Western Australian Planning Commission

Government of **Western Australia**
Department of **Planning**

CockburnCoast

district structure plan

September 2009

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Western Australian Planning Commission

Albert Facey House
469 Wellington Street
Perth Western Australia 6000

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Foreword

Exciting prospects for Cockburn coast

The Cockburn Coast District Structure Plan establishes an exciting future for the Cockburn coast, promising a range of housing types, activities and employment choices.

The structure plan aims to transform the area by redeveloping the South Fremantle Power Station and introducing a transit system link to Fremantle, vibrant coastal nodes and improved connections to the area's environmental elements.

It is anticipated that approximately 10,000 new residents will be able to call the Cockburn coast home, while at least 2700 people will call it their new place of employment. Many more people will be drawn to the rejuvenated Power Station and its surrounds as it becomes a favourite leisure destination for families and visitors alike.

Establishing a framework for future land use and transport planning and decision-making, the district structure plan proposes a forward-thinking response to urban redevelopment.

As a planned urban growth area outlined in the Directions 2031 – Draft Metropolitan Spatial Framework for Perth and Peel, the structure plan demonstrates how urban consolidation can be undertaken in a way that is responsive to the regional context.

A key feature of the structure plan is its focus on sustainability through the establishment of ambitious performance targets. It also provides for a variety of housing types and styles such as apartments, townhouses and smaller dwellings that will offer choice to people interested in modern, beachside development in the metro area.

The structure plan encompasses a range of land uses such as residential, business, commercial, education, tourism and recreational opportunities, while enabling sufficient flexibility to accommodate existing industries until they are ready to relocate.

Redevelopment of the Cockburn coast will take time, however I am looking forward to the State Government, working in conjunction with local governments, landowners and the community, to deliver on the intent of the district structure plan.

This process will complement the collaboration which has already occurred in the preparation of the district structure plan, including the valuable input provided by the Cockburn coast reference group.

John Day MLA
Minister for Planning

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Foundations of a new community

For many years the future of the dormant industrial strip book-ended by the Port Coogee and South Beach developments has been the subject of intense debate.

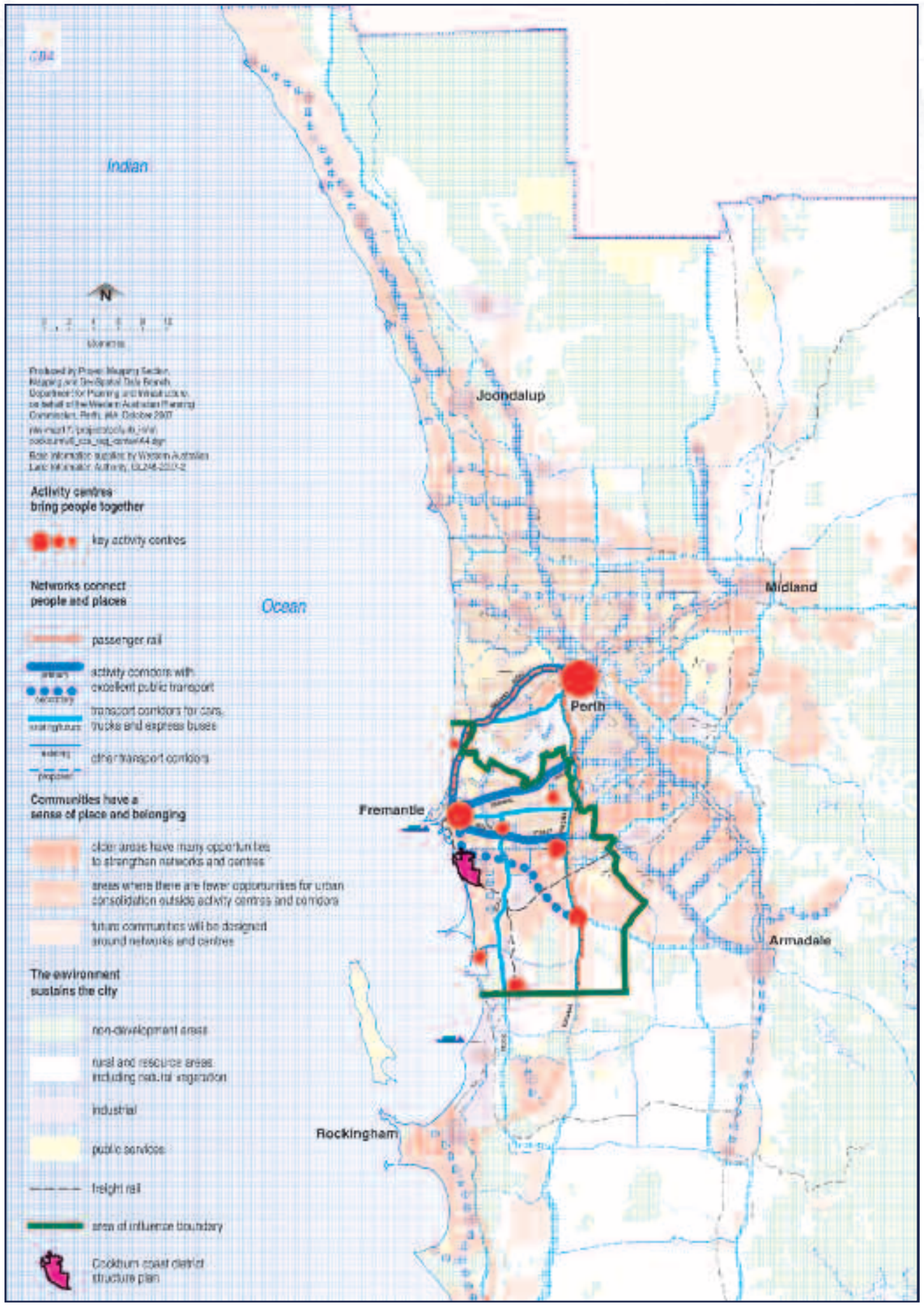
In May 2005, community members were given a forum to voice their aspirations for the area through the Vision for the Cockburn coast dialogue.

Drawing on the ideas put forward at the dialogue, the Western Australian Planning Commission (WAPC) embarked on establishing a new plan for North Coogee - a plan to help guide the creation of an exciting, mixed use beach-side community.

The WAPC has recognised that the Cockburn coast project presents a prime opportunity to demonstrate the application of the Directions 2031 principles. It is also understood that the renaissance of the Cockburn coast will not happen within a void, so the district structure plan has been carefully crafted to complement Cockburn's regional context.

The district structure plan distils the high level principles outlined in Directions 2031 - Draft Spatial Framework for Perth and Peel to guide the Perth and Peel regions to a sustainable future - creating a plan for the future that is integrated, creative, forward looking and sustainable.

Figure A: Regional context



The regional perspective

The purpose of the regional framework is to establish a clear schedule of requirements and performance targets, both regional and place-based, to form the basis for policies and plans for implementation by a future redevelopment authority or, alternatively, through local planning schemes. The WAPC believes that a redevelopment authority will be the most effective agency for implementation of this project, and that the Western Australian planning system will be strengthened if the Cockburn coast project takes place within a framework of regionally derived targets and measures.

Figure A outlines Cockburn coast's position in the regional context, and highlights key activity centres, employment centres and movement networks within the area of influence that relate to the district structure plan area.

Background

The WAPC has advertised the Directions 2031 Draft Spatial Framework for Perth and Peel, which sets the vision, values and principles for the Perth and Peel regions to 2031. The six principles capture the essence of the Directions 2031 strategy, against which planning initiatives, policies and plans are to be tested. These strategic themes are to create:

1. a liveable city;
2. a prosperous city;
3. an equitable city;
4. an accessible city;
5. a green city; and
6. a responsible city.

The regional framework captures this regional analysis and provides targets and guidance for implementation which delivers the Directions 2031 objectives.

The district structure plan deliberately reviewed the regional movement networks, and socio-economic, employment and housing trends to present a clear picture of the Cockburn coast in the context of its surrounding region and identify the key priorities for the district structure plan.

The district structure plan is a reflection of the Directions 2031 policy and has been directly influenced by the regional framework, responding by:

- developing an integrated transport and land use network;
- encouraging mixed use development, supported by higher densities, that is well served by public transport;
- acknowledging and highlighting local identity;
- promoting affordable housing;
- intensifying employment and encouraging employment self-sufficiency; and
- enhancing and reconnecting the community with the area's natural and cultural landscape.

Figure B: Application of Directions 2031 policy in the Cockburn coast district structure plan

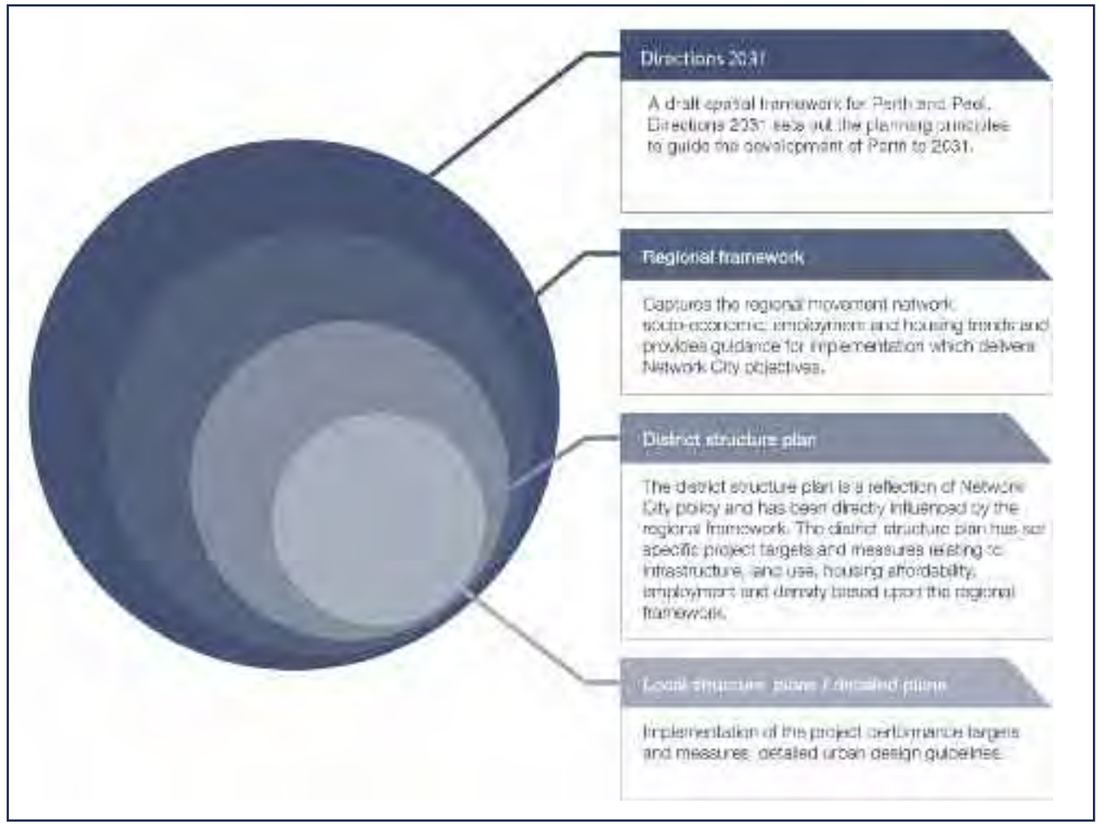


Figure B demonstrates the application of Directions 2031 through the regional framework and the district structure plan.

Responding to regional and local needs

When placed within its regional context, Cockburn coast presents a number of characteristics, challenges and opportunities that need to be accommodated and delivered through the development phases of the project. Outlined below is a set of high-order requirements that provide a framework to guide implementation.

External to the project area

Interface

- The Cockburn coast area needs to be established within its regional context, recognising Fremantle as the high-order activity centre and acknowledging the other local centres that provide important employment, service and recreational resources.
- A key element of the Cockburn coast plan will be to enhance linkages with the surrounding regional and local activity centres and facilities. It will be particularly important to ensure integration with South Fremantle, Port Coogee and the surrounding suburbs of Hamilton Hill, Spearwood and Coogee via pedestrian, cycle and road networks.

Integrated transport strategy

- The planning for the Cockburn coast has identified the immediate need for a sub regional integrated transport strategy for the south-west corridor, with a particular emphasis on public transport.
- The district structure plan is sufficiently robust and flexible in terms of development intensity, level of activity and proposed population to accommodate the outcomes of the integrated transport strategy.

Road network:

- The integrated transport strategy for the south west corridor should consider the long term need for an east-west road link from Rockingham Road through to North Lake Road, generally along the alignment of the existing primary regional road reservation, with a view to downgrading its current status from a controlled access highway standard road.
- Regional through-traffic will be directed towards Stock Road as the primary north-south regional road and Cockburn Coast Drive (Fremantle-Rockingham controlled access highway) as a district distributor-style road. In light of this, a review of the primary regional road function of Cockburn Coast Drive from Russell Road northward is warranted.
- The district structure plan proposes that the Hampton Road/Cockburn Road connection should be seen as an activity corridor that supports a high-frequency public transport service and a variety of land uses. This connection is not to be designed as a high-speed through-traffic route.

Public transport:

- Public transport links must be fostered with key activity centres. In the short to medium term, the flexibility of bus rapid transit (BRT), its ability to offer the service quality of rail (speed, reliability and comfort) and to provide certainty through investment in infrastructure while still being cost effective, have resulted in it being the favoured approach to servicing the Cockburn coast and surrounding communities.
- A BRT system will connect with Fremantle train station in the north, with possibility for the extension of the service further south or to the east in the future (potentially linking through to Rockingham or Cockburn Central, which have been identified as major activity centres). Public transport alignment options north to Fremantle and extensions further south or to the east of the project area will be a key consideration of the integrated transport strategy.
- To facilitate the BRT system, transit priority must be secured along the length of Hampton Road and Cockburn Road (through the centre of the project area). It is particularly important to extend a transit corridor along the section of this road between Douro Road and Rockingham Road. A wider road reservation in this section may be necessary to accommodate transport growth.
- The district structure plan does not preclude the use of light or heavy rail technology along the freight rail alignment in the future should this be provided, with the built form intensity and key structuring elements of the plan compatible with future transit options in this location.
- The proposed alignment of the transit corridor (along Hampton and Cockburn roads) in the district structure plan has the capacity to facilitate light rail technology.

Freight rail:

- The freight rail line is a significant component of the State's import and export industries and its operation will continue in the long term. Future development needs to appropriately accommodate the freight rail infrastructure.

South Fremantle switchyard terminal

- The plan calls for the relocation of the South Fremantle switchyard terminal and associated infrastructure. A comprehensive feasibility study is required to determine the ultimate future location and associated relocation cost for the switchyard terminal. It is acknowledged that relocating the switchyard terminal would come at a high cost. The likely funding source for this undertaking would be either from the sale of government land in the project area and/or from allocated government funding.

Within the project area

Sense of place

- The Cockburn coast will be a high profile area; the experience of other redevelopment projects is that they attract a premium in the market place of 15-25 per cent compared with their immediate region. New development at Cockburn coast must be inclusive and offer a variety of recreation, employment and living opportunities to a wide mix of people. To achieve social diversity, which is a key objective of the Cockburn coast project, a mix of densities, dwelling size and tenure will be required to address this issue. This will be further strengthened by policy initiatives, for example inclusionary zoning.

- The rich Indigenous and European history needs to be demonstrated through the implementation of interpretive strategies, foreshore management, heritage management plans and responsive development around or within sites of significance.

Regeneration of the South Fremantle power station

- The redevelopment of the South Fremantle power station is a critical component of the district structure plan. An essential element of this redevelopment will be meeting the regeneration principles, which include benchmarks for heritage treatment, public access and use, and the long-term economic sustainability of the power station building.
- The redeveloped power station will be the landmark feature of the town centre. It will be a major coastal node and will, therefore, require uses and facilities that will accommodate the needs of the broader catchment area, including recreational, tourism and commercial uses.

Access to the beach

- Access to the beach is a critical factor of the redevelopment and opportunities to improve access across the freight rail line should be maximised. The redevelopment should strive to achieve, as a minimum, the number of access points illustrated on the district structure plan (Figure 2.1).
- There will be different forms of beachfront activity ranging from a high activity beach between the northern arm of Port Coogee and the power station and more passive beachfront activities. The power station sector is seen as a regional beach node, with the O'Connor sector performing a local beach function. A range of uses must be accommodated within the hierarchy of beach nodes, including the use of the beach for animal exercise.

Public transport

- The district structure plan requires that the area will be serviced by a bus rapid transit system, in accordance with Directions 2031 and transit oriented development principles.

Road network

- Cockburn Coast Drive (referred to as Fremantle-Rockingham controlled access highway) needs to be constructed in an alignment and form that is responsive to the topography and the regional road network, providing a higher-order alternative to Cockburn Road for regional traffic. Cockburn Coast Drive will be a district distributor integrator-style road, constructed initially as a two-lane road and based on a reduced operating speed than a highway-standard road.

Employment

- Employment in the structure plan area will be concentrated primarily in the Darkan, Emplacement and Power Station precincts. These precincts will offer a range of complementary employment opportunities, while enabling appropriate transitional arrangements for existing lower-employment businesses.

Precincts

- The project area has been divided into a number of precincts. The district structure plan provides an outline and guides land use, built form character and building height considered appropriate for each precinct. It is intended that this guiding information be followed and implemented in the detailed design of the project area, particularly at the local structure planning and development stage.

Cost contributions

- The lift in land value in the North Coogee area as a result of rezoning industrial land to an urban zoning warrants cost contributions towards infrastructure, particularly public transport.

Performance target and measures

The WAPC is committed to delivering the Directions 2031 policy, which encompasses:

- promoting sustainable urban development through land efficiency;
- promoting transit oriented developments, with an emphasis on density and housing diversity around public transit nodes and areas of activity;

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Table A: Cockburn coast performance targets and measures

Society	Population	Approximately 10 000 people
	Housing stock	1) Approximately 4850 dwellings [1] Minimum 3 per cent separate houses Minimum 22 per cent terrace 2) Minimum 33 per cent low-rise apartments [2] 3) Minimum 31 per cent medium to high-rise apartments [3/4] Minimum 20 per cent affordable housing Minimum 20 per cent adaptable buildings 15 per cent of homes need to be 'family homes'
Economy	Employment profile	Estimated working population 6800
	Employment self - sufficiency	Minimum 40 per cent (approx. 2700 jobs) Preferred 60 per cent (approx. 3600 jobs)
Environment	Resources recycling	20 per cent waste reduction (against per capita average) 60 per cent wastewater reuse 30 per cent reduction in scheme water consumption (against per capita average)
	Energy efficiency	75 per cent dwellings with solar orientation 75 per cent dwellings with cross flow ventilation 40 per cent reduction in stationary greenhouse gas emissions (against per capita average)
	Alternate forms of transport	60 per cent dwellings to be within 800 metres of public transit

1 Potential dwelling yield assumes residential build out of the South Fremantle landfill site and the South Fremantle chalet village
2 Low rise apartments - 3 to 5 storeys
3 Medium rise apartments - 6 to 8 storeys
4 High rise apartments - over 8 storeys
5. Adaptable housing refers to dwellings that are adaptable to changing demographics with the ability to transition over time

- achieving social progress which recognises the needs of everyone; and
- using natural resources prudently.

To contribute to the achievement of sustainable development at Cockburn coast, the WAPC, in reviewing the regional analysis, the Cockburn coast sustainability framework and the integration of the Directions 2031 policy, has set specific project performance targets and measures relating to the regional impacts, infrastructure, broad land use, employment and densities.

These targets and measures are outlined in Table A.

Implementation requirements

To implement the district structure plan, two major issues need to be addressed:

Socio-economic

- Provide accommodation for a substantial population. The principle is to maximise population while allowing reasonable household diversity.
- Respond to population demographic change and ensure construction of appropriate housing stock.
- Provide for substantial employment self-sufficiency.
- Allow for a broadened economic base.

Physical planning

- Provide key regional road connections.
- Provide public transport linked to key destinations.

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Implementation methodology

The project performance targets and measures are to be taken into account when preparing future planning strategies for the Cockburn coast and the Metropolitan Region Scheme (MRS) amendment.

Implementation of the project targets and measures is therefore expected to occur through the relevant statutory provisions whic guide the redevelopment moving forward, be it through a redevelopment authority, local planning scheme or other implementation mechanism.

Given that the district structure plan requires the endorsement of the WAPC, it is expected that the future scheme provisions will reflect the district sturcture plan and, therefore, the performance targets and measures established for the Cockburn coast project.

Regardless of the implementation methodology adopted, the Metropolitan Region Scheme (MRS) will be the long-term governing instrument. In light of this, the MRS will need to be amended to reflect intended land uses, regional requirements and planning principles. Therefore, notionally the Cockburn coast ammendment to the MRS would appear as outlined in the Figure C. Once the criteria established for the lifting of the Urban Deferred zone have been met, the zoning will transition to Urban.

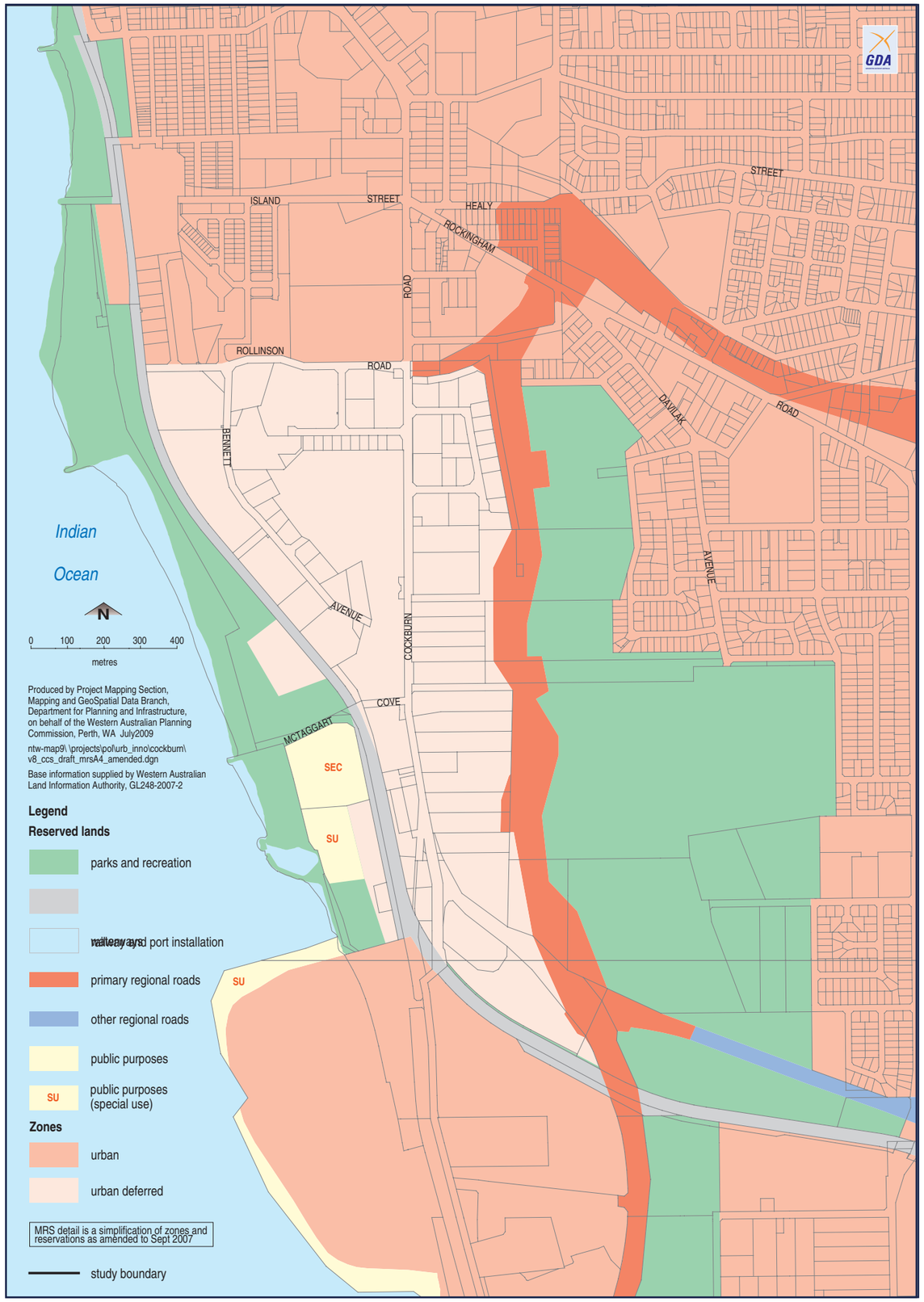
In addidition, a sustainability tool has been developed to benchmark the sustainable development of Cockburn coast. The sustainability tool can measure proposals and programs through all stages of planning and development. In the future, the relevant statutory authorities, government agencies and the community will also be able to assess and monitor the sustainability performance of the project and its component parts.

Monitoring requirements

The key issues that need to be assessed and monitored through the sustainability framework are:

- **environmental issues -** the sustainability of this development and the potential impact on bushland, wetlands, scenic landscapes, natural resources, air and water quality;

Figure C: Notional Cockburn coast amendment of the Metropolitan Region Scheme



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- **social issues -** housing supply, housing diversity and mix, community health and development, community inclusiveness and community services;
- **infrastructure provision -** the efficiency of infrastructure use in established and new areas including its timely provision, cost effectiveness, opportunity for innovation, management and maintenance; and
- **economic issues -** the economic base to support the sustainable future of Cockburn coast including employment self-sufficiency, self-containment, diversity, opportunities for growth, innovation and enterprise.

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Part 1
The district structure plan

- Introduction
- The plan
- Delivering the district structure plan
- Implementation options

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Chapter 1 Introduction

1.1 Setting the scene

"You are now riding through Fremantle's back yard, and against the wind. You always seem to have the wind in your face as the cycle track winds through spinifex-covered dunes. It's a spectacular, wild ride even though you are only three or four kilometres from the city. The crushed bodies of billions of sea urchins have coloured the sand an unexpected grey. Ahead is an industrial cathedral, the decommissioned South Fremantle power station."

Ron Davidson - Fremantle Impressions

The Cockburn coast project area is located approximately 18 kilometres south-west of the Perth CBD, and four kilometres south of Fremantle (Figure 1.1). It shares its boundaries with both the City of Cockburn and the City of Fremantle.

With the Indian Ocean and peerless views of Carnac Garden and Rottnest islands to the west and Beeliar Regional Park to the east, the structure plan covers more than 331 hectares (331 ha) and is "book ended" to the north and south by the South Beach and Port Coogee urban renewal projects.

The project boundary includes the 92 hectare industrial strip that once hosted an assortment of industries, including the manufacture of munitions, an abattoir and the South Fremantle power station. Once the industrial backbone of Perth, this land now forms the heart of the Cockburn coast urban renaissance (Figure 1.2).

Establishing a development framework requires 'big picture' regional investigation. Therefore, the analysis phase of the Cockburn coast district structure plan has explored issues such as integration and coordination with the adjacent Port Coogee and South Beach developments and the South Fremantle community.

The project area also includes the South Fremantle landfill site. The City of Fremantle has joined forces with LandCorp and the South Fremantle community to investigate the remediation options and land use potential of the landfill site, and develop a holistic planning solution. The planning options for the landfill site have been integrated into the structure plan.

The Cockburn coast project area contains a number of State government and private landholdings. In total, 446 landholdings are contained within the structure plan boundaries, including land owned by eight State government agencies, two local government authorities and 182 private landowners.

The WAPC holds the Manning Lake portion (107 hectares) of Beeliar Regional Park for the purposes of parks and recreation.

1.2 The purpose of the plan

The Cockburn coast district structure plan will guide land use planning in the North Coogee area, and aims to provide for sustainable development, while protecting and enhancing the area's distinctive heritage and landscape. The plan is the first step in establishing a detailed land use framework for the Cockburn coast area

The plan will be used by the WAPC, the Department for Planning and Infrastructure, local governments, State Government agencies, landowners and the community to inform further detailed planning for the site and provide certainty about future development in the area.

The plan will:

- provide a clear vision statement;
- provide a clear land use framework for the sustainable development and growth of the Cockburn coast project area;
- establish the planning rationale for rezoning of land for residential and commercial development in designated locations as required to meet increased demand, and for land release;
- give certainty to landowners and investors purchasing land as to the intended future land use;
- indicate local structure and detailed area planning requirements that are to be undertaken in conjunction with landowners and the cities of Fremantle and Cockburn; and
- assist the cities of Fremantle and Cockburn and other infrastructure providers such as Western Power, the Water Corporation and Main Roads to identify priorities for provision of new infrastructure to meet the needs of the future Cockburn coast community.

1.3 Development of the plan

1.3.1 Stakeholder liaison and consultation

The structure plan has been developed following meetings with community members and landowners in the area, council representatives and key Government agencies. Information collected at these meetings, as well as from site visits and analysis, has been combined to enable the identification of opportunities, constraints and key issues affecting each area.

Through the plan formulation process, several variations were tested and revised, in conjunction with the Cockburn coast reference group, before the structure plan was arrived at.

The plans have been exhibited and feedback sought through the reference group, comprising landowners, residents, community members and Government stakeholders; and further through the statutory consultation period.

1.3.2 Developing the plan

In developing the Cockburn coast district structure plan, the following components have been taken into account:

- Facilitating the implementation of Directions 2031 strategic themes;

Figure 1.1: Aerial photo of the site incorporating Fremantle and Perth CBD

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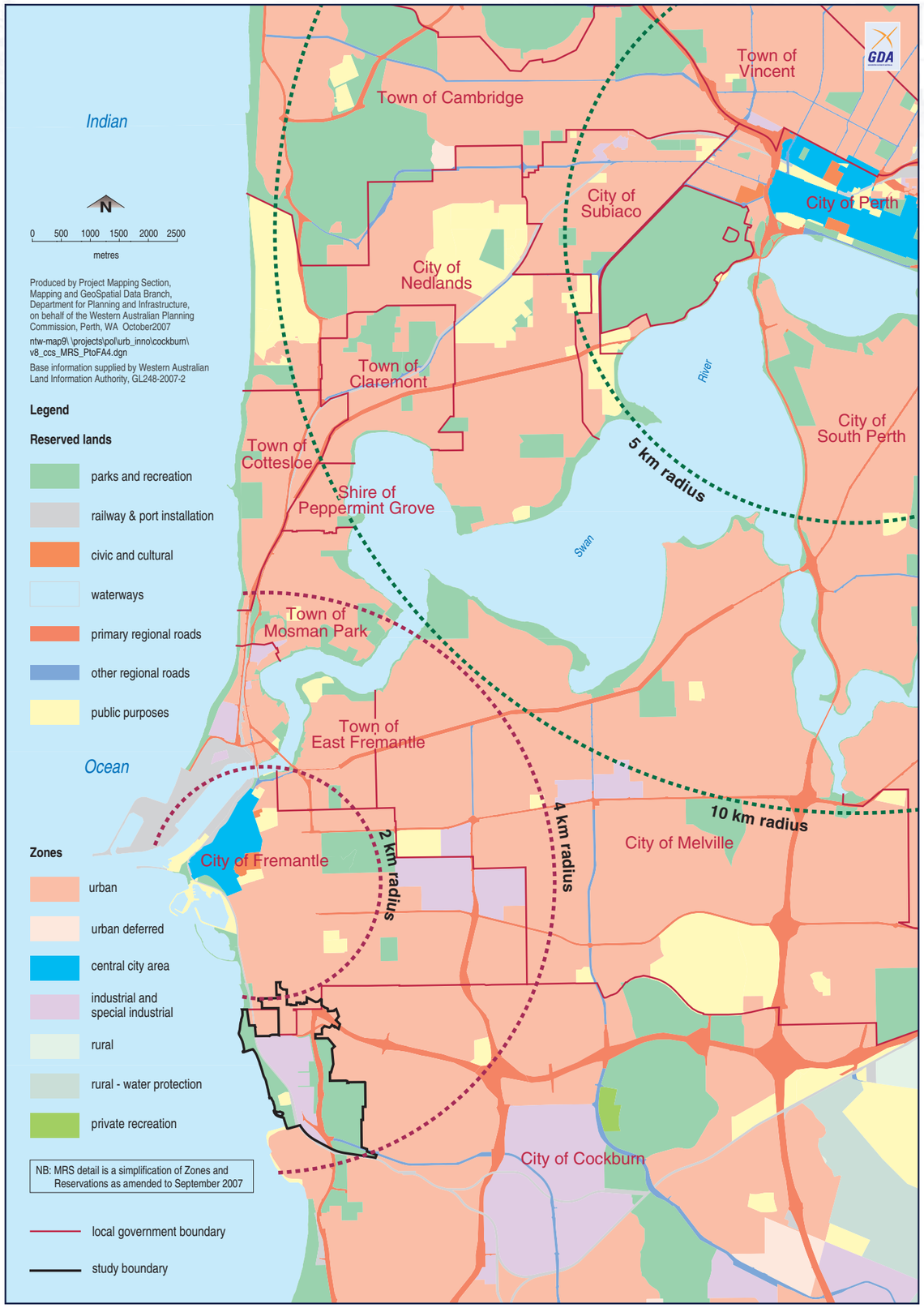
- Establishing a regional framework to identify key regional priorities for the district structure plan;
- Listening to the local landowners, State and Local Government authorities to gain a clear insight of the local needs and aspirations for the Cockburn coast;
- Learning from Fremantle and other coastal nodes around Australia;
- Undertaking environmental, coastal, heritage, transport, engineering, architectural and socio-economic investigations; and
- Responding by establishing a sustainability and design framework for the Cockburn coast to achieve the vision.

1.3.3 Structure plan consultant team

The team of consultants involved in advising the Department for Planning and Infrastructure with the preparation of the district structure plan include:

- Urban design and planning - Taylor Burrell Barnett
- Architecture - James Christou & Associates
- Landscape architect - Epcad
- Traffic and public transport analysis - Worley Parsons
- Infrastructure engineering services - GHD
- Sustainability, socio-economic and housing analysis - Syme Marmion
- Community facilitation - Estill & Associates
- Environmental assessment - ENV Australia
- Coastal process assessment - Oceanica
- Indigenous heritage - Australian Interactive Consultants
- European heritage - Yates Heritage Consultants.

Figure 1.2: Location plan



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1.4 What does the district structure plan contain?

The district structure plan contains:

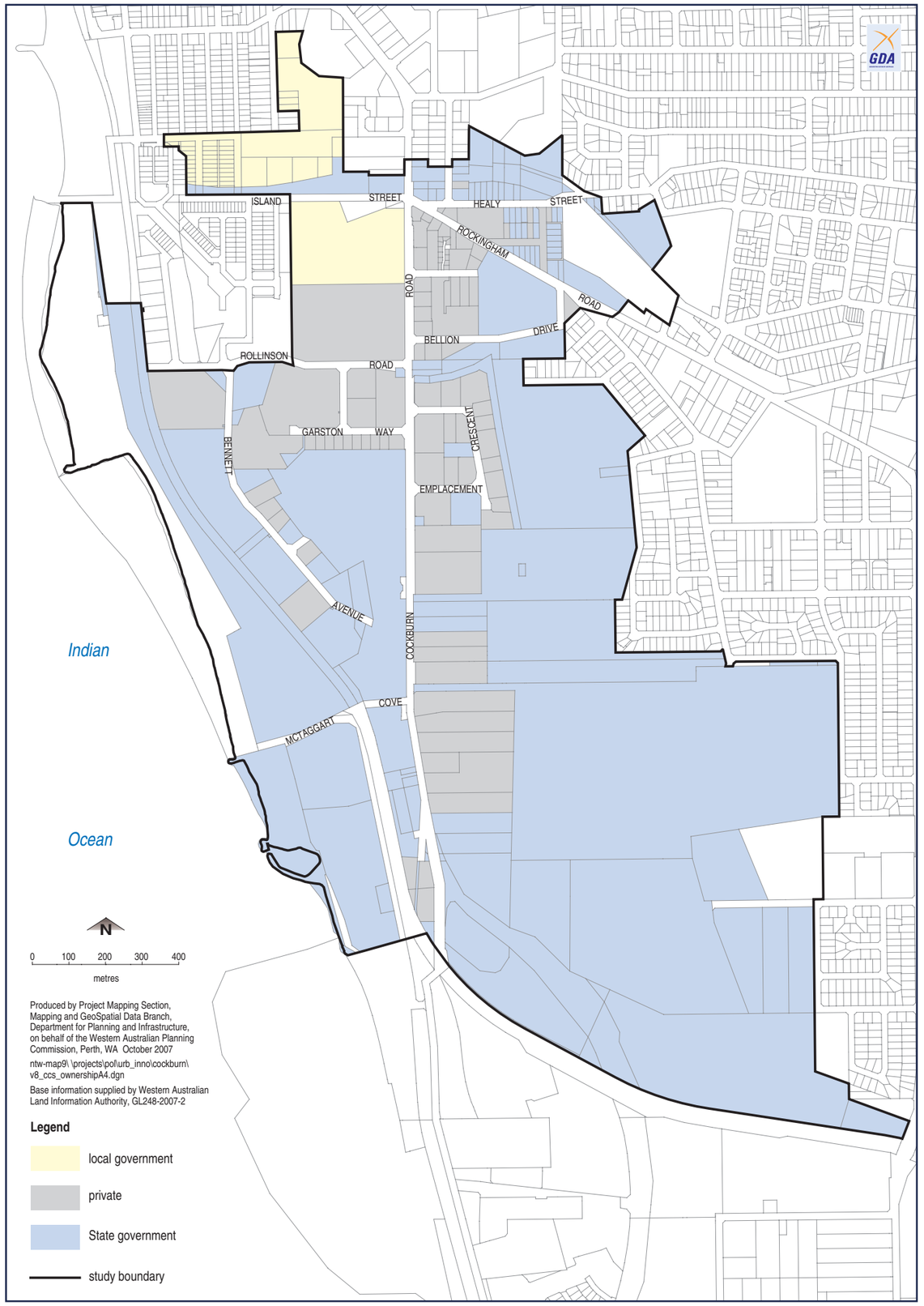
- an analysis of existing conditions;
- a vision for the area;
- a sustainability framework;
- a set of key directions and guidelines directed at achieving the vision;
- a development framework plan;
- conceptual images;
- precinct character and architectural statements;
- implementation mechanisms and requirements; and
- analysis of impacts and outcomes of the plan.

This report also presents:

- information and analysis used to inform the district structure plan preparation;
- an account of emerging themes and issues;
- a description of the structure plan, highlighting key features; and
- an implementation program.

The document is divided into separate parts. Part 1 concentrates on the district structure plan and the implementation of the plan. Part 2 examines the district structure plan's history, project challenges, regional context and physical site characteristics as well as State and local government statutory policy and the sustainability framework.

Figure 1.3: Landownership plan



The document is accompanied by detailed technical information in the supporting consultant reports, which form stand-alone appendices. Included as appendices are the following technical reports:

- Coastal planning strategy;
- Coastal processes assessment report;
- District water management overview;
- Environmental assessment;
- European heritage report;
- Aboriginal heritage report;
- Peer review report;
- Socio-economic assessment; and
- Transport analysis.

- The document is accompanied by detailed technical information in the supporting consultant reports, which form stand alone appendices, including:
  - Coastal planning strategy;
  - Coastal processes assessment report;
  - District water management overview;
  - Environmental assessment;
  - European heritage report;
  - Aboriginal heritage report;
  - Peer review report;
  - Socio-economic assessment; and
  - Transport analysis.

1.5 Structure of the CCDSP

The document is divided into separate parts:

- The **regional framework** provides a comprehensive analysis of the relationship between Cockburn coast and the region, and the requirements both within and external to the project area.
- Part 1 concentrates on the content and outcomes of the district structure plan, including the vision and objectives, anticipated land use mix, transport outcomes, implementation options and further work required through subsequent levels of planning.
- Part 2 examines the district structure plan's history, project challenges, regional context and physical site characteristics, as well as statutory policy and the sustainability framework guiding the project.

Chapter 2
The plan

The following chapter presents the district structure plan in the context of the regional framework that was developed to guide the plan's formulation, and the design framework below describes the various elements of the plan that make up the total proposal for the Cockburn coast.

The district structure plan is shown at Figure 2.1.

2.1 District structure plan design framework

Throughout the plan formulation process, all scenario plans and variations of the structure plan have been based on an urban design framework incorporating a design vision, principles and objectives.

The urban design framework serves as a rationale for the structure plan and reflects the regional framework (see summary) and the underlying principles for the study area, as established in Chapter 8).

The Port Coogee and South Beach redevelopment areas, while not subject to the provisions of the district structure plan, have been considered in the preparation of the plan and indicated on Figure 2.1, given:

- The importance of achieving an appropriate land use and transport interface, as well as integration with these redevelopment areas;
- Cumulative impact of redevelopment on the transport network;
- The need to consider employment opportunities across all three redevelopment areas; and
- Gaining an understanding of the population and dwelling characteristics of the collective redevelopment area to assist in planning for future services, infrastructure and demographic mix.

South Beach and Port Coogee are subject to independent planning and approvals processes, as described in section 5.10.

2.2 The vision - taking Cockburn coast to 2030

"To create a vibrant, landmark destination that is connected, integrated, diverse and accessible."

The design vision for the project area is to create a coastal settlement of beauty, charm and vibrancy that exhibits world leadership in architecture and building design, landscape and water design, and social and cultural sustainability.

The design vision also seeks to create a place that offers new and exciting living, employment and recreation opportunities, whilst also providing an appropriate level of compatibility and support for existing residents and enterprises in the area.

The Cockburn coast project will establish a sustainable community that celebrates the area's past as well as taking on creative ideas, innovation and development.

The vision values the Cockburn coast heritage with the old South Fremantle Power Station brought back to life as a dynamic new waterfront centre which, combined with the new Port Coogee marina development, will create a regionally significant coastal node for Perth's southern suburbs.

Cockburn coast will be an easily accessible place, with an integrated transit system and offering lively café's, restaurants, shops, residential and commercial precincts, tourism, cultural and recreation activities.

It will be a collection of great streets and inspiring public places in which to explore and enjoy the Cockburn coast's past.

New sustainable performance criteria, as outlined in the Regional Framework, will be implemented and are based upon environmentally sustainable design principles, while an integrated urban water design will have a focus on collecting, storing and recycling water.

Fundamentally it is about uniting, social, environmental and economic principles while maintaining and respecting the Cockburn coast's unique history and culture.

2.3 Design principles

The ambitions inherent in this vision are supported by the regional framework and best practice urban design knowledge, that successful places are a combination of three elements - spaces, activities and people. The successful translation of a vision into a structure plan that can be effectively implemented requires all parties to have regard for the following fundamental urban design principles that are acknowledged and practiced in all the world's best places:

- Creating strong leadership, vision and a plan;
- Building community and stakeholder support;
- Focusing on public realm and built form outcomes - not strict land use regulations;
- Providing housing density and diversity;
- Embracing an integrated mix of uses;
- Providing places of employment;
- Integrating and optimising civic land uses;
- Ensuring good connectivity for pedestrians, cyclists and vehicles;
- Creating people-friendly spaces;
- Providing a network of open spaces;
- Being transit oriented;

Figure 2.1: District structure plan

0 200 400
Metres

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On behalf of:
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Flown December 2008

Notes

1. South Fremantle Tip Site is subject to separate planning exercise. Including an option for netball court complex south of Island Street.
2. The zoning and development proposals for this land north of Rockingham Road are to be addressed through the City of Fremantle TPS No.4.
3. Beach activity node.
4. Emplacement Precinct: subject to land use and development transition arrangements to protect existing use rights.
5. East-west link alignment subject to further investigation.
6. Coastal foreshore: indigenous and european heritage significance.
7. Possible reinstatement of Robb Jetty for public use.
8. Beach activity node with mixed use and residential development.
9. Active public open space: Shared facility arrangements with primary school and protection of Robb Jetty chimney.
10. Landbridging opportunity.
11. Reflects preferred outcome of switchyard relocation.
12. Potential for development to be fully integrated with power station across rail reserve.
13. Beeliar Park enhanced and better linked to development area.
14. High amenity beach and foreshore improvements.
15. Possible alternative rapid transport alignment.
16. Port Coogee activity node linked with power station node.
17. A 50 m odour buffer is applied; however, will require further review in detailed planning.

Legend

- low density residential
- mixed use
- residential
- mixed business
- local activity node
- commercial/community
- South Fremantle power station
- freight rail reserve
- pedestrian linkage - bridge
- primary school
- sewer pump station
- public open space
- parks and recreation
- primary arterial road
- district distributor road
- local distributor road
- major access street
- bus/tram rapid transit
- pedestrian linkage/underpass
- coastal setback line
- South Fremantle power station special development area
- Darkan and Emplacement special development area
- district structure plan boundary
- area subject to separate planning process

- Creating public/private partnerships; and
- Understanding the site's position in the market.

These best practice principles have all been applied through the formulation of the district structure plan, to create the framework to allow optimum outcomes to be achieved at the Cockburn coast. They will need to be carried through to all ensuing detailed planning and development exercises in the area to ensure the intended outcomes are achieved.

2.4 Land uses

2.4.1 Land use and zoning objectives

The objectives that have driven the structure plan land use classifications and layout are:

- Creation of an integrated mix of land uses - a place to live, work and play, where people have a choice of activities throughout the day and night;
- Maintenance of the integrity of the existing land uses where appropriate and desired;
- Promotion of a general transition and intensification of uses within the structure plan area;
- Facilitation of an urban typology for residential development, and provide extensive opportunities for live/work within the project area;
- The use of the natural landform, different character and roles of individual streets to create varied land use and built form character precincts;
- Provision for the revitalisation and enhancement of the study area through the combined framework of land use controls, design guidelines and public works; and
- Encouragement of new land uses within the project area, but seek to carefully manage the inter-relationship of such uses with existing and future non-residential uses.

2.4.2 Land uses

The land use framework facilitates a diversity of residential, commercial, retail, entertainment, hospitality, and community-oriented uses that complement the existing activities in surrounding areas, while bringing additional opportunities that may not currently be available. The redevelopment of the existing South Fremantle Power Station building (refer Chapter 2.5.1), and associated revitalisation of the surrounding precinct, will inject a real sense of urban energy into the project area through its striking form and presence, and its ability to generate significant new activity.

The Power Station precinct is just one part of the Cockburn coast project, and the range of land uses and landforms that can be established through the structure plan area will allow new communities, economies and activities to be developed to the benefit of existing and future residents and landowners, and the wider community.

The allocation of land use and associated density is intended to contribute to the unique environment. Proposed land use areas are allocated in Table 2.1.

2.4.2.1 Residential

Approximately 56 hectares of the structure plan area has been designated primarily for residential development. The intent is that the residential development in the Cockburn coast will be of a density mix and built form character more intensive and vibrant than that typically created in greenfields locations on the urban fringe, and thus to ensure more sustainable outcomes across the triple bottom line.

Through the reference group consultation program, strong support was shown for this approach, and the residential mix that gained stakeholder approval was informed by iconic coastal locations elsewhere in Australia, such as Manly and St Kilda.

On this basis, the mix of densities proposed in the residential areas of the structure plan is as follows:

- Single houses 3-6 per cent (min 3 per cent);
- Semi-detached/row or terrace 22-33 per cent (min 22 per cent);
- Low rise 33-35 per cent (min 33 per cent); and
- Medium to high rise 31-37 per cent (min 31 per cent).

Table 2.1: Cockburn coast project land use areas

Land use	Area (ha)	Land use	Area (ha)
Mixed use	40.0	District open space	16.6
Residential	55.8	Regional open space	128.8
Mixed business	3.8	Rail	11.4
Primary school	1.5	Community	0.6
Local activity centre	4.5	Local roads and infrastructure	26.2
Rockingham Road area	17.1	Regional roads	25.3

Low rise apartments are those within the three- to five-storey range; while medium rise apartments are classified as six to eight storeys and high rise apartments are those greater than eight storeys.

These dwelling type allocations are anticipated to be applied throughout the district structure plan area, although it is recognised that some precincts have a greater propensity for accommodating density. A built form code is required to guide the form and density of development, however for the purposes of enabling modelling and providing a guide to local structure plans, the housing type mix generally translates into the following mix of residential densities:

R30	single house;
R50	semi detached/row or terrace;
R80	low rise apartment (3-5 storeys); and
R100/160	medium to high rise apartments (over 5 storeys)

The densities applied, although significantly higher than would be found in a greenfields or outer metropolitan location, are considered to reflect the density required to support the urban form and structure planned for the project area in accordance with the Regional Framework and the Directions 2031 strategy. The relatively removed location from existing residential areas provides the opportunity for this to be achieved without significant community impact, while the housing form will support the urban consolidation, public transport and sustainability objectives for the project area.

The adjoining South Beach and Port Coogee developments are dominated with single residential product, as is the case with the residential areas further to the east. The structure plan area therefore offers an opportunity to increase the diversity of housing types, reflective of the changing demographic trends and urban consolidation objectives while also enabling the practical rehabilitation of the area.

Final density levels will be established through the local structure plans which will be developed for each precinct, with variation dependent on the local context within the precinct (refer Chapter 2.10).

The structure plan does not allocate definitive densities to specific areas. Instead, it is intended that the full density/dwelling mix be provided within each precinct as it is planned, to ensure a real diversity and vitality of residential environments at each stage of the Cockburn coast's redevelopment.

The residential area is expected to yield in the order of 3800 dwellings, however the timing and extent is dependent on a number of factors, including market conditions and transitioning arrangements for existing industries.

In the interests of facilitating contemporary lifestyle choices in the Cockburn coast, it is intended that work-live uses should be permitted in the project area, subject to the usual development and building approvals processes and having regard for parking requirements and other details.

Suitable uses for residential areas:

- Medium density residential
- High density residential
- Home based business.

Uses not suitable:

- All other uses.

2.4.2.2 Mixed use

A mixed use land classification has been strategically placed through much of the project area, in order to allow a range of compatible uses to co-locate adjacent to one another, and vertically in individual buildings.

By allowing the opportunity for a mix of uses, the objective is to promote the redevelopment of the Cockburn coast into a vibrant and sustainable environment that integrates living, working and leisure opportunities.

The mixed use classification has been located in areas where it is considered that the market could, at some time, sustain some commercial use, and where it would be appropriate for these types of uses to develop – along important road linkages and in the vicinity of the activity nodes, the power station and the mixed business areas.

It was considered particularly important to allow a mix of uses for the full length of Cockburn Road. It is intended that Cockburn Road develops into the attractive and vibrant heart of the Cockburn coast area, providing an urban complement to the natural assets of Beeliar

low rise example

Park and the coastal foreshore. This vitality will centre on the activity nodes and transit stops, but should eventually stretch for the length of Cockburn Road through the project area, as the residential community develops and demand grows for a diversity of lifestyle opportunities.

The intention for future planning controls is not to be overly prescriptive about the definition of mixed uses for Cockburn Road, providing that the uses proposed can demonstrate:

- Positive contribution to promoting a vibrant mixed use urban environment;
- Contribution to a continuous active street frontage; and
- Encouragement of pedestrian use of Cockburn Road with provision of awnings or canopies over the footpath (by licence).

terrace housing form example

high rise built form

The local structure plan developed for each precinct will need to identify the location and type of mixed use, which can generally be categorised as follows:

- Mandatory commercial use, particularly at the ground floor;
- Non-residential capacity at ground floor; or
- Home-based business.

Mandatory commercial is to be applied in key strategic locations such as key intersections where activation is required and where residential uses are not permissible due to buffer requirements to existing industry. In the remaining locations it will be required that the buildings are developed to enable non residential at the ground floor or home-based business.

It is not possible for the district structure plan to specify the types of commercial uses that should be established in these mixed use areas. Market demand for residential and commercial uses will fluctuate over time. And in the case of Cockburn coast will depend on the progress of surrounding redevelopment. Given that the time period for redevelopment in the project area could be extensive, it is not possible to dictate the types of commercial uses, the amount of floorspace and the number of residential units that should be established.

Instead, the district structure plan provides a framework for the built form and the variety of land uses that could be established in the study area. The mixed use classification creates the opportunity for a wide variety of commercial uses that are compatible with residential. Office and commercial floorspace would be appropriate on the ground floor of the vast majority of street-edge buildings.

There may also be circumstances where small-scale retail uses are appropriate in strategic locations within the mixed use areas. The overarching policy position should be to focus core retail activity in the activity nodes, however such an application should be considered on its merits. Retail is not viewed as being a prohibited use in the mixed use land area.

In order to ensure that mixed use potential is created even at the early stages of development when the market might not yet support any non-residential use in a particular location, buildings should be constructed in a robust way that will allow for “retro-fitting”, particularly of the ground floor, at a later date. All land use and development proposals in the mixed use areas should be assessed by the relevant decision-making authority based on this requirement.

The average density for residential use within the mixed use area is likely to be R80, although the actual densities will vary and be dependent on the area and development potential of each individual site. On this basis, it is expected that the mixed use areas could accommodate in the order of 1400 dwellings.

The mixed use land within Emplacement precinct has not been included for the purpose of calculating residential yield, as it is unlikely that substantial residential will be able to locate close to existing industrial uses, at least in the medium term. In addition, those parts of Newmarket precinct which are already developed, and therefore unlikely to change for some time, have been removed from the total areas as they will not contribute substantially to the potential yields.

Suitable uses for mixed use areas

- Residential;
- Small retail, service retail;
- Café, restaurant/bar, prepared foods;
- Commercial, small showroom (smaller than 750 square metres net leasable area and 20 metres maximum frontage);
- Office; and
- Community facilities.

Uses not suitable

- Service industrial/service commercial;
- Heavy industrial; and
- Large showroom (greater than 750 square metres net leasable area), bulky goods retail.

2.4.2.3 Mixed business

A mixed business land use classification has been applied in Darkan precinct. Mixed business is a flexible land use classification which accommodates a variety of business types, from office and retail through to service industrial uses. The mixed business classification will also accommodate the existing heavy industry uses on the subject sites for as long as they wish to remain. Residential uses will not be permitted in the mixed business areas, so there will be no issues with encroachment of sensitive uses into the buffer zones of existing industries.

The mixed business classification has been applied in these locations for two reasons: to protect areas with existing industrial uses from pressure to relocate, as a result of any perceived or actual co-location of incompatible uses; and to ensure employment opportunities in the project area by providing enough suitably zoned and serviced land to allow the level of economic self-sufficiency sought for the Cockburn coast.

Economic analysis undertaken as part of the structure plan sustainability assessment has shown that there is a regional and local need to provide a range of employment opportunities in the area. The mixed business classification serves the dual purpose of being located to allow industries with significant existing investment and a reasonably long life-span to remain in the area, and of ensuring that the Cockburn coast can retain and attract a strong economic and employment base through its redevelopment.

Suitable uses for mixed business areas

- Service industrial/service commercial;
- Commercial;
- Office; and
- Trade and professional services.

Uses not suitable

- Residential;
- Heavy industrial' and
- Large showroom, bulky good retail.

2.4.2.4 Local activity nodes

The local activity nodes have been strategically centred on the transit stations, ensuring that all residents of the project area are within easy walking distance of both transit and their daily/weekly shopping needs.

The southern activity node is also co-located with the power station, and the vitality of the two areas combined should provide great activation to this area of the Cockburn coast.

It is intended that the activity nodes contain the vast majority of the area's retail floorspace, with only very limited retail use considered to be appropriate outside these nodes, within the mixed use area. The retail use should be street-based in its built form, with any off-street car parking located to the rear of properties. Mall-based retail with large expanses of car parking will not be supported.

The activity nodes should also be the location for other high-end non-residential uses usually located in close proximity to transit and at the centre of a residential catchment, including entertainment, office and community facilities.

Residential use would be supported and encouraged in the activity nodes should it be proposed. The location benefits afforded by the convenience of having transit, shopping and employment needs on the doorstep are likely to make the activity nodes a very attractive site for residential development, although it is acknowledged that this is dependant on the form of development.

Suitable uses for local activity nodes

- Retail;
- Service retail;
- Commercial;
- Office;
- Entertainment;
- Café, restaurant/bar, prepared foods; and
- Integrated community facilities.

Uses not suitable

- Service industrial;
- Heavy industrial; and
- Showroom, bulky goods retail.

2.4.2.5 Commercial/community

The structure plan identifies a node of commercial/community uses at the north-western corner of the project area, at the corner of Robb Road and Rollinson Road. It is intended that this site form part of a beach activity node, integrating with the enhanced foreshore to the north (as designated in the North Coogee Foreshore management Plan prepared by Stockland and LandCorp) and linking with the point of destination provided by the linear parkland and pedestrian bridge over the freight rail to the south.

The commercial/community land use designation will allow for a low intensity built product appropriate to the foreshore location. It is envisaged that this should take the form of a surf club/recreation/change room facility with supporting café or kiosk use, preferably in a stepped format. The form and tenure of this development is to be further outlined through the local structure planning stage and preparation of a foreshore management plan. Similar land uses are found along the metropolitan coastline, such as at North Cottesloe, North Fremantle and Floreat Beach.

2.4.2.6 Primary school

Current WAPC and Department of Education and Training (DET) guidelines require the provision of one primary school for every 1500-1800 lots. In the case of the project area however, DET has indicated that only one primary school will be required, partly due to existing capacity in adjoining primary school catchments. It is also important to note that the emphasis in the Cockburn coast of providing alternative residential accommodation types is likely to limit the numbers of families with primary-aged children living in the area.

One primary school site has therefore been identified in the project area, located in the centre of the site and in accordance with Liveable Neighbourhoods principles for school siting.

Detailed discussions were also held with the DET to establish the form the school would take, taking into account the particular urban vision proposed for the Cockburn coast area. It was considered that the parameters of the project area are different to those that would exist in a typical greenfields site, so a different approach is warranted when considering the requirements for the school site.

It was agreed that a primary school in this location could be provided as a two-storey building, co-located with the district (active) public open space facilities so a smaller than usual site would be appropriate. In a greenfields environment a primary school site would typically be provided on a 3.5ha site.

For the Cockburn coast site however, a 1.5 ha site co-located with nearly 3 ha of open space (including a senior-sized football oval), is considered appropriate.

The proposed school site is conveniently located close to the central activity node and transit stop, and central to the residential catchment it will serve. It has frontage to Cockburn Road, the main north-south link through the project area, and should be supported by additional local road access in the local level structure planning.

Planning of local road access should ensure on site drop-off and pick-up with minimal queue lengths, associated staff/visitor car parking for 60 cars, co-located with a separate car park for the district recreation facilities, and a safe school bus stop bay.

2.4.2.7 Public open space

The structure plan designates the location of the district-level public open space for the Cockburn coast area. It is intended that additional local-level public open space will be identified during the more detailed planning phases, on the basis of the required WAPC 10 percent per precinct contribution, and to complement the layout of the district open space.

A description of the location, form and function of the district open space is provided in Chapter 2.7.

2.4.2.8 Parks and recreation

The area contains a significant amount of regional parks and recreation reserve, both along the foreshore and at Beeliar Park. The majority of this regional reserve is to be retained in the structure plan, although there is a need for minor consolidation of the reserve in certain areas (mainly to redress inconsistencies in layout that have resulted from historical cadastral peculiarities or to achieve a better planning and urban design outcome).

2.4.2.9 Sewer pump station

The sewer pump station site in the northern part of the project area, adjacent to Rollinson Road, is an existing pump station and the Water Corporation has indicated that facility is required to remain in its current location for the foreseeable future.

A buffer of 50 metres is required between the boundaries of the pump station site and any sensitive land uses (including residential use). The structure plan identifies an area of public open space surrounding the site to enforce this buffer requirement.

It is considered that a review of this buffer will be required during detailed structure planning.

2.4.2.10 Freight rail reserve

The plan recognises the important role that rail plays in the State's freight movement strategy, and has incorporated in the structure planning the long-term continuation and likely increase of freight movements along the rail line. Further detail is provided in Chapter 5.9 regarding the likely impact of freight movements on the project area.

Further detailed planning will need to take into account measures to reduce the impact of the freight rail line through the development of a Noise and Vibration Management Strategy, with consideration for the draft State Planning Policy: Noise and Road Transport Policy.

2.4.3 Structure plan yields

Precise lot and dwelling yields will only be known as detailed subdivision design progresses. The design phase of works will occur as part of the implementation of the structure plan, thus ensuring that each stage is carefully planned for site responsiveness.

For the purposes of predicting the final lot yield and therefore determining the facilities and infrastructure required for the project, a calculation of the net subdivisible area is provided in Table 2.3.

Based on the calculations of potential residential dwelling yield provided in earlier sections of the report, the total potential dwelling yield for the district structure plan area has been estimated at 5300 dwellings as outlined in Table 2.4.

Those parts of Newmarket precinct which are already developed, and therefore unlikely to change for some time, have been removed from the total areas as they will not contribute substantially to the potential yields.

2.4.4 Relevant performance targets

- Approximately 4850 dwellings
- Minimum 3 percent separate houses
- Minimum 22 percent terrace
- Minimum 33 percent low rise apartments
- Minimum 20 percent adaptable housing
- 15 percent of homes to be 'family homes'

2.4.5 Further land use planning and design initiatives required

- Metropolitan Region Scheme amendment
- Local planning scheme amendment
- Local structure planning by precinct
- Built form guidelines

Table 2.3: Structure plan yields

Total structure plan area	331.6 hectares
DEDUCTIONS FOR CALCULATING NET SITE AREA	
D1 Primary school site	1.5 hectares
D2 Foreshore reserve	32.24 hectares
D3 Beeliar Park Reserve	99.67 hectares
D4 Pump station site	0.62 hectares
D5 Freight rail reserve	11.4 hectares
D6 Mixed business	3.8 hectares
D7 Commercial/community node	0.6 hectares
D8 Regional road reserves	25.3 hectares
D9 Rockingham Road area	17.1 hectares
Total deductions	192.23 hectares
Gross subdivisible area (GSA)	139.37 hectares
Deduct 38% roads, drainage and POS	52.96 hectares
Net subdivisible area (NSA)	86.41 hectares

Table 2.4: Potential dwelling yield

	Estimated yield (number of dwellings)
Residential land	3350
Mixed use land	1400
Local activity nodes	100
Total	4850

Potential dwelling yield assumes residential build out of the South Fremantle landfill site and chalet village in accordance with option B as shown in Figure 6.6.

2.5 Special development areas

2.5.1 South Fremantle Power Station special development area

A special development area has been allocated to this site and its surrounds to acknowledge:

- The area's future function as a commercial, civic and recreational coastal node;
- The need for careful and detailed planning to address the design and form of development and linkages to its surrounds;
- The scale and importance of the former power station's regeneration in achieving and influencing the redevelopment of the broader structure plan area;
- The complexity associated with redevelopment of the site and its surrounds; and
- The opportunity to provide a substantial amount of employment land.

The location and form of the centre are determined by certain critical factors, in particular the existing power station building, the relationship and proximity to the modified coastal setting and relationship to the road network. The precinct has been identified as the main activity centre within the district structure plan due to these factors; however the detailed planning will need to address:

- Creation of an iconic urban coastal setting;
- The potential relocation or reconfiguration of the existing switchyard and the associated overhead power lines;
- Local retail, civic and entertainment functions within the context of the site;
- Creation of a main street environment to provide an attractive and safe pedestrian environment which links the transit stop to the power station building and its associated urban beach setting;
- The potential for development to occur over the freight rail line in a 'land bridge' format;
- Maintaining the prominence and historic value of the power station;
- Creation of suitable linkages to Port Coogee and provision of an appropriate urban form interface;
- Provision of parking, accessible by the regional road network, to service the precinct and peak requirements; and
- Creation of an identifiable and accessible centre which services both the local community needs as well as significant visitors from the district and region.

A detailed planning framework is required to address these elements; however the key issues of the power station building and the substation will require particular attention by government for any outcome to be achieved. There is significant opportunity and expectation in regards to the role of the power station building; however redevelopment of the power station and its immediate surrounds is complicated by a number of issues, including heritage status and its scale and infrastructure, which will require careful management and coordination.

2.5.1.1 Building ownership

Verve Energy, the retail arm of the State Government-owned electricity business, currently owns the site. The building's future function is not associated with power generation at a commercial scale and therefore any redevelopment of the building will be dependant on the asset being sold or transferred to a relevant agency or body. The appropriate agency or body is partially dependent on the implementation framework adopted, as outlined in Chapter 3; however the scale and importance of this site requires early intervention. Should a redevelopment authority be established,

this would be the appropriate body to coordinate and facilitate development. If such a body is not established, the role could be undertaken by WAPC/DP, Department of Works or LandCorp, possibly in the form of a joint venture with the private sector.

2.5.1.2 Heritage

An interim listing of the South Fremantle Power Station on the State Register of Heritage Places has lapsed in recent years. It is considered that formal listing of the Power Station on the Register may be appropriate to secure the heritage values of the place into the future. To this end, any person or organisation may nominate a place for entry on the Register of Heritage Places, for consideration by the Heritage Council.

Should a listing be put in place, any proposed alterations, additions or new development would require approval from the Heritage Council, and would need to be in harmony with the place's cultural heritage value.

Irrespective of the heritage listing, the South Fremantle Power Station building is a significant component of the district structure plan, owing to its physical dominance and uniqueness. Retention of the power station is therefore of critical importance. As such, a suite of heritage principles identified through the structure planning process, in conjunction with a heritage architect, to ensure that the heritage values of the site are retained and the significance of the place interpreted appropriately in the evolution of the building and its curtilage from their current state:

1. Retention of the existing facades and windows of the original (current) building structure – it may be possible to modify retained steel window frames.

2. Retention of the link between the building and the foreshore, lagoon and ocean.

3. Retention of the relationship and curtilage between the power station and existing coal storage area and open area to the north-east of the building (partly enclosed by the control room wing).

4. Retention of the remaining original structure and expose this where possible.

5. Develop a large internal central space in any redevelopment (up to the current roof level) to interpret the internal size and scale of the original building. This would also provide the necessary light and ventilation to internal areas. It is recommended that this space extend to an existing external wall.

6. Retain and expose where possible the vertical wall separating the boiler hall from the turbine hall – this should form part of the large internal central space in any redevelopment.

7. New development should be constructed of new material that is contemporary and not identical, but complementary to the rendered façade of the original building. The additional elements should continue the planar cubic form of the existing building and not extend beyond the vertical plane of the façade below it.

8. Climate control should be designed on the inside of existing or new window openings and not protrude outside the plane of the new façade. It is recommended that an indoor-outdoor zone around the inside perimeter of the existing building be developed to provide sheltered outdoor space and a zone of climate control. External projections, screens and other structures beyond the plane of the external surface of the building are not recommended.

9. There is a possibility to add additional space to the top of the building and the opportunity to interpret the four original steel smoke stacks should be encouraged. New towers should be four in number with massing that is similar to the original towers and no higher than the original towers (approximately 20 metres above the roof slab), should this concept be explored further.

10. Use of the large roof area and top of the perimeter wall to install solar PC collectors and wind turbines to produce renewable energy for the building and electrical grid is strongly recommended, as it interprets and continues the original purpose and use of the power station.

11. It is recommended that the roof be developed with a sod topping and grass with a stormwater collection system to filter and recycle possible salt and pollution-laden rain and recycling this for use in the building (toilet/secondary water supply). The grass area can also be used as a rooftop common recreation space for occupants and visitors.

2.5.1.3 Land use mix and regeneration principles

The sheer scale of the power station building presents difficulties in terms of potential uses and tenure. A comprehensive planning and feasibility assessment will be required to be undertaken for the site to provide an appropriate use or mix of uses and form which will reflect the importance and iconic nature of the building. Although inappropriate to presume the outcomes of this assessment, public benefit and proper planning should be applied in establishing the framework and parameters of such an assessment.

Preliminary investigations undertaken as a part of the structure plan have shown the area is too large for any one particular use, and suggests that the development capacity could provide for a mixture of the following uses:

- A range of community uses;
- A mix of residential and commercial uses, along with a boutique hotel or short-stay apartment component; and
- Cafés, restaurants and bar, tourist and festival retail and a small element of convenience retail on the ground floor and a mezzanine level of the main building.

The preliminary investigations have identified the key issues and considerations which will need to be addressed in the comprehensive planning for the site. Ideally a significant portion of the building would be occupied by a civic, cultural or community use which would utilise the unique space of the building, however there are no current apparent users of such a scale. The regeneration of the building will also require a significant investment, therefore the ability to generate a suitable return is also a consideration. The scale of the building is both a significant opportunity and a constraint in deriving an appropriate use or uses.

The building's location on the coast means that the default position for use is residential apartments, however this use would result in limiting public access to the area and potential conflict with the entertainment and hotel activities. It is considered that at a minimum the ground level and administration wing of the building should be established as uses which enable and encourage public access.

On this basis it is recommended that planning and feasibility assessments are undertaken for the site, with the following key principles applied to the planning and development of the power station building:

- Provision of ground floor activity and retention of public access to this level, including the western forecourt of the power station;
- A balance between commercially driven and community uses;
- Maintenance of heritage values;
- Facilitate and promote access to the coast;
- Retain the landmark status of the building;
- Recognise the building's former use, through inclusion of visible green power generation (wind and solar); and
- Provide a suitable interface and relationship to enable creation of a quality pedestrian environment linking between the transit station and the coast.

2.5.1.4 Switchyard infrastructure

The electrical switchyard adjacent to the power station site and associated distribution lines are a significant challenge. Options have been investigated as to the viability of relocation or rationalisation of the switchyard site, with substantial costs involved.

The plan provides for residential and mixed use development on this site upon relocation of the switchyard. However, in the event that it is not feasible for this to occur, the plan does not preclude the switchyard remaining in situ, with the potential for development "sleeving" around the outer extent of the infrastructure.

The physical barrier presented by the freight rail between the power station and the local activity node to the east has been addressed in the plan through the potential for a land bridge approach. As with the switchyard, cost and technical feasibility will require further investigation.

2.5.2 Darkan/Emplacement special development area

The Darkan and Emplacement special development area has been identified as providing significant opportunities for employment generation. The existing land use circumstances of the area, however, warrant careful consideration of the management of the transition from industrial uses to an urban environment with an employment focus.

Redevelopment of this area will therefore need to be planned to intensify employment uses on site (most likely in the form of office/commercial development), but carefully manage this transition so as not to affect the use rights of existing industrial operations in the area.

Transitioning arrangements for these existing industrial uses are outlined further in section 3.5.

2.6 Movement network

2.6.1 Movement network objectives and philosophy

Key to enabling the intensive, mixed use redevelopment of the Cockburn coast is the establishment of a safe, legible and effective movement network for all users. The core components of the transport planning philosophy for the Cockburn coast structure plan have included:

- The need to balance the function and impacts of regional and local transport;
- Development of an internal road network with connections to the wider regional network which disperses traffic;
- Production of a highly connected and amenable pedestrian and cyclist network providing access to local destinations and connections to the regional network;
- Promotion of an efficient public transport system providing connections to Fremantle and the wider regional network with the potential for expansion to the south and east in the future; and
- Development of a transit oriented community.

These philosophies and the proposed movement network and transport system for the Cockburn coast are described in detail in the Transport Analysis Report (see Appendix). The following sections provide a summary of these proposals.

2.6.2 Integrated transport strategy

The location of the Cockburn coast development raises a number of issues regarding regional transport. These include the current location of the Fremantle to Rockingham Controlled Access Highway (CAH) road reservation, the need to consider some level of east-west linkage, potential future development of a dedicated Rockingham to Fremantle transitway and other transport initiatives.

The district structure plan, based upon detailed transport investigations, has made key recommendations regarding transport links within the Cockburn coast area, such as Cockburn Road, Fremantle to Rockingham CAH and public transport services and alignment. While these recommendations have been made with consideration for the broader implications on the regional movement network, further work outside of the scope of the district structure plan is required to address the regional movement network issues and opportunities.

At the regional and metropolitan level, the WAPC has resolved to progress an integrated transport strategy for the south west corridor as a matter of priority. It is anticipated that the strategy will investigate and provide recommendations on regional road and public transport network improvements, and opportunities to influence more sustainable travel behaviour.

The strategy will need to take into consideration the existing road and public transport network, planned and reserved movement network connections, forecast land use and travel projections on a sub-regional level, in order to determine network deficiencies and new opportunities. It is this strategic transport analysis which is required to provide the context for further development of the transport network, both private vehicle and public transport, at the corridor level.

2.6.2.1 Regional road network

The nexus between regional and local traffic issues has been identified at a strategic level through the South West Metropolitan Sector Road Network Study, which was recently undertaken by the Department for Planning and Infrastructure. This study was the first step to identifying capacity issues and future road network options within the broader south west corridor.

This work is now being supplemented by a South Metropolitan and Peel Region Transport Study, which will provide the high level analysis required on a regional scale.

Ultimately, the road network in this corridor must be considered as only one component of the transport system, with future solutions seeking to develop a sustainable and balanced network.

2.6.2.2 Regional public transport

In reviewing the future public transport services and infrastructure on a sub-regional basis, consideration should be given to options for implementation of expansion of standard bus services, bus rapid transit, light rail and heavy rail, as well as:

- Preferred routes and connections;
- Infrastructure requirements and costs, particularly vehicle costs, power supply, track development and transit stops;
- Land requirements and costs;
- Service advantages;
- Capacity advantages;
- Operational thresholds;
- Freight rail operational requirements;
- Existing land uses;
- Opportunities to maximise redevelopment and new development opportunities;
- Perceived and actual constraints to implementing the transport options;
- Impacts on existing communities;
- Comparative cost/benefit of the various public transport modes in the short, medium and long term; and value capture potential and leveraging of cost contributions towards public transport infrastructure.

Table 2.2 is a preliminary analysis of five public transport options, which will be the subject of detailed investigations regarding long term modes and alignments as part of the integrated transport strategy.

2.6.3 Proposed road network

A core philosophy of the structure plan's development has been to balance the function and impacts of local and regional traffic on key roads through the study area. It is expected that the Cockburn coast structure plan area, including traffic from Port Coogee and South Beach, could generate trips up to 36 000 vehicles per day (vpd). This additional traffic will add the congestion on the existing road network, particularly Hampton Road between Douro and Rockingham Roads, which has been described as a bottleneck in the system. The challenge will be to manage this congestion in the future and develop the most balanced transport outcome.

In modelling the future road network and traffic volumes, two approaches were taken to gain a detailed understanding of the impact of the district structure plan on the existing and future road network:

- Forecast traffic volumes were obtained from Main Roads Regional Operational Model (ROM) and supplemented with data from DP's Fremantle to Rockingham Road Network Evaluation Project, including a business as usual approach and a high fuel price scenario; and
- Development of a local traffic model to 2031, using the Paramics platform, and testing several DP and Main Roads agreed network options.

The development of a preferred road network option, as outlined below, has been based on the Paramics modelling outcomes.

2.6.3.1 Hampton Road

Hampton Road, which currently carries about 30 000 vpd, is a critical element in determining the traffic impact of the structure plan. Due to Hampton Road's role as a default regional traffic route, congestion is predicted to increase significantly in the future.

In testing the traffic impacts on Hampton Road between Douro and Rockingham Roads (the network bottleneck), level of service and travel time were determined for three scenarios:

- Two general traffic lanes plus two transit lanes;
- Four general traffic lanes plus two transit lanes; and
- Four general traffic lanes, no transit lanes.

In all scenarios tested, the level of service during AM peak hour, both in terms of intersections and road links, for this stretch of Hampton Road by 2031 is Level of Service F. Of these traffic volumes, 0-20 per cent (dependent on the scenario) of the forecast traffic increase on Hampton Road will be attributable to the structure plan area.

Regardless of whether the structure plan area is to be developed or not, Hampton Road is shown to be congested in the transport modelling analysis. The anticipated volume of traffic on Hampton Road in 2031 without the district structure plan area traffic is 32 100 vpd. Dependent on the scenarios outlined above, additional traffic generated by the structure plan area on Hampton Road has an upper estimation of 6180 vpd. This forecast congestion places an increased emphasis on the need for transit priority in the coastal corridor.

The reallocation of existing kerbside lanes for transit purposes will result in an increased level of delay for general traffic. However, the delays are regarded as moderate and should be considered in the context of:

- The benefits that the transit lanes will generate in the longer term (both local and regional); and
- The additional capacity that will be created on Hampton Road from the perspective of people movement, as opposed to vehicle movement, where up to double the volume of people will be carried by transit than the remaining general traffic lanes.

Further information regarding lanes reallocation is provided in section 2.6.4.3.

2.6.3.2 Cockburn Coast Drive (Fremantle to Rockingham Controlled Access Highway)

The land uses proposed in the structure plan change the nature of the proposed Fremantle-Rockingham Highway from a controlled access highway (with limited local connections and high travel speed, as the name suggests) to more of a district distributor integrator style road, with local connections (at appropriate spacing) and a lowered design speed. To reflect this change in character the road has been identified as Cockburn Coast Drive within the structure plan. Cockburn Coast Drive will carry regional traffic (currently using Cockburn Road) as well as some local traffic from the structure plan area. Forecast traffic volumes range between 14 000 and 20 500 vpd.

It is proposed that the major T-intersections along Cockburn Coast Drive be signalised, and intersections with minor east-west roads managed with priority control.

Cockburn Coast Drive should be constructed initially as two lanes with the reserve width to construct four lanes in the future. A preliminary alignment study is required to determine whether the existing reserve can be rationalised from its current width. The preliminary alignment study should be based on a reduced operating speed (60-70 km/h) from that identified in the original alignment concept and be responsive to the topography.

It is estimated that the revised Cockburn Coast Drive road alignment, as shown on the district structure plan (Figure 2.1) could return in the order of 5.7 hectares of land back to Beeliar Park.

It is anticipated that the built form adjacent to the western side of Cockburn Coast Drive will be a highly urbanised environment, with provisions for a general range of heights between 3-6 storeys and higher elements at landmark and gateway sites. Cockburn Coast Drive will perform both a district and regional function and therefore access is likely to be limited, through rear loading of development via laneways. Development however, will be required to front onto Cockburn Coast Drive for passive surveillance and aesthetic reasons.

2.6.3.3 Cockburn Road

Cockburn Road through the structure plan area is intended to carry low speed, local traffic with forecast volumes ranging from 7400 to 16 500 vpd. Regional traffic will instead use Cockburn Coast Drive or Stock Road, which should provide a higher standard of road and greater travel speed.

Cockburn Road will have many intersections. Those involving major east-west roads will be signalised, providing safe crossing opportunities for pedestrians as well as increasing the capacity of the four-way intersections.

The ultimate configuration of Cockburn Road is two general traffic lanes and two dedicated transit lanes, with provision for on-street parking where appropriate.

2.6.3.4 Coastal roads

The coastal roads have been so named because they do not represent one individual link between the structure plan area and Douro Road; rather they represent up to three potential connections.

The coastal roads provide an important local connection for traffic generated within the structure plan area; allowing this traffic to access South Fremantle without using the congested Hampton Road. It is important to note that traffic using these roads generated by the structure plan area will be local traffic.

The coastal roads should be constructed as low order and slow speed connections to limit through traffic. Coastal mitigation measures may also be required where the roads are seawards of the physical processes setback line.

2.6.3.5 Other roads

The potential for a new connection to the west of the existing freight rail should be maintained, however, any road constructed should not be greater than a local access street.

The potential to construct a new local road providing a connection to Douro Road, in the vicinity of Fremantle Village, should also be considered further in the future planning for the South Fremantle landfill site. Any road constructed should be lower order and designed to limit through traffic.

Other local road networks will be detailed through the local structure planning process.

2.6.4 Proposed public transport network

A critical consideration in the structure plan is the way the travel needs of new residents of Cockburn coast are accommodated within the sub-regional transport network. Within the immediate vicinity of the project area, considerable measures, in the form of both physical infrastructure (Hampton Road dedicated bus lane) and behaviour programs (i.e. Travelsmart), have been undertaken to encourage alternatives to the use of private vehicles and effect changes to traffic movement patterns. In doing so, public transport, cycling and walking have been prioritised.

Similarly, the structure plan aims to promote the use of alternatives to the private car within the Cockburn coast area to ensure that these emerging sustainable transport patterns are reinforced and prioritised in new urban areas. It is not intended that this be achieved by the provision of a single public transport mode, but through the development of a structural framework that is sufficiently robust to accommodate a range of complementary services that operate at the local, regional and metropolitan level.

At the regional and metropolitan level, the WAPC has resolved to progress an integrated transport strategy for the south west corridor as a matter of priority. The scope of the strategy is described in section 2.6.2, however the primary objectives are to identify the high order public transport requirements for the sub-region, in terms of both mode and alignment, and consider implementation and funding mechanisms in the context of broader metropolitan public transport priorities.

An example of bus rapid transit (BRT)

To ensure the early integration of more sustainable transport patterns, it is important that there is a clearly identifiable and efficient local transport service in place in the initial stages of development, that is integrated with and enhances existing local services currently operating in and around Fremantle and Cockburn. Over time, and as demand warrants, this service can be extended and augmented with other modes as the regional and metropolitan public transport network continues to grow.

While bus rapid transit (BRT) is the most viable public transport option for this first stage of the local transport provision, other modes will be actively investigated through the integrated transport strategy. The alignment of Cockburn Road/Hampton Road is the most efficient and effective network connection between Cockburn coast and Fremantle for the delivery of a reasonable rapid transit service. The characteristics of the BRT, as an initial public transport mode are discussed in section 2.6.4.1 below.

Importantly, while the structure plan only shows this single transit alignment, it does not preclude the progressive roll-out of higher order public transport modes as part of a broader metropolitan strategy. Equally, the future implementation of higher order services does not invalidate the propose Hampton Road/Cockburn Road alignment, as it is considered a critical element of any integrated public transport strategy for the area.

For example, the introduction of a passenger rail service along the existing freight rail corridor may be considered a logical extension of the metropolitan passenger rail network at some point in time. Under this scenario, the passenger rail would provide unconstrained rapid transit to the area serviced by one, possibly two stations at minimum 800m intervals. The BRT could then continue to provide a complementary, albeit less rapid, service to the area with transit stops at 400m intervals in a 'main street' configuration. The structure plan anticipates and supports this scenario by focusing development density and activity along the Cockburn Road alignment, and in the key area where a future passenger rail station would most likely be located - in the vicinity of the South Fremantle power station, servicing southern Cockburn coast and Port Coogee.

2.6.4.1 Bus rapid transit

When investigating the provision of initial (short to medium term) public transport services to the area, primary consideration was given to the ability of the mode to be integrated with existing local services and infrastructure, while at the same time providing a sufficiently high level of service, certainty and market confidence (i.e. less than fixed rail but greater than traditional bus services) to generate investment in commercial and community infrastructure along its route.

Additional considerations include:

- Capacity – the number of people that can be carried by a particular vehicle;
- Journey distance and time – the length of the proposed route and how quickly it needs to be traversed;
- Place making and urban form – different modes contribute differently to these urban planning objectives;
- Existing network and services – how the proposed mode will integrate with the existing system; and
- Transit priority – what level of priority is desirable/required and what level is achievable?

Eight separate modes to service the Cockburn coast area north to Fremantle in the short to medium term were compared initially and further narrowed down to four options for further investigation – standard bus services, bus rapid transit, light rail and heavy rail technology (which included a review of the existing single track and separate track options). A detailed examination of these modes is provided in the Transport Analysis Report – see Appendix.

As a result of this investigation, it has been determined that a bus rapid transit system, utilising distinctive vehicles and operating in dedicated lanes, is the most feasible form of public transport for the Cockburn coast in the short to medium term.

Adoption of BRT technology will have many benefits including:

- Reduced initial capital expenditure compared to other technology (excluding standard bus services);
- Implementation of a unique technology that would distinguish the Cockburn coast area from other urban developments;
- A system that, in the long term, could be converted to light rail if sufficient demand was identified;
- A highly flexible system which could operate both on-street and off-street, with and without priority;
- A technology which is generally compatible with other public transport modes used in Perth; and
- A system which offers the greatest “value for money” through reduced operating and capital costs.

2.6.4.2 Rail options

It is acknowledged that fixed rail transport services offer significant benefits, are very popular, as seen with the recent opening of the Perth to Mandurah railway line, and would constitute an important investment in the metropolitan public transport system. Consideration was therefore given to the potential use of the freight rail reserve for either light rail technology or heavy passenger rail, which was reflected in several iterations of the concept plans.

However, a number of constraints exist with the dual use of the freight corridor for light rail or heavy rail transit purposes from the project area north to Fremantle which, while not insurmountable, would make implementation more difficult. These include:

- The width of the railway reserve, which in some locations is as narrow as 11 metres (i.e. Round House);
- Potential for conflict between freight rail movement and passenger movement requirements;
- Catchment only achievable on one side of the corridor through the project area and into Fremantle;
- The Public Transport Authority approach to planning for heavy rail is designed to move large numbers of people at high speed over long distances, which is less compatible with the size of the proposed catchment within and surrounding Cockburn coast. However, a possible extension of the Fremantle passenger train service within the south west corridor will need to be the subject of investigation in the integrated transport strategy; and
- Impacts on the existing local community including noise, vibration and visual amenity.

Table 2.2: Preliminary analysis of public transport options for consideration in the ITS

Assessment criteria	Public transport options									
	Local bus		Bus rapid transit (BRT) utilising distinctive vehicles in a new dedicated alignment		Light rail in a dedicated alignment (Cockburn Road or freight rail alignment)		Passenger rail on existing single track railway (assumes no additional track is required)		Passenger rail - extension of Fremantle line on separate tracks within freight rail reservation	
	Advantages	**Disadvantages**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	***Advantages***	***Disadvantages***
Operational Matters										
Running environment / reserve or traffic lane requirements	Would not result in additional traffic lanes on existing network.	Runs 'on-street' with no priority.	Achieves priority through provision of dedicated lanes; A highly flexible system which could operate both on-street and off-street, with and without priority; and Less constrained operating environment beyond the site southwards or eastwards.	May require additional traffic lanes on existing network - needs investigation.	Achieves priority through provision of dedicated lanes.	May require additional traffic lanes on existing network - needs investigation.	Runs in dedicated reserve; Would not result in additional traffic lanes on existing network; and Applicability beyond the site in a southern or easterly direction has not been determined.	Sharing track with freight rail requires effective timetabling; Railway is at grade resulting in level crossings with delay to vehicular traffic; and Would require long term strategy for integration or relocation of freight rail services.	Un-interrupted service; Runs in dedicated reserve; and Would not result in additional traffic lanes on existing network.	Railway is at grade resulting in level crossings with delay to vehicular traffic; and Engineering issues near Fremantle, where freight rail reserve width is narrow.
Level of service										
Vehicle capacity		60 - 80 people.		60 - 80 people (depending on vehicle type).	110 - 220 people (depending on vehicle type).		Up to 560 people based on 6 car set - but more likely to be 3 car set.		Up to 560 people based on 6 car set - but more likely to be 3 car set.	
Journey time / operating speed		Approx 30 km/h average; and Transfer time penalty between modes.	Can be up to 100 km in dedicated transitway – but in local context unlikely to be above 60kph in keeping with traffic speeds and local amenity.	Potential transfer time penalty between modes; and Transit priority between South Street and Fremantle train station is not currently provided.	Up to 110 km/h (dependent on vehicle chosen) – but in local context unlikely to be above 60kph in keeping with traffic speeds and local amenity.	Potential transfer time penalty between modes.	Up to 80kph based on existing Fremantle line conditions; and Utilising existing railway improves passenger journey by eliminating transfer penalty between modes.	Potential for delay or scheduling issues due to freight rail operations.	Up to 80kph based on existing Fremantle line conditions; and Utilising existing railway improves passenger journey by eliminating transfer penalty between modes.	
Integration with existing transport network	High. Currently used throughout Perth.		High (if existing type of buses used e.g modified CAT bus); and PTA investigating trial of similar technology.	Moderate - if new type of specialist BRT bus used.		This system would be unique in Perth and may have additional servicing requirements.	High - especially with train network and bus to train transfer.	Competing freight and passenger rail needs.	High - especially with train network and bus to train transfer.	
Place making and urban form										
Integration with land uses	High level of integration as can deliver almost 'door-to-door' service with high level of penetration.	Non-permanence of bus infrastructure known to result in reluctance to invest in strong centres of activity.	High level of integration with on-street running; and Makes more efficient use of existing bus lane on Hampton Road north of Douro Road - moderate potential for redevelopment beyond the site.		High level of integration with on-street running. Depending upon alignment provides driver for further redevelopment beyond the site.		Permanence of stations and railway known to result in creation of strong centres of activity; and Makes more efficient use of existing infrastructure.	Dependent on strong design in order to avoid separation; Catchment largely one-sided north to Fremantle; and Integration becomes more problematic east of Cockburn coast.	Permanence of stations and railway known to result in creation of strong centres of activity.	Dependent on strong design in order to avoid separation. Catchment largely one-sided north to Fremantle.
Potential for place making		Low due to lack of permanent bus-based infrastructure such as a station.	High; implementation of a unique technology that would distinguish the Cockburn coast area from other urban developments	Will require rezoning/ redevelopment to maximise TOD opportunities from Cockburn to the southern suburbs rail, or further south of the project area.	High; implementation of a unique technology that would distinguish the Cockburn coast area from other urban developments.	Will require rezoning/ redevelopment to maximise TOD opportunities from Cockburn to the southern suburbs rail, or further south of the project area.	Very high – vehicle capacity and its permanent structures (stations) provide for strongly viable mixed use centres.	Will require rezoning/ redevelopment to maximise TOD opportunities from Cockburn to the southern suburbs rail, or further south of the project area.	Very high – vehicle capacity and its permanent structures (stations) provide for strongly viable mixed use centres.	Will require rezoning/ redevelopment to maximise TOD opportunities from Cockburn to the southern suburbs rail.
Amenity	Limited visual or noise impact as using existing infrastructure.					May require increased width of roads/reserves however can include grassed reserves etc; Overhead wires typically required.	Limited impact as using existing infrastructure (incl. barriers and reserve).	Potential for noise issues; Will require overhead wires; Will require barrier fencing for public safety; and May cause delay for vehicle movements at crossings.	Limited impact as using existing reserve.	Potential for noise issues; Will require overhead wires; Will require barrier fencing for public safety; and May cause delay for vehicle movements at crossings.

2.6.4.3 Public transport alignment

In determining the desirable alignment of the public transport network, both within and surrounding the project area, the following factors were considered:

- Requirement for a northern terminus at Fremantle station;
- The location of existing trip generators and attractors;
- Potential future changes to land uses;
- The creation of “full” and “active” catchments for stops/stations (opportunities for catchments that have a high density of residential development or intensity of commercial use and do not contain large amounts of public open space, water etc.);
- The ability to maximise the use of existing infrastructure;
- Constructability and operability of future services (beyond the district structure plan area); and
- Integration with existing Transperth services.

Two public transport alignments were identified, the first being the coastal alignment primarily using the freight rail reserve, and an eastern route centred on Cockburn Road.

The preferred, and therefore proposed, alignment for bus rapid transit is the Cockburn Road-Hampton Road corridor, including three transit stops at regular intervals through the project area, for the following reasons:

- It is a direct route through the project area and to Fremantle Station, which also provides opportunities for further expansion to the south or east in the future;
- It creates the ability to achieve priority for transit vehicles along Cockburn Road for the entire length of the route within the structure plan area;
- It allows utilisation of existing bus priority lanes on Hampton Road, north of Douro Road;
- It creates increased justification for the provision of transit priority on Hampton Road benefiting services from the wider region;

- The capacity to extend supplementary public transport services along the coastal corridor is not precluded in the future; and
- The alignment assists in creating a highly legible public transport spine, around which urban development can be concentrated.

Two kerbside transit lanes will be provided on Cockburn Road through the project area. The need to establish transit priority on Hampton Road linking the project area north to Fremantle is a matter of urgency to allow the Cockburn coast to function effectively as a transit oriented development.

The decision on how to provide priority for BRT on Hampton Road is not an easy one. The reallocation of kerbside lanes is likely to cause complications in terms of community perception, as it is often difficult to communicate the long-term benefits of such projects. The recent creation of bus lanes on South Street, however, sets a strong precedent for this type of project and demonstrates outcomes achieved while successfully managing negative impacts. The reallocation of lanes on Hampton Road, north of Douro Road, also sets an important precedent. The impacts of this reallocation have been carefully monitored by the City of Fremantle, and indicate that negative impacts can be managed successfully in a local context.

Analysis of intersections on Hampton Road undertaken as part of this project (and described in detail in the Transport Analysis Report – see Appendix) has indicated that the opportunity does exist to reallocate the existing kerbside lanes with limited impacts to general traffic. This option would provide priority for buses in the short term (which is required to support development of the structure plan area) while preserving the option for widening Hampton Road in the future through the acquisition or additional road reserve, should this be deemed necessary.

It is recommended, based on the various investigations undertaken as part of this study, that reallocation of the kerbside lanes on Hampton Road between Douro Road and Rockingham Road should occur in the short term (five years), in order to provide priority for existing services and future services from the structure plan area.

Further studies are required to determine the preferred route for the connection of the BRT system with the Fremantle Train Station and the desired terminus, with Port Coogee and Cockburn Central identified as potential end points for the transit service.

Although not directly related to this project, the opportunity for extending priority lanes south along Rockingham Road should also be examined in the short to medium term, in effect creating the Hampton Road, Rockingham Road/Cockburn Road location as a ‘transit hub’.

2.6.5 Pedestrian and cyclists

Existing pedestrian and cyclist infrastructure within the structure plan is limited to a shared use path located along the coast extending south from Fremantle. This path ceases at the northern end of Robb Road and then commences again to the south of Robb Road. A second shared use path runs parallel to the existing freight railway from its existing level crossing at Cockburn Road east connecting to Spearwood Avenue. There are currently no Perth bicycle network routes within the structure plan area.

It will be important to improve this infrastructure as part of the redevelopment of the Cockburn coast, to ensure that pedestrians and cyclists are well catered for in terms of local trips and longer regional trips.

The future detailed urban design and planning must ensure that pedestrian movement and localised bicycle transport are given the highest priority in the design of the traffic networks and public open spaces.

The structure plan has provided for the broad linkages which provide strong east-west movement predominantly using public open spaces and north-south movement using the road network.

A key objective is to promote pedestrian and cycle links from the existing residential areas east of the development area to the beachfront, with green spine open spaces that promote the draw of community through the project area for everyday recreation and access to lifestyle amenity.

2.6.5.1 Regional network

From a regional perspective it is important to ensure that connection to Fremantle and to suburbs east of the structure plan is maintained and reinforced. Upgrade of the foreshore shared use path is likely be required within the structure plan area in the future to cater for the increased volume of pedestrians and cyclists likely to be using the path.

Connections from Beeliar Regional Park to the east will also be important, as will connection to Spearwood Avenue. Upon reviewing the nature and form of the regional road network, specifically the Roe Highway (Stage 8) reservation, opportunities should be explored to reinstate an open space and pedestrian connection between Clontarf Hill and Beeliar Regional Park. The two sites are of particular significance to the local community and attention should be paid to formalising access should the primary regional road reservation be rationalised or realigned.

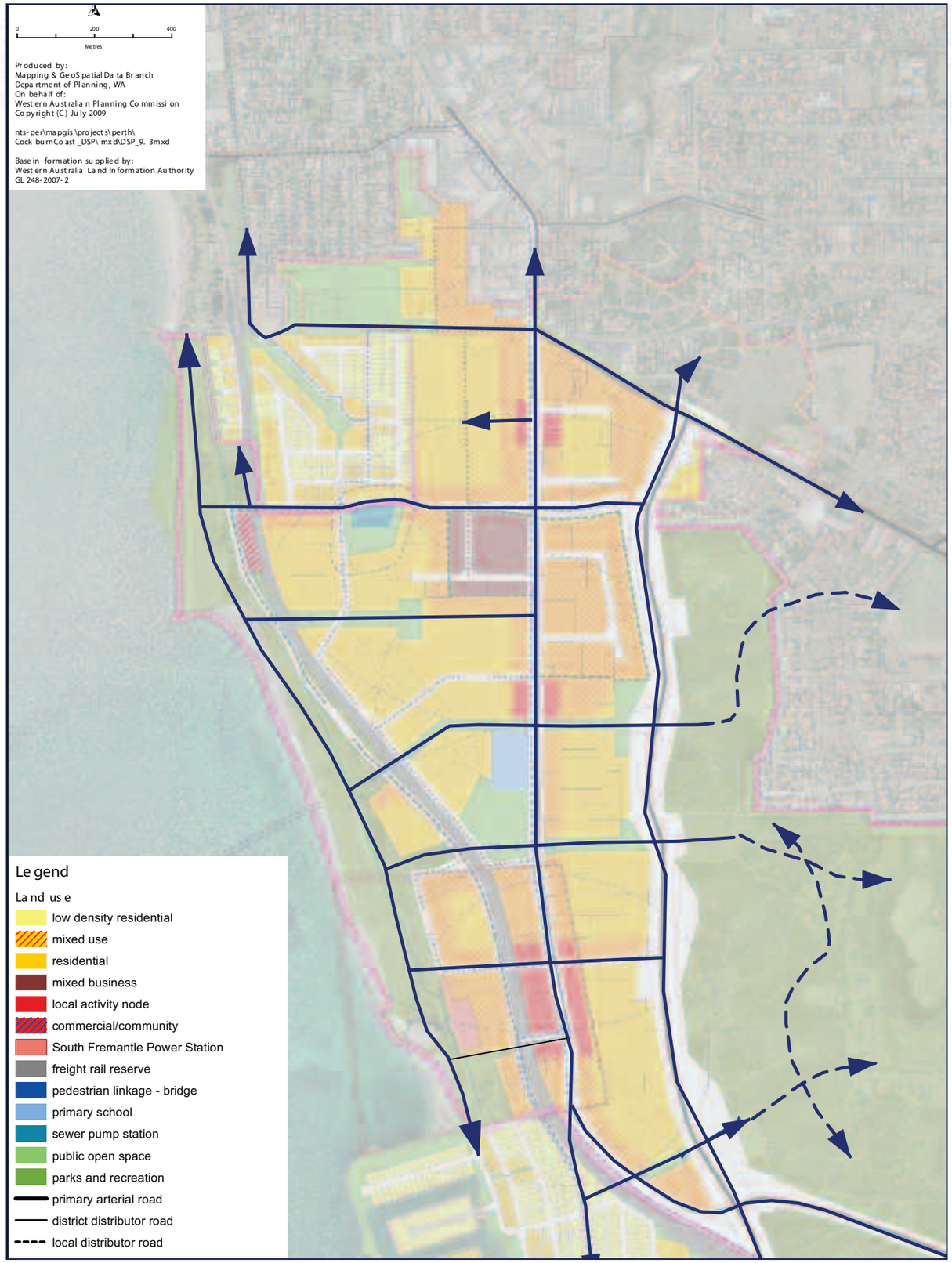
Creation of transit lanes on Cockburn Road for the BRT system will present the opportunity to improve cyclist infrastructure along this important spine of the development. Cyclists may be catered for either through development of on-street lanes or within the transit lanes. Further detailed examination is required to investigate the most appropriate design solution for Cockburn Road in the future.

2.6.5.2 Local network

The diverse mixture of land uses within the structure plan area creates excellent potential for local trips to be made either by cycling or walking.

Where necessary within the structure plan, shared use paths can be provided to facilitate cycling. Generally, cycling should be facilitated through the appropriate design of local streets. Shared use paths should only be provided where traffic volumes or other considerations make on-street riding unsafe or undesirable.

Figure 2.2: Pedestrian and cyclist pathways



2.6.5.3 End of trip facilities

The provision of end of trip facilities for cyclists is critical to ensuring that cycling is a viable transport mode. Within the structure plan area it will be important to ensure that adequate parking facilities are provided at key destinations including transit stops/stations, beaches, neighbourhood centres, tourist nodes and other attractors.

In addition to these locations there is also the opportunity to ensure that suitable end of trip facilities (parking, lockers and showers) are provided by developers as land is redeveloped. This can be achieved through the inclusion of specific provisions within the town planning or redevelopment scheme for the structure plan area. These provisions would require developers to provide bicycling parking and appropriate end of trip facilities based on the number of employees likely to be located on the site.

2.6.5.4 Key pedestrian connection elements

The district structure plan indicates the provision of pedestrian/cyclist linkages across the major physical barriers in the subject area – namely the freight rail reserve, Cockburn Coast Drive, bus rapid transit reserve and parts of Cockburn Road. Key pedestrian and cycle pathways are detailed in Figure 2.2.

Crossing the freight rail reserve would preferably be done in safe conditions at-grade. The formulation of the local structure plan for the Robb Jetty precinct should provide for the opportunity to achieve the three at-grade crossings recommended in the district structure plan. Should at-grade pedestrian crossings not be available north of the power station, the district structure plan requires the provision of pedestrian bridges, as a developer contribution, to provide the connections that will comprehensively integrate the beach and the residents.

The central linkage, above McTaggart Cove, is a fundamental east-west linkage. At the eastern end, the valley enables a natural underpass to be constructed between Beeliar Park and the linear public open space by keeping the Cockburn Coast Drive carriageways high enough to span across the valley between the two high points. This underpass should be a safe environment, with wide openings and good view lines. The opportunity exists to provide a pedestrian bridge/structure that extends at a relatively flat grade from the high end of the linear open space, slightly west of the underpass, across Cockburn Road at a suitable height and through the heritage trees to then pass over the freight rail reserve and into the coastal reserve, with the ability to provide ground connections at Cockburn Road and in the main public open space area.

The southern-most pedestrian bridges are proposed to use the existing topography to pass over Cockburn Coast Drive, Cockburn Road and the freight rail reserve in order to provide an easy and legible connection between Beeliar Park and the Port Coogee marina activity centre.

2.6.6 Relevant performance targets

- 30 percent reduction in greenhouse gas emissions (against per capita average)
- 60 percent of dwellings to be within 800m of public transit.

2.6.7 Further transport planning initiatives required

- Integrated transport strategy for the south west corridor
- Bus rapid transit alignment study and business case
- Hampton Road lane reallocation project plan
- Planning design concept and alignment study - Cockburn Coast Drive
- Travel demand strategy
- Parking management strategy

2.7 Public open space

2.7.1 Open space objectives

Through a focus on water sensitive urban design, sustainability and ecology, the district structure plan aims to create a series of open spaces which reflects the area's unique identity, provides a diversity of experiences and enhances the sense of place.

The objectives for the public realm and open space character for Cockburn coast are to:

- Provide for a range of passive and active recreation opportunities throughout the streets and public spaces;
- Create an urban typology for open spaces while respecting the natural landform and characteristics of the Cockburn coast area;
- Develop a hierarchy of open spaces at a regional, district and local scale offering a range of uses and experiences; and
- Foster multi-purpose open spaces, including integrated urban water management.

2.7.2 Public open space

The district structure plan features two key types of public open space, being the linear landscape corridors extending across the project area, and the multi-purpose open spaces associated with the primary school site and planning for the South Fremantle landfill site. The proposed public open space is shown in Figure 2.3.

The landscape corridors are an important design element of the structure plan and provide strong landscape and physical linkages across the site, connecting the key natural areas of the coastal foreshore and Beeliar Regional Park. These strategic corridors will:

- establish major pedestrian, cycle and potentially horse connections to landmark heritage sites, scenic vantage points and the coast;
- allow the potential to extend the existing horse beach exercise area with equine walking trails through part of the redevelopment area;
- provide a range of recreational opportunities;
- enable preservation of areas of environmental value;
- facilitate water sensitive urban design and integrated water management, including rain water harvesting and storage; and
- foster the creation of a sense of place for people through the engagement and enhancement of the landform, views and vegetation.

A three hectare grassed playing field is provided within the structure plan adjacent to the primary school, to provide for active recreational needs. It is considered that joint use of the site by the

Table 2.3: Open space areas

Grassed playing field	2.83 ha
Pump station POS	1.08 ha
Northern landscape corridor	1.75 ha
Hilltop landscape corridor	2.58 ha
Central landscape corridor	1.14 ha
Southern landscape corridor	0.48 ha
Landfill site POS	6.79 ha

primary school and future residents of the Cockburn coast is appropriate given the prevalence of active open space within the broader district, and land use efficiency gains that are achieved through joint facilities.

This active open space is supplemented by open space to be provided within the South Fremantle landfill site. This land will need to be sufficiently rehabilitated to be used for active recreation purposes.

Establishment of all public open space within the structure plan area will be subject to developer contributions.

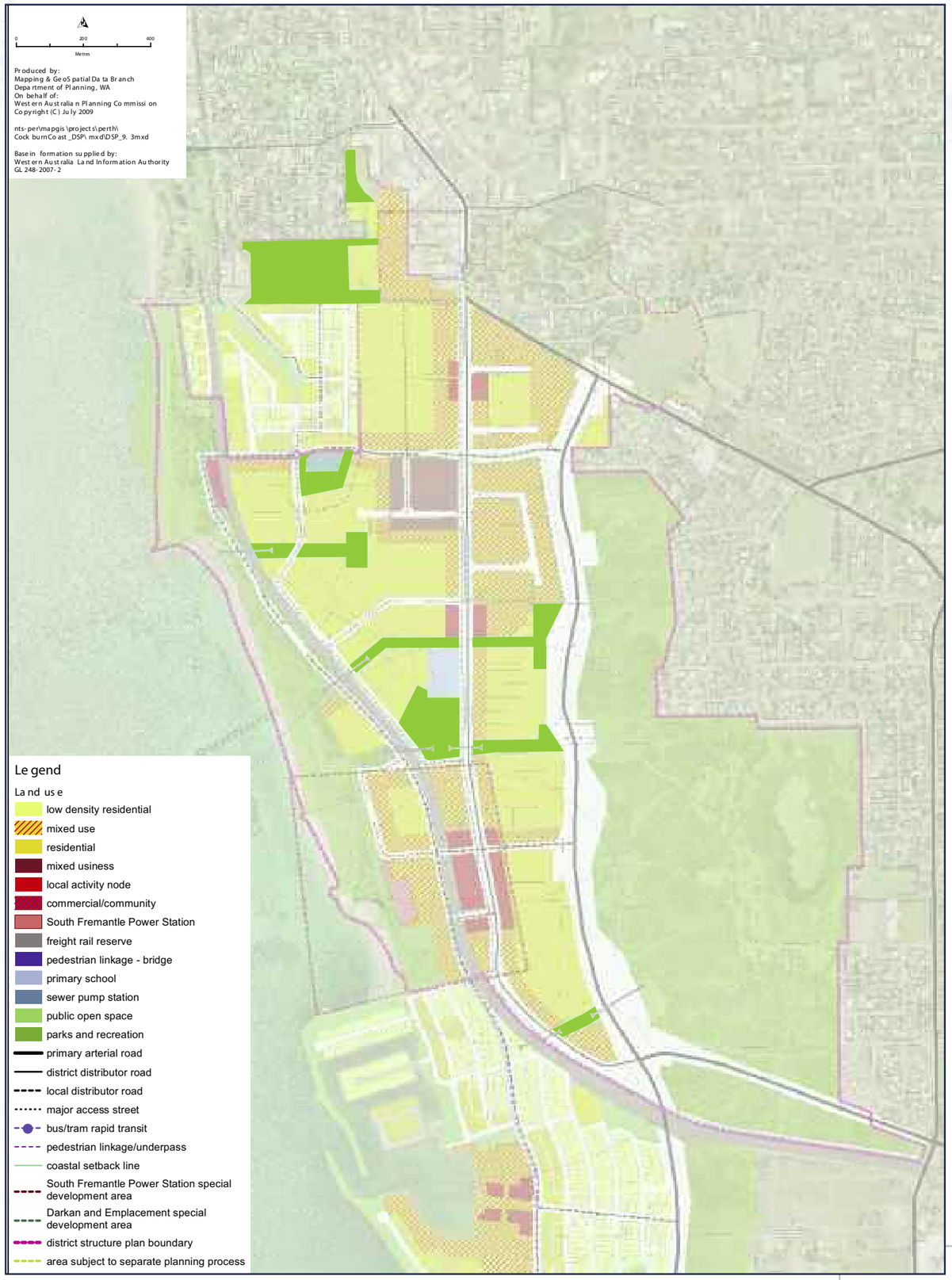
The district structure plan proposes 16.6 hectares of district open space.

2.7.3 Public open space contribution

On the basis of the project's gross subdivisible area of 139.37 hectares (see table 2.3) and proposed open space of 16.6 hectares, a public open space contribution of 11.9 per cent is currently represented on the plan.

This figure includes the district open space associated with the planning for the South Fremantle landfill site, however establishment of this open space is subject to substantial feasibility analysis prior to proceeding with redevelopment of the broader site.

Figure 2.3: Open space map



At the local structure plan stage, detailed design may need to identify a further level of local parks and urban open spaces that will contribute towards the ten percent minimum POS requirement specified by the WAPC. These urban open spaces are discussed further in section 2.8.2.

In the interim however, it is considered that the open space provision, to be provided for through developer contributions, is more than sufficient when combined with the 128.8 hectares of regional foreshore and Beeliar Regional Park reserve located within the project area.

2.7.4 Coastal foreshore

The coastal foreshore has not been included in the calculations for public open space contributions, in accordance with WAPC policy, given its existing reservation for Parks and Recreation purposes under the Metropolitan Region Scheme. It is recognised however that the foreshore area provides an important recreational resource for the new and existing communities of the Cockburn coast and its surrounds.

A coastal planning strategy, which outlines the management options for these coastal recreational opportunities, has been prepared to support the district structure plan. This strategy is in addition to the establishment of a coastal processes setback line, both of which are discussed further in Chapter 2.12.7.

2.8 Public realm

2.8.1 Public realm objectives

The structure plan seeks to create a distinct urban public domain that complements the existing natural and urban areas within and surrounding the project area, and diversifies the opportunities for people to enjoy a vibrant outdoor city life.

To this end, the structure plan is driven by the following public domain objectives:

- Ensuring attractive, interactive and interesting street environments for pedestrians and cyclists;
- Ensuring safety in the public realm, particularly at night;
- Create strong legibility and enhancement of the project area's entries, focal points, movement networks, open spaces and activity nodes; and
- Establish a sense of place through interesting and interactive streetscapes and built form that reflecting the history and coastal influences of the site.

2.8.2 Urban open spaces

The intent through much of the structure plan area is to facilitate the creation, at detailed planning level, of small to mid-size space with an elegant combination of hard and soft landscape elements that promote multiple use of the public realm. Trees, paving and a sophisticated street furniture palette should be the dominant landscape elements.

These spaces will provide a balance to the large public areas that will be created in the Power Station precinct, which themselves should be utilised to the maximum advantage through more detailed design levels.

2.8.3 Streetscapes

The design of the new and existing streets and laneways in the project area will allow them to become high-quality environments that can merge with the other public spaces into a complete and integrated public domain experience, allowing the Cockburn coast to evolve as a vibrant and interactive urban place.

Key streetscape objectives for the area are to:

- Ensure high amenity streetscapes – streets should provide almost continuous shade and shelter through street trees and awnings, and lighting and public art should be a feature of the streets; and
- Create pedestrian-priority shopping streets – streets should be designed to focus on pedestrian and cyclist amenity and safety, while accommodating on-street parking and slow vehicle speeds

The streetscape design through the activity centres, and much of the mixed use and mixed business areas, should have an emphasis on shared surfaces, lighting, paving, awnings, street trees and public art to provide shade, shelter, visual interest and accessibility. Buildings should be located close to the property boundary to enable close interaction with the pedestrian activity along the footpaths.

During preparation of local structure plans and built form guidelines, consideration must be given to ensuring the provision of adequate cover over the footpath, such as awnings and canopies, where mixed use development is proposed. This would require licences to overhang the development boundary. Provision of cover will also facilitate alfresco seating, pedestrian movement and continuity of streetscape.

The number of doors and windows that open to the street should be maximised, giving reason for pedestrian movement along a street, activity between the buildings and street, and to provide visual interest in life inside the buildings. Furthermore, increasing 'evening economy' and providing active evening frontages is a good way of enriching the public realm. Safety is a key component of vitality and all of these factors help create natural surveillance over the public realm.

For streets in residential areas, the aim should be to develop the streets as linear open space environments. This will also help support the proposed network of public spaces by providing attractive and enjoyable pedestrian connections.

The public realm can be enriched by having residential activity interfacing with the street environment. Housing overlooking the public realm provides the potential for 'eyes on the street' and the visual interest of active people. It will be important to ensure that built form guidelines prohibit any negative screening of residential activity from the street environment.

2.8.3.1 Cockburn Coast Drive

As previously stated, the proposed Fremantle Rockingham Highway is expected to be modified in form and nature into what has been referred to as Cockburn Coast Drive. This change in nature and status requires suitable treatment of the built form interface.

The nature of the road will not necessarily accommodate direct road access; however local structure planning and development will need to ensure that buildings provide an outlook to the road the adjoining Beeliar Regional Park. The exchange between the built form and street activity should be encouraged through maximising doors and windows to the street. Use of balconies at upper levels will provide surveillance into Beeliar Park while providing residents with access to the views and vistas on the park and surrounds.

Properties within Emplacement Crescent have currently been developed to back on to the regional road reserve; however through redevelopment of these sites this interface can be addressed.

2.8.3.2 Laneways

A key objective of the structure plan is to promote laneways, through ensuring residential activation over garaging, and the concept of laneways as secondary streets integrated into the local pedestrian systems.

The incorporation of incidental small lots off laneways with interesting architectural responses, row-styling housing and, for larger multiple dwelling sites, residential frontage on to the laneways, will be an essential measure in creating the fine grain of details and authenticity found in a positive urban village.

The concept of laneway activation also provides the opportunity to allow some reduction in the predominant three-level urban height to two-level development where it is considered appropriate. A visual example of this is shown in Chapter 2.10.2.

Consideration should also be given to designing development sites with private laneways forming the common space and access for traffic and pedestrians. These laneways can be secured from public access while still allowing visibility into the development. This provides a built form outcome which is consistent with streetscape objectives while optimising security and access for residents.

2.9 Built form and architectural expression

2.9.1 Built form objectives

The structure plan aims to encourage and ensure certain built form outcomes for the project area, in keeping with the overall design vision, based on the following objectives:

- Creation of a variety of building types, with a key focus on sustainable design;
- Developing landmark buildings in key locations;
- Stipulating adaptable mixed use buildings in appropriate locations;
- Promoting traditional 'main street' forms of building design within commercial areas;
- Facilitating development of commercial and mixed use buildings to the street edges;
- Encouraging active building edges fronting the public realm, particularly at the ground floor level; and
- Retaining a sense of the area's industrial heritage through the built form, while ensuring that the architectural design is contemporary and not 'faux-industrial'.

2.9.2 Townscape vision

The guidelines established here, and for each precinct (section 2.10) give an indication of the physical townscape design intended for the Cockburn coast area as it develops. Investigation of further variety in building bulk and scale is encouraged as part of future detailed planning phases, in addition to the parameters established in the structure plan.

The structure plan aims to create a series of integrated medium to high density urban residential precincts, which will offer the community an alternative living environment to typical suburban of inner-city lifestyles found elsewhere in the Perth metropolitan area.

The townscape vision is to create a sustainable model for higher density living, providing a rich and vibrant mixed use urban location, with:

- A beach lifestyle;
- A sense of shared ownership of open space and recreation opportunities;
- A focus on environmental considerations in landscape design and management;
- A green design focus for buildings, which collectively provide a demonstration of best practice sustainable development;
- Local activity/retail nodes, an active main street focus on Cockburn Road, and a significant destination opportunity with the power station special development area; and
- A range of residential types that promote a mixed population (to include single persons, couples, families, over 50's and the elderly).

2.9.3 Height assessment considerations

Building height is intrinsically linked to other built form and urban character elements, so the structure plan provides a guide to heights that allows for the integration of the following considerations as part of further detailed planning exercises:

- Precinct context;
- Built form height will be in accordance with State Planning Policy 2.6 – State Coastal Planning Policy;
- Hierarchy of the development sites within a precinct;
- Scale and massing opportunities relative to a specific development site (a corner site offers specific opportunities for height that a mid-street site may not);
- Response to the topography of the precinct;
- Opportunity to create either landmark, gateway or iconic building sites, which may demand a greater height than the standard precinct range, variation to the bulk and massing of typical precinct form, and an architectural

identity which distinguishes the building within its precinct context and the overall Cockburn coast townscape;

- Overall streetscape character and the reinforcement of a sense of a cohesive urban quarter generally;
- The inappropriateness of single level residential development;
- The minimum two-level residential development requirement, and the preference for a minimum three-level development height through the redevelopment area; and
- A general preferred range of height within the residential precincts of between three levels and six levels, with specific sites selected for landmark, gateway and iconic site status (these sites are subject to further detailed planning at the local structure plan level and the development of built form guidelines), and intended height ranges at some locations of between 7 and 16 storeys, as outlined in the precinct character statements (Chapter 2.10).

Significant consideration has been given to the appropriateness and location of height within the district structure plan. While height within a coastal environment is often contentious, the Cockburn coast redevelopment area is considered to be an appropriate location for higher built form elements in certain locations given:

- The site is relatively separate from existing communities, and therefore has a minimised impact on existing residents through over-shadowing and over-looking;
- Building heights of up to eight storeys have been applied in the immediate vicinity of the project area; and
- The comprehensive and strategic approach to planning for the redevelopment, as compared to ad-hoc individual developments, provides the opportunity to locate higher rise developments in appropriate locations.

Key considerations in planning for these higher elements through the development of local structure plans and built form guidelines, will be ensuring that the street-level interface remains at a human scale, and that height transition areas are provided adjacent to existing residential communities.

2.9.4 Iconic, landmark and gateway building sites

Legibility and identity of the structure plan area will be enhanced through the inclusion of landmark and gateway buildings. Identification of these sites will occur through the development of the local structure plans; however the principles to be applied are as follows:

- Landmark buildings are to be located at the end of major view corridors and at strategic locations along the ridgeline;
- Gateway buildings will be located at major entrance points in the development area;
- Location of height in accordance with the setback requirements of State Planning Policy 2.6: State Coastal Planning Policy (SPP 2.6); and
- Development applications seeking landmark, gateway or iconic building status will not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

The existing South Fremantle Power Station building already serves as a major landmark and this will be complemented with a series of landmark sites where natural features, building style and additional height will be used to create identifiable sites in the urban landscape. Landmark sites will have the capacity for tower elements of between seven and sixteen storeys, dependent on location, as outlined the precinct character statements (section 2.10).

Gateway sites will have a mandated requirement for additional street presence, addressing the corner such that a statement and sense of arrival is provided.

In addition, opportunity will exist within the project area to create an iconic building site. The intention is to investigate the inclusion of two residential apartment towers with a total height of up to 16 levels, within a larger development site, comprising of five to seven level residential development.

The iconic building site is intended to offer the market a major development which would attract national and international interest from premium developers. Located at the south-eastern end of the redevelopment area, the site would be bounded by major roads and the rail line which may be considered as constraints unless the opportunity was provided to gain panoramic ocean and coastal views.

This option for the iconic development site should be investigated at the local structure planning and built form guideline stage, with due consideration for:

- Consultation processes;
- Overall bulk, form and massing (the apartment towers are intended to be slender forms which give the location identity without dominating the townscape image); and
- Shade and overlooking.

2.9.5 Architectural expression

The overall architectural expression at Cockburn coast in intended to be responsive to the site's character, particularly reflecting the cultural significance and heritage of its industrial past and the architectural context of South Fremantle immediately to the north of the project boundaries.

CockburnCoast

The specific architectural themes for the individual precincts are outlined in the precinct character guidelines.

The overall physical character and sense of place for the Cockburn coast area should be that of a contemporary urban village which has evolved from a post-industrial past. The memory of industrial built forms and selection of materials and architectural detailing should be evident in the architectural responses.

The coastal location also offers a strong thematic, partly as a collective response to a Western Australian beach lifestyle and partly as an essential environmental response. The proximity of the ocean requires designs to consider appropriate building material selection and detailing which can accommodate the harsh climatic extremes and corrosive salt laden air. The cool sea breeze will also shape design responses, which should allow for protection of external living spaces while promoting cross ventilation opportunities.

Consideration of these fundamental architectural elements must be integral to the design guidelines.

2.10 Precinct character guidelines

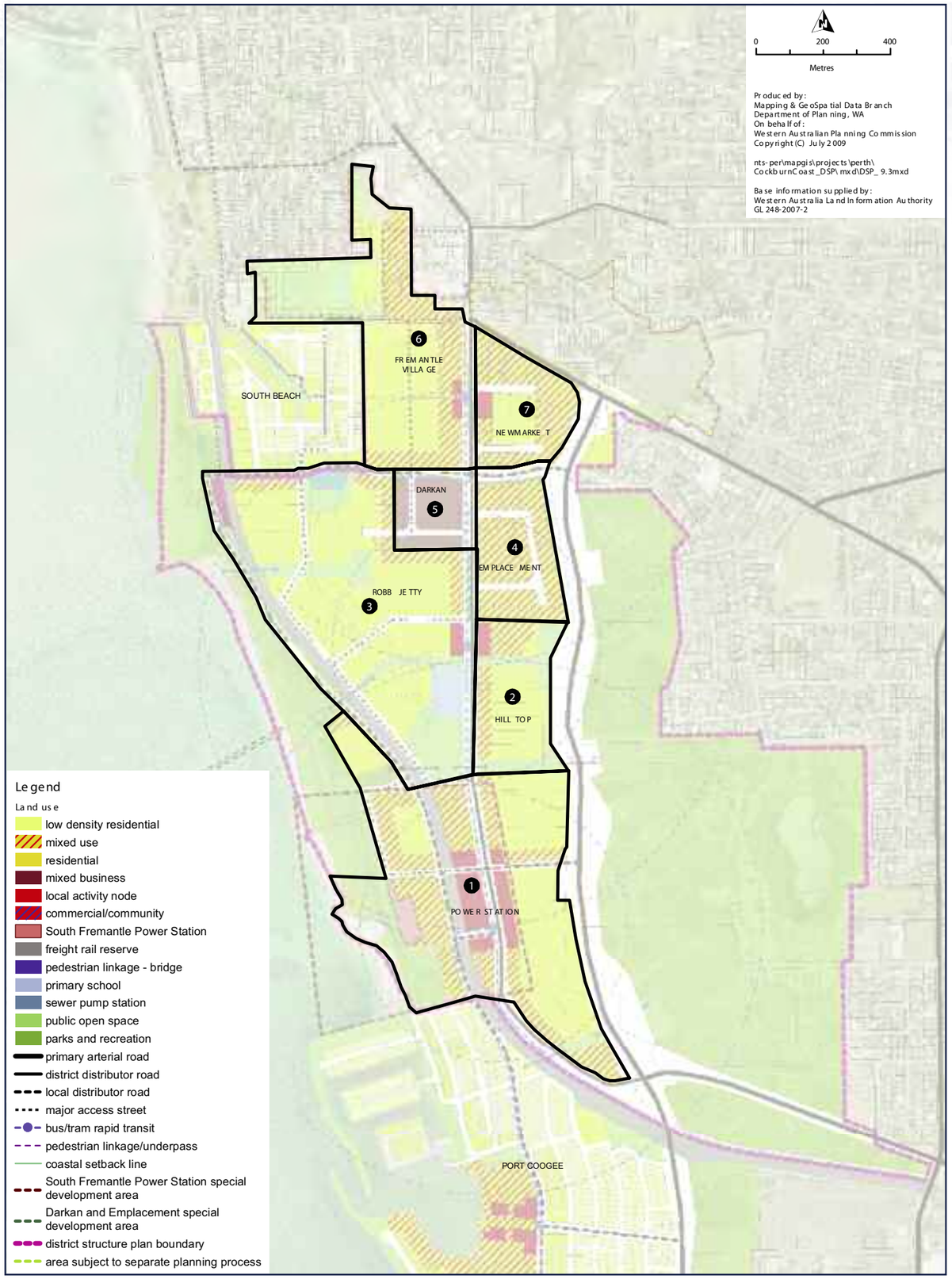
To aid description and administration, the project area has been divided into a number of precincts defined by a range of considerations, including physical characteristics; land use character, both existing and proposed; key roads; and context within the project area and in relation to adjoining land use features.

A precinct plan is provided at Figure 2.4.

This section of the report provides an outline and guide for the kind of land use, built form character and building heights considered appropriate for each precinct. It is intended that this guiding information be followed and implemented in the detailed design of the project area, particularly at the local structure planning and development stages.

This structure plan is also intended to go further in its guiding role than would normally be the case, by providing a framework for the ultimate lot layout and built form typology. This should ensure that

Figure 2.4: Precinct plan



the vision and objectives set for the Cockburn coast during the structure planning processes are carried through into the future.

The seven precincts are:

- Power Station precinct;
- Hilltop precinct;
- Robb Jetty precinct;
- Emplacement precinct;
- Darkan precinct;
- Fremantle Village precinct; and
- Newmarket precinct.

The following sections establish the character guidelines for each of these precincts, and these should be followed by the relevant decision-making authorities when considering all future statutory plans, subdivision and development applications within the structure plan area.

2.10.1 Power Station precinct

The Power Station precinct is in the southern portion of the Cockburn coast area, and extends from Cockburn Coast Drive in the east to the foreshore in the west. It includes the South Fremantle power station, the existing electrical switchyard, and the proposed new development to the west of the freight rail line just south of Robb Jetty.

As part of the Power Station activity node, development west of the freight rail line and north of McTaggart Cove has been included to maximise the redevelopment potential of the power station and its surroundings; enable passive surveillance of the foreshore; generate critical mass to support the proposed commercial outcomes and enable different activities along the beach.

The precinct is the southern gateway to the Cockburn coast area, and interfaces with the Port Coogee development to the south and Beeliar Park to the east. It also has a direct interface with the project area's southernmost east-west linear public open space linkage.

Power Station precinct -

major recreational retail and cultural event opportunity as a city-wide destination

Power Station precinct -

Cockburn Road looking south

The precinct will be the activity hub of the Cockburn coast area, centred on the power station special development area with its local transit stop and associated mixed use and activity node focus. Medium and high-density residential development on the hillside will provide a backdrop to this activity node, complete with a series of landmark and gateway building sites located at strategic sites along Cockburn Coast Drive.

Precinct character

- Unique urban coastal node – principal activity focus of the project area.
- The power station redevelopment is a central component of the activity node with activated mixed use links ideally linking over the rail line and integrating with the Cockburn Road node.
- The redeveloped power station and surrounds are conceived as being a major recreational retail and cultural event opportunity, attracting people from across the metropolitan region as a family-oriented activity destination – an urban/post-industrial version of Sorrento Quay at Hillarys.
- The local structure planning should address car parking provision and fully-integrated public transport links to support the commercial objectives of the structure plan.
- The precinct should aim to create a strong sense of place, with an architectural response which complements and yet contrasts with the power station. New develop should be a contemporary interpretation of a post-industrial aesthetic, and should set the benchmarks for the total development area by providing quality mixed use and environmentally sustainable design.
- The key open space links to Beeliar Park and Port Coogee, and the relationship of the built form to the linear park and northern bridge crossing, will be significant elements forming the character of the Power Station precinct, providing an exciting contrast and complement to the post-industrial character of the built form.

Land use

- Built form development encouraged to span over freight rail reserve to integrate land between Cockburn Road and the power station building. The range of land uses should include residential, office and entertainment.

- The key local retail activity is to occur along Cockburn Road in a vibrant 'main street' setting. A minimum of 5000m2 of retail is expected in this location. Mall-based retail formats will not be supported.
- The switchyard is encouraged to be relocated, subject to funding, and redeveloped for a mix of residential and hospitality uses. Should the switchyard remain, it should be bordered by screened parking structures and appropriately controlled residential and short-stay accommodation.
- The Power Station precinct is the preferred location for short stay and hotel accommodation within the Cockburn Coast area.
- The precinct will be dominated by the power station building, with the ultimate uses of the building requiring detailed analysis and an open consideration of options. The use of the building and its immediate cartilage must have an emphasis on community-based outcomes.

Built form

- The redevelopment of the power station will create a landmark iconic building, and should incorporate responsive recycling treatment and exciting new additions. The past industrial character should be reflected in the development aesthetics.
- All development should promote surveillance of the foreshore, to encourage active and passive use of the area by residents and visitors.
- Buildings should be robust and adaptable to allow for changes in use over time. New buildings should be flexible to meet changes in market demands, allowing residential activity initially with a change in use over time when appropriate.
- Building footprints should be maximised at the street edge and the area of open space optimised by encouraging parking behind buildings. Rooftop and basement parking, and key decked parking stations should be considered, all of which should be sleeved behind building frontages or appropriately screened.
- The residential character of Cockburn Road and immediately adjacent sites should have a solid bulk and massing – reflecting a contemporary version of the Fremantle wool stores.
- The character of the residential sites in secondary streets and laneways should also relate to the industrial memory of the area, and should give particular attention to industrial style roof forms (e.g. saw-tooth roofs) or parapet frontages. The aesthetic should draw on Fremantle and South Fremantle traditional building topologies, but should avoid duplication of historical detailing.

Height

- Bulk and height should be limited on buildings immediately adjacent to the power station, so that these surrounding buildings become secondary forms. The extensive use of glazing and lightweight material cladding and articulated design is an effective way to ensure that the power station is the dominant element.
- Development west of the freight rail line, and south of McTaggart Cove, is permitted to be three to five storeys to reflect the importance of the power station building and ensure that surrounding development does not dominate the power station or the adjacent foreshore.
- Development west of the freight rail to the northern side of McTaggart Cove Road is permitted to be 3 to 4 storeys in height.
- The power station precinct contains the project area's principle activity node and major gateway intersection with the east-west open space link and Cockburn Road. The gateway sites in the precinct should have a height of eight levels, plus potentially a loft level setback from the street frontage. Landmark sites in the precinct should have a height of nine to eleven levels, plus a loft level setback from the street frontage.
- The predominant height on Cockburn Road should be five levels, and within the activity node area the height should increase to six levels, with potential for a seventh level in the roof space, subject to a three metre setback being provided.
- Residential development in secondary streets should be three to four levels in height, with opportunities for roof terraces and an additional loft level in the pitched roof space.
- Gateway and landmark sites beyond eight storeys within the precinct will be located beyond the height setback area of SPP 2.6. Within the Power Station precinct, the SPP 2.6 setback area generally contains land west of the freight rail line and some land located between the freight rail line and Cockburn Road in the southern extent of the precinct.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

Public realm

- The Power Station precinct should be a major public destination venue as a significant mixed use activity node which provides for passive recreational opportunities; a beach lifestyle focus; a boardwalk character for beachfront public open space; and a strong sense of the site's cultural significance and industrial heritage.

2.10.2 Hilltop precinct

The Hilltop precinct is located immediately north of the Power Station precinct, and extends from Cockburn Coast Drive in the east to Cockburn Road in the west. Hilltop has been separated in the precinct planning from the land to the west of Cockburn Road, due to its significant topography and the way that this landform should be treated in future planning and development phases. It is intended that development should be responsive to the topography in Hilltop, and should aim to retain as much of the existing natural character of the site as possible.

Hilltop is a predominantly residential precinct, with some mixed use development along Cockburn Road. It also contains part of the project area's central activity node, focused on the central transit stop, with some further mixed use development sleeving this node. The precinct has the project area's two east-west linear parks,

providing strong connections down the hill from Beeliar Park and through Robb Jetty precinct to the coastal foreshore.

Precinct character

- The Hilltop landform has steep gradients, sometimes above 25 per cent, and has the highest point in the structure plan area. The district structure plan seeks to enhance these characteristics through the design of the public realm and built from. Streets should organically traverse the hillside, and a network of small urban spaces in the road reserves should be created.
- This high point adjacent to Cockburn Coast Dive allows excellent views into the Robb Jetty precinct and through to the ocean.
- The linear park, located in a natural valley, provides excellent connections to Beeliar Park and through to the coast.
- The precinct's residential development is well served by the adjacent transit stop, activity node and mixed use along Cockburn Road.
- There will be a strong interface between Hilltop, the primary school and district open space across Cockburn Road.
- The precinct's two linear parks have been designed to promote both visual and physical connections to the coast and to Beeliar Regional Park to the east.

Land use

- Medium/high density residential.
- Office and commercial uses promoted along Cockburn Road.
- Activity node at transit stop to contain local convenience store and opportunity for other retail tenancies.

Built form

- Buildings to have a direct relationship overlooking and interacting with the linear parks.

Hilltop precinct looking west -

development responsive to the topography

Horse trail through a green link looking east

- Buildings should be designed to 'move' with the winding streets and use the topography to hide parking areas and provide terraced views to the ocean.
- Buildings along Cockburn Road should be adaptable to allow for changes in use over time if market conditions fluctuate, with the ability to accommodate residential, retail and commercial uses.
- Building footprints should be maximised at the street edge and the area of open space optimised by encouraging parking behind buildings. Rooftop and basement parking and key decked parking stations should be considered, all of which should be sleeved behind building frontages or appropriately screened.

Height

- Buildings on Cockburn Road should be a maximum height of five levels.
- The height of buildings on secondary streets throughout the precinct should be three to four levels.
- Building height for development sites fronting the green spine linkage should be five levels, with significant breaks in development on the north side of the spine.
- Selected sites on the steeper topography and ridge line are permitted to be five levels in height, with nominated gateway and landmark sites to be seven levels.
- Laneway development should be a maximum three levels in height.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

Public realm

- The hilltop park, adjacent to Cockburn Coast Drive, is to be a key passive recreation area, with landscaping to enhance its prominence and its role as a major viewpoint over the locality.

- The central valley linear park should incorporate frequent landscape attraction areas along the route between Beeliar Park and Cockburn Road.
- The edges of the linear parks should have numerous access points to the abutting residential developments.
- Integrated pedestrian systems with green spines, pockets parks, secondary streets and laneways.

2.10.3 Robb Jetty precinct

The close proximity to the beach and the flat topography mean that the Robb Jetty precinct will most likely have the strongest coastal residential character. It contains elements of mixed use development potential along significant road links including Cockburn Road, but is otherwise predominantly set aside for medium to high density residential development. The precinct also contains supporting community facilities in the form of the two-storey urban primary school, the area's key active playing field, and a small commercial/community development opportunity at the Catherine Point foreshore activity node. A high amenity, coastal character is proposed for the precinct to complement the adjacent beach and foreshore, and the key areas of open space contained within it.

Precinct character

- The street layout should have a strong east-west emphasis to enable good connectivity to the freight rail crossing points, to highlight the sense of connection to the beach and to optimise ocean views from dwellings – all of which help to foster the perception of a great seaside community.
- The aesthetic character of the built form and public domain should be strongly linked with beach lifestyle and appropriate environmental/climatic design response.
- The mixed business development along the western and southern edges of the Darkan precinct will be interfaced with mixed use development that is compatible with residential.
- Significant stands of trees and the heritage-listed Robb Jetty chimney will be preserved in the active open space area, and associated with the urban character two-storey primary school.
- Mixed use development will frame the precinct along Cockburn Road and Rollinson Road, providing diversity and activation along these key movement corridors.
- Bridges providing strong pedestrian and cyclist links from linear parks across freight rail to coastline.

Land use

- A mix of residential densities to support a variety of family types and incomes.
- Employment and services in the mixed use developments framing the precinct.
- Local retail services around the transit stop.
- School and oval co-located, to protect Robb Jetty chimney and existing mature trees.
- Small scale commercial/community and passive activity node at the Catherine Point Coastal node.

Built form

- Development within the Robb Jetty precinct adjacent to the freight rail line will be required to be highly articulated and punctuated with both public open space and local access points. This is to ensure that view corridors to the ocean are retained from deeper within the development area, and avoid a 'solid wall' effect from the built form, as viewed from the coastal foreshore.
- Residential buildings can adopt a variety of front setbacks throughout the precinct. The fundamental built from elements to dominate the streetscape should be balconies, windows, high quality front yard landscaping and minimal front fencing/walling.
- Mixed use buildings should be adaptable to allow for changes in use over time.
- Building footprints should be maximised at the street edge and the area of open space optimised by encouraging parking behind buildings. Rooftop and basement parking, and key decked parking stations should be considered, all of which should be sleeved behind building frontages or appropriately screened.

New street looking west - beach lifestyle

Public open space linkage looking west

Height

- Buildings on Cockburn Road should be a maximum height of five levels.
- The height of buildings on secondary streets throughout the precinct should be three to four levels, with the lowest level generally permitted to be 1.5m above natural ground level to facilitate car parking provision and security measures.
- Building heights for development sites fronting the east-west linear parks should be no more than four levels, with significant breaks in development on the north side of the spine.
- Sites at the end of street blocks are permitted to be five levels in height.
- Sites abutting the main active recreation reserve are also permitted to be five levels, with nominated gateway and landmark sites to be seven levels.
- Gateway and landmark sites within the precinct will be located beyond the height setback area of SPP 2.6.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

Public realm

- The central and southern east-west linear parks have the combined functions of providing safe, amenable pedestrian/cyclist movement to/from the beach and also providing low-key active and passive recreation opportunities. These spaces need to convey a strong residential character whilst feeling inviting to people passing through.
- Cockburn Road is to be developed with a pedestrian-friendly character that has a balanced approach to car and transit movement. Wide footpaths, on-street parking, two travel lanes and two transit lanes will sit within a well-treed, well-detailed streetscape lined with shops, offices and apartments.

Laneway streetscape - residential frontages and linked pedestrian systems

- Strong environmental considerations will be important in the design, integration and management of public open space provisions.

2.10.4 Emplacement precinct

Emplacement precinct contains those lots with a direct interface with existing Emplacement Crescent, between Cockburn Coast Drive and Cockburn Road. The precinct will contain the new Rollinson Road extension through to Cockburn Coast Drive, and contains a small area of district open space in its south-eastern corner. It is comprised entirely of mixed-use development, and will be subject to special implementation controls to protect existing use rights and ensure compatibility of future development with uses that wish to remain.

Precinct character

- The precinct will display a strong mixed use character, particularly during its development transition period, which will potentially consist of dense residential development sitting above significant compatible commercial operations.
- Timing, staging and transitional arrangements are important in Emplacement precinct to ensure minimal disruption to businesses and minimal impacts on new residents.
- The relationship to Cockburn Coast Drive for future development will be important to ensure a high quality interface.
- Height to be supported at strategic sites to promote views to the east and west.

Land use

- Office and commercial development focused on Cockburn Road.
- High-density residential permitted where the on-site and adjacent uses are compatible with residential.

Built form

- A ‘gateway’ building should be provided at the Rollinson Road/Cockburn Coast Drive junction as a high-quality expression of the precinct’s land use character.
- The landmark building in the precinct should be centrally located to capitalise on the view corridors to the ocean and the northern and central open space corridors.
- Buildings adjacent to Rollinson Road and Cockburn Coast Drive must address these streets with well-detailed façades and have balconies wherever residential dwellings are provided.
- The ground floor of all buildings should be adaptable to allow for changes in use over time.
- Car parking should be screened from Emplacement Crescent.

Height

- Buildings on Cockburn Road should be a maximum height of five levels,
- The height of buildings on Emplacement Crescent may be up to six levels.

- ‘Gateway’ building(s) may be up to eight levels and a landmark building up to 16 storeys, subject to performance criteria.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

Public realm

- Open space area in the south-eastern corner, should be integrated with the adjacent public open space design (hilltop park) and support a quality interface with the abutting mixed-use development.
- Streetscape improvements on Emplacement Crescent will be important, as will ensuring strong built form relationship and activation to Cockburn Road and Cockburn Coast Drive.

2.10.5 Darkan precinct

Darkan precinct is a small portion of the project area surrounding Garston Way and Darkan Avenue and focused on the existing Fremantle Cold Stores operation. It is designated for mixed business uses, and is surrounded by mixed use development in Robb Jetty precinct, across Cockburn Road in Emplacement precinct, and across Rollinson Road in Fremantle Village precinct.

Precinct character

- The precinct will be of a non-residential nature, having an intense commercial development focus to optimise employment and business enterprise activity.
- Existing uses will be able to stay long term, until such time as owners wish to redevelop.
- The ability exists for the businesses to evolve over time into higher value business uses.
- The interface with surrounding mixed use development will provide a transition to nearby residential, and provide scope for supporting business enterprises.
- The proximity to two transit stops and activity nodes provides amenity and services for workers.

Land Use

- Mixed business (refer to Chapter 2.4.2.3 for suitable uses and uses not suitable).
- Office and commercial focus on Cockburn Road.

Built form

- Buildings should be adaptable to allow for changes in use over time.
- Car parking should be screened from the street.

Height

- Buildings on Cockburn Road should be a maximum height of five levels.
- The height of buildings on secondary streets throughout the precinct may be up to four levels, provided that overshadowing does not impact on residential development.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

Public realm

- Quality of streetscaping and interface of buildings with the urban public realm will be important to ensure high standards of amenity in the remainder of the project area are carried through into Darkan precinct.
- Landscaping, active street edges, use of street furniture and other urban public realm treatments should be encouraged to provide high-quality pedestrian environments and urban outdoor spaces.

2.10.6 Fremantle Village precinct

Fremantle Village precinct is located between Cockburn Road in the east and South Beach development in the west. It contains the land currently used for the Fremantle Chalet Village, on the former Fremantle tip site. It has an important interface with the retail and commercial uses on Hampton Road to its immediate north, and will interface with the mixed business uses in Darkan precinct to its south.

Character and built form elements (including height) of the South Fremantle landfill site will be determined through the reference group process currently being managed by LandCorp, in partnership with the City of Fremantle.

Precinct character

- The precinct will be a blend of the character displayed in the South beach development and in the future Robb Jetty precinct development. This will entail a mix of housing types and an intensity of mixed use development along Cockburn Road and Rollinson Road that are established in a setting of high quality streetscapes.
- The northern transit stop is located centrally along Cockburn Road and will lead to the formation of a local retail focus around it.
- It is intended that the section of Cockburn Road north of Rollinson Road will have a ‘main street’ character with a strong pedestrian focus and slow-moving cars.
- The ‘gateway’ and ‘landmark’ buildings should be positioned at each end of this section of Cockburn Road to distinguish the nature and importance of this key community focal area.
- It is important that the new development integrates appropriately with the South beach development and northern commercial area through quality urban design, built form and public realm design.

Land use

- A low to medium density residential interface with the South Beach development will transition to a predominantly medium to high density residential land use base for the precinct.

Commercial on Cockburn Road

- Commercial and office uses are to be established in the mixed use area.
- Local retail activities will be accommodated around the transit stop and along Cockburn Road wherever viable.

Built form

- Development will have to appropriately overcome any geotechnical issues and constraints.
- The 'gateway' and 'landmark' buildings should showcase buildings that highlight the quality and character of the area.
- Mixed use buildings should be adaptable to allow for changes in use over time.
- Building footprints should be maximised at the street edge and the area of open space optimised by encouraging parking behind buildings. Rooftop and basement parking and key decked parking station should be considered, all of which should be sleeved behind building frontages or appropriately screened.

Height

- Buildings on Cockburn Road should be a maximum height of five levels.
- The height of buildings on secondary streets throughout the precinct should be three to four levels.
- A nominated gateway site may be up to eight levels and a landmark building may be up to fourteen levels.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.

Public realm

- Quality of streetscaping and interface of buildings with the urban public realm will be important to ensure high standards of amenity in the remainder of the project area are carried through into Fremantle Village precinct.
- Landscaping, active street edges, use of street furniture and other urban public realm treatments should be encouraged to provide high-quality pedestrian environments and urban outdoor spaces.

2.10.7 Newmarket precinct

Newmarket precinct is in the north-eastern corner of the project area, and contains mainly existing commercial and strata residential development. There is limited scope for comprehensive redevelopment, although these guidelines will provide the framework for any future redevelopment.

Precinct character

- The precinct contains very steep land, particularly on the western side, and high landform in the eastern area.
- The precinct will be characterised by an eclectic mix of new contemporary architecture, the existing medium density residential and commercial enterprises, and possible future mixed-use redevelopment along Cockburn Road.

Newmarket activity node

- A landmark development is encouraged on the eastern corner at the high point that forms the gateway to the project area from the east.
- The topography currently precludes any direct access or development interface with Rockingham Road, Cockburn Coast Drive or the Rollinson Road extension, so the treatment of development adjacent to these roads will be very important.

Land use

- Residential and mixed use focus.
- Ground-floor office and commercial opportunity on Cockburn Road and part of Rockingham Road.
- Local retail activity node at transit stop.

Built form

- Roads and built form to respond to landform.
- Buildings should be adaptable to allow for changes in use over time.
- Building footprints should be maximised at the street edge and the area of open space optimised by encouraging parking behind buildings. Rooftop and basement parking and key decked parking station should be considered, all of which should be sleeved behind building frontages or appropriately screened.

Height

- Buildings on Cockburn Road and Rockingham Road should be a height of four levels, with a maximum of five levels if a three metre terrace setback or loft level is provided.
- The height of buildings on secondary streets throughout the precinct should be three to four levels.
- Development applications seeking landmark, gateway or iconic building status wil not be supported until local structure planning and development of built form guidelines have determined the appropriate locations for these higher built form elements.
- The landmark development is permitted to be up to 16 levels, with gateway sites permitted to be up to 8 levels.

Public realm

- Quality of streetscaping and interface of buildings with the urban public realm will be important to ensure high standards of amenity in the remainder of the project area are carried through into Fremantle Village precinct.
- The Rockingham Road and Cockburn Coast Drive verges and embankments should be well landscaped to present a quality image for the project area.
- Landscaping, active street edges, use of street furniture and other urban public realm treatments should be encouraged to provide high-quality pedestrian environments and urban outdoor spaces.

2.11 Socio-economic elements

The urban renaissance of the Cockburn coast will provide for around 10 800 new residents. The structure plan is the first step in initiating a framework to shape the social and economic characteristics of the new community.

The following section explores the key socio-economic elements of the district structure plan, and components which will need to be further explored in the detailed stages of planning, as the development progresses to build out and as the new community establishes itself.

2.11.1 Social sustainability

Social sustainability and development of a cohesive, active community is an integral component in achieving the vision for the Cockburn coast. Sense of place, diversity, engagement, community facilities and infrastructure and accessibility all play a part in achieving sustainability from the community's perspective. The way forward is to develop tangible strategies for achieving these outcomes and supporting a diverse community through the next phase of detailed planning.

2.11.2 Community facilities and recreation

The district structure plan has been prepared in consultation with a reference group and following an extensive visioning dialogue. This process has identified desirable types of facilities to be incorporated within the Cockburn coast redevelopment, as follows:

- Strong landscape and physical linkages between the Beeliar Regional Park reserve in the east and the coastal foreshore reserve;
- Regeneration of the Power Station building which includes public use elements, such as:
  - Space for community markets
  - Café's. restaurants, microbrewery
  - Convention/theatre space
  - Indigenous and European heritage education/interpretive centre
- Community facilities at the South Beach (North Coogee) coastal node; and
- Educational facilities.

The structure plan has responded to these desirable features through:

- provision for community/commercial facilities at the western extent of Rollinson Road;
- providing for a mix of uses within the revitalised Power Station and surrounds, including a series of principles to guide the further determination of land use and heritage interpretation;
- establishment of linear public open space corridors linking key natural areas; and
- provision of a primary school site, with strong links to the surrounding neighbourhood and transit opportunities.

2.11.3 Sense of place

The depth of a person's experience of a place is directly related to its distinctness, quality and the emotions it draws on.

Creativity lies at the heart of the Cockburn coast's urban renaissance and will play an essential role in breathing new life into forgotten places and buildings. The physical transformation of the Cockburn coast alone will not make the area into a bustling quarter with its own distinct sense of place. To achieve this outcome,

people need to put their own stamp on the land and waterscape. Community-led art projects, innovative architecture and creative concepts are central initiatives in the creation of a stimulating, attractive and safe place.

Cockburn coast already exhibits a strong sense of place through the sites strong Indigenous, European and industrial heritage, and the coastal environment. Further nurturing this sense of place and making the Cockburn coast history 'come alive' is critical. The structure plan therefore supports a number of elements to achieve this by encouraging:

- Legible, vibrant and distinct street environments;
- Regeneration and reuse of the of the Power Station;
- Creation of family friendly destinations;
- Adaptive open space;
- Diverse beach focussed recreational opportunities;
- Strong links to the coast and Beeliar Regional Park;
- Improved public transport links; and
- Creation of a pedestrian oriented environment with cohesive walking and cycling links.

Further detailed planning should explore and provide for place making strategies, heritage interpretation and celebration, as well as public art.

2.11.4 Community diversity

A key component of sustainable communities is diversity - in demographics, incomes and household types - which in turn contributes to the vibrancy, energy and activity within a place. In determining the appropriate form of the Cockburn coast through the structure planning process, careful consideration has been given to enabling a diverse community through:

- Provision for a range of sustainable housing types that match Perth's changing demographics and provide alternatives to the majority of existing single dwelling housing stock available in the broader area;
- Encouraging a diversity of built form, dwelling types and sizes, attracting a mix of demographics and lifestyles;
- Increased densities focussed on the bus rapid transit system, improving accessibility for a wide range of new residents; and
- Establishing an affordable housing target to enable representation of people in lower income brackets.

Future planning for the site will need to provide more specific detail to these initiatives.

2.11.5 Affordable housing

A key platform of Directions 2031 is to achieve an equitable city, particularly in the provision of affordable housing. Steadily declining in recent years, housing affordability has become a critical issue for purchasers and renters alike; no longer confined to low income earners, but increasingly being experienced by those in the moderate to middle income brackets.

This situation has implications for Cockburn coast in its ability to achieve social sustainability and diversity objectives. The prime coastal location and the premiums demonstrated in other comparable redevelopment projects means that new dwellings within the Cockburn coast area are unlikely to be affordable to those in low-moderate income brackets. The desired social mix is therefore unlikely to be delivered under normal market scenarios.

At a district structure plan level, the most tangible tool is the type and size of dwelling stock, which can provide for a range of household types and incomes. The dwelling targets established through the sustainability framework and reference group process, provide minimum requirements for a range of housing types.

Dwelling mix alone will not be sufficient to ensure a reasonable extent of affordability. Intervention through a strong policy, and potentially statutory, response is required to ensure a proportion of affordable housing is provided. A minimum target of 20% affordable housing will be required in Cockburn coast. It is intended that this target will include dwellings for private purchase or rent, and social housing provision (those managed by Government or community housing providers).

In this instance, affordable housing is defined as that which is accessible to low income households (the bottom 40% of income distribution) without spending more than 30% of the gross household income on housing costs. The 30/40 rule of thumb is commonly used as a measure in housing research and policy.

Similar targets have been effective both local and internationally, such as the Social and Affordable Housing Policy applied by the East Perth Redevelopment Authority and the Vancouver model.

Preferably, this target should be supported by policy relating to the treatment of affordable housing within Cockburn coast, establishing standards to ensure the appropriate integration of affordable dwelling units.

While the specific mechanisms to achieve the target, beyond the district structure plan, will need to be established by the ultimate delivery agency or agencies, some options for implementation are outlined briefly below.

2.11.5.1 Affordable housing mechanisms

Inclusionary zoning

Able to be applied either on a mandatory or voluntary basis, inclusionary zoning uses the statutory planning scheme to achieve the housing target.

Mandatory provision generally requires the construction of affordable housing to be included when a certain number of dwelling units are to be built. Cash in lieu payments or a levy on developer contributions can also be applied. While the mandatory provisions of affordable housing may be unpalatable to some sectors of the market, it must be considered in the context of delivering social diversity and the economic gain which will be delivered through the ultimate rezoning and redevelopment of the area for urban purposes.

When applied voluntarily, density bonuses or development concessions can be gained by the developer for the provision of affordable accommodation for rent or purchase.

Government land

Conditions of sale or joint venture partnerships on government-owned land can be applied to bind incoming private owners of partners to deliver the affordable housing target.

Identification of sites for public rent

This option requires the identification of appropriate sites for purchase at market value by Government and community housing providers for social housing initiatives, as applied within the Subiaco and East Perth Redevelopment Authority areas.

Other approaches

Cooperative building programs and shared equity/shared ownership schemes may also be useful to explore for the Cockburn coast.

Affordability of the accommodation over the long term should be secured through legal mechanisms, such as restrictive covenants, to ensure the benefits extend beyond the first generation of homeowners or tenants.

2.11.6 Community engagement and capacity building

Engaging the community in the planning, design and development of the Cockburn coast has been a key component in the preparation of the structure plan and will be a part of its successful implementation.

To date, the project has been guided by the outcomes of the Vision for Cockburn Coast dialogue, the reference group established for the structure plan (discussed further in Chapter 4) and the statutory public comment process. The ongoing involvement and evolution of the Reference Group will be an important feature as detailed planning progresses.

This ongoing consultation process will need to be supplemented by further community development and capacity building initiatives as the project commences to build out, with a key focus on:

- Maximising community participation, including local residents, community groups and Indigenous interests;
- Establishment of local community groups - e.g. conservation and heritage committees
- Event and activity development;
- Establishing partnerships and utilising existing community networks; and
- Facilitating local economic development.

These opportunities to creating and shape the new community will require a collaborative effort between existing residents, landowners, developers, State Government agencies, the cities of Cockburn and Fremantle and community organisations.

2.11.7 Employment

Encouraging the development of new jobs and intensification of existing employment in the Cockburn coast is a key component of the structure plan. Facilitating local employment is driven by a number of objectives:

- Encouraging local economic development through the attraction of high end, intensive employment opportunities;
- Enabling existing industrial operations to transition to higher order uses when it is appropriate for them to do so;
- Activating urban environments through street level activity;
- Reducing transport demand by encouraging movement within, as well as from the project area;
- Making effective use of public transport by encouraging journey to work patronage into, as well as out of, the area; and
- Encouraging a diversity of employment which meets the needs of the local community and fulfils current gaps in the existing employment base.

To secure these employment opportunities, the structure plan establishes employment self sufficiency targets and key employment areas to support the target.

2.11.7.1 Employment self sufficiency

Employment self sufficiency is the number of jobs in a location compared to the resident workforce. The higher number of jobs versus working population, the greater the ability to curb travel demand and achieve the objectives outlined above.

A minimum employment self-sufficiency target of 40% and a preferred target of 60% have been established for the Cockburn Coast area. This target has been established in conjunction with the Reference Group, and having consideration for the context of Cockburn coast in terms of access to activity centres (i.e. Fremantle) and an understanding of the employment mix within the broader sub-region.

To meet the 40% minimum employment self sufficiency target for a resident workforce of 6800 people, 2700 jobs are required. The combined populations of the Cockburn coast development area, Port Coogee and South Beach have been taken into account when calculating the job requirements to meet the self sufficiency target, as there are few employment options available within the land use mix of these adjacent areas.

Employment is anticipated to be provided as follows:

- Approximately 400 jobs in Port Coogee/South Beach
- 500 jobs in home based business
- 2200 jobs required in the development area, equating to 23-44 hectares of net employment land.

Notionally the structure plan, if built to capacity and assuming a high demand for commercial use, could achieve upwards of 75% employment self sufficiency.

In considering future employment prospects for the Cockburn coast, analysis of the existing jobs provided within the area of influence suggests a strong representation of industrial and manufacturing related jobs, but a limited economic base for white collar jobs. More specifically, a shortage of employment in the following sectors has been identified:

- Property and business;
- Education;
- Culture and recreation; and
- Personal and other.

Attraction of employment in these sectors should be encouraged in further detailed stages of planning, through the development of a local employment and economic strategy; and have been facilitated within the structure plan itself through the provision of land for mixed business, mixed use and local activity nodes.

2.11.7.2 Employment land

Three primary land use categories will provide the required employment land for Cockburn coast, these being mixed use, mixed business and local activity nodes. These use categories extend throughout the project area, but largely focus on the central Cockburn Road spine and the associated bus rapid transit link.

The extensive mixed use will need to be classified at further stages of planning into areas requiring mandatory ground floor commercial activity, non-residential capacity (therefore adaptable design) and home based business; and be supported by a commercial feasibility analysis.

Within the areas capable of providing employment land, the majority of jobs will be concentrated in the Power Station precinct and the Darkan/Emplacement precincts.

2.11.7.3 Power Station precinct

The Power Station precinct will be the hub of the Cockburn coast redevelopment. The adaptive reuse of the power station, development within the cartilage and regeneration of other available land will provide the basis of the new town centre and be a major attractor on the south-west metropolitan coastline.

Building on the sense of place offered by the power station and the opportunities to interact with the water at this location, this mixed use node will enable people to stay on a short-term basis, work, live and recreate.

Employment opportunities will therefore centre on the following uses:

- Tourism;
- Entertainment and hospitality;
- Festival retail; and
- Commercial/office.

2.11.7.4 Emplacement and Darkan precincts

The Emplacement and Darkan precincts are the most intensely occupied and most recently developed areas of the industrial zoned land, contributing to the local economy and employment. Several industrial operations within these precincts are substantial both in size and the level of investment made in the premises, while other businesses provide important local services but require flexible and affordable accommodation to deliver them.

The land use categories allocated to these precincts, mixed business and mixed use, recognise the existing industries operating in the area and the longer timeframes associated with redevelopment given its recent construction history and current uses, while enabling the land to transition to higher order uses over time.

In allocating these land use categories, existing operations are afforded a degree of protection until such time as they are able to relocate, however have substantial development opportunities in the future that will support an array of employment intensive businesses.

For the Emplacement and Darkan precincts, the following non-residential uses will form the employment base:

- Commercial/office; and
- Entertainment and hospitality.

2.11.8 Relevant performance targets

- 20% affordable housing
- 15% of homes to be 'family homes'
- Employment self-sufficiency
  - Minimum 40 percent (approximately 2700 jobs)
  - Preferred 60 percent (approximately 3600 jobs)

2.11.9 Further socio-economic initiatives required

- Affordable housing strategy - statutory and policy initiatives
- Community consultation strategy
- Community development strategy
- Local employment and economic development strategy
- Heritage management plan
- Retail/commercial feasibility analysis

2.12 Managing the environment

The Cockburn coast developable area can be considered as possessing limited environment value. Much of the area has been heavily impacted by a long history of industrial land use. Obvious environmental values are generally limited to the coastal foreshore, the ridge situated 1.5 kilometres from the coast, and the area identified as Manning Reserve and Beeliar Regional Park which are situated east of the ridge. The structure plan generally limits impacts to these areas (with the exception of the proposed Cockburn Coast Drive road reserve). Impacts to vegetation on the ridge can be limited by the selection of alignment, construction management and rehabilitation. Some disturbance to vegetation may also result from the development proposed west of the freight ail line at the Power Station precinct.

The redevelopment of the Cockburn coast represents an opportunity to improve the environmental values of the area.

Potential improvements include:

- Management of surface and groundwater systems – infiltration of groundwater to be moved away from areas of known contamination, reducing the rate for contaminants to be discharged to the ocean via groundwater;
- Management of superficial aquifer extraction, limiting potential for salt intrusion into the superficial aquifer and use of contaminated groundwater for unsuitable purposes;
- Restoration of foreshore and ridge vegetation;
- Vegetated connectivity restored between the foreshore and ridge; and
- Economic opportunities allowing historic contamination to be identified and remediated, rejuvenating the land.

The environmental analysis undertaken for Cockburn coast indicates that the planning process and associated regulatory instruments are sufficient to assess in more detail and manage the identified environmental factors. The implementation of the recommended management plans will require the identification of the ultimate development vehicle; however, the proposed conditions are versatile and can be applied to a redevelopment authority or standard MRS and local structure planning approach.

2.12.1 Biodiversity and multi use corridors

There are opportunities to retain existing remnant vegetation particularly west of the proposed Cockburn Coast Drive alignment, and link this existing vegetation with vegetated corridors extending from the ridge to the coastal foreshore vegetation. The structure plan provides for two of these corridors. The corridors are recommended to be approximately 30 to 60 metres in width with a minimum vegetation coverage of 50 per cent in any one area so as to provide a vegetation corridor sufficient to represent ecological value. Other functions for these corridors may include drainage and active and passive public open space.

2.12.2 Flora and vegetation impacts

2.12.2.1 TEC's and Priority Flora

A vegetation survey was undertaken in Spring 2007 to determine the nature and condition of vegetation within the district structure plan area, more specifically those areas within the existing Parks and Recreation reserve and Primary Regional Road (PRR) reserve which are likely to be impacted by the proposed development.

In surveying the coastal foreshore, Primary Regional Road reservation and Parks and Recreation land west of the PRR reserve, no plant taxa gazetted as Declared Rare, Endangered or Vulnerable were located during the survey. One population of the Priority Four species *Dodonaea hackettiana* was found in the study area, however this was located outside of the area impacted by the district structure plan area and is protected by Bush Forever.

The condition of vegetation across the site was considered to range from Very Good, where remnant native vegetation has been excluded from clearing, to Completely Degraded in cleared and developed areas.

2.12.2.2 Impacted areas of Parks and Recreation reserve

The structure plan identifies three areas of vegetation which are currently reserved for Parks and Recreation purposes under the Metropolitan Region Scheme, potentially impacted by development of either built form or road networks.

Beeliar Regional Park

To the extent possible, Cockburn Coast Drive has been designed to be responsive to the ridgeline adjacent to the redevelopment area and minimise impact on Beeliar Regional Park.

The vegetation potentially impacted is primarily located both within the existing Primary Regional Roads (PRR) reservation and the Parks and Recreation reserve located between the western edge of the road reservation and east of the existing private propertly line.

Neither of these parts of the reserve however are located within the Beeliar Regional Park Management Plan area, which extends from the eastern boundary of the existing PRR reservation.

The realignment of the PRR in accordance with the structure plan proposal for Cockburn Coast Drive will return 5.7 hectares back into this management area.

Initial vegetation assessment, via a Spring survery undertaken in November 2007, has identified the condition of vegetation of the impacted area ranges from completely degraded to very good dependent on location.

Coastal foreshore

Within the coastal foreshore two areas of vegetation are likely to be impacted, located at the western extent of Rollinson Road at Catherine Point and land north of McTaggart Cove Road.

Land located at Catherine Point (approximately 0.6 ha) has been identified for community/commercial purposes, as outlined in section 2.4.2.5. The Spring vegetation survey has identified this area as being in a completely degraded condition.

The 2.5ha site north of McTaggart Cove is proposed for residential and mixed use purposes, to provide passive surveillance and critical mass around the Power Station. Vegetation in this area has been identified as Degraded.

2.12.2.3 Flora and vegetation management

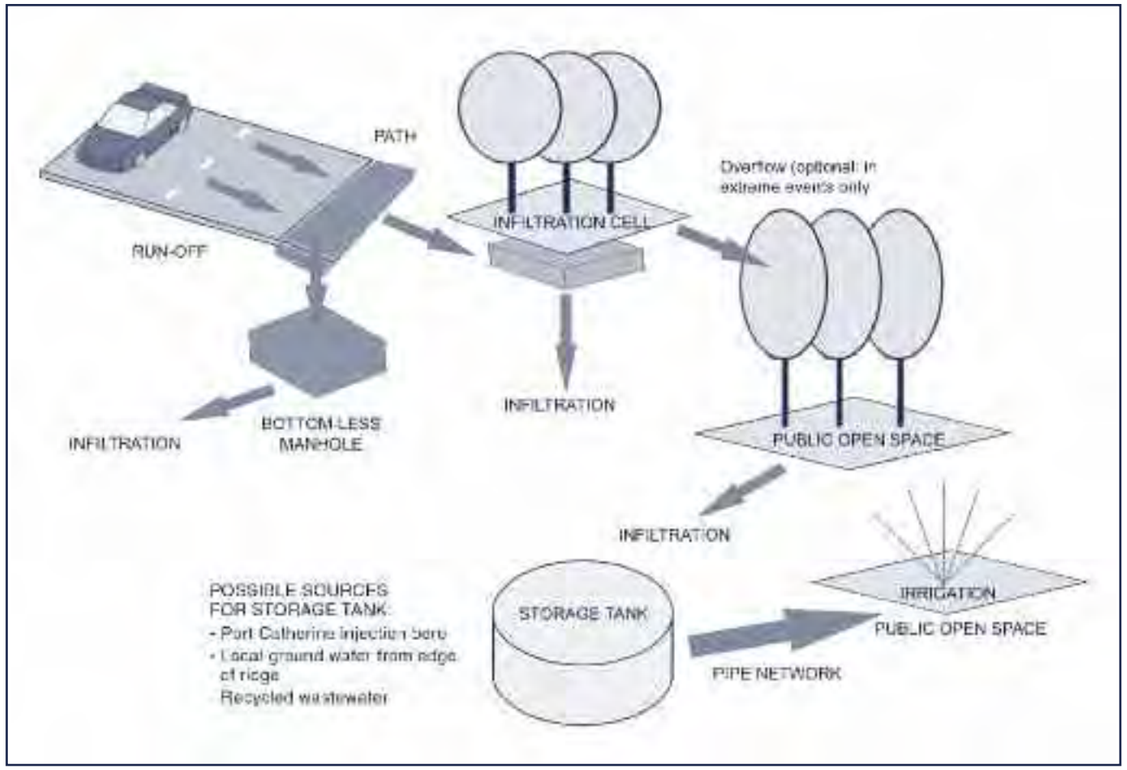
Where disturbance through clearing of areas of remnant vegetation is proposed, a further assessment of vegetation may be necessary to provide an additional scoring event and accurately determine Floristic Community Types.

Management plans will be required to maintain and improve existing vegetation, particularly given the presence of weeds, including Bridal Creeper; manage public interaction with natural areas and to limit impacts from development.

2.12.3 Fauna

A list of conservation dependent fauna potentially present or near the site indicated further assessment of fauna and habitat is required if future development proposes impacts on native vegetation as is indicated by the district structure plan. Further assessment should include field surveys and have consideration for the City of Cockburn's Native Fauna Protection Policy.

Figure 2.5: Options for water sensitive urban design



A Native Fauna Management Plan may be required to address methods of protecting or minimising impacts on habitat and or the possibility of relocation of fauna to a suitable alternative location.

2.12.4 Urban water management

An urban water management overview has been undertaken to guide water management in the structure plan project area. The overview provides a detailed assessment of water management initiatives and identifies areas in which additional work is required to manage all aspects of the water cycle, from stormwater runoff to the provision of potable water.

2.12.4.1 Water sensitive urban design

Due to the potential constraints on groundwater use in the structure plan area, opportunities to utilise as much stormwater runoff as possible should be included in the development. This should be through the consideration of water-sensitive urban design in the subdivision and drainage design to infiltrate rainwater to replenish the superficial aquifer (taking into consideration quality and contamination issues).

Water-sensitive urban design seeks to incorporate stormwater drainage into the urban fabric in a manner that ensures the protection of surface and ground water quality and enhances opportunities for reuse of stormwater.

It is envisaged that the majority of stormwater from both roadways and private property will be disposed via underground soaks. The location of this infrastructure will be determined at subsequent planning stages.

2.12.4.2 Water management recommendations

The following summarises the conclusions and management actions recommended in the urban water management overview.

Groundwater

Groundwater on the site is generally deep and therefore is not a constraint to development. However, the use of groundwater on the site has its risks, primarily the risk of salt water incursion and the historical contamination that has occurred from previous land uses such as landfills and industrial sites. Therefore the use of groundwater on the site is not recommended.

Stormwater

Due to the potential constraints on groundwater use in the structure plan area, opportunities to utilise as much stormwater runoff as possible should be encouraged.

Stormwater on the site is currently infiltrated through a series of fenced sumps. These are unappealing and not considered appropriate for high-density residential areas. Drainage swales and basins can be incorporated into the east-west open space corridors. The location of the corridors takes advantage of the natural catchments, requiring minimal reworking over much of the site to achieve a suitable gradient.

Based on the site geology much of the structure plan site is considered suitable for on-site disposal of storm water by soakage (soakwells and direct recharge via basins and passive community open space and landscaped soakage areas). The east-west corridors of green space can provide drainage opportunities as well as flora and active open space interconnections.

The infiltration of stormwater on contaminated sites can cause contaminants to enter the groundwater. This issue may be addressed through site remediation and/or not infiltrating stormwater on contaminated sites. This issue will need to be addressed prior to the design of the new stormwater system.

Potable water use reduction

The development at Cockburn coast is of a medium to high density residential type and most dwellings will have little or no garden. The potable water use per house is likely to be significantly less than for a conventional low density development.

Requiring home builders and developers to install water wise fittings and appliances is likely to be the most cost-effective way to reduce water use.

Potential sources for domestic 'third pipe' systems for toilet flushing and washing machines include rainwater from roofs, the Port Catherine injection bore, grey water and recycled wastewater.

Groundwater in the area may not be of an appropriate standard to be used in the irrigation of public open space. If this is the case, possible sources of water include the Port Catherine injection bore and recycled wastewater.

2.12.4.3 Additional work required

The following is a list of some key work that requires consideration following the conclusion of the structure plan. Irrespective of the ultimate administrative vehicle that will manage the development of the Cockburn coast, the following work is considered necessary during the detailed planning phases for Cockburn coast:

- Given Department of Water requirements for predevelopment groundwater monitoring, the multiple land ownership and the probable complexity of groundwater contamination issues, it is recommended that a district-level groundwater monitoring program be initiated as soon as is practical. While probably not eliminating the need for lot-level groundwater investigations, the district monitoring program will assist individual landowners define their groundwater contamination issues and therefore costs incurred may be recoverable by scheme contributions;
- Review and survey of the existing drainage system;
- Seek the advice of the Department of Water and the Department of Environment and Conservation with respect to the infiltration of stormwater on and adjacent to potentially contaminated sites in the area;
- Gain a broad spatial understanding of what sites will not be remediated and/or do not meet other criteria for infiltration and overlay the local structure plan to determine areas suitable for infiltration and the stormwater system design;
- Broad design work for water, wastewater and stormwater infrastructure to service the new development, including infrastructure locations;
- Undertake costing and feasibility studies for alternative water supplies, including negotiations with regulators to determine the preferred potable water management strategies; and
- Conduct a water audit on existing and new commercial premises to assess the options for alternative water supplies on a case by case basis.

2.12.4.4 Manning Lake management

The location of Manning Lake within the structure plan area limits the potential for development to have an adverse impact. The plan proposes the alignment of Cockburn Coast Drive to be located on the western side of the ridge, consistent with the MRS zoning for this regional road. Other development proposed is also on the western side of the ridge which has been identified as a surface water divide. Direct impacts from development are therefore considered to represent a minimal risk to Manning Lake. In the event that road construction works to impact upon the eastern side of the ridge, it is recommended that the road management plan includes the consideration of sediment and runoff containment to limit the potential risks to the Manning Lake environs.

Over-extraction of groundwater and the potential for saltwater incursion represent the only apparent direct risk to Manning Lake from the development of the Cockburn coast. Evidence exists that suggests the salt water wedge extends as far inland as Manning Lake. Impacts on the relationship between the salt water wedge and lens of fresh water above the wedge could alter the salinity levels in Manning Lake. Groundwater extraction is not recommended in the Cockburn coast area without further assessment and modelling of this issue.

2.12.5 Contaminated sites

The Cockburn coast's industrial history has resulted in the contamination of land and groundwater. A preliminary assessment based on historical and Government records, aerial photography and previous site investigations (limited to a relatively small number of properties) has identified known contaminated sites, contaminated sites that have been remediated to some extent and potential contaminated sites.

Historically the Environmental Protection Authority (EPA) has managed contaminated land and groundwater through the placement of conditions on approval under planning law and the Environmental Protection Act 1986 (Part IV - Environmental Impact Assessment).

These conditions have required specific actions, or for particular stages in the planning process, the development of site contamination investigation and management plans, and site remediation and validation reports.

The Contaminated Sites Act 2003 is now the main mechanism for identifying and managing known and suspected contaminated sites. The planning process remains however, the most effective mechanism for the identification and subsequent management of unknown contaminated sites. In essence, the land use planning process operates in parallel to the Contaminated Sites Act 2003.

With the introduction of the Contaminated Sites Act 2003, the likelihood of formal environmental impact assessment by the EPA for the contamination can be minimised through the provision of sufficient information in the supporting documentation at the MRS amendment stage to demonstrate that the issue can be managed by the planning approval process.

As a strategic planning document, the district structure plan has:

- Identified local issues relevant to the contamination, such as the location of proposed sensitive receptors (residential development, schools);
- Where advantageous, strategically designated areas of known contamination as less sensitive land uses (although a comprehensive site investigation will still be required by these property owners);
- Identified a process for dealing with the contamination issues at subsequent stages of the planning (e.g. scheme provisions, local policies); and
- Established procedures to ensure that the potential for contamination on site and on land surrounding the development has been considered.

The district structure plan will be supported by an amendment to the MRS. As a minimum, this process will require for sites to be subject to investigation for soil and groundwater contamination prior to the commencement of site works, in accordance with the requirements of the Department of Environment and Conservation (DEC).

Where required, remediation, including validation of remediation of any contamination identified, shall be completed to the satisfaction of the WAPC/or other relevant auhority, on advice from DEC. A Mandatory Auditor's Report, prepared by an accredited auditor, will need to be submitted to the DEC as part of the conditions being placed on the subdivisioon or development.

2.12.6 Noise and vibration management

A noise and vibration study should be carried out to determine the noise levels, likely setback and/or noise mitigation techniques required to develop the site for residential purposes adjacent to or near the freight rail line and the proposed Cockburn Coast Drive. This assessment should be undertaken to guide the development of local structure plans in affected areas and made available to individual landowners to guide development.

Asessment and mitigation strategies will need to be considered in local structure planning and the development of built form guidelines, with conditions applied at the subdivision and development stage.

2.12.7 Coastal planning

The Cockburn coast district structure plan area include 2.3 kilometres if foreshore, extending from the Island Street groyne to the northern Port Coogee breakwater. Consideration for physical coastal processes, coastal use and management of the adjacent foreshore areas have been a key component in the development of the structure plan.

2.12.7.1 Coastal processes setback

A physical processes setback line has been established for the length of coast within this location, in accordance with the requirements of State Planning Policy 2.6 - State Coastal Planning Policy, as shown on the district structure plan (see Figure 2.1).

In calculating the setback line, consideration has been given to:

- Response of the shoreline to an extreme storm sequence (S1);
- Allowance for chronic erosion (S2); and
- Allowance for sea level rise (S3).

Historic coastal works and previously approved setback lines, such as for the ANI Bradken site, have been included in the calculation. For further information on the establishment of the setback line, please refer to the Coastal Processes Assessment Report in the Appendix.

2.12.7.2 Coastal planning strategy

A key initiative to planning for the Cockburn coastline is the adoption of a 'coastal node' approach to providing recreational areas for local and regional coastal users. South Beach, Port Coogee, Coogee Beach and Woodman Point nodes are a connected network of regional, district and local recreational nodes which provide the coastal user with a diverse choice of passive and active recreational opportunities.

The planning and revitalisation of former industrial land at South Beach and Port Coogee, and now Cockburn coast, brings into focus the challenge of managing the foreshore reserve in response to increasing numbers of people, locally and regionally, seeking to use the coastline for a range of new experiences and recreational activities.

Increased demand for beach usage associated with urban development and improved access to the foreshore requires a specific management plan to address the social and recreational needs of both local and regional beach users, while respecting and safeguarding the cultural and environmental integrity of the foreshore.

A coastal planning strategy has been prepared as a strategic and flexible document that complements the structure plan, provides guidance for the future development of detailed foreshore management plans and accords with the requirements of SPP 2.6 – State Coastal Planning Policy. The strategy, which is provided as an Appendix report, establishes the position of Cockburn coast in the hierarchy of coastal nodes; provides direction on the opportunities and constraints for recreational and tourism uses; and identifies management issues and recommendations.

Broadly, the strategy defines three distinct areas of the Cockburn coast foreshore, characterised by the nature of existing heritage uses, type of beach setting and the opportunity to offer a range of beach experiences. The location, classification and required management initiatives related to these beach areas are outlined below.

2.12.7.3 Foreshore management plan

The coastal planning strategy is the first step in developing the framework for managing the impacts of future urban development on the sensitive Cockburn coast foreshore. The this end, the coastal planning strategy is not the mechanism for providing definitive recommendations in relation to the coastline, but rather establishes the key items to be explored and addressed within a foreshore management plan for the structure plan area.

This foreshore management plan should be undertaken in conjunction with, or immediately following, the local structure planning stage that the finer grained details relating to land use mix, built form, impact on the foreshore and the requirements of future residents will become more apparent.

The foreshore management plan will be expected to address the management issues and strategies as outlined in the coastal planning strategy, and the requirements, guidelines and criteria established in State Planning Policy 2.6 – State Coastal Planning Policy.

Elements to be included in the foreshore management plan include but are not limited to:

- Landscape values;
- Erosion and coastal protection;
- Foreshore rehabilitation;
- Fire management;
- Recreation nodes and public access;
- Signage and education;
- Recognition of Indigenous and European heritage; and
- Urban water management design.

Responsibility for this management plan depends on the implementation model; however, it is anticipated that the need for a foreshore management plan will be a condition of the MRS amendment or subsequent approval stages.

2.12.8 Environmental approvals process

Several Acts determine the environmental approvals process for a project of Cockburn coast's nature, these being:

- Planning and Development Act 2005
- Environmental Protection Act 1986
- Environment Protection and Biodiversity Conservation Act 2005
- Contaminated Sites Act 2003

Following the WAPC endorsement of the CCDSP, the Metropolitan Region Scheme will be amended to reflect the final outcomes of the structure plan. As a matter of course, the amendment, once initiated, will be referred to the Environmental Protection Authority under section 38 of the *Planning and Development Act 2005*.

Once referred, the EPA will determine the need for environmental assessment under the Environment Protection Act 1986, based on the known environmental information and the potential for environmental impacts and management requirements.

In addition, the need to obtain approval under the *Commonwealth Environment Protection and Biodiversity Conservation Act* may be required for a project, development or activities, if a significant impact is likely to occur on matters of national environmental significance. Matters of environmental significance include potential impact on nationally listed threatened and migratory species, nationally listed threatened ecological communities and RAMSAR wetlands, amongst other things.

Approvals requirements under the Contaminated Sites Act are discussed further within Chapter 2.12.5.

2.12.9 Relevant performance targets

- 60 per cent reduction in wastewater reuse
- 30 per cent reduction in scheme water consumption
- 20 per cent waste reduction (against per capita average)

2.12.10 Further environmental management initiatives required

- District water management strategy
- Detailed site investigations, contamination remediation strategy and validation reports
- Vegetation management plan
- Fauna management plan
- Noise and vibration management strategy
- Foreshore management plan

2.13 Infrastructure

2.13.1 Site works

A feature of the structure plan includes the Cockburn Coast Drive alignment on the ridgeline and residential development to be responsive to the major topographical features of the project area. Creating open space corridors and responding to the topography is an important aspect in establishing a 'sense of place' for the Cockburn coast and to meet sustainability objectives.

The Cockburn coast project will comprise of a variety of built form and densities to meet the demands of a genuinely diverse community. The scale of the project will provide opportunities for different engineering approaches based upon different built forms:

- Retention of landmark ridgeline features and the creation of open space corridors linking Beeliar Park to the foreshore;
- In the Hilltop precinct, alternative built form and local roads are designed to be responsive to the ridgeline topography; and
- Within the Hilltop precinct, a more 'organic' subdivision layout with lots of varying size and shape.

At the next phase of planning, the various road and built form scenarios are to be explored and presented in detail.

Major engineering features of the structure plan include:

- Cockburn Coast Drive (Fremantle-Rockingham Highway) which will require the alignment to be sympathetic with the existing contours and substantial earthworks will be required;
- A bus rapid transit system on a dedicated lane within Cockburn Road;
- Urban water management including stormwater collection and disposal, water quality management, responsive drainage and establishing stormwater and/or groundwater (from Port Coogee) re-use opportunities, such as third pipes and landscaping;
- Creation of multi-use open space corridors which respond to the topography; and
- Pedestrian bridges and crossings at Cockburn Road and the freight rail line.

2.13.2 Waste water collection

Sewer services will be enhanced by use of the existing sewers operating to the current industrial developments, due to the location of the existing Bennett Avenue sewer pump station.

Sewer reticulation will be designed and installed to serve all lots to the current Water Corporation standards, which is always a condition of subdivision and is basic requirement for community health.

Depending on the final earthworks levels, the project area may require an additional smaller sewer pump station, as well as the required replacement of the existing sewer pump stations within private property. Determination of the sewer pump station requirement and alignment of sewer line routes and easements will take place at the next phase of planning.

The district structure plan has adopted a generic 50 metre odour buffer distance from the existing Bennett Avenue sewer pump station. The existing pump station does not contain odour control equipment and currently there are no odour problems at the existing station. Odour exposure from the sewer pump station is considered to be low, with odour exposure limited to times of maintenance work by the Water Corporation.

At the next phase of planning, however, specific requirements to minimise odour impacts (for example the orientation and design of surrounding built form, screening and landscaping requirements) will need to be detailed. The district structure plan also proposes to redesign the existing Bennett Avenue sewer pump station site to the Water Corporation's criteria for emergency overflow storage. This will include the installation of underground tanks and appropriate landscaping of the site. These measures will provide the opportunity to review the odour buffer applied.

2.13.3 Stormwater

2.13.3.1 On site infiltration

Taking into account drainage from rooves and hard stand areas within lots as well as drainage from roads, the total quantity of stormwater is expected to increase slightly once the site is developed. Most of this change will be on private land, due to the increased area of rooves and hardstand on what was formerly quite a permeable landscape.

The general requirement for stormwater systems in Western Australia is that rainfall events up to the 1 in 1 year storm should be retained within the development area. For events greater than this, runoff from constructed impervious areas should be mitigated in retention or detention areas that provide for nutrient stripping. Flows to waterways should ideally be limited to pre-development flows.

None of the existing sumps within the area have overflows to the ocean or other water bodies. As such, it appears that in a pre-development condition, all of the stormwater currently infiltrates on site. Therefore, for the post-development scenario, stormwater should be retained on site and infiltrated for events larger than the 1 in 1 year storm. Because of the highly permeable soils in the area and generally deep groundwater, it is expected that events up to the 1 in 10 year storm, and possibly even the 1 in 100 year storm can be retained on site.

Infiltration of stormwater adjacent to contaminated sites should not be an issue provided this water flows downwards and therefore does not leach into the contaminated site and cause the movement of contaminants. Based on these assumptions, it is considered that

most of the site can be made acceptable for infiltration of stormwater on site. In areas where infiltration is not possible, stormwater should be reused or piped to an area where infiltration is acceptable.

2.13.3.2 Stormwater infrastructure measures

Future stormwater management should be viewed as a series of linked components, including structural and non-structural components which collectively meet water quality and water conservation objectives in a sequential manner. These measures should include consideration for:

- Measures for infiltration or storage on the site, including soakwells, permeable paving and recycling systems;
- Swales;
- Infiltration and nutrient stripping basins;
- Underground infiltration tanks; and
- Non-structural measures to minimise nutrient and pollutant loads.

The structural measures associated with WSUD can be located within road reserves or network public open space. Cockburn coast's current system if fenced sumps is not considered appropriate for the high density development proposed in the area because of aesthetic reasons, potential safety risks and land efficiency. It is therefore proposed that the existing sumps are replaced with more aesthetic and water sensitive features, that either make a feature of the stormwater through aesthetic design, or hide the infrastructure to allow more efficient use of the land, while reducing nutrient loads, for example through underground infiltration tanks.

2.13.4 Water supply

Although there are various options for non-potable water uses, water reticulation will be designed and installed to serve all lots to the current Water Corporation standards.

Reduction in the actual use of the scheme water, such as the installation of water wise fittings and appliances, can be applied through planning conditions and education campaigns. Costing and feasibility studies for alternative water supplies, including

negotiations with regulators, is required at the next phase of planning to determine the preferred water management strategies, such as a third pipe system.

In accordance with State Water Strategy targets, total water usage should aim to be reduced to 100 kilolitres per person per year, with 40-60kl of this usage being potable water.

2.13.5 Electricity

2.13.5.1 Electricity reticulation

Internal or local power reticulation will require transformer and switchgear sites at regular throughout the district structure plan area. Western Power's preference is for the switchgear sites to be located centrally within the urban development area to maximise the efficiency of a 22kv feeder network.

Western Power now requires power reticulation designs to cater for a larger standard power demand from each lot due to their monitoring of the continual growth in average power demand from residential areas. The location of the internal transformer and switchgear sites will be determined at the next phase of planning. However, district structure plan objectives would require that the local transformer and switchgear sites are screened with adequate landscaping to minimise their visual impact.

A key objective of the structure plan is to maximise the aesthetics and amenity of the project area through innovative urban design, sustainability, transit oriented design and Liveable Neighbourhood principles. The high and unsightly 132kV overhead transmission lines which run across the ridgeline to the regional switchyard terminal is considered to compromise these principles and would be very much out of scale with the proposed urban development and townscape vision. This is particularly the case around the Power Station precinct which is designed as the activity hub of the Cockburn coast area, centred on a local transit stop and associated mixed use and pedestrian activity node focus.

Western Power considers it is cost-prohibitive for the overhead 132kV transmission lines to be underground, although it is technically feasible. Underground transmission lines are common within other projects such as East Perth and Subiaco.

It is the strong preference of the structure plan that the overhead 132kV transmission lines are located underground in the open space corridors, although this is subject to further investigation at the next phase of planning.

2.13.5.2 Switchyard relocation

Long-term options for the regional switchyard terminal, located on four hectares of land adjacent to the South Fremantle power station, have been the subject of ongoing speculation due to its prominent coastal location and the broader public discussion of revitalising the Cockburn coast. A decision about the future retention or relocation of the Western Power switchyard terminal is a critical element of the plan. The preferred option of relocation the switchyard is contrary to Western Power current plans to upgrade the switchyard infrastructure from 66kV to 132kV.

The structure plan recommends the undertaking of a comprehensive feasibility study in collaboration with Western Power to determine the business case for relocating the regional switchyard terminal. The option of relocating the regional switchyard has significant financial implications for the State Government. The investigation would need to consider relocation options, feasibility and risk analysis prior to forming recommendations.

The structure plan preference is for the relocation of the regional switchyard with sleeved developments, such as a car park or short-term accommodation, to minimise its visual impacts.

2.13.5.3 Sustainable energy alternatives

A sustainable infrastructure strategy should be undertaken at the next phase of planning to investigate incorporating alternative sustainable energy supplies, such as wind and solar options, into the Cockburn coast project area.

One alternative energy supply approach is to operate a grid-connected photovoltaic cell network to generate electricity. Photovoltaic cells convert solar energy into electricity and can be installed on the rooftops of buildings. The power from the photovoltaic cells can be used directly by the local residential households or businesses, and any unused power can be fed back into the network and generate a revenue for the owner or Cockburn coast community.

Photovoltaic cells have a relatively high upfront installation cost especially in comparison to traditional fossil fuel energy providers. However, the have few running and maintenance costs once installed. The advantage of a grid-connected photovoltaic cell system is the significant reduction in greenhouse gas emissions and a substantial step forward in establishing the Cockburn coast as a leader in innovation and sustainability best practice.

2.13.6 Gas

Existing gas mains within the structure plan area can be extended, upgraded and expanded to service the new lots.

2.13.7 IT and communications

The current standard Telstra reticulation will be included as part of the subdivision process. Existing Telstra facilities within the project area will need to be extended, upgraded and expanded to service the new lots.

The minimum requirement for new lots within the project area is for the main optic fibre to service the development growth of the Cockburn coast over the next 20 years. Access to this technology will require every type of building to have access to broadband communication network via optic fibre and/or wireless systems. Flexibility of delivery is required in the medium term to ensure adequate allowance is made for design and installation of this infrastructure.

The revolutionary potential of new communications technology lies in their capacity to instantly connect vast networks of individuals and organisations across great geographic distances at very little cost. As such, telecommunication technology has been key to facilitating worldwide flows of information, capital, ideas, people and products. For the Cockburn coast, communications technology will have long-term implications, including how people will work and shop, and on the use of associated infrastructure such as transport and private vehicle use.

2.13.8 Bus rapid transit

The preferred transit system for the Cockburn coast district structure plan area in the short to medium term is a bus rapid transit system with a northern terminus at Fremantle train station, utilising Hampton Road and Cockburn Road.

Costs associated with a BRT system will vary depending on the amount of on-street running, the type of vehicles used and the level of infrastructure provided at stops or stations.

For BRT to be successful, the negative perceptions associated with bus travel must be reversed. This is likely to require the use of new vehicles (liveried vehicle types), the creation of stations rather than stops and most importantly, priority over general traffic.

Further investigations are required to establish a business case for the BRT system, with costs of the technology balanced against the ability of the service to provide for transit oriented development, people movement and place-making opportunities.

2.13.9 Sustainable built form

For Cockburn coast to achieve the sustainability targets it aspires to, particular attention will need to be paid to provision of infrastructure and built form which actively reduce resource consumption, at the more detailed phases of planning.

Consideration will need to be given to improving the efficiency and sustainability of infrastructure at every level of planning, from district headworks upgrades to household appliances. To this end, the built form guidelines required for the redevelopment will need to clearly outline expectations in regards to building orientation, thermal mass, appliances, onsite renewable energy generation, water and wastewater harvesting and reuse systems, roof gardens, amongst other sustainability initiatives.

2.13.10 Relevant performance targets

- 40 per cent reduction in stationary greenhouse gas emissions
- 60 per cent wastewater reuse
- 30 per cent reduction in scheme water consumption (against per capita average)
- 60 per cent dwellings to be within 800m of public transport

2.13.11 Further infrastructure initiatives required

- Sustainable infrastructure strategy
- Switchyard relocation feasibility and business case
- Whole of project business case
- Urban water management strategy

Chapter 3 Implementation options

3.1 Implementation

Implementation of the Cockburn coast project presents some challenges due to the nature of proposed, current and previous land uses. Staging of development, infrastructure provision/modification, site remediation and built form require greater coordination in the context of a brownfields development.

Similar scenarios in Western Australia have been managed through the use of either existing planning systems, with facilitation by local government/LandCorp (such as Marlston Hill) or, more commonly, redevelopment authorities (such as East Perth, Subiaco and Midland).

The State Government has proposed the creation of a metropolitan redevelopment authority, but the necessary legislation has not yet been presented to Parliament. A specific redevelopment authority could also be created, but legislation would also need to be promulgated for this to come into effect.

The implementation options are therefore explored within this context.

Regardless of the implementation mechanism (a redevelopment authority or use of the existing planning system) it is expected that the future planning and development of the Cockburn coast would implement the priority targets and measures established in the regional framework, and deliver the intent of this district structure plan.

3.2 Implementation models

3.2.1 Local planning schemes

Under this model the area would be rezoned to a development zone under the City of Fremantle and City of Cockburn local planning schemes, following amendment to the MRS. This would subsequently require the development of local structure plans in accordance with the relevant scheme provisions to guide development and provide a mechanism for cost sharing. Under the requirements of the structure planning provisions, the local structure plans would be ultimately determined by the WAPC in the context of the district structure plan.

This is the model commonly applied to urban growth areas such as Canning Vale and East Wanneroo. However, use of this model in a brownfield context is less certain given the high level of coordination required associated with the proposed urban form, potential land use conflict and site remediation. In addition the substantial funding required for up-front infrastructure development associated with the power station and substation require greater government intervention than normally associated with greenfield development.

The ability to ensure consistency in approach, control development timing and apply effective cost sharing between local governments also presents a particular challenge under this model. Structure planning provisions between the cities of Fremantle and Cockburn vary within their local planning schemes, as well as variances that exist within the development requirements.

Within this context, a model based on existing scheme provisions is considered problematic in delivering the desired outcome. Potential exists for LandCorp to facilitate the development (as was the case in Marlston Hill), given the strategic nature of the project. This hybrid model would be dependent on an appropriate partnership and funding framework being established.

3.2.2 Joint development scheme

Where development occurs over local government boundaries it is possible to establish a joint development scheme to coordinate development requirements and cost sharing. This mechanism has been applied within the shires of Harvey and Dardanup in the development of the Australind/Eaton Joint Development Scheme.

As with the use of the local planning scheme option, this scenario would be subject to amendment of the MRS and a suitable base-zoning being developed within the local planning schemes.

The development and implementation of the scheme would also require a collaborative framework/management structure being established between the City of Fremantle and the City of Cockburn.

Although providing a more certain level of consistency between local governments and the ability to apply cost sharing across local government boundaries, this approach does not resolve the need for a high level of coordination or the extent of funding required for up-front infrastructure development.

Like use of the local planning schemes, this model would require the participation of a central agency such as LandCorp to achieve the desired outcome.

3.2.3 Specific redevelopment authority

Redevelopment authorities have been used in a number of strategically important locations in Perth such as East Perth, Subiaco, Midland and Armadale. The initial establishment of redevelopment authorities was to create a specific mechanism to enable a coordinated approach to deal with brownfield redevelopment in the context of substantial infrastructure investment and complexity associated with the sites; as well as the strategic importance of the site, its ability to provide leadership/demonstration and the level of government landholdings. It is on this basis that the legislation sought to provide for a whole of government decision-making tool (through overarching statutory powers) and an ability to capture and re-invest capital gains associated with development of the land.

This redevelopment model has proven capacity to be effective in delivering brownfield redevelopment, as demonstrated by the success of current projects. The establishment of such authorities is, however, reliant on significant budgets and lead times, hence their limited application. Ultimately, the feasibility of applying this model within Cockburn coast will be dependent on a decision by Government on the level of broader public benefit derived from the project.

3.2.4 Metropolitan redevelopment authority

The notion of a metropolitan redevelopment authority has been raised by government, whereby the authority, governed by its own legislation, would function across the metropolitan area. This mechanism enables involvement in projects that may not necessarily warrant a specific redevelopment authority, with the potential benefit of a streamlined approach to planning processes.

It is anticipated that such an authority would be linked to major State Government capital works projects. There is some clear potential for such an authority to take the lead in the redevelopment of the Cockburn coast precinct.

Legislation to this effect has not been presented to Parliament, therefore the potential for the application and the operational framework within this model cannot be ascertained. A major constraint to this scenario is the uncertainty and potential time delay in awaiting the legislation.

3.3 Planning requirements following adoption of the district structure plan

Assuming that existing planning legislation is applied to the redevelopment, there are a number of statutory processes which would need to be followed under the Planning and Development Act 2005 to initiate the change in use over the subject land.

3.3.1 Metropolitan Region Scheme amendment

The developable land is largely zoned Industrial, with portions reserved as Parks and Recreation, Railways and Primary Regional Roads under the MRS.

The land zoned Industrial and portions of the Parks and Recreation reserve will need to be rezoned to Urban to facilitate the redevelopment in accordance with the district structure plan. This would constitute a major amendment to the MRS.

Prior to full Urban zoning, the land is proposed to be rezoned to Urban Deferred to enable resolution of a number of statutory and strategic issues. Criteria to be met to enable the lifting of the urban deferral by the WAPC will be outlined during the MRS amendment process.

The amendment process is regulated by the Planning and Development Act 2005, with major amendments being made under the provisions of section 37 of that Act.

The process of amending the MRS includes the following steps.

- The proposed amendment is referred to the Environmental Protection Authority (EPA) to decide whether environmental assessment is needed. Where the EPA require an environmental review, this is carried out before the amendment is advertised.
- The amendment is advertised for public inspection and submissions. Advertisements are placed in local and statewide newspapers, and information made available on the internet site. Landowners whose property is directly affected by a proposed change are contacted in writing. Where there is an environmental review, this is also made available for comment.
- A three-month period is provided for the WAPC to receive public submissions.
- Written submissions are considered by the WAPC. During this time, people who have made submissions may, if they wish, also make an oral presentation to a special committee appointed to consider and report on the submissions.
- The WAPC always reconsiders a proposed amendment in light of submissions and may choose to modify the amendment before proceeding.
- If the amendment has been substantially modified as a result of submissions, the Minister for Planning and Infrastructure may ask the WAPC to re-advertise for further public submissions before presenting it to the Governor.
- The Minister presents the WAPC's recommendations to the Governor for approval.
- The amendment, as approved by the Governor, is placed before each house of State Parliament where it must remain for 12 sitting days. During this time, the amendment is again on public display and the WAPC publishes a report on submissions for public information.
- In Parliament, a member may introduce a motion to disallow the amendment. If this motion succeeds, the MRS will not be amended. Otherwise the amendment becomes legally effective in the MRS.

The amendment process includes a consultation process in addition to that which has been applied to date.

Once the land has been rezoned to Urban Deferred, the WAPC will have responsibility for lifting the deferral when it is satisfied that the conditions it has identified have been satisfied.

3.3.2 Local planning scheme amendment

A complementary scheme amendment to the local planning schemes of the City of Cockburn (LPS 3) and City of Fremantle (LPS 4) would be necessary following amendment of the MRS.

For the most part this amendment could be undertaken concurrently with the MRS amendment subject to the consent of the relevant local governments and the WAPC. Under the Planning and Development Act 2005 rezoning of the land to a development zone would take effect upon gazettal of the MRS amendment.

A development zone exists under both the local planning schemes, which are based on the model provisions. Therefore, the provisions applicable in both schemes are broadly compatible.

In addition to the rezoning of the land to a Development zone and application of a Development Area, requiring subdivision and development in accordance with local structure plans approved by the LGA and the WAPC, the schemes will need to be amended to apply a Development Contribution Area to the redevelopment, and identify specific condtions which must be followed in further detailed planning for Cockburn coast, within the Scheme Schedule.

Should the use of local scheme provisions be the preferred option, there would need to be a detailed assessment of requirements between the schemes, and a suitable mechanism of applying and administering equitable cost sharing across local government boundaries would need to be established and agreed.

Furthermore, some of the land in question would not be subject to the local planning scheme amendment (for example the Fremantle Holiday Village and the former Fremantle landfill site), as it is already zoned urban under the MRS and development area under the local planning scheme.

3.3.3 Master plan

It is recommended that an infrastructure master plan be considered prior to the commencement of local structure planning for the precincts. This master plan would provide further detailed guidance on those elements which span the whole of the project area, yet are too detailed to be explored within the district structure plan.

More specifically, the master plan would tie in the following components:

- local road networks;
- drainage;
- public open space; and
- utilities and services.

The master plan may also provide an appropriate vehicle for providing additional direction on the placement of landmark and gateway sites and treatment of the public realm. The treatment of roads, local open space themes and public spaces could be more fully articulated to ensure a common theme throughout the structure plan area.

The master plan may also enable further planning for key utilities and infrastructure and form the basis of a staging plan. It is anticipated that development will initially be focused within the Robb Jetty precinct, based on servicing and existing land use arrangements.

3.3.4 Local structure plans

Both City of Fremantle LPS 4 and City of Cockburn LPS 3 specify the need for local structure plans or detailed area plans within the development zone prior to consideration of development or subdivision.

Local structure plans should be developed over areas no less than the precincts as identified in Chapter 2.10 of this report. This is necessary to ensure that issues of land use change, infrastructure development and design controls can be coordinated and applied in a consistent manner within the character precincts.

Even in the event of an alternative mechanism (such as a redevelopment authority) being applied, the scale and nature of development would require the preparation of comprehensive local structure plans based on the precincts identified within the report.

In accordance with scheme requirements local structure plans would consist of the following.

1. A map detailing proposals for:
    - neighbourhoods around proposed local activity nodes and town centres;
    - existing and proposed commercial centres;
    - natural features to be retained;
    - street block layouts;
    - the street network, including street types;
    - transportation corridors, public transport network, and cycle and pedestrian networks;
    - land uses including residential densities and estimates of population;
    - school and community facilities;
    - public parklands; and
    - urban water management areas.
2. A report to explain the mapping and to address:
    - the planning framework, including relationship and compliance with the district structure plan and any policies, strategies and scheme provisions which apply to the land and any environmental conditions which apply;
    - the site and context analysis, applying the district level planning and including detailed local analysis;
    - how planning for the structure plan area is to be integrated with the surrounding land;
    - the design rationale for the proposed pattern of subdivision, land use and development;
    - traffic management and safety;
    - parkland provision and management;
    - urban water management;
    - proposals for public utilities including sewerage, water supply, drainage, gas electricity and communication services; and
    - the proposed method of implementation, including cost sharing and any staging of subdivision and development.

Additions to these standard requirements are necessary for local structure plans within the Cockburn coast district structure plan due to the nature of development and the current site context. Additional considerations and inclusions would be:

- existing and previous industrial uses, including buffer requirements, transitional arrangements and site remediation requirements;
- landmark and gateway sites and the proposed response to building form, height and bulk objectives within the character precinct;
- public realm environments and the proposed treatment;
- extent, nature and application of mixed use development, including a description of the intended land use and the anticipated employment generation in the short and medium term;
- sustainability assessment, to include solar performance, view corridors and ped-shed analysis in accordance with district level requirements; and
- architectural and landscape themes, expanding upon the broad principles established in the structure plan.

3.3.4.1 Existing development zones

Within the Cockburn coast boundaries, there are several areas which already have the capacity for urban development through the existing zoning. These areas are outlined further below.

Newmarket Precinct

The Newmarket Precinct requires an alternative approach to the planning approvals process, in that the current precinct zonings under the local planning scheme already provide development opportunities in the form of Mixed Business, Local Centre and Residential development; as well as being substantially built out.

Given this, development within the precinct may progress in the absence of the broader local structure planning and scheme amendments being undertaken. It would be expected however, that development progresses in accordance with the general provisions within the precinct character statements, relating to height, land use mix and built form style, until such time as the landmark sites and gateway sites have been identified. That is, development applications are to conform with the general height provisions until the appropriate locations for landmark and gateway sites have been determined by the relevant authorities.

This development in the interim, may be guided by the application of a local planning policy under the City of Cockburn's local planning scheme.

Fremantle Village

The former South Fremantle landfill site and Fremantle Chalet Village are both zoned as Development Areas under the City of Fremantle's local planning scheme, requiring development subdivision and development generally in occurrence with a structure plan approved by the local government authority and the Western Australian Planning Commission.

Owing to the significant geotechnical and environmental issues associated with the site's former use, the approvals process will require extensive involvement from the Environmental Protection Authority and the Department of Health, amongst other agencies.

Both Development Areas, while subject to similar environmental conditions, have been subject to separate planning and feasibility studies to date. While the precinct character statement outlined in

section 2.10 provides guidance across both sites, it is expected that individual local structure plans are likely to be prepared and assessed in accordance with the existing statutory provisions.

3.3.5 Development control and design guidelines

The local structure plan will establish the framework and theme for development within the character precinct. In addition, specific development controls and design guidelines will be adopted and applied to provide a complementary assessment framework for any subsequent development application. These can be applied through use of detailed area plans (DAPs) and design guidelines (as has been applied traditionally) or through the development of place-based codes.

DAPs provide a tool for enabling variance to the residential design codes where applicable and detailed design controls on built form, height and private open space. Within a context of higher density development and the desire to create a specific urban form, it is anticipated that DAPs will be extensively applied within the area.

To complement the DAPs, design guidelines or requirements are essential to establish the architectural style and detail which would be applied within individual precincts. Design guidelines would specify elements such as roof pitch, material/colour schemes and suitable detailing.

The use of DAPs and design guidelines is likely to be applied should the development of the area be within the context of the existing planning framework.

Should a redevelopment authority or other suitable mechanism be established, the use of place-based codes offers an alternative approach to achieving these ends. The benefit of specific codes is that there is greater flexibility through not being required to specify residential density within the confines of the residential design codes or land use within the context of existing scheme provisions. Place-based codes would enable greater prescription and control on built form, however they are yet to be broadly tested within a Western Australian context. This approach is, however, now being applied within the Wungong Urban Water Scheme under the control of the Armadale Redevelopment Authority.

3.3.5.1 Design review panel

A key outcome of the peer review process was the desire for an ongoing team to carry on the vision established through the district structure plan process. The 'custodians' of the vision, in this case a design review panel, could be an advisory body to the statutory authorities, in essence playing an ongoing peer review role throughout the detailed planning and design stages.

The notion of a design review panel is considered to have merit and should be explored in subsequent planning levels. The innovative approach desired for Cockburn coast requires consistency throughout the entirety of the redevelopment process, ensuring that the objective to push the sustainability envelope is not lost or diluted over the course of the project.

3.3.6 Planning approvals

The granting of subdivision and development approval forms the final phase of the planning implementation process. Dependent on the systems and mechanisms established above, the body responsible for this phase could be either the WAPC and/or the relevant local government or the redevelopment authority.

3.3.7 Other statutory approvals

In addition to the statutory approvals required through the MRS, local planning schemes and legislation governing environmental matters, it is anticipated that the following site-specific approvals will be required:

- Section 18 clearance under the Aboriginal Heritage Act 1972, where disturbance of Indigenous sites of significance is proposed;
- development referral to the Heritage Council under the Heritage of Western Australia Act 1990, where any changes or works are proposed that may affect the place's heritage significance; and
- Contaminated Sites Act 2003 is the main mechanism for identifying and managing known and suspected contaminated sites. The process for addressing contaminated sites through the Act is discussed in section 4.6.

3.4 Transitional arrangements

Specific consideration needs to be given to the transitional arrangements, given the potential land use conflict between current and proposed development. This is particularly the case within the Darkan and Emplacement precincts due to the extent and nature of existing developments.

It is a key objective of the structure plan to maintain diversity of land use and employment in order to create a mixed use environment. It is a clear desire not to create a bedroom community. Models which have been used in similar context are East Perth and Subiaco where transition is accommodated in recognition of existing uses and users.

Principles:

- Maintain local employment.
- Acknowledge and protect significant local uses.
- Facilitate transition to higher order uses over time.
- Maintain amenity and safety for local population.

Operation:

- Non-conforming use rights apply throughout.
- Mixed use sites which adjoin industrial uses must demonstrate compliance with noise, dust, odour etc to EPA standards prior to residential development being permissible.
- Mixed business sites can maintain existing business, however can accommodate higher order uses such as office and commercial.

Implementation:

- District structure plan - principles.
- Local structure plan - detail.
- Development application - compliance.

3.5 Non-conforming use rights

Non-conforming use rights exist within both the City of Fremantle and City of Cockburn local planning schemes. Similar protection is expected with any alternative scheme which may be applied over the area. The key elements which should be considered are the protection of the existing approved operation (in compliance with any conditions which may apply), the expansion of any such use and the potential termination of the use.

3.5.1 Protection of existing uses

Existing uses are protected to continue operation under current and valid planning and environmental approvals. Landowners may continue to operate current approved land uses on existing premises within the structure plan area until alternative premises can be secured, the necessary licences gained and construction of infrastructure can be completed, in the event of relocation of the operations.

To ensure this is maintained, any proposed change of use adjoining an existing industrial use needs to demonstrate that:

- the proposed use would comply with any buffer requirements associated with the existing adjoining use;
- the proposed use/development does not undermine the potential for the existing operation to continue normal operational activity; and
- the proposed use/development would not be adversely affected in terms of odour, safety, noise or visual amenity, particularly where the proposed use is to include residential development.

This requirement is proposed to be founded in the information supplied as part of the local structure plan, however this is required to be demonstrated at the development stage also.

3.5.2 Expansion of existing use

Although capacity exists for non-conforming uses to expand, such proposals must be advertised and council must determine that the proposed expansion would not increase the impact on the locality. Alternatively, a non-conforming use can seek to be replaced by another non-conforming use, however this is subject to the proposed change being deemed to have less impact than the existing use.

3.5.3 Termination of existing use

There is potential to terminate a non-conforming use, should this be deemed to be in the broader public interest. Importantly, current scheme provisions require that any such termination can only take effect through purchase of the property, payment of compensation or both.

Clearly the cost associated with termination means that this would only be applied in circumstances where the existing use is considered to be detrimental to the extent that it prevents achievement of critical objectives or presents unacceptable risk and/or impact to the local area.

3.5.4 Darkan precinct

Within the Darkan precinct, a mixed business classification is proposed, whereby the existing Fremantle Cold Store facility is able to be retained to service the local fishing industry. The use is not noxious and is considered to be able to operate within an urban context. Surrounding sites are able to develop to higher order uses, however residential development is excluded from the immediate surrounds to prevent issues of potential nuisance, particularly associated with the heavy vehicle movements for the site.

Based on the evolution of the overall district and the ultimate decision of the current owners and operators, this situation is subject to review in the medium term. It is considered important, however, that a strong employment focus be retained. This is considered critical from the perspective of maintaining diversity, however also ensuring the area meets the key sustainability objective of local job opportunities and supporting traditional industries.

3.5.5 Emplacement precinct

The Emplacement precinct currently accommodates a number of existing industrial and commercial uses, many of which have been developed in recent times. The most significant of these existing uses is the Alba Oils processing facility for canola oil.

The Emplacement precinct is proposed to be designated as mixed use under the district structure plan, which can include residential components, although it is intended that this area would have a significant proportion of non-residential uses. Although industrial uses exist within other precincts within the structure plan, Emplacement differs due to the scale, age and nature of some of the businesses.

Transitional arrangements will need to be considered and applied throughout the project area, but will be particularly important within this precinct. The canola oil facility in particular represents a challenge in ensuring protection of the existing operation, whilst facilitating redevelopment within the broader area. On this basis, the area has been identified as a special development area, where retention of employment and staging of development will require particular consideration.

3.7 Cost contributions

Urban development within the Cockburn coast area is dependent on significant works, in particular the development and upgrade of infrastructure. The cost of works needs to be shared equitably amongst landowners within the district.

In addition to district level works, significant cost is also associated with planning and works within precincts which are generally held under multiple ownership.

A cost contribution mechanism is therefore required and needs to be applied through the local planning schemes or redevelopment scheme as applicable. The cost sharing will operate at two levels:

- district level infrastructure; and
- precinct planning and infrastructure.

The items requiring district level contributions are those which support the overall development of the area and are likely to include:

- district drainage design and infrastructure;
- Cockburn Coast Drive;
- Cockburn Road upgrade;
- foreshore management plan(s);
- rail crossings;
- school site;
- playing fields;
- pedestrian bridges;
- landscaping of pump station site;
- public open space (land and works);
- traffic controls and infrastructure associated with rapid transit system development; and
- undergrounding of power infrastructure.

Additionally, given the significant lift in property value of the project area attributed to the rezoning of land from industrial to urban use, it would not be unreasonable that landowners contribute towards the provision of the public transport infrastructure.

These items need to be quantified and administered by the relevant implementation body (local governments or redevelopment authority) such that they can be applied throughout the district on a proportional basis.

The infrastructure cost sharing arrangements at the precinct level will be derived and determined through the local structure plan. Following advertising and adoption by the relevant implementation agency, the costs would then be applied upon subdivision or development of the land.

3.8 Priority items for implementation

In addition to the statutory planning requirements following the adoption of the district structure plan, there are a number of items that should be progressed as a matter of priority. These investigations include:

- integrated transport strategy for the south west corridor, including review of the regional road network and public transport modes and alignment;
- reallocation of the kerbside lane along Hampton Road, between Rockingham Road and Douro Road;
- groundwater modelling; and
- built form guidelines.

An action implementation framework, detailing priority and procedural items, is provided in Table 4.1. This list is neither exclusive or exhaustive, however provides an outline of the strategic requirements to move Cockburn coast from a structure planning initiative to a development phase.

Table 4.1: Implementation framework

Discipline	Action*	Responsibility*	Anticipated / recommended timeframe
Planning	MRS rezoning	WAPC	Immediate
	Local planning scheme rezoning	LGA	Short-term
	Local structure planning	RDA or LGA and landowners	Short-term
	Built form guidelines	RDA or LGA and landowners	Short-term
	Cost contributions schedule	RDA or LGA and landowners	Short-term
	South Fremantle power station SDA feasibility study	RDA or State Government and landowners	Short-term
Transport	Integrated transport strategy for south west corridor	DP/Main Roads/LGA's	Immediate
	Bus rapid transit alignment study and business case	DP/PTA	Immediate
	Project plan for lane reallocation on Hampton Road	LGA/PTA/DP	Immediate
	Cockburn Coast Drive alignment study	DP/Main Roads	Immediate
	Travel demand management strategy	RDA or LGA	Medium-term
	Parking management strategy	RDA or LGA and landowners	short to medium term
Environmental	District water management strategy	RDA or LGA and landowners	Short-term
	Noise and vibration management strategy	Landowners	Short-term
	Preliminary and detailed site investigations	Landowners	Immediate
	Contamination remediation and management strategy	RDA and/or landowners	Short-term
	Foreshore management plan	RDA or LGA and landowners	Short to medium-term
Infrastructure	Detailed infrastructure strategy	RDA and/or landowners	Short-term
	Switchyard relocation business case	State Government	Short-term
	Whole of project business case - service infrastructure - switchyard relocation - bus rapid transit - cost contributions - revenue from Government land	State Government	Short-term
Socio-economic	Community consultation	RDA or LGA and landowners	Short-term
	Economic and employment strategy	RDA or LGA and landowners	Short to medium-term
	Community development strategy	RDA and/or landowners	Medium-term
	Heritage management plan	RDA and/or landowners	Short-term
	Affordable housing policy and statutory mechanisms	RDA or LGA	short to medium term

RDA - Redevelopment Authority
LGA - Local Government Authority
DP - Department of Planning
PTA - Public Transport Authority

Short-term 1-4 years
Medium-term 5-10 years

*The strategies outlined and organisations nominated are indicative only

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Part 2
Appreciating the context and the site

- The urban renaissance of the Cockburn coast
- Regional context
- Site analysis
- Existing planning and regulatory framework
- Sustainability

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Chapter 4
The urban renaissance of the Cockburn coast

4.1 The future is a thing of the past

Walking south along the beach, towards old Robb Jetty, there is a place, just after rounding the tip of Point Catherine, where you catch a sudden wide-angle view of the old power station building and the limestone ridge in the distance. Early in the morning, sunlight strikes the old power station at a peculiar angle, shimmering strangely along its borders, spreading pale yellow sunlight on to the austere walls, unmasking its luminous and haunting beauty.

The Cockburn coastline and the limestone ridge behind it are brimming with stories and history. Some stories are as big and as ancient as the landscape itself. Other stories are tiny snapshots of a barely recognisable, long lost world.

Today's landscape of faded sea walls, a red brick chimney stack, a mesh of old wire and rusted fences lie as monuments to a bygone industrial era. There is also a legacy of another kind - the stories of the Cockburn coast and the people who made it. Here, stories of sea and the land come together in a rich assortment of voices.

The urban renaissance of the Cockburn coast begins with people and their stories. The tales of shipwrecks, battlers, racehorses, old industrial buildings, freight trains and old traditions are the spirit of the place. This is the bedrock for the Cockburn coast project and the makings of a sustainable community centred upon a strong sense of place.

"Places are not abstractions or concepts, but are directly experienced phenomena of the lived world and hence are full with meanings, with real objects, and with ongoing activities."

- Edward Relph 'Place and Placelessness' (1976)

While a sense of place is a powerful force in shaping the urban renaissance of the Cockburn coast, it is not a single sense of place that everyone shares. But the common thread is that the Cockburn coast is a place with its own identity tied to the land and waterscapes, traditions, the old power station building, and people.

Nyoongar voice:

The land and waters of the Swan coastal plain have sustained Nyoongar people, the traditional custodians of the land, for more than 50 000 years. The Nyoongars revere the landscape and all the living things it supports. The lasting relationship of the Nyoongar culture and the landscape has been passed down from generation to generation by Nyoongar elders, or "minders of the stories", through the telling of dreamtime stories. It begins a long time ago, before the Europeans came from across the ocean, from the time when the earth was being created and shaped…

Neville Collard - Nyoongar Birdiyia (Boss)

"My pop (grandfather) was Tom Bennell. Until he died in 1989, he was a minder of Nyoongar stories. He passed his stories on to me. Pop was originally a Nyoongar boy, born about 1903, though nobody knows for sure. He was the progeny of a white man, though on the Nyoongar side our line is descended from Yagan. (Yagan was the son of Midgegooroo, a Nyoongar Whadjuk leader.) Yagan was also the right-hand man of Nyoongar leader Yellagonda, who welcomed the Wadjella people (European settlers) on the banks of the Derbarl Yirrigan (Swan River) when he shook hands with Captain Fremantle (in 1829).

In Nyoongar language the crocodile is called Meandip - that's the same name for Garden Island. I'll tell you the story of how the island got its name.

The crocodile Meandip came here and the Nyoongar said, "Hey crocodile, what are you doing down here?"

The crocodile said, "I've come down here from my land, I got lost and I'm here now."

And the Nyoongar said, "This is the Nyoongar land and we don't want you here - you are a bad man - you've got to go back to your land."

But the crocodile said, "I'm not leaving."

And so the Nyoongar had wanginy (talk) and decided they would call on the Waakal to help them. The Waakal said he would go and talk to Meandip, but Meandip said he was not leaving and so Waakal said they would fight and the winner would keep the land.

And so they fought, all the way round the mouth of the Swan River to Cockburn Sound where Garden Island is. Now the Waakal got the better of Meandip, put a foot on him, pulled a whisker out of his face and tied him up. And when you look at the island from up high to the south-west, you can see the white cliffs (his teeth), the knob, that's his crown, and then there's the rest of Mendip's shape. That's how Garden Island got its Aboriginal name - Meandip.

If you go the top of the Round House and look at Garden Island, you can see the shape of Meandip."

CockburnCoast

Photo courtesy: Battye Library

Dreaming stories about the Waugal, crocodile and other creative ancestral beings in the mythology belong not only to the narrow strip of the Cockburn coast but have travelled along dreaming paths to other seaside places, reaching the far north and south of the Swan coastal plain.

The Nyoongar bond to the land and sea remains strong. In keeping with the Nyoongar oral tradition, Nyoongar elders met at Robb Jetty Park near C. Y. O'Connor Beach and shared their cultural knowledge and related memories of the Cockburn coast landscape. Their stories and anecdotes speak of a spiritual connection with the land through dreamtime stories and, importantly, stories of the Robb Jetty camp, a gathering place for Indigenous people from all over Western Australia.

Among the elders present at that meeting were Corrie Bodney and his wife Violet, who tells of life at the Robb Jetty camp.

"The camp was part of many people's 'runs'. There didn't use to be a lot of Aboriginal people living around Perth and Fremantle in the past. They moved to the metropolitan area in the 1950s with the finishing up of work on the stations and the provision of housing by the government. Robb Jetty had been a place to stay for a while, and then move on. Many Aboriginal people also worked in the area, at the abattoirs and trained horses."

First settler's voice

In 1829, when Captain James Stirling established a colony on the Swan River, he proclaimed the Nyoongar people British subjects. For the Nyoongar people, Captain Stirling's declaration ended a period of more than 50 000 years as the sole inhabitants of the land. Colonists, prisoners and adventurers poured into the new land with a new language and strange habits, to change forever the size, shape and destiny of Western Australia and the Cockburn coast.

A grid of European settlements and paths was superimposed over traditional Nyoongar tracks and dreaming trails, bringing a new layer of interpretation of the landscape.

For the early settlers, the landscape was miserable - an oppressive land breeze, deadly wildlife, Nyoongar bush firings, failing crops and sickly livestock. There are few flattering descriptions of the new Fremantle colony from this time. A woman describes her arrival in the colony:

"All these passengers, setting out from England with gay hopes to a land of splendid promise, were ruined in one night. In the dawn light, they saw their precious goods, savings of a lifetime, scattered over the beach, broken by waves and rocks, destroyed,"

Michael Berson - Cockburn: The making of a community (1978)

Photo courtesy: Fremantle Library

But there are glimmers, too, of delight and the chance to try one's luck. South Beach was the stage for the colony's first horse race in 1833. Seven Timor ponies lined up across the beach, their owners keen to win the generous five sovereign purse.

Moving forward 175 years to daybreak in winter, Terry Patterson walks his horses down a well-worn path to South Beach for a gallop and a swim. Terry's family has owned the Daly Street stables since the 1960s.

"These stables," Terry explains, "have been home to Perth, Kalgoorlie and Caulfield cup winners and two Railway Stakes winners. When Aptofine won the Railway Stakes the locals lined the street to cheer the horse."

Industrial voice

The Cockburn coast was once the engine room of Perth's industrial revolution. For some time the Cockburn coast was known for long-horned bulls, smoke stacks, energy and sweat. It was a place of transformation, where iron ore was smelted for artillery shells and bullets, while the old power station was fired by black coal.

One of the most significant industries, which continued until relatively recent times, revolved around the Robb Jetty abattoir. The slaughterhouses of Forrest, Emanuel & Co, and Conner, Doherty and Durack, literally fed the metropolitan area and the Goldfields. These companies were so lucrative they formed a monopoly that no one could compete with.

Nicknamed "The Kimberley Ring" due to the large pastoral properties they held in the far north, these companies controlled the shipping of all stock to Owen Anchorage. The group also had an interest in a wholesale butcher.

"Before Robb Jetty was built - and afterwards, as a measure against Kimberley cattle tick - long-horned bush bulls are pushed down a slippery ramp and forced to swim ashore. A character called 'Wingie' protects them from large tiger sharks which, if the one armed rifleman is on song, will soon be boiled down for their oil at the nearby shark factory."

Ron Davidson - Fremantle Impressions (2006)

4.2 What is the Cockburn coast urban renaissance?

The urban renaissance of the Cockburn coast is driven by the desire to transform an area once populated by industry to a world-class residential and recreational precinct. The challenge is to return a forgotten industrial coastal strip back to the community.

People are searching for communities that provide alternative transportation options, greater street and pedestrian connectivity, schools, public places that bring people together, a mix of architecture and a choice of activities. Cockburn coast is that place.

The response demands creativity - embracing the Cockburn coast's sense of place, and engaging the Indian Ocean; ensuring connectivity, built form innovation, sustainability and public spaces are at the forefront of design criteria, to give rise to a diverse new community.

Understanding the wisdom of Indigenous knowledge and practice

An important component of the creative plan is making people look at the landscape in a completely different way. Respecting and appreciating Nyoongar experiences and knowledge of the land and seascapes will play a significant role in defining the Cockburn coast's past, present and future.

From the draft North Coogee foreshore management plan:

"The customs and knowledge of local Aboriginal people can provide an insight into their way of life and play an important role in the broader education on non-Aboriginal people. Ways of assisting this through the implementation of this strategy include recognition of contemporary Aboriginal cultural and social values through interpretive facilities and projects, protection of important vegetation and use of species with food and medicinal values, such as quandongs, in revegetation projects, involvement of the local Aboriginal community in coastal planning and relevant projects and providing employment opportunities in works programs where possible."

"At North Coogee, there is potential for a ground-level viewing platform with some interpretation of the Aboriginal links to the site at a central location to the beach, provided that the issues related to cliff safety are resolved. The theme of the interpretation could be based on Aboriginal families meeting on the beaches, often in large groups, to camp and fish during summer."

A bright future

The old power station acts as a beacon for the Cockburn coast, linking people to the past. Yet it could offer a bold new outlook on the future. Taking the idea of a beacon a step further is the idea of creating a lighting design plan to illuminate the old building and inspire a renewed appreciation of this important coastal landmark.

Going green

Planning neighbourhoods that have zero net greenhouse gas emissions.

4.3 The challenges

The key challenges identified at the project's inception were comprehensive.

4.3.1 Uncertainty

One of the first issues confronted by the project team was the unease landowners and local residents felt regarding the future redevelopment of the Cockburn coast. While there was recognition of the need for major change, the community response was initially cautious. This caution was driven by a number of key issues, outlined below:

- Prior to the Vision for the Cockburn coast dialogue (May 2005), a succession of planning exercises had encouraged the development of strategies for the renewal of the Cockburn coast. For a number of reasons, the vision or plans never gelled, were lost in arguments, or simply lacked the capacity to convince people to take action.
- On the back of South Beach and Port Coogee residential developments, the Cockburn coast has recently been the subject of land change speculation. Property speculators, in anticipation of residential rezoning, began purchasing industrial land. This has given rise to diverse expectations among landowners; and
- Lack of confidence that the Government would commit the resources towards turning the vision into a reality.

4.3.2 Competing aspirations

From the start of the project, it was evident that there were diverging views regarding development expectations and how the revitalised Cockburn coast should look and feel.

Community views

The key themes identified by the community in the 2005 Vision for the Cockburn coast dialogue were not entirely harmonious. The seemingly opposing themes of limited development and a vibrant beach culture with medium to high density housing were supported at the end of the dialogue.

The Government view

Following the dialogue, the Government committed to transforming the Cockburn coast into a thriving and energetic beachside area with lively cafes, shops, together with residential and commercial, tourism, cultural and recreation activities, providing a diversity of beach experiences.

Landowners' view

A number of industrial businesses had relocated to the Cockburn coast area under the 1993 Coogee Masterplan premise of a biotechnology park, focusing on establishing seafood and food processing industries in the Robb Jetty area. These landowners were concerned that the transformation of the Cockburn coast from an industrial area to one with a residential focus had the potential to prejudice their operations in the long term. Specifically, the landowners were seeking provision for either an adequate transition period for non-compatible land use over time, or the creation of long-term buffers.

Other landowners strongly supported the Government's view that the industrial land should be revitalised as a predominately residential development.

4.3.3 Environmental contamination

Promoting and delivering sustainable brownfield regeneration presents many challenges for landowners, government agencies and the surrounding community. Contamination from past uses requires a long-term cleanup program. The successful remediation of the Cockburn coast will require a significant commitment of resources - money, time and experienced personnel - from the public and private sectors.

A broad range of issues impact upon the reuse of brownfield land:

- A major obstacle to the development of contaminated, or potentially contaminated, sites is uncertainty as to the extent and nature of the contamination;
- Complexities and delays attached to obtaining environmental approvals;
- Brownfield sites are often not perceived as being economically competitive for re-use, compared with greenfield sites, without Government intervention; and
- Environmental contamination problems associated with former industrial works may cross ownership boundaries. Fragmented ownership can make it more difficult to get businesses, landowners, government agencies and the community to work in partnership.

4.3.4 Movement network connections

Road network

The Cockburn coast is relatively poorly served by the surrounding road network, at both a regional and local level. This has the potential to limit development in the area through the creation of bottlenecks.

The location of the Cockburn coast project area also raises a number of issues regarding regional transport. The location of the Fremantle Rockingham Highway road reservation, deletion of the Fremantle Eastern Bypass, uncertainty regarding the extension of Roe Highway beyond the Kwinana Freeway and potential future development of the Rockingham Fremantle Transitway raise a number of difficult questions regarding the role of key roads within the study.

Public transport

Currently there is only a single bus service through the structure plan area. This is a low-frequency service linking Fremantle and Rockingham.

Freight rail

A freight rail line traverses the western portion of the project area towards the Fremantle Port.

As a critical piece of freight movement infrastructure, the State Government has no intention to alter its present alignment.

4.3.5 Fragmented ownership

In total, 446 landholdings are contained within the district structure plan boundary. These are owned by eight State government agencies, two local government authorities and 182 private landowners.

Fragmented ownership poses certain difficulties in taking the urban renaissance forward. It increases the difficulty of implementing sustainable urban design incorporating connected road networks, public open space and water sensitive urban design initiatives. These elements are almost impossible to implement in a piecemeal fashion.

Some site remediation works may cross ownership boundaries, which will require a coordinated approach between landowners and government agencies.

Given the level of fragmented ownership and the existence of substantial industrial operations within the Cockburn coast area, implementation will need to be closely coordinated.

4.3.6 South Fremantle power station

The South Fremantle power station is located on the Cockburn coast shoreline, immediately north of the new Port Coogee development and at the southern end of the extensive tract of land that was formerly the site of the Robb Jetty abattoir. This land forms the core redevelopment opportunity for the Coogee coast redevelopment project.

A heritage assessment of the site was undertaken in 1994. That assessment identified conservation of the exterior of the power station main building, including the northern extension, as desirable. The power station was placed as an interim listing on the State Register of Heritage Places in 1997, however has this listing has now lapsed.

The final use of the power station will influence planning for the general area. Therefore, at this preliminary planning stage, it is important to gain an understanding of the range of viable uses to which the power station structure could be put. The cost of redevelopment of the building remains a substantial constraint.

4.3.7 Switchyard site

The South Fremantle switchyard terminal was, for historical reasons, situated on four hectares of coastal land adjacent to the South Fremantle power station.

The long-term options for the switchyard terminal have been the subject of ongoing speculation due to its prominent coastal location. A decision about the future retention or relocation of the Western Power switchyard terminal is a critical element of the plan. The preferred option of relocating the switchyard is contrary to Western Power's current plans to upgrade the switchyard infrastructure from 66kV to 123kV.

Relocating the switchyard has significant financial risk for the State Government. Order of magnitude estimates for the relocation of the switchyard to an alternative site range from $50 million to upwards of $100 million.

4.3.8 Heritage

The Cockburn coast has immense historical significance.

The area's heritage sites, including listed buildings, Aboriginal sites, the South Beach horse exercise area and other historically important sites such as the gun emplacements, present a unique challenge.

Alteration to the fabric of places entered on an interim or permanent basis on the State Register requires the approval of the Heritage Council of WA, or in places listed on the Municipal Inventory, the approval of the local government authority.

Increased costs and physical constraints are not the only barriers to heritage sites being redeveloped. As well as being local landmarks, these sites contribute to the feeling of the place. Preserving them ensures their contribution to tourism and regional economic development is sustained over the long term, so that future generations may also benefit from them. Conversely, historic buildings and sites can become devalued by unsympathetic development which 'steals' their intrinsic value. Urban renaissance of the Cockburn coast needs to be approached with a combination of architectural and planning sensitivity and flair.

Photo courtesy: Aaron Photographics

4.3.9 Encouraging change

The structure plan is deliberate in setting the development framework for the Cockburn coast and acting as a catalyst to encourage State and local government leadership and private sector investment.

The urban renaissance of the Cockburn coast depends on strategies that promote the co-existence of emerging new residential, mixed use and commercial areas with ongoing industrial and employment related activities in the area. Achievement of these strategies may be through projects and priorities outside the scope of the structure plan.

Commitments to implementation strategies and actions will require leadership and funding from State and local government and the private sector.

4.4 Project philosophy

> *"Whenever we make changes in our surroundings, we can all too easily shortchange ourselves. The way to avoid the danger is to start doing three things at once: make sure that when we change a place, the change agreed upon nurtures our growth as capable and responsible people, while protecting the natural environment, and developing jobs and homes enough for all."*
>
> - Tony Hiss, The Experience of Place.

Now that the Port Coogee and South Beach developments are underway, the decision to transform the under-utilised and vacant industrial land along the Cockburn coast seems obvious. On one hand it is seen and talked about as a 'brownfield' site, having relinquished its role as a busy heavy industrial site, yet it is important to remember some industries retain significant economic value and continue to thrive in their current location.

The Cockburn coast urban renaissance began by asking a very straightforward question:

Can the Cockburn coast district structure plan deliver leading edge environmental and social outcomes as well as economic affordability?

The answer to this question is an unequivocal yes. However, the fundamental point of the question is that rather than simply balancing the competing interests of landowners, local and State government agencies and the community, can the structure plan unite the parties in the pursuit of higher 'sustainability' goals?

The Cockburn coast marks a border between the urban, industrial and natural realms. The structure plan presented an opportunity to introduce ideas for reconciling these traditionally divided spheres by committing to demonstrate sustainability initiatives in both land and built form development, to promote resource efficiency and to encourage lifestyle opportunities that are integrated into the surrounding communities and natural environment.

Pursuing a sustainability agenda means all parties being involved in answering the all-important question of what development framework would make the Cockburn coast more sustainable, particularly in the areas of built form, density, connectivity, different land uses, open spaces, employment opportunities and social mix.

4.5 From rhetoric to reality

The four main factors that informed the development of the district structure plan were:

- Regional framework (as outlined in the summary)
- responding to the project challenges (as outlined in section 4.3);
- the formation and input of the Cockburn coast reference group; and
- the development of the sustainability framework.

This section considers the project approach and some of the mechanisms and strategies which influenced the evolution of the plan.

4.6 Sustainability context

Sustainable planning outcomes result from collaboration, understanding the regional context, developing an acute sense of the special qualities of the place and a balanced approach to decision-making. Sustainable development acknowledges the inter-relatedness of our many actions - that land use impacts on transportation options which impact on people's health, which impacts on job performance, and so on. Sustainable development looks for solutions that solve targeted problems without exacerbating or creating other problems.

For Cockburn coast the need to consider global issues, to reflect State Government policy and to appreciate and respond to the regional framework and local conditions has been fundamental to the structure planning process (see Figure 4.1).

Achieving sustainable development demands a real partnership with individuals and across communities, businesses, organisations and other government agencies. The Cockburn coast plan provides a focus for bringing people together, to see what can collectively be achieved in developing a sustainability agenda.

Since the release of the Western Australia State Sustainability Strategy in September 2003, the Government has encouraged a shift from seeing planning simply as a regulatory system to thinking of it as a positive way to shape the places and communities in which we live, through sustainable development. It strengthened the leadership role of the community, businesses, State government agencies and local government as place shapers and set out new ideas and opportunities for interconnected social, economic and environmental outcomes.

At the start of the project, the Cockburn coast steering committee committed to promoting the Network City policy through sustainability initiatives in both land and built form development, resource efficiency and to encourage lifestyle opportunities that are integrated into the surrounding community and natural environment. The steering committee established four sustainability themes as a cornerstone of the project:

- to encourage best practice design, technologies and concepts;
- to create diversity in uses, housing, people and experiences;
- to foster innovation in the planning of new communities; and
- to generate an integrated, connected, efficient and exciting new urban area that extends on the existing natural assets of the location.

4.6.1 Developing the sustainability framework

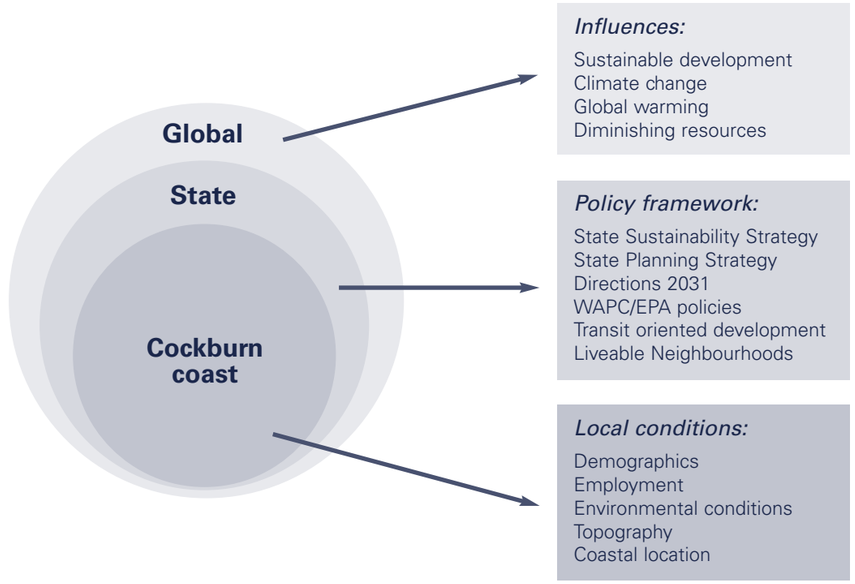
The purpose of the sustainability framework in the first instance was to enable comparison of various structure plan options developed by the project team and reference group. As the plan progresses to the implementation stage, it is expected that the framework will be used to monitor the implementation of the regional framework and ensure that the project meets its sustainability objectives.

The sustainability framework is essentially a matrix with the following basic elements:

- sustainability principles;
- development strategies; and
- measurement tools and indicators.

The sustainability framework is discussed in more detail in Chapter 8.

Figure 4.1: Sustainability context



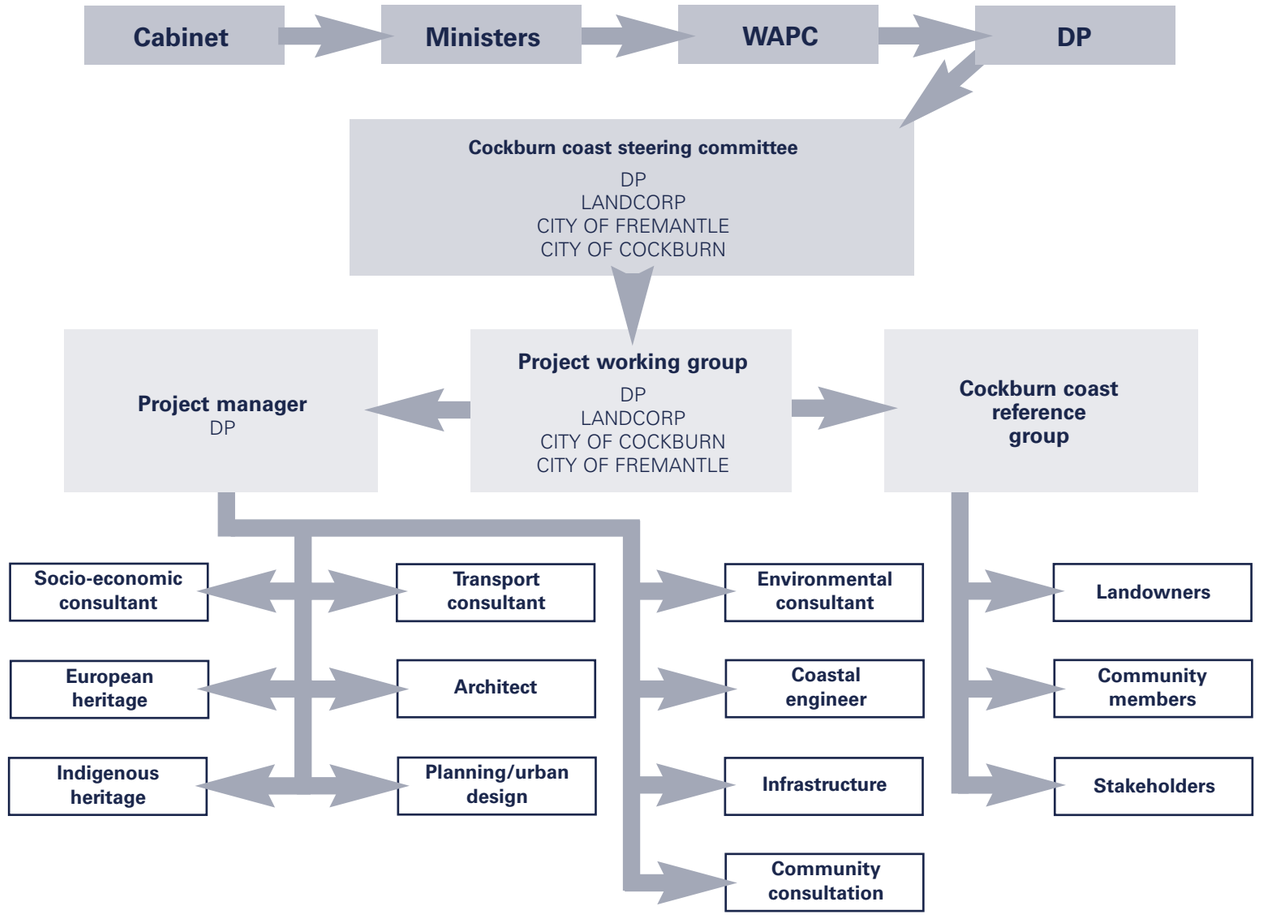
4.7 The project management framework

The preparation of the district structure plan and the sustainability framework has involved existing landowner, local community members and stakeholder consultation, technical data collection and engagement with local and State Government authorities.

The Cockburn coast steering committee, comprising senior representation from the Department of Planning, cities of Cockburn and Fremantle, and LandCorp, was established to guide the district structure plan project. A project working group, including representatives from the same organisations, was established to assist the steering committee progress the plan.

Through this collective approach to management, joint ownership of the plan has been fostered.

Figure 4.2: Project management structure



4.8 Collaborative planning

4.8.1 Cockburn coast reference group

A key factor in the development of the structure plan was the formation of the Cockburn coast reference group. The purpose of the reference group was to provide a balanced representation of stakeholder, community and landowner perspectives, enable input into the development of the plan, and provide a link for information to and from community, stakeholder and landowner groups.

The reference group composition included 16 industrial landowners, nine community representatives/residents and six government stakeholders. Members of the project steering committee also attended the reference group workshops.

Five reference group meetings were held between December 2006 and July 2007. These followed a logical process of identifying key preferences and priorities, weighting sustainability principles, working through planning options and design concepts, and reaching agreement on a draft plan.

The key themes, ideas and concepts discussed at the workshops included:

- development of a sustainability framework;
- improvement of east west connections into the area and consideration of additional access points into South Fremantle;
- community facilities;
- options for the South Fremantle switchyard;
- public transport facilities (more than a general bus service);
- employment nodes;
- built form and architecture themes;
- development to be focussed around future public transport option(s);
- regeneration options for the South Fremantle power station building; and
- protection of the existing foreshore and creation of green links to Beeliar Regional Park.

Some of the concerns or considerations that emerged include:

- impacts associated with extending the road network into the City of Fremantle;
- impacts associated with building height in the foreshore area (recent projects in the area should not set the benchmark for height);
- impacts of the freight rail line;
- the need for existing business owners/operators to be comfortable that it is viable to make the change;
- a staged approach to implementation (on a precinct by precinct basis); and
- transition of non compatible land uses over time and recognition that existing uses have non conforming use rights.

4.8.2 Building on the Vision for the Cockburn coast dialogue

The broader communities of Fremantle, Coogee and Cockburn have been engaged in extensive 'dialogue' consultation programs in recent years. It was agreed at the onset of the project to build on this consultation and supplement it with targeted discussions with key community members, landowners and government agencies.

A review of the Vision for the Cockburn coast dialogue report identified the following key planning themes:

- mainly green open recreational space, as natural as possible, preserved from development, with no high rise except the power station;
- South Fremantle power station redeveloped as an icon, with mixed use;
- medium to high density housing developments to ensure sufficient population for a viable community and to support a comprehensive public transport system;
- a vibrant beach culture, with access for young and old to cafes, restaurants, housing, active and passive recreation;
- limited development and plenty of access to beach for general public;
- good public transport through the area, well linked to major routes through to Fremantle and with good east-west access; and
- a vibrant community area that is family friendly, with clean and plentiful public facilities, which is a destination for locals and tourists.

It is recognised that no one theme summarised participants' vision for the Cockburn coast and the structure plan project approach needed to identify a way forward to unite the key planning themes expressed at the Vision for the Cockburn coast dialogue. This was fundamental in establishing the project philosophy, the collaborative planning approach and the regional and sustainability framework.

4.8.3 Informing the community

The Cockburn coast district structure plan project was launched in June 2006, supplemented by an information brochure which was distributed to the cities of Cockburn and Fremantle, and all landowners and residents within the project boundaries.

Throughout the structure plan process, the broader community was informed about the status of the plan, project management and outputs from the reference group workshops through the WAPC website (www.wapc.wa.gov.au).

CockburnCoast

Chapter 5
Regional context

5.1 Cockburn coast challenges

The Perth and Peel regions are facing significant social, economic, population, demographic, transport and land use challenges. The Directions 2031 strategy expresses a contemporary understanding of these challenges and identifies preferred approaches to how these challenges must be factored into the future planning for Cockburn coast and surrounding areas. The WAPC recognises the opportunity to capitalise on the Cockburn coast district structure plan and establish a new paradigm for urban regeneration projects that seek to deliver Directions 2031 objectives.

This section outlines the regional context within which the Cockburn coast sits and must respond to, before later chapters present the planning and site context which have been critical factors in the development of the plan.

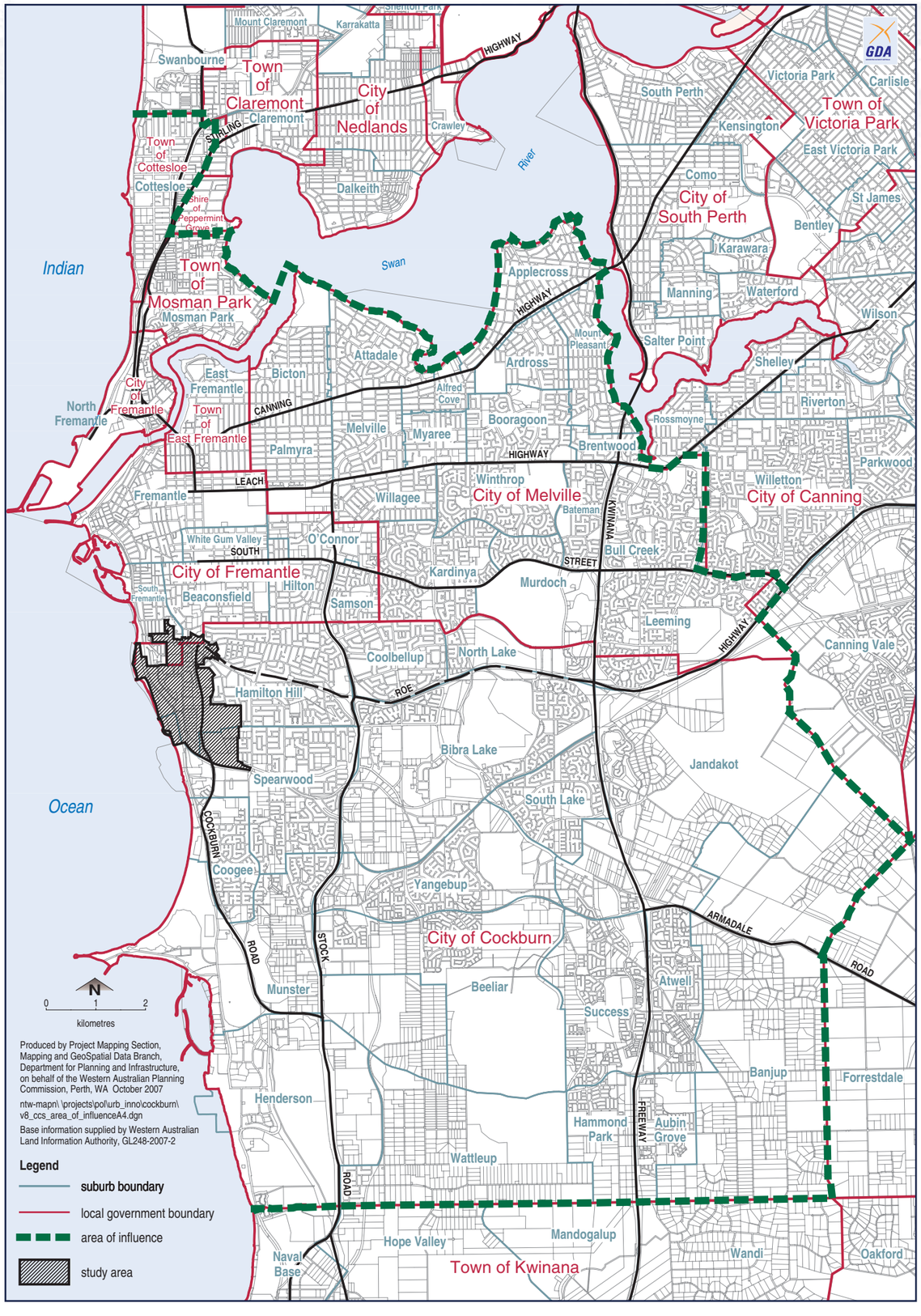
5.2 The regional analysis

Figure 5.1 illustrates the structure plan area in the context of the Cockburn coast's area of influence and surrounding coastal suburbs.

The wider Cockburn coast area of influence is defined by a 30 minute travel time zone and includes the local government areas of Cockburn, Fremantle, East Fremantle and Melville. The areas provide the majority of the local employment opportunities for the new population and an established network of recreational and community facilities.

The towns of Cottesloe and Mosman Park have been included in the demographic comparisons as they are likely to be indicative of a significant segment of the new population of the Cockburn coast.

Figure 5.1: Cockburn coast area of influence



5.3 Development influences in the region

The Cockburn coast has a number of existing features that are likely to influence the redevelopment and the area of influence.

- It will be a high profile redevelopment area: experience of other redevelopment projects is that they attract a premium in the marketplace of between 15 and 25 per cent compared with their local region. Links with the existing community and centres will be important to enable integration.

- The redevelopment area is in a coastal location: evidence exists that coastal residential developments consistently achieve a premium of more than two per cent compounded each year. While income from premium land development will enable significant cross-subsidy for environmental remediation and infrastructure 'pump priming', it will create a challenge in terms of affordability. A mix of accommodation densities, size and tenure will be needed to address this issue.

- The redeveloped power station will be a major mixed use activity hub: it will be the feature of the town centre and has the potential to create an additional western focus for the City of Cockburn. The link between the Cockburn Central retail and employment hub in the east could be a key regional link and a major activity axis within the City of Cockburn.

- The coastal location will provide access to the beach and will be a major visitor attraction for a large proportion of the area of influence's population: access to the beach is an important aspect of Perth life and the combination of the Port Coogee marina and the revitalised power station will create a vibrant place for entertainment and active and passive recreation. It will be a local and regional gathering place.

- The district structure plan includes an assumption that parts of the area of influence will be served by a bus rapid transit system: improved access to public transport facilitated by the structure plan will enable the Cockburn coast community to enjoy links to Fremantle and the attractions of the strategic regional centre.

5.4 Key housing and demographic implications

The sum of the regional influences will attract socio-economic segments which are somewhat different to the current local region: The demographics of Mosman Park and Cottesloe are instructive. Specifically, compared with the current local population the new demographic is likely to be:

- wealthier;
- older;
- with fewer children; and
- in professional services jobs or other higher income employment sectors.

Inclusive of the Port Coogee and South Beach developments, and the redevelopment of the structure plan area, approximately 7400 dwellings will be present upon completion, with the distribution being:

- Port Coogee 1600 dwellings;
- South Beach 500 dwellings; and
- District plan area 4850 dwellings.

This represents almost 30 per cent of all forecast growth in the area of influence to 2026. The density of these dwellings is likely to be significantly more intense than the pattern of the area of influence, where the predominant residential accommodation style is detached, single storey and on a large lot. The current structure plan area is likely to have an average density similar to other urban infill projects ie Subiaco and East Perth. This level of intensification will be vital to the sustainability of any rapid public transit network. It is also in accordance with the goals of Directions 2031 - to establish fuller use of urban land and to encourage people on to public transport.

It is estimated that the final population of the Cockburn coast structure plan area will be in the order of 10 000 new residents. Combined with the Port Coogee and South Beach developments, the residential population is anticipated to be approximately 14 500 residents, with 3500 and 1000 new residents respectively.

The projected population figures for the structure plan area are based on the estimated housing type (as shown in Table 5.1) and projected household mix (refer to Table 5.2) .

5.5 Preferred housing mix

The Reference Group determined a preferred housing mix for the district structure plan as shown in Table 5.1.

Table 5.1: Preferred housing mix

Housing type	Housing mix range
Separate house	3% - 6%
Semi-detached / row or terrace and town house	22% - 33%
Flat/unit/apartment: low rise*	33% - 35%
Flat/unit/apartment: high rise#	31% - 37%
Total	**100%**

* Low rise = 3 to 5 storeys
\# Medium = 6 to 8 storeys
High rise = greater than 8 storeys

Table 5.2: Estimated household mix

Estimated household	Cockburn coast mix	Cities of Fremantle and Cockburn 2021
Couple with children	14-15%	33%
Couple without children	30%	23%
One parent family	10-11%	10%
Other family	2%	2%
Group households	5%	4%
Lone person households	38%- 40%	28%

5.6 Population forecasts within the area of influence

The Cockburn coast development will contribute the main population growth within the area of influence over the next 15 years.

As the population grows there are likely to be many changes within the age structure which will have a significant economic and social impact on the area of influence. Table 5.3 shows the forecast proportional change in age structure for the area of influence, the towns of Cottesloe and Mosman Park and the Perth metropolitan area between 2006 and 2021.

Broadly, the demographics show:

- The cities of Cockburn and Fremantle are forecast to demonstrate a decline in young children in line with the metropolitan average. However, the towns of Cottesloe and Mosman Park are likely to see a slight rise as young couples move into the redevelopment areas and start a family. It is anticipated that this trend will occur in the Cockburn coast structure plan area. All areas have a greater proportional decrease of adolescents and teenagers (10-19 years).
- Cottesloe and Mosman Park have a decreasing proportion of 20-29 year olds, while Cockburn has the greatest proportional increase. This is likely to be a reflection of young independents leaving home in the coastal suburbs and young households moving into more affordable suburbs such as Cockburn. If the Cockburn coast area is to achieve a demographic and household mix, affordable accommodation and tenure mix will be the key.
- There is a proportional increase in people aged 30-39 years in the coastal suburbs which is at a higher level than the Perth average, indicating that where possible, established households are purchasing in beach suburbs close to schools. While Cockburn has a decreasing proportion of people aged 30-39 years, the Cockburn coast development may provide an opportunity to remain close to family and friends and still own a modern coastal property.

Table 5.3: Proportional change in age structure

	Cities of Cockburn and Fremantle			Towns of Cottesloe and Mosman Park			Perth metropolitan area		
	2006	**2021**	**Prop'n Change**	**2006**	**2021**	**Prop'n Change**	**2006**	**2021**	**Prop'n Change**
0-9	12.0%	11.2%	- 0.8%	10.8%	11.0%	0.2%	12.6%	11.4%	- 1.2%
10-19	14.1%	11.9%	- 2.2%	14.2%	12.2%	- 2.0%	14.3%	12.3%	- 2.0%
20-29	12.9%	13.9%	0.9%	13.3%	11.6%	- 1.8%	14.0%	14.5%	0.5%
30-39	13.9%	15.7%	1.8%	12.5%	15.2%	2.7%	14.6%	15.0%	0.5%
40-49	15.5%	13.4%	- 2.1%	14.5%	13.1%	- 1.4%	14.9%	13.4%	- 1.5%
50-59	13.7%	12.1%	- 1.5%	14.3%	12.5%	- 1.8%	13.0%	12.5%	- 0.5%
60-69	8.3%	10.4%	2.1%	9.7%	10.8%	1.1%	8.0%	10.0%	2.0%
70-79	6.0%	7.4%	1.4%	5.3%	8.6%	3.3%	5.2%	7.0%	1.8%
80+	3.7%	4.0%	0.3%	5.3%	4.9%	- 0.4%	3.3%	3.8%	0.5%
Total	199,010	246,380		15,508	16,920		1,445,077	1,848,900	

Source: ABS (2006) Census of Population & Housing & WAPC (2005) WA Tomorrow Forecasts

- All areas have a proportional decrease in people aged 40-59, which may reflect the lack of housing diversity in all suburbs. There is potential in the structure plan area to provide a wide range of accommodation for 'down sizers', 'empty nesters' and single person households.

- All areas have similar proportional growth in people aged 60 plus, however Cottesloe and Mosman Park have a higher proportion of people between the ages of 70-79 years. If this trend follows in the Cockburn coast area, an accommodation mix which includes adaptable housing and universal access design principles in the public realm will be important.

- Overall and in comparison with the City of Cockburn and the area of influence, the structure plan area is likely to have a greater proportion of lone person households and a lower proportion of families with children, more in line with the coastal areas of Cottesloe and Mosman Park.

5.7 Comparison areas - proportional change in age structure

The likely mix of household types in the district structure plan has been analysed by reference to the correlation between household type and housing mix in a range of comparable locations in Australia. The analysis, as shown in Table 5.3, indicates some variance from the overall forecast housing mix in the City of Cockburn and the City of Fremantle, but still with a good demographic mix.

5.8 Key economic and employment implications

While many jobs in light and heavy industry, government and community services and the retail sector can be found locally or within a short intra-regional journey, those engaged in professional occupations must, for the most part, travel into Perth. If the future demographic and household dynamic identified previously comes to fruition, there will be demand for a level of professional suites and offices within the area of influence catchment.

Employment sustainability and self sufficiency is important, particularly in terms of reducing private transport demand and in encouraging the Cockburn coast as an employment destination for the local community. The City of Cockburn has an employment self sufficiency of 68 per cent (2001), the combined cities of Cockburn and Fremantle have 106 per cent employment self sufficiency and the wider area of influence has an employment self sufficiency of 82 per cent. These levels are high and indicate a sound basis for further successful economic development. (Liveable Neighbourhoods recommends employment self sufficiency levels of 30-60 per cent). Generally, these levels can be hard to achieve because the development industry can only be expected to provide land for a certain amount of community and employment uses. Economic development programs may be provided by some, but this is not always the case. Even at full occupation primary schools, corner shops and working from home will only provide around 25 per cent of required jobs. Additional information technology and communications infrastructure may support a higher level of home working.

Regional levels of employment self sufficiency below 40 per cent can lead to high levels of commuting, low diversity of local employment, high youth unemployment and a poor sense of community well-being. Therefore, it is important that additional population growth in any region is developed with a corresponding understanding of the region's economic strengths and weaknesses and an appropriate level of employment provision. Unfortunately, the South Beach and Port Coogee developments have not facilitated an appropriate level of employment land. The balance must be generated from the structure plan area and linkages improved to the area of influence and other employment nodes.

Research and analysis and discussions with the City of Cockburn have identified a number of economic characteristics within the area of influence:

- There is sufficient local industrial land and a substantial regional employment base in industrial estates. This will increase, with significant medium-term capacity in Latitude 32 (Hope Valley), O'Connor and Myaree. However it will be important to maintain local enterprises within the structure plan area (particularly those that refer to the local economy). Within the Emplacement and Darkan precincts area, there are a number of businesses that directly relate to the Fremantle economy, especially in seafood handling and marine services. On the other hand, there is a range of other industries, which provide vital services to the heavy industries in Kwinana and Henderson. In addition, a number of services located in Emplacement Crescent lease flexible and affordable industrial units for community purposes. Some industries to the southern end of Cockburn Road are housed in buildings that date back to the operation of the Robb Jetty abattoir and have little to do, directly, with the local economy. These might be considered for relocation in the shorter term.

- The City of Cockburn has a high proportion of manufacturing workers and jobs, and a low proportion of white-collar and tourism-related jobs. There is no economic base for high-end jobs at present. The structure plan can provide land for business and mixed use development and will facilitate growth in the tourism industry with increased access to the beach and the revitalisation of the power station as a hotel and community activity hub. The level of business and tourism activity envisaged is still relatively low and will complement the high levels of Fremantle.

- The City of Cockburn's current (2006) median weekly household income is $1102, compared with the area of influence average median weekly household income of $1123. This is likely to increase as the new homes are occupied by a demographic mix similar to the coastal suburbs of Mosman Park and Cottesloe.

Higher levels of household expenditure can be anticipated in line with the changing household types and an increase in professional workforce. While this will have implications for retail development it is clear that the area of influence has more than adequate provision even for the anticipated population growth. Most strategic regional shopping will occur in Fremantle, and regional needs are also catered for at Cockburn Central and Phoenix Centre in Spearwood. Local and daily needs will need to be provided within the structure plan. It is also envisaged that there will be a relatively high level of festival or specialty shopping within the revitalised power station.

The hierarchy of commercial centres surrounding Cockburn coast have the capacity to provide the regional and district shopping areas for the development. Two local/neighbourhood centres will be located within Cockburn coast and will cater for the local shopping demand of residents.

Figure 5.2 depicts the position of Cockburn coast within the area of influence in relation to key employment nodes and activity centres.

Figure 5.2: Jobs capacity and location of major centres surrounding Cockburn coast

5.8.1 Tourism

Tourism will play an important role in generating local employment opportunities, activity and vibrancy within Cockburn coast. Analysis of the tourism market within the City of Cockburn reveals:

- 92 000 overnight visitors per year on average between 2002/03 and 2005/06 (Tourism WA, 2006), the vast majority (80 per cent) of these visitors are intrastate travellers;
- holiday/leisure and visiting family/relatives are the two main reasons for visiting;
- the three main accommodation options for people visiting the City of Cockburn are staying with friends or relatives, in rented accommodation or in a hotel/resort/motel; and
- a wide variety of leisure activities are undertaken by visitors to the City of Cockburn, with the main two being social/other and outdoor/nature activities.

Further afield, looking at the close tourism nodes of Fremantle and Cottesloe, a gap has been identified in the provision of 3, 4 and 5 star accommodation, as shown in Table 5.4.

Future tourism opportunities for the structure plan area should therefore seek to capitalise on these areas of deficiency within the surrounding tourism nodes.

The preferred location for short stay accommodation and other tourism related uses in the Cockburn Coast redevelopment area is within the Power Station precinct.

Figure 5.3 illustrates the number and location of existing tourism rooms across the metropolitan area.

5.9 Regional transport

5.9.1 Regional rail services - freight

The Cockburn coast area is currently traversed along its western boundary by a freight railway connecting to the Fremantle inner harbour. Currently approximately 22 trains (44 movements) occur along this line each week.

Figure 5.3: Tourism accommodation

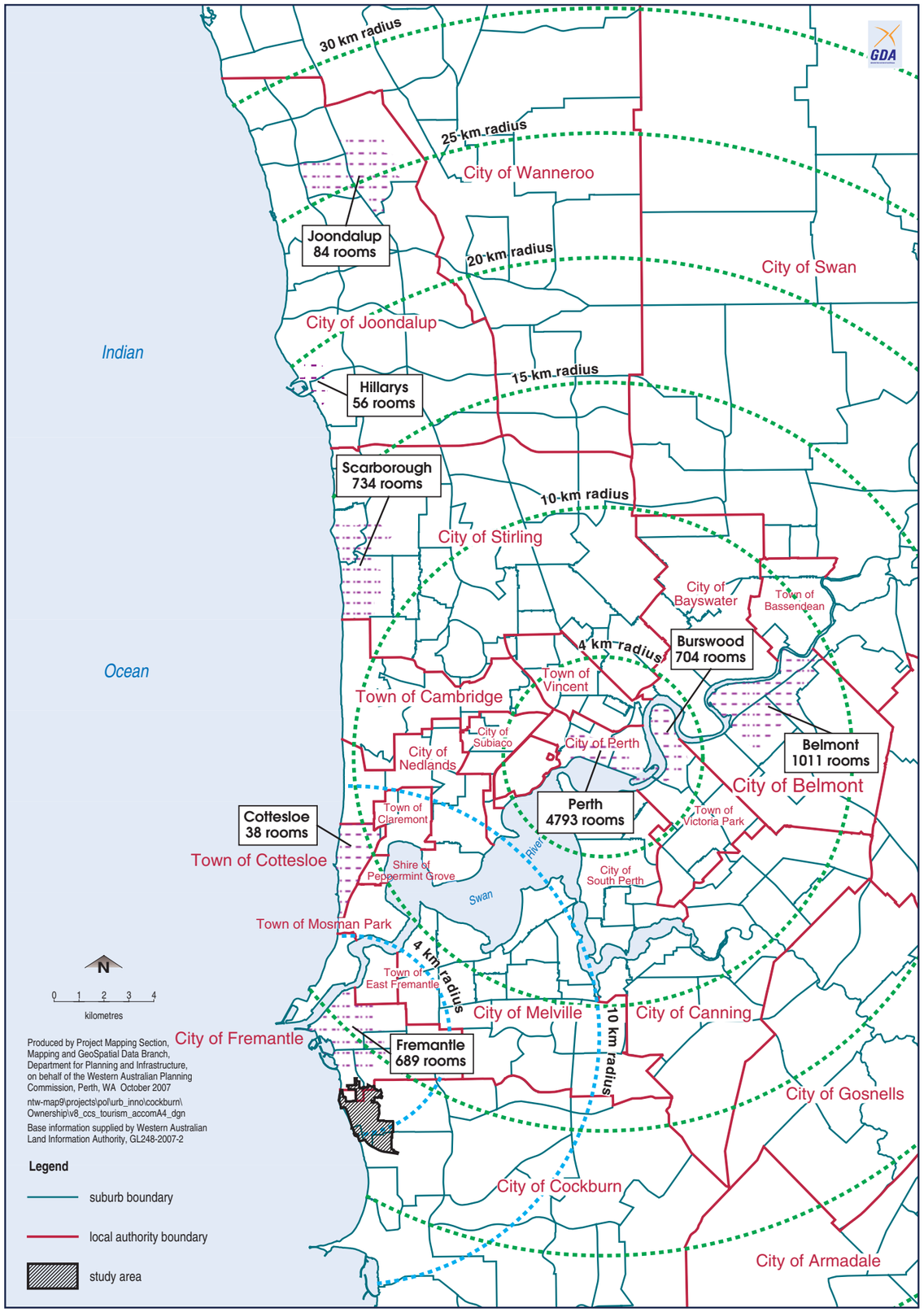


Table 5.4: Summary of number of rooms in Perth metropolitan region

Star Rating	Perth	Joondalup	Hillarys	Cottesloe	Fremantle	Scarborough	Belmont
5 Star	825	81	0	0	2	327	0
41/2 Star	1715	0	47	0	320	56	70
4 Star	170	3	3	2	6	64	288
31/2 Star	1303	0	3	33	225	141	323
3 Star	154	0	0	3	10	46	186
2 Star	260	0	0	0	0	0	0
Other	366	0	3	0	126	100	144
Total	**4793**	**84**	**56**	**38**	**689**	**734**	**1011**

Source: RAC Western Australia Experience, 2003

Fremantle Ports has advised that future freight rail projections are for 8 trains per day (4 from the port and 4 to the port).

It is assumed that these projected movements will be double-stacked and in the order of 600m long.

This increase in freight rail movements accords with key government policy to transfer freight movement from roads to rail.

5.9.2 Regional public transport services

Fremantle, as a high-order activity centre, is the focus of a number of public transport services from surrounding urban areas. Fremantle station acts as a public transport hub for the south-west corridor, providing a location where passengers can change between local and regional services and providing access to the Fremantle City Centre.

Within the south-west corridor, the dominant public transport feature is the series 900 high-frequency services between Fremantle and Rockingham that was seen as a step towards the concept of a dedicated Rockingham to Fremantle transitway. The 920 bus service operates at a base frequency of 15 minutes over an extended timetable seven days a week. Within the Cockburn area, these services utilise Rockingham Road and Hampton Road.

To the north of the project area, the Fremantle CAT service provides a free, frequent local bus service along Marine Terrace and South Terrace. This service operates on an extended timetable seven days a week.

In order for the district structure plan to be a true transit oriented development it is critical that an efficient public transport system is extended through the Cockburn coast project area providing a strong connection to the wider regional public transport network and Fremantle.

5.9.3 Regional road networks

Understanding the regional road network in which the Cockburn coast development will sit is critical to ensuring both sustainable outcomes within and beyond the district structure plan area.

The regional road network features a number of important north-south and east-west road links. Key east-west road routes include Canning Highway, Leach Highway, South Street and Spearwood Avenue. The regional road network is detailed in Figure 5.4, as well as potential regional road changes to the network in the immediate vicinity of the Cockburn coast.

North-south primary regional roads include Stirling Highway, Stock Road, Kwinana Freeway and the proposed Fremantle to Rockingham Controlled Access Highway (CAH), which exists as a reserve in the MRS and runs along the eastern side of the developable area.

The Fremantle Eastern Bypass (FEB) reserve that formerly proposed connection of the Fremantle to Rockingham CAH with Stirling Highway has been deleted from the MRS. The intention is for Stock Road/South Street to become a major route, with Stock Road ultimately planned as a six lane primary regional road with grade separated interchanges.

The other significant primary regional road reservation in the immediate vicinity of the area is provided for Stage 8 of Roe Highway. The State Government is currently investigating construction of the link between Mitchell Freeway and Stock Road.

As a result of the current constructed regional road configuration, Hampton and Cockburn roads perform a more regional role in the network.

5.9.4 Balancing local and regional transport demand

A core philosophy of the structure plan's development has been to balance the function and impacts of local and regional traffic on key roads through the study area. This has meant taking a regional perspective on many issues and considering the much broader implications of regional changes to the transport network.

Contextual movement network factors also highlight the importance of balancing the demands of traffic with opportunities for frequent, high quality public transport services. The approach to vehicle movement and public transport provision within the structure plan area is detailed in section 2.4.

The significant issues related to the road network that are dealt with by this plan are:

- the configuration and alignment of Fremantle-Rockingham Controlled Access Highway;
- establishment of a public transit corridor along Cockburn and Hampton roads; and

- district-level connector roads within the structure plan area that provides a framework for a local road network to be developed as part of the next level of local structure plans.

5.10 Surrounding development and planning initiatives

The Cockburn coast project area is “book ended” to the north and south by urban renewal projects on former industrial land.

To the north, the South Beach residential development plans have been approved, with remediation and development works underway on land adjoining the North Coogee foreshore area. Port Coogee, to the south, is a 300-pen public marina and residential development.

An ambition of the urban design framework is to align and integrate with Fremantle and the surrounding Port Coogee and South Beach developments.

5.10.1 Port Coogee

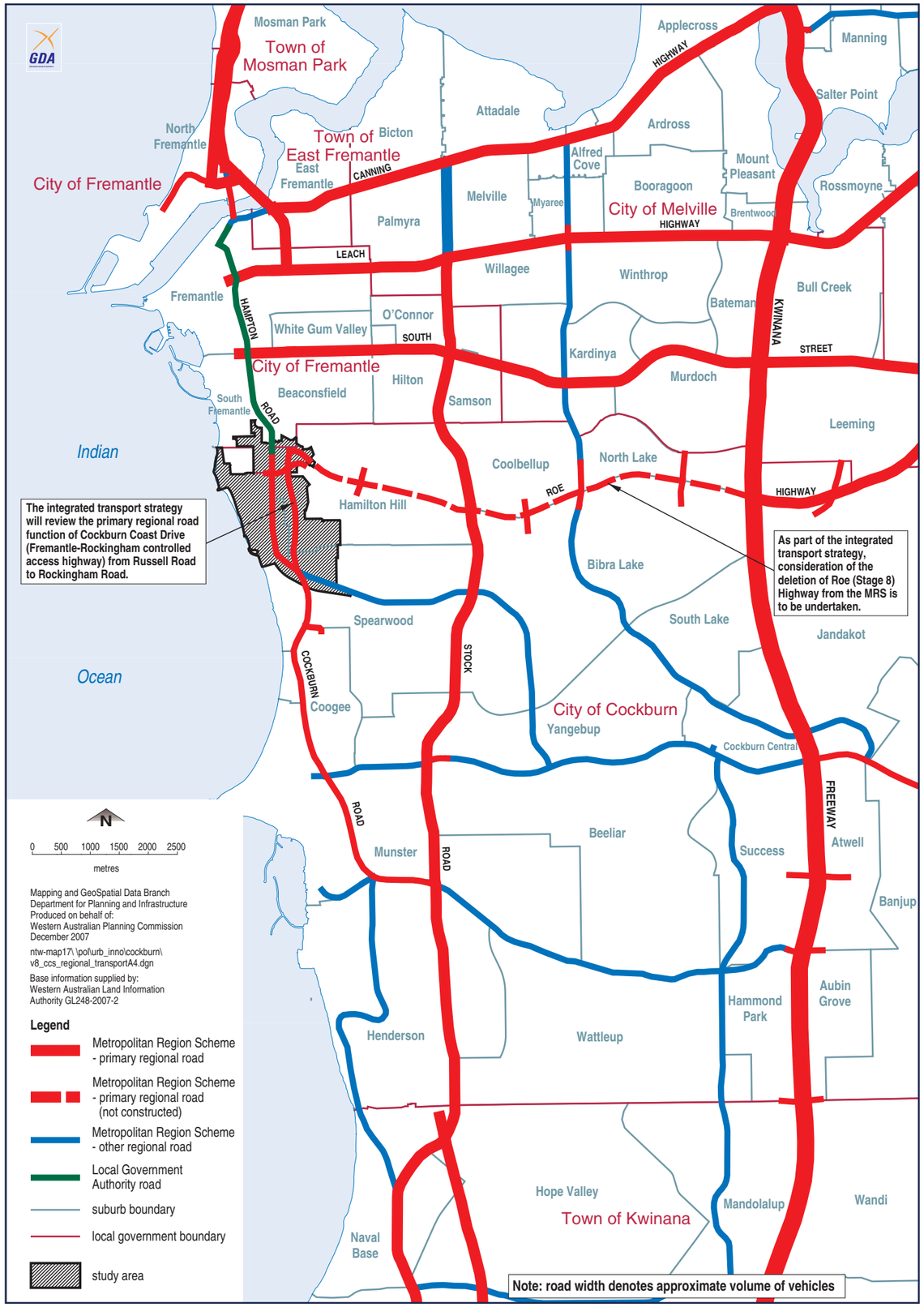
Incorporating former industrial land in South Coogee, residential development at Port Coogee has been contemplated since the late 1980s when an agreement was struck between the State Government and the City of Cockburn.

In 1993, the Coogee Master Plan reflected the State Government's in-principle support for a residential marina development, and in 1997, this endorsement was formalised with the marina's proponent through the Port Catherine Project Agreement (the agreement).

Key to this agreement is the delegation of responsibilities between the State Government and the proponent, Port Catherine Developments (a wholly-owned subsidiary of Australind Holdings) for the project's delivery. Under these arrangements:

- the State Government is responsible for the assembly and remediation of Government land within the project area; and

Figure 5.4: Regional road network



- Port Catherine Developments is to obtain all of the necessary planning and environmental approvals.

In accordance with the agreement (as revised in 2000), the developers have secured the required approvals, including:

- amendment to the MRS in 2003;
- amendment to the town planning scheme;
- adoption of the Port Coogee local structure plan (2005);
- subdivision approval; and
- development approval.

The total Port Coogee project area is approximately 86 hectares and has a projected population of approximately 3500 people.

5.10.2 South Beach Village - Stockland

Formerly Western Australian Government Railways land and the site of a number of industrial operations, the 13.6 hectare South Beach Village site in North Coogee is currently the subject of redevelopment.

The site's proximity to Fremantle, its coastal location and the diminishing presence of industry within the area, led to the rezoning of the land from industrial to urban under the MRS in 2001. In accordance with the subsequent rezoning of the land in the City of Cockburn's town planning scheme, a structure plan was prepared by the proponent and adopted by the Council in 2002.

Further modifications to the structure plan were made in 2003 and 2005. The amended plan and approved development includes:

- approximately 265 lots;
- 12 grouped or multiple dwelling sites;
- 1.85 hectares of public open space;
- a range of densities between R20 and R100; and
- height limits ranging from two to eight storeys.

It is expected that 1000 people will live in the estate when it is completed.

5.10.3 South Beach Estate

The 4.3 hectare South Beach Estate, located on the northern end of the Stockland site and at the extremity of South Terrace, is currently being developed by LandCorp.

The site will ultimately comprise 32 single residential lots and six group/multiple dwelling housing lots, with densities ranging from R40 to R100.

5.10.4 South Fremantle landfill site

After 55 years of receiving a variety of domestic, hazardous, industrial and quarantine waste, the 19-hectare South Fremantle landfill site closed in 1986. The landfill was capped, with the south-east portion (6.45 hectares) privately developed as a caravan park (also in 1986) and owned in freehold title, with the balance informally functioning as a recreation area for local residents.

Various technical investigations have been undertaken since the landfill's closure, but previous options proposed for the site have failed to gain the support of the local community or achieve financial viability.

The City of Fremantle as landowner, and LandCorp as the State's land development agency, have established a collaborative arrangement to further studies for the landfill site, in accordance with a Memorandum of Understanding formalised in 2004.

Recognising the importance of community participation and support, a stakeholder advisory group was established in December 2005 to provide input into the development of land use options.

The work of the City of Fremantle, LandCorp and the advisory group has resulted in two options for further geotechnical, environmental and economic feasibility analysis.

Features of the two options are outlined in Table 5.5 and shown in Figures 5.5 and 5.6.

The structure plan reflects Option B as determined through the advisory group process.

The landfill site is currently zoned as a Development Area under the City of Fremantle's Local Planning Scheme No.4, requiring development or subdivision to be in accordance with a local structure plan approved by the City and the WAPC. Any development of the landfill site will be subject to an extensive approvals process through the Environmental Protection Authority and the Department of Health. In this regard, the allocation of land use options over the landfill site within the Cockburn coast district structure plan, consistent with the independent planning process by the City and Landcorp, does not constitute approval for development of this site.

Table 5.5: South Fremantle landfill options

Option A	◆ Inclusion of a City of Fremantle depot site ◆ Mixed use development ◆ Some residential with green corridors ◆ Netball courts ◆ Approximately 30% public open space and 15% residential / mixed use
Option B	◆ Mixed use in place of City depot ◆ Residential development instead of netball courts ◆ 3-5 storey pile-driven residential development (of a height / density required to make it economically viable) ◆ Approximately 32% public open space and 48% residential / mixed use

Figures 5.5 and 5.6: South Fremantle landfill site development options

5.10.5 Clontarf Hill

The structure plan does not seek to represent preferred land uses within the Clontarf Hill area, north of Rockingham Road. Although Clontarf Hill is within the project area boundary the land is predominantly zoned urban under the MRS (with the exception of land subject to the primary regional road reservation).

Clontarf Hill and its surrounds has been included within the structure plan area to allow for the exploration of improved north-south and east-west transport connections, primarily utilising the existing primary regional road reservation.

Because the Clontarf Hill area straddles the border of the cities of Fremantle and Cockburn, there are multiple zonings under the two local planning schemes. Land within Fremantle is zoned as Development Area 19 and open space under Local Planning Scheme No. 4, with property south of Healy Road (within Cockburn's jurisdiction) zoned for mixed business and residential under Town Planning Scheme 3. Barring the open space reserve, none of the zonings preclude the development of residential uses.

Fremantle's Development Area 19 will require a local structure planning exercise to determine appropriate uses and development, independent of the district structure planning process. This planning will need to be undertaken by the landowners, having due regard to the recommendations of the Cockburn coast structure plan.

Chapter 6
Site analysis

6.1 Environment

6.1.1 Climate

The Cockburn coast area has a Mediterranean climate with hot, dry summers and cool, wet winters.

The average annual maximum temperature is 24°C, but this varies between 31°C in February and 18°C in July.

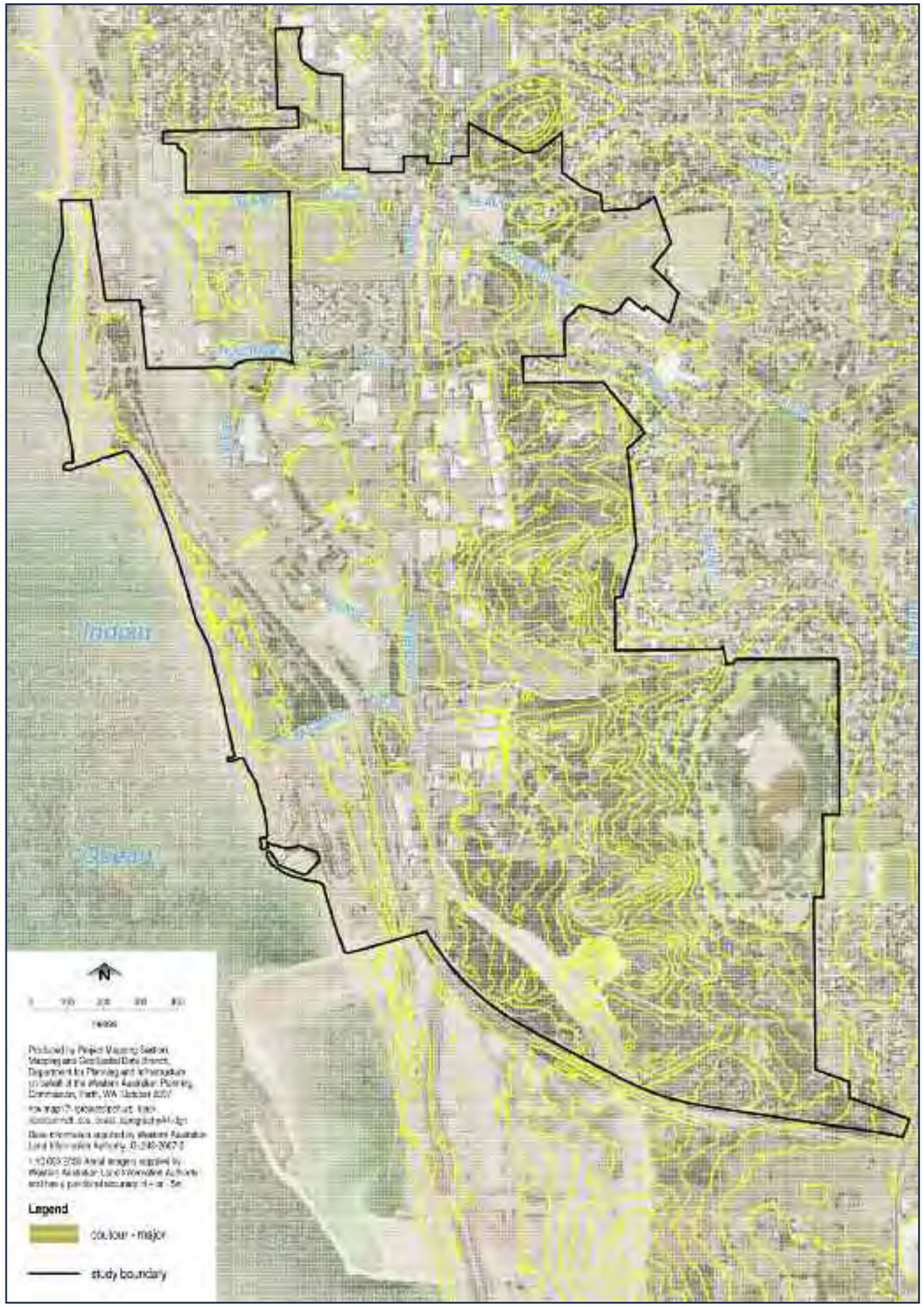
The average annual rainfall is 887 mm per year, of which approximately 85 per cent, or 750 mm, falls between May and October. The annual average pan evaporation is 1671 mm. Rainfall exceeds evaporation for four months of the year, between May and August.

6.1.2 Landform and topography

The site is dominated by the parallel features of the coastline and a ridgeline, which rises approximately 1.5 kilometres inland from the coast. The Cockburn coastline forms the west boundary of the site. The undeveloped coastal reserve area consists of an elevated primary dune approximately 5 metres Australian Height Datum (AHD) with a swale and secondary dune in some sections. The land that extends behind the dunes is relatively flat over much of the Cockburn coast until the ridge (City of Cockburn 2001).

The topography of the land west of Cockburn Road generally ranges between 6-8 metres AHD. The area around the old South Fremantle landfill site (now in part supporting the Fremantle Holiday Village) rises to an elevation of approximately 20 metres AHD and the land behind the South Fremantle power station is mapped at an elevation of 12 metres AHD (Perth Groundwater Atlas, 2004). Figure 6.1 details the topography of the project area.

Figure 6.1: Topography map



The land rises and falls gently in sections to the east of Cockburn Road to 15-20 metres AHD ultimately forming the Spearwood Ridge, which runs in a north-south direction and peaks at 40-50 metres AHD (Perth Groundwater Atlas, 2004). The terrain drops steeply to the east of Spearwood Ridge down to the gentler slopes around Manning Lake.

6.1.3 Soils and geology

Mapping by the Geological Survey of Western Australia (1986) indicates that the surface geology for the majority of the site consists of Safety Bay sand, which is described as being white, medium-grained, rounded quartz and shell debris, well sorted, of aeolian origin. This surface geological unit is mapped over the site west of Cockburn Road.

East of Cockburn Road, the surface geology is Tamala limestone overlain by Safety Bay sand. This geological unit is associated with the ridgeline which extends in a north-south orientation parallel with the coast. East of the ridgeline within Manning Park Reserve, a small area is mapped as containing sand derived from Tamala limestone, surrounding sandy silt associated with Manning Lake. An overview of the key soil characteristics across the project area is provided in Figure 6.2.

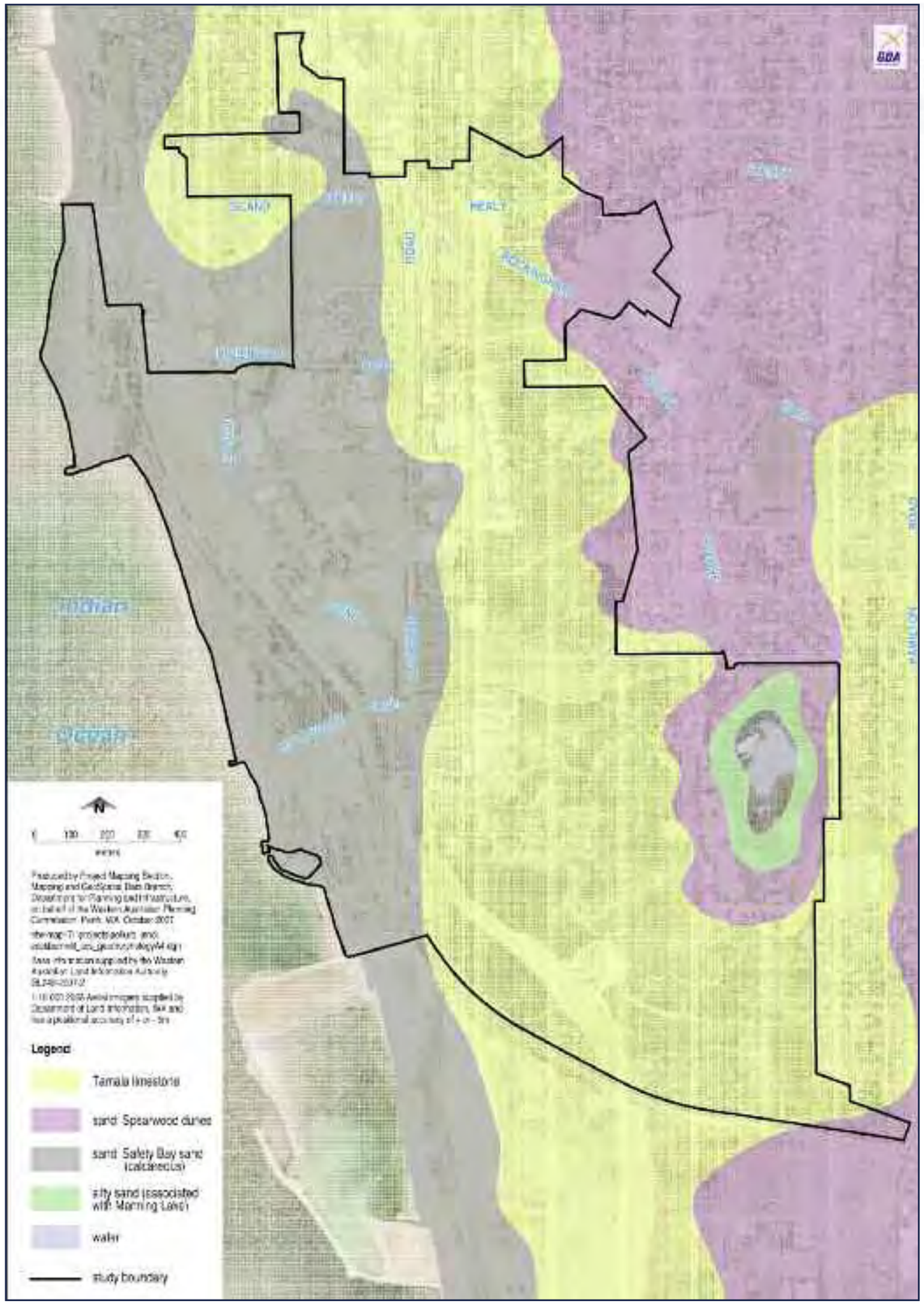
6.1.4 Surface water

The local superficial geology consists of Safety Bay sands and Tamala limestone, each of which has a high hydraulic conductivity. Therefore, surface water flow is not considered to be the significant hydrological process in the Cockburn coast area. The site can be divided into a number of areas that would form catchments under very heavy rainfall, or if the site was more impervious.

A main barrier to surface water (and drainage flow) is the railway line, which runs roughly parallel to the coast until it intersects Cockburn Road in the south of the site. It then heads in an easterly direction to form the southern boundary of the Cockburn coast area. The railway line is elevated above the general ground level and forms a barrier to the flow of surface water. There is also a small line of dunes to the west of the railway line that would limit the flow of surface water to the ocean.

Immediately to the west of Cockburn Road lie a series of flat areas. This area includes a number of the current stormwater compensating basins.

Figure 6.2: Soil profiles



6.1.5 Run-off rates

Given the highly permeable nature of the geology of the Cockburn coast, surface water in the structure plan area is limited, with the only natural surface water feature being Manning Lake in Beeliar Regional Park, which is at or below sea level.

6.1.6 Manning Lake

Manning Lake is identified as a wetland in the Department of Environment and Conservation (DEC) Swan Coastal Plain Geomorphic Wetland Dataset. The central portion of the lake is mapped as a conservation category wetland. The area immediately surrounding the lake is mapped as a resource enhancement category wetland and the surrounding parkland area is a multiple use category wetland. Manning Lake is also mapped as an Environmental Protection Policy Lake under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.

The lake is located in a depression with a base level just below 0 metres AHD. The lake itself is generally a spring-fed almost ephemeral representation of the local groundwater table but also receives stormwater during the wet season.

6.1.7 Groundwater

Superficial aquifer

As indicated by the Perth Groundwater Atlas (2004), the groundwater level in the structure plan area is in the range of 1 metre AHD at the eastern boundary to 0 metre AHD at the coast (Figure 7.1). Given the range in topography, groundwater is approximately 3 metres below ground level at its closest point (excluding the existing foreshore reserve area) and approximately 39 metres below ground level beneath the highest point of the ridgeline. Water levels in summer may be below 0 metres AHD. The bottom of the superficial aquifer is located at approximately -20 metres AHD.

The groundwater within the superficial aquifer moves in a generally westerly direction (DEC 2004), as would be expected. However, it has been observed in previous studies by environmental consultants ENV Australia that movement may be in a more north-westerly direction in the northern part of the area. Groundwater in sections of the site closer to the coast will experience tidal influences.

The southern part of the Cockburn coast area (south of Manning Lake) was included in a model of the Cockburn groundwater area. The model confirms that there is a significant salt water wedge in the aquifer that can extend to a height of 0.5 metres AHD. This wedge lies under a layer of fresh water and may extend as far east as Manning Lake, which may influence the salinity levels experienced within the lake. While the highly porous nature of the local aquifer means that yields of fresh water can be significant, over-extraction from the aquifer would lead to salt water intrusion. The approximate area subject to an over-extraction risk is generally that area to the west of Cockburn Road (Department of Environment, 2004).

The majority of the site lies within the Kogalup groundwater sub-area, with the extreme north of the site being within the Fremantle groundwater sub-area. The Department of Water indicates that there is currently 0.76 GL/yr (2.1 ML/day) of groundwater available for allocation in the Kogalup sub-area and 0.99 GL/yr (2.7 ML/day) available within the Fremantle sub-area. The available allocations within these areas are constantly changing as new licences are issued and old licences are rescinded.

Superficial groundwater quality

One of the main factors that limits the beneficial use of groundwater is salinity. For potable water supply, a maximum salinity of approximately 500 mg/L total dissolved solids is required. Depending on plant species, a higher salinity may be tolerated for irrigation, but generally not more than 1500 mg/L.

Groundwater salinity data has been sourced for the City of Cockburn's bores, including one at Emplacement Crescent and three at Manning Park, as well as from the Department of Water's database. Salinity in the Cockburn bores varied between 630 and 1760 mg/L. The highest salinity encountered was in one of the bores at Manning Park. This is similar to the variation between 370 and 2400 mg/L encountered at the South Fremantle landfill (Parsons Brinckerhoff, 2004) and the 220 to 1800 mg/L in the Water Information System (WIN) database for various bores within and adjacent to the Cockburn coast area.

While the tops of casing and bore depths were not available for these bores, it is expected that the salinity is correlated to the depth of the bore and location relative to the salt wedge. The high salinities encountered in the Manning Park bore and bores within the Fremantle landfill indicate that the salt wedge may extend under most, or all, of the site.

A number of groundwater studies for contamination have been undertaken on individual sites within the area. Work is still being conducted by various landowners on an ongoing basis as sites are earmarked for remediation and rezoning for residential purposes. This site-by-site assessment will continue as individual land parcels are developed. A summary of some of this work was undertaken by GHD for LandCorp in 2004. It indicated that while the groundwater in the area met the Australian and New Zealand Environment and Conservation Council requirements for irrigation water, in some locations the groundwater quality did not meet drinking water quality guidelines at the time of sampling (GHD, 2004). Groundwater nitrate and iron levels may also exceed long-term irrigation water guidelines in some areas (Parsons Brinckerhoff, 2004 and ENV Australia, 2006). Elevated levels of nitrate are common in areas that have historically been used for market gardening, such as the Coogee area, which is up-gradient of the Cockburn coast (Pionke et al, 1990).

A review of historical data, reports and current industrial operations within the Cockburn coast has been undertaken by ENV Australia to support the structure plan. This review was undertaken on a lot by lot basis and provides a historical record of development in the Cockburn coast and the known and potential contamination. In the context of groundwater, the review indicates that the potential exists for a wider geographical spread of contamination and wider suite of contaminants than is suggested by the GHD study.

It is acknowledged that the information available to this study may not represent all the data that is available in the area.

Confined aquifers

In the Cockburn coast area, two confined aquifers (Leederville and Yarragadee) underlie the superficial aquifer (Davidson, 1995). These aquifers are present under part or all of the Perth metropolitan area. The salinity of these aquifers varies spatially and in some areas the water is used for potable water supply.

While the upper Leederville aquifer is suitable for drinking and irrigation, the lower Leederville and Yarragadee aquifers are of marginal quality. Water quality within the upper Leederville aquifer in the Cockburn coast area is estimated at between 500 and 1000 mg/L, while water quality in the lower Leederville and Yarragadee aquifers within the Cockburn coast area is estimated at between 1000 and 2000 mg/L (Davidson, 1995).

6.1.8 Vegetation

The majority of remnant vegetation within the site is for the most part contained within Manning Park (142 hectares) and the foreshore area which includes Catherine Point Reserve, C. Y. O'Connor Reserve, and 29 hectares of a number of smaller parcels of land generally identified as foreshore reserve or unallocated Crown land. The Manning Park and foreshore area (Point Catherine and C. Y. O'Connor reserves) are both reserved under the MRS as Parks and Recreation.

Threatened (declared rare) flora

A flora database search of the area identified seven declared rare flora species and 16 priority flora species as potentially occurring in the area.

The DEC database search showed that there are no threatened ecological communities within the site. However, there are identified occurrences of the vulnerable threatened ecological community known as Callitris preissii (or Melaleuca lanceolata) forests and woodlands on the nearby Swan coastal plain (within 10 kilometres of the area).

The vegetation associations, condition and use of Manning Park, Point Catherine and C. Y. O'Connor reserves are listed below.

Manning Park Reserve

Manning Park Reserve is managed by the City of Cockburn with some assistance from the WAPC and DEC.

The area includes five vegetation communities;

- Melaleuca rhaphiophylla;
- Eucalyptus gomphocephala (tuart) woodland;
- Eucalyptus decipiens (redheart or mattock);
- Melaleuca huegelii/Melaleuca acerosa shrublands; and
- Acacia woodlands on taller dunes (City of Cockburn 2001).

Figure 6.3: Vegetation

Eucalyptus decipiens and acacia woodlands are not well represented in reserves on the Swan coastal plain (City of Cockburn 2001). These areas of vegetation would not be affected by the proposed urban development as they are within Manning Park Reserve, but the primary regional road reservation as defined in the MRS would impact on the northern patch of acacia woodland.

Bush Forever condition scales have been used to assess the condition of the vegetation at Manning Park and Catherine Point Reserve. At Manning Park Reserve the vegetation condition of the upland areas is poor due to the impact of disturbances including powerlines, limestone quarries, fire and neglect. The cleared areas, mainly on the western side of the ridge, make up approximately 22 per cent of the reserve and are considered degraded. Approximately 14 per cent of the reserve in the south-east is weed infested and its condition is recorded as good. The ridge areas, which are largely inaccessible and make up 37 per cent of the reserve, are considered to be in very good condition. A very small area, about one to two per cent of the reserve, is in excellent condition. The balance of the reserve within the formal zones was not assessed for bushland condition (City of Cockburn 2001).

Beeliar Regional Park management

A large portion of the Manning Park Reserve forms part of the Beeliar Regional Park. This area of Beeliar Regional Park is bound by the proposed Fremantle to Rockingham Highway to the west, residential development to the north and east, and the railway line to the south. The alignment for the proposed other regional road, which is a westward extension of Spearwood Avenue, is excised from the Beeliar Regional Park.

Although the State government introduced legislation to give regional parks legal standing and vesting in the Conservation Commission in 1997, land tenure still varies. At the Cockburn coast site, the Beeliar Regional Park is vested with the WAPC with the exception of the southern portion of Manning Lake, which is vested with the local government authority (Conservation Commission 2006). The City of Cockburn is currently responsible for the ongoing management of the site with some assistance from the WAPC and the DEC.

The Beeliar Regional Park Management Plan finalised by the Conservation Commission in 2006 provides objectives and direction for how the park should be managed.

Figure 6.4: Bush Forever site 247

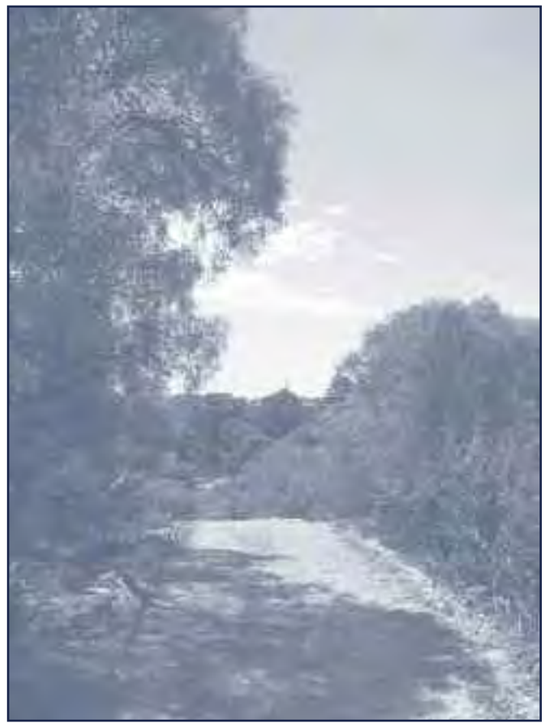
Bush Forever

Bush Forever Site 247 (50.6 hectares) is located over much of the same area as the Manning Park Reserve portion of Beeliar Regional Park (see Figure 6.4), with the exception of a small strip of Beeliar Regional Park south of the proposed regional road extension of Spearwood Avenue.

Foreshore reserve - Catherine Point and C. Y. O'Connor reserves

The foreshore reserve includes approximately 29 hectares of coastal dune and immediate hinterland along the Cockburn coast foreshore. This area is managed by DEC.

Vegetation communities represented within the foreshore reserve, particularly at Point Catherine, are dune coastal heath. Spinifex longifolia, Spinifex hirsutus, Leipidosperma gladiatum and Scavolea crossifolia dominate these communities (City of Cockburn 2001).



Approximately 70 per cent of the foreshore reserve vegetation is considered to be in very good or excellent condition. The remaining 30 per cent is in good condition (City of Cockburn 2001).

6.1.9 Fauna

A list of all vertebrate fauna potentially occurring within the study area was compiled from searches of the DEC threatened fauna database and the Commonwealth Department of the Environment and Heritage environment protection and biodiversity conservation database.

The results indicate that threatened and priority fauna species recorded in the vicinity of the Cockburn coast were within Beeliar Regional Park.

6.1.10 Contaminated sites

Historically, the predominant land use in the structure plan area has been industrial, with a cluster of industries such as the abattoir, tannery, marshalling yards and the power station. Known contaminated sites have previously been identified within the structure plan area, and in undertaking further due diligence for the site a preliminary desktop review of all properties was undertaken with landholdings assessed on the potential risk for land and water contamination.

The intent of the review was not to provide site-specific management responses or assessment guidelines, but to broadly determine the extent of known and potential contamination sites and to assess the need for planning conditions to be incorporated in the structure plan.

The desktop review included examination of historic certificates of title and aerial photos, contamination-related reports and limited owner/operator interviews.

The review indicated that a large number of the lots within the structure plan boundaries are either known contaminated sites that may or may not have been remediated to some degree, or are potentially contaminated due to their previous or current land uses.

Known and potential contamination is mainly located in the Power Station, Robb Jetty and Hilltop precincts, both east and west of Cockburn Road.

The structure plan's response to contaminated sites is detailed in section 2.12.5 of this report.

6.2 Coastal assessment

6.2.1 Marine geology

Owen Anchorage is characterised by complex bathymetry, with ridge and depression systems and onshore Holocene sedimentary deposits. The area is located within two limestone ridges, with an additional ridge located offshore. The offshore ridge is Five Fathom Bank, which is separated from the Garden Island Ridge by the Sepia Depression. A third ridge, Spearwood Ridge, is located onshore of the present shoreline.

During the Holocene period (<10,000 years before present), sediment accumulated in discrete banks in zones of wave energy convergence behind reefs and islands. The two banks within Owen Anchorage are Success and Parmelia banks. These banks have largely formed due to the deposition of sediment, eroded from the Rottnest Shelf and Garden Island Ridge, in the lee of reefs and islands as incipient tombolo forms.

Success Bank has formed as an incipient tombolo feature in the lee of Mewstone Rocks, and Parmelia Bank in the lee of Carnac Island. Once the banks had sufficiently shallowed (to within approximately 10 metres of the surface), sufficient light was available for the development of extensive seagrass meadows, providing an additional source of sediment. The sediments forming the banks and beaches in this area are predominantly carbonate sourced from reworked limestone. Grey Becher sands and white Safety Bay sands are the dominant sediment types in the area (Maunsell et al 1988).

6.2.2 History of human use and coastal impacts

The historical placement of infrastructure close to the shoreline has resulted in the need for coastal engineering works, which have altered the coastal processes (Table 6.1). The majority of mitigation works have been required as a result of the construction of the South Fremantle power station and development in the vicinity of Catherine Point and South Beach.

The construction of the power station, including the two groynes forming the intake area, caused erosion to the south that required the construction of a rock revetment. An additional groyne (groyne 3) was constructed to the north to help reduce the rate of sedimentation in the intake area.

Groyne 3 has caused beach accretion to the north which counteracted the downdrift erosion to the south of the Catherine Point groyne until 2001. Historically, seawalls and timber groynes had also been installed to mitigate shoreline erosion impacts on the recreation facilities, freight railway, switchyard and the ANI Bradken foundry site.

Additional dredging, nourishment and mitigation structures have been conducted in the Cockburn coast district structure plan project area and the wider Owen Anchorage.

6.2.3 Coastal processes

The behaviour of the Cockburn coast shoreline is controlled by human modifications, in combination with seasonal and inter-annual variation in sediment transport rates and sediment supply. The sediment transport rates are mainly governed by the sediment supply, seasonal variation in wave conditions and wind-driven currents, and the rate of saturation and bypassing of the structures.

The Cockburn coast is partially sheltered from ocean wave action by the reefs and islands between Garden and Rottnest islands, and the broad shallows of Success and Parmelia banks. These features act to modify the prevailing wave directions on a local scale, enhancing the significance of north-west winter storms compared with the more frequent south-west storms. During summer and early autumn, the prevailing wave conditions are south-south-westerly wind waves, generated by strong sea breezes blowing along the length of the coastal lagoon from Cockburn Sound to Owen Anchorage.

Seasonal switching of the prevailing wave directions causes corresponding reversals in the direction of sediment transport and a rotation in the alignment of pocket beaches. The seasonal switching also influences the magnitude of the bypassing of Island Street groyne to the north, Catherine Point groyne to the south, the power station groyne 3 in both directions and the power station groyne 2 to the south. Additional seasonal sediment transport occurs due to aeolian (wind-driven) transport.

Table 6.1: Coastal infrastructure within the Cockburn coast district structure plan project area

Location	Works	Year(s)	Why constructed?
Island Street	Rock groyne	1962, ext. 1996	During three stages of South Beach restoration. The second stage was the construction of the Island Street groyne with nourishment north of the structure from offshore dredging (in 1964/65). Constructed in 1962 to 107m, extended 80m in 1996. Additional rock revetment protection placed on south side of the groyne in 2006.
Catherine Point	Rock groyne	1959, ext. 1962	During three stages of South Beach restoration. The first stage was the proposed Constructed to 107m in 1959. Catherine Point groyne, with behaviour to be observed over the next three years. Groyne extended 61m in 1962 due to saturation.
South Fremantle power station	Groyne No. 3	1949, ext. 1960?	Constructed to reduce the quantity of sediment infilling the South Fremantle power station holding basin.
South Fremantle power station	Groynes No. 1 and 2	1946/7	Constructed as a holding basin for the intake water. Groyne No.1 is to the south (~180 m long) with the discharge pipe cut through it. Groyne No. 2 is to the north (~165 m). Groynes were joined by a bridge. Rapidly filled with sediment and the intake pipe was extended offshore. Two walls constructed within the basin.
South Fremantle power station	Rock revetment	1948, ext. 1949	Constructed in response to erosion to the south of the South Fremantle power ptation intake groynes. Originally ~45m, extended to ~22m.
Port Coogee*	Two breakwaters	2006	Sheltering for Port Coogee harbour waters.

Note: * Outside the district structure plan study area

Table 6.2: Reclamation, beach renourishment and dune creation within the Cockburn coast district structure plan project area

Location	Works	Year(s)	Associated works	Volume (10^3m^3)
Scott Street to Island Street (or Catherine Point?)	Dune construction	1984 - 1986?	Dunes created, brushed and vegetated to restrict sand movement on to roads, car parks and the railway, with groyne maintenance prior to the America's Cup.	~31.8
Scott Street to Island Street	Nourishment and dune construction	1996	Land extended 60 m westward into water. With dune creation behind. As part of South Beach redevelopment.	~120
Duoro Street to Island Street	Nourishment	1964 - 1965	During three stages of South Beach restoration, nourishment undertaken in combination with the construction of the Island St groyne.	~61.2
South of Catherine Point	Temporary nourishment	2001	There was localised raising (1.5 m) of dunes south of Catherine Point in March 2001 due to sand storage from construction works. Assumed to be removed.	

Note: * Outside the district structure plan study area

Table 6.3: Historic structures within Owen Anchorage which are no longer functional

Location	Works	Year(s)	Removal year	Why constructed?
Bradford Kendall	Tipped limestone seawall and jetties	pre-1954	Superseded by onshore sediment supply	Bradford Kendall (now known as ANI Bradken) Foundry was established on high ground adjacent to beach. Tipped limestone wall to prevent further damage to the property.
Robb Rd	Barge and boat wrecks	~1966 - 1971	Lost function ~1987 - 90	Barge and boat wreck that behaved as a semi-detached breakwater, sustaining sand to the north and reducing supply to the south.
Robb Rd	Jetty	1892, ext. in 1910, 1943-44, lowered in 1947	~1972 - 1975	Constructed to unload munitions and stock for the abattoir. Contained a stormwater drain. Remnant jetty piles still remain.
Omeo wreck*	Boat wreck	1894	Early 1960s. Lost function	Barque wreck that behaved as a semi-detached breakwater, forming a tombolo and sustaining sand to the north.

Note: * Outside the district structure plan study area

Historically, the study area as a whole has experienced net accretion (accumulation of sediment), with periods of strong local erosion. The main source of material contributing to the net accretion is the landward propagation from Success Bank, feeding the Catherine Point salient. It has been suggested that this supply has been artificially enhanced through the onshore transport of dredge material disposed of during early excavations of Success Channel. The structure of Cockburn coast is, in effect, two linear sections meeting at Catherine Point. From here, the coast runs north and south-south-east. This change in orientation, combined with the wave climate, suggests a separation in the direction of net sediment transport. Alongshore movement away from this zone in both directions has been indicated by wave and sediment transport modelling (MRA 2005b). Finer sediment cells are located within these two larger sediment cells. The sediment cells are constrained between fixed structures with varied levels of sediment bypassing.

For the coast north of Catherine Point, northwards transport over summer and autumn generally exceeds the southerly reversal during winter. South of Catherine Point, the angle of the shore enhances southward transport and reduces the effect of sea breeze wind waves, causing a net southwards sediment transport. These basic patterns of movement have been complicated by the construction of groynes in both sections of coast.

Further modifications to the coastline have the potential to significantly alter the sediment budget and the behaviour of the shoreline. The net sediment budget could be altered by modifications to structures, beach nourishment programs and the reduction/increase in onshore sediment supply from Success Bank due to climate change.

Any proposed development should be sufficiently set back from the present shoreline to minimise the need for further modification works that could alter sediment transport processes. A physical processes setback line has been established in accordance with the Statement of Planning Policy 2.6 - State Coastal Planning Policy. Figure 6.5 identifies the physical coastal processes set back line and existing coastal mitigation measures. The Coastal Processes Assessment Report is an Appendix to this report.

6.3 Aboriginal heritage

An investigation of Aboriginal heritage for the Cockburn coast district structure plan has been completed for the project area. The Aboriginal heritage assessment included research and archaeological appraisal as well as a meeting with Aboriginal elders representing various native title claimants at Robb Jetty.

The investigation provided a background to both the archaeological and ethnographic sites in the area, as well as an indication of the nature and frequency of heritage surveys conducted in the area under the Aboriginal Heritage Act (1972).

The search revealed nine previously recorded sites within and adjacent to the project area, details of which are outlined in Table 6.4. The search also revealed 34 reports related to Aboriginal heritage in the Cockburn coast area, nine of which were deemed relevant to the Cockburn coast structure plan.

Details of Aboriginal recorded sites

SITE ID 18332/ Clontarf Hill

Clontarf Hill, previously known as Hamilton Hill, is bound by Healy Road to the south and Clontarf Road to the north. The attributes of the site are given as ceremonial, mythological, an artefact site, a hunting place and a natural feature. It currently sits on the interim register of the Department of Indigenous Affairs (DIA) and the site file has 'open' access status. A member of the Independent Environmental Nyoongars, who grew up in the Fremantle area, reports he went with his father as a young child to Clontarf Hill to catch rabbits, and on these occasions he saw “full blooded” Aboriginal people camped on the hill (Jones 2000:1).

Coordinates: 383417mE, 6450405mN, Zone 50 (Reliable).

Figure 6.5: Physical setback lineLand Ownership by Area

Table 6.4: Aboriginal heritage sites within the Cockburn coast area

Site ID.	Site #	Site name	Site type	Archaeo/ Ethno	Status	Access	Proximity
18332		**Clontarf Hill**	Ceremonial mythological, artefacts / scatter (camp, hunting place, natural feature)	Both	Interim	Open	Department of Indigenous Affairs (DIA) site polygon is outside but abuts the present study area, on the northern boundary of district structure plan.
3776	S02169	**Indian Ocean**	Mythological	Ethno	Permanent	Open	This mythological site covers the large area of water between the mainland and the three islands (Rottnest, Carnac and Garden). Its DIA polygon overlaps the coastline, as well as, the western boundaries of the project area.
3707	S02207	**Robb Jetty Camp**	Man made structure (camp)	Both	Permanent	Open	This site will be directly impacted by proposed redevelopment works - **S18 required.** The Robb jetty camp site is located within the district structure plan area

Figure 6.6: Aboriginal heritage site locations

SITE ID 3776/ Indian Ocean

Site 3776 (Indian Ocean) was reported by Brown (1983) and listed in 1985, and relates to two mythological narratives concerning the creation of Cockburn Sound and the offshore islands, especially Rottnest. One myth was recorded by Armstrong in 1836 and the other by Moore in 1884. Armstrong is quoted as follows: *"They [the Aboriginal people] state, as a fact handed down to them from their ancestors, that Garden Island was formerly united to the mainland, and that the separation was caused, in some preternatural manner by the Waugal."*

Moore observed in 1884: *"The natives (sic) have a tradition that Rottnest, Carnac and Garden islands, once formed part of the mainland. …the ground split asunder with a great noise, and the sea rushed in between…."*

The Aboriginal Cultural Material Committee (ACMC Resolution 2004/082) recently resolved to reassess and evaluate site 3776 as 'not a site' under the Aboriginal Heritage Act (1972), but further resolved that the site may be restored at any time if and when further supporting information comes to hand. With its recent re-mapping (ACMC Resolution 2004/083), site 3776 now reaches the mean high water mark of the coastlines of Garden, Carnac and Rottnest islands and of the mainland.

Registry Status: section 5(B), section 5 (C), section 39 (2) (a), section 39 (2) (b), section 39 (2)(c).

Coordinates: 372552mE, 6445470mN, Zone 50 (Reliable).

SITE ID 3707/ Robb Jetty Camp

Site 3707 (Robb Jetty Camp) was first reported by O'Connor, Bodney and Little (1985) as a camping area located in the sandhills to the south of South Beach, in the vicinity of Catherine Point. The camps were situated between the Bradford Kendall Pty Ltd Iron Foundry and Robb Jetty. According to O'Connor et al (1985), early records indicate that the area was used as a camp area and was still in use by Aboriginal people from outside the metropolitan area at the time of recording. Like other long-established fringe camps, O'Connor et al considered the area likely to have been a traditional camping area.

The site is on the permanent register and the file has 'open' access. The register indicates that the site is currently mapped as being approximately 1.2 kilometres long, and its width is no greater than 100 metres.

O'Connor et al also note that the area is known to have been used for Aboriginal camping from about 1910, and that "although Perth Metropolitan Aboriginal people no longer camp here, it was noticed that Aboriginal visitors from the Kalgoorlie region were living among the sandhills".

Coordinates: 382501mE, 6449352mN, Zone 50 (Reliable)

Table 6.5: Summary of details of previously recorded Aboriginal heritage sites within close proximity of the Cockburn coast district structure plan project area.

Site ID.	Site #	Site name	Site type	Archaeo/ Ethno	Status	Access	Restriction	Proximity
121	S02968	**Cockburn Light house**	Artefacts / scatter	Archaeo	Permanent	Open	None	This site is outside the district structure plan's proposed redevelopment area, approximately 3 km to the south of the project area.
15840		**Cockburn Road**	Mythological	Ethno [associated Archaeo]	Permanent	Open	None	This site is outside the district structure plan's proposed redevelopment area, approximately 2 km to the south of the project area.
15841		**Woodman Point**	Mythological	Ethno	Permanent	Open	None	The Woodman Point site is outside the study area, approximately 4 km to the south-west of the project area.
20866		**Lake Coogee**	Mythological	Ethno	Interim	Open	None	The Lake Coogee site is located approximately 4km from the southern boundary of the district structure plan.
15838		**Lake Coogee 1**	Artefactual	Archaeo	Interim	Open	None	This site lies approximately 5 km south of the study area, and thus outside the proposed district structure plan boundaries.
15839		**Lake Coogee 2**	Artefactual	Archaeo	Permanent	Open	None	This site lies approximately 3 km south of the study area, and thus outside the proposed district structure plan boundaries.

6.4 European heritage

A heritage assessment report has been completed for the Cockburn coast structure plan project area, including archival research of the Heritage Council of Western Australia Register of Heritage Places to acknowledge the nature and location of known heritage sites. The places outlined in Table 6.6 are listed on the State Register of Heritage Places on a permanent or interim basis.

Heritage sites on the State register are protected under the provisions of the Heritage of Western Australia Act 1990. Any proposed demolition, relocation, subdivision, amalgamation, alteration, addition or new development must be in harmony with the place's cultural heritage values and be referred to the Heritage Council for approval.

Table 6.7 is an integrated list of all heritage listings for the Cockburn coast project area.

- Column 1 lists the most common name of the place.
- Columns 2 and 3 list the street/lot/location number and name.
- Column 4 represents the City of Cockburn Municipal Inventory of Heritage Places, including the reference number and management category.
- Column 5 represents the National Trust of Western Australia list. This list does not have any reference numbers, so its listing is noted only.
- Column 6 represents the Register of the National Estate. This column includes the register number and the type of listing.
- Column 7 represents the database compiled by the Heritage Council of Western Australia. The column shows the Heritage Council reference number and notes permanent or interim registration.

The management categories are as follows:

Category A

Highest level of protection appropriate: recommended for entry into the State Register of Heritage Places (if they are not already on the register). Provide maximum encouragement to the owner under the City of Cockburn planning scheme to conserve the significance of the place. Incentives to promote conservation should be considered.

Category B

High level of protection appropriate: provide maximum encouragement to the owner under the City of Cockburn planning scheme to conserve the significance of the place. A more detailed heritage assessment to be undertaken before approval given for any major redevelopment. Incentives to promote conservation should be considered.

Category C

Retain and conserve if possible: endeavour to conserve the significance of the place through the provisions of the City of Cockburn planning scheme. A more detailed heritage assessment may be required prior to approval being given for any major redevelopment or demolition; photographically record the place prior to any major redevelopment or demolition.

Category D

Significant but not essential to an understanding of the history of the district: photographically record the place prior to any major redevelopment or demolition.

Category E

Historic site with few or no built features: recognise, for example, with a plaque, place name, or reflection in urban or architectural design.

The types of listings and their legal status are listed below.

Indicative

Data provided to or obtained by the Australian Heritage Council or the former Australian Heritage Commission has been entered into the database and the place is at some stage in the assessment process. A decision on whether the place should be entered in the register has not been made.

Identified

The former Australian Heritage Commission has assessed the values of this place and decided that it should be entered in the register. The place had not reached the interim list stage by 1 January 2004 when the commission was abolished.

Interim list

The place was in the interim list at 1 January 2004 when the Australian Heritage Commission was abolished. The place had been publicly proposed for entry in the register. Such places will need to be assessed under the new procedures in the Australian Heritage Council Act 2003, if they are to be entered in the register.

Registered

The place is in the Register of the National Estate. Although some places may be legally registered because they are within a larger registered area, they may not necessarily possess intrinsic significance.

Figure 6.7 details the location of significant European heritage sites within the district structure plan project area.

CockburnCoast

Table 6.6: Cockburn coast sites on the State register

No.	Name	Location	Date	Registration dates
16120	South Beach horse exercise area station	Beach between South Beach and the power	1833	2006-05-09
03211	Robb Jetty chimney	Bennett Avenue, Hamilton Hill	1919	1996-05-14
09242	Randwick stables (cnr Hardey St), Hamilton Hill	24 Rockingham Road 1924	1923	2001-11-23
00504	Newmarket Hotel (cnr Cockburn Road), Hamilton Hill	1 Rockingham Road	1912	2005-09-23
00533	Azelia Ley homestead, Manning Estate	34 Davilak Road, Hamilton Hill	1866 1982	1992-06-05

Figure 6.7: European heritage map

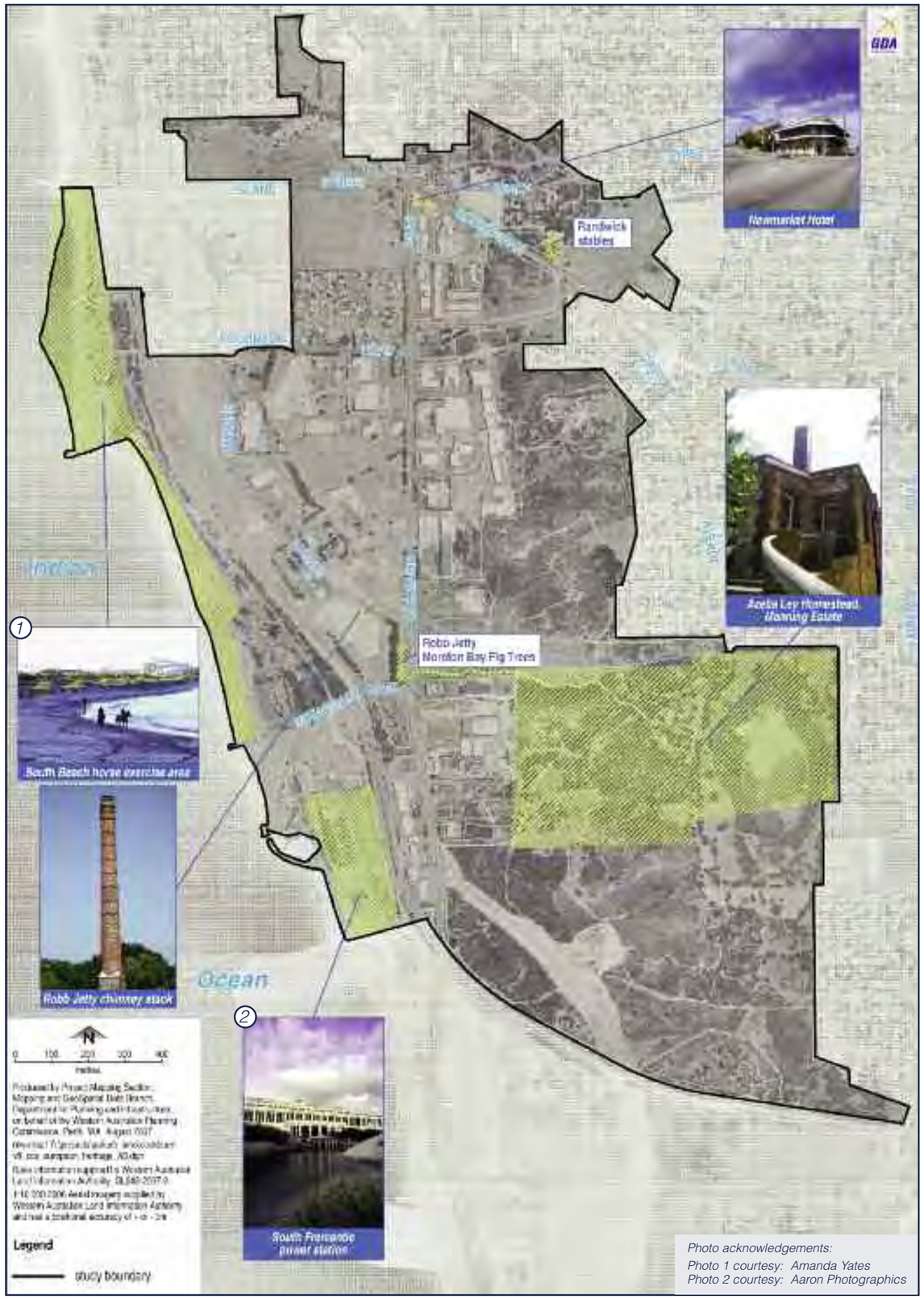


Photo acknowledgements:
Photo 1 courtesy: Amanda Yates
Photo 2 courtesy: Aaron Photographics

Table 6.7: Integrated list of heritage places

Name of place	Street No	Street name	MIHP	National Trust	AHC	Heritage Council WA
Azelia Ley homestead	34 Res 26870	Davilak Avenue	1 Cat A	Listed	INT RNE 10445	00533 PERM
Manning Park and tuart trees	Res 26870	Azelia Road	33 Cat B			10184
Marks house	1	Davilak Avenue	34 Cat B			10185
Davilak House		Davilak Road				00511
Newmarket Hotel	1	Rockingham Road (Crn Cockburn Road)	38 Cat A			00504 INT
Randwick stables	24	Rockingham Road	79 Cat A	Listed		09242 PERM
Residence	22	Healy Rd				02414
Palms and pine trees	24	Rockingham Road				12989
Rob Jetty chimney		Bennett Avenue	63 Cat A			03211 INT
Morton Bay Fig trees	Lot 9001	Cockburn Road	88			17010
Limestone office on Braden site	Lot 1815	Island Road	74 Cat D			17001
South Beach horse exercise area		Foreshore Reserve	82 Cat A			16120 INT
C. Y O'Connor statue		South Beach	81 Cat A			17006
South Fremantle power station		Robb Road	75 Cat A	Listed		03381 INT
Dianna ship wreck	Offshore				RNE 10430	
James ship wreck	Offshore				RNE 10440	

PERM - Permanent listing
INT - Interim listing

6.5 Existing infrastructure

6.5.1 Sewerage system

The site is served by reticulation sewers to all the existing industrial developments, and the Bennett Avenue No.2 sewer pump station, all of which are under the control of the Water Corporation.

The pump station requires a buffer of 50 metres from the nearest residential development, and ideally should be surrounded by public open space or similar land use. This buffer may be subject to further review during detailed structure planning.

Several lots have existing private sewer pump stations which would be required to be removed if the lots are subdivided.

6.5.2 Water supply

Existing water mains traverse the site and provide an adequate supply to the existing industrial developments.

6.5.3 Electricity

The South Fremantle switchyard terminal adjacent to the old power station is a long-term strategic asset for Western Power and the community. Several main overhead transmission lines (at 330KV and 66KV) traverse the site in an east-west direction to connect to the existing Western Power switchyard.

A number of existing pole top transformers provide 22KV high voltage and low voltage power to the existing industrial developments within the site.

6.5.4 Natural gas

Alinta has existing high pressure gas mains in Cockburn Road, along with medium pressure and standard low pressure gas mains in various other streets within the structure plan area.

6.5.5 Telecommunications

Telstra plans show existing optic fibre cables in Cockburn Road (both sides north of Clontarf Road), Rockingham Road, Rollinson Road and an extension into the South Beach subdivision.

These cables need to be protected during redevelopment earthworks, roadworks and trenching. The cables provide the infrastructure to provide a broadband service to future residents of Cockburn coast.

Standard Telstra cables exist in both verges of the roads servicing the current industrial development and will need to be protected during any redevelopment works.

6.5.6 Location of existing infrastructure

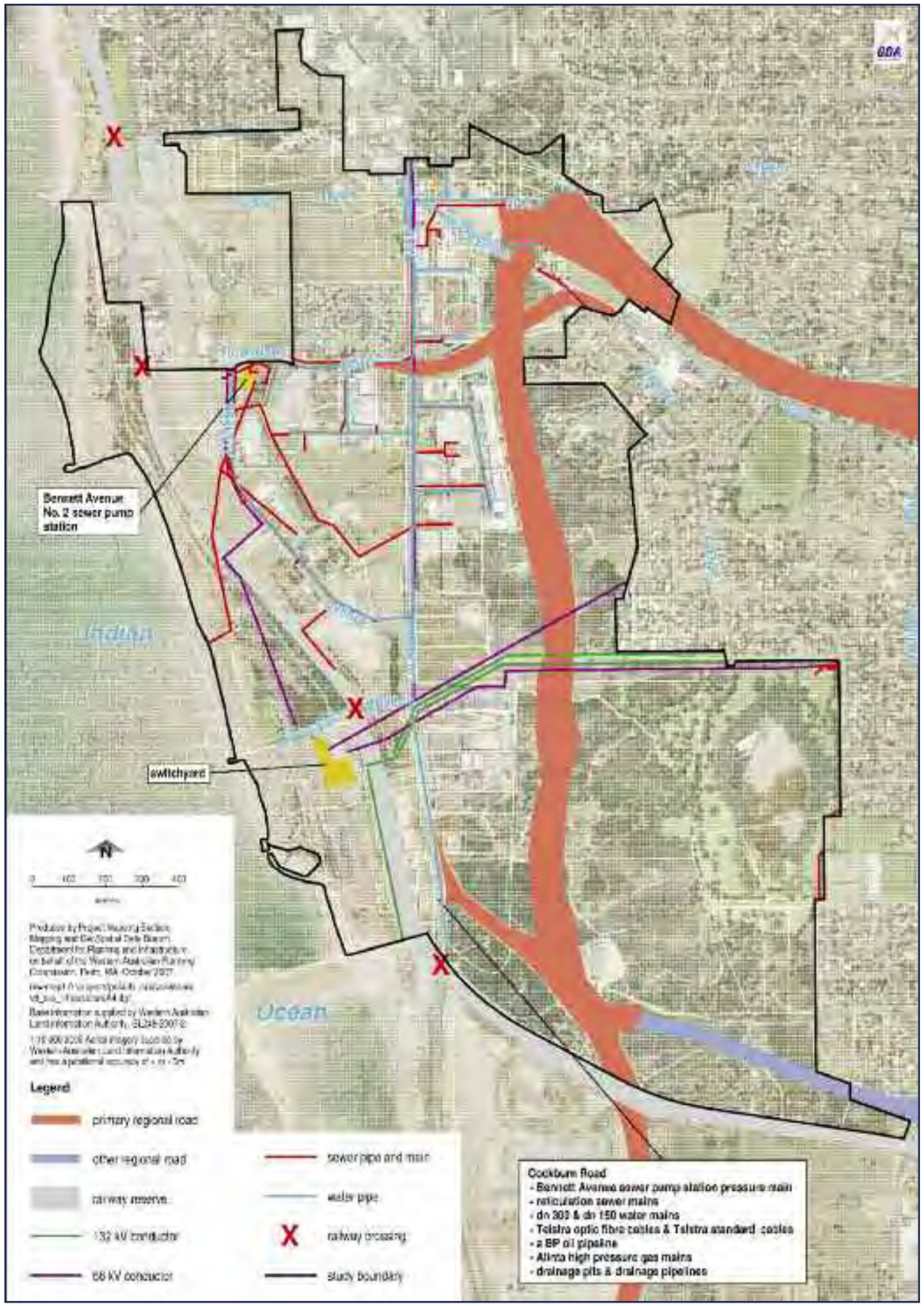
The location of the existing essential infrastructure is shown in Figure 6.8.

Cockburn Road

A number of significant services are located within the existing Cockburn Road reserve. These include:

- the Bennett Avenue sewer pump station pressure main;
- reticulation sewer mains;
- water mains;
- Telstra optic fibre cables and standard Telstra cables in both verges;
- Western Power data pilot cables;
- oil pipeline;
- Alinta high pressure gas mains; and
- drainage pits and drainage pipelines.

Figure 6.8: Location of existing infrastructure



Other roads

All the existing roads in the current industrial subdivision contain the typical array of services in the verges, suitable for servicing the current developments. These services include:

- sewer reticulation;
- water reticulation;
- power reticulation;
- Telstra reticulation;
- gas reticulation; and
- drainage pipe and pits.

6.5.7 City of Cockburn infrastructure

As well as the existing road reserves, the City of Cockburn has extensive roads, dual-use paths and car parks at the C. Y. O'Connor Reserve and other parks within the foreshore area that will need to be maintained or improved.

6.6 Transport

6.6.1 Local road network

In the close vicinity of the structure plan area, the road network is dominated by north-south routes of Cockburn Road/Hampton Road, Rockingham Road, and the future Cockburn Coast Drive (formerly Rockingham - Fremantle Highway). There is a limited number of existing east-west routes, with a westerly extension of Spearwood Avenue recently completed by the City of Cockburn to improve the east-west connection.

Cockburn Road is a primary distributor, under the care and control of Main Roads Western Australia. It carries regional through-traffic between Rockingham/Kwinana and Fremantle (and beyond) as well as traffic associated with the Cockburn industrial area and the Henderson industrial estate. Over the past 10 years, traffic volumes along Cockburn Road have reduced as a result of the discontinuity introduced at Russell Road (reinforcing Stock Road as the major north-south route) and the introduction of bus lanes along Hampton Road. The most recent (2003/04) published annual average weekday traffic flow (AAWT) for Cockburn Road, south of Rockingham Road, is 17 460 vehicles per day (vpd).

North of Rockingham Road, Hampton Road is a district distributor 'A' road and is a City of Fremantle road. While not designated as a regional road, the section of road between Rockingham Road and Douro Road carries significant traffic volumes (the most recent published AAWT for Hampton Road, south of Douro Road is 32 430 vpd), which includes regional through-traffic.

Rockingham Road, a district distributor 'A' road, is a parallel route to Cockburn Road. The most recent published AAWT for Rockingham Road, east of Cockburn Road, is 14 980 vpd.

6.6.2 Walking and cycling

There are no Perth bicycle network (PBN) routes within the structure plan area. Regional pedestrian and cyclist movement is facilitated by a coastal shared-use path connecting Woodman Point to Fremantle. From Fremantle, other regional connections are available to the wider metropolitan area.

PBN route SW10 connects to a shared-use path on Rockingham Road and provides access to the east through Beaconsfield, Hamilton Hill, Coolbellup and Bibra Lake.

Existing pedestrian and cyclist infrastructure within the structure plan area is limited to an existing shared-use path along the coast, extending south from Fremantle. This path ceases at the northern end of Robb Road and starts again south of Robb Road. A second shared-use path runs parallel to the existing freight railway from the level crossing east of Cockburn Road, connecting to Spearwood Avenue.

Following redevelopment, it will be important to ensure that pedestrians and cyclists are well catered for, both for local trips and longer regional trips.

6.6.3 Public transport

Currently only Route 126 provides a direct service through the district structure plan area. This is a low-frequency service with a northern terminus at Fremantle station and a southern terminus in Rockingham.

Chapter 7
Existing planning and regulatory framework

7.1 Planning history

Numerous planning exercises have been conducted over the Cockburn coast area in recent times, with some planning elements eventuating and others failing to progress beyond the concept stage. The two principal reasons for this lack of progress have been a failure to reach consensus on the ultimate land uses, and the complexity of the issues affecting this piece of land. The district structure plan for the Cockburn coast must address and resolve these issues, while recognising previous planning studies and their implications.

7.1.1 Vision for Cockburn coast (May 2005)

The Vision for Cockburn coast dialogue and community survey were held in May 2005, providing stakeholders, landowners and the community with an opportunity to outline their vision for the area. Participants overwhelmingly expressed a willingness to see the area redeveloped as a vibrant new urban community and provided feedback on height, density, transport links, open space, the beach interface and integration with surrounding developments.

While providing an insight into the aspirations of the community for this site, the dialogue and survey process was only the starting point for the redevelopment of Cockburn coast. The key recommendation resulting from the vision was the completion of detailed investigations and structure planning.

The vision exercise provided a foundation for the preparation of the district structure plan. As further technical information and a more intimate knowledge of the project area has been gained, the Cockburn coast reference group has added weight to and further refined the outcomes expressed through the vision.

7.1.2 North Coogee/Robb Jetty development of alternative options

A report outlining alternative development options for the North Coogee/Robb Jetty precinct was commissioned by the Department for Planning and Infrastructure and LandCorp in 2002. The report, prepared by Ecologically Sustainable Design, investigated a range of opportunities for the former abattoir site.

The report assessed a range of development options (including full industrial and primarily residential), but did not conclude that any one option was preferable. However, the report did include order of magnitude costs for site remediation, treatment of the freight rail line and other major infrastructure costs. These costs were assessed against the development potential and outlined more substantially in MacroPlan's accompanying North Coogee - Benefit Cost Assessment (2002).

It was determined through this process that, despite previous assumptions, residential and mixed use development in this location is economically viable.

7.1.3 Coogee Master Plan

The Coogee Master Plan emanated from the Heads of Agreement signed between the State Government and the City of Cockburn in 1988, and set in train the transfer of land in South Coogee (now Port Coogee) to urban uses and the development of North Coogee as a biotechnology park.

Located at the foot of the Robb Jetty abattoir, the biotechnology park was established by the former Department of Commerce and Trade to house industries associated with the processing of livestock and seafood (several of which were actively encouraged to re-locate from the South Coogee area).

After the closure (and subsequent demolition) of the Robb Jetty abattoir in June 1994, LandCorp assumed responsibility for the further development of the North Coogee area in accordance with the Coogee Master Plan. This development slowed in the late 1990s after a review of the Master Plan (unpublished), which generated considerable debate as to the suitability of progressing the area as an industrial estate.

7.2 Planning policy analysis

7.2.1 State Sustainability Strategy

In 2003, the Western Australian Government adopted the State Sustainability Strategy which defined sustainability as “meeting the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity”.

Prepared as a guide to Government decision-making, the strategy:

- defines sustainability and what it means for Government, business and the community;
- outlines tools for pursuing sustainability;
- specifies actions across Government to move towards more sustainable practices; and

- provides best practice case studies to demonstrate sustainable actions being pursued by Government and industry.

The strategy is a challenge to Government, industry and the community to consider new ideas and to be innovative in creating opportunities for interconnected environmental, social and economic outcomes.

Since the adoption of the strategy, sustainability has been at the forefront in the formation of Government policy.

7.2.2 Directions 2031

Directions 2031 Draft Spatial Framework for Perth and Peel is the guiding document for future planning of the metropolitan area.

Outlining priority strategies and actions to deliver a world class, liveable city, Directions 2031 highlights six strategic themes:

- a liveable city;
- a prosperous city;
- an equitable city;
- an accessible city;
- a green city; and
- a responsive city.

This framework promotes mixed use employment and higher density centres, linked by frequent public transport services, thereby ensuring accessbility and amenity.

Planning for Cockburn coast is aligned to the principles of Directions 2031 by:

- facilitating strong links to the surrounding activity centres of Fremantle, Port Coogee and Cockburn Central;
- promoting qualified density oriented around a high-frequency public transport service;
- planning for the development with the community and landowners;
- linking decision-making to sustainability;
- encouraging locally-based, appropriate employment; and
- providing the framework for the comprehensive redevelopment and revitalisation of the under-utilised industrial area.

7.3 State policies relating to Cockburn coast

7.3.1 Transit oriented development

Transit oriented developments (TODs) are compact, walkable communities focused around public transport nodes with development of sufficient density to support high-frequency public transit services.

TOD has become a key focus for planning of new urban areas and the redevelopment of nodes around long-standing train stations and other public transport infrastructure. The growth of TOD has been assisted by significant investment in public transport (such as the New MetroRail project) and a growing community desire for a diverse mix of uses, housing and employment situated in close proximity to quality transport services.

Support for this form of development has been encapsulated in the revised Development Control Policy 1.6 Planning to Support Transit Use and Transit Oriented Development. This policy seeks to:

- promote and facilitate the use of public transport as a more sustainable alternative to the private car for personal travel, accessibility to services and facilities (including employment opportunities, community services and recreational facilities) and to improve equity in accessibility for those who do not own or have access to a car;
- encourage spatial patterns of development that make it easier to plan and efficiently operate public transport services, and for the existing and potential users of public transport to access those services;
- encourage balanced public transport use along transit corridors by creating places that are destinations as well as points of departure;
- ensure the optimal use of land within transit oriented precincts by encouraging the development of uses and activities that will benefit from their proximity and accessibility to public transport, and which will in turn generate a demand for the use of transit infrastructure and services;
- ensure that opportunities for transit-supportive development are realised, both on publicly and privately owned land, and that transit infrastructure is effectively integrated with other development to maximise safety, security and convenience for transit users; and
- promote and facilitate walking and cycling within transit oriented precincts by establishing and maintaining high levels of amenity, safety and permeability in the urban form, and to promote and facilitate opportunities for integrating transport modes by creating opportunities for convenient, safe and secure mode change.

7.3.2 Liveable Neighbourhoods

Offering an alternative policy tool to current WAPC development control policies relating to subdivision, Liveable Neighbourhoods has been prepared to guide more sustainable forms of development in new and existing urban areas.

Both a planning and assessment tool, Liveable Neighbourhoods is applicable at both a structure planning and subdivision level, and focuses on eight core elements to deliver diverse, accessible and connected developments and communities:

- community design;
- movement network;
- lot layout;
- public parkland;
- urban water management;
- utilities;

- activity centres and employment; and
- schools.

Liveable Neighbourhoods has been applied to the development of the Cockburn coast structure plan and is fundamental to achieving a balanced, robust urban revitalisation of this under-utilised piece of coastline.

7.3.3 State Planning Policy 2.6 - State Coastal Planning Policy (SPP 2.6)

Adopted by the WAPC in 2003 and further amended in 2006, the State Coastal Planning Policy has been prepared to address planning and development issues along the Western Australian coastline. Specifically, the policy addresses development setbacks, provision of coastal foreshore reserves, foreshore management plans and height limits for urban development.

The provisions of SPP 2.6 have been closely adhered to in the future planning for Cockburn coast to ensure the relationship between built form and the foreshore is appropriate; beach access is maintained and improved; natural coastal processes are catered for; ongoing foreshore management is defined; and that height will be located so as to complement, not detract, from the amenity and aesthetics of the coastline.

A physical processes setback line and a coastal planning strategy have been determined in accordance with this policy in section 2.12.7.1.

7.3.4 State Planning Policy 3 - Urban Growth and Settlement (SPP 3)

This policy sets out the principles and considerations, which apply to planning for urban growth and settlements in Western Australia. The policy aims to facilitate sustainable patterns of urban growth and settlements.

The objectives of this policy are to:

- promote a sustainable and well planned pattern of settlement across the State, with sufficient and suitable land to provide for a wide variety of housing, employment, recreation facilities and open space;
- build on existing communities with established local and regional economies, concentrate investment in the improvement of services and infrastructure and enhance the quality of life in those communities;
- manage the growth and development of urban areas in response to the social and economic needs of the community and in recognition of relevant climatic, environmental, heritage and community values and constraints;
- promote the development of a sustainable and liveable neighbourhood form which reduces energy, water and travel demand while ensuring safe and convenient access to employment and services by all modes, provides choice and affordability of housing and creates an identifiable sense of place for each community; and
- coordinate new development with the efficient, economic and timely provision of infrastructure and services.

7.3.5 Bush Forever

Bush Forever aims to identify areas of regional significance worthy of protection to conserve the biodiversity of the vegetation on the Swan coastal plain. It is a non-statutory regional policy under the WAPC policy framework and has been endorsed by the Western Australian Government, WAPC and the Environmental Protection Authority.

Bush Forever recognises the scope to use land use planning processes to protect and manage bushland areas of significance, while accommodating compatible future development requirements.

One Bush Forever site, number 247, is located within the structure plan area covering largely the same land area as the Manning Lake portion of Beeliar Regional Park.

7.4 City of Cockburn policies and strategies

7.4.1 City of Cockburn Local Planning Strategy

This strategy was prepared in support of Town Planning Scheme No.3 and provides, among other things, an outline of the demographic trends, existing land use mix and justification for proposed changes to the scheme.

One of the key aspects of the strategy is the identification of existing land use and transport characteristics and issues related to these areas. North Coogee is specifically identified as an issue, with the Council “keen to have options for the future use of this strategically important area evaluated, given that it is at a 'gateway' into the district and also to the most picturesque piece of the metropolitan coast line”.

The strategy also addresses the issue of the South Fremantle power station and supports the power station being redeveloped, rehabilitated and re-used in the community interest.

7.4.2 Sustainability Strategy

In June 2006, the City of Cockburn formally adopted Policy SC37 Sustainability to ensure its activities and operations consider sustainability issues. In December 2006, the Sustainability Strategy was finalised to provide the context for the policy and establish responsibilities for implementation and reporting.

The strategy promotes a range of principles, with the objectives being:

- sustainable planning and development;
- balanced economic growth;
- sense of place and healthy communities;
- environmental management;
- efficient settlements and use of resources; and
- management, accountability, transparency and engagement.

7.4.3 SPD1 Bushland Conservation Policy

This policy provides council with a clear position and a range of strategies for ensuring that the conservation, protection and management of local bushland within the district is optimised.

The policy provides for:

- identification and assessment of local bushland;
- protection of bushland through the planning and development process;
- management of Council controlled bushland; and
- purchase of local bushland.

7.4.4 SPD 2 Community Facilities Infrastructure Policy

The purpose of the policy is to locate existing and future community and active recreation areas in the district, so that landowners and their consultants can be aware of the likely planning requirements when initiating re-development plans or structure plans.

Under this policy, it is expected that landowners and consultants will also have due regard for planned community facilities in the preparation of redevelopment or structure plans within the district, and that any departures from the plan will need to be justified to the council's satisfaction.

7.4.5 SPD 3 Native Fauna Protection Policy

This policy provides strategies for managing native fauna in situations where development proposes habitat removal. The policy enables council to require the preparation of a fauna management plan to address protection of existing habitats or relocation of fauna.

7.4.6 SPD 4 Wetland Conservation Policy

SPD4 provides Council with a clear position and outlines a range of strategies for the protection of wetlands within the district. The policy provides landowners with clear and consistent guidelines for development within areas adjacent to or within the influence of wetlands.

7.5 City of Fremantle policies and strategies

7.5.1 Local Planning Strategy

Under the City of Fremantle's Local Planning Strategy, the local government area is split into a number of local planning areas. The South Fremantle Local Planning Area includes and abuts some portions of the Cockburn coast structure plan area.

The objectives for South Fremantle include:

- retaining the local planning area as a predominantly medium density residential area with some higher density residential development within local centres and mixed use areas to provide for a variety of dwelling types and sizes;
- ensuring residential redevelopment is compatible with the heritage character of the built environment, streetscapes, urban spaces and the amenity of adjoining properties;
- ensuring the development of neighbourhood centres, local centres and mixed use areas as vibrant community hubs that serve the day-to-day and weekly needs of nearby residents;
- providing appropriate zoning and development controls to promote the continued development of designated mixed use, commercial and industrial areas and to ensure compatibility between areas;
- facilitating the environmental remediation and redevelopment of contaminated sites;
- preserving and enhancing the natural environmental features of the local planning area, especially the coastal features and access; and
- ensuring safe access and movement for pedestrians and cyclists.

7.5.2 Fremantle at the crossroads - Transport Plan 2003-2007

The overarching policy objective for the transport strategy is “the creation and maintenance of a safe, integrated and sustainable transport system that maximises accessibility for all”.

The strategy was prepared by the City of Fremantle to analyse the transport trends and traffic growth, with a view to implementing travel demand management initiatives. These initiatives are driven by the following principle:

“Integrated transport planning requires catering for all transport modes. The needs of one user group should not be sacrificed to meet the needs of another user group. Vulnerable road users - pedestrians and cyclists - require particular attention. Programs to encourage walking and cycling will be compromised if transport infrastructure continues to provide for high speed car travel leaving a hostile environment for these environmentally friendly modes.”

7.5.3 Green Plan (2001)

The Green Plan has five key objectives and outlines specific strategies and actions for implementation:

- to maintain and enhance green spaces in Fremantle;
- to increase the quantity and improve the distribution of green spaces in Fremantle;
- to increase and improve linkages between green spaces;
- to increase the amount of flora/vegetation cover and increase habitats for native fauna and encourage their movement between green spaces; and
- to protect existing vegetation and encourage the greening of private property.

7.6 Statutory planning context

7.6.1 Metropolitan Region Scheme

Being a substantial land area, Cockburn coast is classified into a number of zones and reserves under the MRS. Much of the land area is zoned for either industrial purposes or parks and recreation, including the foreshore, South Fremantle power station and the Manning Lake portion of Beeliar Regional Park.

The South Fremantle landfill site and land within the north-east segment of the project area are zoned urban under the MRS. These areas have been included within the structure plan boundaries primarily to investigate, and where possible resolve, transport and integration issues at the northern interface.

Reservations for regional infrastructure include primary regional road (Fremantle-Rockingham Controlled Access Highway) and other regional road reservations (Spearwood Avenue extension) traversing the site, as well as the freight rail reservation and the public purpose reserve designated over the switchyard site.

The zoning of Cockburn coast under the MRS is shown in Figure 7.1.

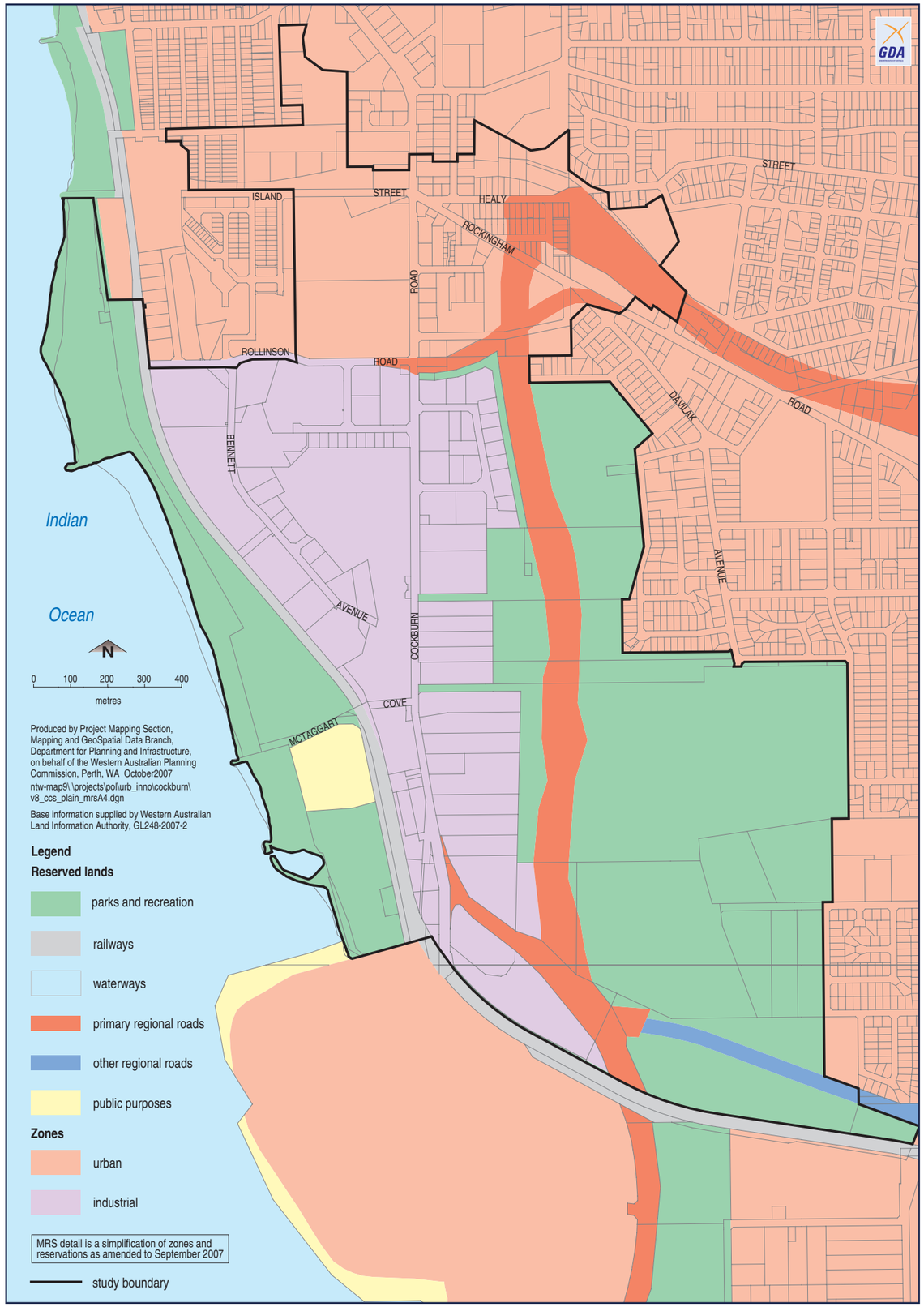
In the absence of a redevelopment authority to undertake further detailed planning for the Cockburn coast, the structure plan will guide the rezoning of industrial land to urban.

7.6.2 City of Cockburn Local Planning Scheme

Gazetted in December 2002, the City of Cockburn's Local Planning Scheme No. 3 covers the vast majority of the Cockburn coast structure plan area.

The subject land is zoned primarily as Industry and Light Industry, with the balance being MRS reserves (primary regional road, parks and recreation and public purpose).

Figure 7.1: Metropolitan Region Scheme



7.6.3 City of Fremantle Local Planning Scheme

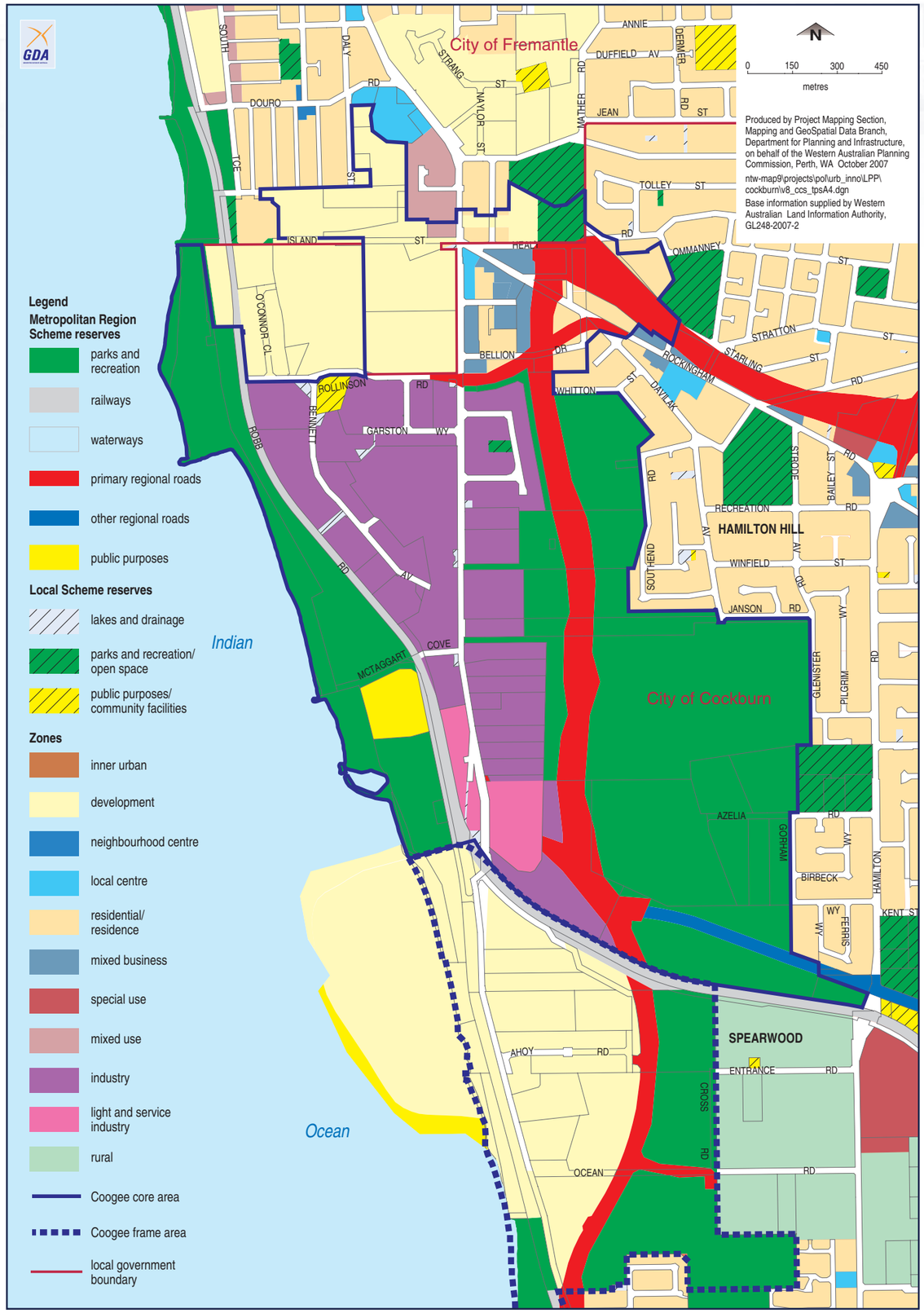
Only three areas within the Cockburn coast area fall within the jurisdiction of the City of Fremantle - the South Fremantle landfill site, the Fremantle Chalet Village and 5.7 hectares of land in the Clontarf Hill area.

Under Local Planning Scheme No. 4, gazetted in March 2007, the landfill site and the Chalet Village are classified as Development Area 2 and Development Area 3 respectively, with Clontarf Hill zoned as Development Area 19 and open space.

An approved structure plan is required under the scheme prior to any further development of development area sites.

Zoning under both local planning schemes is shown in Figure 7.2.

Figure 7.2: Local planning scheme zoning



7.6.4 Improvement Plan No. 33

This plan was gazetted in June 2006 under the Planning and Development Act 2005, and covers the entirety of the district structure plan area. It was enacted to give certainty to landowners within the Cockburn coast area, by giving the WAPC the power to determine development applications as well as the local government authority.

The plan also enables the WAPC to obtain land through negotiation with the landowner or on a compulsory acquisition basis.

When determining applications, the WAPC must have regard for current and future plans for the area, thereby providing an effective mechanism to resolve planning and development where land use is subject to change. Improvement Plan 33 is detailed in Figure 7.3.

7.7 Existing uses

7.7.1 Industrial

A number of substantial businesses continue to operate within the area zoned industrial. Several of these have a long association with the area, largely relating to the Robb Jetty abattoir and processing of animal by-products.

More recently, several large-scale operations have been established in the Cockburn coast area following the redevelopment of the Robb Jetty industrial estate as a biotechnology park focusing on food and seafood processing industries. Today, Fremantle Cold Stores and Alba Edible Oils are the largest industrial businesses operating within the area, with substantial capital invested in the development of these premises over the last few years.

Planning for future land use change must acknowledge the investments that have been made and the existing use rights of these operators in accordance with their current approvals, ensuring that these activities can continue until such time as it is feasible for redevelopment.

7.7.2 Service industry

The first stage of subdivision under the Coogee Master Plan, Emplacement Crescent, is characterised by service industry and service commercial uses, which have been constructed since 1999. Mostly pre-fabricated concrete buildings, the focus of this precinct is warehouse-type uses.

Many of these uses are not directly related to the marine processing or biotechnology industries and do not necessarily require the separation of land uses attributed to the industrial zoning, being neither noxious, noisy nor intensive.

7.7.3 Commercial

There are a number of commercial businesses located within the project area, such as Craft Décor and Tradelink plumbing supplies. The majority of these showrooms are located along the north-eastern section of Cockburn Road.

7.7.4 South Fremantle landfill site

Since the closure and capping of the landfill site, much of the area has informally been used as public open space by local residents.

The southern portion of the landfill site was transferred into freehold title in the mid-1980s and subsequently developed for affordable accommodation. Known as the Fremantle Chalet Village, it houses approximately 80 residents.

Development options for the landfill site and the approvals process for this site are discussed further in chapter 5.10.

7.7.5 Public purposes

A number of sites for public purposes are located throughout the project area, including drainage reserves and public utility infrastructure. The largest of these are the Western Power switchyard, located adjacent to the South Fremantle power station (4 hectares) and the Water Corporation pump station (1.1 hectares) situated on the corner of Bennett Avenue and Rollinson Road.

7.7.6 Residential

Residential land is confined to the north east of the structure plan area, both north and south of Rockingham Road. To the south of Rockingham Road, residential development largely consists of relatively recent strata developments, while to the north many properties remain single dwellings.

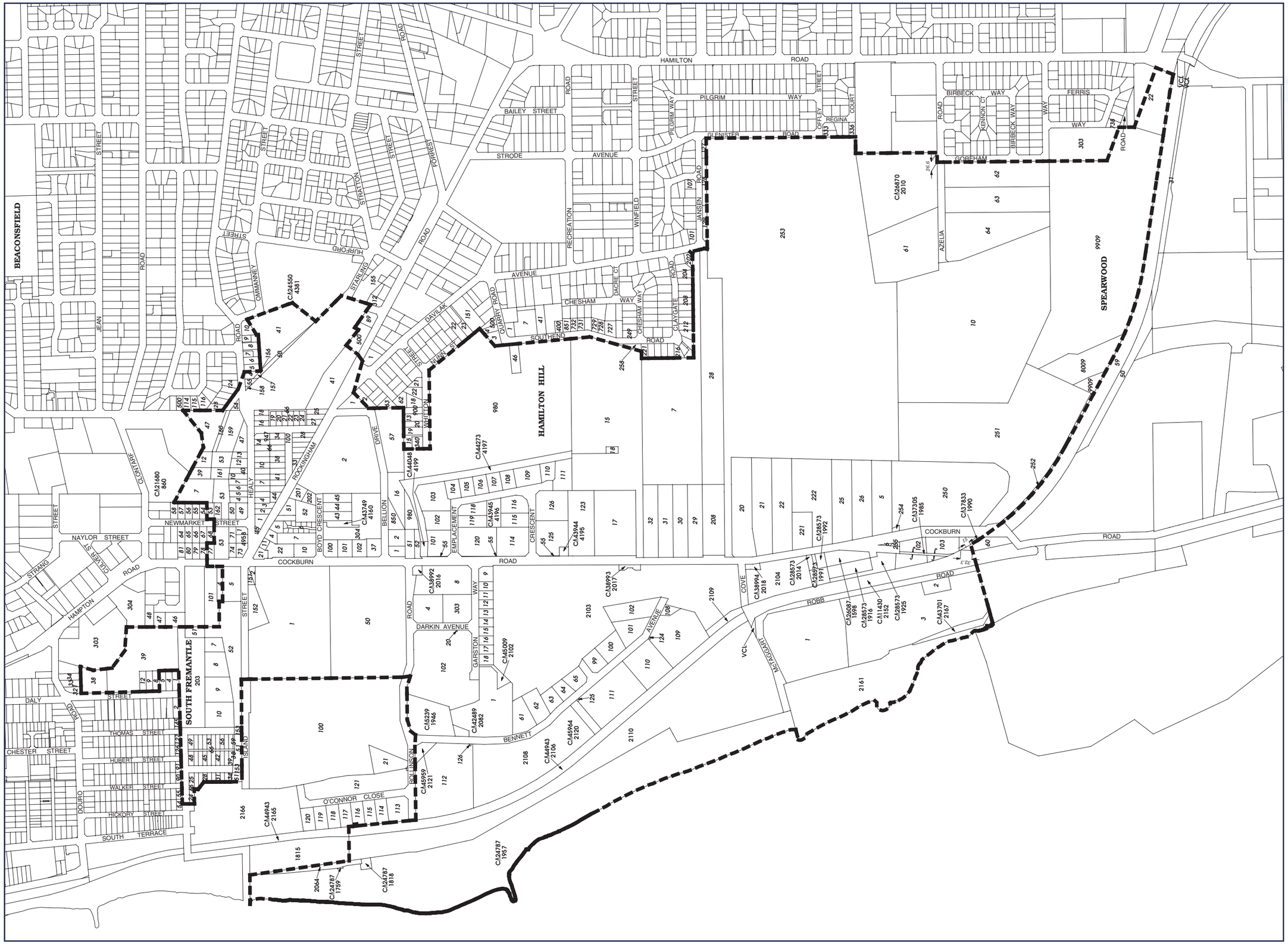


Figure 7.3: Improvement Plan 33

Chapter 8
Sustainability

8.1 Sustainability framework

The sustainability framework is an extension of the Directions 2031 philosophy and the regional framework. It acknowledges social, cultural, environmental and economic inter-dependencies and the challenge of long-term thinking and planning. The sustainability framework, therefore, focuses on developing a resilient Cockburn coast that can adapt to change by building strong communities and designing flexibility into its economy, infrastructure and buildings.

The Cockburn coast sustainability framework in collaboration with the regional and urban design framework seeks to translate the vision, “to create a vibrant, landmark destination that is connected, integrated, diverse and accessible,” into reality.

Sustainability themes for the district structure plan area within the Cockburn coast are to:

- encourage best practice design, technologies and concepts;
- create diversity in uses, housing, people and experiences;
- foster innovation in the planning of new communities; and
- generate an integrated, connected, efficient and exciting new urban area that extends on the existing natural assets of the location.

The themes are a statement of what is to be achieved and have been couched in terms which are measurable. The Cockburn coast sustainability framework builds on the regional framework and the above core themes to promote long-term sustainability at various stages of the development process.

The sustainability framework includes an electronic tool to assess structure plan options and rate their level of sustainability. The assessment tool draws together, in a comprehensive fashion, City of Cockburn and State Government policies that are relevant to major development in the Cockburn coast. Its development has required the formulation of precise definitions and measures, resulting in greater clarity of the expectations for development outcomes. As such it fosters a consistent and coordinated response to major developments and for development proponents.

In addition, the sustainability framework has been developed to ensure implementation of the regional framework measures and targets and sustainability principles at local and subdivision stages through a series of strategies. Development proposals and programs can be measured by the tool to facilitate triple bottom line benefits through all stages of structure planning and subdivision. In the future, agencies and the community will also be able to assess and monitor the sustainable performance of the project and its component parts.

8.2 Sustainability framework overview

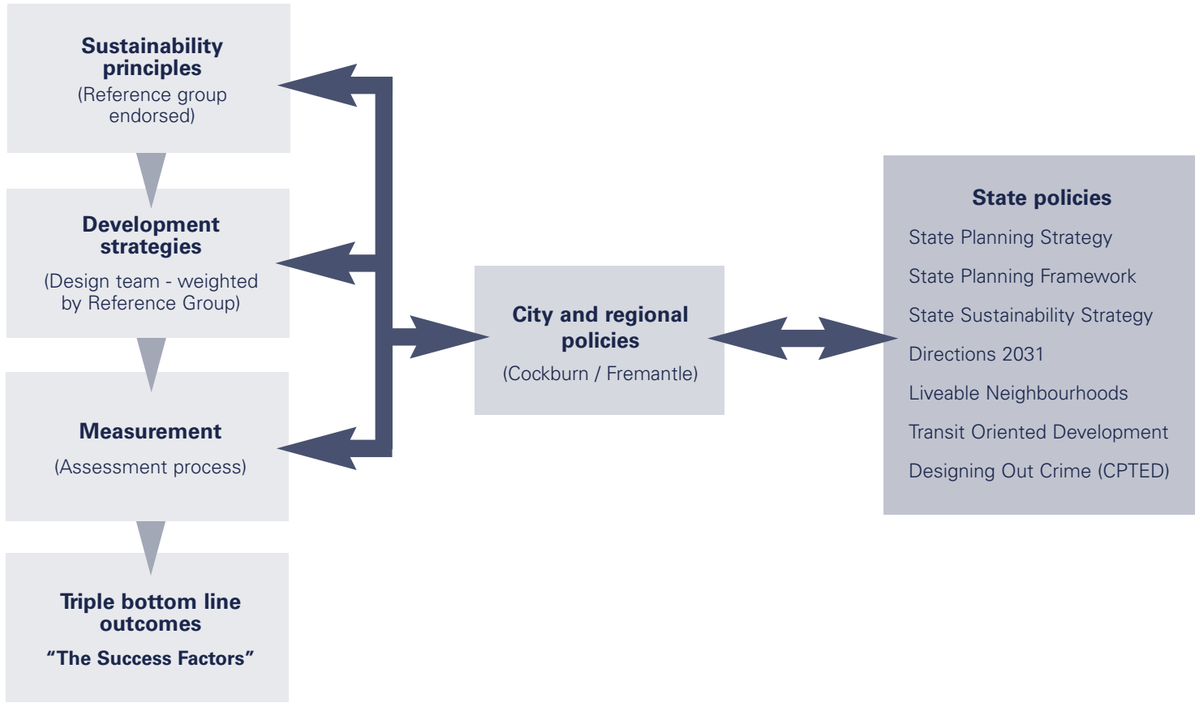
The Cockburn coast sustainability framework is a matrix with five basic elements:

- the set of development elements (the structure plan or development proposal);
- the set of criteria (principles and strategies) to evaluate the elements;
- numerical weights on each set of the criteria based on their relevance to the overall principles for the development area;
- numerical assessment (measures) of how well each option satisfies each criterion; and
- a rating system (score) for proposals, which exceed the standard development option.

The sustainability framework is based on the regional framework and on a set of guiding principles (and development strategies) formulated by the design team. The strategies were assembled from various sources including national, state and regional policies. The structure plan concepts were assessed using a set of measures, which include targets. The level of compliance or departure from the measures and targets is identified in the tool. A weighted score is given for each response and a final score or rating enables the proponent and the assessor to consider modifications or areas of performance excellence.

The purpose of the sustainability framework in the first instance was to enable comparison of various district structure plan options. It is expected that the framework will now be used to monitor the progress of the project and to ensure that it meets sustainability objectives. The flow chart (Figure 8.1) illustrates the process for designing the Cockburn coast sustainability framework.

Figure 8.1: Process for designing the Cockburn coast sustainability framework



8.3 Sustainability principles

The sustainability principles provide a strategic direction and a united approach to achieve the Cockburn coast vision.

The Cockburn coast sustainability principles include:

- telling the story of the Cockburn coast through the identification, management and promotion of significant sites that contribute to the area's cultural heritage and to build on these unique features to provide a sense of place;
- demonstrating innovation in the development of Cockburn coast through the application of best practice technologies and design;
- demonstrating a range of affordable housing strategies;
- promoting efficient use of resources, land and infrastructure;
- encouraging development that is commercially feasible, attractive to the market and to the wider community;
- ensuring diversity of land uses to facilitate locally-based employment, providing services that are appropriate to the needs of the local and wider community;
- demonstrating best practice, responsible environmental management, facilitating remediation and rehabilitation;
- providing opportunities for the use of alternative transport modes, through the provision of quality transport, cycling and pedestrian infrastructure combined with an interconnected urban design;
- capitalising on the exceptional natural assets of the Cockburn coast through improvement, enhancement and provision of greater access to the local environment;
- demonstrating efficient land use and transport in the structure plan through the application of transit oriented design principles; and
- engaging the community in the planning, design and development of the Cockburn coast, instilling a sense of ownership and ensuring equitable outcomes.

These principles form the basis of the sustainability framework, used in assessing the sustainability of structure plan options, and to guide future planning. The principles are broad, over-arching statements that incorporate guidance on environmental, social and economic (triple bottom line) elements. In order to formulate a triple bottom line assessment framework, it has been necessary to translate these principles into specific environmental, social and economic strategies that will achieve outcomes consistent with the sustainability principles.

8.4 Cockburn coast development strategies

The Cockburn coast development strategies form a plan of action to address the outcomes implied by the principles. Each strategy contains measures, weightings and targets against the three pillars of sustainability, environmental, social and economic.

The final strategies are as follows:

Environmental

- maximise energy efficiency;
- maximise water efficiency;

- responsive to climate change; and
- maintain biodiversity.

Social

- site responsive design;
- high levels of connectivity;
- maximise safety/wellbeing;
- interpret sites of significance;
- diverse housing form/dwelling type;
- range of housing affordability options;
- social diversity/integration;
- high speed/frequent public transport;
- access to public transport;
- maximise alternate modes of transport;
- community and stakeholder consultation and participation; and
- universal access design.

Economic

- maximise public benefit (financial) from expenditure;
- maximise scale and diversity of employment base;
- promote economic development and employment opportunities; and
- best practice information technology and telecommunications.

A weighting process enabled all members of the Cockburn coast reference group to have individual input into the framework, and to arrive at an overall group average weighting. To do this, the relative importance of each strategy was scored by reference group members, with each strategy given a ranking out of 10 (10 being the most important, 1 being least important). Each sustainability component was given equal weighting (33.3 per cent) and each strategy listed a relative percentage within each component.

The results of the weighting exercise demonstrated that:

- maximising water efficiency is the most important environmental consideration;
- access and frequency of public transport are the most important social considerations; and
- best practice information technology and communications and maximising public benefit from expenditure are the most important economic considerations.

The full results of the strategy weighting exercise are shown in Table 8.1.

The strategies have been weighted by their importance in achieving the principles. These strategies and their relative weighting form the basis for the Cockburn coast sustainability framework. The parameters used in the weighting process are consistent with the triple bottom line measures used in sustainability reporting frameworks.

To enable the sustainability tool to function as part of the structure plan development and assessment process, a series of measures were developed. The measures help to determine the level of compliance of the structure plan.

8.5 Cockburn coast measures and rating

In response to the challenge set by the State Sustainability Strategy, the WAPC has developed a suite of policies and strategies to achieve more sustainable development outcomes, ranging from overarching statements of planning policy, to the Directions 2031 policy, down to the subdivision design guide Liveable Neighbourhoods.

The sustainability measures for the structure plan area were sourced from federal and State policies such as the Greenhouse Policy and State Sustainability Strategy and from WAPC planning statements and policies. At a local level, criteria from the City of Cockburn Local Planning Strategy and data sets from the 2006 ABS Census have been included. The key data sets are:

- base demographics;
- dwelling types/household types;
- likely dwelling typology based on projected household types;
- current local and regional employment base worker profile; and
- employment targets/self-sufficiency.

The list of criteria was refined on the basis that they were relevant to the local Cockburn situation, easily understood, measurable, comparable and with base data and targets that could be readily accessed or prepared quickly. Subsequent reviews should always assess the applicability of the criteria and should consider the introduction or deletion of new or existing criteria on their merits.

Based on these measures, structure plan options that respond very well to the more important considerations, as weighted by the reference group, would score more highly. Those which respond less well to important considerations will not be scored as highly.

For example, options and proposals for the structure plan area were to be scored on the basis of achieving a minimum 40 per cent employment self-sufficiency ratio. Extra points were awarded to those development proposals that provide additional employment potential in more innovative industries and added to the diversity of the local employment base.

While some elements are measured against a matrix (as in the case of housing) other measures or criteria are presented in checklist format (it either meets the criteria or it doesn't). This applies to the remainder of the social and economic sections and the whole environmental section.

Following testing and refinement of the framework, it was considered an appropriate tool to enable preliminary assessment of the structure plan options.

The sustainability framework was used to assess the planning options that were developed. The outcomes of this assessment process were used when developing and refining the concept plans and preferred structure plan.

The strength of the process is that it not only worked closely with landowners and stakeholders over a series of meetings, it also worked with the established State Government policy context (such as a requirement to intensify development within inner or existing urban areas, or ensure a degree of employment self sufficiency).

The evolution of the structure plan has demonstrated how a planning exercise can actively involve stakeholders in the formation of a structure plan as well as in the development of a sustainability framework by which the plan is assessed. While this framework will not be the final determinant on whether a proposal is approved, it will encourage discussion and refinement, and help promote a common understanding of sustainability, and how it applies to the Cockburn coast.

8.6 Future use of the sustainability framework tool

Different levels of information (areas of detail) are relevant at the various stages of a sustainability assessment, namely district structure plan, local structure plan and subdivision stages. While at this stage of the planning process the district structure plan has been assessed, it follows that an assessment will be required for subsequent local structure plans and subdivisions. These stages will need to demonstrate, through the use of the tool, compliance with the regional framework, a consistent sustainability theme, a high level of continuity and commitment in all social, environmental and economic outcomes and will require a consistent approach to assessment by the assessing authority and the various proponents. This means that the tool should be integrated into the negotiation and approval process wherever possible by the assessor and should be available for self assessment by the proponent.

8.6.1 District-level planning

District-level planning is carried out over an extensive identified geographic area. Land developers who own land in the district structure plan area, in conjunction with the responsible planning authorities including the City of Cockburn, City of Fremantle and State planning agencies, are likely to carry out the planning for the

Table 8.1: Sustainability framework and respective measures

TBL component	Strategies	Weighting against principles	Measures
Environmental	Maximise energy efficiency	8.9%	- % lots with solar orientation - Minimise demolition - Target waste management/recycling
	Maximise water efficiency	9.0%	- Total district water cycle management plan - Target grey water re-use
	Responsive to climate change	7.7%	- Climate change responsive built form and technologies - Coastal setback compatibility with coastal processes
	Maintain biodiversity	7.6%	- Use of endemic landscape species - Green/ecological links - Foreshore management plan - Area of conservation reserve (m2)
Social	Site responsive design	2.8%	- Amount of natural features integrated and promoted - Integration of existing/new active/passive POS
	High levels of connectivity	2.6%	- High pedestrian permeability and legibility - % homes with 100m, 400m and 2km of POS/facilities/services
	Maximise safety/wellbeing	2.8%	- Compliance with CPTED
	Interpret sites of significance	2.6%	- Conservation and heritage management plan - Govt/private commitment to public art/ cultural heritage
	Diverse housing form/dwelling type	2.8%	- % mix standard/medium/high densities and dwelling yield
	Range of housing affordability options	2.6%	- % affordable and types of affordable housing
	Social diversity/integration	2.4%	- Degree of integration of elements to achieve social diversity
	High speed/frequent public transport	3.1%	- Quality rating of public transport options
	Access to public transport	3.1%	- TOD/ped shed measures
	Maximise alternate modes of transport	2.9%	- Cycle network provision
	Community and stakeholder consultation and participation	2.9%	- Involvement in decision making
	Universal access design	2.6%	- % adaptable buildings
Economic	Maximise public benefit (financial) from expenditure	9.3%	- Extent of departure from commercial best practice - Internal rate of return on project
	Maximise scale and diversity of employment base	7.0%	- Employment self-sufficiency
	Promote economic development and employment opportunities	7.5%	- Extent of economic development program
	Best practice information technology and telecommunications	9.5%	- % dwellings with access to broadband technology - % businesses with access to broadband technology

area. It is usually at this stage that district roads, centres and servicing are placed. The regional analysis and sustainability tool encouraged more information to be considered at this stage, including:

- site selection, land use justification and planning context;
- broad biodiversity and open space issues;
- flood risk, drainage management, sustainable urban drainage systems;
- transport accessibility and efficiency;
- housing affordability and tenure mix;
- mixed use components;
- employment generation;
- density and form;
- utility and technology provision;
- building adaptability and existing building reuse proposals;
- non-vehicular circulation and access; and
- future implementation and phasing proposals.

Aspects of energy conscious design, renewable and recycled resource use, design for health and safety and life cycle considerations may also need to be considered at district structure plan stage to reap the greatest sustainability potential from the site.

8.6.2 Local structure plans

Local structure plans involve a more detailed level of planning for a specific local area. These plans usually show the general layout of all roads for that area, specific sites for public open space, schools and drainage. The preparation of structure plans is generally done in accordance with the prevailing planning scheme and State government guidelines. The tool will now encourage a greater level of detail on all aspects of development at the local structure plan stage, including proposals for streetscape and character, area-wide urban design, universal access, building materials selection and relationship to adjacent communities. It is at this level that specific commitments regarding community and economic programs will be identified.

Appendices

- glossary
- abbreviations
- reference list
- public submission form

CockburnCoast

Appendix A: glossary

Area of influence
The land surrounding the district structure plan area, generally accessed within a 20 minute travel time and having a direct relationship with the study area in terms of employment, demographics, transport and access, development and recreational opportunities.

Clause 32
A statutory mechanism under the Planning and Development Act 2005 that provides for the dual determination of development applications by the local government authority and the WAPC.

Department of Planning
The State government department responsible for providing advice and planning services to the WAPC and Minister for Planning and Infrastructure.

Development
Any change to land use, including housing, any demolition, erection, construction, alteration of or addition to any building or structure on the land and any excavation or other works.

Development contribution
A fee or contribution charged against a development for the provision of infrastructure and other items.

Directions 2031
The draft metropolitan strategy covering the Perth metropolitan region and the shires of Mandurah and Murray in the Peel region.

Employment self-sufficiency
The total jobs available in a particular area as a proportion of the number of people in the workforce living in that area.

Gross subdivisible area
The total site area of a subdivision proposal, less deductions for non-residential uses such as school sites, drainage sites, retail and related land uses, community facilities etc.

Hydrogeology
The study of groundwater, groundwater flows, quality and the distribution of aquifers.

Improvement Plan
A statutory mechanism applied under the Planning and Development Act 2005, enabling the WAPC to determine development applications and enter into arrangements for the purchase of properties within the affected area.

Inclusionary zoning
Provisions within a local planning scheme, or local planning policy, requiring a share of new dwellings constructed to be affordable to those on low to moderate incomes.

Land use classification
The allocation of land uses in the district structure plan to guide future planning and development, and to inform the rezoning of the land.

Legibility
Where the design of the street system provides a sense of direction and connection, giving clear signals regarding the spatial layout and geography of an area.

Liveable Neighbourhoods
A design and assessment tool published by the WAPC for structure plans and subdivisions.

Local planning scheme
A set of provisions that identifies the way the land in the scheme area is to be used and developed. It may comprise a scheme map(s), text and usually an explanatory report. Formally referred to as town planning schemes (TPS).

Metropolitan Region Scheme
The regional planning scheme for the Perth region

Mixed use
The compatible mixing of a range of appropriate uses, integrated in close proximity either vertically in a building or adjacent to each other.

Residential design codes (R-Codes)
A state planning policy adopted by the WAPC that contains provisions relating to residential density and development standards - also known as the R-Codes.

Sleeving
The process of constructing a veneer of buildings such as car parking and shop facilities around a large, bulky building and/or infrastructure that does not rely on street frontage.

State planning policy
A WAPC policy made under the provisions of the Planning and Development Act 2005, concerning general or broad planning controls, or matters which may be the subject of a local planning scheme or which relate to a specific region or area of the state.

Strategic planning
The provision and coordination of long term land use planning and development.

Statutory planning
The legal form of planning where legislation and planning law prescribe the procedures for preparation, adoption and implementation of controls for land use and development.

Streetscape
The visible components in a street between the facing buildings, including the form of the buildings, garages, setbacks, fencing, landscaping, driveway and street surfaces, utility services and street furniture.

Structure plan
A plan that provides a framework for the coordinated provision of land use, development, infrastructure and allocation of services at either the regional, district or local level.

Subdivision
The division of land into lots.

Sustainable development
The ability to meet the needs of the present, without compromising the ability of future generations to meet their needs.

Transit oriented development
Mixed use development designed to maximise use and access to public transport infrastructure through density, land use diversity and legible networks.

Western Australian Planning Commission
The Western Australian Planning Commission (WAPC) is responsible for urban, rural and regional land use planning in Western Australia.

Zones
The classification of land in local planning schemes for use and development, excluding land in reserves.

Appendix B: abbreviations

ACMC	Aboriginal Cultural Material Committee
AHD	Australian height datum
BRT	bus rapid transit
CAH	controlled access highway
DA	development application
DAP	detailed area plan
DEC	Department of Environment and Conservation
DET	Department of Education and Training
DIA	Department of Indigenous Affairs
DP	Department of Planning
DSP	district structure plan
EPA	Environmental Protection Authority
FEB	Fremantle Eastern Bypass
gla	gross lettable area
ha	hectares
IP	Improvement Plan
LGA	local government authority
LPS	local planning scheme
MRS	Metropolitan Region Scheme
MRWA	Main Roads WA
nla	net lettable area
POS	public open space
PRR	primary regional road
RDA	Redevelopment Authority
ROM	Regional Operations Model
SDA	special development areas
SPP	State planning policy
SRG	stakeholder reference group
TOD	transit oriented development
vpd	vehicles per day
WAPC	Western Australian Planning Commission
WSUD	water sensitive urban design

Appendix C: reference list

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