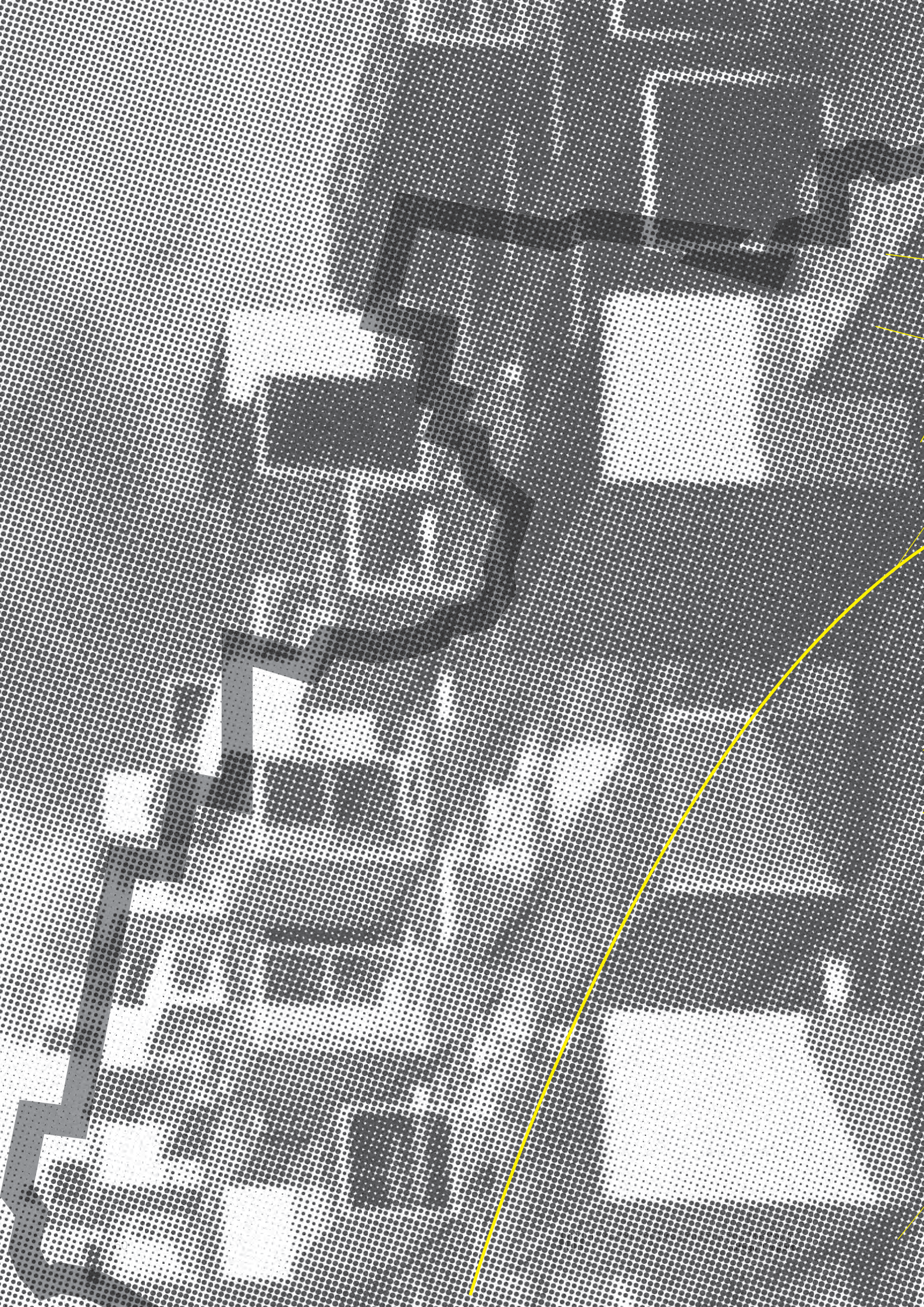
While creation of this style of hub will be attractive to some sections of the current population it could also attract a very different population from locations outside the study area. It is likely that development of a TOD will also lead to a change in the character of the existing residential population in areas surrounding TOD sites over time. For example, residents of TODs may decide to take up permanent residence in areas outside TODs overtime due to their preference for living in the area.

The successful creation of a TOD does have a number of potential benefits for the existing and incoming communities through creation of opportunities for establishment of a range of services and facilities which may currently not exist and generating the impetus for expansion and upgrading of services and facilities.

These benefits should be considered in context of the potential disbenefits which, in particular long term residents are likely to experience, such as increased traffic, noise, visitor activity and competition for services and facilities. While to an extent these can be mitigated through sound planning and consultation with the local community the degree to which these changes occur are likely to be of significant concern. It will be important to achieving the desired future character and community cohesion that change is carefully and sensitively managed.

Key issues:

- Identification of the actual needs of the current and incoming populations for socia infrastructure in terms of level, capacity and quality;
- Management of disbenefits for existing population;
- Provision of social infrastructure which manages competition between existing and incoming populations;
- Staging of infrastructure provision to ensure it attracts the desired future populations (residential, working and visiting);
- Consultation with existing communities particularly given the importance placed on desire to retain current population and achieve longer term social diversity.



Transit-oriented development has gained currency ... as a means of promoting smart growth, injecting vitality into inner city settings, and expanding lifestyle choices.

Transit Oriented Development in The United States Today. (2005, p03)

CHAPTER
04
PROPERTY
OPPORTUNITIES
REVIEW
WORKING
PAPER

04

Property Opportunities Review

1.0 Introduction

The following working paper provides an analysis of the study area in the context of reviewing the property and development industry framework for the study area to establish preliminary property opportunities. We have also made comment in relation to the identified broad economic value of any redevelopment of the land resulting from the provision of quality transport infrastructure.

This paper also identifies the likely sequence of any new development and provides a preliminary understanding of the extent to which new development is able to cross subsidise any infrastructure investment.

As a result we have reviewed the study area in the context of the relevant plans and frameworks to establish area specific opportunities within the nominated study area.

2.0 Strategic Overview

The study area comprises a number of contemporary property markets including residential, industrial, retail, commercial and community use. Transport Infrastructure within the study area is significant, providing a network of bus routes and train stations. The regeneration and re-development of large tranches of industrial and brown field land within the urban renewal areas of Fortitude Valley and Newstead into usable urban mixed-use developments has had a positive impact on both the underlying value of land and the community as a whole.

Recent demographic trends show that the gradual increase in lone person households is set to continue. This trend coupled with the increasing population move into the Brisbane area, indicates that higher density residential and mixed-use areas within close proximity to transport infrastructure are the likely preferred types of developments going forward, given the reduction in traditional suburban land available for development.

We have also considered broad economic trends which indicate that the study area has a high proportion of above average income earners, a higher proportion of renters and a lower than average number of persons per household than the Brisbane statistical district. Higher densities are appropriate around major transport nodes due to:

- Car ownership and cost to park in the CBD
- High cost to buy/rent in the city or near city
- Requirement for affordable accommodation within close proximity to the CBD
- Increase in lone person households
- Improving transport infrastructure into the CBD
- Student access to Universities
- Affordable accommodation near hospitals

3.0 Local Development Opportunities and Trends

The urban renewal initiative has been the catalyst for the regeneration of Industrial land uses and brown field land holdings within close proximity to the CBD. This land has been identified as being appropriate for urban and community uses, which has seen the redevelopment and relocation out of the near city framework in order to gentrify into urban uses. These uses can be broadly defined as both destination and origin uses:

Destination Uses:
- Retail shopping
- Commercial office
- Mixed-Use
- Hospitals and Educational Facilities

Origin Uses:
- Residential

4.0 Identified TOD Development Sites

We have considered the study area in the context of providing TOD specific sites. The following key sites are considered to offer the best opportunity for TOD re-development in both the short to medium time frame (ten years) and long term (10+ years time frame). In our opinion, the longer term opportunities may become apparent upon completion of the more key TOD sites in the short to medium term.

We have considered the sites in the context of their development time frame and have

numbered them accordingly. We are of the opinion that the following sites may be best developed in the following sequential order to adequately reflect the desired outcome or the regeneration of the study area.

4.1 Short to Medium Term TOD Opportunities

The following two sites have been assessed independently; however we note that subject to the outcome of the north-south tunnel, these two precincts including the area between have been identified as an opportune TOD site, due to limited constraints imposed on surrounding land and proximity to the CBD.

4.1.1 RBH – Site 1

The area bounded by the Royal Brisbane Hospital on Bowen Bridge Road and Herston Road, Enoggera Creek, Inner City Bypass and the RNA Showgrounds.

Whilst this node is located just outside of the study area we are of the opinion that this offers significant opportunities for TOD related mixed-use development given the location adjacent to the Hospital and Bowen Bridge Road.

Key issues for the site are:

- Opportunity for both destination and origin attractions due to the hospital, showgrounds, commercial office and University within close proximity to the node
- Land immediately adjoining both the RBH and RNA to the north is not impeded by any heritage or demolition control constraints
- RBH and RNA showgrounds are identified as being constrained by cultural heritage, although the actual heritage components can be separately identified and incorporated into a broader development
- The draft master plan over the RNA showgrounds would appear to be a significant underutilisation of the site.
- The portal of the proposed North South Bypass Tunnel will provide an opportunity for regeneration of this area as it adjoins substantial sites such as the RNA and Queensland Newspapers site.
- Some land to the north of the RBH is constrained by wetland corridors

Potential Highest and Best Use:

- Commercial Office/Retail mixed-uses
- Additional hospital services including a possible private hospital
- Short-Term accommodation
- Student accommodation / Affordable Housing

4.1.2 Bowen Hills Train Station – Site 2

Another major TOD opportunity is the Bowen Hills Train station through Bowen Hills along Montpelier Road to Breakfast Creek Road. This site offers a major opportunity for further development to enhance the urban regeneration of the surrounding area further.

Key issues for the site are:

- Substantial warehouse, commercial and retail development already in place
- Higher opportunity for re-development given the shift in industrial uses away from the CBD
- Surrounding development will mirror medium density mixed-uses present within the urban renewal precinct at present
- Opportunity for both destination and origin attractions given the surrounding amenity proposed for the locality
- Some heritage and demolition control constraints imposed on surrounding property
- Ability to link into adjoiniong sites such as those owned by Queensland Newspapers
- Substantial airspace development opportunity over Bowen Hills Station

Potential Highest and Best Use:

- Residential Accommodation
- Commercial Office/Retail mixed-uses

4.1.3 Albion Train Station – Site 3

Surplus land surrounding the station has been identified as a TOD opportunity due to the proximity to the CBD and regeneration of the Albion precinct. Sandgate Road provides access for major bus routes to the northeast and Airport regions, together with the Albion Train Station, as such we are of the opinion this TOD opportunity is significant. We also note that at the present time the Flour Mill is for sale, with redevelopment likely to involve a medium density mixed use development.

Key issues for the site are:

- Surrounding uses are consistent with warehouse (Flour Mill and other industrial uses) and character residential.
- Likely that the development may comprise only origin amenity with service retail offerings
- Some heritage and demolition control constraints are imposed on land adjoining the site

Potential Highest and Best Use:

- Retail uses
- Residential

4.1.4 Corner of Breakfast Creek Rd and Inner City Bypass – Site 4

The precinct bounding the Inner City Bypass and Breakfast Creek Road has been identified

as a TOD opportunity due to the regeneration of the surrounding Newstead area. Recent sales of larger land holdings in the area have seen a high proportion of sales within this precinct for future mixed-use developments.

Key issues for the site are:

- Enoggera Creek fronting land is subject to waterway corridors
- Proposed redevelopment of portions of the Albion Park Raceway will provide a stimulus to the area
- Significant redevelopment is planed for the area west of Breakfast Creek Road and south of Enoggera Creek in addition to the significant changes taking place on the eastern side of Breakfast Creek Road
- Land of Cultural Heritage significance can be found within the node

Potential Highest and Best Use:

- Commercial Office/Retail mixed-use
- Residential

4.1.5 Lutwyche Rd

Lutwyche Road, the spine of the study area is also a major TOD opportunity from the southern most extremity at the RBH to the Emergency Services Complex on the northern extremity. The major transport routes running north/south through the study area allows for major access into the CBD. It is envisaged that two blocks on either side of Lutwyche Rd may have future destination and origin type developments (this is somewhat driven by existing heritage character provisions); we recognise this covers a large area however of particular note is the following short-term TOD node:

4.1.6 Lutwyche Central – Site 5

Located on the corner of Chalk Street and Lutwyche Road, Lutwyche shopping centre is a key TOD site in the context of its location on a major road with a large number of bus services in and out bound. The location offers both destination and origin opportunities.

Key issues for the site are:

- Substantial retail development already in place that would provide immediate amenity to new residential and commercial development that may be lacking in new greenfield or brownfield sites
- Surrounding commercial and residential uses currently present
- Opportunity for both destination and origin attractions, particularly given the strong existing retail development
- This precinct does not appear to be impeded by demolition control or cultural heritage constraints
- Potential for a considerable time lag between take up, amalgamation and re-development
- Narrow Lutwyche Road corridor through the area, however changing land uses and increased density, particularly on the western side may allow for road widening to accommodate transport lanes.
- Some character housing to the west of Lutwyche Road behind those properties directly fronting Lutwyche Road.

Potential Highest and Best Use:

- Retail uses
- Commercial office (lower opportunity in the short term due to ability of competing locations closer to CBD to meet future demand)
- Residential

4.2 Long-Term TOD Opportunities

4.2.1 Lutwyche Road – Windsor Homemaker Centre – Site 6

The homemaker centre on the corner of Newmarket Road and Lutwyche Road offers a significant opportunity for TOD related uses and re-development given both the origin and destination nature of the site. This site can be further redeveloped with minimal disruption and lack of amenity to the rear residential uses given the retained nature of the site and potential for a number of additional storeys over the current retail. It is envisaged that an Emporium style development with ground floor retail and mixed use office and residential uses could be accommodated on the site.

Key issues for the site are:

- Located along a major bus route and adjoining Windsor Train Station
- Opportunity for both destination and origin attractions
- Surrounded by some heritage places and within a demolition control precinct
- The retained nature of the site may afford a greater development opportunity without adversely affecting the adjoining residential

Potential Highest and Best Use:

- Retail uses with some ancillary office uses
- Residential above

4.2.2 Newmarket Rd – Bretts Homezone – Site 7

Currently utilised as a retail shopping centre, this development is relatively new, however has a significant amount of development upside to the rear of the site in its current configuration. As such, whilst not being located on a major road or next to a train station, its location, between both Wilston and Windsor train stations, on a bus route and directly opposite general industrial uses which provides a long term future development opportunity.

Key issues for the site are:

- Located within 400 metres of Wilston/ Windsor train station and along a main bus route
- Constrained for future redevelopment by the adjoining sport and recreation grounds
- Could be connected to the RBH via walking tracks
- Potential alignment of future extensions of the Inner Northern Busway may provide easy walking access to bus transport
- Significant height and density may be able to be accommodated on the site with good access to local retailing

Potential Highest and Best Use:

- Residential to the rear of the site fronting the parkland

4.2.3 Windsor/Wilston/Wooloowin Train Stations – Sites 8 - 10

These train stations offer opportunities for over rail developments; however available surplus land surrounding the stations for major re-

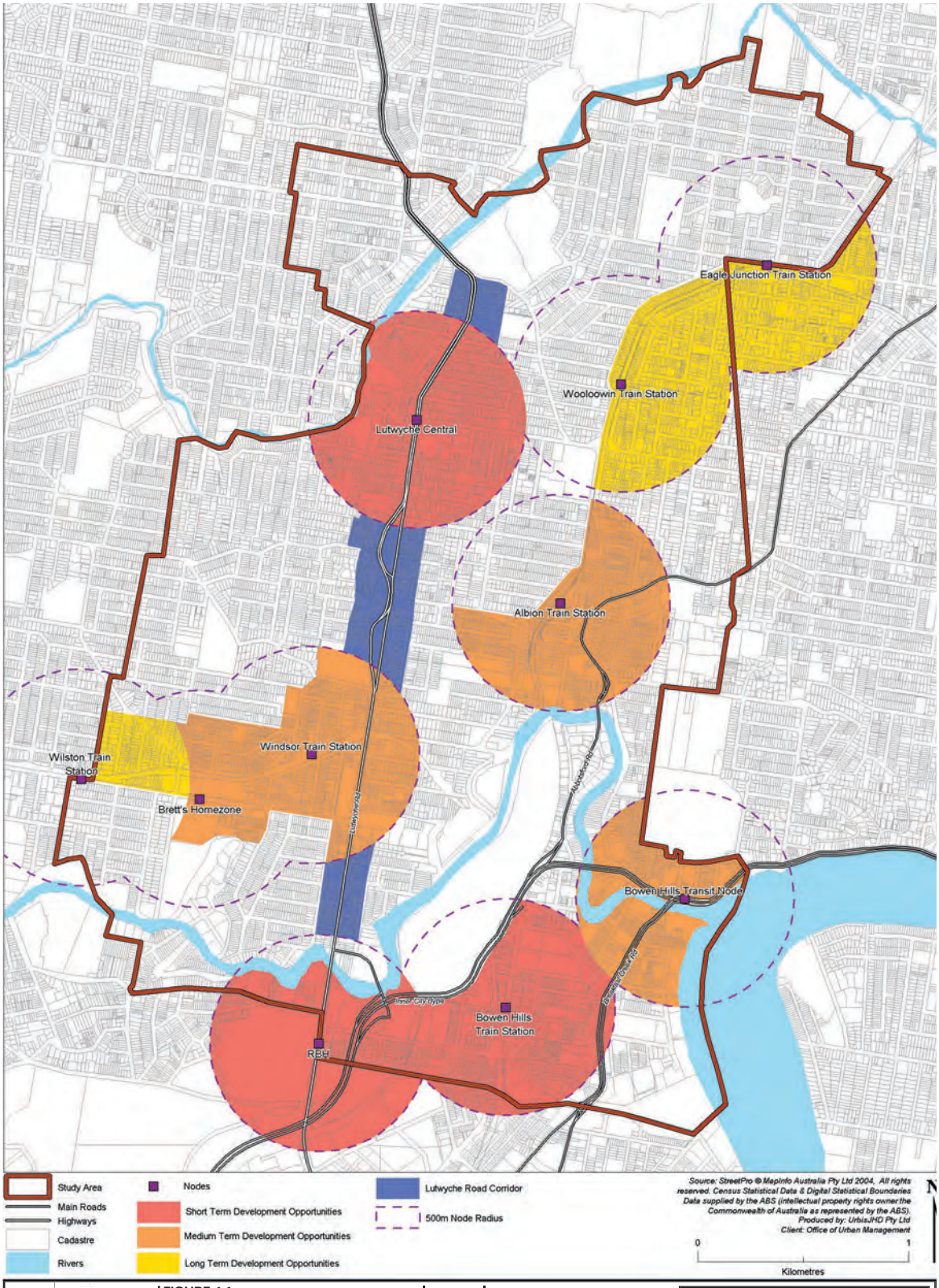


FIGURE 4.1
Major Property and Economic Nodes

Issue A

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development is limited. Whilst opportunities exist, it is likely that the economic viability to undertake such a development may not be realised for some time. As such over-rail developments can be cost prohibitive if the scale of development cannot subsidise this cost, in the order of $2,000 to $4,000 per square metre currently.

Surrounding development is characterised as predominantly detached pre 1947 housing located within demolition control precincts. Should the development of these sites be appropriate and able to be undertaken to ensure the surrounding amenity is maintained short-term development is considered possible however, should a higher proportion of land be required, we consider these to be long term TOD opportunities as there may be a considerable time lag top acquire additional land holdings.

Key issues for these sites are:

- Above rail opportunities for all stations
- Excellent exposure to community uses and major transport routes
- Character residential adjoins all three stations
- Both Windsor and Wilston stations are within close proximity to a tranche of industrial development along Newmarket Road, which is considered an opportunity for higher density development opposite the Bretts Homezone site.
- Cost prohibitive to build over rail

Potential Highest and Best Use:

- Residential
- Mixed-use

4.2.4 Eagle Junction Train Station – Site 11

As above, this train station offers the opportunity for above rail mixed-use developments, with the benefit of a small amount of surplus surrounding land. Given the location of the Eagle Junction train station, along Rose Street, we consider this site, whilst just outside the study area, appropriate to consider as a long-term TOD opportunity. Cutting around the station may also assist in realising a platform over the site.

Key issues for this site are:

- High level of character housing to the north of the precinct
- High level of medium density development to the south of the rail station
- Opportunity to link the station, major bus routes and these higher density developments with the implementation of a TOD into the precinct

Potential Highest and Best Use:

- Residential
- Convenience retail

5.0 Preliminary Assessment of Value

Demand has historically been moderate to high for the regeneration precincts of Fortitude Valley and Bowen Hills and as such, should the study area demonstrate developments consistent with those found in these areas, we are of the opinion that the key TOD sites may experience a similar level of demand to that which has been experienced within the Urban Renewal areas.

Given current levels of demand for affordable housing within close proximity to the CBD, we consider demand may also support staged levels of supply within these nodes. However a further study will be required to ascertain the required number and mix of dwellings within each of the nodes.

Value is largely a function of achievable density, as opposed to accessibility at this stage. Should these sites be able to achieve both a high level of density and increased amenity through TOD related development, value increases may be further realised.

Urban development on infill sites near transit lines in cities and higher density suburbs is the best means of generating ridership for transit and offering people a choice of travel modes

Urban Land Institute, Developing Around Transit. (2004, p87)

SECTION
5.0
TRANSIT
ORIENTED
DEVELOPMENT
CATALYST
IDENTIFICATION
WORKING
PAPER

5.0

Transit Oriented Development Catalyst Identification Working Paper

1.0 Introduction

The purpose of this paper is to identify in development and design terms, specific locations which can be brought forward as catalysts for TOD. The aim of this exercise is to inform the route alignment selection process for the Northern Busway and Airport Link to ensure that valuable TOD opportunities are not forgone. Hence sites are identified which could be potentially unlocked or improved by this proposed transport infrastructure. A land use approach to TOD catalyst site development is also proposed to facilitate both best market value and sustainable development.

1.1 Process

A strategic analysis was undertaken drawing upon the findings and implications of each of the working papers prepared, these being the context summary, land use review, community review and property economics review. A workshop was held between the project team members to discuss and identify potential TOD catalyst sites, including the justification for their selection, timing priorities and possible land use functions. An overlay map (refer to Figure X) was prepared which combined the urban regeneration opportunities identified in the land use review with the nodes identified in the property economics analysis together with the 400-600m radii from existing railway stations within the study area.

This analysis identified the TOD catalyst sites within the study area as:

- Bowen Hills;
- Lutwyche Central;
- Albion;
- Windsor;
- Lutwyche Road Corridor.

The following sections of this report:

- Provide a justification for the TOD catalyst site selection in terms of land use, planning, design and property economics considerations;
- Explore each of the sites in more detail in terms of land use function, density considerations and the potential economic value; and
- Make recommendations about the deliverability and relative priority of each site.

2.0 RBH and Bowen Hills

2.1 Justification

2.1.1 Context

- The South East Queensland Regional Plan identifies Bowen Hills as a potential TOD;
- The Bowen Hills area meets the criteria for TODs within the SEQ Regional Plan (that is, provides a railway station with frequent service, densities of development likely to support that required by a TOD (30-80 dwellings / ha) and a walkable catchment within 600m of the station can be defined;
- City Plan identifies a majority of land surrounding the site as being suitable for centre activities, ranging from offices to shops, some light industry and high density residential development;
- The Bowen Hills Local Plan identifies a majority of the area surrounding the railway station as being suitable for mixed uses and office parks. The Queensland Rail Railway yard to the north of the station is identified in the Local Plan as being intended for Queensland Rail purposes, however notes that future re-development may be an option;
- The Trans-apex pre-feasibility report identifies Bowen Hills as a potential TOD location.

2.1.2 Land Use

- Serviced by existing railway station with a relatively high frequency of transit services;
- BCC bus services are provided;
- Land within the general vicinity of the rail station is largely absent of Demolition Control Precincts and heritage places with the exception of land to the immediate east of Abbotsford Road. Residential land in this area includes detached dwellings as well as higher intensity residential forms;
- A mix of non-residential land uses can also be found within the suburb;
- The locality is generally free of biophysical constraints;
- A number of large freehold and government owned land parcels exist;
- The opportunity exists to establish links

between Bowen Hills and other activity nodes /TOD localities such as Royal Brisbane Hospital, RNA Showgrounds and Newstead Riverpark.

2.1.3 Property Economics

- Presence of hospital, showgrounds, commercial office and QUT at Kelvin Grove provide destination opportunities adjoining major employment nodes;
- Heritage components of Royal Brisbane Hospital and RNA can be separately identified and incorporated into a broader redevelopment;
- Draft master plan over the RNA showgrounds would appear to be a significant underutilisation of the site;
- The portal of the proposed North South Bypass Tunnel will provide an opportunity

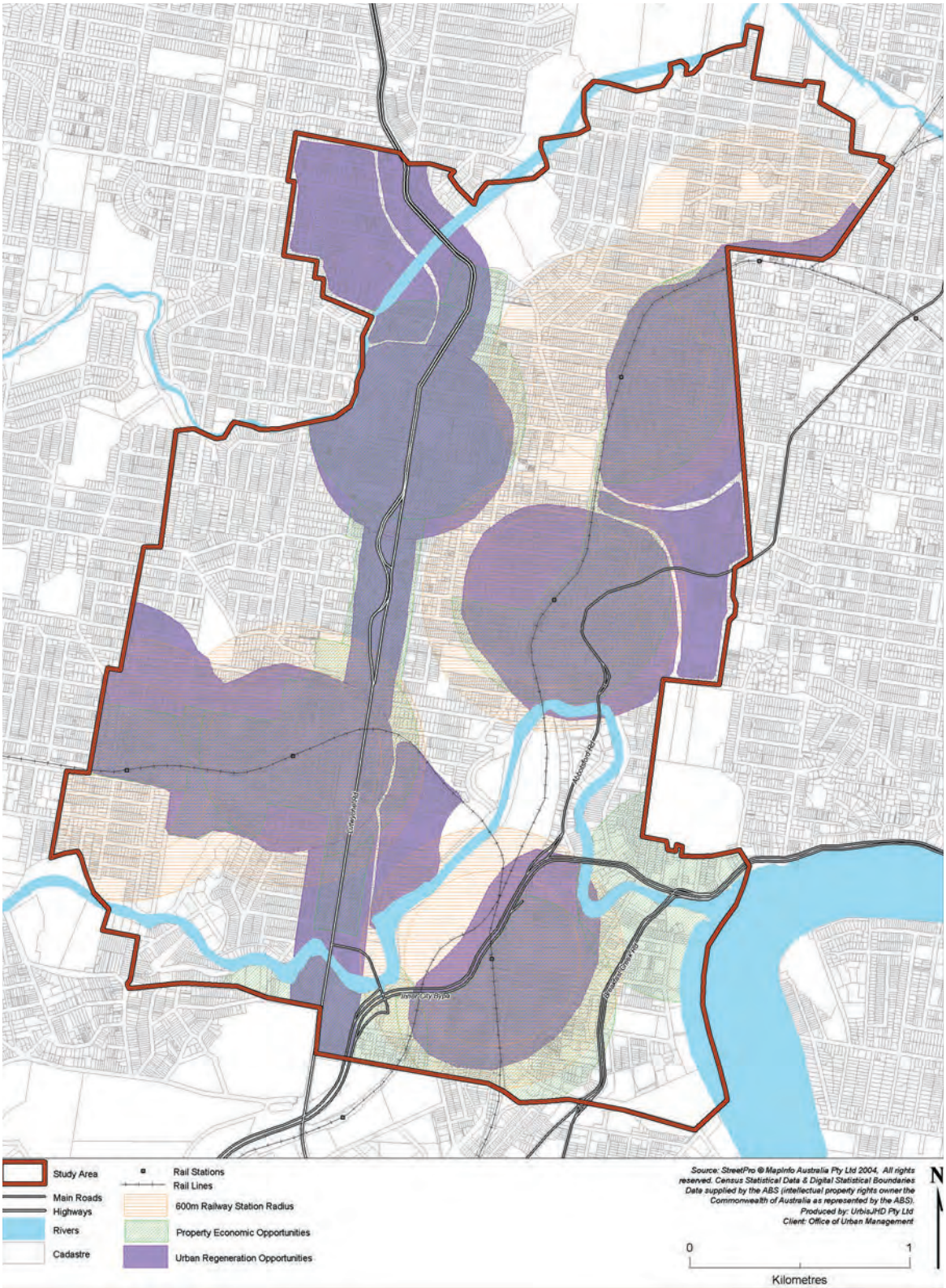

FIGURE 5.1
TOD Opportunity Overlay Map

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for regeneration of this area as it adjoins substantial sites such as the RNA and Queensland Newspapers site;
- Substantial airspace development opportunity over Bowen Hills Station.

2.1.4 Design Considerations
- The combination of Bowen Hill's proximity to major employment areas, the availability of key sites in the short to medium term, and the excellent public transport infrastructure that is already in place makes this area one of the highest priority TOD catalyst locations within inner northern Brisbane;
- Aside from some small pockets of residential land, the area is largely characterized by low-density commercial development that could easily be re-accommodated within a more intense urban pattern;
- The rail station accommodates all of Brisbane's northern routes and will be proximate to the proposed inner Northern Busway. This high level of accessibility provides a logical early focus for the development of a TOD;
- The area has the potential to house a large number of workers associated with the Royal Brisbane Hospital and other local employment destinations. In particular, a high-density scheme would be able to make a major contribution to the sustainable and affordable housing of key workers;
- The strong influence of the Royal Brisbane Hospital and the established presence of the media industry provide an important opportunity to create a TOD built around the twin themes of 'Arts and Science'. Alongside high density residential, commercial and retail development, this approach could help to ensure the distinctiveness of the area and set it apart from other TOD's that will be incrementally brought forward over time;
- Although timing will be subject to feasibility, the topography of land surrounding the rail station facilitates an 'air rights' development of significant scale. Also, key sites such as the 'Queensland Newspapers' land holding provide large potential development parcels able to make a rapid and significant impact on the character of the area;
- In the long term (10-20 years), the area's proximity to the vast Mayne rail yards complex will be advantageous as and when further expansion of the TOD is required.

2.1.5 Community Review
- A potential TOD at Bowen Hills is likely to incorporate Perry Park (The Brisbane Strikers Football Club) as its northern gateway, with the adjoining Royal Brisbane Hospital to the west likely to form part of the TOD.

2.2 Priority and Land Use Function

Short-Term TOD opportunity – Potential Land Use Function
- Commercial Office/Retail mixed-uses
- Hospital and research based commercial
- Arts and Media type uses
- Both Convenience, Comparison and Service Retail
- Additional hospital services including a possible private hospital
- Short-Term accommodation
- Student accommodation / Affordable Housing
- Service and light industry with low level impacts

3.0 Albion

3.1 Justification
3.1.1 Context
- South East Queensland Regional Plan identifies Albion as a potential TOD;
- City Plan identifies the area as being intended for low and low-medium residential uses, general industry uses and centre activities;
- Clayfield / Wooloowin District Local Plan states that:
  - Intensifying residential development between Mawarra Street and the Albion Railway Station may be acceptable, subject to satisfactory noise attenuation being provided as part of any redevelopment, as this area is close to the station and Albion Business Centre;
  - The Albion Shopping Centre should continue to function as an entertainment/restaurant centre for the Albion neighbourhood. The centre should also develop as a place of employment and as a focus for social and community services and activity. Proposals in the centre must maintain traditional building facades where they have heritage significance. Further development on Sandgate Road should not compromise the operation of buses through Albion;
  - Industrial activities should continue in the existing industrial area. However, any expansion is not encouraged. Other compatible non–residential activities may be encouraged where they do not adversely impact on surrounding residential amenity.
- The Trans-apex pre-feasibility identifies Albion as a potential TOD location.

3.1.2 Land Use
- The centre currently accommodates retail/ commercial activities with a restaurant/ entertainment focus and local service facilities;
- The locality is serviced by Breakfast Creek and Sandgate Roads and the Albion railway station;
- A number of large freehold/government

owned land parcels exist;
- The locality is generally free of biophysical constraints (with the exception of flooding);
- The land to the east of the railway station includes heritage places and demolition control precincts are situated to the west of the station. However it is noted that the land along the eastern side of the railway line includes large industrial areas, blocks of multi-unit development and linked areas of non-character residential land.

3.1.3 Property Economics
- Bus, Rail and established retail are already present, providing opportunities for higher density developments to connect existing infrastructure and provide a more intense development;
- Large land holdings such as the Flour Mill and other industrial uses are currently in the market with proposed redevelopment opportunities;
- Likely that the development may comprise a high proportion of origin amenity, such as residential, with limited additional retail offerings outside the existing core retail.

3.1.4 Design Considerations
- Albion to some extent already exhibits some of the qualities sought within TODs, with good bus services, a well serviced rail station and an established local centre;
- The inherited scale character of the centre along Sandgate Road lends itself to smaller changes over a longer period of time. The most notable opportunities relate to the redevelopment of under-utilised sites at the northern and southern extremities of the shopping parade;
- The flour mill site provides this area's most visible development and intensification opportunity. The site is currently a prominent landmark and it potential redevelopment should seek to achieve a similar level of visual prominence;
- The quarry site on Crosby Road is within 10 minutes walk of Albion station and provides another significant opportunity to increase the residential density of the area provided improved pedestrian linkages between the site and station can be delivered.

3.1.5 Community Review
- A TOD at Albion is likely to accommodate the Holy Cross Catholic School and Windsor Park.

3.2 Priority and Land Use Function
Medium-Term Priority - Potential Land Use Function
- Retail uses
- Residential development
- Mixed-use restaurant/entertainment
- Some limited commercial opportunities focussing on local services

4.0 Lutwyche Central

4.1 Justification
4.1.1 Context
- City Plan identifies the portion of Lutwyche central fronting Lutwyche Road as being part of a Multi-purpose Centre Area and suitable for centre activities. Land surrounding the centre and either side of Lutwyche Road is designated for Low-Medium Residential uses;
- Demolition control precincts could potentially constrain TOD densities;
- Grange District Local Plan identifies that the Lutwyche City Shopping Centre and surrounds are intended to function as a centre providing a range of retail, business, community and recreational needs. Future development should seek to consolidate the centre;
- Transport infrastructure will need to be upgraded to provide a transport node (no railway station or major bus interchange presently);
- The Trans-apex pre-feasibility report identifies Lutwyche as a potential TOD location.

4.1.2 Land Use
- The site currently accommodates intensive retail/commercial activities and is thus a prominent destination within the study area;
- The centre has frontage to Lutwyche Road;
- Although some of the land within close proximity to the Lutwyche Shopping Centre is included in Demolition Control Precinct it is evident that much of this housing stock (particularly to the east and north of the centre) has experienced a degree of transition. It is noted that heritage places exist in the surrounds of the shopping centre;
- Ad-hoc commercial/retail development has occurred to the north and south of the centre along Lutwyche Road;
- The locality is generally free of biophysical constraints.

4.1.3 Property Economics
- Substantial retail development already in place that would provide immediate amenity to new residential and commercial development that may be lacking in new greenfield or brownfield sites;
- Opportunity for both destination and origin attractions, particularly given the strong existing retail development and employment centre;

- Potential for a considerable time lag between take up, amalgamation and re-development;
- Narrow Lutwyche Road corridor through the area, however changing land uses and increased density, particularly on the western side may allow for road widening to accommodate transport lanes;
- Some character housing to the west of Lutwyche Road behind those properties directly fronting Lutwyche Road.

4.1.4 Design Considerations

- Lutwyche Central is seen to be a major TOD development opportunity within the inner northern precinct of Brisbane. This is based on its accessibility and its relative distance from the Bowen Hills TOD, which is seen to be sufficient to allow the mutually beneficial development of each centre;
- Because of the hillside approach followed by a straightening of Lutwyche Road to reveal views of the City centre, Lutwyche Central has the potential to become the northern most gateway to inner Brisbane;
- The established 'High Street' character of parts of Lutwyche Central provides a strong basis on which to build a higher intensity mixed use area through the introduction of increased levels of residential and commercial development;
- Much of the built fabric of the area is not of preservation quality, which would allow the gradual re-development and intensification of key sites in the area;
- The proposed inner Northern Busway will provide the improvements to public transport service provision necessary to facilitate the development of a TOD.

4.1.5 Community Review

- The Lutwyche Central potential TOD is likely to include the Wooloowin Primary School, with the Holy Cross Catholic School being situated on the periphery of the TOD.

4.2 Priority and Land Use Function

Short-term TOD opportunity – Potential Land Use Function

- Retail uses
- Residential
- Commercial office (lower opportunity in the short term due to ability of competing locations closer to CBD to meet future demand, however demand will develop over time)

5.0 Windsor

5.1 Justification

5.1.1 Context

- The Grange District Local Plan identifies that the area is located within proximity to the Windsor/Wilston Industrial Area and the Lutwyche Industrial Area. These two industrial areas are intended to remain in the area and provide for a range of industrial, service and business activities;
- City Plan identifies Low-Medium Density Residential, Character Residential and Low Density Residential uses are intended within the area surrounding the Windsor Railway Station with Centre and Residential uses intended along the Lutwyche Road frontage;
- The Trans-apex pre-feasibility report identifies Windsor East as a potential TOD location.

5.1.2 Land Use

- The area is serviced by an existing railway station;
- BCC bus services are provided;
- Located at the junction of major road corridors (Newmarket Road and Lutwyche Road);
- A number of large freehold land parcels exist;
- The site currently accommodates retail showroom development;
- The locality is generally absent of biophysical constraints;
- Frontage to Lutwyche Road is provided;
- While supporting large areas of high quality character residential housing within the broader locality, lower quality (for example, run-down or modified) character residential and non-character sections can be found close to, or adjacent Windsor train station and along Lutwyche Road.

5.1.3 Property Economics

- Located along a major bus route and adjoining Windsor train station;
- Opportunity for both destination and origin attractions, employment centre already in place;
- Surrounded by some heritage places and within a demolition control precinct;
- The retained nature of the site may afford a greater development opportunity without adversely affecting the adjoining residential.

5.1.4 Urban Design Considerations

- The proximity of Windsor to both Windsor and Wilston rail stations and the proposed inner northern busway along Lutwyche Road combined with a series of large underdeveloped commercial sites along Lutwyche and Windsor Roads makes the area particularly suitable for medium term development as a TOD;

- Any new development should seek to complement existing residential characteristics of the area whilst ensuring a step-change in residential development densities. The overall aim being, to preserve attractive aspects such as Wilston village and areas of character housing whilst ensuring the most sustainable use of the larger non-residential sites;
- Particular opportunities exist in the area to the east of Lutwyche Road, which are currently inaccessible and generally un-attractive.

5.1.5 Community Review

- A TOD at Windsor is likely to contain the Windsor Primary School. Downey Park will likely be located on the periphery of a potential TOD.

5.2 Priority and Land Use Function

Medium-term TOD Opportunity - Potential Land Use Function

- Retail uses at ground level, particularly on the existing Windsor Homemaker Centre
- Medium to High Density Residential
- Low levels of commercial office around transport nodes with frontage to Lutwyche Road
- Mixed-use (particular opportunity on Windsor Homemaker Centre and Homezone Centre)

6.0 Lutwyche Road Corridor

6.1 Justification

6.1.1 Context

- City Plan identifies the corridor as being suitable for a range of uses including industry, residential and centre activities;
- The Grange District Local Plan and Clayfield / Wooloowin District Local Plan do not make any specific mention to the corridor as a whole; but note industrial areas and centre development within the corridor.

6.1.2 Land Use

- Relatively continuous ribbon commercial and retail development has occurred along the length of Lutwyche Road;
- These uses are reasonably small in scale and have occurred in an ad-hoc fashion;
- The corridor provides the opportunity to establish links between major centres of activity within the inner north;
- Although some parts of the road corridor are affected by heritage places and Demolition Control Precincts, the majority of land to the immediate east and west has either experienced a degree of transition or is generally not subject to character constraints;
- The locality is generally free of biophysical constraints;
- Public transport (bus services) occurs at a relatively high frequency along the corridor.

6.1.3 Property Economics

- Spine of the study area, a major TOD opportunity from the southern most extremity at the Royal Brisbane Hospital to the Emergency Services Complex on the northern extremity;
- The major transport routes running north/south through the study area allows for major access into the CBD. It is envisaged that two blocks on either side of Lutwyche Rd may have future destination and origin type developments (this is somewhat driven by existing heritage character provisions);
- Current property values are typically higher than the economic value for redevelopment, therefore development will be delayed in these areas until sufficient density is implemented to justify development.
- Highly fragmented ownership patterns that will require time to facilitate amalgamation to maximise development potential;
- Key northern linkage providing access to both bus and rail infrastructure.

6.1.4 Design Considerations

- Lutwyche Road provides a major urban design opportunity for Brisbane. The corridor is one of the City's key northern approaches and through bold development and public realm improvements could become the Brisbane's premier urban boulevard, accommodating exemplary public transport infrastructure, vibrant local centres, high-density housing and an attractive green character;
- Lutwyche Road is the backbone of the Inner Northern Regeneration Precinct and will play a vital role in linking early TOD developments at Bowen Hills and Lutwyche Central.

6.1.5 Community Review

- The Lutwyche Road Corridor TOD is likely to incorporate Windsor Primary School and Wooloowin Primary School in addition to the Kedron Emergency Services Complex. The Royal Brisbane Hospital will be located on the periphery of the TOD.

6.2 Priority and Land Use Function

Development of this node is considered to be a long-term opportunity due its size and current uses spreading along the spine of the study area. Upon the re-development of the previously identified nodes such as Bowen Hills, Lutwyche Central and Windsor (centring on the intersection of Newmarket and Lutwyche Roads), the areas adjoining and spreading north/south should be re-developed to provide a hub of destinational uses.

Potential Land Use Function

- Retail uses
- Commercial office (lower opportunity in the short term due to ability of competing locations closer to CBD to meet future demand)
- Residential

7.0 Economic Value of TOD Areas

In order to establish a high level analysis of the economic value of each node, we have undertaken a review of average property values, current plot ratios and achievable densities for a residential development within each node.
We have applied an average 0.6 plot ratio in line with the current plan for a residential medium density site of a minimum of 800 square metres on the basis of 80 to 90 square metres per unit. We have applied a plot ratio of 1.0 to Bowen Hills as this location currently allows for a higher density.

In each case we have identified the number of units that can be developed under the current plan. The cost per unit to undertake a development of this nature is constrained by current plot ratios and as such development which maximises current plot ratios is cost prohibitive as reflected in the Cost per unit – Current Density, below.

The current benchmark cost to undertake a medium-density development relies on a maximum cost per unit currently ranging from approximately $50,000 to $60,000. As such we have identified the density required within each node to justify re-development at a more appropriate cost of $60,000 per unit.

We note these assumptions rely on current average sales rates per square metre. A more detailed feasibility study should be undertaken to ascertain actual sales rates.

Whilst these figures have been derived from current market indicators and benchmarks, it is necessary to articulate that, should development continue within these areas, it is likely that with any increase in both amenity and density achievable, an increase in profit may also be realised from the development of these key nodes. As such it is likely that under lying land values may also increase in line with these increases.

As such, whilst increases in density required to make a project feasible within the current market are in the order of two to three times current plot ratios, it is likely that underlying land values will continue to increase in line with any increase in amenity provided within each of these nodes. It is likely that achievable densities will require regular consultation and review to ensure development is controlled to a market acceptable level to enable appropriate levels of development to continue.

	Bowen Hills	Albion	Lutwyche	Windsor	Lutwyche Rd Corridor
Average Site Area	800sqm	800sqm	800sqm	800sqm	800sqm
Current Average Price Per square metre	$1,400	$900	$1,000	$700	$1,000
Current Density	1.0	0.6	0.6	0.6	0.6
Achievable No of Units	9	6	6	6	6
Cost per unit – Current Density	$124,000	$120,000	$133,000	$93,000	$133,000
Cost per unit – Economic Value	$60,000	$60,000	$60,000	$60,000	$60,000
Required Density at Economic Value	19 units	12 units	13 units	9 units	13 units
Required Plot Ratio	2.1	1.35	1.5	1.05	1.5
% Increase from Current Average Plot Ratio	110%	125%	150%	75%	150%

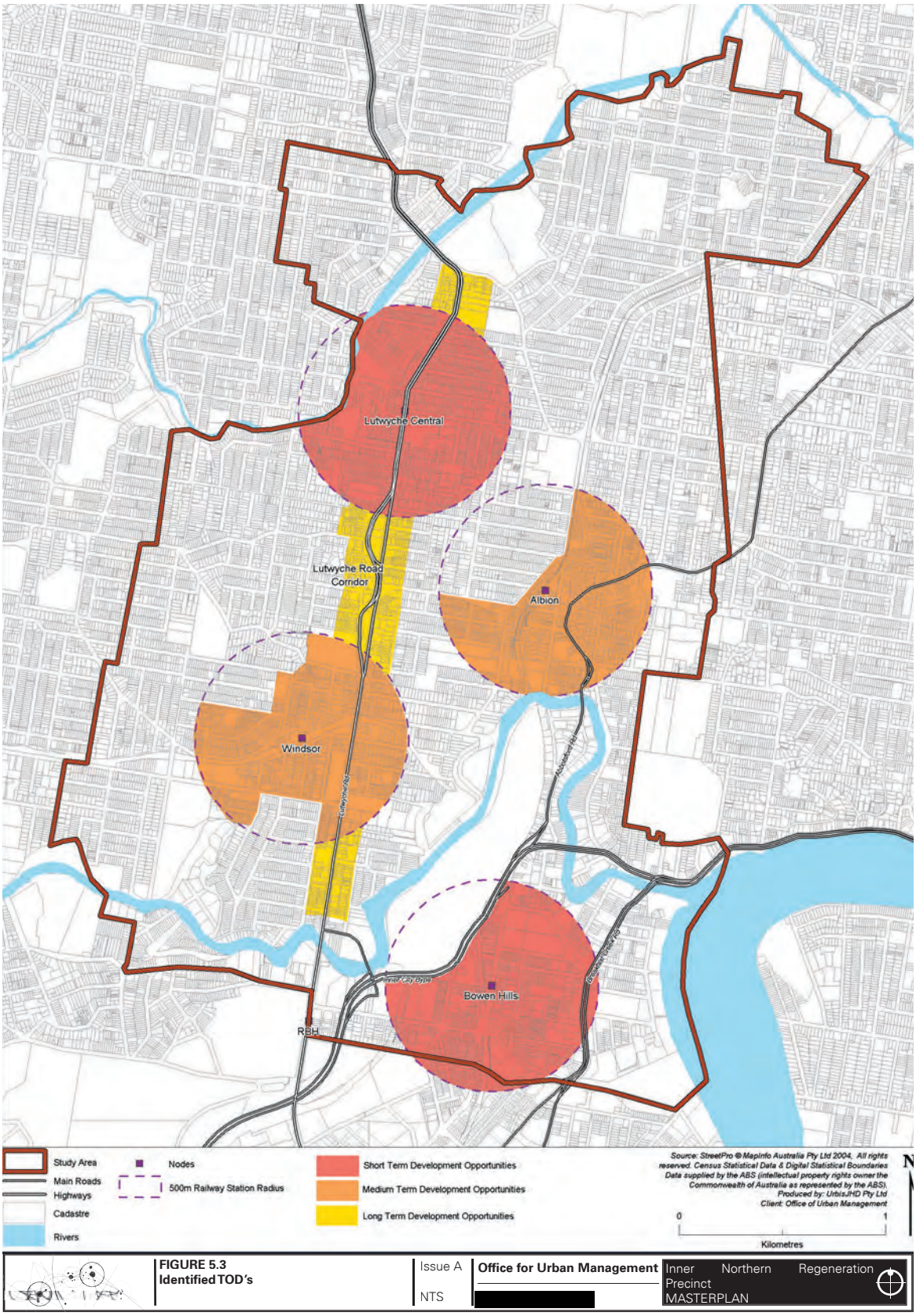

FIGURE 5.3
Identified TOD's

Issue A

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Inner Northern Regeneration Precinct MASTERPLAN

conclusions

This report comprises Stage 1 of the INRP Masterplan and consists of a series of five working papers which provide a:

- Context summary;
- Land use review;
- Community review;
- Property economics review; and
- TOD catalyst site identification.

The study area encompassed by the suburbs of Herston, Bowen Hills, Wooloowin, Windsor, Lutwyche and Albion presents a once-in-a-generation opportunity to integrate transport and urban form outcomes to provide a model for TOD in South East Queensland.

The main findings of each of the working papers are presented below.

Summary Context
A context review was undertaken of the existing town planning and infrastructure planning frameworks applying to the study area.

The South East Queensland Regional Plan identifies the pre-requisites and principles of TOD development which should be considered in the development of the INRP masterplan. The Regional Plan identifies it is a pre-requisite that TOD's are serviced by quality and high frequency public transport, provide levels of development density and intensity that support public transport and provide pedestrian friendly walkable catchments centred around a public transport nodes or corridors.

The key principles of TOD development, including location, catchment area and density, are as follows:

- Focus development around nodes or corridors where infrastructure capacity exists or can be created;
- Provide catchments of approximately 600m radius;
- Develop the community at densities between 30 and 80 dwellings per hectare (net) or greater; and
- Provide a mix of uses to achieve a greater variety of services.

The South East Queensland Infrastructure plan identifies the key transport infrastructure projects of the North South Bypass Tunnel, Northern Busway and the Airport Link that will affect the study area.

The Brisbane City Plan outlines the intended land use allocations through Area classifications and more specifically through Local Plans. Multi-purpose and Special-purpose Centres are those designations in City Plan most appropriate for the development of TOD's.

A number of documents were reviewed in relation to transport infrastructure within the area. The TransApex Pre-feasibility Report is considered the most recent and relevant of these. This report identifies a number of potential TOD locations within the study area at Bowen Hills, Windsor East, Lutwyche and Albion.

Land Use Review
A review was undertaken of the existing land uses within the study area and its bio-physical characteristics with the aim of identifying urban regeneration opportunities.

Within the study area, the Lutwyche City Shopping Centre, Windsor Homemaker Centre and to a lesser extent, Windsor Homezone and Eagle Junction are identified as being major destinations/ activity nodes. A number of significant additional uses are located within the study area including the Queensland Rail Yards and Workshops in Bowen Hills, Newstead River Park urban renewal area and the Emergency Services Complex at Kedron Park. Although the Royal Brisbane Hospital is located outside the bounds of the study area, the site is considered to be a major employment and social service destination within the inner north and Brisbane itself.

The majority of the study area is serviced by bus routes. The study area is serviced by the railway stations of Wilston, Windsor, Bowen Hills, Albion, Wooloowin and Eagle Junction. Although each of the railway stations within the study area vary markedly with regard to land use activities and character, Brisbane City Council, via detailed land use surveys and site

analysis has identified each as having the potential for accommodating higher density redevelopment.

In addition to the above the analysis has identified vast tracts of residential land to the east and west of Lutwyche Road and land to the north of Albion as currently experiencing a period of transition with single detached dwellings no longer dominant. This land is considered to be conducive to the processes of consolidation as are the ad-hoc commercial and retail uses spanning the length of Lutwyche Road.

A number of sizable freehold and government owned land parcels can be found within the study area. The majority of the locality is relatively unconstrained with regard to waterways, wetlands, significant vegetation and sloping land.

Urban regeneration opportunities thus encompass relatively accessible land surrounding railway stations, centres and Lutwyche Road itself. The North Albion/South Wooloowin area has undergone high levels of transition from detached housing to higher density residential forms and is therefore identified as having urban consolidation and redevelopment potential.

Those parts of the study area identified as having important and 'intact' character value have generally been disregarded as having redevelopment potential as has much of the existing industrial development within the study area given its significance to serving the inner City area.

Community Review

A demographic profile was prepared, which indicated that overall the study area is characterised by a population with a lower than average household size and home ownership and car ownership rates. Generally households having higher than average incomes and the population is characterised by a high proportion of 25-39 year olds. A more detailed examination of these statistics, however, reveals that the population is likely to be in transition with community comprising older family households and young professional households with both high and low income earners. TOD development is likely to increase the number of people working, living and visiting the study area and increase housing diversity. Whilst TOD development will be attractive to some sections of the current population it could also attract a very different population from locations outside the study area.

The study area is serviced by existing community infrastructure including schools, parkland and other social services. TOD development may lead to the competition for services and facilities but could also provide the impetus for the expansion and upgrading of services and facilities.

Key social planning issues associated with TOD development within the study area include:

- The identification of the actual needs of the current and incoming populations for social infrastructure (level, capacity and quality);
- Management of dis-benefits for the existing population;
- Provision of social infrastructure which manages competition between existing and incoming populations;
- Stating of infrastructure provision to ensure it attracts desired future populations;
- Consultation with existing communities particularly in terms of retaining the existing population and achieving long term social diversity.

Property Economics Review

A review of the study area was undertaken in the context of reviewing the property and development industry framework for the study area to establish preliminary property opportunities for TOD sites. The study area was analysed in order to broadly identify the economic value of any potential redevelopment resulting from the provision of quality transport infrastructure under current planning legislation. A hypothetical review of the current achievable plot ratios was also undertaken to provide an indication of appropriate plot ratios to enable profitable and economically viable developments to firstly occur and then be sustained into the long term.

A total of 11 localities were identified as appropriate to enable opportunities for TOD related development. Of these it was considered the Bowen Hills Station and RBH locations provided the most appropriate opportunity for a major TOD opportunity. The site is considered key due to its proximity to the CBD together with the proposed north south bypass tunnel portal. This site provides a considerable opportunity to provide destination opportunities and major employment nodes.

The Windsor, Wilston, Wooloowin and Eagle Junction train stations were identified for their over rail opportunities, however we note that the significant cost associated with constructing over rail is such that may constrain such a development for the long term until such

a time that these costs either decrease or are able to be expended to achieve the appropriate return on investment.

The remaining sites identified as Lutwyche Road, Lutwyche Central, Albion rail station and Windsor nodes were identified. These sites provide significant opportunities for cross utilisation of transport infrastructure and provide both bus and rail accessibility. Whilst the Albion and Windsor sites are constrained by the over rail costs, it is likely that significant development opportunities are available on both surrounding land and alternative major land holdings, such as the Albion Flour Mill, Windsor Homemaker Centre and Home-Zone Retail Centre

The economic value of each site was further analysed in the context of both achievable density (current planning legislation) and required density to show a positive return on cost in line with current benchmarks. This indicative analysis had the following outcomes:

- Current plot ratios do not encourage medium-high density scale development;
- Increasing construction costs and correlating increasing land values are driving total development costs up. This in turn impacts on the price paid for the land;
- Current land prices have reached a level which cannot sustain current achievable plot ratios;
- An increase in plot ratio in the order of two to three times their current densities of between 0.6 and 1.0 is required to make development on any broad scale viable.

TOD Catalyst Identification

A strategic analysis was undertaken which drew upon the findings of each of the preceding working papers to identify potential TOD catalyst sites. The notable TOD catalyst opportunities within the study area were identified as:

- Bowen Hills;
- Lutwyche Central;
- Albion;
- Windsor;
- Lutwyche Road Corridor.

Bowen Hills

Bowen Hills is serviced by a railway station with a relatively high level of services and provides the opportunity to establish links with the Royal Brisbane Hospital, RNA Showgrounds and Newstead Riverpark. The portal of the proposed North South By-pass Tunnel will provide the opportunity to regenerate the area.

The influence of the Royal Brisbane Hospital and establish presence of the media industry provide the opportunity to create a TOD based on the themes of 'Arts and Science'. A TOD in this location would be able to make a valuable contribution to affordable housing and in particular worker, short term and student accommodation associated with major nodes such as the Royal Brisbane Hospital. The value of existing service and light industry functions in the area should be recognised.

Bowen Hills represents a short term TOD opportunity from a property economics perspective.

Lutwyche Central

Lutwyche is a TOD opportunity presented by the existing district level shopping centre and its frontage to Lutwyche Road. The land surrounding the centre and either side of Lutwyche Road is designated for Low-Medium Density uses despite the existence of Demolition Control Precincts. Lutwyche Central has the ability to become the northern gateway to inner Brisbane. The proposed inner Northern Busway could provide the improvements necessary to public transport to facilitate the development of the TOD.

It is likely that a TOD based on Lutwyche Central would be focussed on retail, commercial office and residential development.

Lutwyche Central is a short term TOD opportunity and the substantial retail development already in place would provide immediate amenity to new residential and commercial development.

Albion

Albion is currently serviced by both bus and a railway station with a high frequency of services, providing opportunities for higher intensity developments to connect existing infrastructure. Redevelopment potential is represented by a number of large land holdings such as the Flour Mill and various industrial uses which are currently in the market. The locality also includes an established local centre including restaurant and entertainment functions. Land to the east of the railway station includes large industrial sties, multi-unit development and link areas without character residential value.

Albion is likely to present opportunities for mixed use development including retail, commercial, restaurant/entertainment and residential land uses.

A property economics analysis indicates that Albion would be a medium term priority TOD.

Windsor

The Windsor site would be located along a major bus route at the junction of major road corridors (Newmarket Road and Lutwyche Road) and adjoining the Windsor railway station. An employment base is established by the existing Homemaker Centre. Areas about the Windsor train station are allocated to Low-Medium Density Residential development with Centre and residential uses intended along Lutwyche Road. Some lower quality character housing exists near to the train station and along Lutwyche Road.

TOD development in the area should seek to complement the existing residential characteristics whilst ensuring a gradation in residential densities. It is likely that an effective land use function for the TOD would be mixed use development incorporating residential, retail and some ancillary office uses.

The proximity of Windsor to both the Windsor and Wilston railway stations and potential Northern Busway along Lutwyche Road combined with large, under-utilised commercial sites makes the area suitable for a medium term TOD.

Lutwyche Road Corridor

Commercial ribbon development has occurred along Lutwyche Road. The corridor presents the opportunity to provide links between major activity centres within the inner north extending from the Royal Brisbane Hospital in the south to the Emergency Services Complex in the north. Public transport occurs at relatively high frequency along Lutwyche Road. The City Plan perceives this area as being suitable for a range of uses including centre activities, industry and residential development. Immediately adjacent to the corridor large tracts of residential development have either undergone transition or are generally absent of character controls. From an urban design perspective this approach to Brisbane has the potential to become Brisbane's premier urban boulevard encompassing vibrant local centres, higher density housing and high frequency of public transport.

Potential land use functions include residential development, retail uses and longer term commercial office development.

The Lutwyche Road Corridor is considered to represent a long term TOD opportunity due to its size and current use. Upon the redevelopment of Bowen Hills and Lutwyche Central this north/south spine could be developed to form a linking corridor of destinational uses.

GFA/Density

The high level analysis undertaken indicates that plot ratios would need to increase two or three fold that of current densities to facilitate large scale development opportunities within each TOD catalyst site that is economically viable.

Conclusion

The results of this study are intended to inform subsequent stages 2-4 of the INRP Masterplan process and the preferred route selection process for the Airport Link and Northern Busway infrastructure projects.


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Urban Land Development Authority

BOWEN HILLS
INTERIM LAND USE PLAN

March 2009

BOWEN HILLS – INTERIM LAND USE PLAN

Table of contents

Part 1 Preliminary

1. Introduction

(1) This interim land use plan may be cited as the Bowen Hills Interim Land Use Plan.

(2) This interim land use plan has been prepared pursuant to Section 8 of the *Urban Land Development Authority Act 2007*.

(3) This interim land use plan applies only to the Bowen Hills Urban Development Area, as identified in Figure 1.

2. Backgrou nd

(1) The Bowen Hills Urban Development Area was declared by a regulation, pursuant to Part 2 Division 1 Section 7 of the *Urban Land Development Authority 2007*.

(2) The main purposes of the *Urban Development Authority Act 2007* are to facilitate the following in the urban development areas –

(a) the availability of land for urban purposes;

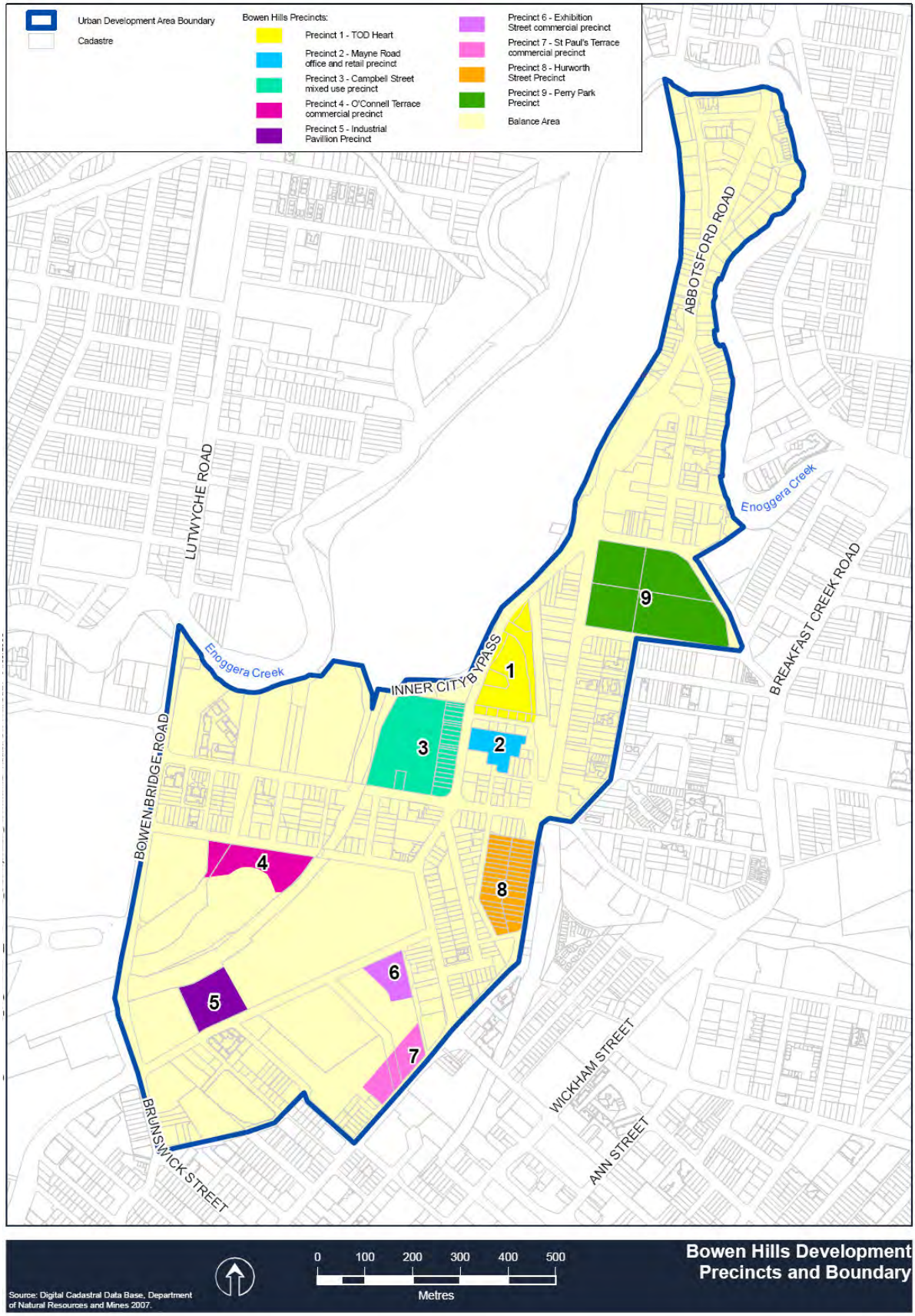
(b) the provision of a range of housing options to address diverse community needs;

(c) the provision of infrastructure for urban purposes;

(d) planning principles that give effect to ecological sustainability and best practice urban design;

(e) the provision of an ongoing availability of affordable housing options for low to moderate income households.

Bowen Hills - Urban Development Area **Figure 1**



Bowen Hills Development Precincts and Boundary

Part 2 Land use planning

1. Purpose of Interim Land Use Plan

(1) The purpose of this interim land use plan is to:

(a) ensure that the future development opportunities of the urban development area to be expressed in the development scheme are protected from incompatible land uses and activities; and

(b) in limited and select instances, identify precincts in which it is appropriate to facilitate development prior to the development scheme taking effect; and

(c) regulate orderly development and provide direction as to the preferred form of development within the precincts.

2. Development precincts

(1) This interim land use plan nominates precincts within which particular development may be allowed. The precincts are shown in Figure 1.

(2) Land within the declared urban development area not included in a precinct is part of the balance area.

2A. Development in the Balance Area

(1) All development within the balance area (except for development identified in Schedule 1 which is exempt development) is UDA Assessable Development – Prohibited.

(2) UDA Assessable Development – Prohibited is UDA Assessable Development that is inconsistent with the interim land use plan.

(3) UDA Assessable Development – Prohibited may not be carried out in the Urban Development Area.

3. Urban development area development principles

(1) Bowen Hills Urban Development Area will develop as a vibrant, inner urban locality, accommodating a wide, integrated and balanced range of uses that are connected by a high quality public realm.

(2) Taking advantage of its strategic location and high frequency public transport, future development within comfortable walking distance of the Bowen Hills railway station will exemplify best practice inner city transit oriented development and deliver the densities required to increase public transport patronage.

(3) The urban development area will provide housing choice and diversity through a mix of densities, types, designs, tenures and levels of affordability, to cater for a range of lifestyles, incomes and lifecycle needs.

(4) Development in the urban development area will exemplify the use of active transport as the principal local transport option, supporting and promoting walking and cycling and the use of public transport through urban design and the provision of facilities, complemented by management techniques and incentives.

(5) Development in the urban development area will foster healthy lifestyles by ensuring safe and comfortable pedestrian and cycling environments, around transit stops and stations and along key pedestrian and cycling routes.

(6) The urban development area will be connected to major employment hubs and neighbourhoods around it by a network of high quality streets, displaying a high level of integration with pedestrian and cycle routes and civic spaces.

(7) Development in the urban development area will complement, rather than compete with surrounding neighbourhoods, for example Fortitude Valley.

(8) Buildings and spaces within the urban development area should exhibit excellent design that delivers subtropical character and accommodates the mixtures of densities and activities.

(9) Development in the urban development area will be guided by built form provisions that focus on local accessibility and improve legibility, permeability and connectivity.

(10) Access will be enhanced to Bowen Park and Perry Park, the primary green spaces within the urban development area. Development will provide new civic and open spaces, green links and opportunities for sport and recreation, to meet the needs of a diverse community.

(11) The interface between development opportunities and heritage places within the urban development area will be managed sensitively.

(12) Development will be designed, built and managed to incorporate best-practice measures to achieve both physical sustainability and social sustainability, including incorporation of crime prevention through environmental design (CPTED).

Part 3 Precinct Intents

1. Precinct 1 – Transit Oriented Development Heart

(1) Precinct 1 is the heart of the transit oriented development at Bowen Hills and will support a major mixed-use development with a significant office employment focus, serving the diverse community of this new neighbourhood.

(2) It is proposed in this precinct to establish a substantial commercial office use, supported by land uses adjacent to the public realm.

(3) To ensure vibrancy and 24/7 activity and enable development to deliver the densities to support public transport, a residential component to the mixed-use development is encouraged. The integration of residential and non-residential uses will involve careful design to deliver and maintain reasonable levels of amenity.

(4) A new Bowen Hills transit facility incorporating a rail-bus interchange and secure end of trip facilities for cyclists is considered an essential infrastructure component and is contemplated in the vicinity of Hudd Street.

(5) A civic plaza will provide a strong structural core for the transit oriented development and improve site legibility and permeability.

(6) Development of this precinct must result in a collection of diverse buildings and civic spaces with a strong urban character.

(7) Hudd Street will be widened, extended to Abbotsford Road and will develop as a new 'main street'.

(8) Development will demonstrate best practice crime prevention through environmental design (CPTED) principles. For example, both Hudd Street and the frontage to the transit facility and civic square must be activated for pedestrians by incorporating retail, restaurants/cafes and other pedestrian-activating uses (e.g. banks, community facilities, galleries) on the ground floor level.

(9) Development within this precinct will contribute to an enhanced local movement network through accommodating a new local road and new pedestrian through-routes both through civic spaces and along urban streets.

(10) No dedicated park and ride is permitted within the precinct. A shared parking facility, e.g. commercial car park, would be optimally located within this precinct.

(11) Within this precinct, the design of development should respond to the area's sloping levels and its context to deliver the functional integration of transport facilities at the heart of the new urban village along with high amenity, people-oriented public spaces.

(12) Development should relate to Abbotsford Road and the residential area to the east and enhance the awareness and attractiveness of the public transport facility.

2. Precinct 2 – Mayne Road Office and Retail Precinct

(1) Precinct 2 is primarily intended for office development with retail, restaurants and cafes and other land uses oriented to the public activating the ground level. Residential development as part of a mixed-use development (for example, a residential tower or hotel over a commercial podium) would also be acceptable in this location.

(2) Pedestrian activation is required on three frontages – Hudd, Mayne and the frontage to the railway station, reflecting the desired 'main street' character.

(3) 24-hour public access to the railway station complex is to be maintained through the precinct at ground floor level.

(4) No dedicated park and ride is permitted within the precinct.

(5) Access to car parking and service bays should be achieved from the southern boundary of the site and not adversely impact on pedestrian and cycle movements.

3. Precinct 3 – Campbell Street Mixed Use Precinct

(1) Precinct 3 is intended to be developed as a major mixed-use development accommodating a range of centre activities including office development, retail, residential towers, and new civic/public open space.

(2) Potential exists on this site for a maximum 3,000 m^2 supermarket developed near Campbell Street as part of an integrated mixed-use development, provided that satisfactory traffic management can be achieved and an active ground plane oriented towards and connected to Mayne Road is achieved.

(3) New uses within precinct 3 should contribute to the development Mayne Road as a 'main street', activated at the ground floor level by restaurants, retail, local services and/or small-scale businesses that encourage visual interest (e.g. galleries) and will provide a high level of pedestrian and cycle access and connectivity to adjoining areas.

(4) Development of this large site should result in a collection of buildings and a series of intimate civic spaces, rather than a single complex.

(5) Development within the precinct should contribute to improved permeability and support enhancement of the local road network through the introduction of a new local street through the site. Campbell Street may be widened.

(6) A shared parking facility, e.g. commercial car park, is desirable within this precinct, optimally located on the western boundary of this precinct to maintain amenity and direct traffic flows.

(7) On the site's western boundary, development may need to be setback from the existing rail corridor to protect future rail requirements.

4. Precinct 4 – O'Connell Terrace Precinct

(1) Precinct 4 is intended to incorporate new office development addressing the O'Connell Terrace frontage and Bowen Park. Fine-grained local convenience retail development and cafes or restaurants located at ground floor level will serve the needs of the local workforce and visitors to the area.

(2) This precinct represents significant opportunity for growth of the hospital, educational and research sectors and medical / allied health services along O'Connell Terrace. Hotel or short-term accommodation uses would also be permitted within this precinct to enliven and provide passive surveillance of O'Connell Terrace.

(3) O'Connell Terrace is the important east-west bus connection in the urban development area and the only pedestrian route between Bowen Hills railway station and the Royal Brisbane and Women's Hospital. Any changes on this frontage must include streetscape treatment that improves pedestrian and cyclist amenity and safety.

(4) A new pedestrian overpass is contemplated to link the Royal Brisbane and Women's Hospital, the hospital busway station, O'Connell Terrace and Bowen Park.

(5) To enhance Royal National Association (RNA) operations, replacement of large animal facilities and service access improvements will be permitted. These facilities will need to be of high architectural quality and reinforce the amenity and safety of the public realm of O'Connell Terrace. Their design should be flexible to enable adaptation for alternative use outside of Show times.

(6) Development will need to take account of this precinct's heritage value.

(7) Any development adjoining Bowen Park must respect the park's high heritage value and enhance its amenity and safety.

5. Precinct 5 – Industrial Pavilion Precinct

(1) The existing Industrial Pavilion will be replaced with a new exhibition centre, with a hotel constructed on top of the new building.

(2) Development is to respect the heritage values of the site, retain the existing walls to Gregory Terrace, and create a positive visual and functional relationship with the adjoining Old Museum site.

(3) Development within this precinct should facilitate pedestrian and cycle movement through the Showgrounds site from Gregory Terrace to O'Connell Terrace.

(4) Development may need to be setback from the existing rail corridor to protect future rail requirements and a busway extension to Fortitude Valley.

6. Precinct 6 – Exhibition Street Commercial Precinct

(1) Precinct 6 is intended for commercial office development, which may be supported by fine-grain local convenience retail development and cafes or restaurants at ground floor level supporting the commercial uses above and encouraging pedestrian activity.

(2) Development must address both Exhibition Street and the Showgrounds, enhance the local streetscape and take into consideration views which can be gained from surrounding sites and buildings.

(3) Development in the precinct should deliver ways of maintaining the presence, legibility and sense of entry to the Showgrounds.

7. Precinct 7 – St Paul's Terrace Commercial Precinct

(1) This area is intended primarily for office development with fine-grain, local convenience retail at ground floor level.

(2) Development must address St Paul's Terrace and the Showgrounds and take into consideration views which can be gained from surrounding sites and buildings.

(3) The height of development at this location should be complementary to the Green Square development.

(4) Development in the precinct should deliver ways of maintaining the presence, legibility and sense of entry to the Showgrounds.

(5) Development within this precinct should facilitate a high order pedestrian and cycling connection to the Green Square development and on to Fortitude Valley.

8. Precinct 8 – Hurworth Street Precinct

(1) Precinct 8 is intended to accommodate multi-unit dwellings (including affordable housing), a community facility, small-scale local convenience retail and services at ground floor level and a new park.

(2) Where possible, development should seek to create an active relationship with the Hurworth and Markwell Street frontages and overlook these streets. To achieve the latter, the design of development will need to respond to the site's topography and context.

(3) A pedestrian and cycle route along the Markwell Street alignment will assist with facilitate access from and past the precinct to the new Bowen Hills transit facility.

9. Precinct 9 – Perry Park

(1) Perry Park is to be retained as a major sport and recreational use and green space for Bowen Hills.

(2) Development within the precinct may include outdoor sport and recreation, indoor sport and recreation uses, education and training facility, community facility, child care centre, café and administration centre.

(3) Development within this precinct should provide an arrival point into this precinct from the transit facility.

(4) Development within this precinct should facilitate the creation of high quality pedestrian and cycling linkages from the Folkestone – Abbotsford Road intersection towards Teneriffe.

10. Assessable development

(1) Table 1 of the interim land use plan identifies whether development within the nominated precincts is –

(a) UDA Self Assessable Development (Column 2) or

(b) UDA Assessable Development – Permissible (Column 3A) or

(c) UDA Assessable Development – Prohibited (Column 3B)

(2) Development not identified in this interim land use plan as UDA Assessable Development – Permissible, UDA Assessable Development – Prohibited or UDA Self Assessable Development is UDA Exempt Development. A UDA development approval is not required for UDA Exempt Development nor is it necessary for a person carrying out UDA Self Assessable Development complying with the requirements of this interim land use plan for the UDA Self Assessable Development.

(3) All UDA Assessable Development – Permissible is UDA Assessable Development that is identified in column 3A, requires a UDA development application to be lodged with the Urban Land Development Authority (ULDA) for assessment and decision as set out in Part 4 of this interim land use plan. Approval is required for development to be undertaken.

(4) Identification of development as UDA Assessable Development - Permissible does not mean that a UDA development approval (with or without conditions) will be granted.

(5) UDA Assessable Development – Permissible that is inconsistent with the interim land use plan must be refused.

(6) UDA Assessable Development – Prohibited is UDA Assessable Development that is inconsistent with the interim land use plan. UDA Assessable Development – Prohibited may not be carried out in the Urban Development Area.

Table 1 – Table of Development[1]

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
Precinct 1	Nil	**1. Making a material change of use for:** (a) Centre activities (excluding display and sale activities and service station) (b) Environmentally Relevant Activities associated with acceptable development (c) Estate sales office (d) Major educational and research facility (e) Commercial carpark **2. Carrying out operational work for:** (a) Filling or excavation associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Park (civic space)	All other development except development mentioned in Column 3 – Permissible or Schedule 1.
Precinct 2	Nil	**1. Making a material change of use for:** (a) Centre activities (excluding display and sale activities and service station) (b) Environmentally Relevant Activities associated with acceptable development **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1**	All other development except development mentioned in Column 3 – Permissible or Schedule 1.

[1] *This Table of Development only relates to development in the nominated precincts. Development in the balance area is dealt with in clause 2A in part 2.*

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
Precinct 3	Nil	**1. Making a material change of use for:** (a) Centre activities (excluding display and sale activities and service station) (b) Environmentally Relevant Activities associated with acceptable development (c) Estate sales office (d) Major educational and research facility (e) Commercial carpark **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Park	All other development except development mentioned in Column 3 – Permissible or Schedule 1.
Precinct 4	Nil	**1. Making a material change of use for:** (a) Convention Centre (b) Environmentally Relevant Activities associated with acceptable development (c) Hotel (d) Major educational and research facility (e) Office (f) Restaurant not exceeding 250m² of GFA (g) Shop where located at ground level not exceeding 250m² of GFA (h) Short term accommodation **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 (b) RNA show activities (service access arrangements) **3. Reconfiguring a lot other than in Schedule 1**	All other development except development mentioned in Column 3 – Permissible or Schedule 1.

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
		4. All aspects of development for: (a) RNA show activities (large animal facility) other than in Schedule 1	
Precinct 5	Nil	**1. Making a material change of use for:** (a) Convention centre (b) Environmentally Relevant Activities associated with acceptable development (c) Hotel (d) Office (e) Restaurant not exceeding 250m² of GFA (f) Shop where located at ground level not exceeding 250m² of GFA **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1**	All other development except development mentioned in Column 3 – Permissible or Schedule 1.
Precinct 6	Nil	**1. Making a material change of use for:** (a) Environmentally Relevant Activities associated with acceptable development (b) Office (c) Restaurant not exceeding 250m² of GFA (d) Shop where located at ground level not exceeding 250m² of GFA **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1**	All other development except development mentioned in Column 3 – Permissible or Schedule 1.
Precinct 7	Nil	**1. Making a material change of use for:** (a) Environmentally Relevant Activities associated with acceptable development (b) Office (c) Restaurant not exceeding	All other development except development mentioned in Column 3 – Permissible or Schedule 1.

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
		250m² of GFA (d) Shop where located at ground level not exceeding 250m² of GFA **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1**	
Precinct 8	Nil	**1. Making a material change of use for:** (a) Community facility (b) Environmentally Relevant Activities associated with acceptable development (c) Estate sales office (d) Restaurant not exceeding 250m² of GFA (e) Shop where located at ground level not exceeding 250m² of GFA (f) Multi unit dwelling **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Park	All other development except development mentioned in Column 3 – Permissible or Schedule 1.
Precinct 9	Nil	**1. Making a material change of use for:** (a) Child care facilities (b) Community facility (c) Education Purpose (d) Environmentally Relevant Activities associated with acceptable development (e) Indoor sport and recreation (f) Outdoor sport and recreation (g) Restaurant not exceeding 250m² of GFA (h) Shop where located at ground level not	All other development except development mentioned in Column 3 – Permissible or Schedule 1.

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
		exceeding 250m² of GFA **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Park	

Part 4 Development assessment

1. Making an application

(1) A UDA development application must be made to the Urban Land Development Authority (ULDA) in accordance with Part 4 Division 3 Subdivision 1 of the *Urban Land Development Authority Act 2007*.

2. Notice of application

(1) Public notice is required for all UDA assessable development involving a material change of use.

3. Deciding an application

(1) Development in the urban development area is assessed and decided by the ULDA under the provisions of the *Urban Land Development Authority Act 2007* and this interim land use plan.

(2) The ULDA must refuse a UDA development application where it is inconsistent with:

(a) the *Urban Land Development Authority Act 2007*; or

(b) the Urban Development Area development principles (Part 2); or

(c) the intent of the development precinct (Part 3); or

(d) the development assessment criteria (Part 5); or

(e) the infrastructure contributions requirements (Part 6).

Part 5. Development Assessment Criteria

1. Development Assessment Criteria

(1) The development assessment criteria represents one way of complying with the urban development area development principles and the intent of the development precincts.

(2) The ULDA may consider and accept an alternative development solution to adequately address the development assessment criteria where:

(i) the proposed development is a superior outcome; and

(ii) the proposed development must not prejudice the ability to achieve the Urban Development Area development principles and the intent of the development precinct.

(a) Affordability

(i) Where development precincts are intended to include a residential component, applicants will be expected to demonstrate how the proposed development will contribute to house choice to meet a diversity of needs.

(ii) Contributions towards affordable housing may be required, in built form or by way of a monetary contribution, where the ULDA deems that the proposed development does not adequately address the urban development area's diversity of housing needs. Such requirements will be enforced through conditions attached to any development approval

(b) Built Form

(i) The design of buildings and spaces, including with respect to building height, bulk and scale, is arranged to respond to the particular circumstances of the building site, the street, adjacent buildings and public spaces and (for developments within Precinct 1 and 2) the transit facility.

(ii) The minimum and maximum building heights within specific precincts does not exceed the range listed in *Table 2 – Minimum and maximum storeys*.

(iii) Within precincts 1, 2 and 3, where mixed use buildings front identified main streets (see Figure 2), podium and tower style development is preferred, with a four (4)-storey podium to the street elevation accommodating the retail component and a residential tower block above or behind.

(iv) Buildings located on the boundaries of the urban development area are to be designed to ensure that an appropriate transition is established to buildings on adjoining sites.

(v) Development on the western boundary of precinct 3 is to create a continuous built form or other device that screens the area to the east from the adjoining road interchange.

Table 2: Minimum and maximum storeys

Development Precinct	Minimum and maximum number of storeys
Precinct 1	10-20 storeys
Precinct 2	6 – 15 storeys
Precinct 3	4-15 storeys
Precinct 4	Up to 8 storeys
Precinct 5	Exhibition space –20 metres high 7 storey hotel and services
Precinct 6	Up to 15 storeys
Precinct 7	Up to 15 storeys
Precinct 8	8 - 15 storeys
Precinct 9	Up to 4 storeys

(c) Building design

(i) Within precincts 1, 3, 4 and 8, development should be perceived as a collection of buildings, rather than a single complex or limited number of large buildings.

(ii) Building form and layout allow for the development of diverse spaces in the streetscape that reinforce entries to buildings and allow ground floor retail or restaurant/café components to spill out into the street in appropriate locations while maintaining pedestrian flow and ease of movement.

(iii) To support legibility and human scale and allow for the integration of further development over time, buildings are to be strongly articulated and different in appearance from their neighbours, with distinct materials, details and colours.

(iv) The architectural treatment of facades and elevations avoid large blank walls, and openings and setbacks are to be used to articulate vertical building surfaces and contribute positively to the streetscape.

(v) Building form is to define both major and minor entry points to the building and creates a sense of street address at each entry for their users.

(vi) Building designs are to be open and permeable and exploit the sub-tropical climate.

(vii) Buildings are to be finished with high quality materials, selected for their durability and the contribution they make to the sub-tropical character of the UDA.

(viii) Eaves and external shade structures are to be incorporated into buildings to limit summer sun and maximise winter sun.

(ix) Buildings are to incorporate varied roof forms that are visible to surrounding buildings as well as pedestrians and designed to be attractive when able to be seen. Roofs that are actively used for human activity and/or developed as green roofs are desirable to achieve sustainable building form.

(x) Development adjoining or affecting a heritage place responds to its setting. Where development adjoins or affects a heritage place, a report from a properly qualified heritage architect outlining how the development responds to the heritage place should be submitted at development application stage.

(d) Building setbacks and separation

(i) Building setbacks are to spatially define the street and are to be designed to achieve a strong urban streetscape character.

(ii) Buildings within precincts 1, 2 and 3 which front defined 'main streets' and/or areas with high levels of pedestrian activity such as the transit facility are to achieve zero setbacks to the street up to four (4) storeys above ground level. Figure 2 identifies areas where zero setbacks to the street are required.

(iii) All other buildings within the urban development area precincts are to be designed and sited to allow:

(a) circulation of air and adequate penetration of light; and
(b) separation between buildings for the amenity of the development and adjoining properties, whilst contributing to the intended highly urban character of the urban development area.

(e) Active frontages

(i) Buildings within Precincts 1, 2 and 3 which front the 'main streets', civic plaza and transit interchange must incorporate active frontages (i.e. windows, entrances and footpath uses) that relate strongly to and generate activity in the public realm.

(ii) To provide weather protection and encourage pedestrian movement through the precinct, continuous awnings are to be provided in these areas.

(iii) Civic spaces are to be located where there is a high volume of pedestrian traffic and are to be activated by development on the edges, consistent with the principles of best practice crime prevention through environmental design (CPTED).

(f) Transport, access, on-site parking and servicing

(i) On-site car parking numbers for residential and non-residential uses will be negotiated between the ULDA and the applicant on a site-by-site basis.

(ii) Development is to support the transit oriented development intention of the urban development area, including the promotion of public and active transport over private car usage in innovative ways.

(iii) To protect amenity and maintain a significant urban streetscape, ancillary car parking areas within the urban development area should preferably be at basement level rather than surface level.

(iv) Any parking structures above ground must be sensitively designed and sleeved with other active uses. Further development above parking structures is encouraged.

(v) Short-term parallel parking within the urban development area is desirable where the ULDA s is compatible with the preferred circulation pattern, pedestrian and cyclist movement networks and bus network.

(vi) End of trip facilities for cyclists are to be provided as part of development for non-residential purposes, including secure, undercover bicycle storage facilities, showers and lockers.

(vii) For residential uses, secure and undercover bicycle-storage facilities for the use by owners and tenants are to be provided at a minimum rate of one bicycle space per dwelling.

(viii) Service access and access to off street parking areas are located and designed to take into account desired circulation patterns, pedestrian and cyclist movement networks, land use and amenity.

(ix) To the extent determined appropriate by the ULDA, transport impacts shall be addressed and mitigated having regard to Brisbane City Plan's *Transport, Access, Parking and Servicing Planning Scheme Policy*.

(x) To the extent determined appropriate by the ULDA, servicing, loading and unloading facilities, bicycle facilities and parking spaces, vehicle parking bays, manoeuvring areas and driveways shall be designed having regard to the standards set out in Brisbane City Council's *Transport, Access, Parking and Servicing Planning Policy*.

(g) Accessibility, permeability and movement

(i) The design and layout of development is to support increased accessibility, permeability and movement for pedestrians and cyclists and appropriate movement by vehicles.

(ii) Cycle way paths and high quality cycling facilities are to be incorporated in all road design layouts within the precincts.

(iii) Development is to be designed to include safe and highly visible connections to pedestrian and cycle networks through landscape design elements and treatments.

(h) Sustainability – Energy Rating

Commercial and Mixed Use Development

(i) Development achieves a minimum energy rating of five (5) stars or equivalent under the Australian Green Building Rating (AGBR) Scheme. A building services report from an accredited assessor will be required at UDA development application stage].

Residential Development

(i) Development achieves a minimum energy rating of four (4) stars or equivalent under the Australian Green Building Rating Scheme. A building services report from an accredited assessor will be required at UDA development application stage].

(i) Sustainability - Integrated water management

(i) Development must include water sensitive urban design measures to integrate water supply, wastewater and stormwater to ensure protection of the water cycle. This should be demonstrated by submission of a site-based Integrated Water Management Plan (IWMP) incorporating Water Sensitive Urban Design.

(j) Sustainability — Waste management

(i) Site works and building design must facilitate the efficient sorting and disposal of waste to maximise recycling opportunities.

(k) Sustainability – landscaping

(i) Landscaping incorporates native drought tolerant species.

(ii) For residential development, landscaping should constitute 30% of the site area and provide on site recreation opportunities.

(iii) For non-residential development, landscaping should provide a positive visual and amenity contribution to the public realm.

(iv) Landscaping should be designed and located so that it:

(a) can be observed and appreciated by the public at all times;

(b) addresses streets and open spaces to facilitate personal and property security, surveillance of footpaths and public open space, and to deter crime and vandalism; and

(c) takes advantage of microclimatic benefits allowing adequate on-site solar access and access to breezes.

(l) Acoustic Amenity Criteria

(i) The design, siting and layout of development must address noise impacts and where necessary incorporate appropriate noise mitigation measures.

(ii) Development achieves acceptable noise levels for noise sensitive uses for areas affected by rail noise. Noise sensitive uses meet indoor

design level noise criteria to achieve average maximum sound level (10pm – 6 am) not greater than 50 decibels (db).

(iii) Where determined necessary by the ULDA, an acoustic report will be required to evaluate and address potential noise impacts and recommend appropriate noise mitigation measures.

(m) Reconfiguration of a lot – lot layout

(i) Lots have an appropriate area and dimensions for the siting and construction of the buildings, the provision of outdoor space, convenient vehicle access and parking..

(ii) Lot frontages address streets and open spaces to facilitate personal and property security, surveillance of footpaths and public open space, and deter crime and vandalism.

(iii) Lot size and dimensions must enable buildings to be sited to:

(a) protect natural or cultural features;

(b) address site constraints including slope, soil erosion, flooding and drainage;

(c) retain special features such as trees and views;

(d) ensure that lots are not subject to unreasonable risk, hazard, noise impacts or air quality impacts;

(e) ensure reasonable buffers between existing or potential incompatible land uses; and

(f) maximises solar orientation benefits to assist energy rating targets.

(n) Erosion and sediment control

(i) Development must incorporate adequate erosion and sediment control.

(ii) Submit an erosion and sediment control plan to set out the required measures for all stages of development, including at the time of earthworks, road works and building work.

(o) Flood immunity

(i) Habitable rooms and non-habitable areas have acceptable levels of flood immunity.

(p) Stormwater management

(i) A Site Based Stormwater Management Plan (SBSMP) must be prepared for all major and minor stormwater management measures.

(q) Acid Sulphate Soils

(i) All development within the urban development area takes account of and takes appropriate action where necessary in accordance with the State Planning Policy 2/02 - Planning and Managing Development Involving Acid Sulphate Soils.

(r) Environmentally Relevant Activities

(i) Making a material change of use for an Environmentally Relevant Activity must comply with the purposes of the *Environmental Protection Act 1994*

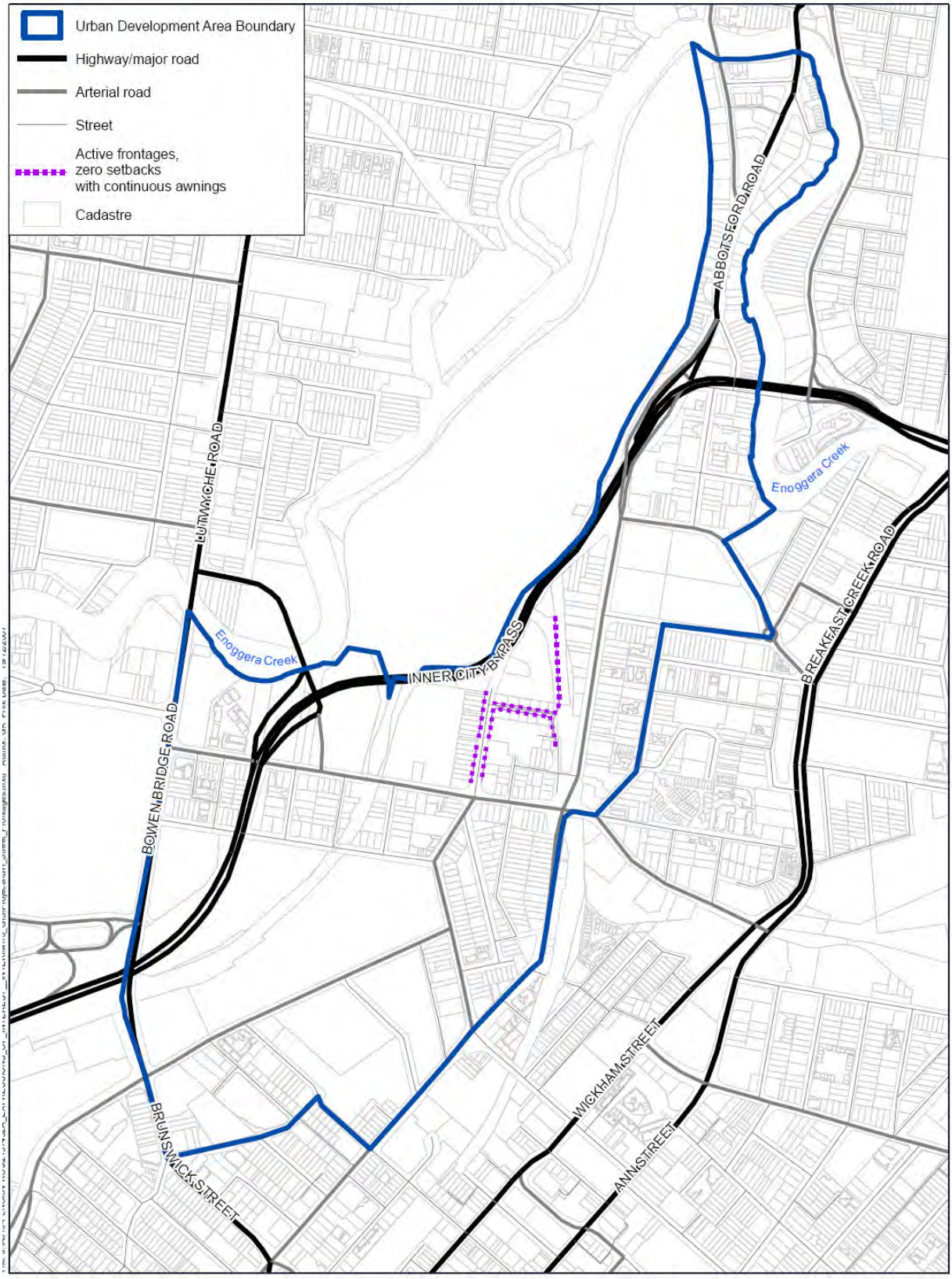
(s) Fill and Excavation

(i) To the extent determined appropriate by the ULDA, fill and excavation shall be carried out having regard to the standards set out in Brisbane City Plan's *Fill and Excavation Code*.

(t) Park

(i) To the extent determined appropriate by the ULDA, parks shall be located, designed and developed having regard to the Brisbane City Plan's *Park Code*.

Bowen Hills - Urban Development Area **Figure 2**



Part 6. Infrastructure Contributions

1. Introduction

(1) Under *the Urban Land Development Authority Act 2007*, the ULDA may impose conditions relating to infrastructure, and the payment of contributions or the surrender of land for infrastructure for any development area.

2. Infra structure requirements

(1) Under this interim land use plan, infrastructure contributions within the urban development area will be required and enforced through conditions attached to any UDA development approvals.

(2) As a part of the preparation of the permanent development scheme for the urban development area, the ULDA will prepare an infrastructure contributions policy. Until that time, by negotiation with the ULDA, development approved under the interim land use plan will be required to contribute towards infrastructure elements which will include (but not be limited to) delivery of:

(a) public passenger transport infrastructure
(b) streetscape improvements
(c) new roads and improvements to existing roads
(d) bicycle and pedestrian paths
(e) water supply infrastructure
(f) sewerage infrastructure
(g) stormwater drainage infrastructure
(h) community facilities and public recreation land.

(2) Contributions towards infrastructure may be in kind or by way of monetary contributions as considered appropriate by the ULDA.

Schedule 1

EXEMPT DEVELOPMENT

Development exempt from assessment against the Interim Land Use Plan.

Building work
Minor building work or demolition work except where the building is identified as a heritage registered place.
Material change of use of premises
Making a material change of use of premises implied by building work, plumbing work, drainage work or operational work if the work was substantially commenced by the State, or an entity acting for the State, before 31 March 2000.
Making a material change of use of premises for a class 1 or 2 building under the Building Code of Australia (BCA), part A3 if the use is for providing support services and short term accommodation for persons escaping domestic violence.
Reconfiguring a lot
Reconfiguring a lot under the *Land Title Act 1994*, where the plan of subdivision necessary for the reconfiguration – ▪ is a building format plan of subdivision that does not subdivide land on or below the surface of the land; or ▪ is for the amalgamation of two or more lots; or ▪ is for incorporation, under the *Body Corporate and Community Management Act 1997*, section 41, of a lot with common property for a community titles scheme; or ▪ is for the conversion, under the *Body Corporate and Community Management Act 1997*, section 43, of lessee common property within the meaning of that Act to a lot in a community titles scheme; or ▪ is in relation to the acquisition, including by agreement, under the *Acquisition of Land Act 1967* or otherwise, or land by – i. A constructing authority, as defined under that Act, for a purpose set out in paragraph (a) of the schedule to that Act; or ii. An authorised electricity entity; or ▪ is in relation to land held by the State, or a statutory body representing the State and the land is being subdivided for a purpose set out in the *Acquisition of Land Act 1967*, schedule, paragraph (a) whether or not the land relates to an acquisition; or ▪ is for the reconfiguration of a lot comprising strategic port land as defined in the *Transport Infrastructure Act 1994*; or ▪ is for the *Transport Infrastructure Act 1994*, section 240; or ▪ is in relation to the acquisition of land for a water infrastructure facility
Subdivision involving road widening and truncations required as a condition of development approval
Operational work
Clearing of vegetation other than marine plants
Operational work or plumbing or drainage work (including maintenance and repair work) if the work is carried out by or on behalf of a public sector entity authorised under a State law to carry out the work.
Erecting no more than one satellite dish on a premises, where the satellite dish has no dimension greater than 1.8 metres.

Filling or excavation where:

a. to a depth of one vertical metre or less from ground level on land to that is not referred to in Brisbane City Plan's Acid Sulphate Soil Code, Wetland Code and/or Waterway Code and where the site is not listed on the Contaminated Land Register or Environmental Management Register

OR

b. top dressing to a depth of less than 100 vertical millimetres from ground level on land that is not referred to in Brisbane City Plan's Wetland Code and/or Waterway Code.

All aspects of development

All aspects of development a person is directed to carry out under a notice, order or direction made under a State law.

All aspects of development including maintenance that are incidental to and necessarily associated with a Park.

All aspects of development including maintenance that are incidental to and necessarily associated with the RNA show activities.

Development for a utility installation, being an undertaking for the supply of water, hydraulic power, electricity or gas, of any development required for the purpose of that undertaking by way of:

(a) development of any description at or below the surface of the ground

(b) the installation of any plant inside a building or the installation or erection within the premises of a generating station of any plant or other structures or erections required in connection with the station

(c) the installation or erection of an electricity distribution or supply network (and any components of such a network) which operates at voltages up to and including 33 kilovolts, excluding new substations

(d) the installation or erection of a new electrical transmission line on land on which such a line has already been erected and which is identified as a future line on Plan No: A4H303666- Powerlink Electricity Network and Plan No: 7775-A4/A-Energex 110kV Feeder Network

(e) the augmentation of a Powerlink substation identified on Plan No: A4-H-303666- Powerlink Electricity Network and of any Energex substation existing as at the date this clause took effect

(f) the placing of pipes above the surface of the ground for the supply of water, the installation in a water distribution system of booster stations and meter or switchgear houses - any other development not specifically referred to above except where it involves erection of new buildings or reconstruction or alteration of existing buildings that would materially affect their design or external appearance

(g) any other development not specifically referred to above except where it involves erection of new buildings or reconstruction or alteration of existing buildings that would materially affect their design or external appearance

This exempt does not apply for a utility installation, where it involves:

i. the erection of new buildings

ii. power generation plant where burning 100kg or more of fuel an hour

iii. reconstruction or alteration of existing buildings that would materially affect their design or external appearance

iv. waste handling, treatment and disposal facility

Development involving the construction, maintenance or operation of roads, busways and rail transport infrastructure, and things associated with roads, busways and rail transport

infrastructure by or on behalf of or under contract with the ULDA, Brisbane City Council or the Queensland Government.

Things associated with roads, busways and rail transport infrastructure include but are not limited to:

- Activities undertaken for road construction
- Traffic signs and controls
- Depots
- Road access works
- Road construction site buildings
- Drainage works
- Ventilation facilities, including exhaust fans and outlets
- Rest area facilities and landscaping
- Parking areas
- Public passenger transport infrastructure
- Control buildings
- Toll plazas
- Rail transport infrastructure

Schedule 2

Definitions

Active frontage is as defined in the *Brisbane City Plan 2000*

Affordable housing refers to housing which can be reasonably afforded by low to moderate income households (including rental and home ownership).

Articulation is as defined in the *Brisbane City Plan 2000*

Authority refers to the Urban Land Development Authority

Balance area refers to land not included within a precinct

Building work is as defined in the *Urban Land Development Authority Act 2007*

Busway is as defined within the *Transport Infrastructure Act 1994*

Centre activities is as defined in the *Brisbane City Plan 2000*

Child care facility is as defined in the *Brisbane City Plan 2000*

Club is as defined in the *Brisbane City Plan 2000*

Community facility is as defined in the *Brisbane City Plan 2000*

Contamination is as defined in the *Environmental Protection Act 1994*

Convention centre is as defined in the *Brisbane City Plan 2000*

Development is as defined in the *Urban Land Development Authority Act 2007*

Development scheme is as defined in the *Urban Land Development Authority Act 2007*

Display Dwelling is as defined in the *Brisbane City Plan 2000*

Education purposes is as defined in the *Brisbane City Plan 2000*

Environmentally Relevant Activity as defined in Schedule 1 of the *Environmental Protection Regulation* made under the *Environmental Protection Act 1994*

Estate sales office is as defined in the *Brisbane City Plan 2000*

Filling or excavation is as defined in the *Brisbane City Plan 2000*

Gross Floor Area is as defined in the Brisbane City Plan 2000

GFA means Gross Floor Area

Ground level is as defined in the *Brisbane City Plan 2000*

Ground storey is as defined in the *Brisbane City Plan 2000*

Habitable Room is as defined in the *Building Code of Australia 1996*

Heritage place refers to a premises identified in the Queensland Heritage Register

Hotel is as defined in the *Brisbane City Plan 2000*

Indoor sport and recreation is as defined in the *Brisbane City Plan 2000*

Interim land use plan is as defined in the *Urban Land Development Authority Act 2007*

Main street refers to a commercial street with high levels of pedestrian activity and amenity

Major educational and research facility refers to use of premises for teaching and research e.g. university or research development

Medical centre is as defined in the *Brisbane City Plan 2000*

Minor building work is as defined in the *Brisbane City Plan 2000*

Minor demolition work is as defined in the *Brisbane City Plan 2000*

Multi-unit dwelling is as defined in the *Brisbane City Plan 2000*

Office is as defined in the *Brisbane City Plan 2000*

Operational works is as defined is as defined in the *Urban Land Development Authority Act 2007*

Outdoor sport and recreation is as defined in the *Brisbane City Plan 2000*

Park is as defined in the *Brisbane City Plan 2000*

Precinct refers to an area of land within the UDA on which certain development is assessable under this ILUP

Public Carpark refers to a use of premises (which may include the manual washing, cleaning and detailing of vehicles) for the parking of motor vehicles where not ancillary to another use

Public passenger transport infrastructure is as defined within the *Transport Planning and Coordination Act 1994*

Radio or television station refers to a use of premises for the transmitting and/or receiving of radio signals or use as a broadcasting station, a television station, a repeater station or a translator station as referred to in the *Commonwealth Broadcasting and Television Act 1942*

Rail transport infrastructure is as defined within the *Transport Infrastructure Act 1994*

Reconfiguring a lot is as defined in the *Urban Land Development Authority Act 2007*

Restaurant is as defined in the *Brisbane City Plan 2000*

Road is as defined in the *Urban Land Development Authority Act 2007*

Satellite Dish is as defined in the Brisbane City Plan 2000

Shop is as defined in the *Brisbane City Plan 2000*

Short-term accommodation is as defined in the *Brisbane City Plan 2000*

Storey is as defined in the *Brisbane City Plan 2000*

UDA refers to the declared urban development area

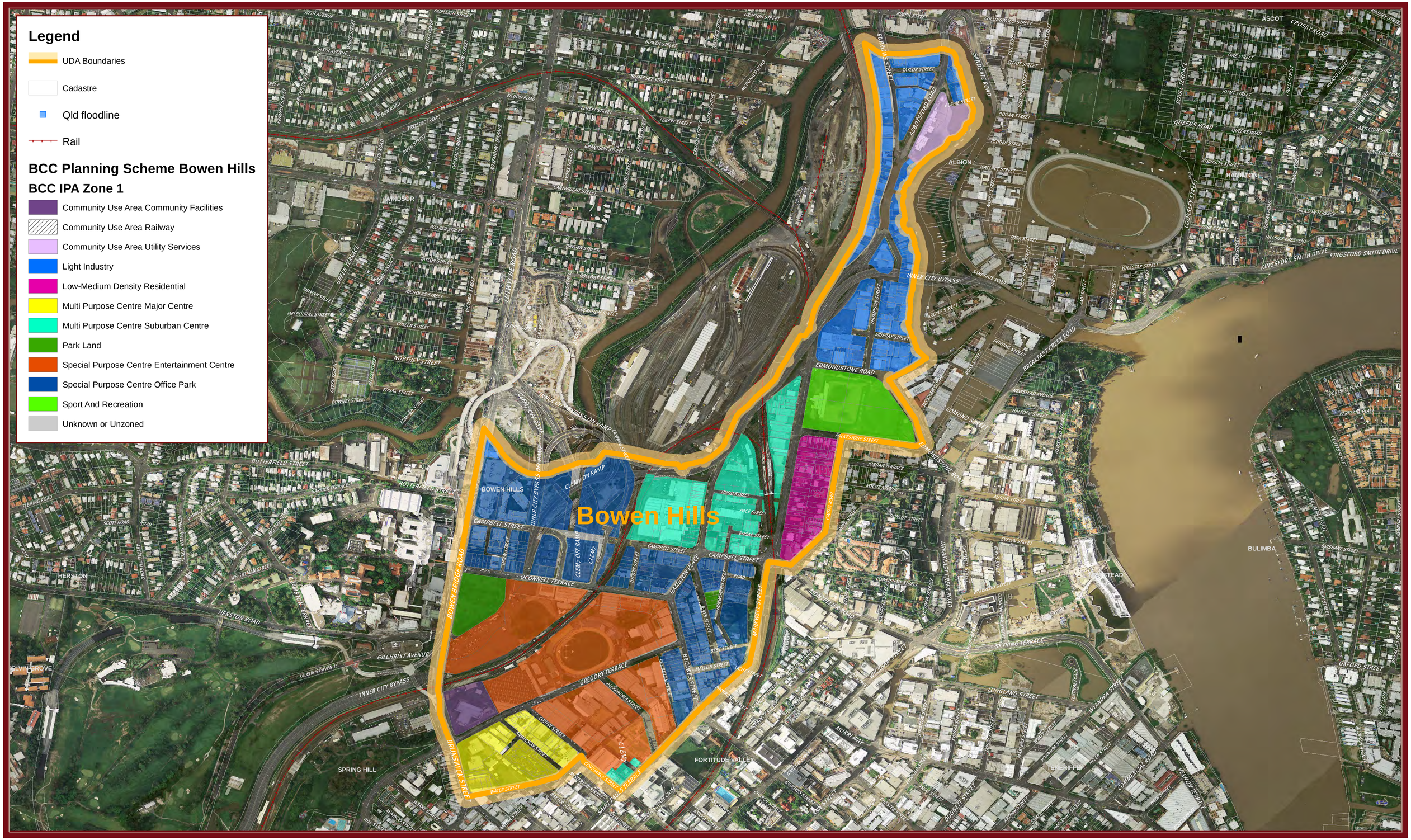
UDA Assessable Development means UDA Assessable Development – Permissible and UDA Assessable Development – Prohibited

ULDA refers to the Urban Land Development Authority

Utility installation is as defined in the *Brisbane City Plan 2000*

urban land development authority

Brisbane City Council Planning Scheme Zonings prior to UDA Determination



Working Draft not Commonwealth, State or Local Government Policy

0 37.575 150 225 300 375

Metres

Map Produced by: Department of Infrastructure and Planning
Spatial Services 2011
Cadastre: July 2011
Flood Extent: DERM web service 2011
Imagery: DERM Flood Imagery Service 2011
2009 SPOT satellite
DERM Aerial photography

Queensland Government
Department of Infrastructure and Planning

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design level noise criteria to achieve average maximum sound level (10pm - 6 am) not greater than 50 decibels (db).

(iii) Where determined necessary by the ULDA, an acoustic report will be required to evaluate and address potential noise impacts and recommend appropriate noise mitigation measures.

(m) **Reconfiguration of a lot - lot layout**

(i) Lots have an appropriate area and dimensions for the siting and construction of the buildings, the provision of outdoor space, convenient vehicle access and parking..

(ii) Lot frontages address streets and open spaces to facilitate personal and property security, surveillance of footpaths and public open space, and deter crime and vandalism.

(iii) Lot size and dimensions must enable buildings to be sited to:

(a) protect natural or cultural features;

(b) address site constraints including slope, soil erosion, flooding and drainage;

(c) retain special features such as trees and views;

(d) ensure that lots are not subject to unreasonable risk, hazard, noise impacts or air quality impacts;

(e) ensure reasonable buffers between existing or potential incompatible land uses; and

(f) maximises solar orientation benefits to assist energy rating targets.

(n) **Erosion and sediment control**

(i) Development must incorporate adequate erosion and sediment control.

(ii) Submit an erosion and sediment control plan to set out the required measures for all stages of development, including at the time of earthworks, road works and building work.

(o) **Flood immunity**

(i) Habitable rooms and non-habitable areas have acceptable levels of flood immunity.

(p) **Stormwater management**

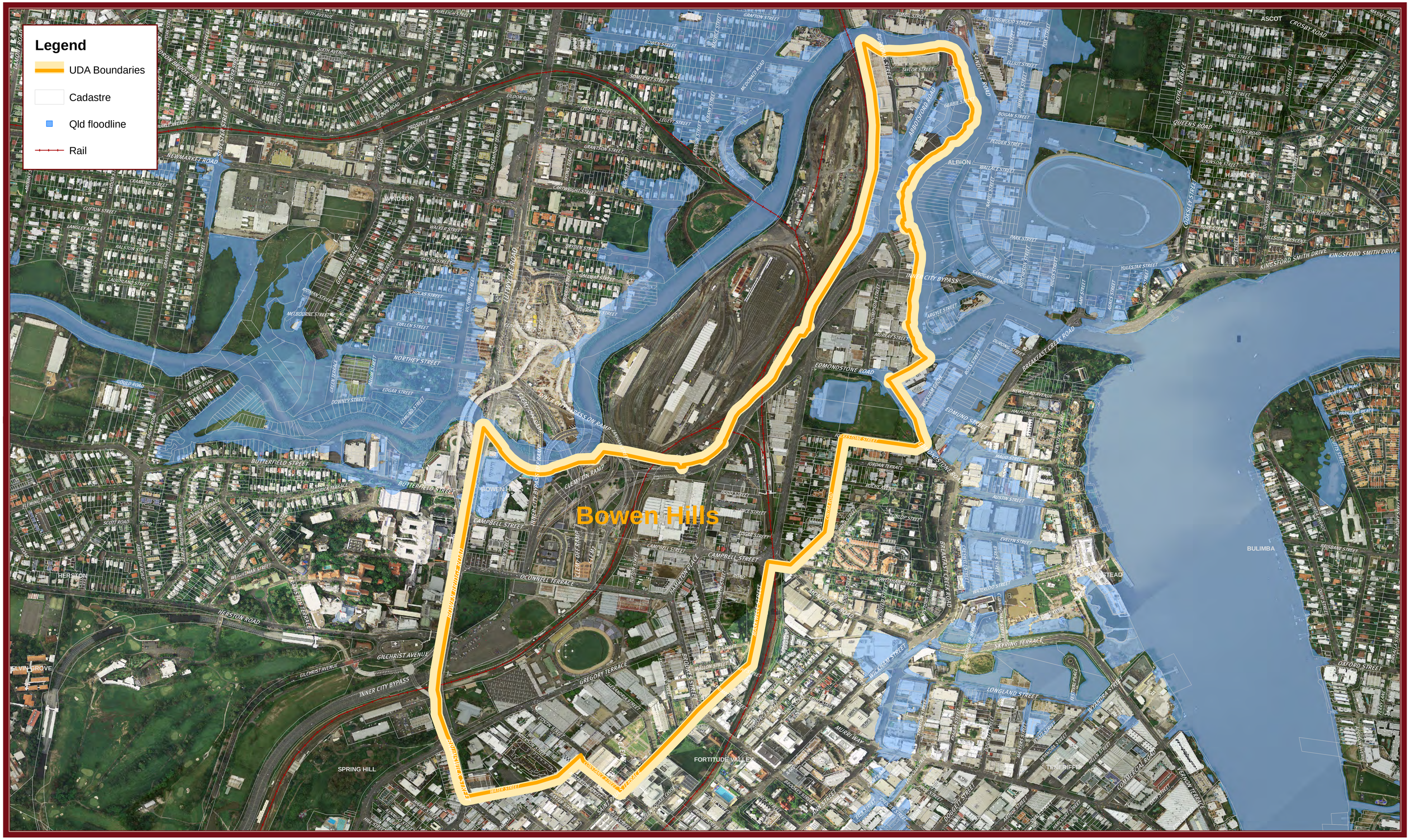
(i) A Site Based Stormwater Management Plan (SBSMP) must be prepared for all major and minor stormwater management measures.

(q) **Acid Sulphate Soils**

urban land development authority

UDA Flood Extent: Bowen Hills

Mapped and affected



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Queensland Government
Department of Infrastructure and Planning

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Northshore

Disclaimer

The information shown on this map does not represent Commonwealth, State or Local Government policy. The Department of Infrastructure and Planning does not guarantee or make any representations as to its accuracy or completeness, nor will they accept any responsibility for any loss or damage arising from its use.

Source
BCC (Aerial 2005), OUM

Version
October 2007

Working Draft Only

Not Commonwealth, State or Local Government Policy

Key
- Parcels, May 2007
- Northshore Precinct Local Plan boundary
- Government owned land
- Possible Urban Land Development Authority boundary

0 0.05 0.1 0.2 0.3 0.4
Kilometres

Produced by the Office of Urban Management,
Department of Infrastructure adn Planning

Queensland Government
Department of Infrastructure and Planning

Northshore
Neighbourhood Plan

1. Introduction

This Neighbourhood Plan contains specific additional local planning requirements. Where it conflicts with the requirements of the City Plan, this Neighbourhood Plan prevails. In using this Neighbourhood Plan, reference should also be made to Section 1.1 – Using a Local Plan at the front of this chapter.

For the purpose of Chapter 3, section 4.1 of the City Plan, this Neighbourhood Plan is taken to be a structure plan and no further structure plan is required before development can occur.

2. Development Principles

The Northshore urban redevelopment will support a healthy and diverse community with access to a variety of housing types, open space, a thriving Urban Centre, community facilities and choice in transport and mobility. Map A illustrates the location of various land uses and the major road system within the Neighbourhood Plan area.

2.1 The Northshore urban form will be based on a high-density commercial and residential centre at Barcham Street where a number of public transport options will be provided to serve the whole Neighbourhood Plan area. Higher-density residential land uses will occur around the Barcham Street Urban Centre and along the river. Non-residential uses will buffer existing industry or provide suitable land uses at Kingsford Smith Drive.

2.2 The western end of Northshore will contain a mix of residential accommodation (including short term accommodation) and offices. Retail uses supporting the Brisbane Cruise Ship Terminal (including entertainment uses, restaurants and convenience retailing) are envisaged in this part of Northshore as part of a mixed use area serviced by public transport. The scale, intensity and breadth of non residential uses in this part of Northshore will maintain the primacy of the Barcham Street centre.

2.3 Northshore will provide housing choice and diversity through a mix of densities, types, designs and affordability to cater for a range of lifestyles, incomes and lifecycle needs. Low income affordable housing will be provided in areas close to and including the Urban Centre.

2.4 High residential and public amenity will be achieved by managing separation distances between higher and lower density residential and relating building setbacks from roads and public spaces to building height.

2.5 The design, siting and layout of development will ensure that buildings address the street in a traditional manner. Car parking areas will be located within basements, integrated within buildings or located behind active street frontages.

2.6 The Barcham Street Urban Centre will accommodate a range and scale of retail, commercial, office and community uses sufficient to cater for the convenience needs of the Northshore business and residential community. It will be centrally located to maximise pedestrian accessibility and connectivity to the surrounding residential areas in Northshore, with a traditional main street, high quality public realm and integration with public transport. Other retail, commercial or office proposals will maintain the primacy of the Barcham Street Centre for the Northshore area.

2.7 Northshore will be an inclusive community with a strong sense of local identity established by a range of cultural, service, open space and recreational facilities, and social infrastructure to be established progressively as the area develops and based on community need. With a strong connection to the Brisbane River, Northshore will be a memorable place incorporating modern architecture and recognition of the area's historic maritime uses. Views to and from the river will be preserved and enhanced.

2.8 An active, safe and interesting river edge will be established through the design, siting and layout of development including appropriate vehicle, pedestrian and cycleway access, maintaining views to the river, removal of the existing wharfs and provision by developers of a high quality public riverwalk along the entire river frontage. Refer to Figures b and c for further detail.

2.9 The road network will support road based public transport and dedicated pedestrian and bicycle paths as illustrated on Map C, with stops provided within a radius of 400 metres from new development. Development will provide appropriate connections within and external to Northshore, including linkages to Council's Regional Bikeway system. The opportunity to integrate Northshore to the existing heavy rail system via the Northshore –Doomben Link is to be preserved .

2.10 An interconnected open space network catering for the recreational needs of all residents will be provided. The open space network will include a district level park with co-located community facilities, as well as a range of other parks generally within 400 metres of all future residents. MacArthur Avenue will be established as a sub-tropical tree-lined boulevard with part of the road reserve being developed as a linear park. Land intended for public open space or recreation purposes shall first be removed from the contaminated land register.

2.11 Development will be designed, built and managed to incorporate best practice measures, which:

- maximise water conservation and reuse;
- minimise energy use and waste production;
- incorporate sub-tropical design principles;

- incorporate water quality management so that no adverse impacts occur to receiving environments;
- incorporates crime prevention through environmental design (CPTED);
- incorporate large shade trees into private and public development.

2.12 Some areas in Northshore are close to existing industries producing a range of external impacts. These areas are included in the Emerging Community Area in the City Plan and are identified within Residential Investigation Areas on Map D. While these areas are potentially well suited for the types of uses envisaged by this Neighbourhood Plan, issues of air quality, odour impacts and risk need to be further investigated and quantified before development can occur. Investigations may include plume mapping, and the suitability of different building heights for different kinds of development.

2.13 Other areas within Northshore will continue to be used for port or industrial uses in the short to medium term. New residential development will therefore be staged with appropriate buffer distances maintained to protect these ongoing operations and provide appropriate levels of residential amenity. Only where it can be demonstrated that public health and safety and high levels of residential amenity can be achieved, or these existing port and industrial uses are decommissioned or relocated, can development in accordance with this Neighbourhood Plan proceed.

2.14 Progressive development of Northshore Neighbourhood Plan area will require upgrading of public transport and road infrastructure to service new residents and businesses. Accordingly each stage of development will require upgrading of road and public transport infrastructure. Development will only receive approval where no net loss of capacity to the road network occurs.

3 Precinct intents

Map A – Northshore Precinct Map indicates the precincts of this Neighbourhood Plan. *Maps B(a) to B(d) – Northshore Precincts* indicates the location of each precinct.

3.1 Precinct 1 – Urban Centre Precinct

3.1.1 The Urban Centre Precinct will provide a vibrant place for people to shop, work and socialise. It is the central location for community, business and commercial uses in Northshore and will be developed as the dominant Multi-Purpose Centre serving the needs of the Northshore community. It will function as a Suburban Centre and will be developed at a greater scale and intensity than the extent of other non-residential uses both within and adjacent to Northshore.

The Urban Centre Precinct will contain a neighbourhood sized supermarket, convenience retailing, restaurants, offices and small scale commercial and community support uses up to 10 storeys. Residential uses including low income affordable housing will be encouraged at higher levels of buildings.

3.1.2 Barcham Street will be developed as a main street characterised by contemporary architecture, minimal building setbacks, active street frontages, continuous awnings for shelter and shade and high quality landscaping, paving, street furniture and public art. Buildings along Barcham Street will comprise smaller shop frontages to provide retail choice and visual interest. Refer to figure a for further detail.

Development on the northern frontage near the entrance to the Urban Centre will feature high quality and contemporary architecture to function as a landmark.

3.1.3 The Urban Centre will integrate land use and public transport to facilitate easy access for all residents in Northshore. High-quality, safe and convenient pedestrian connections to the Mixed Use precinct will be provided. A detailed centre concept plan will be required prior to the development commencing, to ensure integration of residential, community and commercial land uses, public transport and open space.

3.1.4 The Urban Centre will provide community uses linked to the district-sized park located to the north of the precinct. Based on a future community needs assessment, community uses and facilities may include a library, community hall/centre, childcare facilities and other similar uses.

3.2 Precinct 2 – Mixed Use

3.2.1 The Mixed Use Precinct is intended to provide a mix of residential (both short and long term) and office development. Some retail uses will support the mixed use precinct such as restaurants, cafes, taverns, shops, indoor sport and recreation and convenience retailing to serve residents or workforce in the precinct.

The Mixed Use Precinct will be secondary to the Barcham Street Centre in relation to the scale and breadth of non residential uses. The Mixed Use Precinct is divided into three sub precincts where different outcomes are expected for each discrete mixed use area as follows:

a/ The Waterfront East Sub Precinct;
b/ The Waterfront West Sub Precinct; and
c/ The Kingsford Smith Drive West Sub Precinct

3.2.2 The Waterfront East Sub Precinct will provide high-density residential development with appropriately located non-residential uses at the ground level of buildings. Non-residential uses may include restaurants, cafes, taverns, shops, indoor sport and recreation and other leisure and recreation type uses. Building and landscape design will be of a sub-tropical character featuring awnings, movable shutters, partially enclosed winter gardens and views to the Brisbane River.

An integrated bus interchange, pedestrian and cycle network will form part of the Urban Centre within the Waterfront East Sub Precinct. CityCat services may also be provided in this locality in the future.

3.2.3. Development within the Waterfront East Sub Precinct will provide a high level of public amenity at ground level by maintaining appropriate separation distances between buildings, relating building setbacks to building height and providing quality landscaping. The precinct will be characterised by a signature building of up to 20 storeys that will function as a landmark because of its architectural excellence. Car parking areas will not present to any frontage within this sub precinct.

3.24 The Waterfront West Sub Precinct contains the Brisbane Cruise Ship Terminal (including entertainment uses, restaurants and specialty retailing). New development will accentuate this location as a destination point for residents and visitors of Brisbane, and link with other parts of Northshore.

A mix of residential (short and long term) and office space is intended for this sub precinct. Public transport integration will occur in this part of Northshore to support people travelling to and from this mixed use area.

Building height will reflect existing and approved development. A detailed centre structure plan will be required to demonstrate visual and pedestrian connectivity with adjoining precincts and sub precincts particularly the Kingsford Smith Drive West Sub Precinct.

3.25 The Kingsford Smith Drive West Sub Precinct will contain a mix of office and residential uses. Ground floor retail may be supported where it serves the daily convenience needs of workers or residents in that development. Some showroom or display and sales (cars) uses may be supported at the ground floor.

Development will be lower rise (generally six storeys) on Kingsford Smith Drive and higher towards the River. A detailed centre structure plan will be required to demonstrate visual and pedestrian connectivity with adjoining precincts and sub precincts in particular the Waterfront West sub Precinct. This sub precinct will provide integrated public transport solutions for this part of Northshore through the Hercules Street link.

3.3 Precinct 3 – Waterfront Residential

3.3.1 The Waterfront Residential Precinct will provide high-density residential development in a high-quality sub-tropical setting. Development will contribute to a transition in building height to achieve an overall 'tapering' or stepping effect' of buildings in the precinct.

3.3.2 Publicly accessible cul-de-sacs from MacArthur Avenue to the Brisbane River will be provided to assist with building separation, maintain sightlines to the Brisbane River at ground level and provide public access to the river.

3.3.3 Residential development fronting MacArthur Avenue and the riverwalk will achieve high amenity, safe and accessible public spaces and residential privacy through design outcomes including low-rise development or a lower rise podium, separation distances between buildings and ensuring car parking is located within basements, integrated within buildings or located behind active street frontages.

3.3.4 The ability to work from home will be encouraged through the location of small scaled offices at the ground level of buildings fronting McArthur Avenue.

..

3.3.5 Development adjacent to Portside Wharf and the Brisbane Cruise Ship Terminal (parcel WR7) will provide for tie up of cruise vessels by retaining the existing wharf or providing other maritime structures within the site's frontage. Development will also ensure urban design issues such as pedestrian and cycleway connections, public access, site security and grade differences are resolved. Some appropriately scaled non-residential uses adjacent to Portside Wharf will assist in mitigating potential amenity impacts from the cruise ship terminal operations.

3.4 Precinct 4 – Variable Density Residential

3.4.1 The Variable-Density Residential Precinct will provide varying density residential development including small lot, detached and attached terrace style housing forms and multi unit dwellings up to 5 storeys. Refer to Figure d for further detail. Low income affordable housing will be encouraged in areas close to the Urban Centre Precinct.

3.4.2 Development will protect and rehabilitate urban habitat for flora and fauna with a particular focus on enhancing the existing mangrove community along the northern and eastern boundaries of the Neighbourhood Plan area.

3.4.3 Small-scale convenience shopping facilities will be provided within the eastern portion of the precinct.

3.4.4 A limited range of non-residential uses may be provided south of Curtin Avenue to assist in mitigating potential amenity impacts from the General Industry Area located north of Curtin Avenue. Refer to Map B(c) for details. These non residential uses will not themselves be susceptible to potential amenity impacts. Adaptable buildings that are capable of reversion to residential uses once amenity impacts have ceased will be considered highly. Otherwise residential uses in this area will be supported only where it can be shown that potential amenity impacts can be satisfactorily addressed.

3.4.5 The ability to work from home will be encouraged through the location of small scaled offices at the ground level of buildings fronting McArthur Avenue.

3.4.6 There is some opportunity for non-residential uses fronting Kingsford Smith Drive east of Remora Road. Potentially suitable uses may include short term accommodation, offices, commercial services and retail showrooms. Areas of higher risk from industrial uses may require low population uses. Higher buildings may also be considered appropriate in this location where buildings maintain amenity for pedestrians at street level and important view corridors.

3.4.7 A district sports park will be provided to the north of the Urban Centre and subject to a community needs assessment, may include co-located community facilities. Any road dissecting the park will be designed to reduce impacts on usability and functionality and will accommodate suitable pedestrian and vehicular connections to the two parts of the park. New residential development in close proximity to the park will be adequately buffered from noise and lighting impacts to enable the provision of a range of sporting, cultural, social or community services.

3.5 Precinct 5 – Service Industry

3.5.1 The Service Industry Precinct will provide for uses that support and are allied to the existing industrial uses of the area. This precinct will also function as a buffer between the rail line, existing industrial uses and future development in the Variable-Density Residential Precinct. Development in this precinct must not compromise the future residential development in the adjoining Variable-Density Residential Precinct.

3.5.2 The form of development will include high quality industrial and showroom uses that may benefit from being close to existing industrial uses, infill residential uses and regional transport infrastructure.

4. Level of assessment

The following tables contain exceptions to the level of assessment, overriding the levels of assessment in Chapter 3.

A preliminary approval may change the level of assessment identified in these tables.

The trigger for assessment in the level of assessment table is material change of use and/or building work (associated with a use or structure specified in the level of assessment table) unless otherwise specified.

4.1 Precinct 1 – Urban Centre Precinct

Self Assessment	Applicable Codes
1. Centre Activities (except Cinema, Convention Centre, and hotel or multi unit dwelling) where: ▪ complying with the Acceptable Solutions in the Centre Amenity and Performance Code; ▪ not involving building work; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code
Code Assessment	**Applicable Codes**
1. Centre Activities (except Cinema, Convention Centre, and hotel or multi unit dwelling) where: ▪ involving building work; ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figure e; ▪ where not located in a Residential Investigation Area; and ▪ where not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code

Impact Assessment Generally Appropriate	Applicable Codes
1. Cinema and Convention Centre where ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figure e; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional. 2. Multi Unit Dwelling, Single Unit Dwelling or Hotel where ▪ complying with the Acceptable Solutions for GFA and building height in Table 1; ▪ not located within 150 metres of an existing industrial use identified in Chapter 3, Industrial Areas – Schedule 1 or Schedule 2 of the City Plan; or ▪ not located within the Residential Investigation Area identified on Map D; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code Centre Amenity and Performance Code Centre Design Code Residential Design – High Density Code

4.2 Precinct 2 – Mixed Use

4.2.1 Waterfront East Sub Precinct

Self Assessment	Applicable Codes
1. Centre Activities (except Cinema, Convention Centre, and hotel or multi unit dwelling) where: ▪ complying with the Acceptable Solutions in the Centre Amenity and Performance Code; ▪ not involving building work; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code
Code Assessment	Applicable Codes
1. Centre Activities (except Cinema, Convention Centre, and hotel or multi unit dwelling) where: ▪ involving building work; ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1; and Figure f; ▪ where involving a shop, individual tenancies do not exceed 500m² GFA; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code
Impact Assessment Generally Appropriate	Applicable Codes
1. Cinema and convention centre where: ▪ complying with the Acceptable Solutions for GFA,	For all development: Northshore Local Area Code Centre Amenity and Performance Code

building setbacks and height in Table 1 and Figure f; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	Centre Design Code
2. Multi Unit Dwelling, House or Single Unit Dwelling where: ▪ complying with the Acceptable Solutions for GFA and height in Table 1; ▪ not located within 150 metres of an existing industrial use identified in Chapter 3, Industrial Areas – Schedule 1 or Schedule 2 of the City Plan; ▪ not located within the Residential Investigation Area identified on Map D; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	Residential Design – High Density Code

4.2.2 Waterfront West Sub Precinct

Impact Assessment Generally Appropriate	Applicable Codes
1. Centre Activities (cinema, convention centre, display dwelling, hotel, indoor sport and recreation, medical centre, restaurant, shop, short term accommodation) where: ▪ complying with the Acceptable Solutions for GFA and height in Table 1; ▪ not located within a risk buffer identified on Map E, unless it can be demonstrated that the uses/activities have permanently ceased as certified by a suitably qualified professional; and ▪ not within a Residential Investigation Area identified on Map D	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code
2. Multi Unit Dwelling, House or Single Unit Dwelling where: ▪ complying with the Acceptable Solutions for GFA and height in Table 1; ▪ not located within 150 metres of an existing industrial use identified in Chapter 3, Industrial Areas – Schedule 1 or Schedule 2 of the City Plan; ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional; and ▪ not located within the Residential Investigation Area identified on Map D	Residential Design – High Density Code

4.2.4 Kingsford Smith Drive West Sub Precinct

Impact Assessment Generally Appropriate	Applicable Codes
1. Centre Activities (child care facility, display and sales activities, display dwelling, education purposes, indoor sport and recreation, medical centre, multi unit dwelling, office, radio or television station, restaurant, shop, short term accommodation) where:	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design Code

▪ complying with the Acceptable Solutions for GFA and height in Table 1; ▪ not located within a risk buffer identified on Map E, unless it can be demonstrated that the uses/activities have permanently ceased as certified by a suitably qualified professional; and ▪ not within a Residential Investigation Area identified on Map D. 2. Multi Unit Dwelling, House or Single Unit Dwelling where: ▪ complying with the Acceptable Solutions for GFA and height in Table 1; ▪ not located within 150 metres of an existing industrial use identified in Chapter 3, Industrial Areas – Schedule 1 or Schedule 2 of the City Plan; ▪ not located within the Residential Investigation Area identified on Map D; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional .	Residential Design – High Density Code

4.3 Precinct 3 – Waterfront Residential

Code Assessment	Applicable Codes
1. Centre Activities being an Office, Restaurant, Shop, and Short Term Accommodation where: ▪ located on parcel WR7 shown on Map B(b); ▪ complying with the Acceptable Solutions for GFA, and height in Table 1; ▪ where involving a shop, individual tenancies do not exceed 500m² GFA; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Centre Amenity and Performance Code Centre Design code Centre Amenity and Performance Code Centre Design code
2. Office or Restaurant where: ▪ involving building work; ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figures g to k; ▪ where less than 250m² of GFA and located on the ground level of any building with a frontage to MacArthur Avenue; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	Residential Design - High Density Code Subdivision Code
3. Multi Unit Dwelling where: ▪ complying with the Acceptable solutions for GFA, building setbacks and height in Table 1and Figures g to k; ▪ not located within 150 metres of an existing industrial use identified in Chapter 3, Industrial	

Areas - Schedule 1 and Schedule 2 of the City Plan; ▪ not included in a Risk Buffer in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional; and ▪ not located in a Residential Investigation Area in Map D.	
Impact Assessment	Applicable Codes
Generally Appropriate	
1. Multi Unit Dwelling where: ▪ not complying with the Acceptable solutions for GFA, building setbacks and height in Table 1and Figures g to k; or ▪ not located within 150 metres of an existing industrial use identified in Chapter 3, Industrial Areas - Schedule 1 and Schedule 2 of the City Plan; or ▪ not located within a risk buffer identified on Map E, unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional; or ▪ not located in a Residential Investigation Area in Map D. 2. House or Single Unit Dwelling where ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Residential Design – High Density Code Subdivision Code

4.4 Precinct 4 – Variable Density Residential

Self Assessment	Applicable Codes
House where: ▪ not exceeding a height of 12 metres and 3 storeys; and ▪ complying with the Acceptable Solutions of the House Code except A2; and ▪ located in excess of 150 metres from an existing industrial use identified in Chapter 3, Industrial Areas - Schedule 1 or Schedule 2; and ▪ not located within the ANEF 20 Contour for the Brisbane Airport ; and ▪ not located within a risk buffer identified on Map E, unless it can be demonstrated that the uses / activities have permanently ceased as certified by a suitably qualified professional; and ▪ not located within the Residential Investigation Area identified on Map D; and ▪ located on a lot less than 3,000m²	For all development: Northshore Local Area Code House Code and Residential Design – Small Lot Code
Code Assessment	Applicable Codes

1. Home Business, where: ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	For all development: Northshore Local Area Code Home Business Code Centre Amenity and Performance Code Centre Design Code
2. Office or Restaurant where: ▪ involving building work; ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figures l, m and n; ▪ where less than 250m² of GFA and located on the ground level of any Multi Unit Dwelling building with a frontage to MacArthur Avenue; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional..	House Code and Residential Design – Small Lot Code Residential Design-Medium Density Code or House Code
3. House where: ▪ on a lot less than 450m² or with an average width less than 15m, or on a rear lot less than 600m² (excluding access way); ▪ building setbacks are in accordance with Figure p; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional..	
3. Multi Unit Dwelling, Single Unit Dwelling or House where: ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figures l, m and n; and ▪ located in excess of 150 metres from an existing industrial use identified in Chapter 3, Industrial Area – Schedule 1 or Schedule 2; and ▪ not located within a risk buffer identified on Map E, unless it can be demonstrated that the uses / activities have permanently ceased as certified by a suitably qualified professional; and ▪ not located on a site within the ANEF 20 Contour for the Brisbane Airport; and ▪ not located within the Residential Investigation Area identified on Map D .	Short Term Accommodation Code Centre Amenity and Performance Code Centre Design Code
4. Short Term Accommodation where: ▪ on land with a frontage to Kingsford Smith Drive; and ▪ not located within a risk buffer identified on Map E, unless it can be demonstrated that the uses / activities have permanently ceased as certified by a suitably qualified professional; ▪ not located within the Residential Investigation Area identified on Map D.	
5. Uses where located in the area shown as '*Preferred location for non-residential uses'* on Map B(c) involving; ▪ Club; or ▪ Community Facility; or	

▪ Education Purpose; or ▪ Garden Centre; or ▪ Health Care Purposes; or ▪ Hotel; or ▪ Medical Centre; or ▪ Office; or ▪ Restaurant; or ▪ Retail showroom; or ▪ Short Term Accommodation; or ▪ Youth Club; and ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figures l, m and n; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.. 6. Centre Activities being an Office, Restaurant, Shop, Short Term Accommodation and Multi Unit Dwelling where: ▪ located on parcel VDR2 shown on Map B(b); ▪ complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1 and Figures l, m and n; ▪ where involving a shop, individual tenancies do not exceed 500m² GFA; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional. 7. Reconfiguring a Lot where any resulting lot is 400m² or less but no less than 250m², not located in a Residential Investigation Area, or not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional.	Centre Amenity and Performance Code Centre Design Code Subdivision Code
Impact Assessment Generally Appropriate	Applicable Codes
1. Multi Unit Dwelling or Single Unit Dwelling where: ▪ not complying with the Acceptable Solutions for GFA, building setbacks and height in Table 1and Figures l, m or n; ▪ not located within 150 metres from an existing industrial use identified in Chapter 3, Industrial Area – Schedule 1 or Schedule 2; ▪ not located in a Residential Investigation Area; and ▪ not located in a Risk Buffer Area identified in Map E unless it can be demonstrated that the uses/ activities have permanently ceased as certified by a suitably qualified professional..	For all development: Northshore Local Area Code Residential Design-Medium Density Code Residential Design-Medium Density Code

5 Northshore Hamilton Neighbourhood Plan Code

This Code provides additional and/or alternative Acceptable Solutions to the Codes in Chapter 5 and takes precedence over the Codes in Chapter 5.

Where an Acceptable Solution or the corresponding Performance Criterion in this Neighbourhood Plan Code directly varies from an Acceptable Solution and Performance Criterion in the Neighbourhood Plan Code in Chapter 5, the Acceptable Solution and Performance Criterion in this Neighbourhood Plan Code takes precedence. All remaining Acceptable Solutions and Performance Criteria from applicable or relevant generic Codes in Chapter 5 will continue to apply.

The purpose of this Code is to ensure that development in the Neighbourhood Plan area is consistent with the Development principles and Precinct intents of this Neighbourhood Plan.

5.1 General

Performance Criteria	Acceptable Solution
Gross Floor area and Height	
P1 Building bulk and scale must be consistent with the character and intent stated for each precinct Higher density development will be sensitively located toward the river and within the Urban Centre to take full advantage of this unique location and access to public transport connections	A1 The maximum gross floor area complies with Table 1 - *Maximum gross floor area and storeys*
P2 Northshore and in particular the Urban Centre and Mixed Use Precincts must be easily identifiable within the region The Waterfront Residential precinct must provide a 'stepped' building height profile starting from its most easterly and westerly ends culminating at a landmark building located within the Waterfront Mixed-Use precinct	A2.1 The height difference between buildings on adjoining parcels in the Waterfront Residential Precinct is at least 3 metres A2.2 The maximum building height does not exceed building heights listed in *Table 1 - Maximum gross floor area and storeys*
Building setbacks and separation	
P3 Setbacks to streets and the riverwalk are scaled according to building height to create pedestrian amenity at ground level	A3.1 Building setbacks to the river and streets are in accordance with the setbacks in figures e to n for the relevant precincts
P4 Separation distances between buildings create a sense of privacy and provide view corridors from within and into Northshore	A4.1 Separation distances between buildings in the Waterfront Residential Precinct are in accordance with Figures h and k
P5 Separation distances between buildings in parcel WR7 and the adjoining cruise ship terminal must be maintained to provide buffering from the operational impacts of the cruise terminal and to protect residential amenity	No acceptable solution prescribed
Accessibility, permeability and movement	
P6 The design and layout of development must achieve adequate accessibility, permeability and movement consistent with the intent of the Northshore Neighbourhood Plan	A6.1 Roads, pedestrian and cycleway paths are located generally in accordance with the location of Mobility Paths on Maps B(a) to B(d) and Map C (Northshore – Mobility and Circulation Plan) A6.2 Pedestrian pathways within road reserves have a minimum width of 1.5 metres
Diversity and safety	
P7 Mobility, circulation and access throughout Northshore must be designed to be safe and secure and to cater for a range of users	A7.1 Development provides adequate lighting across the pedestrian and cycleway networks A7.2 Development ensures all surfaces and finishes at ground level are safe, anti-slip and universally accessible

Performance Criteria	Acceptable Solution
	A7.3 The design and layout of development maximises casual surveillance of public access, circulation and mobility paths A7.4 Pedestrian and cycleway paths are clearly delineated and separated A7.5 All access points, ramps, and configurations are designed and constructed in accordance with AS1428 - Design for Access and Mobility A7.6 Tactile devices such as Braille are provided to signage or relief tiles to ground and other references to cater for the visually impaired
P8 Development must be designed and located to minimise opportunities for crime and enhance people's sense of safety	A8.1 Development incorporates crime prevention through environmental design principles (CPTED) including maximising opportunities for casual surveillance of public areas by locating large windows (adjoining well-used internal areas) and useable veranda spaces overlooking streets, parks and communal areas
P9 The pedestrian and cycleway network must feature high-quality materials drawn from a chosen palette	A9.1 All materials and specifications are of a quality consistent with BCC's Design and Maintenance Manual and all relevant guidelines and legislation
Working from Home	
P10 Home businesses in the form of small scaled offices will be encouraged within residential buildings fronting MacArthur Avenue to provide opportunities for residents to work from home.	A10.1 Offices allocated to working from home use does not exceed a total GFA of 250m^2 for each multi unit dwelling building A10.2 The office is used by one or more of the permanent residents of the multi unit dwelling building A10.3 The office is located on the ground floor of the multi unit dwelling building with a frontage to MacArthur Avenue A10.4 The office has a clearly defined entrance either from MacArthur Avenue or the main entrance to the multi unit dwelling
Balcony requirements	
P11 Residential development must provide adequate balcony space and privacy for residents	A11.1 The minimum area for balconies for a 1 bedroom dwelling is 9m^2 and 15m^2 for all others. The minimum dimension of the balcony in any direction is 3.0m A11.2 Lower level balconies (up to 3 levels) use opaque glass or other appropriate screening measures to maintain privacy for residents
P12 Building form and facades must present to the street in an interesting and articulated manner	A.12 Balcony and facade proportions are provided and maintained in accordance with Figure o
Sustainability - Requirements for Commercial and Mixed Use Development	

Performance Criteria	Acceptable Solution
P13 Development must utilise a combination of design and construction techniques that actively reduces energy consumption, and greenhouse gas emissions	A13 Commercial and mixed use office development achieves an Australian Building Greenhouse Rating Scheme (ABGR) rating of four-stars or equivalent
P14 Development must maximise water use efficiency through the utilisation of water saving devices	A14 Public amenities use minimum 4 star rated Water Efficiency Labelling Scheme (WELS) water efficient urinals, infrared operated or water-less urinals
Sustainability - Requirements for Residential Development	
P15 Building and urban design outcomes must reduce reliance on artificial heating and cooling	A15 The thermal performance of development achieves an R value of 1.5 for external walls, 2.5 for roof and ceiling structures, and 3.0 for roof and ceiling structures where air-conditioning is used
P16 Buildings and public domain areas must be designed for maximum energy efficiency and thermal comfort	A16 Development achieves a minimum of four-stars through a nationally accredited rating scheme
P17 A high level of indoor air quality must be achieved for all buildings within the development	A17 All residential living areas are naturally ventilated with opening windows and cross-ventilation opportunities
Sustainability – Integrated water management	
P18 Development must include water sensitive urban design measures to integrate water supply, wastewater and stormwater to ensure protection of the water cycle by: ▪ reducing potable water usage ▪ minimising wastewater production ▪ minimising impacts on the water cycle ▪ minimizing use of pesticides, herbicides and artificial fertilizers; ▪ protecting waterway health by improving stormwater quality and reducing site run-off ▪ incorporate water reuse infrastructure to maximise recycling opportunities ▪ use of alternative water sources. ▪ incorporation of water conservation fixtures, fittings and appliances *Note: An Integrated Water Management Plan (IWMP) identifies the range of strategies and actions proposed to integrate water supply, wastewater and stormwater and thus ensure protection of affected waterways and catchment areas. An IWMP also identifies those Water Sensitive Urban Design measures proposed to be incorporated in a development to ensure protection of the water cycle* *The IWMP must provide sufficient information on how these matters are to be dealt with for the particular site. Detailed design of the drainage network and Water Sensitive Urban Design measures will usually be required as subsequent application for operational works or as a condition of approval. The Stormwater Management Code and Council's Subdivision and Development Guidelines provide detailed guidance on the implementation of Water Sensitive Urban Design*	A18.1 A site based Integrated Water Management Plan (IWMP), incorporating Water Sensitive Urban Design, is submitted at development application stage including any but not restricted to the following measures: ▪ swale systems ▪ swale/bioretention systems ▪ on-site infiltration/porous pavements ▪ conveyance and non-conveyance bioretention systems ▪ filter/buffer strips ▪ Nusewer welded PE sewers and low pressure sewer systems ▪ Reticulated non-drinking water system ▪ a pressure limiting device where mains water pressure exceeds 300kPa. The device must ensure that the maximum operating pressure at any outlet within a building does not exceed 300kPa ▪ dual flush 6/3 toilets are installed ▪ minimum 4 star (WELS) appliances are installed ▪ minimum 4 star rated (WELS) showerheads are installed in all showers ▪ minimum 4 star rated (WELS) taps are installed ▪ garbage grinders are not installed; ▪ swimming pools are provided with covers; ▪ disposal of swimming pool water to accord with BCC Subdivision and Development Guidelines 2000, Part C, Chapter 11 A18.2 The IWMP includes details of when the proposed measures are to be adopted and how implementation is to be ensured such as covenants on each lot conditioned through development A18.3 Development provides or connects to a reticulated non-drinking water network. This is then connected to:

Performance Criteria	Acceptable Solution
	▪ Fire hydrants and fire service ▪ Outdoor taps ▪ Watering systems to landscaped areas ▪ Outdoor watering system of parks, gardens and recreation areas ▪ Wash down areas ▪ Other uses where appropriate in preference to potable water A18.4 Development includes a rainwater harvesting system such as a rainwater tank: ▪ with at least 50% of the roof area connected to the rainwater storage system ▪ that is used for water supply to the toilet cistern/s and laundry cold water tap/s ▪ with a backup reticulated water supply ▪ with a suitable backflow prevention device to protect the reticulated water supply from contamination, in accordance with AS/NZS 3500:2003
Sustainability – Energy	
P19 Development must adopt renewable power sources wherever practicable	A19.1 Development utilizes renewable, non – polluting energy (such as solar power) from on-site generation. A19.2 Development provides an energy smart hot water system (energy efficient gas, heat pump or gas-boosted solar hot water are the minimum standard) A19.3 Development provides LP gas connections for all cooking appliances
P20 Energy-efficient appliances must be utilised to achieve best practice energy efficiency	A20.1 Buildings are installed with minimum four-star energy efficient devices, equipment and appliances that meet the National Minimum Energy Performance Standards (MEPS, refer to www.energyrating.gov.au) A20.2 Multi unit dwellings incorporate centrally located energy efficient chilled and heated water plants A20.3 Air-conditioning systems not more that 10kWr in capacity achieve a Cooling/ Heating Star rating of not less than 4.5 Stars (www.energyrating.gov.au), systems between 10kWr and 65kWr have an Energy Efficiency ratio (EER) not less than 3.0 with Coefficient of Performance (COP) not less than 3.3 and insulation and sealing to air-conditioning pipework and ducts complies with BCA Specifications J5.2 A20.4 All equipment is properly maintained to ensure design efficiency performance
P21 Building and urban design outcomes must reduce reliance on artificial heating and cooling	A21.1 Site planning and individual building orientation is based on passive solar design and energy-efficiency principles A21.2 Buildings include provision for adequate natural ventilation for all habitable areas. All windows other than small fixed lights are adjustable and opening A21.3 Buildings include light coloured roofs that

Performance Criteria	Acceptable Solution
	incorporate ventilation A21.4 Eaves and external shade structures are incorporated into buildings to limit summer sun and maximise winter sun A21.5 Trees are strategically placed to protect buildings from western sun and other local microclimatic factors A21.6 Natural ventilation of car parks is used wherever possible rather than mechanical ventilation
P22 Development must utilise a combination of design and construction techniques to reduce energy consumption, reduce peak energy loads and greenhouse gas emissions	A22.1 All buildings are designed to maximise natural lighting and minimise energy use for artificial lighting A22.2 Development includes energy-efficient lighting systems such as fluorescent fittings and solar power lighting to common areas. A22.3 Development utilizes off peak energy and timers to reduce peak load from uses such as swimming pool filters.
Sustainability – Transport	
P23 The use of bicycles and other forms of non-motorised transport must be facilitated within development	A23.1 Development is designed to include safe and highly visible connections to pedestrian and cycle networks through landscape design elements and treatments A23.2 Secure bicycle-storage facilities for the use of apartment owners and tenants are provided at a rate of one bicycle space per two dwellings
Sustainability – Biodiversity	
P24 Development must maintain and enhance the biodiversity values of the site and the Brisbane River	A24.1 Landscape areas include at least 50% locally occurring native plants or species and species that provide habitat and food resources for local fauna A24.2 An Environmental Management Plan (EMP) is provided for both the construction and operational phases of development which addresses biodiversity
P25 Development must protect and enhance existing mangrove vegetation	A25.1 Landscape species are endemic to the area and are non-invasive A25.2 Development fronting the mangrove creek on the north and eastern boundaries integrates the mangrove creek into the landscape and open space areas of the development
Sustainability – Air	
P26 A high level of indoor air quality must be achieved for all buildings	A26 Buildings include adequate seals and screening to assist with indoor pest control.
Sustainability – Waste	
P27 Landfill waste must be minimised through the recycling of materials and effective management of waste product	A27.1 Buildings are designed and equipped with sorting facilities to separate waste A27.2 High quality and clean recycled materials

Performance Criteria	Acceptable Solution
	(timber, crushed concrete and cleaned bricks) are used where possible within the development construction A27.3 Development is designed to maximize use of standard sizes of materials wherever possible to minimize waste. A27.4 Development must provide for the collection and reuse of garden/ green waste.
Sustainability – Landscaping	
P28 Development must provide landscaping that includes a subtropical design response including the use of extensive native vegetation and large shade trees in private and public spaces	A28.1 10% of the site area is used for deep planting A28.2 Landscaping is to incorporate native drought tolerant species A28.3 Any proposed roof and podium planting is to have a non-potable water supply for irrigation
Sustainability- Materials	
P29 Building materials must be selected based on whole-life-cycle considerations	A29.1 Building materials are sourced from local manufacturers and/or suppliers where possible, or utilize the most economical method of transportation with regard to fossil fuels A29.2 Products are selected based on minimal ongoing maintenance requirements and durability A29.3 Building materials, products and systems low in embodied energy (with low levels of pollution emitted during manufacture) are used
P30 Development utilises non-toxic and low emission products	P30.1 Use of non-toxic or low loxicity paints on at least 90% of all internal painted surfaces P30.2 Use of non-toxic or low toxicity floor coverings on at least 80% of all indoor covered areas P30.3 Use of low-toxicity sealants and adhesives where possible P30.4 Use of non-allergic materials for furnishings where possible
Acoustic amenity	
P31 Development must protect residential amenity from potential noise impacts generated from traffic, aircraft and industrial uses	A31.1 For land within the ANEF 20 Contour for the Brisbane Airport, an acoustic assessment report demonstrating compliance with State Planning Policy 1/02 -Development in the Vicinity of Certain Airports and Aviation Facilities and Supporting Guideline is submitted A31.2 For land outside the ANEF 20 Contour for the Brisbane Airport, an acoustic assessment report complying with the requirements of the City Plan Noise Impact Assessment PSP is submitted, and appropriate recommendations are incorporated into the design, siting and layout of development
Air quality amenity	
P32 Development must: ▪ maintain public health and protect residential amenity from potential air quality impacts generated from ongoing port operations within Northshore and existing	A32.1 Residential or sensitive development does not locate within a Residential Investigation Area identified on Map D unless it can be demonstrated that existing or potential air quality impacts are within acceptable

Performance Criteria	Acceptable Solution
industrial uses external to Northshore; and ▪ maintain health, safety and amenity of future residents by ensuring new dwellings are not adversely affected by existing industry in the locality.	limits
Existing industrial uses	
P33 Development must: ▪ maintain public health and safety and protect building occupants from potential risks associated with ongoing port uses within Northshore ▪ not compromise the operation of existing industrial uses external to Northshore ▪ maintain health, safety and amenity by ensuring new buildings are not adversely affected by existing industry in the locality	A33.1 Residential or sensitive development does not locate within a risk buffer area as identified on Map E, unless it can be demonstrated that the industrial use/activity has permanently ceased as certified by a suitably qualified professional or the level of risk is within accepted limits A33.2 Residential or sensitive development does not locate within 150 metres of an existing industrial use identified in Chapter 3, Industrial Areas – Schedule 1 and Schedule 2 of the City Plan, unless it can be demonstrated that the industrial use or activity has permanently ceased or that potential impacts are within acceptable limits A33.3 Residential or sensitive development does not locate within a Residential Investigation Area identified on Map D, unless it can be demonstrated that potential impacts are within acceptable limits
Riverwalk – Continuous public access	
P34 Development on land fronting the Brisbane River must provide a continuous and publicly owned and accessible riverwalk including design elements that add variety and interest for users of the riverwalk	A34.1 Land and development adjoining the Brisbane River includes a riverwalk provided by the developer that has the following attributes: ▪ a minimum 20 metre building setback is maintained from high water mark to the outer most projection of the building; ▪ all land within 15 metres of the high water mark shall be dedicated to Brisbane City Council as park;and ▪ the minimum dimension of pathways are: - for the Waterfront Residential Precinct in accordance with Figure r; - for the Mixed Use precinct, in accordance with figure f; - for the Variable Density Residential Precinct, 6 metres ▪ linkages between the bikeway/walkway and adjoining riverfront properties are provided
Riverwalk – Safety and security	
P35 The riverwalk must provide a safe and secure place	A35.1 The existing wharf structures are removed and replaced with a new land-based structure in accordance with Figure r, except for development parcel WR7 where the wharf may be retained for tie up of ships associated with the use of the adjoining cruise wharf A35.2 Development provides adequate lighting across the length of the riverwalk in accordance with relevant BCC standards A35.3 The design and layout of development maximises casual surveillance and incorporates other relevant CPTED principles where appropriate

Performance Criteria	Acceptable Solution
	A35.4 The riverwalk is designed to ensure all surfaces and finishes at ground level are safe, anti-slip and universally accessible
Riverwalk – Vistas	
P36 The riverwalk must be designed to protect views from the site to the river and provide a visual connection between the river edge and adjoining development, while minimising impact on privacy of residents	A36.1 The design of the riverwalk maximises vistas from private residential areas to the river A36.2 Artwork, solid planes or bulky objects such as vegetation or signage are carefully placed and designed to maintain views and sightlines to the river A36.3 Change of levels, planting buffers or other design devices are incorporated to highlight the separation of public and private areas, increase the sense of security and privacy for those living in proximity to the riverwalk, and improve the sense of security for those using the riverwalk
Riverwalk – Interface between private properties	
P37 The riverwalk must be designed to provide a seamless integration between public and private realms, the water and the land	A37.1 The riverwalk experience is continuous and consistent between nodal points/viewing platforms at the end of river access roads A37.2 Between street ends, material design features and themes are carried through with matching levels, widths, complementary treatments and finishes along adjoining sections of the riverwalk, assisting visual blending at the boundary interface A37.2 If developed incrementally, subsequent segments of the riverwalk are consistent with the overall design, palette of colours, material treatments and tree species approved as part of the first segment of the riverwalk
Riverwalk – Accessibility, permeability and legibility	
P38 The riverwalk must be designed to provide a shared movement environment accessible to pedestrians, cyclists and users with varied degrees and types of disabilities	A38.1 All access points, ramps, and configurations are in accordance with Australian Standard AS1428– Design for Access and Mobility A38.2 An adequate number of clear entry and exit points are provided, along with dedicated and strategically placed lookouts and water access points A38.3 Riverwalk levels within the Waterfront Residential Precinct are typically lower than adjoining development to facilitate vistas to and from the river generally in accordance with Figures i and r A38.4 The riverwalk area is designed to provide easy pedestrian and cyclist navigation and negotiation A38.5 Tactile devices such as Braille to signage or relief tiles to ground and other references are provided for visually impaired people A38.6 High-quality public artwork with vertical emphasis is featured along the riverwalk to assist in marking distances, mental mapping and relative location, supported by audio activation devices where

Performance Criteria	Acceptable Solution
	appropriate
P39 The riverwalk must feature high quality materials drawn from an approved palette	A39 All materials and specifications are to be of a quality consistent with the BCC Public Riverside Facilities Design and Maintenance Manual
Riverwalk – River experience viewing platforms	
P40 Nodal points /viewing platforms are provided at key locations along the riverwalk, particularly at river access street ends	A40.1 The design of nodal points / viewing platforms are undertaken generally in accordance with Figure s A40.2 The nodal points provide appropriate transition between various sections of the riverwalk provided in association with the land-based development
Artwork	
P41 Development involving building work must incorporate artwork in public places	A41.1 Artwork will be located in the Urban Centre Precinct, Mixed Use Precinct and Waterfront Residential Precinct A41.2 Artwork is to be located in public spaces and selected with a view to enhancing the interest and vitality of these spaces A41.3 Artwork is to be positioned so that it can be observed and appreciated by the public at all times *Note: At the applicant's discretion, artwork may be located off the site to enhance its visibility. Any off-site location will need to be agreed by the Assessment Manager to ensure pedestrian and vehicular movement and safety is not compromised*
Development Staging	
P42 Development is staged to occur in conjunction with ongoing infrastructure investment for: ▪ traffic capacity of routes to and from Northshore; and ▪ public transport infrastructure for residents and workers in Northshore Development will only receive approval where no net loss of capacity to the road network occurs.	A42 Development occurs inaccordance with Table 2 Staging and Map F Staging Plan, or inaccordance with infrastructure agreement.

5.2 Precinct 1 – Urban Centre

Performance Criteria	Acceptable Solution
P1 The total retail and commercial floorspace in the Urban Centre Precinct reflects: ▪ its role and function as a Suburban Centre; and ▪ Its primary role in the Northshore Neighbourhood Plan area as the main commercial centre	A1.1 Retail GFA is limited t0 10,000m² retail floor area including one full line supermarket. A1.2 Total retail floor area for supermarket is limited to serve Northshore Neighbourhood Plan Area
P2 Building setbacks must be consistent with the desired streetscape for the Urban Centre	A2 Building setbacks comply with Figure e
P3 Buildings along Barcham Street must provide small shop frontages and tenancies to provide retail choice and visual interest	A3 Buildings have a minimum average width of 10 metres for each tenancy frontage or tenancy
P4 A neighbourhood community facility must be located	A4 The location of a community facility is generally in

Performance Criteria	Acceptable Solution
within the precinct for future residents use	accordance with Map B(a)
P5 Development must provide facilities for convenient, safe and comfortable movement of pedestrians in and to the Urban Centre. The finished levels must allow easy pedestrian, bicycle, vehicular and car parking interconnection between properties and buildings in the Urban Centre	A5 The pedestrian/vehicle movement system within the Urban Centre is provided generally in accordance with Map B(a)

5.3 Precinct 2 – Mixed Use

Performance Criteria	Acceptable Solution
P1 Development must contribute positively towards the permeability of the precinct through the incorporation of appropriate mobility paths, building design and layout	A1 For the Waterfront East Sub Precinct the building form, access to the site and circulation within the site is in accordance with the preferred mobility paths identified on Map B(a) For other sub precincts no acceptable solution prescribed. *Note: For all sub precincts including Waterfront East Sub Precinct an integrated Centres Concept Plan will be required.*
P2 Building setbacks must be consistent with the desired streetscape for the precinct	A2 For the Waterfront East Sub Precinct building setbacks comply with; i) where development is located within VC5 a minimum 20 metre building setback ii) where development is located within VC4 in accordance with Figure f For other sub precincts no acceptable solution prescribed.
P3 Development must provide facilities for convenient, safe and comfortable movement of pedestrians to the Urban Centre, waterfront and public transport nodes. The finished levels must allow easy pedestrian, bicycle, vehicular and car parking interconnection between properties and buildings in the precinct	A3 For the Waterfront East Sub Precinct the pedestrian/vehicle movement system within the Waterfront Mixed-use Precinct is provided generally in accordance with Map B(a). For other sub precincts no acceptable solution prescribed. *Note: For all sub precincts including Waterfront East Sub Precinct an integrated Centres Concept Plan will be required.*
P4 Vehicle access and parking must be safe and convenient for residents, visitors and service providers. Sufficient resident and visitor parking must be provided according to: (i) the number, size and type of dwellings proposed (ii) the availability and acceptability of kerbside parking adjacent to the site (iii) local traffic or parking management (iv) the likely preference of the occupier or target market Note: Resident parking provision may be reduced from the rate specified in the Acceptable Solution where public transport is available within a reasonable walking distance or where low demand is indicated, through detailed studies and evidence	A4.1 Off–street parking spaces are provided: (i) where qualifying for a subsidy for aged persons or persons with disabilities accommodation under any law, one car space per three dwellings (ii) otherwise, as shown below, the total rounded up to the nearest whole number. A4.2 For residential development, vehicle spaces for different dwelling sizes and number of bedrooms are provided as follows: Average vehicle spaces per dwelling Small (<75m²) or one bedroom 1 space Medium (75–110m²) or two bedroom 2 spaces Large (>110m²) or three bedroom 2 spaces

Performance Criteria	Acceptable Solution
	Plus 0.25 per dwelling for visitors Note: Tandem parking may only be used where two spaces are provided for one dwelling
P5 Development in the Waterfront West Sub Precinct and Kingsford Smith Drive West Sub Precinct is integrated around waterfront access, public transport accessibility, and pedestrian and visual connectivity.	No Acceptable Solution Prescribed *Note: For Waterfront West and Kingsford Smith Drive sub precincts an integrated Centres Concept Plan will be required.*
P6 Built form in the Kingsford Smith Drive West Sub Precinct provides lower scale built form to Kingsford Smith Drive	A6.1 Building form within 40 metres of Kingsford Smith Drive is limited to 6 storeys and 21 metres.
P7 The total volume of shop space in Kingsford Smith Drive West and Waterfront West Sub Precincts is limited to reflect the primary role of the Barcham Street Centre	A 7.1 Shop tenancies are no greater than 500m2 each. A7.2 Shop and restaurant uses are located in the Waterfront West Sub Precinct. A7.3 Shop or restaurants in the Kingsford Smith Drive West Precinct serve only the sub precinct in which they are located. A7.4 Display and sales activities are greater than 1000m2 and less than 1,500m2

5.4 Precinct 3 – Waterfront Residential

Performance Criteria	Acceptable Solution
P1 The extent of non residential uses adjacent to Portside Wharf will reflect its role as a subordinate centre to the Urban Centre Precinct	A1 Total non residential uses adjacent to Portside Wharf (on Parcel WR7) does not exceed 4,000m² which includes a maximum of 2,500m² of restaurant and shop uses
P2 Tower design must mitigate visual impacts on regional view sheds. Spacing between buildings must allow for light penetration, air circulation, views and vistas, and outlook	A2.1 Building setbacks comply with Sections h to l A2.2 Mid-block separation of buildings is provided in accordance with Figure q
P3 Vehicle access and parking must be safe and convenient for residents, visitors and service providers. Sufficient resident and visitor parking must be provided according to: (i) the number, size and type of dwellings proposed (ii) the availability and acceptability of kerbside parking adjacent to the site (iii) local traffic or parking management (iv) the likely preference of the occupier or target market. Note: Resident parking provision may be reduced from the rate specified in the Acceptable Solution where public transport is available within a reasonable walking distance or where low demand is indicated	A3.1 Off–street parking spaces are provided: (i) where qualifying for a subsidy for aged persons or persons with disabilities accommodation under any law, one car space per three dwellings (ii) otherwise, as shown below, the total rounded up to the nearest whole number. A3.2 Vehicle spaces for different dwelling sizes and . number of bedrooms as follows: Average vehicle spaces per dwelling Small (<75m²) or one bedroom 1 space Medium (75–110m²) or two bedrooms 2 spaces Large (>110m²) or three bedrooms 2 spaces Plus 0.25 per dwelling for visitors Note: Tandem parking may only be used where two spaces are provided for one dwelling

Performance Criteria	Acceptable Solution

5.5 Precinct 4 – Variable Density Residential

Performance Criteria	Acceptable Solution
P1 A small scale convenience centre will be located in the eastern area of the Precinct (VDR2) to provide for the daily shopping needs of residents	A1 Total non-residential uses is in the order of 1,000m^2
P2 Building height for a house is consistent with the intent of the precinct	P2 Building height is a maximum of 3 storeys and 12 metres
P3 Houses on lots of between 250m^2 and 400m^2 must minimise amenity impacts on adjoining dwellings and must complement setbacks prevailing in the street	P3 For detached houses side, rear and front boundary setbacks comply with Figure p (small lot housing); or For two or more houses which have built to boundary walls: ▪ they are approved and constructed at the same time ▪ the front rear and side boundary setbacks comply with Figure p (2 storey terrace) ▪ external side boundaries are not less than 1.5 metres
P4 Building setbacks for small lot and terrace style residential product must reflect and respond to the urban intent of the precinct	A4 Development of terrace or small lot housing is in accordance with Figure p
P5 Building setbacks for multi unit dwellings must be consistent with the desired streetscape for the precinct	A5 Building setbacks comply with Figures l, m and n

Table 1 - Maximum gross floor area and storeys

Precinct	Maximum GFA (times site area)	Maximum number of storeys and metres above RL 5.5
Urban Centre Precinct		
VC1	3	10 storeys / 30 metres
VC2	3	10 storeys / 30 metres
VC3	2	10 storeys / 30 metres
NB: Maximum non-residential GFA is 13,500m2 including up to 3,500m² GFA of office uses. Total GFA is made up of maximum non-residential GFA and residential GFA.		
Waterfront Mixed Use Precinct		
Waterfront East Sub Precinct - VC 4	3.0 *NB: Total GFA is made up of maximum non-residential GFA and residential GFA* *Maximum non-residential GFA 2,500m²*	20 storeys /65 metres
Waterfront East Sub Precinct - VC 5	3.0	18 storeys /60 metres
Waterfront West Sub Precinct	Development to reflect existing and approved plot ratio and height of buildings south of Kingsford Smith Drive and west of Remora Road.	
Kingsford Smith Drive West Sub Precinct	Development to reflect existing and approved plot ratio and height of buildings south of Kingsford Smith Drive and west of Remora Road	
Waterfront Residential Precinct		
WR 1	1.75	10 storeys / 30 metres
WR 2	2.5	12 - 14/ 36 - 42 metres
WR 3	3.0	16 storeys/ 48 metres
WR 4	3.5	18 storeys/ 54 metres
WR 5	3.0	16 storeys/ 48 metres
WR 6	2.5	14 storeys/ 42 metres
WR 7	2.0	13 storeys/ 39 metres
Variable Density Residential Precinct		
VDR 1	1.5	5 storeys/ 15 metres
VDR 2	2.5	10 storeys/ 30 metres
VDR 3	1.5	5 storeys/ 15 metres
VDR 4	1.5	5 storeys/ 15 metres

Table 2 – Staging

Staging inaccordance with Map F Staging Plan	Residential Investigation Area Implications	Traffic Capacity and Movement
Stage 1.	Refer to Map F Staging Plan.	Development allowed for up to 5,000 vehicles per day as an equivalent replacement for existing General Industry use of Northshore Neighbourhood Plan Area.
Following stages.	Other stages available for residential development subject to removal or reduction of Residential Investigation Areas.	No additional development in excess of 5,000 vpd until additional traffic and / or public transport infrastructure added. Development will only receive approval where no net loss of capacity to the road network occurs.

Urban Land Development Authority

NORTHSHORE HAMILTON
INTERIM LAND USE PLAN

March 2009

NORTHSHORE HAMILTON – INTERIM LAND USE PLAN

Table of contents

Part 1 Preliminary

1. Introduction

(1) This interim land use plan may be cited as the Northshore Hamilton Interim Land Use Plan.

(2) This interim land use plan has been prepared pursuant to Section 8 of the *Urban Land Development Authority Act 2007*.

(3) This interim land use plan applies only to the Northshore Hamilton Urban Development Area, as identified in Figure 1.

2. Background

(1) The Northshore Hamilton Urban Development Area was declared by a regulation, pursuant to Part 2 Division 1 Section 7 of the *Urban Land Development Authority 2007*.

(2) The main purposes of the *Urban Land Development Authority Act 2007* are to facilitate the following in the urban development areas –

(a) the availability of land for urban purposes;

(b) the provision of a range of housing options to address diverse community needs;

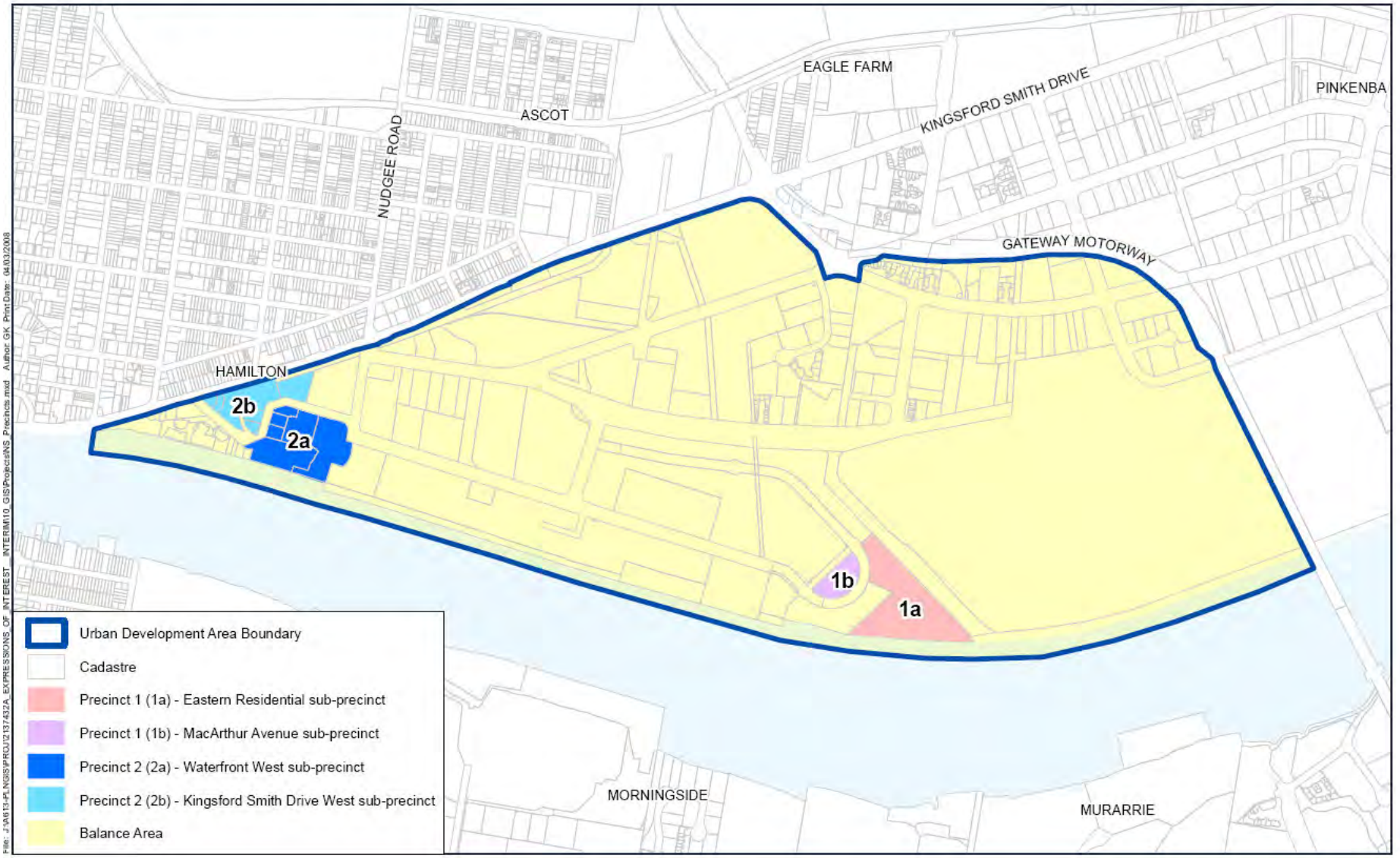
(c) the provision of infrastructure for urban purposes;

(d) planning principles that give effect to ecological sustainability and best practice urban design; and

(e) the provision of an ongoing availability of affordable housing options for low to moderate income households.

Northshore Hamilton - Urban Development Area

Figure 1



Part 2 Land use planning

1. Purpose of interim land use plan

(1) The purpose of this interim land use plan is to:

(a) ensure that the future development opportunities of the urban development area to be expressed in the development scheme are protected from incompatible land uses and activities; and

(b) in limited and select instances, identify precincts in which it is appropriate to facilitate development prior to the development scheme taking effect; and

(c) regulate orderly development and provide direction as to the preferred form of development within the precincts.

2. Development precincts

(1) This interim land use plan nominates precincts and sub-precincts within which particular development may be allowed. The precincts and sub-precincts are shown in Figure 1 above.

(2) Land within the declared Urban Development Area not included in a precinct or sub-precinct is part of the balance area.

2A. Development in the Balance Area

(1) All development within the balance area (except for development identified in Schedule 1 which is exempt development) is UDA Assessable Development – Prohibited.

(2) UDA Assessable Development – Prohibited is UDA Assessable Development that is inconsistent with the interim land use plan.

(3) UDA Assessable Development – Prohibited may not be carried out in the Urban Development Area.

3. Urban Development Area development principles

Northshore Hamilton Urban Development Area will be a high-quality, sustainable and environmentally responsive urban environment which supports a healthy and diverse community with access to a variety of housing types, lifestyle and employment opportunities, open space, the Brisbane River and a choice in transport modes which promotes a high level of self-containment and local accessibility.

Development within the Northshore Hamilton Urban Development Area will:

(1) create a safe, diverse and inclusive community through the provision of a range and mixture of housing types, densities, and designs which deliver affordable housing;

(2) create a high quality urban area founded on transit oriented development principles centred on a possible railway station and other

public transport infrastructure which is integrated with a vibrant, sustainable and highly accessible centre that meets the needs for goods and services of workers and residents;

(3) provide a functional, safe and permeable urban environment that promotes a healthy and safe lifestyle with high levels of pedestrian and bicycle access, integrated open space networks, a high quality public realm that promotes a strong sense of local identity which recognises the area's historic maritime uses and protects streetscapes, landmarks and vistas;

(4) provide a high-quality open space network adjoining the river that is active, safe and interesting with enhanced access for residents and visitors while maintaining views to the river;

(5) create a sustainable and environmentally responsive urban environment with a distinct subtropical character which incorporates eco-friendly and innovative building design, layout and construction methods, minimises waste, energy and water usage, maintains satisfactory air, water and acoustic standards, and protects and enhances biodiversity;

(6) provide a high level of public health, safety and residential amenity through the creation of environments that offer opportunities for healthy activity, recreation and social interaction and taking into consideration potential impacts and risks associated with existing port and industrial activities, traffic and transport infrastructure and land contamination;

(7) be sequenced and designed to recognise and protect the ongoing operations of existing port and industrial activities and also major economic and transport infrastructure of the Brisbane Airport, the Port of Brisbane, the Brisbane International Cruise Terminal, the Gateway Motorway and Australia Trade Coast, while providing appropriate levels of residential amenity; and

(8) be effectively integrated with surrounding land uses and connect to existing and planned infrastructure and public and active transport networks linking to Hamilton, Newstead Riverpark, Fortitude Valley, Australia Trade Coast and Bowen Hills.

Part 3 Development Intent

1. Precinct 1

(1) Precinct 1 will provide for varying density residential development including small lot, detached and attached terrace style housing forms and high-rise multi-unit dwellings.

(2) Development in Precinct 1 will ensure appropriate built form, access and visual integration to the Northshore Riverside Park situated west of Precinct 1a and south of Precinct 1b.

(3) Development will be setback from the Brisbane River to provide a continuous and public accessible Riverwalk connecting the Northshore Riverside Park and the Royal Queensland Golf Course.

(4) Development of sub-precinct 1a will include the dedication of land fronting the Brisbane River for public access.

(5) The boundary of sub-precinct 1a features a mangrove-lined creek. Development is to protect and rehabilitate urban habitat for flora and fauna with a particular focus on enhancing this existing mangrove community.

(6) The Hamilton rock training wall located along the Brisbane River frontage of sub-precinct 1a has been identified as having potential local heritage significance. This wall is to be preserved where its cultural significance is recognised and its structural integrity allows.

(7) Sub-precinct 1b will provide convenience shopping facilities to enable residents within the development to access goods and services, reduce their car dependency and encourage a sense of community. Approximately 1,000m^2 of gross floor area will be allocated for these convenience facilities.

(8) The ability to work from home will be encouraged through the location of home businesses at the ground level of buildings fronting MacArthur Avenue.

2. Precinct 2

(1) Precinct 2 is a mixed use area containing residential accommodation (long and short term) and office development. Some small scale retail uses will support the mixed use nature of this precinct, such as restaurants, cafes, taverns, shops and indoor sport and recreation.

(2) Building and landscape design will be of a sub-tropical character featuring awnings, movable shutters, partially enclosed winter gardens and views to the Brisbane River.

(3) Precinct 2 will incorporate visual and pedestrian connectivity to and from Kingsford Smith Drive and the Brisbane River.

(4) Sub-precinct 2a includes the Brisbane Cruise Ship Terminal. A mix of residential and office space is intended for this sub-precinct. New

development should accentuate the Terminal as a destination point for residents and visitors to Brisbane. Public transport integration will support people travelling to and from this sub-precinct and the adjoining Terminal.

(5) Sub-precinct 2b will contain a mix of residential and office with some ground floor retail serving the daily convenience needs of workers and residents in the development. The ground floor retail will provide an active street frontage to Kingsford Smith Drive and links to sub-precinct 2a.

4. Assessable development

(1) Table 1 of the interim land use plan identifies whether within the nominated precincts is –

(a) UDA Self Assessable Development (Column 2) or

(b) UDA Assessable Development – Permissible (Column 3A) or

(c) UDA Assessable Development – Prohibited (Column 3B)

(2) Development not identified in this interim land use plan as UDA Assessable Development - Permissible, UDA Assessable Development – Prohibited or UDA Self Assessable Development is UDA Exempt Development. A UDA development approval is not required for UDA Exempt Development nor is it necessary for a person carrying out UDA Self Assessable Development complying with the requirements of this interim land use plan for the UDA Self Assessable Development.

(3) All UDA Assessable Development – Permissible is UDA Assessable Development that is identified in column 3A, requires a UDA development application to be lodged with the Urban Land Development Authority (ULDA) for assessment and decision as set out in Part 4 of this interim land use plan. Approval is required for development to be undertaken.

(4) Identification of development as UDA Assessable Development – Permissible does not mean that a UDA development approval (with or without conditions) will be granted.

(5) UDA Assessable Development – Permissible that is inconsistent with the Interim Land Use Plan must be refused.

(6) UDA Assessable Development – Prohibited is UDA Assessable Development that is inconsistent with the interim land use plan. UDA Assessable Development – Prohibited may not be carried out in the Urban Development Area.

Table 1 – Table of Development[1]

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
Precinct 1	Nil	**1. Making a material change of use for:** (a) Environmentally Relevant Activities associated with acceptable development (b) Estate sales office (c) House where on a lot between 250m^2 and 400m^2 (d) Home Business (e) Multi-unit dwelling (f) Restaurant where located on the ground level and fronting MacArthur Avenue not exceeding 250m^2 of GFA (g) Shop where located in sub precinct 1a not exceeding 250m^2 of GFA (h) Shop where located in sub precinct 1b not exceeding 500m^2 of GFA (i) Short term accommodation where located in sub precinct 1b (j) Single-unit dwelling **2. Carrying out operational work for:** (a) Filling or excavation associated with a material change of use other than in Schedule 1 (b) Removal, destruction or damage of marine plants **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Utility installation other than in Schedule 1	All other development except development mentioned in Column 3 – Permissible or Schedule 1.
Sub-precinct 2a	Nil	**1. Making a material change of use for:** (a) Cinema (b) Convention centre (c) Development in a heritage registered place (d) Display dwelling (e) Environmentally Relevant Activities associated with acceptable development	All other development except development mentioned in Column 3 – Permissible or Schedule 1.

[1] *This Table of Development only relates to development in the nominated precincts. Development in the balance area is dealt with in clause 2A in part 2.*

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
		(f) Estate sales office (g) Home business (h) Hotel (i) Indoor sport and recreation (j) Medical centre (k) Multi-unit dwelling (l) Office (m) Restaurant not exceeding 1000m² of GFA (n) Shop not exceeding 1000m² of GFA (o) Short term accommodation (p) Single unit dwelling **2. Carrying out operational work for:** (a) Filling or excavation where associated with a material change of use other than in Schedule 1 **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Utility installation other than in Schedule 1	
Sub-precinct 2b	Nil	**1. Making a material change of use for:** (a) Child care facilities (b) Development in a heritage registered place (c) Display and sales activities (d) Display dwelling (e) Education purposes (f) Environmentally Relevant Activities associated with acceptable development (g) Estate sales office (h) Home business (i) Indoor sport and recreation (j) Medical centre (k) Multi-unit dwelling (l) Office (m) Restaurant not exceeding 1000m² of GFA (n) Shop where located on the ground level and not exceeding 1000m² of GFA (o) Short term accommodation (p) Single unit dwelling	All other development except development mentioned in Column 3 – Permissible or Schedule 1.

Column 1	Column 2	Column 3 – UDA Assessable Development	
Precincts	**UDA Self Assessable Development**	**Column 3A**	**Column 3B**
		Permissible development	**Prohibited development**
		2. Carrying out operational work for: (a) Filling or excavation where associated with a material change of use other than in Schedule 1 (b) Prescribed tidal work (c) Removal, destruction or damage of marine plants **3. Reconfiguring a lot other than in Schedule 1** **4. All aspects of development for:** (a) Radio or television station (b) Utility installation other than in Schedule 1	

Part 4 Development assessment

1. Making an application

(1) A UDA development application must be made to the ULDA in accordance with Part 4 Division 3 Subdivision 1 of the *Urban Land Development Authority Act 2007*.

2. Notice of application

(1) Public notice is required for all UDA assessable development involving a material change of use.

3. Deciding an application

(1) Development in the urban development area is assessed and decided by the ULDA under the provisions of the *Urban Land Development Authority Act 2007* and this interim land use plan.

(2) The ULDA must refuse a UDA development application where it is inconsistent with:

(a) the *Urban Land Development Authority Act 2007*; or

(b) the Urban Development Area development principles (Part 2); or

(c) the intent of the development precinct (Part 3); or

(d) the development assessment criteria (Part 5); or

(e) the infrastructure contributions requirements (Part 6).

Part 5. Development assessment criteria

1. Development assessment criteria

(1) The development assessment criteria represents one way of complying with the urban development area development principles and the intent of the development precincts.

(2) The ULDA may consider and accept an alternative development solution to adequately address the development assessment criteria where:

(i) the proposed development is a superior outcome; and

(ii) the proposed development must not prejudice the ability to achieve the Urban Development Area development principles and the intent of the development precinct.

(a) Affordability

(i) Where development precincts are intended to include a residential component, applicants will be expected to demonstrate how the proposed development will contribute to house choice to meet a diversity of needs.

(ii) Contributions towards affordable housing may be required, in built form or by way of a monetary contribution, where the ULDA deems that the proposed development does not adequately address the urban development area's diversity of housing needs. Such requirements will be enforced through conditions attached to any development approval.

(b) Building height and scale

(i) The Gross Floor Area complies with Table 2: Gross floor area and storeys.

(ii) The total volume of shop and restaurant space in Precinct 2 complies with Table 2: Gross floor area and storeys and reflects the role of this centre within the City-wide Centre hierarchy as identified in the *Brisbane City Plan 2000*.

(iii) The maximum building height does not exceed the building heights listed in Table 2: Gross floor area and storeys.

(iv) Buildings located on the boundaries of a precinct must be designed to provide an appropriate transition and linkages to the balance area.

Table 2: Gross floor area and storeys

Development Precinct	Gross Floor Area	Maximum Building Height *(i.e. maximum number of storeys and metres above RL 5.5)*
Precinct 1		
Sub-precinct 1a (Eastern Residential)	1.5 x site area	5 Storeys / 17.5 metres
Sub-precinct 1b (MacArthur Avenue)	2.5 x site area	10 storeys / 35 metres
Precinct 2		
Sub-precinct 2a (Waterfront West)	3.0 x site area	15 storeys / 52.5 metres
Sub-precinct 2b (Kingsford Smith Drive West)	3.0 x site area	Building form within 15m of Kingsford Smith Drive is limited to 6 storeys and 21m in height, except at the western corner on the intersection with Kingsford Smith Drive, where a taller landmark building up to 9 storeys is permitted. Elsewhere, 15 storeys / 52.5 metres

(c) Building design

(i) Design is to consider the way a building's height, bulk and scale are arranged in relation to the building site, the street, adjacent buildings and public spaces.

(ii) Residential development must provide adequate balcony space and privacy for residents.

(iii) Buildings must be finished with high quality materials, selected for their durability and the contribution they make to the subtropical character of the urban development area.

(iv) The architectural treatment of facades and elevations must avoid large blank walls, and openings and setbacks must be used to articulate vertical building surfaces and contribute positively to the streetscape.

(v) Development must be designed, constructed and maintained to attenuate noise from external sources and to minimise the emission of noise, and to mitigate environmental harm and maintain environmental values for the end uses.

(d) Building setbacks and separation

(i) Building within the urban development area precincts must be sited to provide adequate separation between buildings for the amenity of the development and adjoining properties, to provide adequate space for landscaping and open space, solar access and minimise overshadowing. Setbacks should also spatially define the street and be designed to achieve a strong urban streetscape character.

(e) Transport, access, on-site car parking and servicing

(i) On-site car parking numbers for residential and non-residential uses will be negotiated between the ULDA and the applicant on a site-by-site basis.

(ii) Vehicle parking areas must be located within basements, integrated within buildings or located behind active street frontages and must be sensitively designed and positioned to protect amenity and maintain a significant urban streetscape.

(iii) For residential uses, secure and undercover bicycle-storage facilities for the use by owners and tenants must be provided at a minimum rate of one bicycle space per dwelling.

(iv) Service access and access to off street parking areas will take into consideration desired circulation patterns, pedestrian and cyclist movement networks, land use and amenity.

(v) To the extent determined appropriate by the ULDA, transport impacts shall be addressed and mitigated having regard to Brisbane City Plan's *Transport, Access, Parking and Servicing Planning Scheme Policy*.

(vi) To the extent determined appropriate by the ULDA, servicing, loading and unloading facilities, bicycle facilities and parking spaces, vehicle parking bays, manoeuvring areas and driveways shall be designed having regard to the standards set out in Brisbane City Plan's *Transport, Access, Parking and Servicing Planning Scheme Policy*.

(f) Accessibility, permeability and movement

(i) The design and layout of development facilitates high levels of accessibility, permeability and movement.

(ii) Development contributes positively towards the permeability of the precinct through the incorporation of appropriate mobility paths, building design and layout and is integrated with waterfront access, public transport accessibility, pedestrian, cyclist and visual connectivity.

(iii) Development is designed to include safe and highly visible connections to pedestrian and cycle networks through landscape design elements and treatments.

(g) Riverwalk - continuous public access

(i) Land and development adjoining the Brisbane River includes a riverwalk that has the following attributes:

(a) a minimum 20m building setback is maintained form high water mark to the outer most projection of the building

(b) all land within 15m of the high water mark shall be dedicated as park to the Crown.

(c) unimpeded linkages are to be provided between the bikeway/walkway and adjoining riverfront properties.

(ii) Public access along the Brisbane River must be designed to minimise the visual impact on the landscape values of the River by:

(a) providing a riverwalk in a manner having regard to the 'Public access' Element of the Brisbane City Council's Brisbane River Corridor Planning Scheme Policy; and

(b) designing, constructing and maintaining public riverside pedestrian/cycle pathways and boardwalks and other facilities having regard to the Brisbane City Council's Public Riverside Facilities Design and Maintenance Manual.

(h) Acoustic amenity

(i) The design, siting and layout of development must address noise impacts and where necessary incorporate appropriate noise mitigation measures.

(ii) Where determined necessary by the ULDA, an acoustic report will be required to evaluate and address potential noise impacts and recommend appropriate noise mitigation measures.

(i) Sustainability - energy rating

Commercial and Mixed Use Development

(i) Development achieves a minimum energy rating of five (5) stars or equivalent under the Australian Green Building Rating (AGBR) Scheme. A building services report from an accredited assessor will be required at UDA development application stage

Residential Development

(ii) Development must achieve a minimum energy rating of four (4) stars or equivalent under the Australian Green Building Rating Scheme. A building services report from an accredited assessor will be required at UDA development application stage.

(j) Sustainability - integrated water management

(i) Development must include water sensitive urban design measures to integrate water supply, wastewater and stormwater to ensure protection of the water cycle. This should be demonstrated by submission of a site-based Integrated Water Management Plan (IWMP) incorporating Water Sensitive Urban Design.

(k) Sustainability — waste management

(i) Site works and building design must facilitate the efficient sorting and disposal of waste to maximise recycling opportunities.

(l) Sustainability – biodiversity

(i) Landscape areas include at least 50% locally occurring native plants or species and species that provide habitat and food resources for local fauna.

(ii) Landscape species are locally occurring native plants, with preference given to endemic plants. Plants are of local provenance where possible. Where plants are non locally occurring they are demonstrated to be non invasive and non dispersive.

(iii) Development fronting the mangrove lined creek adjoining the boundary of sub-precinct 1a integrates the creek and its vegetation into the landscape and open space areas of the development.

(m) Sustainability – landscaping

(i) Landscaping incorporates native drought tolerant species.

(ii) For residential development, landscaping should constitute 30% of the site area and provide on site recreation opportunities.

(iii) For non-residential development, landscaping should provide a positive visual and amenity contribution to the public realm.

(iv) Landscaping should be designed and located so that it:

(a) can be observed and appreciated by the public at all times;

(b) addresses streets and open spaces to facilitate personal and property security, surveillance of footpaths and public open space, and to deter crime and vandalism; and

(c) takes advantage of microclimatic benefits allowing adequate on-site solar access and access to breezes.

(n) Brisbane Airport Aviation Facilities

(i) Development in the vicinity of Brisbane Airport must be consistent with *State Planning Policy 1/02 - Development in the Vicinity of Certain Airports and Aviation Facilities*, particularly with regard to building height, noise attenuation measures and lighting requirements.

(o) Erosion and sediment control

(i) Development must incorporate adequate erosion and sediment control.

(ii) Submit an erosion and sediment control plan to set out the required measures for all stages of development, including at the time of earthworks, road works and building work.

(p) Flood immunity

(i) Habitable rooms and non–habitable areas have acceptable levels of flood immunity.

(q) Stormwater Management

(i) A Site Based Stormwater Management Plan (SBSMP) must be prepared for all major and minor stormwater management measures.

(r) Site history

(i) Any development within vicinity of the Hamilton rock training walls (along the Brisbane River frontage of Precinct 1a) will need to determine the extent that the original walls are still in situ and if possible where and when any modifications, upgrades, and reconstructions have occurred. Prepare a statement of significance and recommendation on preservation, protection and on-going maintenance of this wall.

(s) Acid Sulfate Soils

(i) All development within the urban development area must consider and take appropriate action where necessary in accordance with the *State Planning Policy 2/02 - Planning and Managing Development Involving Acid Sulfate Soils,*

(t) Reconfiguration of a lot – lot layout

(i) Lots must have an appropriate area and dimensions for the siting and construction of potential buildings, the provision of outdoor space, convenient vehicle access and parking.

(ii) Lot size and dimensions must enable buildings to be sited to:

(a) protect natural or cultural features;

(b) address site constraints including slope, soil erosion, flooding and drainage;

(c) retain special features such as trees and views;

(d) ensure that lots are not subject to unreasonable risk, hazard, noise impacts or air quality impacts;

(e) ensure reasonable buffers between existing or potential incompatible land uses; and

(f) maximises solar orientation benefits to assist energy rating targets.

(u) Environmentally Relevant Activities

(i) Making a material change of use for an Environmentally Relevant Activity must comply with the purposes of the *Environmental Protection Act 1994.*

(v) Fill and excavation

(i) To the extent determined appropriate by the ULDA, fill and excavation shall be carried out having regard to the standards set out in Brisbane City Plan's *Fill and Excavation Code*.

(w) Prescribed tidal work

(i) Prescribed tidal works must comply with the *Coastal Protection and Management Regulation 2003*, Schedule 4A IDAS code for development applications for prescribed tidal work.

(x) Tidal work

(i) Tidal works must comply with the coastal management provisions under the *Coastal Protection and Management Act 1994*.

(y) Removal, destruction or damage of marine plants

(i) Removal, destruction or damage of marine plants must comply with the purposes of the *Fisheries Act 1994*.

Part 6. Infrastructure Contributions

1. Introduction

(1) Under the *Urban Land Development Authority Act 2007*, the ULDA may impose conditions relating to infrastructure, and the payment of contributions or the surrender of land for infrastructure for any urban development area.

2. Infrastructure requirements

(1) Under this interim land use plan, infrastructure contributions within the urban development area will be required and enforced through conditions attached to any UDA development approvals.

(2) As a part of the preparation of the permanent development scheme for the urban development area, the ULDA will prepare an infrastructure contribution policy. Until that time, by negotiation with the ULDA, development approved under this interim land use plan will be required to contribute towards essential infrastructure elements which will include (but not be limited to) delivery of:

(i) public passengers transport infrastructure

(ii) streetscape improvements

(iii) new roads and improvements to existing roads

(iv) bicycle and pedestrian paths

(v) water supply infrastructure

(vi) sewerage drainage infrastructure

(vii) stormwater drainage infrastructure

(viii) community facilities and public recreation land

(3) Contribution towards infrastructure may be in kind or by way of monetary contributions as considered appropriate by the ULDA.

Schedule 1

EXEMPT DEVELOPMENT

Development exempt from assessment against the Interim Land Use Plan.

Building work
Minor building work or demolition work
Material change of use of premises
Making a material change of use of premises implied by building work, plumbing work, drainage work or operational work if the work was substantially commenced by the State, or an entity acting for the State, before 31 March 2000.
Making a material change of use of premises for a class 1 or 2 building under the Building Code of Australia (BCA), part A3 if the use is for providing support services and short term accommodation for persons escaping domestic violence.
Reconfiguring a lot
Reconfiguring a lot under the *Land Title Act 1994*, where the plan of subdivision necessary for the reconfiguration – a. is a building format plan of subdivision that does not subdivide land on or below the surface of the land; or b. is for the amalgamation of two or more lots; or c. is for incorporation, under the *Body Corporate and Community Management Act 1997*, section 41, of a lot with common property for a community titles scheme; or d. is for the conversion, under the *Body Corporate and Community Management Act 1997*, section 43, of lessee common property within the meaning of that Act to a lot in a community titles scheme; or e. is in relation to the acquisition, including by agreement, under the *Acquisition of Land Act 1967* or otherwise, or land by – i. A constructing authority, as defined under that Act, for a purpose set out in paragraph (a) of the schedule to that Act; or ii. An authorised electricity entity; or f. is in relation to land held by the State, or a statutory body representing the State and the land is being subdivided for a purpose set out in the *Acquisition of Land Act 1967*, schedule, paragraph (a) whether or not the land relates to an acquisition; or g. is for the reconfiguration of a lot comprising strategic port land as defined in the *Transport Infrastructure Act 1994*; or h. is for the *Transport Infrastructure Act 1994*, section 240; or i. is in relation to the acquisition of land for a water infrastructure facility
Subdivision involving road widening and truncations required as a condition of development approval
Operational work
Clearing of vegetation other than marine plants
Operational work or plumbing or drainage work (including maintenance and repair work) if the work is carried out by or on behalf of a public sector entity authorised under a State law to carry out the work.

Erecting no more than one satellite dish on a premises, where the satellite dish has no dimension greater than 1.8 metres.
Tidal works – a. that will be used for a port authority operations, or a constructed public marine facility, or marine operations including navigation and safety by, for or safeguarded by Queensland Transport or a port authority; or b. for creating or changing the configuration or characteristics of a navigational channel
Filling or excavation where: a. to a depth of one vertical metre or less from ground level on land to that is not referred to in Brisbane City Plan's Acid Sulphate Soil Code, Wetland Code and/or Waterway Code and where the site is not listed on the Contaminated Land Register or Environmental Management Register OR b. top dressing to a depth of less than 100 vertical millimetres from ground level on land that is not referred to in Brisbane City Plan's Wetland Code and/or Waterway Code.
All aspects of development
All aspects of development a person is directed to carry out under a notice, order or direction made under a State law.
All aspects of development including maintenance that are incidental to and necessarily associated with the golf club activities and operations.
All aspects of development including maintenance, that are incidental to and necessarily associated with port facilities.
All aspects of development including maintenance that are incidental to and necessarily associated with a Park.
Development for a utility installation, being an undertaking for the supply of water, hydraulic power, electricity or gas, of any development required for the purpose of that undertaking by way of: a. development of any description at or below the surface of the ground b. the installation of any plant inside a building or the installation or erection within the premises of a generating station of any plant or other structures or erections required in connection with the station c. the installation or erection of an electricity distribution or supply network (and any components of such a network) which operates at voltages up to and including 33 kilovolts, excluding new substations d. the installation or erection of a new electrical transmission line on land on which such a line has already been erected and which is identified as a future line on Plan No: A4H303666- Powerlink Electricity Network and Plan No: 7775-A4/A-Energex 110kV Feeder Network e. the augmentation of a Powerlink substation identified on Plan No: A4-H-303666-Powerlink Electricity Network and of any Energex substation existing as at the date this clause took effect f. the placing of pipes above the surface of the ground for the supply of water, the installation in a water distribution system of booster stations and meter or switchgear houses - any other development not specifically referred to above except where it involves erection of new buildings or reconstruction or alteration of existing buildings that would materially affect their design or external appearance

g. any other development not specifically referred to above except where it involves erection of new buildings or reconstruction or alteration of existing buildings that would materially affect their design or external appearance

This exempt does not apply for a utility installation, where it involves:

- the erection of new buildings
- power generation plant where burning 100kg or more of fuel an hour
- reconstruction or alteration of existing buildings that would materially affect their design or external appearance
- waste handling, treatment and disposal facility

Development involving the construction, maintenance or operation of roads, busways and rail transport infrastructure, and things associated with roads, busways and rail transport infrastructure by or on behalf of or under contract with the ULDA, Brisbane City Council or the Queensland Government.

Things associated with roads, busways and rail transport infrastructure include but are not limited to:

- Activities undertaken for road construction
- Traffic signs and controls
- Depots
- Road access works
- Road construction site buildings
- Drainage works
- Ventilation facilities, including exhaust fans and outlets
- Rest area facilities and landscaping
- Parking areas
- Public passenger transport infrastructure
- Control buildings
- Toll plazas
- Rail transport infrastructure

Schedule 2

Definitions

Acceptable development for an Environmentally Relevant Activity Column 3 – Permissible Development is an Environmentally Relevant Activity associated with exempt, self assessable or approved UDA development.

Affordable housing refers to housing which can be reasonably afforded by low and moderate income households (including rental and home ownership).

Balance area refers to land not included within a precinct

Building work is as defined in the *Urban Land Development Authority Act 2007*

Busway is as defined within the *Transport Planning and Coordination Act 1994*

Cinema is as defined in the *Brisbane City Plan 2000*

Child care facilities is as defined in the *Brisbane City Plan 2000*

Contamination is as defined in the *Environmental Protection Act 1994*

Convention centre is as defined in the *Brisbane City Plan 2000*

Display and sales activities is as defined in the *Brisbane City Plan 2000*

Display dwelling is as defined in the *Brisbane City Plan 2000*

Development is as defined in the *Urban Land Development Authority Act 2007*

Development scheme is as defined in the *Urban Land Development Authority Act 2007*

Education purposes is as defined in the *Brisbane City Plan 2000*

Environmentally Relevant Activity (ERA) is as defined in Schedule 1 of the *Environmental Protection Regulation* made under the *Environmental Protection Act 1994*

Estate sales office is as defined in the *Brisbane City Plan 2000*

Filling or excavation is as defined in the *Brisbane City Plan 2000*

Gross Floor Area is as defined in the *Brisbane City Plan 2000*

GFA *means Gross Floor Area.*

Habitable Room is as defined in the *Building Code of Australia 1996*

Hotel is as defined in the *Brisbane City Plan 2000*

House is as defined in the *Brisbane City Plan 2000*

Indoor sport and recreation is as defined in the *Brisbane City Plan 2000*

Interim land use plan is as defined in the *Urban Land Development Authority Act 2007*

Marine plants is as defined in the *Fisheries Act 1994*

Medical centre is as defined in the *Brisbane City Plan 2000*

Minor building work is as defined in the *Brisbane City Plan 2000*

Minor demolition work is as defined in the *Brisbane City Plan 2000*

Multi-unit dwelling is as defined in the *Brisbane City Plan 2000*

Office is as defined in the *Brisbane City Plan 2000*

Operational works is as defined in the *Urban Land Development Authority Act 2007*

Park is as defined in the *Brisbane City Plan 2000*

Port facilities is as defined within the *Transport Infrastructure Act 1994*

Precinct refers to an area of land within the UDA on which certain development is assessable under this ILUP

Public passenger transport infrastructure is as defined within the *Transport Planning and Coordination Act 1994*

Radio or television station is as defined in the *Brisbane City Plan 2000*

Rail transport infrastructure is as defined within the *Transport Infrastructure Act 1994*

Reconfiguring a lot is as defined in the *Urban Land Development Authority Act 2007*

Restaurant is as defined in the *Brisbane City Plan 2000*

Road is as defined in the *Urban Land Development Authority Act 2007*

Shop *is as defined in the Brisbane City Plan 2000*

Short-term accommodation is as defined in the *Brisbane City Plan 2000*

Tidal works is as defined in the *Coastal Protection and Management Act 1995*

UDA Assessable Development means UDA Assessable Development – Permissible and UDA Assessable Development – Prohibited

ULDA refers to the Urban Land Development Authority

Utility installation is as defined in the *Brisbane City Plan 2000*

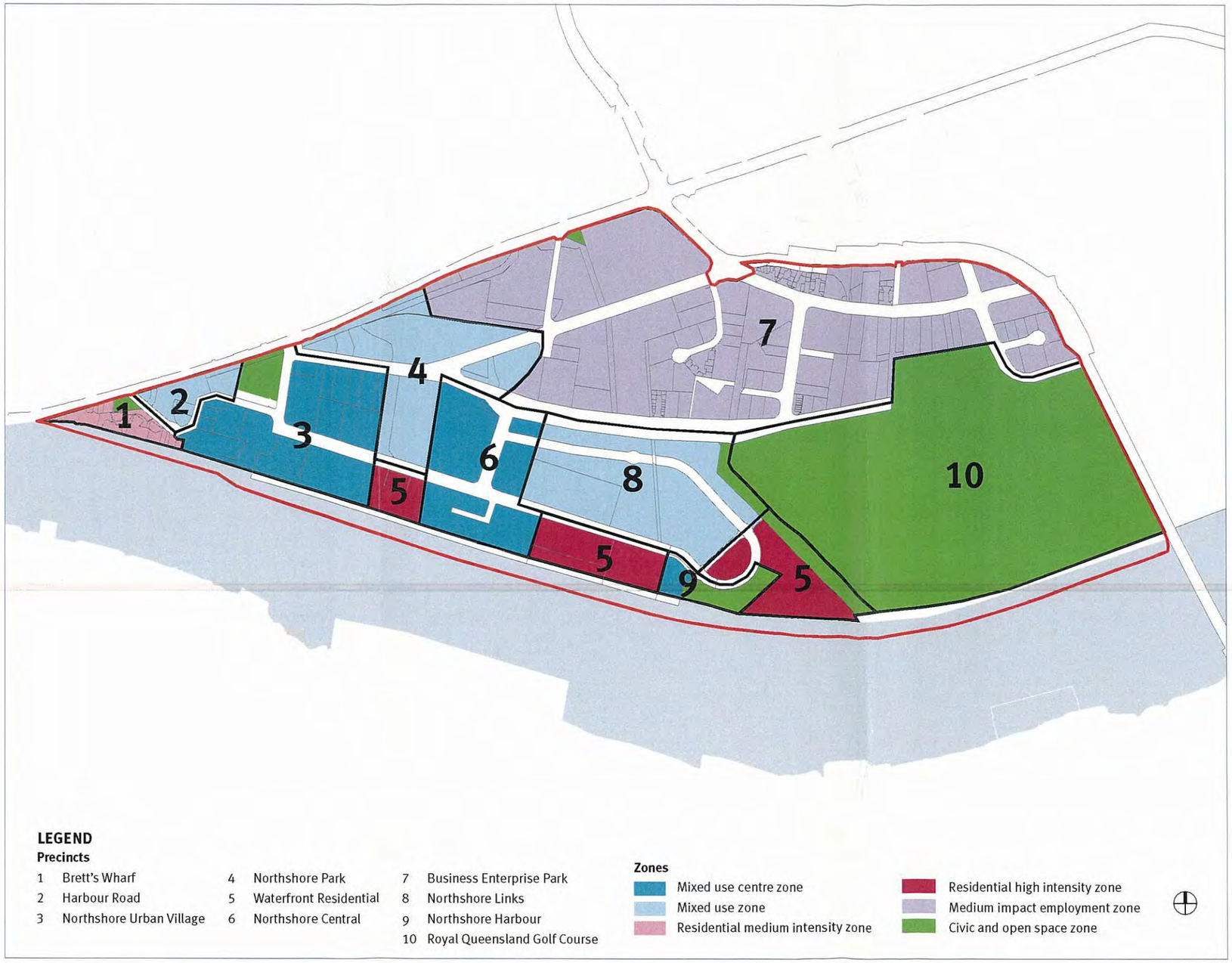
Introduction

The Northshore Hamilton UDA is divided into ten precincts and 14 sub-precincts. Land within the UDA is also allocated a zone.

The location and boundaries of the precinct and sub-precincts are shown in Figure 6: Zoning and precinct plan.

The zones are explained in detail section 3.3 of the land use plan.

Figure 6: Zoning and precinct plan



urban land development authority

UDA Flood Extent: Northshore Hamilton

Mapped and affected

Working Draft not Commonwealth, State or Local Government Policy

0 37.5 75 150 225 300 375

Metres

Map Produced by: Department of Infrastructure and Planning
Spatial Services 2011
Cadastre: July 2011
Flood Extent: DERM web service 2011
Imagery: DERM Flood Imagery Service 2011
2009 SPOT satellite
DERM Aerial photography

Queensland Government
Department of Infrastructure and Planning

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ATTACHMENT 4 – Land Ownership - Fitzgibbon Urban Development Area

Legend

	Fitzgibbon Urban Development Area
	State Government Owned Land
	Brisbane City Council owned or controlled land

Other sites are privately owned as indicated.

Town Planning Report
In Support of a
Material Change of Use
Application
253 Telegraph Road, Fitzgibbon
Lot 1 on RP802239

743 Ann Street, PO Box 1559, Fortitude Valley QLD 4006 Phone 07 3237 8899 Facsimile 07 3237 8833

CONTENTS

APPENDIX

1. SUMMARY

This application seeks preliminary approval to override the planning scheme for the City of Brisbane in accordance with Section 3.1.6 of the *Integrated Planning Act 1997* (IPA), for Material Change of Use to allow for the creation of Conservation area and Low Density Residential areas in accordance with a proposed Structure Plan and a proposed Telegraph Road Residential Development Code.

The site is bounded by Telegraph Road in the north, the Bill Brown sports fields in the east, a north-bound Citytrain line in the west and a residential area to the south. The site is approximately 114 hectares and largely vacant, consisting of remnant vegetation, and easements for electricity and gas distribution.

The site is currently in the ownership of the Queensland Housing Commission (Department of Housing). The Department of Housing (The Department), as a key provider of affordable and sheltered housing, occasionally has to dispose of assets in order to fund the provision of housing services and the development of housing projects to benefit the wider community. The subject site has been earmarked for disposal by The Department.

As a consequence of the disposal, The Department will not be developing the site. Accordingly, through the development and preparation of the Structure Plan, it has been the intention of the Department to achieve the highest and best possible development scenario for the site, taking into consideration the need to protect the high priority environmental values, and provide for a range of residential opportunities in this key area. Subsequent to the application being favourably decided it is the intention of the Department of Housing that the land will be sold. Having the Preliminary Approval in place will require future approvals and development to occur in accordance with the Structure Plan, the Telegraph Road Residential Development Code and the conditions of approval. Failure to develop generally in accordance with these documents would require fresh Material Change of Use approvals to be sought.

Prior to the preparation of the Structure Plan, the Department commissioned a detailed ecological investigation to ascertain which areas of the site are suitable for development and which areas need to be protected to ensure the retention of important habitat and corridor values. This study (Refer to Appendix G) included a review of the extensive ecological work undertaken to date and involved the most comprehensive Squirrel Glider survey that had been undertaken to date in South-East Queensland to determine the extent and viability of glider and raptor populations on the site and the wider area. This and a number of previous studies of the site (listed at Appendix I) formed the basis for the preparation of the Structure Plan. Core habitat areas and corridor opportunities were identified and earmarked for protection and other areas, such as disturbed or lower priority habitat areas, were considered suitable for sensitive development.

The Structure Plan has taken detailed account of local and regional infrastructure, the location of conveniences and services and surrounding land uses to provide a plan that facilitates the orderly development of the area.

Further, the Department has proposed that a sustainable development code be prepared in order to ensure that any subsequent development of the site provides the best opportunities to protect the natural environment and conserve valuable resources by requiring amongst other things that houses be energy and water efficient and that infrastructure development respects natural systems. The attached Telegraph Road Residential Development Code (Appendix F) requires that the subsequent development of the site incorporate *inter-alia* Water Sensitive Urban Design (WSUD) principles, water collection facilities within individual allotments, and energy and water efficiency measures.

It was a key requirement in the development of the Structure Plan for the site that the relevant State Government Agencies, Brisbane City Council and key Community representatives be consulted during the preparation of the Structure Plan, and this report details the programme of stakeholder consultation undertaken to date.

As a result of the above considerations, the Structure Plan proposed provides a substantial area of the site to be retained for conservation purposes to enable its long-term protection as a publicly owned conservation area. Residential precincts are proposed along with a Code to ensure that its development achieves a high standard of sustainability, provides a range of housing opportunities, and is well connected to local amenities as well as Brisbane's Central Business District through a legible movement system within the site and connections to major road and public transport infrastructure.

A comprehensive assessment of the site has been undertaken to ensure that such development, generally in accordance with the Structure Plan and Telegraph Road Residential Development Code would result in a high quality residential area surrounded by important and protected natural habitat. Detailed assessment reports are provided with this application to demonstrate that that the proposal achieves Council's intended outcomes in relation to infrastructure provision, accessibility, flood immunity and environmental protection.

The proposal achieves a balance between the need to protect priority areas of habitat within the City, ensuring their connectivity through a network of natural systems; and the need to provide new housing opportunities within easy reach of the City. In this instance, the proposal, once approved, provides the added benefit of securing valuable funds to enable the Department of Housing to deliver affordable housing solutions throughout Queensland.

It is further considered that Structure Plan and the detailed information that has been provided in support of this application might inform a Local Planning exercise for the Fitzgibbon area.

2. SITE DETAIL

Street Address	253 Telegraph Road
Suburb	Fitzgibbon
Real Property Description	Lot 1 on RP 802239
Site Area	114.1Ha
Area Classification	Emerging Community
Name of Owner	Queensland Housing Commission
Name of Ward & Councillor	Bracken Ridge: Councillor Carol Cashman

3. APPLICATION DETAIL

Aspects of Development	Preliminary Approval to override the Planning Scheme for the City of Brisbane in accordance with Section 3.1.6 of the Integrated Planning Act
Applicant	The Queensland Department of Housing C/- The PMM Group Pty Ltd PO Box 1559 Fortitude Valley QLD 4006 Ph. [redacted] Fax. [redacted]
Contact Person	[redacted] Town Planner

4. PROPOSAL

Description of Proposal

The proposal seeks preliminary approval for a Structure Plan to ensure the orderly development of the site. The Structure Plan proposes a significant area to be protected within a Conservation Precinct with the balance of the site to accommodate residential land uses. Development of the residential precincts is further informed by the proposed Telegraph Road Residential Development Code, which is intended to be a companion to the *House Code* for the site. The Telegraph Road Residential Development Code provides a number of detailed standards to ensure that high quality, sustainable housing is established at the site.

The application seeks preliminary approval for the proposed uses and movement network to allow detailed subdivision design and Master-planning to be undertaken by the ultimate developer of the site.

It is envisaged that the residential precincts will provide for development generally consistent with the Low Density Residential Area in Brisbane City Plan 2000. Accordingly, complementary land uses, such as for example Child Care Centres, Neighbourhood Centres and Multi-unit Dwellings would be subject to the same level of assessment as in the Low Density Residential Area.

The structure of the application proposes that:

- the subdivision of the site will be subject to applications for Reconfiguration of a Lot which will be Code Assessable as per Section 5.2.3 *Level of Assessment – Low Density Residential Area, Character Residential Area and Low-medium Density Residential Area* and in accordance with the *Subdivision Code* in *City Plan*;
- subsequent development of a House on lots approved under the above subdivision would be Self Assessable where in accordance with the *House Code*, *Residential Design – Low Density, Character and Low-medium Density Code*, the *Telegraph Road Residential Design Code* and where applicable, the *Residential Design – Small Lot Code*.
- complementary uses such as Shop, Child Care Centre and Multi-unit dwellings will be subject to Impact Assessment (Generally Appropriate) in accordance with Section 5.2.3 *Level of Assessment – Low Density Residential Area, Character Residential Area and Low-medium Density Residential Area* and the *Subdivision Code* in *City Plan*; and

- Development which is not consistent with the Structure Plan (including, for example applications involving amendments to precinct boundaries) would be subject to a fresh application for Material Change of Use.

5. SITE CHARACTERISTICS / INSPECTION

Location

The site is located at 253 Telegraph Road, Fitzgibbon. A locality plan is provided within the site analysis summary at Appendix D.

Road Frontage - Frontage width and street name

The site has frontage to Telegraph Road, an Arterial road as identified in the Brisbane Proposed Road Hierarchy (Planning Scheme Map 1 of 3)

There are two other roads that terminate at the site: these being Roghan Road to the east of the site; and Carselgrove Street at the South of the site. These roads are identified in City Plan as suburban roads, and are shown as through roads on Planning Scheme Map 1.

Topography

The site is gently undulating and ranges in height from approximately 9m AHD to approximately 20m AHD. The site contains two tributaries of Cabbage Tree Creek; the northern tributary is Carseldine Drain and the southern tributary is an unnamed drain. The northern part of the site accommodates relatively low lying areas subject to seasonal inundation, with a high point of around 20m AHD along the western boundary. Contours, waterways and wetlands are shown in the attached site analysis summary at Appendix E

Current use of site

The site is presently vacant. As a result, unauthorised motorised and non-motorised recreation occurs. Photos of the site are provided within the site analysis summary at Appendix E.

Ecology

There have been a number of detailed assessments of the environmental values of the site undertaken. The most recent two studies, undertaken by WBM Oceanics, have been attached to this report (Refer Appendices G and H). In addition, a bibliography of relevant ecological assessment reports is attached at Appendix I.

The site contains areas of ecological significance, including vegetation communities and a number of significant fauna species.

Flora

The site consists of a number of areas of vegetation listed under *Schedule 5 Significant Vegetation Communities* of the *Natural Assets Planning Scheme Policy* and areas considered to be *Endangered* and *Of Concern* in accordance with the *Vegetation Management Act (1999)(VMA)*. These areas are described and shown at Appendix H.

Fauna

The squirrel glider (*Petaurus norfolcensis)* has been identified on the site and is *Potentially Vulnerable* (Column 4) and Significant (Column 7) in Schedule 4 of the Natural Assets Planning Scheme Policy. The Grey Goshawk *(Accipter novaehollandiae)* is known to forage at the site and is identified in

Schedule 4 of the Natural Assets Planning Scheme Policy as Rare (Column 1) and subject to a medium level of threat at the regional level (Column 6) and Significant (Column 7)

A detailed assessment of the value of the site to Sugar Gliders and Raptors is attached at Appendix G. This report concluded that the preservation of core habitat areas and fauna movement opportunities is essential to ensure the viability of the population on site and the regional meta-population.

The site, though not listed in Schedule 2 of the Natural Assets Planning Scheme Policy as a significant site, may be considered to contain communities as identified in Schedule 1 as:

> ***8**. Communities and/or ecosystems classified as 'endangered' or 'of concern' in the Queensland Environmental Protection Agency document Conservation Status of Queensland's Bioregional Ecosystems (Sattler and Williams, 1999).*
>
> ***10**. Habitat areas or features supporting one or a group of Significant Fauna Species, Significant Flora Species, and/or Significant Vegetation Communities as identified in Schedules 3, 4 and 5 of this Policy.*
>
> ***21**. Areas identified as Waterways, Waterway Corridors or Wetlands in the Waterway Code or Wetland Code and as indicated on the Planning Scheme Maps, and the flora and fauna species/communities and ecological processes supported by these areas.*

Surrounding Land Use

The surrounding area contains a range of land uses.

The site is bounded along the west by the Sunshine Coast rail line and along the north by Telegraph Road. Its eastern boundary is formed by a large area of land designated as Sport and Recreation in City Plan. Much of the adjoining site to the east has previously been used as a landfill by the Brisbane City Council, and Energy Developments Limited has recently constructed a facility to generate electricity from landfill methane on this site. Part of this site, fronting Telegraph Road is used for active recreation.

West of the site, on the other side of the Sunshine Coast rail line is land designated within the Emerging Community Area under City Plan. An application has recently been approved by the Brisbane City Council to develop part of this area into low density residential areas with parkland along the Cabbage Tree Creek Corridor (Application No DRS/USE/H03-878039). The approved plans detail a large area of parkland and waterway corridor which provides a connection under the railway line from the adjacent site.

To the south east of the site are a number of large undeveloped allotments within the Low to Medium Density Residential area.

The south of the site is bordered by a number of Low-density residential developments, which enjoy close proximity to Carseldine train station.

6. PROPOSAL

This application seeks Preliminary Approval pursuant to section 3.1.6 of IPA, for the adoption of a Structure Plan (Refer to Appendix E) and the Telegraph Road Residential Development Code (Refer to Appendix F).

The Structure Plan depicts a conservation precinct, residential precinct, road and other access networks all designed to accommodate the environmental and scenic opportunities of the site and to maintain the

bushland character of the area, maximising the retention of existing vegetation. The Structure Plan is accompanied by the Telegraph Road Residential Development Code which seeks to ensure that sustainability design elements are incorporated into all subsequent developments on the site.

Each of the elements of the Structure Plan are outlined below.

Conservation

The identification of significant ecological areas on the site has formed the basis of the structure planning exercise.

WBM Oceanics have undertaken a detailed ecological survey and vegetation mapping exercise (Refer Appendices G and H).

The existing waterways and wetlands together with the significant vegetation across the site have been identified and are to be retained to protect key wildlife habitats and movement corridors between adjoining and more distant significant areas as identified in the attached report by WBM Oceanics. A key requirement of the survey has been to identify opportunities to provide ecologically functional and sustainable buffers between the site and other nearby and more distant natural areas necessary to sustain the regional meta-population of Squirrel Gliders.

The areas proposed to be designated as *Conservation* in the proposed Structure Plan include significant areas of the site identified as Wetlands or waterways corridors within *Map 2 of the Planning Scheme: Waterway Corridors and Wetlands*. These areas are particularly important as they will ensure that the hydraulic and ecological function of the waterway corridor linking Cabbage Tree Creek is retained. The Structure Plan incorporates the open space corridor, generally reflecting that indicated on the Brisbane Green Space System Map.

The bushland to be retained on site will continue to form an important core ecological habitat, in addition to allowing connectivity between natural areas to the west and the Cabbage Tree Creek corridor to the east.

In addition, these corridors may provide some passive recreation opportunities including a network of sensitive pedestrian and bicycle paths within disturbed areas with linkages to active open space areas within the site, the street network and adjoining land.

It is proposed that areas identified as *Conservation* on the Structure Plan will be dedicated as Parkland and transferred to the Brisbane City Council for inclusion in the Public Conservation Estate as part of subsequent development proposals.

Strategic Fauna Linkages

The proposed Structure Plan identifies a number of significant environmental corridors in addition to the waterways indicated on *Map 2 of the Planning Scheme: Waterway Corridors and Wetlands*. These corridors seek to implement the Green Space Corridor as shown on Map 1 of the Planning Scheme: Area Classifications and Proposed Road Hierarchy to 2011. They will provide opportunities for interconnectivity of habitat areas to facilitate the viability of local wildlife populations.

Residential Precinct

The structure plan proposes an area of approximately 60.5 hectares for future residential development. It is anticipated that this area will contain development consistent with the Low Density Residential Area and be developed in accordance with the proposed Telegraph Road Residential Development Code.

The residential areas have been nominated in areas remaining after priority conservation areas were determined.

Telegraph Road Residential Development Code

A Telegraph Road Residential Development Code has been prepared by the Applicant and focuses on sustainability principles that are to be incorporated into subsequent development of the site. The Code was developed to support the Structure Plan in achieving sustainable outcomes for the site and is intended to be applied in the design and development of housing at the site.

It is intended that the preliminary approval of the Telegraph Road Residential Development Code will guide the preparation of subsequent applications for Reconfiguration of a lot and be used in conjunction with the House Code to ensure the sustainable development of the residential areas. It is the intention that the Code provides additional Acceptable Solutions to the *House Code* and *Residential Design – Low Density, Character and Low-medium Density Code* in Chapter 5 of City Plan, when endorsed by the Preliminary Approval.

The significant site-specific elements of the Code include the following:

- Maximum building heights of 8.5m above natural ground level;
- Sustainability measures including natural ventilation, solar access, reduced energy and water consumption, recycling, sustainable transportation and sustainable building materials;
- Incorporation of water sensitive urban design features in the stormwater management system;
- Reduction of bushfire risk;
- An overall focus on protection and enhancement of the ecological functions and processes; and
- The provision of information to prospective purchasers of land within the site by a prospective developer relating to the environmental features of the site and encouraging the adoption of sustainability measures beyond those specified in the code and where applicable, advice on living adjacent to a high quality bushland area.

Movement Network

The proposed Structure Plan indicates a strategic movement network consisting of a number of levels, including:

- a suburban route proposed to carry public transport;
- indicative secondary access routes;
- pedestrian and cycle access through the site.

Surburban Route

The proposed suburban route follows the general route indicated in the City Plan, though, in order to achieve ecological outcomes for the site, meanders around the core ecological areas to join Telegraph Road to the west of the Norris Road. The proposed movement network does not provide for a Carselgrove Avenue connection to the south in order to manage traffic impacts on residential development, and ensure that traffic on the proposed new suburban route is minimised in the area where it adjoins the conservation area. The proposed route represents an appropriate balance between the need to ensure connectivity, and to ensure that high traffic volumes do not significantly impair movement of fauna.

This suburban route provides a connection through the site that will provide access to Telegraph Road from the proposed residential areas and a southerly access to Roghan Road linking the proposed upgrade of the existing sporting facilities with frontage to Telegraph Road.

The key elements of the proposed suburban route are that it provides the best possible balance between the need to:

- minimise the impact of the road on east-west fauna movement;
- reduce the scale of road construction such that fauna movement and/or hydrology is not impeded by large engineering structures (bridges and culverts) as may be required if the road was located in a more easterly position; and
- provide a legible movement network that accords closely with the routes depicted in City Plan.

Indicative Secondary Access Routes
The Structure Plan details a number of secondary access routes through the proposed residential precincts.

Pedestrian and Cycle Network
The Structure Plan also provides an indicative pedestrian and cycle network which provides for movement within and through the site, and to enable future residents to easily access the range of local facilities and conveniences. The indicative route is shown along the proposed surburban route, connecting Telegraph Road to Roghan Road and the proposed upgraded sports facilities. An indicative route is shown to the South to link to Carseldine Station and the local centre.

A detailed traffic impact assessment report, prepared by Lambert and Rehbein is attached at Appendix J.

In relation to the internal road network, Lambert and Rehbein have noted at Section 3.3 of their report that:

> *We consider that the road network as proposed;*
>
> - *provides for safe and efficient traffic movements to/from the subject site;*
> - *provides adequate road network linkages to the external road network for trips to broader destinations such as the Brisbane CBD and employment areas to the north of the site which are likely to be the most attractive;*
> - *provides suitable arrangements for servicing the site for bus travel, ensuring that the majority of the development is within walking distance of public transport;*
> - *minimises the potential for unnecessary vehicular intrusion through the site; and*
> - *minimises the potential impacts of the subject land on the sensitive receiving environment.*

Stormwater Management

An assessment of floodplain, waterway and stormwater management prepared by 4-Site is attached at Appendix L. The report provides details of stormwater quality and quantity assessment and methodologies, including Water Sensitive Urban Design (WSUD) and Biodiversity Friendly Urban Development (BFUD) measures.

The report provides a methodology for the preparation of a flood study which is to be undertaken by 4Site upon provision of details of the southern drain by the Brisbane City Council.

The report demonstrates that:

- The floodway function of existing waterways will not be impaired;
- The existing drainage system and flood inundation areas are not constraints to the development of the site (a flood study, consistent with Council's existing flood modelling, will be undertaken subsequently to confirm this assertion);

- Stormwater quality management can be achieved within the proposed development without detriment to waterways or bushland; and
- The development is consistent with conserving the wetland and waterway valves on site.

Services, Works and Infrastructure

An Infrastructure Engineering Report has been prepared by John Wilson and Partners (Refer to Appendix M). The report, in addition to the Floodplain, waterway and stormwater management report prepared by 4Site co (Appendix L) outlines specific engineering works strategies focusing on sustainable outcomes that should be adopted in the development proposal. The engineering strategies include:

- Promoting softer engineering approaches such as minimizing earthworks and reusing existing facilities and infrastructure;
- Locating service infrastructure within existing easements and disturbed areas to ensure that the impact of the development on the surrounding environment is minimised;
- Maximizing sustainable development opportunities such as reuse of water and waste-water and providing in-line stormwater treatment systems such as road drainage swales and detention basins, doubling as water quality treatment devices;
- Reinforcing responsibilities of self-sufficiency and using where practical appropriate micro-solutions and systems;
- Identify and protect important features before and during construction.

The Infrastructure Engineering Report concludes that with some minor augmentation, there is sufficient infrastructure capacity in the area to service such a development with reticulated services. In addition, the engineers have demonstrated that sufficient infrastructure can be installed in the site to provide for the development with minimal intrusion into conservation areas.

Summary

A comprehensive multi-disciplinary assessment has been undertaken to ensure that the proposed Structure Plan provides for the orderly and sustainable development of the site. It has been determined that the site is suitable and the infrastructure is available to accommodate the scale of development proposed.

7. STRUCTURE PLANNING

Please refer to the 'Site Analysis Summary' (Appendix E)

The Site is within the Emerging Community Area in *Brisbane City Plan 2000*. The site is within an area proposed for the development of a *Fitzgibbon Local Area Plan* and for which Brisbane City Council has previously commenced preparation such a plan.

Accordingly, The applicant sought to establish a robust process of Structure Plan preparation which:

- identifies the key environmental opportunities on the site;
- consults widely to ensure that the range of agencies views are taken into consideration;
- provides a rigorous assessment of key issues to ensure the proposal is feasible, environmentally sustainable and enables a high degree of connectivity with local and regional amenities and services; and
- determines the optimum strategic layout for the site.

The Structure Plan is supported by a Code to ensure that the sustainable development principles that have been incorporated into the Structure Planning process are carried over into the ultimate development of residential dwellings at the site.

The preparation of the Structure Plan has included the conduct of pre-lodgement discussions with the Brisbane City Council, a number of local community representatives and relevant of State Government agencies, including:

- Department of Housing;
- Environmental Protection Agency;
- The Department of Natural Resources, Mines and Energy;
- The Department of Primary Industries and Fisheries;
- Queensland Rail; and
- Queensland Transport

Consultation has occurred with a number of Brisbane City Council staff, including Councillor Carol Cashman, Councillor for Bracken Ridge, Greg Bowden of the Lord Mayor's Office and a number of representatives of Environment and Parks, Traffic and Transport, Water Resources and City Planning. For more details, refer to Section 11 of this report.

This Structure Plan has been prepared to ensure a comprehensive and integrated planning approach to the development of the subject site and demonstrates the potential for the integration of the site into the local area.

The Structure Plan provides for future site development at the broad land use level, to allow a developer in discussion with the Council to determine the most appropriate development configuration. As a result, this application contains no Reconfiguration of a Lot component or conceptual lot layouts. It is intended that such details will be comprehensively addressed at later reconfiguration stages. The Structure Plan and Telegraph Road Residential Design Code provides a sound basis for the sustainable development of the site.

Accordingly, the structure planning process has identified the following preliminary design elements;

- environmental opportunities and constraints;
- open space networks;
- road networks;
- public transport routes;
- pedestrian and cyclist links;
- community facilities;
- major stormwater flow paths;
- major servicing issues; and
- indicative land use types and suggested development densities.

Once the Structure Plan and Telegraph Road Residential Design Code has been approved by Council, it is anticipated that it will be used as a guide for the detailed design components and the design of individual subdivision stages of development.

It is also considered that the Structure Plan and Telegraph Road Residential Design Code, in addition to the significant background material accompanying this application may inform the preparation of a Fitzgibbon Local Area Plan.

A response to the performance criteria contained in the Structure Planning Code of City Plan is provided at Appendix O of this report. In addition, Section 10 of this report provides further details in relation to the other material contained in the Structure Planning Code.

The proposed Structure Plan therefore complies with the requirements of the Structure Planning Code.

8. ELEMENTS OF THE APPLICATION

Level of Assessment

The application seeks preliminary approval to override the planning scheme in accordance with Section 3.1.6 of the Integrated Planning Act to establish precincts of Low Density Residential and Conservation over the site. The application is subject to Impact Assessment (Generally Appropriate) as a Structure Plan has been prepared in accordance with City Plan requirements.

Area Designation and Local Plan Area

The site is within the Emerging Community Area, and is shown in the Strategic Plan as Residential Neighbourhoods with an area of Open Space Corridors from west to east along the Cabbage Tree Creek Corridor. The site is adjacent to a large area of Sport and Recreation land to the east and properties within the Low to Medium Density Residential (LMR) Area to the south east.

The site is not within an existing Local Plan Area. The site is within the area for the proposed Fitzgibbon Local Plan and as such it is expected that the structure plan for this application will inform the Local Planning exercise.

Codes

The following Codes have been identified as being relevant to the application and are addressed in the sections indicated.

Codes	Report Appendix
Primary Codes	
Structure Planning Code	Appendix O
Secondary Codes	
Biodiversity Code	Appendix P
Services, Works and Infrastructure Code	Appendix M – Infrastructure Engineering Report
Stormwater Management Code	Appendix L – Preliminary Assessment of Flood Plain, Waterway and Stormwater Management
Transport, Access, Parking and Servicing Code	Appendix J – Traffic Impact Assessment Report
Waterway Code	Appendix P
Wetland Code	Appendix P

9. REFERRAL COORDINATION / AGENCIES

The application will require Referral coordination pursuant to section 3.3.5 of the Integrated Planning Act 1997 (IPA) as it seeks preliminary approval to override the planning scheme in accordance with Section 3.1.6 of the Act.

The Department of Housing sought confirmation from the Department of Local Government and Planning in relation to the likely referral agencies for such an application. Each of these agencies have been consulted during the preparation of the application and are familiar with the content and form of the application. Further details are provided in Section 11 of this report.

10. COMPLIANCE SUMMARY

STRATEGIC PLAN

The property is located in the Residential Neighbourhood classification of the Strategic Plan, which contain residential areas and related amenities and facilities. The site contains a Green Space Corridor, which are intended to link and unify the Brisbane Green Space System.

The critical elements of the Residential Neighbourhoods are *liveability, residential character, safety, servicing and accessibility – developing a sense of community.*

"The components of the residential neighbourhoods strategy are to:

- *meet realistic expectations of future amenity;*
- *ensure housing choice and affordability;*
- *promote increases in density near high quality public transport and close to the City Centre;*
- *maintain character;*
- *provide access to services and facilities;*
- *maintain lands of environmental and scenic value;*
- *discourage isolated subdivisions in developing areas and encourage land amalgamation and forward planning of neighbourhoods;*
- *provide for some mixed use development;*
- *coordinate the orderly cost effective provisions and augmentation of infrastructure."*

Section 4.2.2.6 of the Strategic Plan (Ch.2 of the City Plan 2000) states that *development in Emerging Community Areas is to be orderly, well planned and will provide a diverse range of housing types and supporting uses. New development is to achieve good urban design outcomes, connectivity in roads and open space and support local character identified in any relevant Local Plan.*

In preparing the Structure Plan, the applicant has sought to provide the foundation by which the ultimate developer can achieve a high quality residential development; incorporating the principles of environmental sustainability, good urban design, connectivity at a local and regional scale and opportunities for a range of housing types, adjacent to an area of important bushland.

The proposed Structure Plan outlines the development footprint, movement network and conservation areas, ensuring large areas of important ecological habitat are protected in perpetuity and that pedestrian, cycle and vehicular movement within and through the site is optimised.

The proposal will result in subsequent development that provides a mix of housing choice and retains an adjoining high quality bushland environment. The natural character of the site is maintained through the retention and rehabilitation of significant vegetation, wildlife habitats and wildlife movement corridors. These environmental corridors will also provide attractive pedestrian connections through the site and to adjoining development and local services. An integrated road network will be provided within the development and provide accessible and convenient connections to the adjoining road network and the nearby Carseldine train station. The site will be developed in an orderly sequence to ensure the appropriate provision of infrastructure to the development.

Urban Design and sustainable design principles have been adopted to create a development that retains the bushland character, protects environmental values, provides for community safety and creates integrated and easily accessible movement networks through the site – overall, creating a strong sense of community.

Brisbane Green Space System

The site contains a Green Space Corridor as identified on Strategic Plan Map C: Brisbane Green Space System. Section 4.4.2 of the Strategic Plan notes that:

> ***Green space corridors*** *are to link and unify the Brisbane Green Space System. These corridors comprise a network of ecological, waterway, recreation and foreshore corridors linking major conservation, parkland and recreation areas in the City and neighbouring local governments areas. Land in any of the five Green Space components may contribute to green space corridors.*
>
> ***Green space corridors*** *are also intended to serve as physical breaks and buffers in the urban area, to increase the sense of identity for local communities and to serve floodway and drainage functions. Green space corridors are to allow wildlife movement, provide access to refuges or alternative habitat, provide habitats in their own right, connect areas of wildlife habitat and maintain and enhance biodiversity and the viability of ecosystem functioning generally.*

The proposed Structure Plan complies with this intent as it seeks to retain a corridor in the area indicated in Map C of the Strategic Plan. The Structure Plan proposes a large conservation precinct that retains significant habitat areas including a waterway corridor which forms part of the Cabbage Tree Catchment.

It is envisaged that the conservation precinct indicated on the Structure Plan will form an Conservation and Recreation component of the Brisbane Green Space System, providing approximately 53.5 hectares as a key area of habitat for the long term protection of natural systems and the potential for some low impact, passive or nature-based recreation.

A comprehensive assessment of the proposal has been undertaken to ensure that the important elements of the site are preserved and protected in accordance with Section 4.1.2.3 of the Strategic Plan.

Intent of Area – EMERGING COMMUNITY AREA

The Emerging Community Areas are intended for urban purposes at some future time. These areas have not been fully investigated and may contain pockets of land unsuitable for development because of scenic or environmental constraints. All land in this area requires preparation of a neighbourhood structure plan before development can occur.

The Emerging Community Area is recognised by the City Plan as being generally suitable for urban development. It is recognised that these areas have not been fully investigated and may contain pockets of land unsuitable for development because of scenic or environmental constraints. As such, City Plan requires that development within the Emerging Community Area should accord with a *Neighbourhood Structure Plan*.

This application provides the Neighbourhood Structure Plan to guide the future development of the site. The Structure Plan provides for areas of housing development and a large conservation area along with an indicative road network. Subsequent development, subject to applications for reconfiguration of a lot will be required to accord with the Structure Plan, supported by the Telegraph Road Residential Development Code.

The application therefore accords with this intent as it provides for the orderly development of land in accordance with the Structure Plan while protecting significant areas of the site for conservation purposes.

DESIRED ENVIRONMENTAL OUTCOMES (Emerging Community Areas)

1. ***A range of housing types and opportunities are provided to meet different needs, lifestyle choices and housing market diversity.***

   It is intended that housing choice will be provided within this development through a range of housing types to meet different needs and lifestyle choice. The provision of a large area for residential development, in addition to large areas to be retained for conservation purposes, allow the range of opportunities afforded by City Plan to a Low Density Residential Area. The site allows for the development of residential areas in the vicinity of public transport and local amenities, with close connections to major transport routes and adjacent to a large conservation area with natural area linkages to Cabbage Tree Creek and Moreton Bay.

   The proposal clearly accords with this DEO in that the Structure Plan provides for a wide range of housing opportunities.

2. ***Land is developed in an orderly sequence, and in accordance with a neighbourhood structure plan and/or Local Plan***.

   A Structure Plan has been prepared for the site which seeks to provide for the orderly development of the site and to ensure that future development is well integrated with surrounding areas. The Structure Plan provides for areas of residential development to the north west of the site and most of the southern area of the site. An indicative road network has been included in the proposed Structure Plan to ensure that the site provides connections to surrounding areas for motor vehicles and pedestrians. The proposal will provide for future development which is consistent in scale with surrounding land uses and be in close proximity to local services and amenities and public transport routes.

   The structure plan, once approved by the Council, will provide the basis for the orderly development of the area.

   Development of the site will be subject to further applications to the Council for Reconfiguraton of a Lot.

3. ***Land is developed in a sustainable manner to reflect the general form of the City by integrating development sites, community infrastructure, greenspaces and important natural features.***

   The site is integrated with existing development in the area and will provide a logical extension to local neighbourhoods. The form of the local area will be retained through the development of mainly low-density residential development. The large dedicated conservation area is well integrated with local open space and natural area networks. Pedestrian and bike paths will also be provided throughout the site to provide connections to the adjoining parks and residential neighbourhoods and other local facilities.

   The proposal provides a Telegraph Road Sustainable Development Code which provides for the incorporation of sustainability initiatives into subsequent development, including Water Sensitive Urban Design (WSUD) principles and the incorporation of energy and water efficiency measures. In

addition, the proposal is within close proximity of a range of services and as such will encourage walking, cycling and the use of public transport.

4. ***Significant historical, architectural, topographic, landscape, scenic, social, recreational and cultural features and associations, as well as fauna and flora habitats, fauna movement corridors, wetlands and waterway corridors, are protected and enhanced and incorporated into the overall development of the area.***

   Retention of valued vegetation and regeneration of vegetation within environmental buffers, bushland and waterway corridors provides visual amenity and protects the bushland character and wildlife corridors through the site. Approximately 53.5 hectares of the site, being areas with high habitat value, will be retained and transferred to the Council for environmental purposes.

5. ***Development is well planned and integrated with surrounding land uses, and is supported by local centres and basic community facilities.***

   In addition to linkages to environmental areas and corridors, the site is located in close proximity, to a range of conveniences and local amenities. The site is adjacent to the Bill Brown Sports Field, an active sporting area with links to the Cabbage Tree Creek open space corridor. A number of parks are located in the adjoining areas to the south and on the northern side of Telegraph Road and a district sporting facility is proposed on the former landfill site adjacent to the site.

   In relation to transport, the site is within close walking distance of the Carseldine train station, to which access will be improved with the provision of a pedestrian/cycle link from the site. A bus stop exists at Bracken Ridge Plaza, which provides services to QUT Carseldine Campus, Brisbane North Institute of TAFE and a number of other conveniences as well as linkages to the Brisbane CBD.

   The site is within close proximity of a number of small shopping centres, including walking distance to Bracken Ridge Plaza.

   The site is within a few minutes drive to major transport linkages including the Gateway Motorway (2.5km east) and the Gympie Arterial (1km west). There are a number of state and private schools in close proximity of the site.

6. ***Development does not impinge on existing or intended use of adjacent areas. Buffer areas are provided. Any interim uses do not prejudice future development.***

   The development is integrated with surrounding residential areas, provides vegetated buffers and environmental corridors and incorporates environmentally sustainable principles to ensure minimal impact on the adjoining conservation areas and existing and future residential development surrounding. The proposed development is consistent with the Strategic Plan designation for the site and as such, no future development opportunities will be prejudiced.

7. ***Roads and other transport corridors are coordinated and interconnected to ensure pedestrian, bike, public transport and private vehicle accessibility between neighbourhoods, Centres and other locations, providing a range of services and facilities.***

   Integrated pedestrian and bike paths will be provided through the site and along corridors to provide connections between precincts and to the adjoining parks and residential neighbourhoods, local amenities and public transport. It is proposed to extend Roghan Road to link Telegraph Road at the north of the site. The Roghan Road extension will provide for a public transport linkage through the site and create a system of private internal roads to provide safe and convenient access to the housing.

8. Urban Design promotes a sense of place and identity and community safety.

Urban Design Principles have been adopted along with an ESD focus to create a development that retains the bushland character of the site and provides integrated movement networks that allow for casual surveillance and therefore, increased community safety. The proposed development will create a number of neighbourhoods with bushland vistas adjacent to natural areas, active parkland and pedestrian and cycleways and as such will provide a strong sense of community identity.

Structure Planning Code (Amended 1 January 2005)

The Structure Plan has been prepared in accordance with the Structure Planning Code, in particular, the most recent (January 2005) version.

The responses to the performance criteria have been attached at Appendix O.

The application seeks to reduce the level of assessment for reconfiguration of a lot and subsequent development such that it is consistent with Section 5.2.3 of City Plan: *Level of Assessment – Low Density Residential Area, Character Residential Area and Low-medium Density Residential Area.* The development of a House will therefore be Code Assessable where in accordance with the House Code and Telegraph Road Residential Development Code. Complementary land uses such as a shop, Child Care Centre or Community Centre will be subject to Impact Assessment (Generally Appropriate). Development which is inconsistent with the Structure Plan will be subject to Impact Assessment and as such a new application will be required.

The preparation of the Structure Plan accords with Section 6.1 of the Structure Planning Code, in that a comprehensive site analysis exercise and consultation with relevant stakeholders has been undertaken (refer Appendix D).

Demonstrating Integration
The Structure Plan proposes residential development and conservation areas which are compatible with surrounding uses. The proposal fits into the road hierarchy by providing a suburban route connecting Roghan Road and Telegraph Road. The proposed road will provide options for access to a proposed Council District Sporting facility on the former landfill site via Roghan Road or an improved access point on Telegraph Road (at its current location). The proposed road location has been determined in close consultation with an Ecologist and is considered to be the optimum location to ensure the need to provide adequate access is balanced with protection of core habitat areas.

The proposal provides for the orderly subdivision of the subject site within the Emerging Community area.

The proposed structure plan has not identified specific localities for parks, though it is anticipated that subsequent applications for reconfiguration of a lot will provide parks and recreation space in accordance with Section 5.1.1 of the Subdivision Code. The Structure Plan does not indicate locations for local shops as the most appropriate location of a local shop will be dependant on the design of residential areas and subject to an Impact Assessable application.

The proposal ensures that:

- *Land is used primarily for residential purposes*. The site is intended primarily for conservation and residential purposes.
- *Residential Communities are well serviced*. The site is located in close proximity to a range of local services (refer Appendix D).

- *Residential Development has good access to public transport, local parks, schools, shops and community facilities*. The site is well located and all properties to be developed in subsequent development pursuant to the preliminary approval will be in close proximity to local amenities.
- *Residential Development provides appropriate housing choices for all people*. The structure plan provides for the development of the site to provide for a range of housing types. The preliminary approval will provide the basis for subsequent reconfiguration application to accord with the Subdivision Code and provide a range of housing opportunities consistent with the Low Density residential area.
- *The proposal does not impinge on the legitimate operation of existing areas*. The proposal will not impinge on the legitimate operation of existing areas. In addition, the proposal provides sufficient buffering between proposed residential areas and the former landfill site.

Brisbane City Plan 2000 – NATURAL ASSETS PLANNING SCHEME POLICY

The Structure Plan has been prepared based on the findings of a detailed ecological assessment of the report and has therefore been designed around the need to allow for the development of this strategically important land whilst retaining its important environmental features.

Whilst the site is not included in the Natural Assets Planning Scheme Policy in itself, a number of the sites feature are (Refer to Section 5 of this report).

The Structure Plan protects these features through dedication as Conservation Area and provides for the transfer of these areas to the Brisbane City Council for inclusion in the Public Conservation Estate, as part of subsequent development applications for reconfiguration of a lot.

11. PRE-LODGEMENT DISCUSSIONS AND CONSULTATIONS

The applicant was keen to ensure that a robust consultation programme was undertaken with the Brisbane City Council and relevant referral agencies. The intention of a comprehensive consultation programme was to:

- Ensure that relevant agencies were aware of the proposal and able to contribute to the planning of the site; and
- Identify any issues that may be important in considering any development scenarios for the site and be able to report on these to streamline the application.

As a result, numerous meetings were held with a number of representatives of Brisbane City Council, State Government Agencies, the Councillor for Bracken Ridge, Councillor Carol Cashman, and a number of Community representatives.

An outline of the prelodgement discussions and issues raised is provided below.

In a letter from the EPA dated 5 March 2003, in response to a request from the Department of Housing seeking comments on the development of the site, the Director General advised that the EPA:

> *… supports the development of the site, maximising retention of significant ecosystems, minimising ratio of boundary area to these systems and maximising connectivity with vegetation communities.*

The Department of Housing held a meeting on 4 April 2003 with [redacted] of City Planning and then Lord Mayor Tim Quinn to discuss the planning of the site.

A letter from the Director of Environment, Southern Region of the Environmental Protection Agency to Brisbane City Council on 6 June 2003 outlined the values of the site and advised that the department does not oppose development in areas identified as not environmentally significant in the Lord Mayors letter of December 2000. The Environmental Protection Agency advised that the planning and design of the site should occur in consultation with the local community and incorporate a range of ecologically sustainable residential development features.

An initial meeting was held between [redacted] of the Development Assessment Team North, [redacted] and [redacted] of City Planning, and [redacted] of Environment and Parks and PMM on 1 August 2003 to discuss the status of the draft Fitzgibbon Local Area Plan and seek input on the level of information required to support a planning application for the structure plan.

A specialist ecology meeting was held on Wednesday 20 August 2003 involving [redacted] from Brisbane City Council, [redacted] and [redacted] rom WBM and [redacted] from PMM. The meeting centred around the detailed ecological work conducted to date and resolved to discuss the matter further in coming weeks once Council had an opportunity to review the findings of the WBM report.

An additional meeting was held between WBM and Environment and Parks Branch on 3 September 2003 in which the WBM Squirrel Glider study was discussed and it was agreed by Council that the work undertaken by WBM provided a good basis for further discussions. The maintenance of core habitat and functional habitat linkages to maintain a viable glider population on the site in addition to discussions relating to the 'relative' value of the southern corridor to Carseldine Campus.

A meeting was held in September 2003 with [redacted] of City Planning and [redacted] of Environment and Parks Branch. A proposed development footprint was discussed and PMM tabled a draft Structure Plan for comment. Council's officers indicated that the proposal accorded generally with their expectations for the site.

A meeting was held on 12 January 2004 with Department of Housing, PMM and WBM Oceanics Ecologist [redacted] to brief relevant State Government Agencies and seek feedback on the proposed structure plan. In attendance were: [redacted] rom the Department of Main Roads, [redacted] and [redacted] from Queensland Rail, [redacted] and [redacted] from the Environmental Protection Agency, [redacted] from the Department of Natural Resources and Mines and [redacted] from the Department of Primary Industries.

A number of issues were raised in this forum. The Environmental Protection Agency indicated that a minimum of 50Ha should be retained for conservation. There was some discussion in relation to the need to ensure a pedestrian and cycle link to the south, and the opportunity to achieve higher density residential development in areas close to Carseldine Train Station. It was noted that any potential noise impacts from the railway line and future upgrade of Telegraph Road should be considered. The Department of Primary Industries were keen to ensure that drainage lines would be preserved.

A meeting was held with Department of Housing and officers of the Environmental Protection Agency on 19 March 2004 to discuss the draft Structure Plan and the WBM Oceanics report and with a view to gaining the EPAs in principle support for the Structure Plan and development application process.

A meeting was held between PMM and officers of EPA and Housing on 16 April 2004 in which EPA officers sought clarification in relation to the (previously proposed) Conservation Residential precincts and offered in principle support for the plan. The EPA by letter of 29 April 2004 advised that they generally support the draft structure plan for the site (refer Appendix N).

A meeting was held on 28 June 2004 between Councillor Carol Cashman (Councillor for Bracken Ridge) and [redacted] of the Lord Mayor's Office, Department of Housing and PMM. Councillor Cashman was generally supportive of the proposal provided access and parking issues were adequately addressed and that the proposal did not result in high density development. Councillor Cashman noted that she was keen to ensure that local community representatives were consulted on the proposal, particularly in relation to ecological issues.

A meeting was held with Queensland Transport and Queensland Rail on 13 August 2004. The two agencies were generally supportive subject to the provision of a connection between the developable area and the train station in the south. At that stage, an indicative pedestrian cycle link was not shown. The need to ensure noise issues were adequately addressed was discussed. It was also suggested that increased densities be provided for in the south of the site adjacent to the Carseldine train station and adjoining local centre

A meeting was held with a Councillor Carol Cashman and a number of representatives of local community and environmental groups at the Bracken Ridge Ward Office on Thursday 7 October 2004. There were some concerns raised in relation to the loss of areas of bushland and the possibility of the integrity of the bushland being reduced through increased edge effects.

The applicant wrote to the relevant State Government Agencies that had responded in writing on 24 August 2004 seeking their support for the proposed Structure Plan.

The Department of Primary Industries and Fisheries indicated by letter of 1 September 2004 (refer Appendix N) that they have no objections in principle to the proposed development subject to a number of conditions.

Queensland Rail (QR) advised by letter of 21 September 2004 (refer Appendix N) that they support the proposal in principle, noting that they would like to see a (pedestrian and cycle) linkage provided to link to Carseldine Station and through to Carseldine Campus of QUT. QR noted in addition, that they are keen to see increased densities in the south of the site adjacent to the Carseldine train station and adjoining local centre.

A meeting was held with officers of the Brisbane City Council to discuss the draft structure plan on 11 October 2004. In attendance were [redacted], [redacted] from City Planning, [redacted] and [redacted] rom Environment and Parks Branch, [redacted] from Water Resources Branch, [redacted] from the Development Assessment Team North and J[redacted] from Traffic and Transport Branch. [redacted] (Ecoserve) and [redacted] (4Site) were in attendance in addition to [redacted] and [redacted] from PMM.

A number of issues were discussed including the principle of strengthening core habitat areas and east west corridors in preference to the southern fauna linkage which may be compromised by upgrades to Beams Road such as construction of an overpass over the train line. Other issues discussed included the likely extent of filling on site, and Council officers requested that detailed information was submitted in support of the Preliminary Approval detailing any filling and excavation that may be required to enable subsequent development pursuant to the Structure Plan. Council officers considered it important to achieve a balance between ecological and hydrological considerations in determining the final layout for the site. Council was happy to consider the possibility of making improvements to downstream hydraulics provided ecological benefits accrue.

The Council indicated that the proposed road layout should provide access to a proposed sports and recreation facility to be constructed on the former Fitzgibbon Landfill site. Council noted that the proposed suburban route should be suitable for buses.

Other issues discussed include:

- The need to include alternative water use strategy; and
- Provide sufficient buffering to the landfill to minimise the likelihood of leachate impacts to residential properties.

The Structure Plan was amended following this meeting to its current form. As a result of the meeting and subsequent meetings with the Consultancy Team consisting of [redacted] from Ecoserve and Norrie Sanders from 4Site, it was considered preferable to retain a larger area of bushland in the core area of the site in favour of a southern linkage which would be limited in its effectiveness by proposed upgrade to Beams Road and the potential intensification of development around the Carseldine Train Station. As a result a proposed southern linkage was removed. The linkage, consisting of a residential precinct proposed to be called a *Bushland Residential Precinct* was intended to provide fauna movement opportunities by allowing for large lot development with Building Location Envelopes (BLEs) with an indicative density of around 5 dwellings per hectare. The core bushland area of the site was substantially increased in the northern area to 53.5 hectares and the conservation area was increased to ensure a direct linkage between the site and a recent Brisbane City Council acquisition site (Lot 24 on SP160371). As such the Structure Plan provides improved opportunities for east-west fauna linkages from the west of the site through to the Cabbage Tree Creek corridor to the east.

The Environmental Protection Agency were asked by email to support this most recent amendment to the structure plan and have indicated by letter of 23 December 2004 that it is difficult to determine whether the most recent proposal provides a preferable biodiversity outcome to the scheme to which the EPA was referring in their letter of 29 April 2004. A copy of the response is provided at Appendix N.

As such, the final structure plan has taken into consideration the suggestions and requirements of the Brisbane City Council and referral agencies. This, combined with detailed technical input from relevant consultants has ensured the development of a structure plan that achieves high quality environmental outcomes for the site.

12. INTEGRATED PLANNING ACT (1997) CONSIDERATIONS

Referral Co-ordination

The application requires referral co-ordination triggered by Section 3.3.5(c) of IPA in that the application seeks a preliminary approval under Section 3.1.6 of IPA.

13. ISSUES

Consultation with State Government Agencies

Significant consultation has occurred with State Government Agencies that are likely to be Referral Agencies, as outlined in Section 11 of this report. The agencies involved in the consultation were identified by the Department of Local Government and Planning's Referral Coordination Unit as those that would be nominated as part of the referral coordination process.

The agencies support the proposal in principle and formal responses are attached at Appendix N.

Natural Values

The identification of core environmental values has formed the basis of the Structure Plan preparation.

In order to fully understand the ecological values of the site, and to determine any areas available for residential development, WBM Oceanics were engaged to:

- Undertake a review of previous studies of raptors and Squirrel Gliders as they relate to the study site;
- Conduct a comprehensive field survey to investigate squirrel glider population densities and habitat use on site;
- Undertake a Population Viability Assessment (PVA) for the squirrel glider population supported by the subject site and assess the sites value as it relates to a potential glider meta-population within the local area; and
- Assess the raptor habitat values of the subject site and their context within the local area.

The report found that there is approximately 87 hectares of habitat on the site which may be suitable for use by Squirrel Gliders and determined a squirrel glider density of 0.62 per hectare. In relation to Population Viability Assessment, the study determined that the population would be unlikely to persist on the site unless connected to other populations. Indeed it was considered that, allowing for catastrophe (fire, drought) up to 23 local patches of habitat, including patches west of Gympie Road, would need to be inter-connected through a series of fauna movement corridors to ensure a viable population is maintained in the area.

The report concluded that the subject site is suitable for development, recommending that:

- The area to the north dominated by *Broad-leaved Paperpark* should be preserved in it's entirety;
- The removal of any mature habitat (referring, in particular to the large areas of Blue-gum) should be accompanied by actions to ensure connectivity with other remnant patches, including across the rail line at the western boundary of the site;
- Existing areas of sapling regrowth, exotic grassland areas and the former quarry on the site could support development without impacting on the Squirrel Glider population;
- Any development be accompanied by a series of amelioration measures, including:
    - Ensuring opportunities for off-site movement by gliders are maintained or enhanced; and
    - Ensuring that glider mortality is not exacerbated by the introduction of domestic animals and maintaining suitable tree spacings.

The report also noted that areas of sapling regrowth to the east of the site and north of Roghan Road may in the future contribute important habitat and should be retained if possible.

In relation to Raptors, the report recommended the protection of the *Melaleuca quinquenervia – Eucalyptus teretecornis – Lophostemon suaveolens* tall open forest and the provision of buffering to ensure these areas are separated from cleared and developed areas. In addition it was recommended that the sites value of a stepping stone for movement of forest raptors through the study area is not reduced.

As a result, the Structure Plan has been prepared to provide primarily for the protection of significant environmental values and priority corridor areas. Following detailed ecological advice and discussions with relevant State Government Agencies and the Brisbane City Council, the structure plan proposed incorporates a substantial core conservation area of approximately 53.5 hectares that both, provides a large core habitat area and optimises fauna movements through the site, from and including a recent BCC acquisition site to the west (Lot 24 on SP160371), to the Cabbage Tree Creek Corridor to the east.

The Detailed ecological assessments are attached at Appendix G and H and a bibliography of relevant ecological studies for the site is at Appendix I.

Flood Plain, Waterway and Stormwater Management

A comprehensive hydrological assessment of the site and proposal has been undertaken by 4Site (Refer to Appendix L).

The purpose of the assessment is to demonstrate that:

- The floodway function of existing waterways will not be impaired;
- The existing drainage system and flood inundation areas are not constraints to development of the site (a flood study, consistent with Council's existing flood modelling, will be undertaken subsequently to confirm this assertion);
- Stormwater quality management can be achieved within the proposed development footprint, without detriment to waterways or bushland; and
- The development is consistent with conserving the wetland and waterway values on site.

A detailed flood study is currently being prepared for the site and will be finalised once information in relation to the southern drain is made available by Council.

The Preliminary Assessment of Flood Plain, Waterway and Stormwater Management demonstrates that the development will not have a detrimental impact on the function of existing waterways. Furthermore, Water Sensitive Urban design measures as specified in the Telegraph Road Residential Development Code will ensure that the effects of flooding are minimised and water quality objectives are achieved through good design principles, including the use of rainwater tanks, swales and detention basins and the retention of vegetation on site.

The report provide a methodology for the preparation of a flood study which is to be undertaken by 4Site upon provision of details of the Southern Drain by the Brisbane City Council.

The report demonstrates that:

- The floodway function of existing waterways will not be impaired;
- The existing drainage system and flood inundation areas are not constraints to development of the site (a flood study, consistent with Council's existing flood modelling, will be undertaken subsequently to confirm this assertion);
- Stormwater quality management can be achieved within the proposed development without detriment to waterways or bushland; and
- The development is consistent with conserving the wetland and waterway valves on site.

Traffic and Transport

A detailed Traffic Impact Assessment Report has been provided by Lambert and Rehbein (Refer to Appendix J).

The purpose of the Traffic Impact Assessment report was to provide a detailed assessment of the proposed Structure plan and assess the effectiveness of the movement network, including whether:

- The proposal is sufficiently integrated with the local and wider road network and provides sufficient connections with local and regional services and wider destinations such as the Brisbane CBD without providing a 'rat-run';
- safe and efficient access to the site is provided to the site;
- sufficient opportunities are provided for public transport routes, cycling and pedestrians;
- proposed access points are sufficient and whether any modifications will be required to the local traffic network to ensure that the development does not give rise to adverse impacts.

In addition, it was considered important to assess the Surburban Route as it had been located to maximise opportunities for fauna movement across the road by locating it to the west of the site and creating a low-speed environment through the use of bends. It was considered in preparation of the structure plan that the connection of Carselgrove to the proposed Surburban route would increase fauna mortality by significantly increasing traffic volumes and the likelihood of rat-runs from Beams Road to Telegraph Road. As such, the

traffic report specifically considered the impact of this feature of the development on the surrounding road network.

In discussions relating to the proposal, Council had indicated that Telegraph Road would be realigned in the future onto the parcel of land to the north west of the subject site and link directly with Linkfield Road via an overpass above the existing railway line. The proposed alignment is shown in Appendix D. The traffic consultants were asked to comment on any implications such an upgrade may have on the proposed development.

The report demonstrates that there is sufficient capacity within the surrounding road network and intersections to accommodate the development and any projected traffic generation.

In particular, the traffic report notes at Section 3.3 that:

> *We consider that the road network as proposed;*
> - *provides for safe and efficient traffic movements to/from the subject site;*
> - *provides adequate road network linkages to the external road network for trips to broader destinations such as the Brisbane CBD and employment areas to the north of the site which are likely to be the most attractive;*
> - *provides suitable arrangements for servicing the site for bus travel, ensuring that the majority of the development is within walking distance of public transport;*
> - *minimises the potential for unnecessary vehicular intrusion through the site; and*
> - *minimises the potential impacts of the subject land on the sensitive receiving environment.*

In relation to the connection to Carselgrove Road as indicated in City Plan, the Traffic Impact Assessment report notes at Section 3.3 that:

> *While the City Plan currently identifies linkages from the through the subject site to Carselgrove Road it is considered that this direct connection may not be necessary. The direct linkage being provided through to Roghan Road then on to Handford Road provides efficient and effective links to the external road network and subsequently to the broader travel destinations. It is considered that the direct road link through the site to Carselgrove Avenue would effectively only provide for access to the adjacent railway station and QUT Campus for the subject development and the significant residential areas to the north of Telegraph Road which we consider is currently adequately catered for by the existing road network elements (such as Handford Road / Beams Road). It is considered that the direct connection would not offer any real benefits for access to/from the broader travel destinations such as the Brisbane CBD and north to the Pine Rivers Shire commercial areas.*
>
> *Furthermore adequate linkages are provided between the development and the local destinations, i.e. Carseldine Railway Station and QUT Campus, in the form of dedicated pedestrian and cycleways. It is considered that this is a more appropriate form of access as this would discourage the use of the motor vehicle for access to these local destinations and would encourage walk and cycle trips.*

The report was not able to take account of the proposed upgrade and realignment to Telegraph Road and notes at Section 4.2 of that:

> *… there are currently no timeframes in place for the construction of the aforementioned realignment; and as such, the timing of the works is unclear at this stage. Therefore, for the*

purpose of this assessment, it has been assumed that the realignment of Telegraph Road would not occur during the 10 year design horizon of the subject development.

The Traffic Impact Assessment report provides detailed traffic calculations to demonstrate that the proposal is suitable from a traffic proposal and will not have an adverse impact on the local and wider traffic system.

Noise

A Noise Impact Assessment has been prepared by Ron Rumble and Associates (Refer to Appendix K).

The purpose of the report is to present an assessment of any likely noise impacts and constraints on the proposed development from nearby uses, roads and nearby railway.

The report has concluded that a number of noise attenuation measures will be required to mitigate noise impacts to proposed residential areas. The potential noise sources that may require attenuation include Telegraph Road (including once upgraded), the railway line and the methane generation plant.

It is anticipated that some attenuation measures will be required to certain areas adjacent to Telegraph Road, the railway line and the methane generation plant. The report considers that some future dwelling sites will be considered to be noise affected and will therefore require appropriate treatment at the time of development. There are no areas that are considered to be unsuitable for residential development.

Integration with Surrounding Development

The proposed structure plan, as outlined in sections 7, 10 and 11 of this report has been designed to achieve a high degree of integration with surrounding ecological systems in addition to local neighbourhoods. The proposal provides road and cycle linkages through the site to provide connectivity between residential areas, access to local services and facilities and pedestrian and cycle access to public transport and local centres.

Cultural Heritage

A Cultural Heritage study conducted by [redacted] of Turnix Pty Ltd in March 2000 found no evidence of archaeological material.

Infrastructure

A detailed assessment of the capacity of existing infrastructure has been undertaken by John Wilson Partners (Refer to Appendix M).

The purpose of the report was to determine whether there is sufficient infrastructure in the area to provide essential services to the development.

The report demonstrates that with a number of augmentations, there is sufficient capacity within the water, sewer, electrical and telecommunications systems to accommodate the development. It is likely that with Water and Energy efficiency measures as proposed in the Telegraph Road Residential Development Code the proposal will under-utilise this infrastructure. Accordingly, some dispensation may be sought in respect of future headworks contributions to reflect the water and energy efficient of the development. In addition, routes for anticipated infrastructure have been selected so as to minimise the effect of the development of proposed Conservation areas.

South East Queensland Regional Plan

The Office of Urban Management has recently released the draft *South East Queensland Regional Plan* for consultation. The Regional Plan seeks to guide growth and development in South East Queensland to 2026. The plan provides a number of land designations and seeks to protect lands within the *Regional Landscape and Rural Production* area from urban development. The Plan provides an *Urban Footprint* designation for lands considered to be suitable for urban development.

The site falls within the Urban Footprint area in the draft South East Queensland Regional Plan.

Fitzgibbon Local Area Plan

The Brisbane City Council have indicated that the funding is available to commence the preparation of a Fitzgibbon Local Area Plan in the current financial year. A Local Planning exercise had been undertaken previously for the area but was not completed.

It is anticipated that the Structure Plan once approved by the Council will inform the preparation of the Fitzgibbon Local Area Plan.

Parks and Recreation

The proposal provides a substantial area of the site to be provided for Conservation purposes. The site is adjacent to the Bill Brown Sorts fields and the former landfill site which is proposed to be used for District Sporting facilities. A number of other parks are located within close proximity to the site and detailed in Appendix D: *Site Analysis Summary*. As such, the site is well located in relation to parks and recreation facilities.

The applications seeks preliminary approval for the proposed Structure Plan and as such, does not propose detailed allotment layouts or the location of local parks.

The proposed locations of parks and open space for passive and active recreation will be negotiated with Council by the ultimate developer of the site at the time of applications for reconfiguration of a lot. The location and function of Parks on the site will comply with Performance Criteria P3, Section 5.1.1 of Council's Subdivision Code and will more appropriately be determined as part of the detailed urban design of the developable areas for subsequent planning applications for reconfiguration of a lot.

14. CONCLUSION

The proposed Structure Plan provides for conservation areas, a strategic movement network and residential development where in accordance with a proposed Telegraph Road Sustainable Development Code.

A systematic process of detailed investigations and consultation with State Government agencies and the Brisbane City Council has ensured that the proposed structure plan provides the best achievable balance between the need to preserve important habitat area; and provide for areas suitable for residential development and therefore realise funding for the provision of essential housing services for the State.

The proposed Structure plan achieves this balance with approximately 53.5 hectares of the site to be set aside for conservation and allowing residential development in accordance with the Telegraph Road Sustainable Development Code over the balance. This scenario provides a significant core area for the squirrel glider and opportunities for ecological linkages for the gliders and forest canopy raptors therefore enabling the survival of the local meta-population by providing for connections to other local habitat patches.

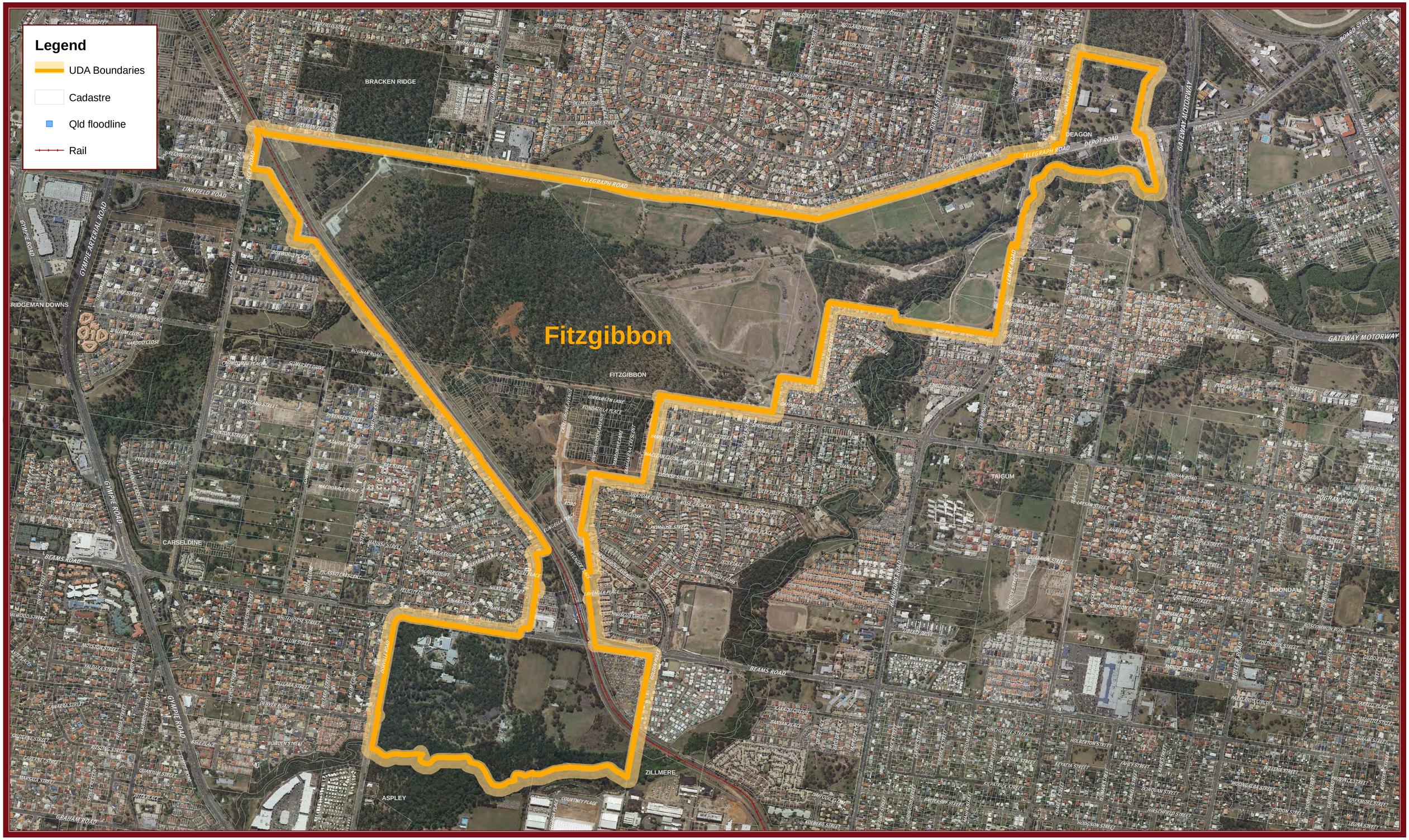
The proposal complies with the relevant provisions of CityPlan 2000.

We therefore commend the proposed Structure Plan to the Council for approval subject to conditions.

urban land development authority

UDA Flood Extent: Fitzgibbon

Area mapped : flood data does not intersect



Working Draft not Commonwealth, State or Local Government Policy

0 45 90 180 270 360 450

Metres

Map Produced by: Department of Infrastructure and Planning
Spatial Services 2011
Cadastre: July 2011
Flood Extent: DERM web service 2011
Imagery: DERM Flood Imagery Service 2011
2009 SPOT satellite
DERM Aerial photography

Queensland Government
Department of Infrastructure and Planning

D:\110906\QFCM_FloodCommission\UDA\maps\MXD\110906QFCM_ULDA_FloodCommission.mxd

[redacted]

From: [redacted]
Sent: Wednesday, 31 August 2011 5:18 PM
To: [redacted]
Cc:
Subject: RE: Queensland Floods Commission of Inquiry - Draft Response to Issue 8
Attachments: ATT419927.txt

H[redacted]

Thanks for this. In your absence I discussed this response wit[redacted]nd advised that my only concern is with the statement about flooding at Fitzgibbon. I have investigated this matter and can confirm that the UDA did not flood during the December/Jan period referred to by the Flood Commission. I will forward to you an email from [redacted] that explains that flooding occurred in November and the reasons for this flooding.

Hope this makes sense.

[redacted]
Planning Manager

ulda | Level 4, 229 Elizabeth Street, QLD 4000 Australia
GPO Box 2202 Brisbane QLD 4001 Australia
[redacted] W www.ulda.qld.gov.au

Fro [redacted]
Sent: Tuesday, 30 August 2011 12:04 PM
To
Cc [redacted]
Subject: FW: Queensland Floods Commission of Inquiry - Draft Response to Issue 8
Importance: High

<<20110830 - Queensland Floods Commission of Inquiry - Response to Issue 8V2.doc>>
Sorry about previous email - now with attachment!

From: [redacted]
Sent: Tuesday, 30 August 2011 12:02 PM
To: [redacted]
Cc:
Subject: Queensland Floods Commission of Inquiry - Draft Response to Issue 8
Importance: High

Hi [redacted]

As discussed with [redacted] yesterday, we would appreciate it if you could have a quick look at the attached draft response and advise of any concerns/suggestions asap. We need to provide this to the coordinating officers in DLGP by cob today so (as usual) would appreciate a prompt response - feel free to send as a tracked changes version if that suits.

Also note that Mark has not yet had the opportunity for a final review so may want to make some final changes as well.

Thanks and regards,
[redacted]

FITZGIBBON URBAN DEVELOPMENT CARSELDINE URBAN VILLAGE FLOODING AND STORMWATER MANAGEMENT PLANS

Urban Land Development Authority
August 2010

www.wrmwater.com.au

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REPORT TITLE: Fitzgibbon Urban Development Area Carseldine Urban Village Flooding and Stormwater Management Plans

CLIENT: Urban Land Development Authority

REPORT NUMBER: 0541-02-L [Rev 2]

Revision Number	Report Date	Report Author	Reviewer
0	13 July 2010	JO	DN
1	2 August 2010	JO	DN
2	24 August 2010	JO	DN

For and on behalf of

[redacted]nt Pty Ltd

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1 INTRODUCTION

1.1 GENERAL

The Urban Land Development Authority (ULDA) is currently preparing the master plan for the proposed Carseldine Urban Village (CUV), within the Fitzgibbon Urban Development Area (UDA). The proposed CUV is a mixed use development made up of three precinct areas within the Fitzgibbon UDA as shown in Figure 1.1. This report, prepared by WRM Water & Environment, presents the results of hydrologic and hydraulic modelling studies undertaken to assess the impacts of the proposed development on flood behaviour and stormwater runoff.

1.2 ADOPTED ASSESSMENT CRITERIA AND DESIGN OBJECTIVES

1.2.1 Flooding

The impacts of full development of the UDA and development of Stages 1 to 4 of the Fitzgibbon Chase development were investigated in detail in a previous study (WRM, 2009) which developed a TUFLOW two-dimensional hydraulic model of the entire UDA. That study investigated a suite of flood mitigation infrastructure options to ensure no adverse impact on flood levels on adjoining or downstream properties. Since the completion of the full development study, a number of development features have been modified and the subsequent impacts of the revised full development Fitzgibbon UDA have been reassessed using the TUFLOW model. The results of the revised assessment are documented in WRM's letter "*Impact Assessment of the Revised Full Development Footprint and Flood Mitigation Infrastructure*" dated 1 March 2010.

The studies documented in this report assess the flood level impacts of Stage 1 to Stage 5 of the proposed CUV for the 100 year Average Recurrence Interval (ARI) event using the TUFLOW hydraulic model. The model incorporated full UDA development features to the north of the CUV. The effectiveness of the flood mitigation works within the CUV and along Cabbage Tree Creek were also assessed. The 100 year ARI water level impact of the Fitzgibbon UDA development was assessed along Cabbage Tree Creek, Fitzgibbon Drain and Carseldine Drain to ensure that the full Fitzgibbon UDA development (including the staging of the CUV) does not adversely impact on flooding outside the UDA compared with pre-development conditions.

A future report will document the concept design of the proposed flood mitigation measures required along Cabbage Tree Creek downstream (north) of the Railway following consultation with Brisbane City Council and further refinement of concepts.

1.2.2 Stormwater

Development within the Fitzgibbon UDA will be designed to meet current best practice design objectives for Water Sensitive Urban Design (WSUD), including management of stormwater quantity and quality, and source substitution for non-potable water supply.

Current WSUD design objectives for stormwater management are provided in the South East Queensland Regional Plan Implementation Guideline No. 7: Water Sensitive Urban Design (DIP 2008). The design objectives include:

- A stormwater quality management design objective. This objective requires the following reductions in total load of key stormwater pollutants discharging from the site, compared to untreated stormwater runoff:
  - 80% reduction in total suspended solids,
  - 60% reduction in total phosphorus,
  - 45% reduction in total nitrogen, and
  - 90% reduction in gross pollutants.
- A frequent-flow management design objective. This objective requires the first 15 mm of runoff from impervious surfaces (for sites with > 40% imperviousness) to be captured and managed to minimise the impacts on downstream ecosystems associated with the increased frequency of runoff from impervious surfaces.
- A waterway stability management design objective. The objective aims to protect downstream waterways from increases in in-stream erosion by ensuring that the peak 1 year ARI stormwater discharge from the site to the receiving waterway is not increased by the proposed development.
- In addition to the DIP (2008) objectives, the South East Queensland Water Strategy (QWC, 2008) and the Queensland Development Code (QDC, 2010; QDC, 2009; and QDC, 2008) include a non-potable water source substitution design objective. The objective requires all new Class 1 and Class 2 buildings that connect to the reticulated town water supply to employ water efficient practices.

A MUSIC model has been developed to ensure that load reduction targets for the development can be achieved.

Stormwater treatment measures (STMs) for the development have been proposed to achieve these stormwater management design objectives including rainwater tanks, sediment traps, trash racks, grass swales, bio-retention cells, detention basins, and flow dissipaters. The proposed STMs will only treat runoff from new development areas. Runoff from unmodified areas within the CUV such as the existing buildings within the QUT campus will remain untreated. However, further analysis and consideration of reuse options for the existing buildings is recommended as part of the development.

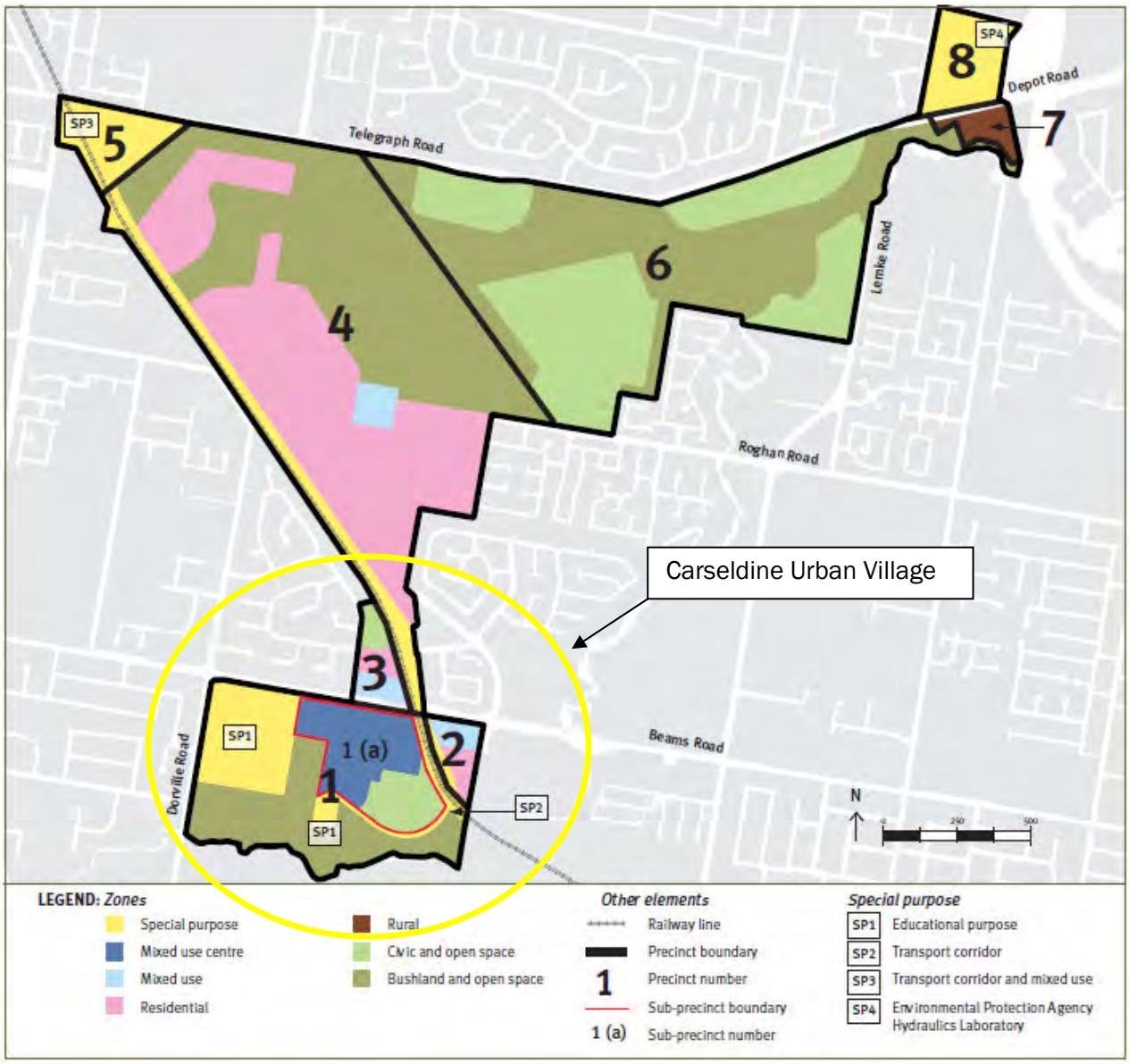


Figure 1.1 Carseldine Urban Village Locality

2 FLOODING AND DRAINAGE CHARACTERISTICS

2.1 EXISTING CONDITIONS

Figure 2.1 shows the major drainage features in the vicinity of the proposed development site. Cabbage Tree Creek is located along the southern boundary of the proposed CUV Development. Cabbage Tree Creek has a catchment area of approximately 19.5 km^2 to the North Coast Railway. Fitzgibbon Drain is a manmade channel that flows in an easterly direction about 850 m to the north of the proposed development. The Fitzgibbon Drain catchment area to its confluence with Cabbage Tree Creek is 1.3km^2.

Figure 2.2 shows the Cabbage Tree Creek pre-development Q100 flood extent in the vicinity of the CUV development (WRM, 2009). It was found that during a Q100 flood event with full development of the Cabbage Tree Creek catchment, floodwaters would exceed the capacity of Cabbage Tree Creek upstream of the railway crossing causing some water to escape the confines of the creek in a northerly and easterly direction across the eastern QUT Carseldine site.

- The northerly flowing water overtops Beams Road and inundates the CUV Precinct 3 and Balcara Avenue, before draining through culverts under the railway to Fitzgibbon Drain.
- The easterly flowing water overtops the North Coast Railway (initial flow through the ballast underneath the rails may occur) and flows across the existing wreckers yard to a maximum depth of 0.4 m before flowing along Beams Road to rejoin Cabbage Tree Creek on the northern side of Beams Road.

Further discussion of the existing conditions flooding within the Fitzgibbon UDA can be found in a previous report (WRM, 2009).

2.2 PROPOSED DEVELOPMENT

The proposed CUV is a mixed use development, made up of three precinct areas within the Fitzgibbon UDA as shown in Figure 1.1. Precinct 1 encompasses the former Carseldine QUT land including the existing campus buildings. Precinct 2 includes the existing Kelly's Wreckers yard along Beams Road. Precinct 3 includes the existing Clock Corner retail development, three townhouse developments, the existing Carseldine Railway Station car park, and an open space area to the north of the park and ride fronting Balcara Avenue.

Figure 2.3 shows the proposed staging plan for the CUV. The proposed busway has been considered in this report as a separate development which is not linked to the staging of the CUV development. The proposed CUV development includes 5 stages over an area of about

19.5 ha including 12 ha of gross developable area and 7.5 ha of road reserve (excluding the proposed busway, open space, and existing QUT campus buildings). In addition, a park and ride area (about 0.23 ha) and sports field (about 3.3 ha) will be included in the south-eastern corner of Precinct 1. A number of flood mitigation measures are also proposed, which will be discussed in Section 3.4.

In total the development will yield an estimated 1169 unit dwellings, 7.66 ha of commercial floor area, 0.8 ha of retail floor area, and 0.58 ha of community use area, with significant areas protected as bushland and open space.

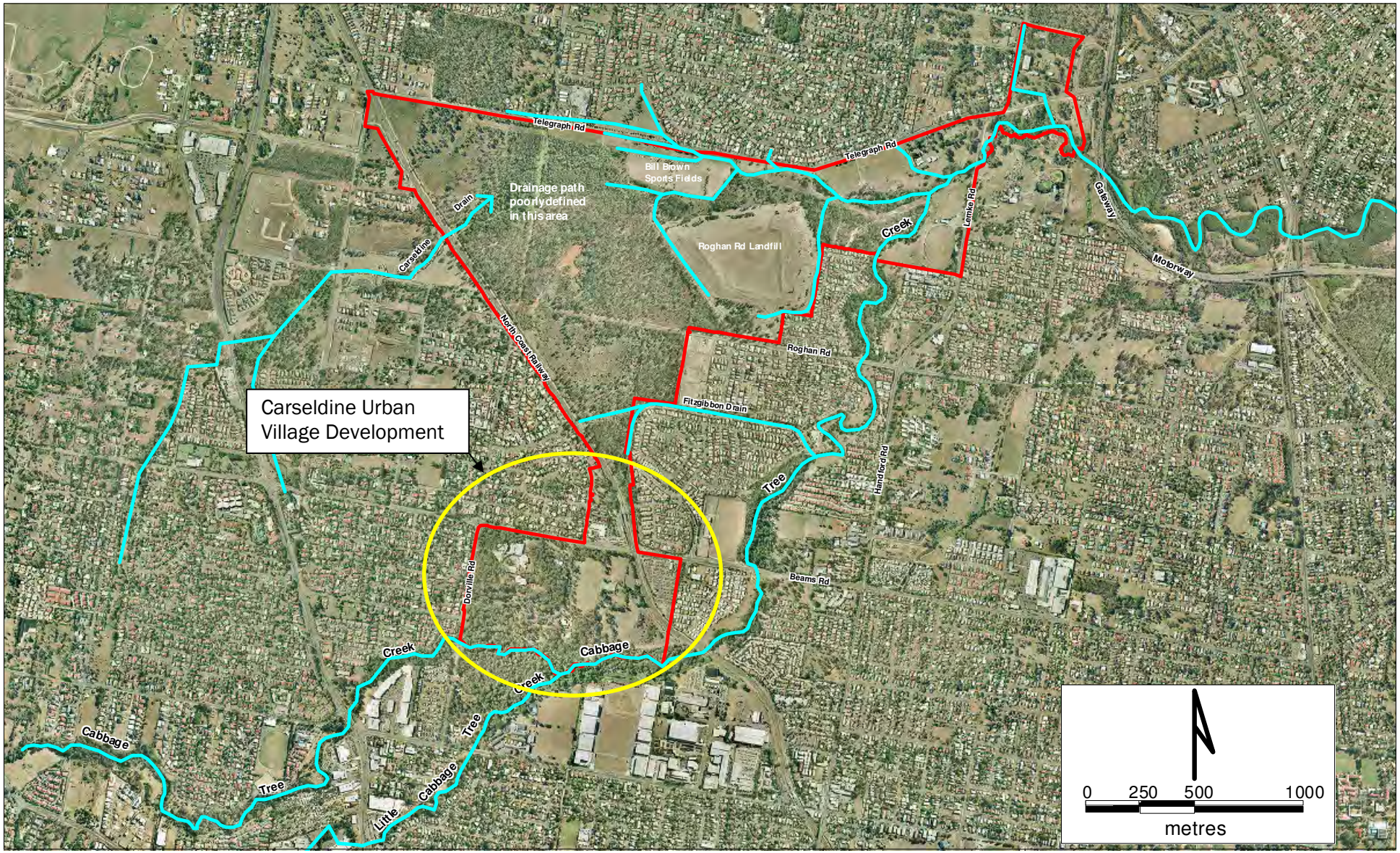


Figure 2.1 Fitzgibbon UDA Drainage Features

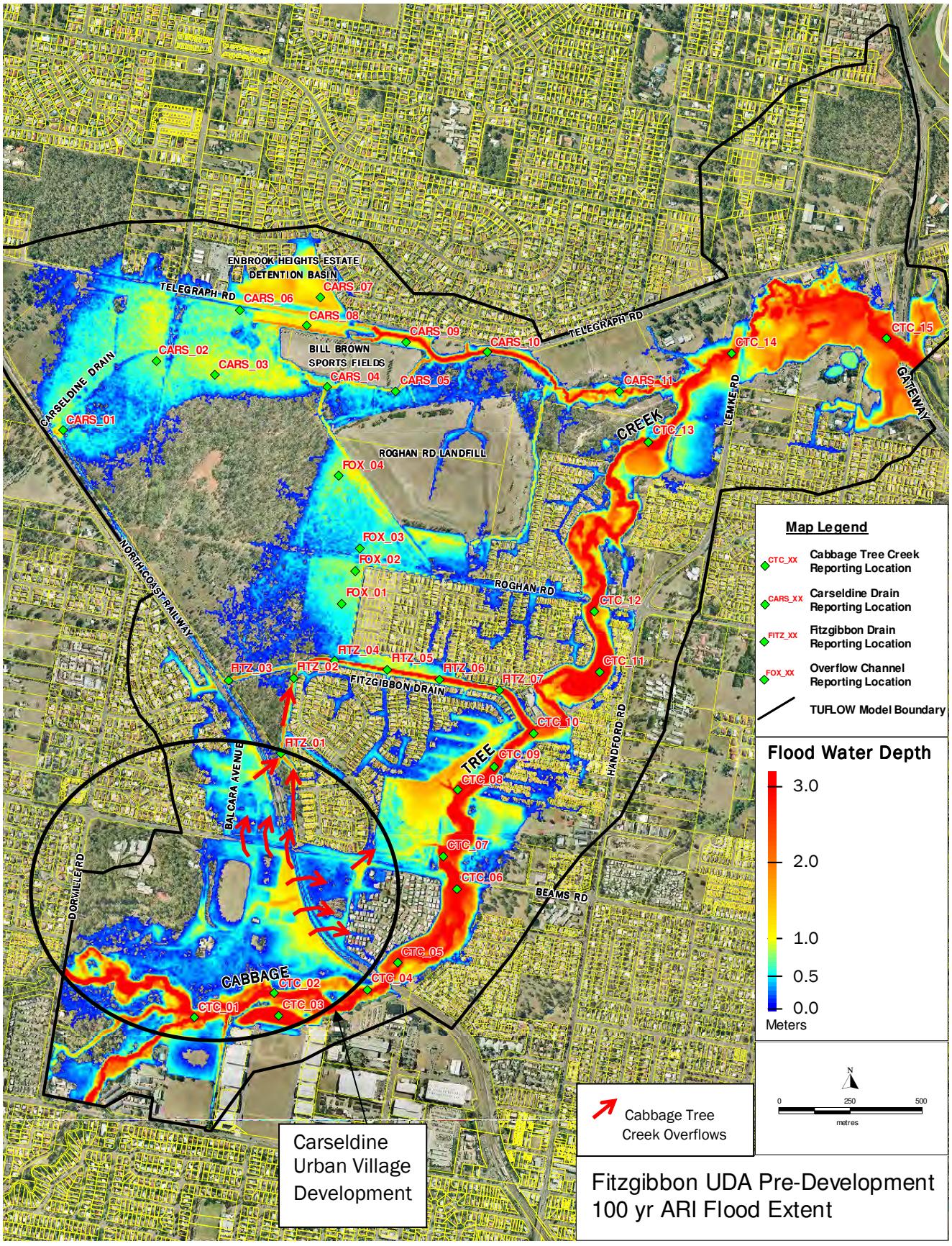


Figure 2.2 **Pre-Development 100 year ARI Flood Extent, Fitzgibbon UDA site (from WRM,2009)**

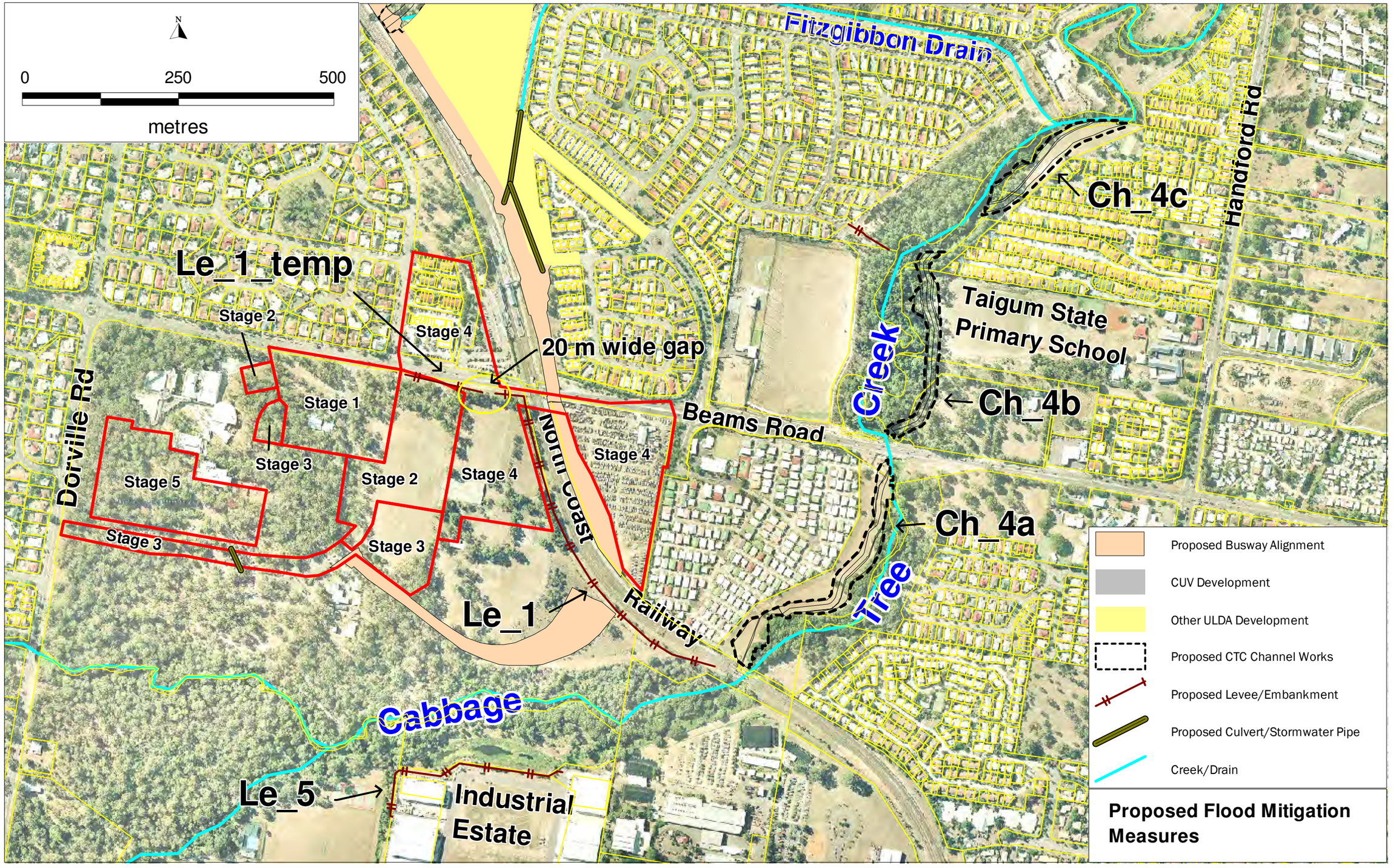


Figure 2.3 Proposed Carseldine Urban Village Staging (indicative only) and Flood Mitigation Measures

3 FLOOD IMPACT ASSESSMENT

3.1 METHODOLOGY

The impacts of Stage 1 to Stage 5 of the proposed CUV were assessed using the hydrologic and hydraulic models originally developed for the assessment of flood impacts for Stages 1 to 4 of Fitzgibbon Chase (to the north of Beams Road) and the overall development of the UDA. Full details of the development and calibration of the models are documented in the following report: *Flood and Stormwater Management Studies for the Fitzgibbon Development Scheme* (Ref. 0541-01-G [Rev 1] dated 24 July 2009).

For the assessment of flood impacts due to the proposed CUV development it was assumed that all other areas within the Fitzgibbon UDA to the north of the CUV were fully developed. The modelled peak water levels for Stages 1, 2, 3 and full development (Stages 4 and 5) were compared with existing (pre Fitzgibbon UDA development) conditions. The flood impacts of the CUV with and without flood mitigation measures were investigated.

The model was run for the 100 year ARI flood event for five storm durations including the 60, 90, 120, 180, and 270 minute duration storms to determine the impact of Stages 1 to 5 compared with pre Fitzgibbon UDA development on peak flood levels at 37 reporting locations within the study area. The reporting locations are shown in Figure 2.2.

3.2 MODEL CHANGES

The TUFLOW model including full Fitzgibbon UDA development (WRM, 2010) was modified by removing the CUV development and flood mitigation infrastructure along Cabbage Tree Creek. The model was then reconfigured to simulate the impacts of the CUV development as it progressed from Stage 1 to Stage 5. The modifications to the model were based on the following assumptions:

- The Manning's 'n' in the developed areas was modified to 0.025 to reflect the improved drainage efficiency within the developed area;
- The initial and continuing losses for the CUV development were set to 2.4 mm and 0.25 mm/hr. This corresponds to an impervious fraction of 90%.
- The existing landform was modified to include the expected extent of development based on preliminary advice from ULDA.
- No flood mitigation measures were included within the CUV or along Cabbage Tree Creek.

3.3 UNMITIGATED 100 YEAR ARI WATER LEVEL IMPACTS

Table 3.1 shows the 100 year ARI flood level impacts of the proposed Stage 1, Stage 2, Stage 3, and Stages 4 and 5 of the CUV without any mitigation measures along Cabbage Tree Creek. The reporting locations are shown in Figure 2.2. Note that Stage 4 and 5 do not include the proposed busway.

The results of the flood modelling show the following:

- Stage 1 of the CUV does not increase 100 year ARI water levels compared with predevelopment conditions outside of the Fitzgibbon UDA. Hence, Stage 1 of the CUV does not require flood mitigation works along Cabbage Tree Creek.
- Stage 2 and 3 of the CUV (without flood mitigation measures) increase 100 year ARI water levels along Cabbage Tree Creek outside of the Fitzgibbon UDA by up to 0.02 m compared with predevelopment conditions. Figure 3.1 shows that the potential Cabbage Tree Creek flood level impacts will also increase flood levels on the wreckers yard by up to 0.03 m.
- Stages 4 and 5 of the CUV (without flood mitigation measures) increases 100 year ARI water levels along Cabbage Tree Creek outside of the Fitzgibbon UDA by up to 0.57 m compared with predevelopment conditions.

Without flood mitigation measures, the CUV development will increase 100 year ARI flood levels along Cabbage Tree Creek from Stage 2 onwards. Hence, the development will require flood mitigation works to ensure that the peak 100 year ARI flood level is not increased on any adjacent property as a result of the CUV development.

Note that Stage 5 will have negligible impact on flood levels along Cabbage Tree Creek if it is developed prior to the rest of the CUV because it's footprint is almost entirely outside the Cabbage Tree Creek 100 year ARI flood extent. However, the Shared busway will increase flood levels and would require some form of flood mitigation measures to manage these impacts

Table 3.1 CUV Development TUFLOW Model 100 yr ARI Flood Levels Impacts (Unmitigated)

Reporting Location	Pre-Fitzgibbon UDA Peak Flood Level (m AHD)	100 yr ARI Water Level Impacts (m)			
		Stage 1	Stage 2	Stage 3	Stage 4 & 5
CTC_01	15.48	0.00	0.00	0.00	**0.01**
CTC_02	14.47	0.00	0.00	0.00	**0.30**
CTC_03	14.37	0.00	0.00	0.00	**0.37**
CTC_04	13.71	0.00	**0.02**	**0.02**	**0.57**
CTC_05	12.65	0.00	**0.01**	**0.01**	**0.20**
CTC_06	12.5	0.00	**0.01**	**0.01**	**0.15**
CTC_07	12.38	0.00	**0.01**	**0.01**	**0.11**
CTC_08	12.11	0.00	**0.01**	**0.02**	**0.03**
CTC_09	11.56	0.00	**0.01**	**0.02**	**0.05**
CTC_10	10.31	-0.02	0.00	0.00	-0.03
CTC_11	9.26	-0.01	0.00	0.00	-0.03
CTC_12	8.69	-0.01	**0.01**	0.00	-0.02
CTC_13	5.95	-0.01	0.00	0.00	-0.01
CTC_14	4.69	0.00	-0.01	-0.01	0.00
CTC_15	3.9	-0.04	-0.03	-0.03	-0.03

Note the 100 year ARI water levels in this table must **not** be used to determine development fill levels.

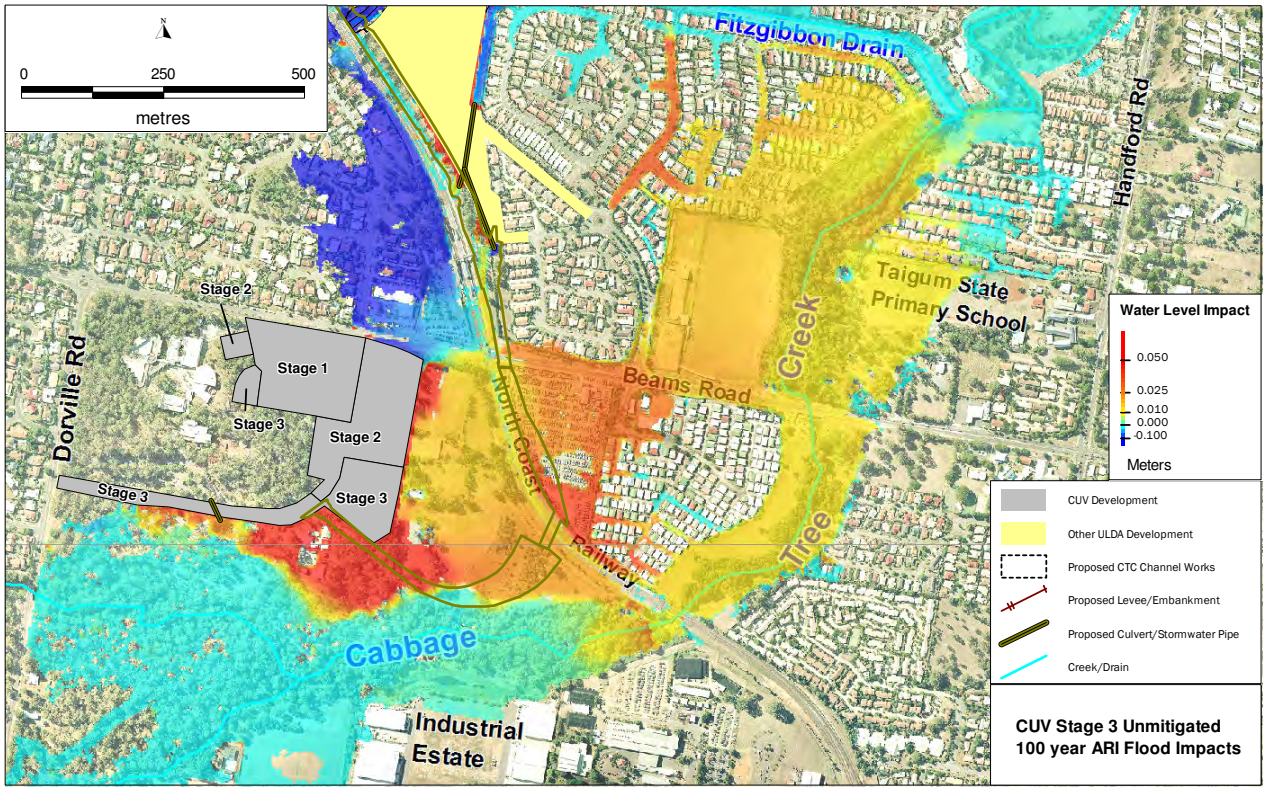


Figure 3.1 Cabbage Tree Creek 100 year ARI Flood Level Impacts - CUV Stages 2 & 3 (Unmitigated)

3.4 PROPOSED MITIGATION MEASURES

Figure 2.3 shows the location of the CUV and proposed Cabbage Tree Creek mitigation works. The proposed suite of flood management measures for the CUV development includes:

- Within the Fitzgibbon UDA:
  - A flood protection levee along the upstream boundary of the railway easement between the proposed CUV development and the North Coast Railway crossing of Cabbage Tree Creek (Le_1);
  - A temporary flood mitigation bund (Le_1_temp) along Beams Road.
- Outside the Fitzgibbon UDA:
  - A channel along Cabbage Tree Creek from North Coast Railway to Beams Road (Ch_4a);
  - A channel along Cabbage Tree Creek from Beams Road to Taigum State Primary School (Ch_4b);
  - A channel along Cabbage Tree Creek from Taigum State Primary School to Fitzgibbon Drain (Ch_4c); and
  - A flood protection bund along the northern lot boundary of the industrial estate to the south of the CUV (Le_5).

Table 3.2 shows the implementation timing for each mitigation measure.

- For Stage 1, no flood mitigation measures are required.
- For Stage 2, most of the flood mitigation measures are required including Le_1, Le_5, Ch_4a, Ch_4b. A temporary bund (Le_1_temp) along Beams Road is required until Stage 4 of the CUV is developed. A 20 m gap will be provided in Le_1_temp (see Figure 2.3).
- For Stage 3, no additional flood mitigation is required.
- For Stage 4, Ch_4c is required.
- For Stage 5, no additional flood mitigation is required.

Table 3.2 Implementation Schedule of Flood Mitigation Measures

Description	Stage 1	Stage 2 & Stage 3	Stage 4 & Stage 5 (Full Development)
Within the UDA			
Le_1	-	✓	✓
Le_1 temp	-	✓	✗
Outside the UDA			
Ch_4a	-	✓	✓
Ch_4b	-	✓	✓
Ch_4c	-	-	✓
Le_5	-	✓	✓

3.5 MITIGATED 100 YEAR ARI WATER LEVEL IMPACTS

3.5.1 Overview

The unmitigated conditions TUFLOW models for "Stage 2 & Stage 3" and "Stage 4 & Stage 5" conditions were modified to include the proposed mitigation measures for each scenario as shown in Table 3.2. The impact of the proposed mitigation measures are summarised below.

3.5.2 Results

Table 3.3 shows the 100 year ARI water level impacts across the study area for the CUV (mitigated) "Stage 2 and Stage 3" and "Stage 4 and Stage 5" conditions. Figure 3.2 and Figure 3.3 show the flood level impacts of the proposed CUV (mitigated) "Stage 2 and Stage 3" and "Stage 4 and Stage 5" condition, respectively.

The results show that the proposed flood mitigation measures successfully mitigate most development impacts downstream of the railway crossing. The development increases Cabbage Tree Creek 100 year ARI flood levels upstream of the railway. The following is of note:

- The water level impact along Carseldine Drain is due to Fitzgibbon UDA development to the north of the CUV. These impacts are not associated with the CUV development.
- There is a potential flood level increase adjacent to the existing industrial estate upstream of the railway. The proposed flood protection levee (Le_5) adjacent to the Industrial Estate ensures that this development is not impacted by Cabbage Tree Creek flood waters during a 100 year ARI event.
- In general, the proposed "Stage 2 and Stage 3" mitigation measures reduce flood levels along Cabbage Tree Creek downstream of the railway. However, there is a localised minor increase in water levels at CTC_09 where Ch_04b rejoins Cabbage Tree Creek (see Figure 3.2). Given that this minor water level impact is isolated to the outlet of the channel, no existing development will be impacts by this increase, and future works will mitigate this impact, no further mitigation measures are proposed for this stage of development.
- In general, the proposed "Stage 4 and Stage 5" mitigation measures reduce flood levels along Cabbage Tree Creek downstream of the railway. However, there is a localised increase in water levels at CTC_05 and CTC_10 (see Figure 3.3).
  - The increase in water level at CTC_05 could be reduced by widening the channel at this location. However, the left bank of the channel is constrained by a sewer manhole at this location. Excavation of the right bank could also be undertaken, however, this is undesirable as this could destabilise the existing bank downstream. This impact is isolated to a small area.
  - The increase in water level at CTC_10 is isolated to the confluence of Cabbage Tree Creek and Fitzgibbon Drain. The water level increase only potentially impacts the arena area on the southern side of the equestrian centre. No buildings on the property are affected.
- There is a potential flood level increase at the existing research facility. It not known whether or not the floor level of the facility will maintain 100 year ARI flood immunity. It is recommended the floor level of the existing building be survey to determine if Cabbage Tree Creek flood water would in fact exceed the floor level of the facility.
- There is a potential flood level increase on the school sports field to the west of the industrial estate. No existing buildings are impacted by this water level increase.

Table 3.3 also shows the Cabbage Tree Creek water level impact if the proposed Busway was constructed after Stage 3 and prior to the development of Stage 4 and Stage 5 of the CUV. This case assumes that flood mitigation works are constructed as for Stage 2 and Stage 3. The results indicate that the Busway would increase water levels along Cabbage Tree Creek between the railway and Fitzgibbon Drain by up to 0.15 m without additional mitigation works. Therefore, if the Busway was constructed prior to the Stage 4 of the CUV, Ch_4c should be constructed as part of the Busway works.

Table 3.3 CUV Development TUFLOW Model 100 yr ARI Flood Levels Impacts (Mitigated)

Reporting Location	Pre-Fitzgibbon UDA Peak Flood Level (m AHD)	100 yr ARI Water Level Impacts (m)		
		Stage 2 & Stage 3	Stage 4 & Stage 5	Stage 3 & Busway
CTC_01	15.48	0.01	0.02	0.04
CTC_02	14.47	0.11	0.25	0.31
CTC_03	14.37	0.15	0.31	0.35
CTC_04	13.71	0.19	0.43	0.41
CTC_05	12.65	-0.05	0.03	0.14
CTC_06	12.5	-0.05	0.00	0.15
CTC_07	12.38	-0.05	-0.02	0.10
CTC_08	12.11	-0.01	-0.04	0.04
CTC_09	11.56	0.01	-0.63	0.05
CTC_10	10.31	-0.05	0.04	-0.02
CTC_11	9.26	-0.04	-0.03	-0.02
CTC_12	8.69	-0.05	-0.02	-0.01
CTC_13	5.95	-0.03	-0.01	-0.01
CTC_14	4.69	-0.02	0.00	0.00
CTC_15	3.9	-0.05	-0.03	-0.04

Note the 100 year ARI water levels in this table must **not** be used to determine development fill levels.

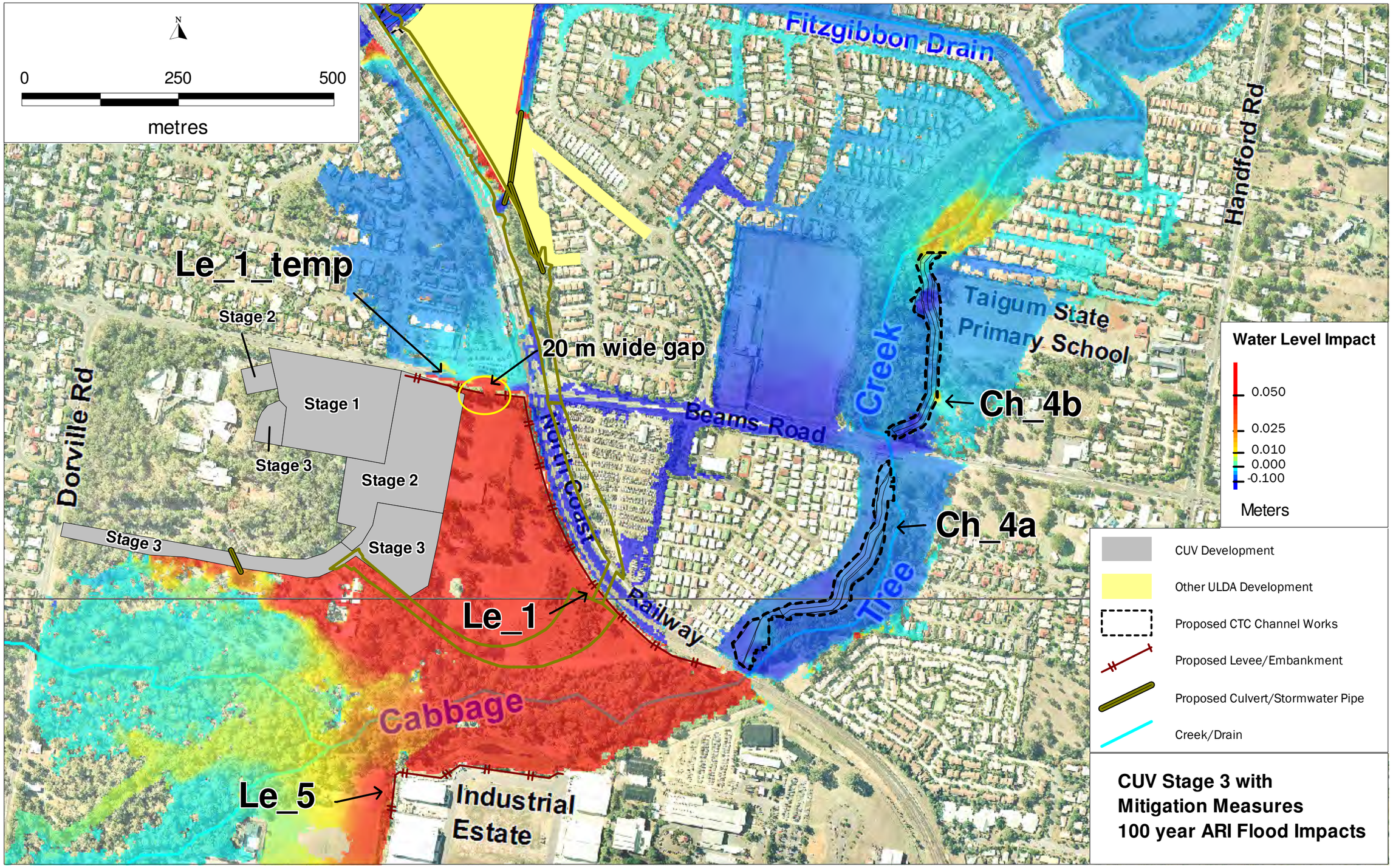


Figure 3.2 100 year ARI Flood Level Impacts in the Study Area, CUV Stage 3 (without busway) with Mitigation Measures

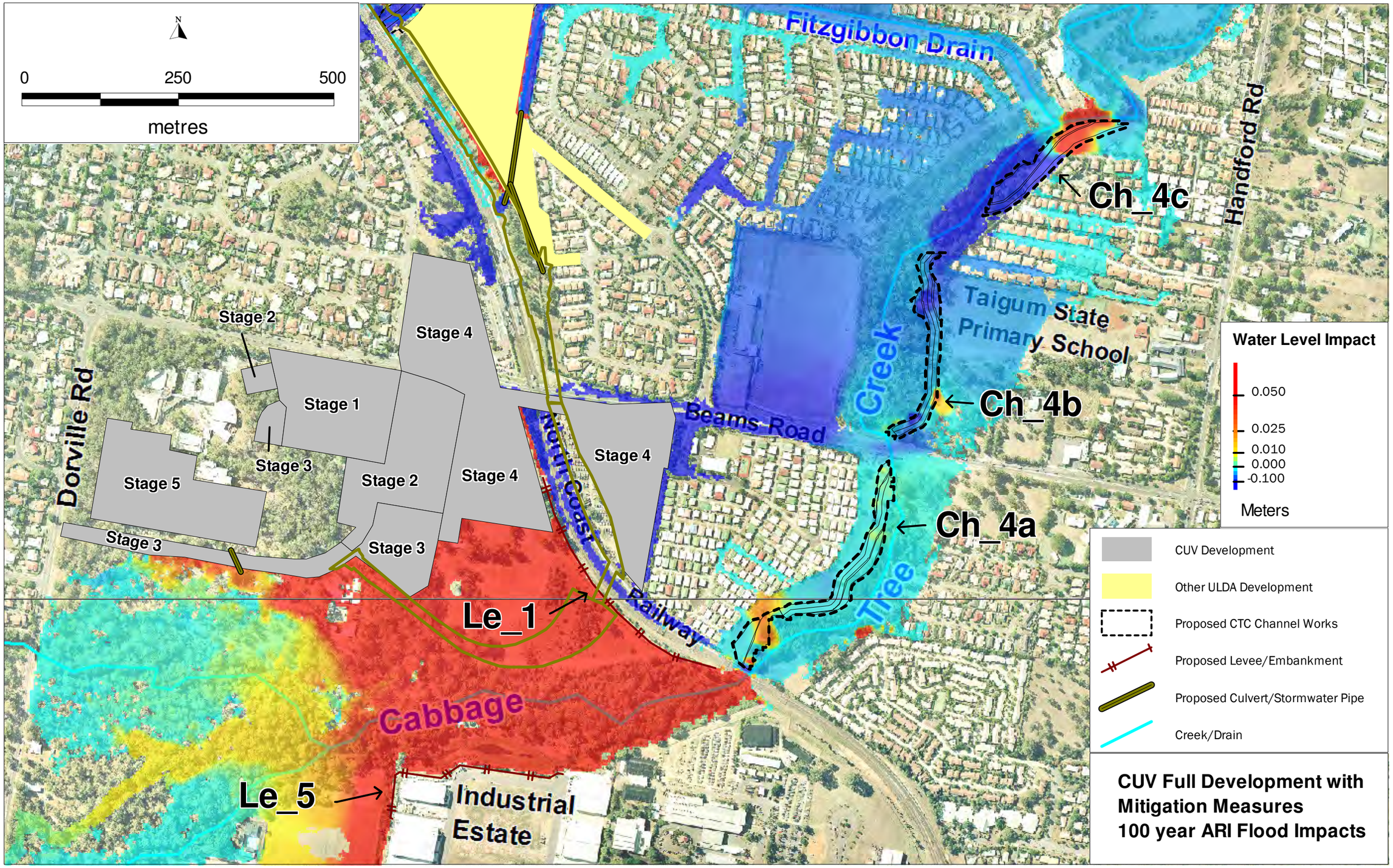


Figure 3.3 100 year ARI Flood Level Impacts in the Study Area, CUV Full Development (without the busway) with Mitigation Measures

3.1 SPORTS FIELD AREA FLOOD IMMUNITY

Table 3.4 shows the 2, 10, and 100 year ARI flood levels along Cabbage Tree Creek adjacent to the proposed sports field at five reporting locations. The locations of the sports field and reporting locations are shown in Figure 3.4. The Cabbage Tree Creek 10 year ARI flood level adjacent to the sports field ranges from about 14.4 m AHD at the upstream end to 13.7m AHD near the railway line. There is a natural levee along the northern bank of the creek which ensures that the 10 year ARI flows are contained within the confines of the creek banks. Hence, even though the sports field area is lower than the adjacent creek flood levels in some locations, it is not flooded for this event.

The 10 year ARI peak flood levels adjacent to the sports field are very close to overtopping the natural levee. It is likely that the sports field area would be inundated for events greater than a 10 year ARI event.

It is understood that BCC requires the finished level of the proposed sports area to have at least 5 year ARI flood immunity.

Table 3.4 Cabbage Tree Creek 2, 10, and 100 year ARI flood Levels Adjacent to the Proposed Sports Field

Reporting Location	Peak Flood Level (m AHD)		
	2 year ARI	10 year ARI	100 year ARI
1	14.19	14.73	15.17
2	13.82	14.37	14.81
3	13.71	14.24	14.72
4	13.42	13.93	14.57
5	13.16	13.70	14.48

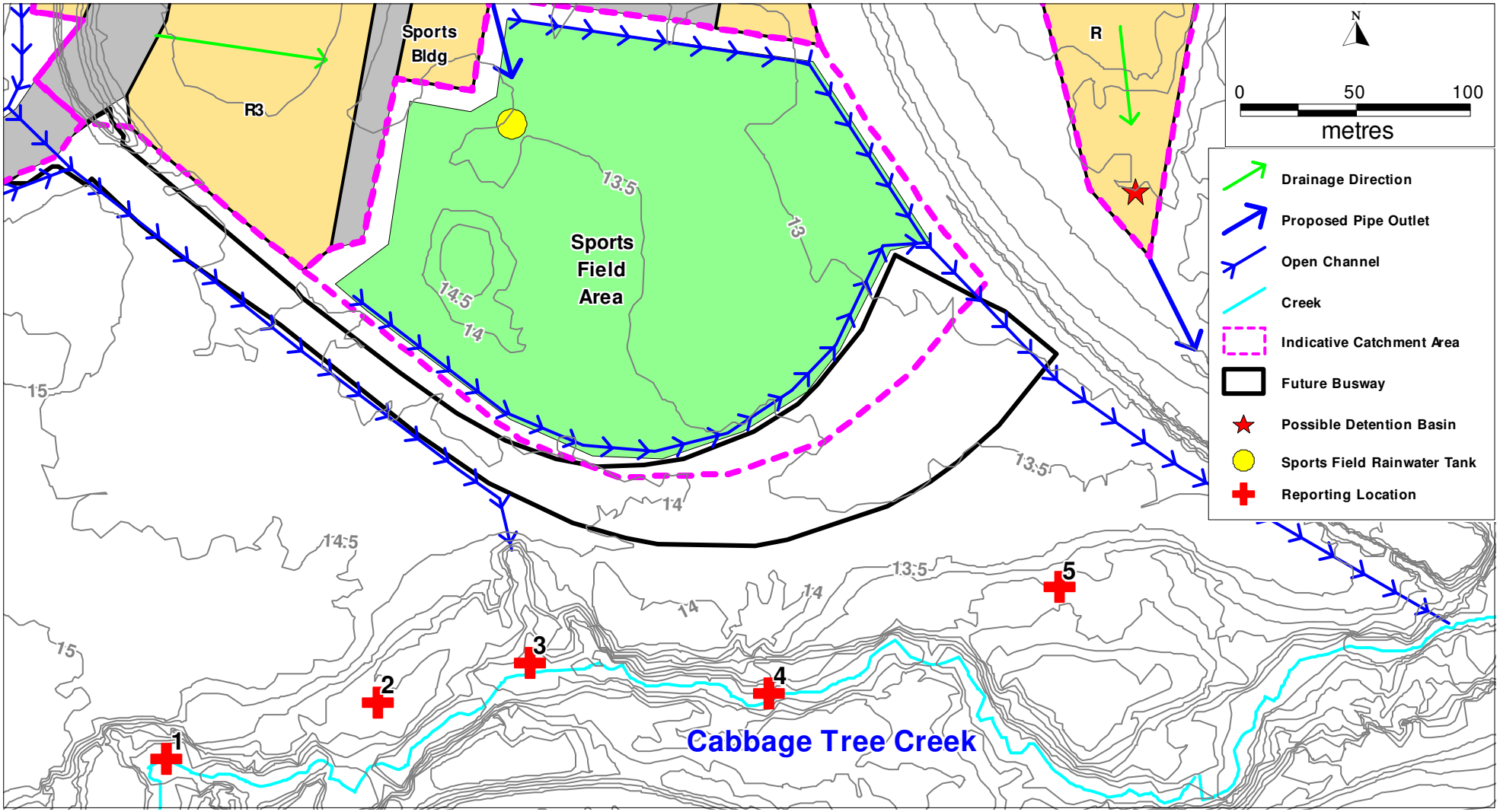


Figure 3.4 Sports Field Flood Reporting Locations

4 STORMWATER QUANTITY MANAGEMENT

Figure 4.1 shows indicative stormwater drainage directions for the development site. The redevelopment of the CUV will increase the impervious area of the site. Management of impacts associated with these changes may require stormwater quantity management devices such as detention basins, flow spreaders, energy dissipation devices, and constructed channels for some areas of the site. Erosion protection will be required at the outlets of all stormwater pipes. The exact location and sizes of these devices will be determined at the detailed design stage. The following is of note:

- Precinct 1 will significantly increase the amount of impervious area of the site. It is recommended that, where possible, stormwater runoff from the proposed Precinct 1 development be directed towards Cabbage Tree Creek. Stormwater runoff from the development will not impact on the peak discharge in Cabbage Tree Creek due to the significant difference in catchment areas. It is proposed that the stormwater runoff from the eastern portion of the development be piped to a water storage tank within the sports field for irrigation of the sports field and other open space areas. Flow in excess of the stormwater pipe network capacity and overflows from the water tank will flow via a constructed channel to the railway corridor boundary. The proposed channel will then drain along the south-western side of the proposed flood protection levee (Le_1 from WRM July 2009 report) to Cabbage Tree Creek. Stormwater from Stage 5 of Precinct 1 will be piped under the busway and discharge to the bushland via a flow spreader and energy dissipation device. The runoff from the remaining bushland area north of the busway will be collected in an open channel along the western side of R1 and the northern side of the busway and directed, via a culvert through the busway and open channel, to Cabbage Tree Creek.
- Precinct 2 is the existing wreckers yard. There is limited information in relation to current stormwater drainage from this property. The proposed Precinct 2 development will likely significantly increase the impervious area of the site. The management of stormwater runoff from the site may require a detention basin(s) to ensure that the proposed development does not increase peak discharges from the site onto adjoining properties.
- Precinct 3 is currently significantly developed with the majority of the site consisting of roof area, car park, and other impervious areas. Stormwater runoff from the proposed development will be directed northwards to the existing open space area and discharge to Fitzgibbon Drain via the railway culverts. The developed conditions peak discharge to the railway culverts will likely be reduced by the proposed development because Cabbage Tree Creek floodwaters that currently overtop Beams Road will be excluded when Stage 4 is developed. Hence, it is unlikely that detention basin(s) will be required for this site. A flow spreader and/or energy dissipation device will be required at the stormwater pipe outlet and an open channel will be constructed within the remaining open space to direct runoff to the railway culverts.

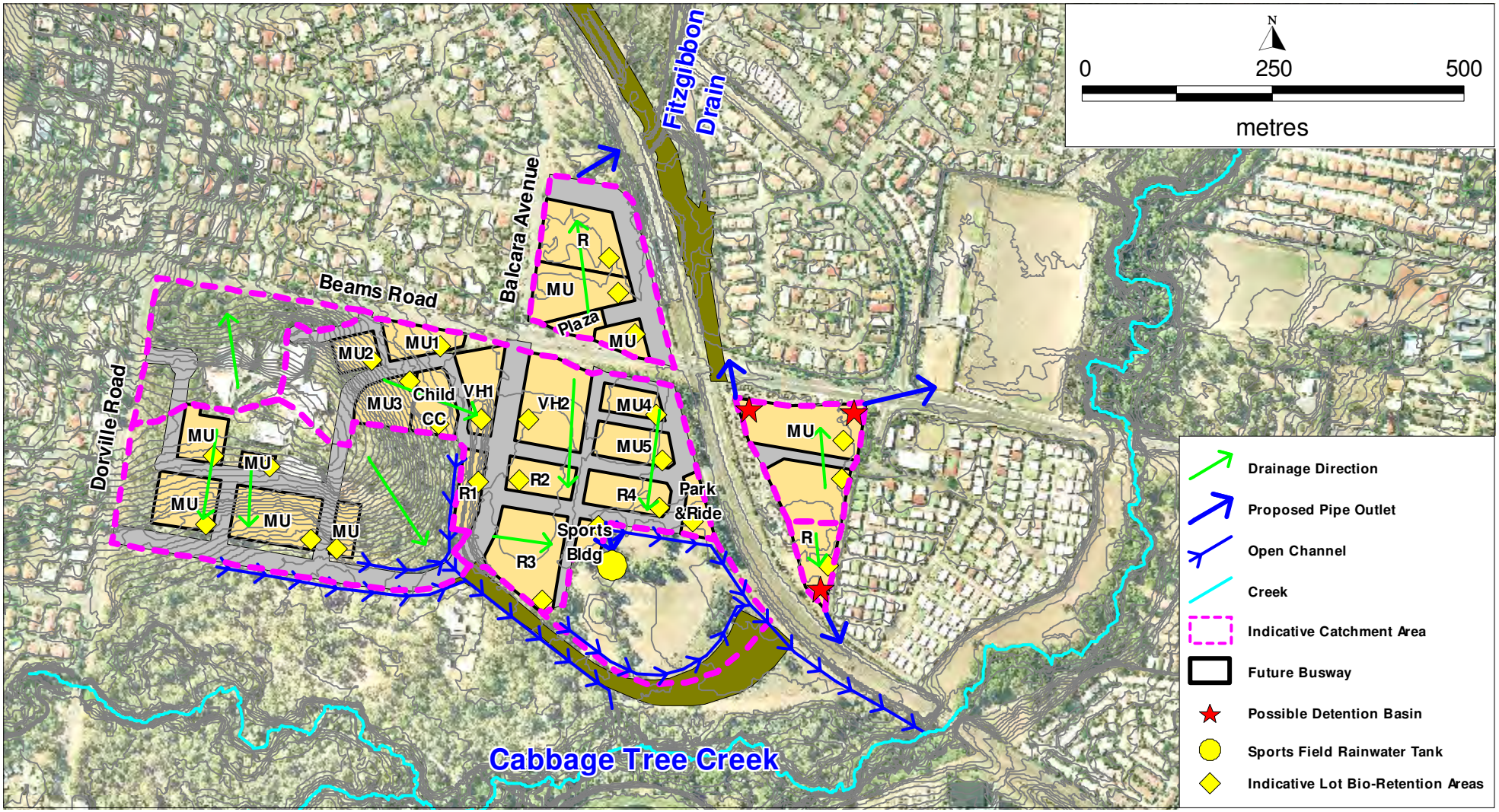


Figure 4.1 Conceptual Stormwater Management Plan (Indicative Only)

5 STORMWATER QUALITY MANAGEMENT

5.1 OVERVIEW

The stormwater management plan for the site includes the following:

- Descriptions and preliminary sizing of the Stormwater Treatment Measures (STMs) proposed for the operational phase of the development;
- Quantitative modelling to demonstrate that the treatment system will meet relevant performance criteria for stormwater quality management and frequent flow management;
- Description of erosion control management measures for waterway stability management.

The proposed stormwater management strategy includes the use of road-side bio-retention pods within the road reserve that will replace conventional gully pits. Runoff from allotments (including roof, overflows from rainwater tanks, and ground), will drain overland or via pipes for collection and treatment within site-based bio-retention pods (separate to road-side bio-retention pods). Stormwater will be conveyed to underground stormwater pipes within the bio-retention pods either through the filter media and sub-surface drainage or the overflow riser pipe.

The 'MUSIC' model for urban stormwater improvement conceptualisation (CRCCH, 2005) was used to assess the un-mitigated and mitigated runoff quality from the developed area on the site, and determine the performance of the proposed stormwater treatment system.

5.2 PROPOSED STORMWATER TREATMENT TRAIN

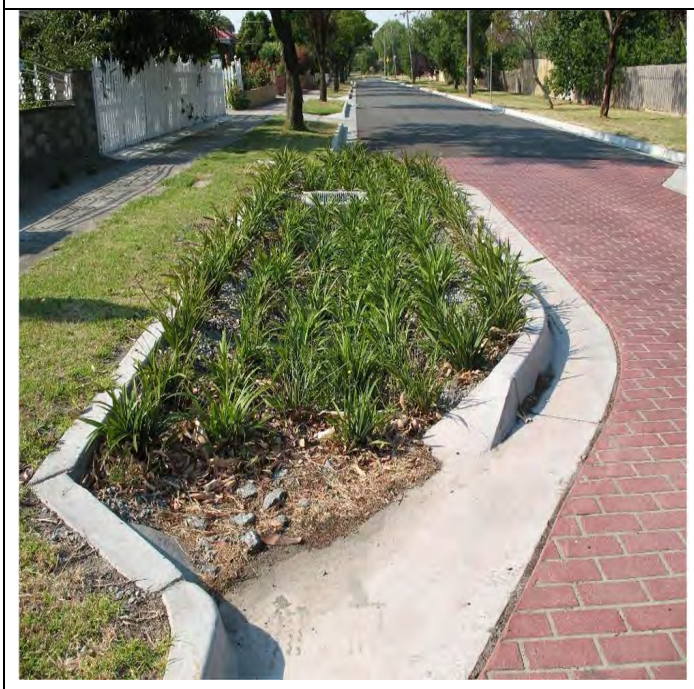
5.2.1 Overview

Figure 4.1 shows an indicative stormwater management plan for the development site. The locations of STMs are indicative only and are based on the most current available layout. The exact location of STMs will be determined during detailed design. It is recommended that further investigation be undertaken at the detailed design stage of the development on a lot-by-lot basis to locate and size these STMs within the lot footprint.

The following water sensitive urban design features will be included in the proposed development:

- Rainwater tanks will collect roof runoff for non-potable reuse on site.
- Lot-based bio-retention pods will be constructed within the lot area footprint. The pods will treat ground level runoff from lots as well as overflows from rainwater tanks.

- Roadside bio-retention pods will be constructed, at regular intervals within the road reserve. The pods will treat road runoff only. Figure 5.1 shows examples of typical road-side bio-retention pods.
- Appendix C shows typical plan and cross sections of the bio-retention pods. Bio-retention pods will consist of the following layers:
  - A 150mm deep drainage layer with particles between 10 and 15mm in diameter in the base of the basin. Slotted 90 mm PVC pipe at 1.5 m spacing (max) will be placed within this layer and connected to the underground pipe network.
  - A 150mm deep sand transition layer placed over the drainage layer.
  - A 500mm deep growing medium of sandy loam placed over the transition layer.
  - Small flows entering the basin will percolate into the gravel/sand layer, with sediment and nutrients being removed in the process. It was assumed that the underlying soil is impermeable when undertaking the water quality modelling.
  - Once flows exceed the hydraulic capacity of the bio-filtration layer, flows will fill the basin and discharge (via a riser pipe).
- A sediment forebay installed upstream of all bio-retention pods will remove coarse particles prior to discharge to the bio-retention pods.
- Where possible, runoff from impermeable surfaces should be directed to adjacent gardens and grassed areas (e.g. driveways, footpaths, small car parks, paved area, car wash areas).



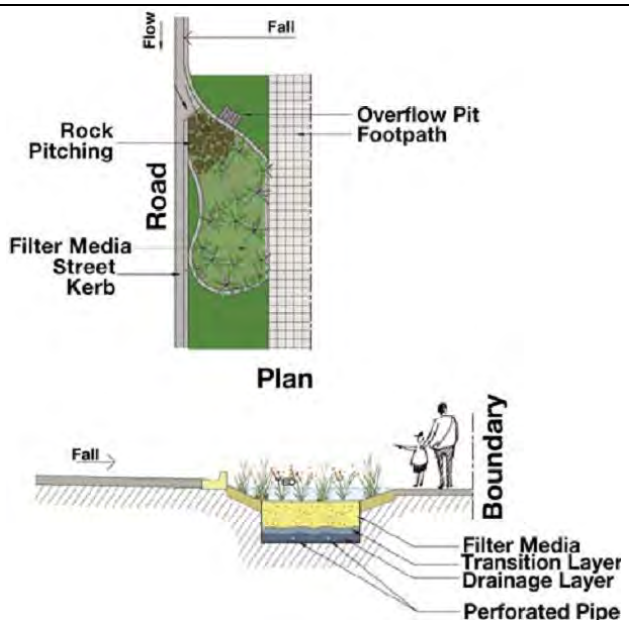


Figure 5.1 Examples of Roadside Bio-Retention Areas

5.2.2 Rainwater Tanks and Stormwater Harvesting

Requirements for source substitution are provided in the South East Queensland Water Strategy (QWC, 2008) and the Queensland Development Code (QDC, 2010; QDC, 2009; and QDC, 2008) which require all new Class 1 and Class 2 buildings that connect to the reticulated town water supply to employ water efficient practices. It is recommended that the CUV development employ rainwater tanks (and water efficient fittings internally) within all Class 1 and Class 2 buildings to reduce the development's reliance on town water supply. Tank water will be reused within the development for non-potable water use. These uses should include as a minimum:

- toilet flushing;
- laundry cold tap;
- external irrigation; and
- swimming pools.

Table 5.1 shows the non-potable water demands for the internal residential, internal commercial, and external areas that were adopted for this study. These demands are based on research undertaken in the Gold Coast (Willis et al., 2009) and have been adopted by the QWC. The following assumptions were made:

- Non-potable indoor use for residential dwellings includes toilet flushing and laundry.
- Non-potable indoor use for commercial floor space includes toilet flushing only.
- Non-potable external water use for residential and commercial pervious areas. 50% of pervious areas were irrigated and rates were seasonally adjusted using evapotranspiration.
- There are no swimming pools within the development.

Table 5.1 Non-Potable Water Demand

Non-Potable Water Demand	Units	Value
Internal Residential	L/person/dwelling/day	43.4
	persons/unit dwelling	1.8
Internal Commercial (toilet only)	L/person/day	20
	persons/ha GFA	330
External Residential and Commercial	$m/m^2/day$	0.002
	days/yr	200
	portion of pervious area irrigated	0.5

Detailed analysis of the potential reduction of non-potable water use that can be achieved with rainwater tanks is discussed further in Section 6.

Note that reuse options for the former QUT campus and commercial buildings that will be retained in the CUV have not been considered in this study. It is recommended that potential reuse options be assessed for these buildings during detailed design.

5.3 WATER QUALITY MANAGEMENT DESIGN OBJECTIVES

5.3.1 Construction Phase

Table 5.2 shows pollutants identified by BCC (2003) as being generated during a development's construction. Measures will be taken during the construction phase to manage each of these pollutants. An erosion and sediment control plan in accordance with the latest erosion and sediment control guidelines (IECA, 2008) will be developed as part of the operational works approval.

Table 5.2 Pollutants Typically Generated During the Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic Materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters (eg from tile works)
pH Altering Substances	Acid sulfate soils, cement slurry and wash waters

5.3.2 Operational Phase

Table 5.3 presents the site runoff load-based design objectives for the operational phase of the development.

Table 5.3 Operational Phase Site Runoff Performance Criteria

Parameter	Percent Reduction (%) [a]
Suspended Solids	80
Total Nitrogen	45
Total Phosphorous	60
Gross Pollutants	90

[a] Source: DIP, 2008

The percent reductions given in Table 5.3 are the target reductions for comparing mitigated site conditions with unmitigated site conditions. The treatment train selected for the proposed development will ensure design objectives are met for all pollutants.

5.4 MUSIC MODELLING

5.4.1 Methodology

Assessment of mitigated post-development site runoff water quality was undertaken using the 'MUSIC' water quality model (CRCCH, 2005). Suspended solids, total nitrogen and total phosphorus concentrations were estimated with the Brisbane City Council (BCC) MUSIC model runoff generation parameters. Baseflow and stormflow concentration parameters were adopted from BCC (2003) and IEAust (2006). Adopted MUSIC parameters are provided in Appendix A.

Two separate analyses were undertaken to ensure that the proposed development met the water quality objectives (see Appendix B):

1. MUSIC models were used to calculate the lot bio-retention area required for each stage of the development to meet the stormwater quality management design objectives for five different tank sizes. Tank sizes were specified in terms of kL per hectare of development area. Two Scenarios were assessed:
    a. Rainwater tanks collect roof water only (Scenario 1); and
    b. Rainwater tanks collect roof water and lot runoff from impervious areas (Scenario 2).
2. A separate MUSIC model was then prepared for road areas.

5.4.2 Source Node Parameters

Tables B1 and B2, Appendix A, show the adopted MUSIC source node rainfall-runoff and pollutant concentration parameters, respectively. These parameters are either default model parameters (CRCCH, 2005) or were sourced from BCC (2003) and GCCC (2006). Table 7 in GCCC (2006) provides mean stormwater flow pollutant concentrations for roof, road and other impervious/pervious areas within a residential area. Mean baseflow pollutant concentrations and standard deviations given for residential use areas (BCC, 2003) were applied to road areas.

Routing was not used in any drainage links.

5.4.3 Adopted Development Areas and Stage Yields

Table 5.4 shows the adopted areas for roof, pervious, and impervious areas within the development. The estimated site impervious cover is indicative only and based on preliminary planning advice from the ULDA.

Table 5.4 Adopted Development Areas

Land Use	Lot Area (ha)			
	Roof	Pervious	Impervious	Total
Precinct 1				
VH	0.89	0.30	0.30	1.48
Child CC	0.26	0.04	0.13	0.44
MU1	0.19	0.08	0.11	0.38
MU2	0.13	0.05	0.08	0.26
MU3	0.23	0.14	0.09	0.46
MU4	0.11	0.06	0.11	0.28
MU5	0.18	0.09	0.18	0.45
R1,2,3,4	0.87	0.65	0.65	2.18
R5	1.00	0.60	0.40	2.00
Sports Bldg.	0.10	0.01	0.03	0.14
Precinct 2				
MU	0.39	0.24	0.34	0.98
R	0.47	0.35	0.35	1.17
Precinct 3				
MU	0.49	0.20	0.29	0.98
R	0.34	0.26	0.26	0.86
Other				
Roads	0.00	1.50	5.99	7.49
Park & Ride	0.00	0.02	0.21	0.23
Total	**5.63**	**4.58**	**9.52**	**19.73**

5.4.4 Estimated Development Yield

The estimated development yield for the development is shown in Table 5.5.

Table 5.5 Estimated Development Yield for Each Stage

Stage	Number of Residential Dwellings	Commercial Floor Area (m²)	Retail Floor Area (m²)	Community Use Total Area (m²)
1	147	4,855	2,000	4,350
2	257	13,562	2,500	0
3	150	4,550	0	0
4	465	38,675	1,000	1,400
5	150	15,000	0	0
TOTAL	**1,169**	**76,642**	**5,500**	**5,750**

5.4.5 Non-Potable Water Demand

Table 5.6 shows the estimated non-potable water demand of the development for each stage. The non-potable demands are based on the development yield shown in Table 5.5 and the estimated non-potable water demands for each land use in Table 5.1. The following is of note:

- The development will consume an estimated 60 ML/yr of water for non-potable uses that could to some extent be supplied by rainwater tanks.
- Internal demands make up 90 % of the overall non-potable water demand
- Non-potable demand calculated for commercial, retail, and community use areas were based on commercial reuse values.
- The non-potable demand associated with the reuse of existing buildings within the former QUT campus were not considered.

Table 5.6 Estimated Lot Based Non-Potable Demand That Could be Supplied by Rainwater Tanks

Stage	Lot Area (ha)				Non-Potable Demand (kL/d)			Non-Potable Demand (kL/yr)	
	Roof	Pervious	Impervious	Total	Res. Internal	Com. Internal	Total Internal	External	Total (Internal + External)
1	0.86	0.29	0.39	1.54	11.48	6.25	17.73	575	7,051
2	0.99	0.45	0.48	1.93	20.08	10.60	30.68	909	12,114
3	0.51	0.37	0.35	1.23	11.72	3.00	14.72	737	6,113
4	2.27	1.35	1.70	5.32	36.33	26.83	63.16	2,701	25,769
5	1.00	0.60	0.40	2.00	11.72	9.90	21.62	1,197	9,093
TOTAL	**5.63**	**3.06**	**3.32**	**12.02**	**91.32**	**56.58**	**147.91**	**6,118**	**60,140**

5.4.6 Lot-Based MUSIC Model Configuration

Figure B1 and Figure B2, Appendix B shows the Scenario 1 (rainwater tanks collect roof area only) and Scenario 2 (rainwater tanks collect roof area and impervious lot runoff) lot-based MUSIC model configurations, respectively, used to assess the mitigated post-development runoff quality for each stage of the CUV. A bio-retention pod node, one tank node, and one GPT node were used for each of the five rainwater tank cases (50 kL/ha, 100 kL/ha, 200 kL/ha, 300 kL/h, and 400 kL/ha). These nodes represent the treatment nodes that will treat runoff from the lot areas. The proposed GPTs, in the form of a sediment forebay installed on the inlets into the lot bio-retention area were modelled as a single GPT node.

It was assumed that 100% of the roof (Scenario 1) and roof + impervious areas (Scenario 2) were connected to the rainwater tanks. The overflows from the tank and other areas not captured in the tank were directed to the lot bio-retention areas for treatment.

- Table 5.7 shows the properties adopted for modelling the sediment forebay area.
- Table 5.8 shows the total tank volume used for each tank case. The adopted rainwater reuse demands are shown in Table 5.6.
- Table 5.9 shows the properties adopted for modelling the bio-retention pods. The bio-retention component will be planted with a selection of native shrubs and grass.

Table 5.7 Sediment Fore-bay Properties

Pollutant	Input (mg/L)	Output (mg/L)
Total Suspended Solids	1000	500
Total Phosphorous	5	4
Total Nitrogen	50	50
Gross Pollutants	15	7.5

Table 5.8 Adopted Rainwater Tank Volumes for each scenario

Stage	Tank Volume (kL)				
	50 kL/ha	100 kL/ha	200 kL/ha	300 kL/ha	400 kL/ha
1	77	154	308	462	616
2	96	193	385	578	770
3	61	123	246	368	491
4	266	532	1,065	1,597	2,129
5	100	200	399	599	798
TOTAL	600	1202	2403	3604	4804

Table 5.9 Bio-Retention Basin Properties

Inlet Properties	
Low Flow By-Pass (m^3/s)	0
High Flow By-Pass (m^3/s)	100
Storage Properties	
Extended Detention Depth (m)	0.30
Extended Detention Surface Area (m^2)	- [a]
Seepage Loss (mm/hr)	0
Infiltration Properties	
Filter Area (m^2)	- [b]
Filter Depth (m)	0.5
Filter Median Particle Diameter (mm)	0.45
Saturated Hydraulic Conductivity (mm/hr)	180
Depth Below Underdrain Pipe (% of Filter Depth)	0
Outlet Properties	
Overflow Weir Width (m)	2

[a] Assumed equal to the Filter Area
[b] See Table 5.10 & Table 5.11

5.4.7 Lot-Based MUSIC Model Results

Table 5.10 shows the required Scenario 1 lot bio-retention area for each stage. Table 5.11 shows the required Scenario 2 lot bio-retention area for each stage. Note that this area is for the filter media **only**. Additional area will be required to accommodate the extended detention and flood detention depths. This additional area will be determined at the detailed design phase. Appendix D shows the mean annual pollutant percent reductions for suspended solids, total nitrogen, total phosphorous and litter based on the adopted treatment train for all cases. The actual bio-retention area required for each development area will be affected by the details of the site cover and adopted stormwater drainage system and should be confirmed during detailed design. The following is of note:

- WQOs are met for all modelled water quality parameters.
- The amount of bio-retention area required for a lot reduces as the amount of rainwater tank volume is increased.
- The amount of bio-retention area required as a percentage of total lot area ranges:
  - for Scenario 1 between about 0.7% with a rainwater tank volume of 50 kL/ha to 0.3% with a rainwater tank volume of 400 kL/ha.
  - for Scenario 2 between about 0.7% with a rainwater tank volume of 50 kL/ha to no bio-retention with a rainwater tank volume of greater than 200 kL/ha.

Table 5.10 Required Bio-Retention Area for each stage for Scenario 1[a]

Stage	Total Bio Retention Area Required (m²)				
	50 kL	100 kL	200 kL	300 kL	400 kL
1	115	85	65	55	50
2	120	95	75	60	55
3	75	60	45	40	35
4	360	260	220	200	190
5	135	100	70	60	50
TOTAL	**805**	**600**	**475**	**415**	**380**

[a] Rainwater tanks collecting roof runoff only

Table 5.11 Required Bio-Retention Area for each stage for Scenario 2[b]

Stage	Total Bio Retention Area Required (m²)				
	50 kL	100 kL	200 kL	300 kL	400 kL
1	110	55	10	0	0
2	115	50	5	0	0
3	70	30	0	0	0
4	350	160	20	0	0
5	130	50	10	0	0
TOTAL	**775**	**345**	**45**	**0**	**0**

[b] Rainwater tanks collecting roof runoff plus ground level impervious area runoff

5.4.8 Road MUSIC Model Configuration

Figure B3, Appendix B show the MUSIC model configuration used to assess the road post-development runoff quality from the CUV site. The area of the source nodes for road (including road reserve) and the Park and Ride area was 7.49 ha, and 0.23 ha respectively. The adopted percent impervious was 80% and 90%, respectively.

- Table 5.7 shows the properties adopted for modelling the sediment forebay area.
- Table 5.12 shows the properties adopted for modelling the bio-retention pods.

Table 5.12 Road Bio-Retention Basin Properties

Inlet Properties	Road Area	Park & Ride
Low Flow By-Pass (m^3/s)	0	0
High Flow By-Pass (m^3/s)	100	100
Storage Properties		
Extended Detention Depth (m)	0.20	0.20
Extended Detention Surface Area (m^2)	1360	50
Seepage Loss (mm/hr)	0	0
Infiltration Properties		
Filter Area (m^2)	1360	50
Filter Depth (m)	0.5	0.5
Filter Median Particle Diameter (mm)	0.45	0.45
Saturated Hydraulic Conductivity (mm/hr)	180	180
Depth Below Underdrain Pipe (% of Filter Depth)	0	0
Outlet Properties		
Overflow Weir Width (m)	2	2

5.4.9 Road MUSIC Model Results

Table 5.13 shows the mean annual pollutant loads for suspended solids, total nitrogen, total phosphorous and litter for road runoff. WQOs are met for all modelled water quality parameters.

The total amount of bio-retention required to treat road runoff is about 1.8% of the total road area (including road reserve). Table 5.14 shows the approximate maximum spacing per 10 m^2 of bio-retention area for each road type. It is envisaged that the bio-retention area will be located within the parking and planting width of the road reserve. Two-way cross fall road types will require bio-retention on both sides of the road. For Access Lanes and the Shared Busway road types, bio-retention will either be placed in the verge width or will require area outside the road reserve width. Note that the bio-retention pods, where possible, will replace conventional gully pits.

Table 5.13 Mean Annual Pollutant Loads, Roads Post-Development Mitigated

Pollutant	Annual Pollutant Load (kg/year)		Percent Reduction (%)	WQO Percent Reduction (%)
	Source Node	Mitigated (with tanks)		
Suspended Solids	26200	2720	89.6	80
Total Phosphorous	45.4	13.1	71.1	60
Total Nitrogen	215	117	45.3	45
Litter	1720	0.00	100.0	90

Table 5.14 Required Spacing per 10m² Bio-Retention Area for Road Types within the CUV

Road Type	Road Reserve Width (m)	Parking and Planting Width (m)	Maximum Spacing (m/10 m² bio-retention)
Village Main Street	23	2.5	24
Loop Road	20	2.5	27
Access Places	19	2.5	29
Resident Park Esplanade Road	21	2.5/6.0	26
Access Lanes	14	None	39
Shared Busway	20	None	27

5.5 FREQUENT FLOW MANAGEMENT

The frequent-flow management design objective requires the first 15 mm of runoff from impervious surfaces be captured and managed to minimise the impacts on downstream ecosystems associated with the increased frequency of runoff from impervious surfaces. Rainwater tanks and bio-retention basins are used to achieve this requirement.

5.6 WATERWAY STABILITY MANAGEMENT

Waterway stability management aims to protect downstream waterways from increases in in-stream erosion by ensuring that the peak 1 year ARI stormwater discharge from the site to the receiving waterway is not increased by the proposed development. Limiting the peak flows up to the 1 year ARI discharge from the site will be achieved using rainwater tanks and bio-retention pods. Additional erosion protection and flow dissipation device(s) will be required on the proposed pipe outlet(s) from the development site to ensure no local erosion at the stormwater outlets.

6 MINIMISATION OF POTABLE WATER USE

6.1 SITE-BASED RAINWATER TANKS

6.1.1 General

Rainwater tanks will likely serve as the primary management measure for the reduction of potable water use within the development. In assessing the potential reduction in potable water demand, it has been assumed that water collected in rainwater tanks will be used for toilet flushing, washing machines, and landscape irrigation only. Other non-potable water demands within the CUV may vary considerably depending on the nature of activities undertaken but have been ignored in the investigation.

The MUSIC model developed in Section 4.4 was used to estimate the proportion of non-potable water demand that could be supplied by site-based rainwater tanks. Two scenarios were assessed to determine the potential non-potable reuse that the development could achieve if rainwater tanks collected runoff from:

1. roof areas only (Scenario 1); and
2. roof areas and impervious lot areas (Scenario 2).

Five tank cases were investigated for both scenarios including 50 kL/ha, 100 kL/ha, 200 kL/ha, 300 kL/h, and 400 kL/ha of gross development area.

Non-potable water reuse options for the existing buildings within the former QUT campus have not been considered in this study. It is recommended that potential reuse options be assessed for these buildings during detailed design.

6.1.2 Queensland Development Code

All new commercial and residential buildings must be water efficient as mandated in Part 4 of the Queensland Development Code (QDC) - "*Building Sustainability*". Of some relevance to this development:

- **MP4.1 -"*Sustainable buildings*" (QDC, 2010)** requires that shower roses, toilet cisterns, and taps in Class 1 and Class 2 buildings be fitted with fittings with a minimum 3-star (4-star for toilet cisterns) water efficiency labelling and standards rating.
- **MP4.2 -"*Water Saving Targets*" (QDC, 2008)** requires that Class 1a buildings and Class 1b buildings reduce their demand on the reticulated town water supply by 70 kL/dwelling/year and 42 kL/dwelling/yr, respectively. It is noted that the majority of CUV will consist of Class 2 buildings, which are not covered by these guidelines.

- **MP4.3 -"*Alternative water sources - commercial buildings*" (QDC, 2009)** The code requires that new commercial developments connected to the reticulated town water supply have an alternative water source such as a rainwater tank for non-potable water use. As a minimum, the available tank volume should be equivalent to of 1,500 kL/pedestal plus additional storage for swimming pool water and other non-potable uses (if applicable).

At a master planning level, much of the information required to comply with the QDC is generally not known, for example, how many commercial pedestals and swimming pools will be installed within the development. It is recommended the required tank volume for all Class 1, Class 2, and commercial buildings be confirmed at the detailed design stage.

6.1.3 Results

Figure 6.1 shows the portion of non-potable water demand that can be supplied by different sized rainwater tanks for Scenario 1 and Scenario 2. The following is of note:

- The expected reduction in non-potable water demand for Scenario1 ranges from 36% to 71% for the 50 kL/ha tank and 400 kL/ha tank case, respectively.
- The expected reduction in non-potable water demand for Scenario 2 ranges from 40% to 83% for the 50 kL/ha tank and 400 kL/ha tank case, respectively.
- The expected benefit of Scenario 2 over Scenario 1 increases as the amount of tank volume increases. For example, the tank volume required to achieve a 40% reduction in non-potable water use is about 50 kL/ha for Scenario 2 compared with about 70 kL/ha for Scenario 1. However, the tank volume required to achieve a 70% reduction in non-potable water use for Scenario2 is just above 200 kL/ha compared with almost 400 kL/ha tank for Scenario 1.
- About 100 kL/ha of tank will achieve a 50% reduction in non-potable water use. To achieve an additional 20% - 30% reduction would require about 4 times the amount of tank volume.

Figure 6.2 shows that, for Stages 1 and 2 of the CUV, the portion of non-potable water demand varies significantly. For example:

- To achieve a 70% reduction of non-potable water use for Stage 1 would require a tank size of between 150 and 200 kL/ha for Scenario 2. In comparison, Stage 2 (Scenario 2) would require more than 300 kL/ha.
- For the case of a 200 kL/ha tank volume, the expected Stage 2 reduction in non-potable reuse that collects roof water only (Scenario 1) is 52% compared with a Stage 1 reduction of 75% if roof and impervious areas (Scenario 2) is collected.

These results indicate that the reductions in non-potable use that can be achieved can vary substantially from stage to stage and will likely vary even more on a lot basis due to the mixed use nature of the CUV development. Hence the best approach to managing stormwater will be different for each lot within the development because the non-potable water demand of each lot will be different. It is recommended that a lot-based stormwater quality management plan (SQMP) that takes into account the expected reuse of the site be done at the detailed design stage. It is also recommended that each lot should be required to install a minimum tank volume of 120 kL/ha of lot area to ensure the overall CUV development meets a minimum reduction in non-potable water demand of 50% (30 ML/a).

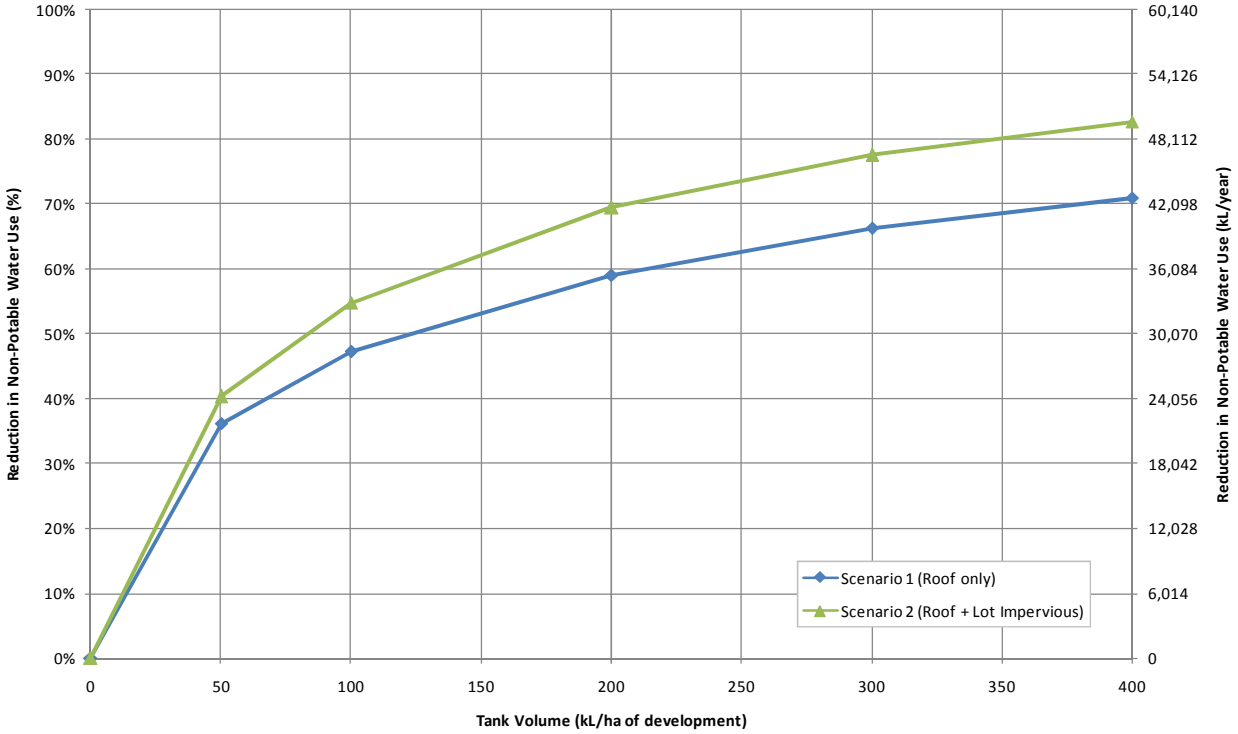


Figure 6.1 Affect of Rainwater Tanks on Non-Potable Water Use - CUV Development

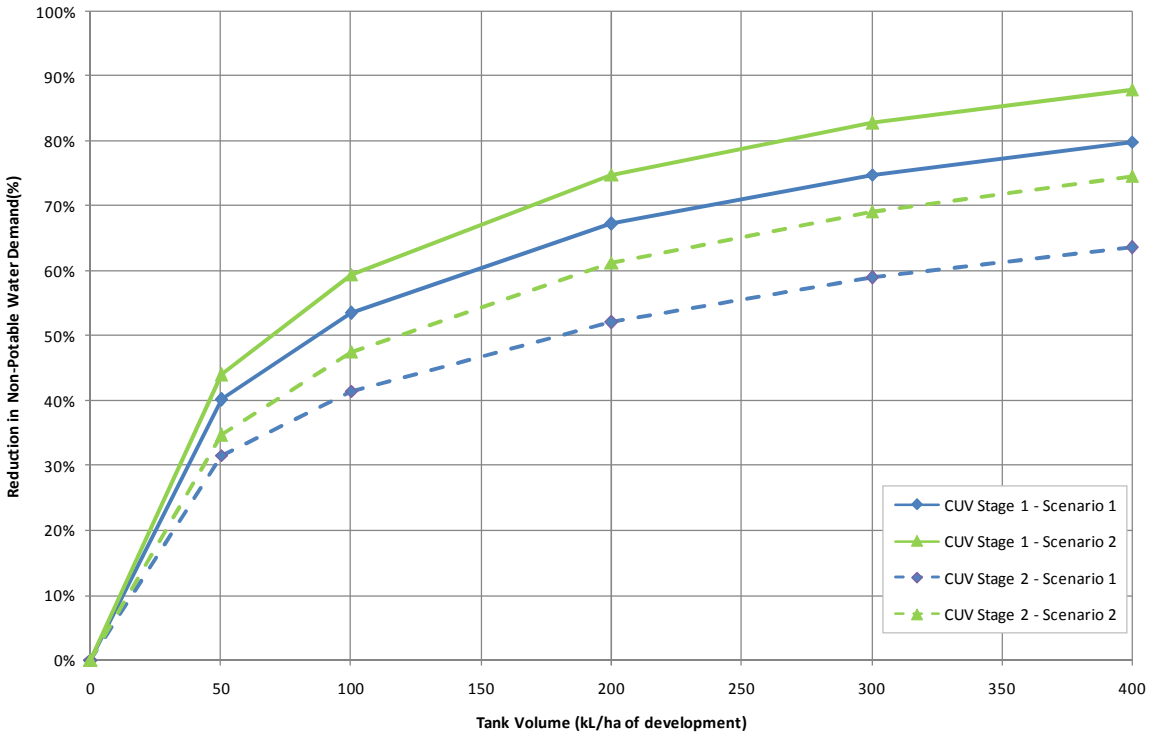


Figure 6.2 Effect of Rainwater Tanks on Non-Potable Water Use - CUV Stage 1 & 2

6.2 SPORTS FIELD STORMWATER TANK

6.2.1 Methodology

The proposed CUV will modify the existing sports field within the south-east corner of Precinct 1. It is proposed to harvest site stormwater runoff from the eastern half of the Precinct 1 development for irrigation of the sports field. The MUSIC model developed in Section 1 was modified to include a sports field stormwater tank to assess the potential non-potable water that could be supplied by runoff from the site. The effectiveness of the tank was assessed for seven cases including 10 kL/ha, 25 kL/ha, 50 kL/ha, 75 kL/ha, 100 kL/ha, 200 kL/ha, and 300 kL/ha of sports field area.

For the purposes of this analysis the following assumptions were made:

- The pervious area of the sports field is 3 ha;
- A total of 6.04 ha of Precinct 1 development drains to the sports field tank including:
  - 2.95 ha of roof;
  - 1.41 ha of pervious lot;
  - 1.68 ha of impervious lot; and
  - 3.90 ha of road;
- Lot based rainwater tanks are installed on the development at a rate of 200 kL/ha and only collect roof water; and
- Irrigation demand of 6 ML/yr calculated by:
  - 0.002 m/m^2/day;
  - 200 days/year; and
  - 50% of the sports field area irrigated.

6.2.2 Results

Figure 6.3 shows the portion of sports field irrigation demand that can be met for a given stormwater tank volume. It can be seen that 50%, 75%, and 90% of irrigation demand can be supplied by a tank volume of about 60 kL, 150 kL, and 285 kL, resectively.

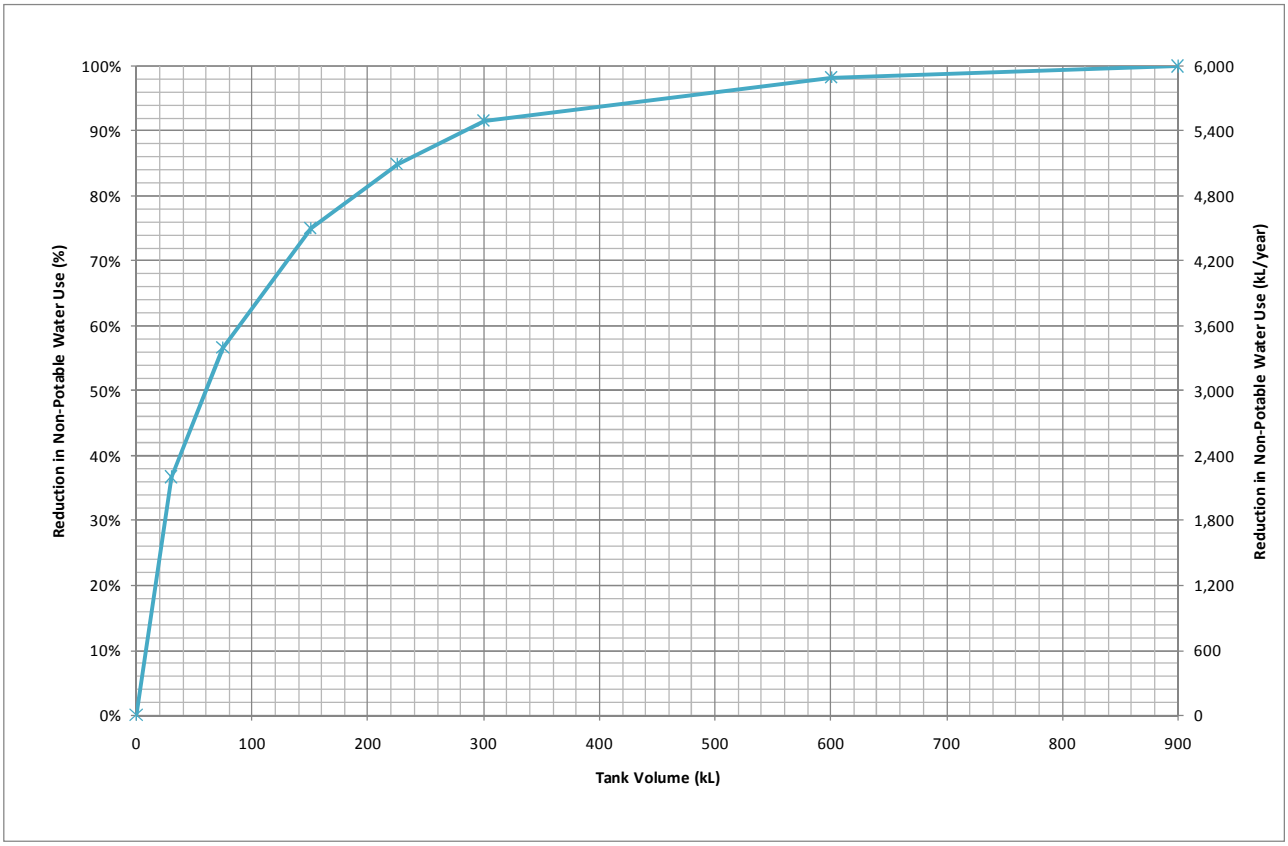


Figure 6.3 Portion of sports field water demand met by the stormwater tank

6.3 INDICATIVE RAINWATER TANK COST

Figure 6.4 shows indicative cost of tanks for different sized aboveground poly tanks and underground concrete tanks. In general, underground concrete tanks are more expensive than aboveground poly tanks and cost of storage per kL decreases as the adopted tank size increases.

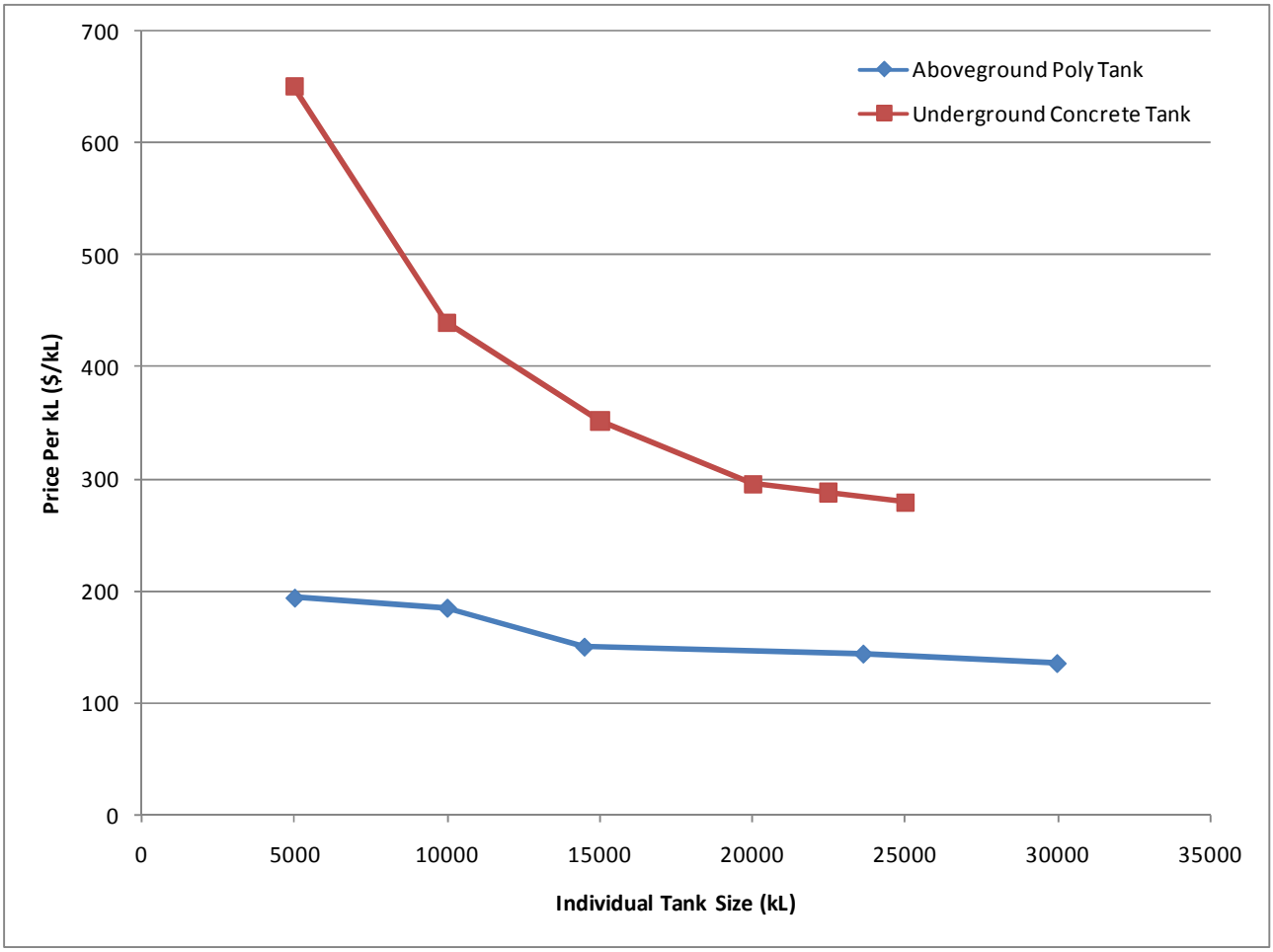


Figure 6.4 Indicative cost per kL of Storage for Different Tank Sizes (Source: www.rainwatertanksdirect.com.au)

7 SUMMARY OF FINDINGS

The Urban Land Development Authority (ULDA) is currently undertaking the master planning of the Carseldine Urban Village (CUV), within the Fitzgibbon Urban Development Area (UDA). This report, prepared by WRM Water & Environment, presents the results of hydrologic and hydraulic modelling studies undertaken to assess the impacts of the proposed development on flood behaviour and stormwater runoff.

The TUFLOW model developed in a previous study (WRM, 2009) and revised in a subsequent study (WRM, 2010) was used to assess the impact of the development on flood levels within the vicinity of the UDA. The results of the flood modelling indicated that:

- Stage 1 of the CUV does not increase 100 year ARI water levels outside of the Fitzgibbon UDA compared with predevelopment conditions. Stage 1 of the CUV does not require flood mitigation works along Cabbage Tree Creek.
- Stages 2 and 3 of the CUV increase 100 year ARI water levels along Cabbage Tree Creek outside of the Fitzgibbon UDA by up to 0.02 m compared with predevelopment conditions. Stages 2 and 3 will require some form of flood mitigation works to ensure that the peak 100 year ARI flood level is not increased as a result of the CUV development.
- The proposed sports field area has 10 year ARI flood immunity.

Note that further modelling and development of detailed concepts for proposed flood mitigation works is underway as part of a separate Cabbage Tree Creek flood mitigation study.

A number of stormwater treatment devices (STMs) within the development will be required to achieve the stormwater management design objectives. The proposed measures include rainwater tanks, sediment traps, lot based bio-retention pods, roadside bio-retention pods, detention basins, and flow dissipaters. Two lot-based scenarios were investigated:

- Rainwater Tanks collect roof water only (Scenario 1); and
- Rainwater Tanks collect roof water and lot runoff from impervious areas (Scenario 2).

Rainwater tanks were assumed to supply non-potable water use.

Five tank sizes were investigated for both scenarios, including 50 kL/ha, 100 kL/ha, 200 kL/ha, 300 kL/h, and 400 kL/ha of gross development area.

The required total bio-retention area:

- for Scenario 1 ranged between about 0.7% with a rainwater tank volume of 50 kL/ha to 0.3% with a rainwater tank volume of 400 kL/ha.
- for Scenario 2 ranged between about 0.7% with a rainwater tank volume of 50 kL/ha to no bio-retention with a rainwater tank volume of greater than 200 kL/ha.
- to treat all road runoff and the park and ride area totals 1410 m^2.

The proposed STMs ensure that the development meets the design objectives for stormwater management.

An investigation into the potential minimisation of water demand from the town reticulation water supply was undertaken for the development. It was estimated the non-potable water demand of the development will be about 60 ML/year. The above five tank cases were assessed for both scenarios to estimate the benefits of reusing site runoff for non-potable uses. The results of the modelling indicate that:

- The expected reduction in non-potable water demand for Scenario1 ranges from 36% to 71% for the 50 kL/ha tank and 400 kL/ha tank case, respectively.
- The expected reduction in non-potable water demand for Scenario 2 ranges from 40% to 83% for the 50 kL/ha tank and 400 kL/ha tank case, respectively.
- A sports field tank could supply 50%, 75%, and 90% of annual irrigation demand with a 60 kL, 150 kL, and 280 kL capacity , resectively.

The best approach to managing stormwater will be different for each lot within the development because the non-potable water demand of each lot will be different. It is recommended that a lot-based stormwater quality management plan (SQMP) that takes into account the expected type of development and non-potable water demand of each site be done at the detailed design stage. It is also recommended that each lot should be required to install a minimum tank volume of 120 kL/ha of lot area to ensure the overall CUV development meets a minimum reduction in non-potable water demand of 50% (30 ML/a).

The best approach to managing stormwater will be different for each lot within the development. The required bio-retention area for the lot depends on the adopted volume of rainwater tank. On this basis, it is recommended that a lot-based stormwater management plan be done at the detailed design stage. Lot based stormwater management plans will locate and size STMs within the lot footprint based on actual development yields, site cover, and estimated water demands.

8 REFERENCES

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APPENDIX A

MUSIC PARAMETERS

Table A1 Adopted MUSIC Runoff Generation Parameters

Parameter	Urban Residential	Commercial	Industrial	Rural Residential	Forested
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!	120α	120α	120α	120α
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

Notes: * Single pervious soil store adopted
α Shallow Soil Store
! Deep Soil Store

Source: BCC (2003)

Table A2 Adopted MUSIC Base and Stormflow Concentration Parameters

Land Use Type for MUSIC Source Nodes [1]	Parameter	Total Suspended Solids (Log_{10} mg/L)		Total Phosphorus (Log_{10} mg/L)		Total Nitrogen (Log_{10} mg/L)	
		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Commercial Roof [2]	Mean	0.78	1.30	-0.60	-0.89	0.32	0.37
	Std Deviation	0.39	0.38	0.50	0.34	0.30	0.34
Commercial Pervious[2]	Mean	0.78	2.18	-0.60	-0.47	0.32	0.37
	Std Deviation	0.39	0.38	0.50	0.34	0.30	0.34
Commercial Impervious[2]	Mean	0.78	2.43	-0.60	-0.30	0.32	0.37
	Std Deviation	0.39	0.38	0.50	0.34	0.30	0.34

Notes: Source: 1 BCC (2003)
2 Mean Stormflow concentrations sourced from GCCC (2006) all other concentrations from BCC (2003)

APPENDIX B

MUSIC MODEL

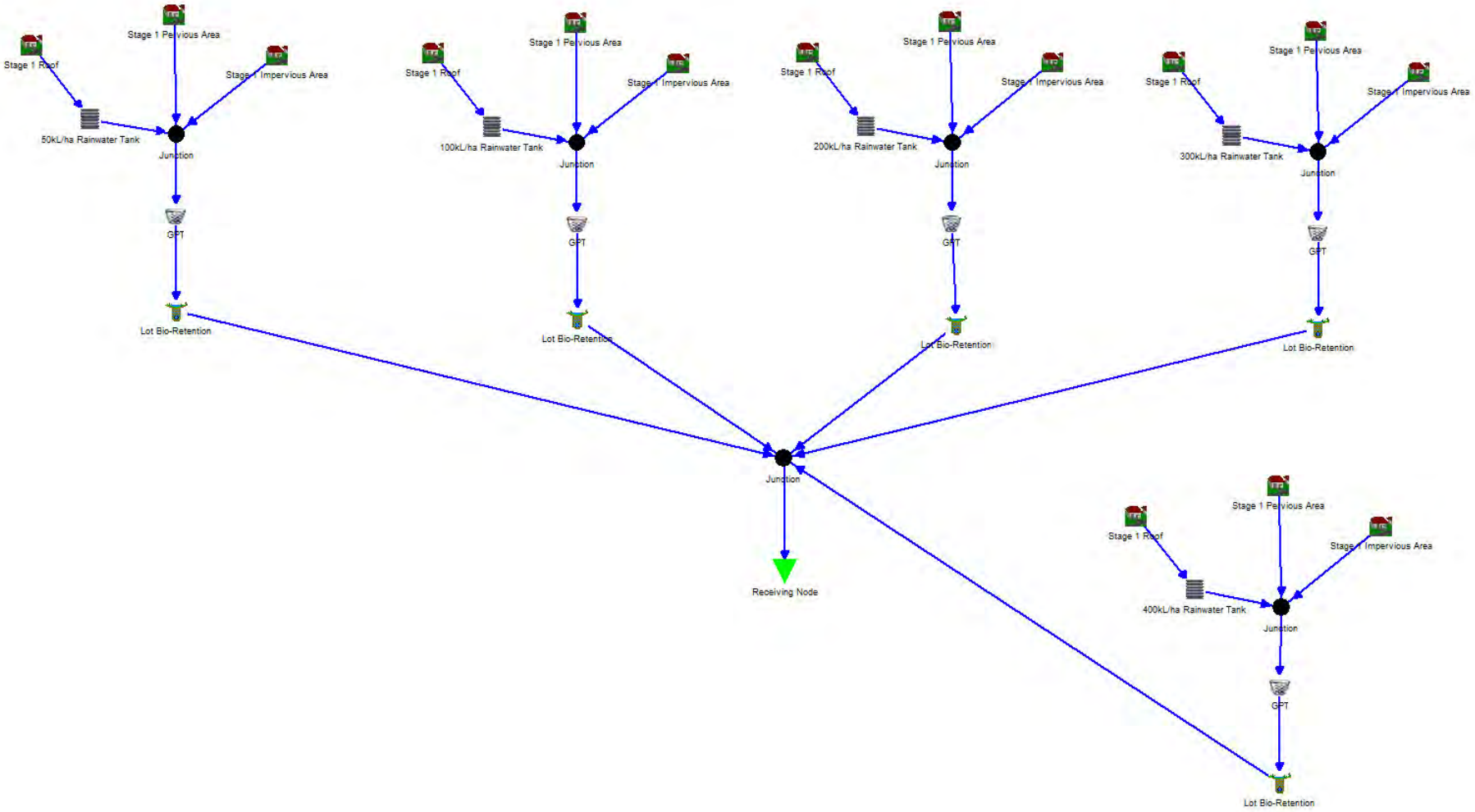

Figure B1 Lot Based MUSIC Model (Scenario 1)

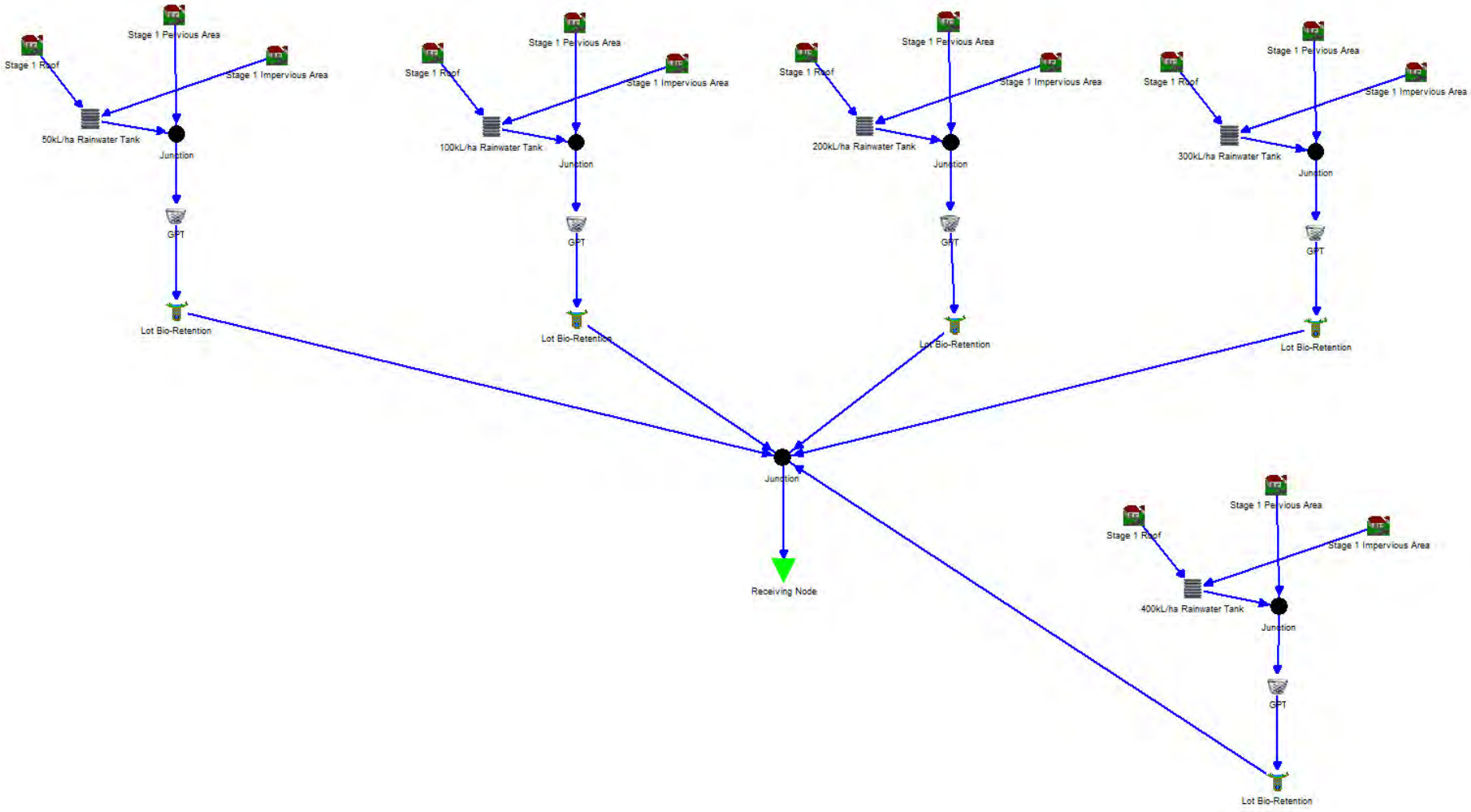

Figure B2 Lot Based MUSIC Model (Scenario 2)

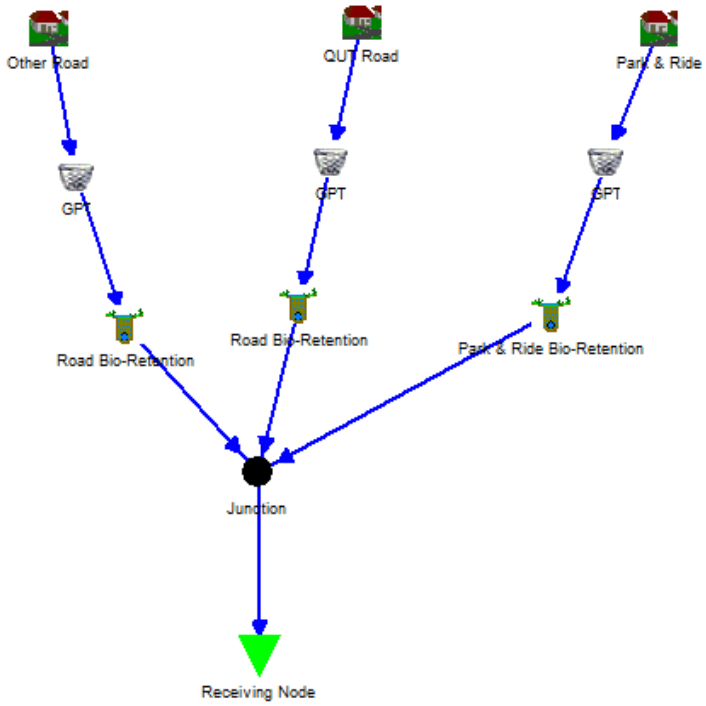

Figure B3 Road MUSIC Model

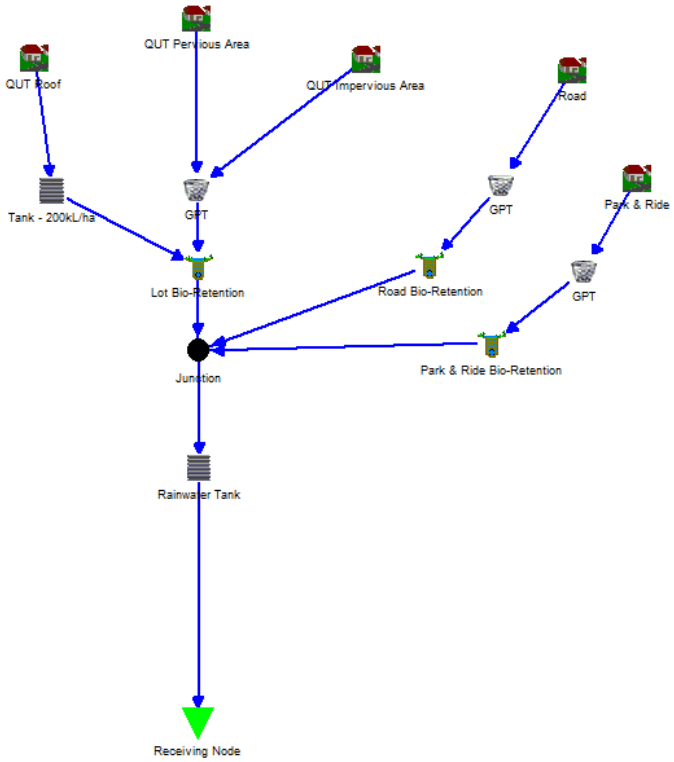

Figure B3 Sports Field Rainwater Tank MUSIC Model

APPENDIX C

TYPICAL BIO-RETENTION POD PLAN AND CROSS-SECTIONS