

August 2007

The future of **east** Wanneroo

Land use and water management
in the context of Network City



Prepared by the
Western Australian
Planning Commission
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Foreword

East Wanneroo has been a traditional market gardening and rural area with a rich and colourful history. With the drying climate now being experienced, many market gardens are having operational difficulties because of limited water supplies. Apart from this, there have been many changes in this part of the north-west corridor and the City of Wanneroo as Perth continues to grow and expand.

These problems became very apparent to me through consideration of a large number of appeals against unsuccessful subdivision applications for horticulture lots where there was no water allocation.

To deal with this in a systematic manner, in 2002 I established a community consultative committee chaired by the Member for Wanneroo, Dianne Guise MLA, who has worked with the community to respond to these issues.

The committee proposes solutions to the competing demands for groundwater, future land use and development, and environmental protection. The committee is confident that its proposals will see the continuation of a horticultural industry in the north-west corridor.

Public consultation is an important part of the planning process and has been an integral part of preparing the land use concept for east Wanneroo.

I thank Dianne and her committee for their excellent work in developing a broad framework within which future land changes can be accommodated.

A handwritten signature in black ink that reads "Alannah MacTiernan". The signature is written in a cursive style.

Hon Alannah MacTiernan MLA
Minister for Planning and Infrastructure

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S

ummary

The 1992 North-West Corridor Structure Plan and the City of Wanneroo's 2000 Interim Local Rural Strategy have provided the planning framework for land use decision-making in the east Wanneroo area. These and other government policies have promoted the retention of rural land in east Wanneroo for agricultural and horticultural purposes.

Urban development is rapidly occurring on existing urban zoned land in the east Wanneroo area and there are increasing land use conflicts and pressures for further change.

Community uncertainty, climate change, declining watertable levels over the Gngangara Mound, impacts on the groundwater dependent ecosystems, declining public and private water supply and changing agricultural economics, have all led to this review of future land uses and water resource management issues in east Wanneroo.

Consultation with the community has been a key consideration. A preliminary discussion paper was released in 2004, several public meetings were held, a draft strategy was released in November 2005 on which 688 submissions were received, and a community consultative committee, chaired by the local Member of Parliament Mrs Dianne Guise, has had a significant input.

The proposed concept will result in major land use changes in south-east Wanneroo from rural to future urban, and the possible establishment of a new agricultural and horticultural area in northern-east Wanneroo to replace those southern areas lost to future urban development.

This will be determined through detailed investigation into the feasibility of establishing a new agricultural and horticultural area in north-east Wanneroo, based on the options available for the use of recycled water from the Beenyup and/or future Alkimos wastewater treatment plants. Any proposed land use changes and water management strategies need to be coordinated under the overall umbrella of agreed sustainable management policies for the Gngangara Mound water resource.

The Gngangara Mound is a major part of the existing and future public drinking water supplies for the developing Perth metropolitan area, supporting and protecting environmental assets and values over much of the north-west corridor. A more holistic view of the broader considerations of the management of the land and water resources of the Gngangara Mound is being considered in the Gngangara sustainability strategy that is to be prepared by the Department of Water.

At the same time, a sustainable future urban structure will be defined for east Wanneroo, together with future road and public transport networks, activity centres and corridors and population targets. Strategies will be developed to deliver diverse employment opportunities and movement modes other than the car. There will need to be an agreed implementation process to support a future Metropolitan Region Scheme (MRS) amendment from rural to urban deferred for identified areas.



1 Introduction

Traditionally, east Wanneroo has been a major centre of local economic and employment activity based around agricultural and horticultural land uses. Land use decision-making and planning policy at the state and local government levels has been based on the North-West Corridor Structure Plan. This plan resulted in identification of the current urban and urban deferred areas east of Wanneroo Road, the existing special rural zones and the remaining area in south-east Wanneroo retained in the rural zone for rural uses and landscape protection. In north-east Wanneroo, a basic raw materials area (Nowergup), an agricultural area (east Carabooda) and a rural/landscape protection area (east of Wanneroo Road) were identified.

State and local government planning policies have been focused on controlling and limiting the development and subdivision of rural land and promoting productive agricultural/horticultural land uses and minimising conflicts between incompatible land uses.

This policy approach has been implemented based on the assumption that there are few constraints to using groundwater and rural zoned land for rural, agricultural and horticultural uses. Due to climate variation and lower rainfall conditions the situation has now clearly changed.

Although horticulture is a significant social and economic activity in Wanneroo, there is little prospect of new water licences and allocations being made available in the Wanneroo groundwater area, particularly the southern area south of Flynn Drive, to enable new or the expansion of horticultural uses and land to be irrigated. Overall planning and management of the Gngangara Mound groundwater resource is entering into a new phase where declining watertable levels and availability of groundwater are major limiting factors affecting the area and the whole community.

Landowners in east Wanneroo have been seeking a resolution to complex land use and water management issues for many years.



2

Study Area

The area being considered includes land zoned rural and reserved for parks and recreation in the MRS in east Wanneroo, from the northern areas of Carabooda and Nowergup south, through to Mariginiup and Gnangara. The area also includes the land in the Wanneroo groundwater area in the urban, urban deferred and industrial zones and some areas with the priority source protection areas in the underground water pollution control area and State Forest 65 (figure 1).

2.1 Aim and objectives

Aim

To identify the future of east Wanneroo in the context of Network City and to prepare a concept for sustainable land use and water management by integrating land use planning and future development with water resource planning objectives, the allocation of land for agricultural uses, the protection of basic raw materials, environmental values and landscape features, for the benefit of the whole community.

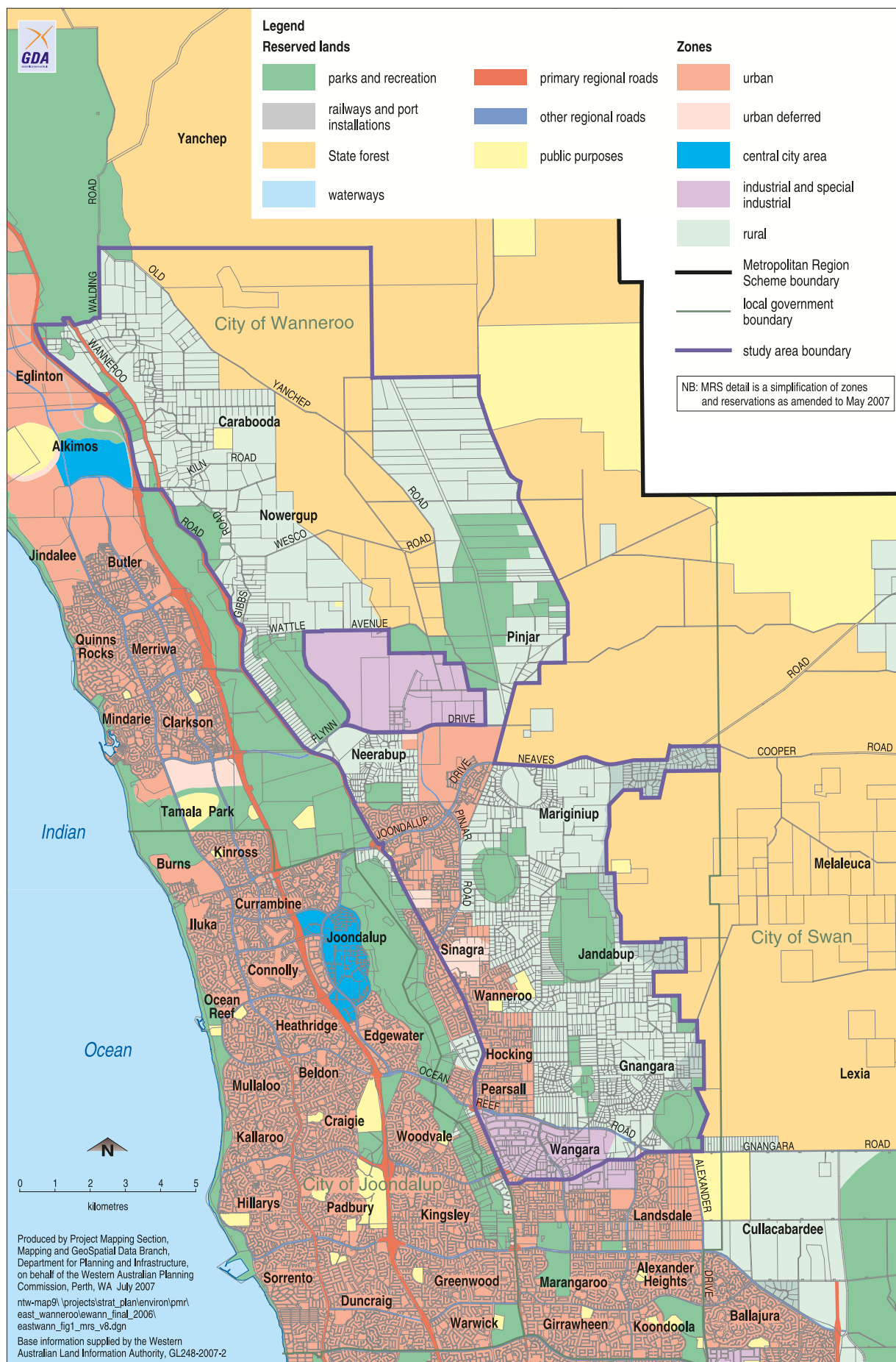
Objectives

The principal objectives are to:

- provide a framework for land use decision-making that promotes the best use of limited water resources, productive agricultural lands and provides opportunities for future land development to achieve the desired environmental, economic and social outcomes for the benefit of the whole community;
- provide a framework for the continuation and enhancement of east Wanneroo's contribution to the region's economic development and employment opportunities;
- promote best management practices for land uses, rural agricultural production and water usage;
- identify all relevant substantive planning issues, constraints and opportunities for rural land uses, future urban land uses and other forms of development;
- protect the significant wetlands and remnant vegetation, water resources, rural landscape, heritage and other conservation values; and
- improve and provide balanced land use planning and water resource management decision-making for input into related planning schemes or strategies through better access to information, consultation and understanding between government agencies, landowners and community groups.



Figure **1** Study area boundary and Metropolitan Region Scheme (MRS) zones



3 Project management and community consultation

The planning work has been undertaken with the input from a steering committee, community consultative committee and technical group and proposes a new strategic direction for land use planning and policy in east Wanneroo.

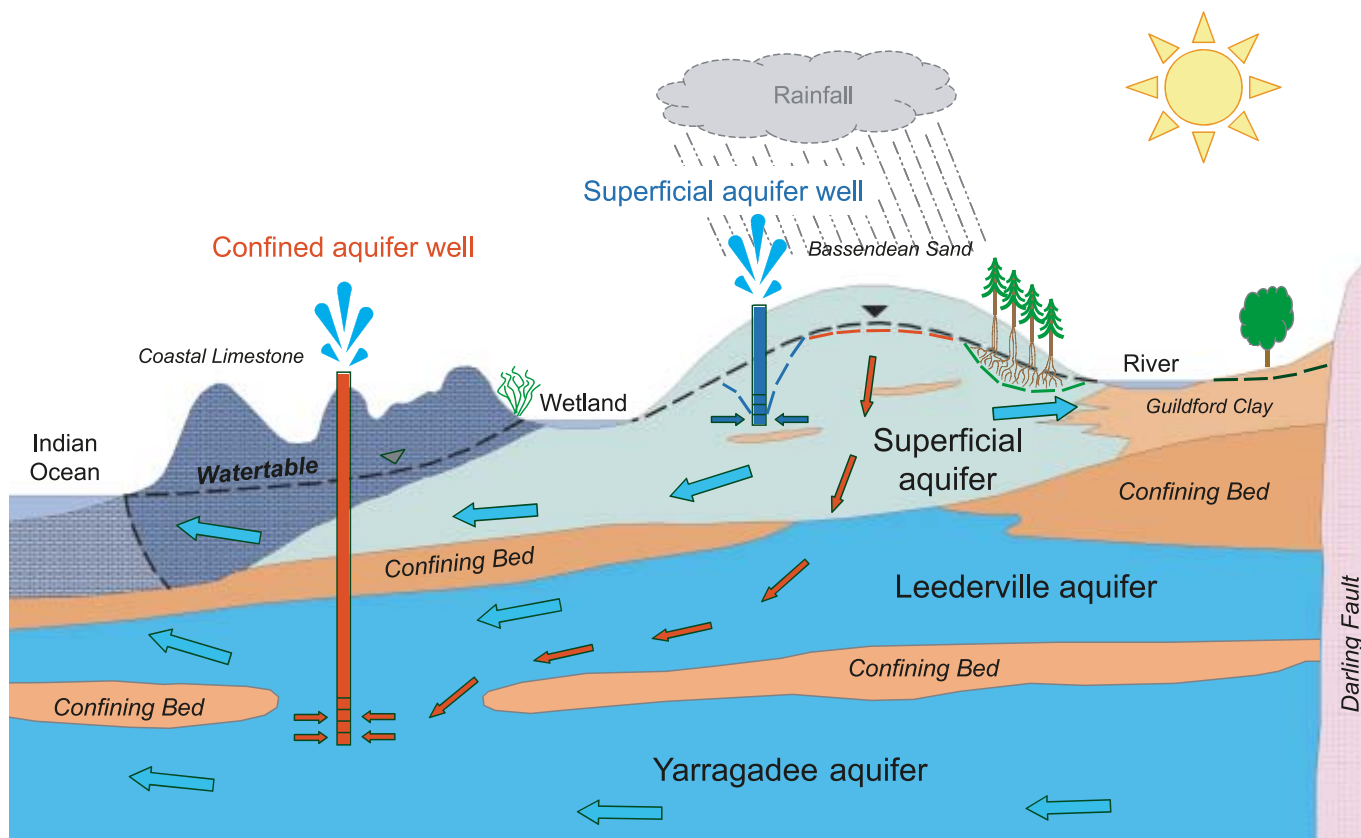
The Community Consultative Committee was established to ensure that community input was incorporated into the preparation of the land use concept.

The East Wanneroo Land Use and Water Management Strategy Preliminary Discussion Paper was released for a three-month public comment period in May 2004. Some 450 submissions were received and a community forum, chaired by Wanneroo MLA Dianne Guise, was held at the city's administration centre in November 2004 to facilitate progress and community input to the draft strategy. A public meeting and planning workshops have also been held.

A further draft was prepared and released in November 2005 for public comment. A total of 688 submissions were received expressing a wide range of views from stakeholders, community groups and local residents. These issues have been considered in developing the land use concept.

A summary of the key issues raised by submissions, and responses to submissions, can be obtained from the Department for Planning and Infrastructure (DPI).

Figure 2 Groundwater resources of the Gngara Mound



4 Key land use planning and water resource management issues

4.1 Groundwater management and environment

The Gngangara Mound is of strategic importance for public and private water extraction, including public drinking water, and maintenance of natural groundwater dependant ecosystems. Its aquifers are recharged mostly by direct infiltration from rainfall and run-off from the State forest areas in Wanneroo and Gingin, and along the base of the Darling Scarp and Dandaragan Plateau. Groundwater resources are contained in three aquifers; the superficial, Leederville and Yarragadee. Of the three, the superficial aquifer provides most water for the public drinking water supply, horticulture and agriculture, industry, domestic and livestock purposes. The confined Leederville and Yarragadee aquifers are generally reserved for future public drinking water supplies (figure 2).

The east Wanneroo area falls in the groundwater region on the western flank of the pollution control areas and the Gngangara, Mirrabooka and Wanneroo public drinking water source area of the Gngangara Mound.

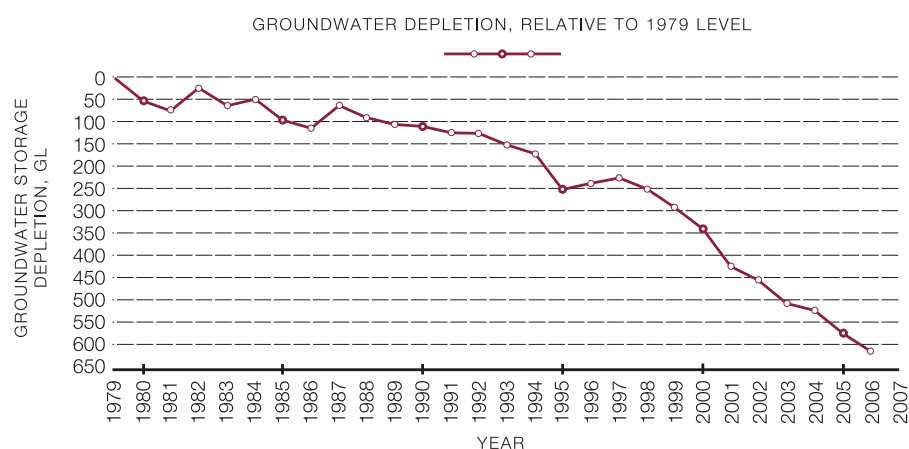
In 2002 the Indian Ocean Climate Initiative prepared a discussion paper entitled Climate Variability and Change in the South-West of Western Australia that predicts changing climatic conditions for the State towards lower rainfall, drier winters and, by implication, less recharge of groundwater.

The draft East Wanneroo Land Use and Water Management Strategy, released in November 2005, reflected the Indian Ocean Climate Initiative discussion paper and outlined the lower rainfall conditions and status of recharge to the mound, the demands for groundwater, groundwater management sub areas and groundwater allocations.

The ten Wanneroo groundwater sub areas are over or near full allocation and are currently being reviewed by the Department of Water.

The Gngangara Mound's water resources have been in decline over the last 30 years, more noticeably in the last seven years (graph 1).

Graph 1
 Gngangara Mound groundwater storage depletion



SOURCE
 DEPARTMENT OF WATER, 2007

Table 1
 Licensed/extracted/estimated water use (ML/year) from the Wanneroo groundwater area

SECTOR	ML/YEAR	TOTAL %
Horticulture/agriculture	27 649	83%
Parks and recreation	3 278	10%
Industry and services	499	1%
Domestic/rural	324	1%
Garden bores	1 734	5%
TOTAL	33 484	100%

SOURCE
 MARSDEN JACOB ASSOCIATES 2006

NOTE

WATER EXTRACTED FOR HORTICULTURE, PARKS AND RECREATION, RURAL RESIDENTIAL, AND INDUSTRY AND SERVICES, WHICH IS LICENSED BUT UNMETERED, IS MEASURED AS THE LICENSED VOLUMES (AS AT OCTOBER 2005). GARDEN BORES ARE UNLICENSED AND UNMETERED, THEREFORE WATER USAGE LEVELS ARE INFERRED FROM SURVEY DATA OR TECHNICAL FIELD SURVEYS AND ANALYSIS.

4.1.1

Groundwater demand

Table 1 illustrates the use of groundwater from the unconfined superficial aquifer in the northern and southern groundwater areas, the majority being for horticulture/agriculture purposes.

Extraction of public drinking water from the unconfined superficial aquifer by the Water Corporation has never occurred in the study area. While there is abstraction adjacent to the study area in the underground water pollution control area, in order to minimise the risk of unacceptable environmental impacts, several of these bores are no longer in use.

There is one bore extracting from the confined Yarragadee aquifer in the study area.

Ranges of options are being considered to supplement the demand for drinking water through the integrated water supply system. Investigations into using recycled water for managed aquifer recharge into the Leederville aquifer are continuing. Additionally, the seawater desalination plant at Kwinana has commenced operation and will supply 17 per cent of Perth's drinking water.

Additionally, the State Government announced that a second desalination plant will be built at Binningup, south of Perth.

4.1.2

Wetlands and remnant vegetation

The main environmental and landscape features are the chains of linear and circular wetlands and associated vegetation and wildlife, including Lakes Pinjar, Adams, Neerabup, Carabooda, Mariginiup, Jandabup, Gngangara, Yonderup, Nowergup, Badgerup, Wilgarup and Coogee Springs, Pipindinny and Beonaddy Swamp, Bronzewing Sumpland and the limestone karst landforms and remnant tuart vegetation to the east of Wanneroo Road and the Gibbs Road area in Carabooda/Nowergup.

These and other priority wetlands and areas contain many pockets of remnant native vegetation, with some sites designated under Bush Forever. Protection of regionally significant wetlands and native vegetation is considered to be fundamental to the protection of east Wanneroo's environment and landscape character.

Wetlands in the study area have been mapped and classified using the geomorphic classification system and evaluated and assigned a management category that provides guidance on specific management and protection requirements. These categories are conservation (C), resource enhancement (R) and multiple use (M).

Conservation management category wetlands are the highest priority for protection on the Swan Coastal Plain and the Department of Environment and Conservation (DEC) opposes any activity that may lead to further loss or degradation of their environmental values.

Resource enhancement wetlands are identified as high priority with an objective for management, restoration and protection towards improving their conservation value. Management objectives for multi-use wetlands are to develop and manage in the context of water and other town and environmental planning requirements.

Following further detailed site analysis of wetlands in the Mariginiup area, the Environmental Protection Authority (EPA) has re-classified the status of wetlands between Boundary, Lakeview and Coogee roads, Mariginiup. The management category for two sumplands and two damplands, and the boundary of two damplands was assessed. Wetland boundaries and classifications in the study area are shown in figure 3.

The lowering of groundwater levels is one of many threats to wetlands, lakes, native vegetation and wildlife populations in the study area.

A buffer area around wetlands helps to maintain the ecological processes and functions associated with the wetland, protect the wetland from any adverse impacts, protect the community from any nuisance insects and may provide appropriate public access or activity nodes. The definition of buffer requirements around wetlands will need to be undertaken as part of more detailed structure planning for the area.

Many of the submissions received raised the protection of the wetland and lake systems and remnant native vegetation as a significant issue in east Wanneroo.

Figure **3** Geomorphic wetlands, EPP lakes, remnant vegetation and Bush Forever areas



Significant wetlands will be protected from development. More detailed structure planning for new urban areas will need to investigate innovative ways that can be used to manage urban water drainage and ensure wetland conservation management objectives and water quality and quantity requirements are met.

4.1.3

Acid sulfate soils and soil acidification

Acid sulfate soil is the common name given to naturally occurring soil and sediment containing iron sulfides. These sulfide minerals are generally found in waterlogged soil or sediment and are benign in their natural state. However, when disturbed and exposed to air by excavation or dewatering, they oxidise and produce sulfuric acid, iron precipitates and concentrations of dissolved heavy metals such as aluminium, iron and arsenic. Release of acids and dissolved metals can cause environmental harm and damage to infrastructure, including risks to human health, flora and fauna.

Mapping by the DEC has identified acid sulfate soil risk areas (figure 4). This is based on broad regional scale soil and groundwater information and more detailed site-specific investigations are required when development is proposed.

Some preliminary acid sulfate soil investigations carried out by RPS Bowman Bishaw Gorham, in the south-east Wanneroo area, indicate that acid sulfate soil occurrences are not as widespread as the broad DEC mapping indicates. Nor are they an absolute impediment to proposed future urban development.

Although the investigation did not detect widespread sulfide minerals, measurements from groundwater monitoring bores undertaken in June 2005 recorded pH values below the Irrigation and Drinking Water Guidelines – an indication that groundwater at the site is moderately acidic.

In addition to the acid sulfate soils issues, this reflects the additional process of acidification of the groundwater resource over the Gngangara Mound that is occurring. The pattern of acidification at the watertable on the Gngangara Mound extends downwards into the aquifer at the rate of 3.5-5 cm per year and is concentrating metals at the boundary between highly acidic and less acidic groundwater. Limited drilling data suggests that low pH values in groundwater on the Gngangara Mound do not extend more than about 5 metres below the watertable, and ongoing monitoring indicates that water supply production bores across the mound are not directly affected by acidic groundwater. The low pH values recorded in groundwater is of environmental concern because aluminium leached from soil minerals at pH values less than about 4.5 is toxic to many species of plants and fauna. High concentrations of aluminium in groundwater are likely to be causing most of the observed loss of biodiversity in wetlands, including Lakes Jandabup and Mariginiup, which experience episodic acidification.

Investigations currently being carried out by Curtin University indicate that some soil profiles near the crest of the Gngangara Mound are also extremely acidic, with soil pH values often being less than 4.5 and up to at least 5 metres below the watertable, especially near pine plantations (Troy Cook, pers comm, October 2006).

Where acid sulfate soils are found, a detailed site investigation and a soil and groundwater management plan must be prepared and approved by the responsible authorities, to determine the capacity of land to support the proposed land use. If the soils can be managed, conditions will be imposed on subsequent subdivision or development.

Further technical information on acid sulfate soils and acidification of groundwater is available from the DEC.

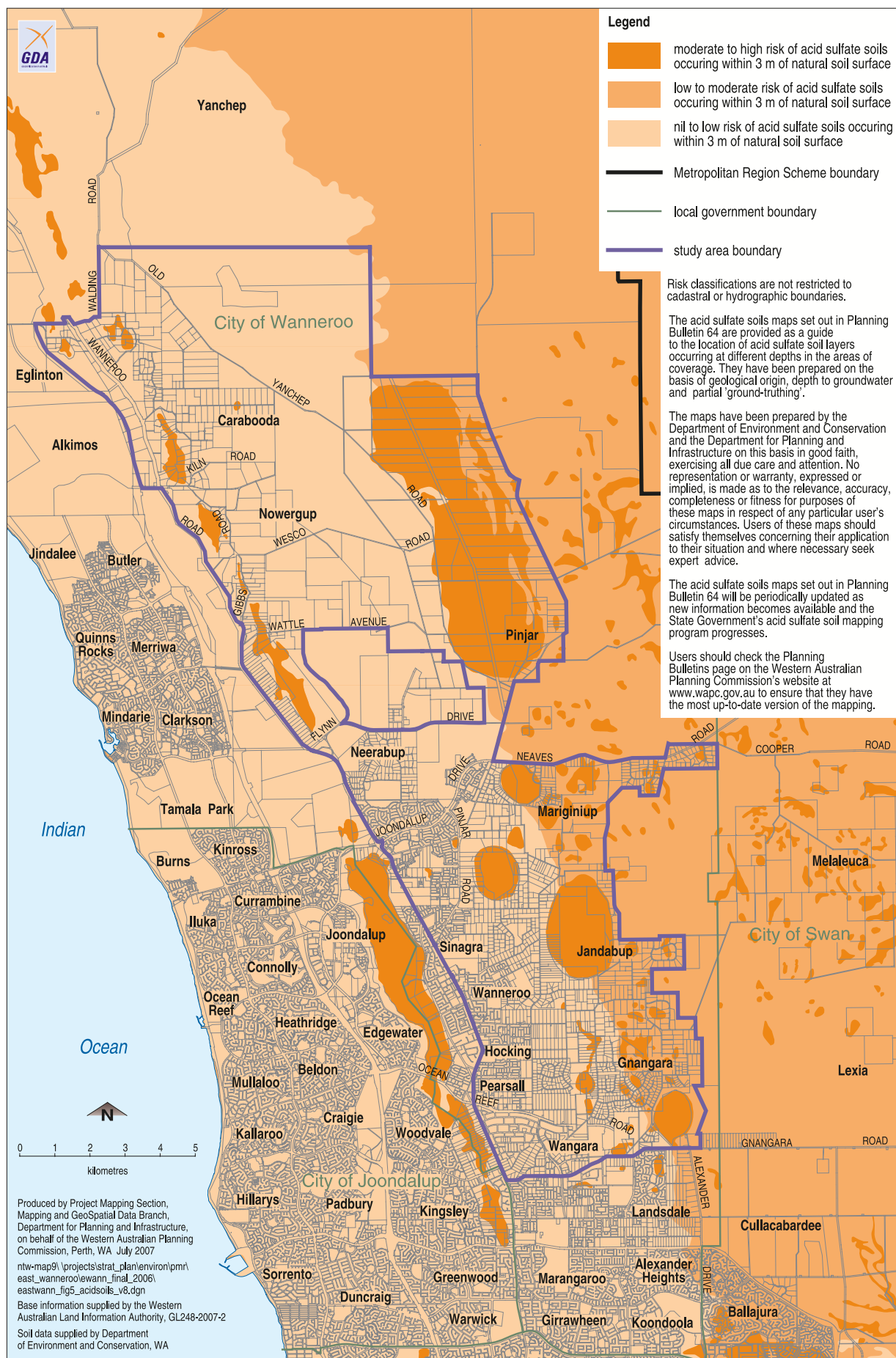
4.2

Horticulture and agricultural land use

There are many direct and indirect benefits from horticulture and agriculture in the form of provision of fresh food, income, employment, tourism, cultural identity and contribution to State and national export markets.

In terms of State production, horticulture and other intensive agriculture on the Gngangara Mound contributes at least \$125 million, about 2 per cent of total State production, of \$4.38 billion and 35 per cent of total metropolitan production. The mound accounts for more than 20 per cent of the State's vegetable production.

Figure **4** Acid sulfate soils



Wanneroo is recognised as having high-quality soils and water, favourable climatic conditions for year-round production of horticultural crops, low frost risk, existing and well-developed infrastructure and close proximity to a workforce and markets. Approximately 2500 ha of sandy soils are irrigated in the Wanneroo area.

In 1999, the estimated employment in the Wanneroo horticultural area was between 4000 and 7000 people. Important crops grown in the Wanneroo area are more labour-intensive such as lettuce, broccoli, tomatoes, celery and beans and its strawberry production is approximately 73 per cent of the State's total production. Plant nurseries, native flower and turf production are also important horticultural businesses in the area.

The area is characterised by a large number of small rural lots with lot sizes between 2-4 ha and progressively larger to the north. Where growers have sought to expand, buying or leasing adjacent or nearby land parcels has provided limited options.

The displacement of agriculture and horticulture from the expanding urban fringe has seen significant dislocation in areas of market gardens around Osborne Park, Tuart Hill, Stirling, Balcatta and progressively northwards. Until recently, it was thought that horticulture could relocate either north or south of the metropolitan region with ease. Groundwater in Gingin and many other areas is now fully allocated and similar issues to Wanneroo, such as increasing competition for water in the face of climate variability, are occurring.

Although some growers may be prepared to invest in more water-efficient irrigation systems and best land management practices, it is unlikely that large amounts of groundwater will be available for the establishment of new horticultural land uses, expansion of existing uses or other groundwater dependent rural land uses in south-east Wanneroo.

The demographic profile of rural land owners, high value of rural land, small lot sizes, changing agricultural/horticultural economics and markets, a limited and declining groundwater supply, conflicts with existing special rural zones and expanding residential development, are cited as some of the issues facing the continuance and expansion of a horticultural industry in southern east Wanneroo (ie south of Flynn Drive).

4.3 **Future urban land use**

It is recognised that quality horticultural land in close proximity to urban populations is a limited resource. For many years, much of east Wanneroo has remained rural zoned land because of state and local government planning policies, such as the State Planning Policy 2.5 Agriculture and Rural Land Use Planning, promoting the retention of productive rural zoned land and agricultural/horticultural land uses and not supporting further subdivision of productive rural land.

While this may have been justified in the past, the long-term availability of groundwater for horticulture in east Wanneroo can no longer be a given.

The impact of climate variability is a major factor and it is clear from current research that lower rainfall over the past 30 years, and the past eight years in particular, has resulted in lower recharge of the Gngangara Mound, declining watertable levels and less groundwater available to satisfy the three major demands – public drinking water supplies, the environment, and private self-supply predominantly for horticultural and agricultural uses (graph 1).

Under the current water allocation and licence system, the expansion of horticulture and agriculture in east Wanneroo is limited and reports from growers and industry sources suggest the number of growers on prevailing small lots will decline from natural attrition and adverse market forces.

Current water allocation limits in the Wanneroo groundwater area, the impact of lower rainfall and the corresponding detrimental impact on the environmental values of Gngangara Mound may result in changes in future public and private water licensing and allocation policy to focus on less abstraction from the superficial aquifers on the mound. These factors pose major constraints to the future viability of south-east Wanneroo's agricultural/horticultural industry, which is dependent on a limited and declining water supply from the superficial aquifer.

In association with the possible establishment of a new agricultural/horticultural precinct in north-east Wanneroo, a change in land use from rural to future urban in south-east Wanneroo, would help to supplement declining watertable levels and wetlands via urban stormwater recharge and decreased groundwater abstraction.

Social arguments favouring land use change relate to existing land use conflicts between agriculture/horticulture and encroaching urban development, the existing special rural development, small lot sizes, market changes, rural producers opting to leave the industry, and the aspirations of many landowners for more development and subdivision opportunities.

Economic arguments favouring land use change relate to the changing structure of horticultural markets and product supply chains favouring efficient, large-scale horticultural production that can compete with overseas and interstate products for domestic and export markets. There also are high costs involved to change from existing land and irrigation management practices to more efficient practices that growers may be required to adopt as a result of declining watertable levels, in addition to the possibility of more stringent water licence conditions, increased monitoring of the use of groundwater for private irrigation, and/or possible reductions in existing water allocations.

The staged relocation of the agricultural/horticultural industry to a new well-planned northern agricultural precinct would provide security for the industry to remain in close proximity to Perth metropolitan urban centres.

While the coastal strip west of Wanneroo Road still has much undeveloped urban and urban deferred zoned land, recent population forecasts for the City of Wanneroo estimate that the population will grow from 117 409 in 2006 to 161 578 in 2011, and to 250 491 in 2021. The population of the north-west corridor is projected to reach 429 400 by 2031. Such rapid population growth is causing pressure for the release of more urban land.

While there is some 8200 ha of urban and urban deferred land in the whole of the City of Wanneroo local government area, representing many years land supply, in south-east Wanneroo there is approximately 1950 ha of existing urban and urban deferred land. This equates to approximately 3-5 years of land supply.

Proposals for longer term urban development in south-east Wanneroo will provide a source of medium and long-term residential land.

4.3.1 Network City context

Network City, published as Network City: community planning strategy for Perth and Peel, is the metropolitan strategy for Perth and Peel, superseding Metroplan. Since 2004, the WAPC has prepared Network City – a milestone in metropolitan planning and State Planning Policy Network City 2006 (draft).

Network City aims to achieve a more compact city structure with mixed use activity centres connected by activity corridors, more efficient use of infrastructure, land, road and transport systems and energy use, resulting in a more diverse and vibrant city.

Each of the Network City planning elements of urban growth, governance, community, environment, heritage, employment, transport and infrastructure are to be implemented by links to the preparation of regional and local planning strategies, planning schemes and statutory decision-making.

The land use concept for east Wanneroo responds to Network City directions in the following ways:



1

Proposed future urban land uses about the existing urban zoned land to the east of Wanneroo Road and the developing new residential communities. The proposed future urban areas may be viewed as an extension of the existing urban zone and will be in close proximity to existing regional road and transport infrastructure (Mitchell Freeway, Wanneroo Road, northern suburbs railway line) existing roads such as Lenore, Franklin and Sydney Road, major employment activity centres of Neerabup, Wangara and Malaga and the established and expanding activity centre at Joondalup, Wanneroo townsite and Kingsway.

New north-south and east-west activity and transport corridors will be planned and established as part of future detailed structure planning. The area is between 5-7 kilometres and a 10-15 minute drivable catchment of the Edgewater, Warwick, Currambine and Joondalup railway stations. New public transport systems will need to be designed to provide a high level of connectivity in new residential neighbourhoods and to district and local activity centres, the Wanneroo townsite, Joondalup City Centre and the Joondalup and Whitfords railway stations.



2

The east Wanneroo district comprises two major industrial zones; the existing Wangara area to the south and the developing Neerabup area to the north and is close to the Wangara, Malaga and Joondalup City Centre. In the context of Network City these industrial zones constitute activity centres and as such contribute significantly to economic enterprises and employment opportunities, both for the east Wanneroo district and the metropolitan region. The close proximity of these industrial zones to the proposed future urban areas in south-east Wanneroo (Neerabup is approximately 3-5 km, Wangara 2 km and Malaga approximately 5 km to the south) will assist in achieving a level of employment self-sufficiency for the east Wanneroo area. Wanneroo Road, Mitchell Freeway, the metropolitan passenger rail system, proposed new road networks and existing and future transport oriented development and public transport systems will integrate new residential areas with activity centres and transport corridors.

3

The land use concept strengthens and consolidates rural land uses by retaining the existing northern rural/agricultural zone in Carabooda/Nowergup, and also proposes the creation of an adjoining and new rural/agricultural precinct on land currently in State Forest 65 area immediately to the east. This will consolidate and create a major new agricultural activity centre, possibly based on the use of recycled water and best practice agricultural and water management practices.

4

Sustainable development, built form, urban design and environmental management strategies for the east Wanneroo wetlands and other natural resources (water-sensitive urban design, water use efficiency, protection and management of wetlands and greenway links) are to be promoted. The major wetlands are protected by existing and proposed parks and recreation reservations and the declining wetland water levels are proposed to be enhanced by using managed urban stormwater run-off to recharge groundwater and wetlands while ensuring water quality standards are met. Bush Forever sites are protected and links with public open space and to the proposed Gnangara Park can be achieved.

5

The land use concept also moves towards greater integration with the broader North-West Corridor Structure Plan. In this context the land use concept addresses broader Network City elements and objectives by enhancing and promoting:

- better use of existing infrastructure and services planning by public private partnerships;
- water-sensitive urban and rural land use management;
- conservation of sensitive environmental resources;
- green infrastructure linkages; and
- sustainable development, urban design and built form, Liveable Neighbourhood design principles, transport oriented residential, industrial and horticultural land uses and activities with strong links to public transport.

4.4

Small rural lot subdivision

Small rural lot subdivision is the subdivision of rural land into small lots where the land use is mainly residential with the ability to use land for the keeping of animals or production of produce for domestic purposes. These types of lots could range in size from 2000 m² to 4 ha, depending on local conditions and other environmental or water protection constraints. Different forms of small rural lot subdivision can comprise a range of existing City of Wanneroo local planning scheme rural zones; special rural (lot sizes from 1-4 ha), and rural community (lot sizes from 2000 m² in the case of cluster-style strata subdivision to 4 ha for conventional subdivision) and special residential (lot size of 2000 m²-1 ha).

From community consultation and submissions received, it is clear rural subdivision of a range of lot sizes is considered to be a legitimate lifestyle choice and appropriate in some areas of east Wanneroo.

Living on small rural lots can assist to:

- provide a transition or buffer between proposed urban development, rural zoned land and wetland features;
- protect the natural environment and landscape features adjoining wetlands and other local features;
- provide a mechanism for the protection or rehabilitation of native vegetation or degraded rural areas;

- provide a rural setting lifestyle option in the city;
- recognise community opinion to retain some rural and rural landscape character in east Wanneroo;
- provide a more diverse rural character with a range of lot sizes and land use, social and economic diversity and protect the rural landscape/environmental amenity of east Wanneroo.

Areas of land inside small rural lot subdivisions would remain zoned rural under the MRS and be zoned in the appropriate rural zone in the City of Wanneroo's local planning scheme.

Areas with the potential for small rural lot subdivision as identified in the land use concept (figure 5) will need to be further investigated and defined as part of a local area structure plans, prepared as a basis for the rezoning process, to be initiated by the City of Wanneroo and land owners. A local area structure plan would:

- provide overall guidance as to how land is to be subdivided;
- investigate in greater detail the specific environmental and wetland protection issues;
- consider management measures and other development issues relating to lot size, roads, access and servicing requirements, any community facilities, cost contributions and the appropriate land use objectives and controls for the new rural zones in the area.

4.5

Tourism, landscape, Aboriginal and European heritage values

East Wanneroo contains a variety of rural land uses, heritage features and landscapes and it is important to identify, protect, enhance and promote its cultural and rural landscape character. Tourism opportunities for the rural and horticultural areas are outlined in the Wanneroo Tourism Strategy (2004-2008), which concentrates on developing tourism across the city. It considers the rural precincts as one of the key features of the city, which differentiates it from comparable regions in peri-urban locations.

The tourism strategy draws on research, which identifies growing trends with visitors to seek out authentic and conservation experiences and the link with current rural areas across the city.

Carabooda and Nowergup have some significant rural karst landscapes, containing large remnant tuarts, wetlands and other native vegetation, along with built heritage features and values, such as the historic lime kilns.

The value of this rural area as a recreational and tourism resource will be enhanced further by the urbanisation of the north-west corridor. The location of this expanding population will create a market in immediate proximity to the rural area, which may enhance its tourism opportunities.

This is the main theory behind the North Wanneroo Rural Way Project. Part of the tourism strategy, this project aims to “develop the region as a viable economic resource whilst maintaining its rural integrity, plus to promote the rural precinct as a high quality and unique rural region of Western Australia.” (Wanneroo Tourism Strategy 2004-2008, p51.)

How private landowners manage the rural landscape is an important issue in relation to scenic values and tourism appeal. If agriculture and horticulture continue to be displaced from the southern portion of the study area to Carabooda/Nowergup, and if a new agricultural/horticultural precinct is established in the pine plantation, this may create complementary tourism opportunities.

This land use concept proposes the Carabooda/Nowergup area remains zoned rural and an area east of Wanneroo Road (including the remnant tuart and some karst areas) be included in a rural living/landscape protection area. This will allow for future complementary rural subdivision (with the option of using cluster-style subdivision design) in appropriate locations, and the protection of landscape values. However, the Nowergup /Carabooda area will need to be subject to further detailed planning and final land use allocation may still need to respond to future demands.

4.5.1 Aboriginal heritage

Aboriginal people have been living in Australia for more than 40 000 years. The Nyungar people belonging to this portion of land were called the Bibbulmun and evidence of their lifestyle and sites of significance are well documented in Wanneroo, particularly around the lakes and wetlands.

Protection of Aboriginal heritage sites in Western Australia is effected through overlapping state and federal legislation, the *State Aboriginal Heritage Act 1972* and the Commonwealth’s *Australian Heritage Commission Act 1975*, *Native Title Act 1993* and *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

The definition of what constitutes an Aboriginal site is contained in section 5 of the *Aboriginal Heritage Act 1972*. This Act applies to:

- place of importance and significance where persons of Aboriginal descent have, or appear to have, left any object, natural or artificial, used for, or made or adapted for use for, any purpose connected with the traditional cultural life of Aboriginal people, past or present;
- any sacred, ritual or ceremonial site, which is of importance and special significance to persons of Aboriginal descent;
- any place which, in the opinion of the registrar, is or was associated with Aboriginal people and which is of historical,

anthropological, archaeological or ethnographic interest and should be preserved because of its importance and significance to the cultural heritage of the State;

- any place where objects to which the Act applies are traditionally stored, or to which, under the provisions of this Act, such objects have been taken or removed.

Aboriginal sites fall into two basic and overlapping categories:

Archaeological sites - places where material cultural remains associated with past Aboriginal land use; and

Anthropological sites - places of spiritual importance and significance to Aboriginal peoples.

Disturbance most commonly arises through development processes, which result in impact to the land on which the site is located. Under section 17 of the *Aboriginal Heritage Act 1972*, it is an offence to knowingly disturb or destroy an Aboriginal site without the express consent of the Minister for Indigenous Affairs, which may be applied for under section 18.

It is important to consider Aboriginal heritage sites during all stages of the planning process to avoid breaches of the Act and dispute during development.

Under section 38 of the *Aboriginal Heritage Act 1972*, as far as practicable, a record of known Aboriginal sites must be maintained.

The form that this registration takes is subject to ministerial discretion but has consisted of a Register of Aboriginal Sites, formed by individual site records.

A search of this site register, through the Department of Indigenous Affairs, found 22 sites of significance in the study area. The types of sites found were mythological, artefacts, skeletal and ceremonial. Lake Gngangara, Mariginiup, Nowergup, Adams and Neerabup were all identified as being connected to historical Aboriginal activity. Two sites were identified as closed, implying approval into their location, to undertake effective structure planning, will need to be sought.

4.5.2 European heritage

Horticulture and agriculture are significant contributors to the economic and social fabric of the Wanneroo area. These traditional land uses and the association with early migrant settlement have given Wanneroo a rich history and cultural and community identity.

The first settlers in Wanneroo were dairy farmers, woodcutters, lime burners and pastoralists. Nearly a century after British colonisation, southern European migrants established market gardens, dairying and lime production. Wanneroo's population has continued to grow, whilst maintaining its historical links.

The Heritage Council of Western Australia is the state government agency created under the *Heritage of Western Australia Act 1990* to identify, conserve and promote places of cultural heritage significance in WA.

The Act provides for the compilation of Western Australia's Register of Heritage Places as well as a municipal inventory for each local government area. The Heritage Council also promotes and sponsors academic-based professional education; provides advisory services to the Minister for Heritage and the public; undertakes conservation planning, and administers funding for these purposes. The objects of the *Heritage of Western Australia Act 1990* with due regard to the rights of property ownership, are:

- to identify, conserve and, where appropriate, enhance those places in Western Australia which are of significance to the cultural heritage;
- in relation to any area, to facilitate development that is in harmony with the cultural heritage values of that area; and
- to promote public awareness as to the cultural heritage, generally.

Under the Act, the Register of Heritage Places carries legal implications for other government departments, municipal councils, developers and individual property owners and a person found to be in breach of the Act may be fined.

A permit is required to be granted by the Minister under section 64 of the Act authorising the implementation of the proposal or the carrying out of any works:

- which may involve disturbance to vegetation or of the surface of the land; or
- for the construction, renovation, alteration or extension of; or
- which may cause damage to, any building; or of demolition or other development to the cultural heritage characteristics of that place listed on the register.

Like Aboriginal heritage sites, structure planning should also take into account sites with European heritage values.



5

The proposed land use concept

Following public submissions on the 2005 draft concept plan, as well as further consultation and investigations, the land use concept is shown in figure 5. This concept provides the broad framework from which more detailed investigations, district and local area structure planning and scheme amendments can occur.

The land use concept proposes major land use change from rural to future urban in the area south of Neaves Road. In concert with these changes, it is recommended a new agricultural/horticultural precinct be established in northern-east Wanneroo on land in State Forest 65 (figure 5). The new precinct, if approved, will provide a large, well-designed area that can adopt world's best practice to provide certainty for agricultural/horticultural uses with secure leasehold land and water use rights. Due to the shortage of groundwater for agricultural/horticulture activities on the Gngangara Mound, an investigation into the economic, environmental and social feasibility of a new precinct reliant on recycled water is to be undertaken by the Department of Agriculture and Food Western Australia (DAFWA). This will provide input into the Gngangara sustainability strategy, which is to be coordinated by the Department of Water.

Proposed land use change from rural to future urban needs to be managed over the medium to long term to minimise the social and economic impacts of the gradual loss of and change from active agricultural/horticultural production to urban land uses in the southern areas of east Wanneroo.

5.1

Provide for new urban development in south-east Wanneroo

Figure 5 outlines the possible changes in land use from rural to future urban. The area has the potential to supply approximately 1950 ha of future urban land. It could be divided into smaller urban planning precincts, in which development could be staged over time. Logically, those precincts closest to existing residential areas, physical, social and transport infrastructure should be developed first. In this way an orderly pattern of development and the necessary social and physical infrastructure can be provided, resulting in no isolated new residential communities or unacceptable land use conflicts with existing rural land uses.

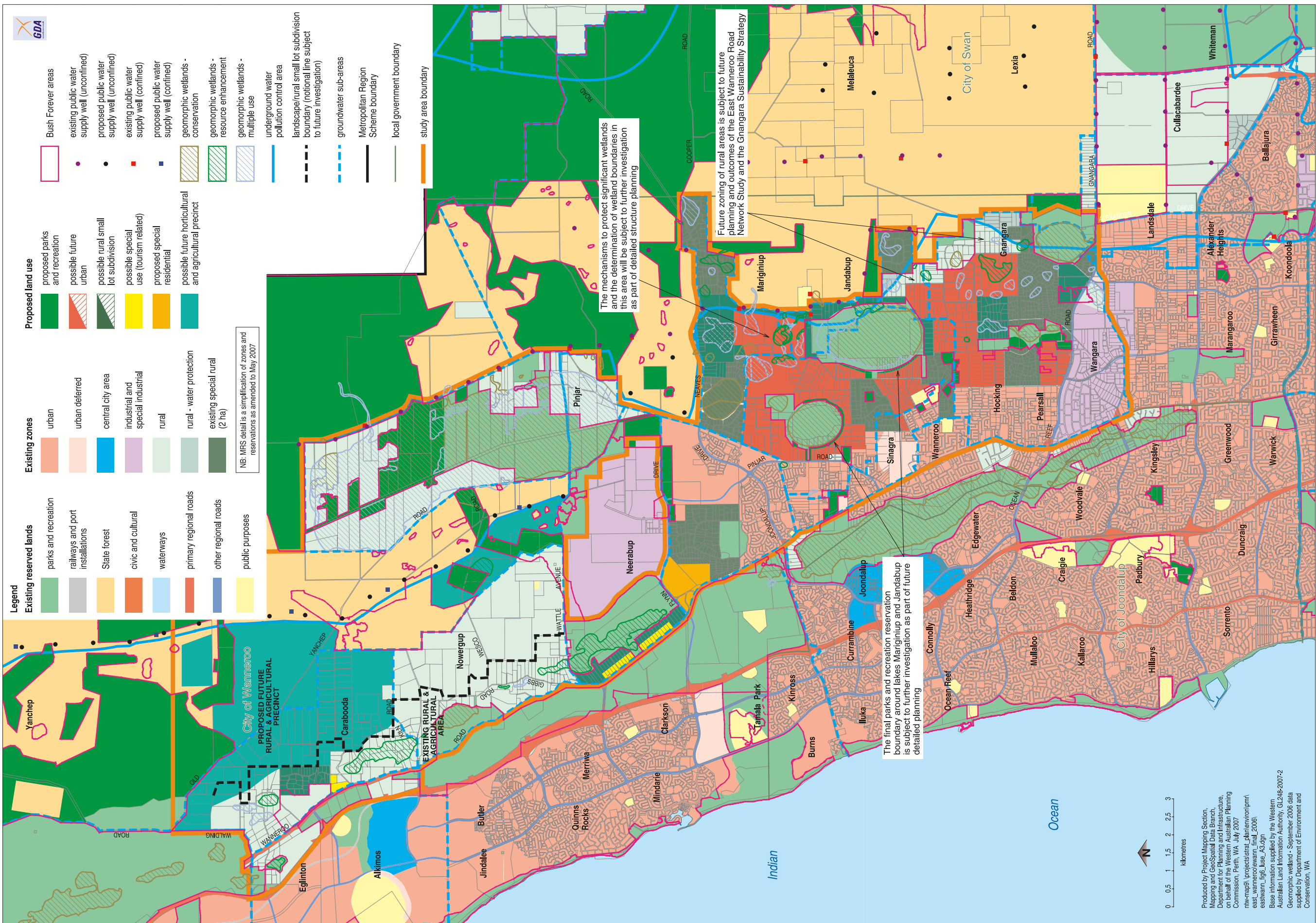
The implementation time frame for the proposed land use changes will be dependant on landowners and the City of Wanneroo to coordinate and participate in the preparation of district and local structure plans for new urban precincts and local planning scheme amendments, as well as the provision of necessary social and physical infrastructure.

Environmental management issues and the ordered staging of converting rural land to urban deferred and then to urban zoned land over the medium to long term, will need to be managed through the planning, environmental assessment and approval processes via outline development plans, MRS and local planning scheme rezoning processes and district and local structure planning.

The land use concept provides a broad framework for possible future urban areas. Major issues in relation to the design of the new urban areas in east Wanneroo will be resolved by district and local structure planning. This will determine:

- detailed urban form;
- subdivision layout and housing density;
- upgraded and new road infrastructure;
- public transport system requirements;
- service infrastructure;
- school sites;
- retail areas;
- wetland protection and buffer areas;
- conservation areas;
- protection of remnant vegetation and open space requirements;

Figure 5 Land use concept



- management of acid sulfate soils;
- total urban water management measures (for example, effluent and stormwater disposal, water supply and groundwater, drainage and nutrient management and wetland water levels).

Any large-scale urban development in east Wanneroo needs to be tested against the principles and directions of Network City, specifically, the planning of east Wanneroo should achieve the following standards:

- manage growth by sharing responsibility between industry, communities and government;
- plan with communities;
- nurture the environment;
- make fuller use of urban land;
- encourage public over private transport;
- strengthen local sense of place;
- develop strategies which deliver local jobs;
- provide affordable housing.

Sustainable development, urban design, density and built form promoting Liveable Neighbourhood design principles, transport oriented residential areas with good connections and access to social services, and a development form that is able to support a high quality public transport system are essential.

This is designed to create new vibrant, connected centres and communities that are not isolated by the lack of social infrastructure and/or access to and from the surrounding urban areas and services provided in the regional centres such as Joondalup.

The expanded and upgraded Wanneroo townsite is planned to become a major activity centre and focus for the east Wanneroo area. As part of the structure planning process other new local commercial/shopping activity centres will also be planned and developed as part of new urban areas in east Wanneroo.

Increased residential densities and mixed use around and in district and local activity centres, are to be promoted to create and take advantage of these hubs of activity and close proximity to transport corridors.

Future urban proposals may provide guidance and more certainty for some landowners, but also may contribute to land banking and speculation. Landowners need to be cognisant of the future process and variable time frames involved.

While figure 5 shows a possible future land use concept, many existing uses may remain for some time and existing use rights need to be recognised. For example, some rural uses, such as nurseries, chicken farms, mushroom farms and market gardens, will need to be buffered from proposed urban development until they cease or negotiate incentives to move or relocate.

5.1.1 Infrastructure - roads, public transport and servicing

It needs to be recognised by the east Wanneroo community that new and upgraded local and regional roads and connections into the surrounding network are required as part of future urban development and growth of the Neerabup industrial area to the north.

While all major services are available nearby, the detailed urban design, the alignments and provision of new roads and the planning for an effective public transport system, is part of a range of major issues to be resolved during future structure planning for new urban areas.

The Mitchell Freeway, Wanneroo Road and the northern suburbs railway line provide existing strong north-south transport corridors. Additional strong north-south (for example, Lenore/Franklin, Badgerup and Sydney roads) and east-west (for example Elliot, Caporn and Coogee roads) new activity and transport links, including a new eastern regional transport corridor will need to be provided. Urban design promoting Liveable Neighbourhood principles, transport oriented residential, and access to social services in the surrounding areas is to be encouraged.

While connections to a new public rail system may be an option in the foreseeable future, an effective bus based public transport strategy that includes transit orientated development and a strong public transport system will need to be planned in concert with the urban structure planning. Feeder bus services will be a primary part of a transport system throughout the area. These services can provide a fast and economical public transport service to the area. New feeder bus routes will be carefully designed to ensure that the new residential areas are in an acceptable walkable catchment to bus stops and routes and that local and district centres, schools, railway stations and other social services are connected by timely services.

Railway stations at Currumbine, Joondalup, Edgewater and Whitfords are inside a 10-15 minute drivable catchment area, and park-and-ride facilities are available at all stations except Joondalup. Drop-off facilities are available at Joondalup station and new feeder bus services will be designed to connect to the major interchange stations to facilitate access and commuter traffic.

Achieving effective public transport outcomes will rely on an integrated planning approach at the structure planning stage. This will help promote the road network and relevant land uses that are conducive to the provision of an effective and competitive public transport system.

In the past, planning for new local and regional roads in east Wanneroo has been problematic. The East Wanneroo District Transport Study was commissioned to assess future transport needs. It did not consider possible new urban areas as proposed in this study area.

The Gngangara sustainability strategy that is to be prepared as a matter of urgency by the Department of Water in 2007, will determine environmental and public water supply requirements and investigate strategic land use options for portions of the adjacent State Forest 65 area. These will include alternative post pine plantation land uses, such as possible future urban, and the potential for a new north-south regional transport corridor road alignment to service the Neerabup industrial area.

At this early stage in the planning process there are two broad options for the location of a new eastern regional transport corridor.

The preferred option is for a regional transport corridor, aligned through State Forest 65. This option is favoured by the community and would require modification to the priority 1 source protection area designation and is dependent on Government decisions in relation to the future importance of this area for public water supply and the location of existing and future public water supply bores in the area.

Another option for the regional transport corridor alignment is in the existing rural zone, using the current Sydney Road alignment where possible, but requiring a link through private property to

connect to Neaves Road in the north and in the proximity of Alexander Drive in the south.

Due to the uncertainty about the best future regional transport corridor alignment(s) through the eastern portion of east Wanneroo, it is proposed to retain the rural zoning on land generally east of Sydney Road until more detailed transport and urban structure planning is undertaken.

In 2006, the WAPC commissioned ARRB Consulting to undertake a road network options study to investigate possible road network options to accommodate future traffic generated from proposed urban development and the Neerabup industrial area. The methodology used was an update of the existing Main Roads region operational model land use.

The study estimates the volume of vehicles that will be generated from the proposed future urban development in east Wanneroo and growth of the Neerabup industrial area. These estimates are then used to give a conceptual indication of the capacity and types of roads required to cater for the estimated vehicle volumes. There are limitations to the modelling when applied at this early stage in the planning process. It does not determine the final alignments for new roads and road reserve widths or consider other urban design factors, other forms of urban development or the best way to integrate transport and activity corridors into and through future urban areas.

At full development, the traffic modelling study indicates the broad road capacity in east Wanneroo and the need for:

- An important regional transport corridor from the Neerabup industrial area at the east end of Flynn Drive down the eastern portion of the development area, to connect south onto Gnangara Road in the proximity of Alexander Drive or Beechboro Road.
- A district distributor road from Neaves Road to Gnangara Road along the alignment of Rousett Road / Franklin Road / Lenore Road. This road would function as an urban activity corridor and be designed appropriately to accommodate a mixed use centre east of Lake Mariginiup and other land uses along it.
- Elliot Road to be upgraded to a district distributor from Wanneroo Road to the new eastern north-south regional transport corridor road.

The final location and design (for example the width and number of lanes) of any new roads in east Wanneroo is not in the scope of this study and will need to be considered as part of an overall transport strategy to be undertaken as part of future structure planning.

Traffic modelling will also need to be reviewed at that time. Liveable Neighbourhood urban planning objectives, transit oriented development, and connectivity of new residential areas to an efficient public transport system(s) will be a major consideration in future transport and urban structure planning.

5.1.2

Watertable modelling of the land use plan

A fundamental principle in recommending land use changes in east Wanneroo is that urban water recharge from new urban areas, the removal of pine plantations and the decrease in private abstraction (when rural uses are converted to urban uses) can have a beneficial effect on watertable levels and environmental values (figure 6).

The Department of Water modelled the watertable response to land use changes in two phases. The first phase considered only the staged change in land use from rural to urban. It shows that with a small increase in urban land use from 2002 to 2010 the watertable will continue to fall due to the overriding effect of a decline in rainfall. As larger areas of rural land are converted to urban areas, and current private licensed bore abstraction ceases over a larger area of rural east Wanneroo, by 2010, the watertable recovers from 0.5 m to 1.4 m over the whole of east Wanneroo.

The second phase of modelling consisted of staged changes in land use and abstraction along with medium to high-volume Water Corporation abstraction (150 GL/year), clearing and thinning of pines in accordance with the Forest Products Commission schedule to 2014, the continuation of the short-term average rainfall of 740 mm per annum and the cessation of most private bore abstraction, as land use changes from rural to urban.

This modelling still showed a declining Gnangara Mound watertable trend caused by lower rainfall until about 2012, when the effect of land use change and significantly reduced private licensed bore abstraction is felt. By 2020, a recovery in watertable levels of between 0-3 m occurs over much of east Wanneroo.

5.1.3

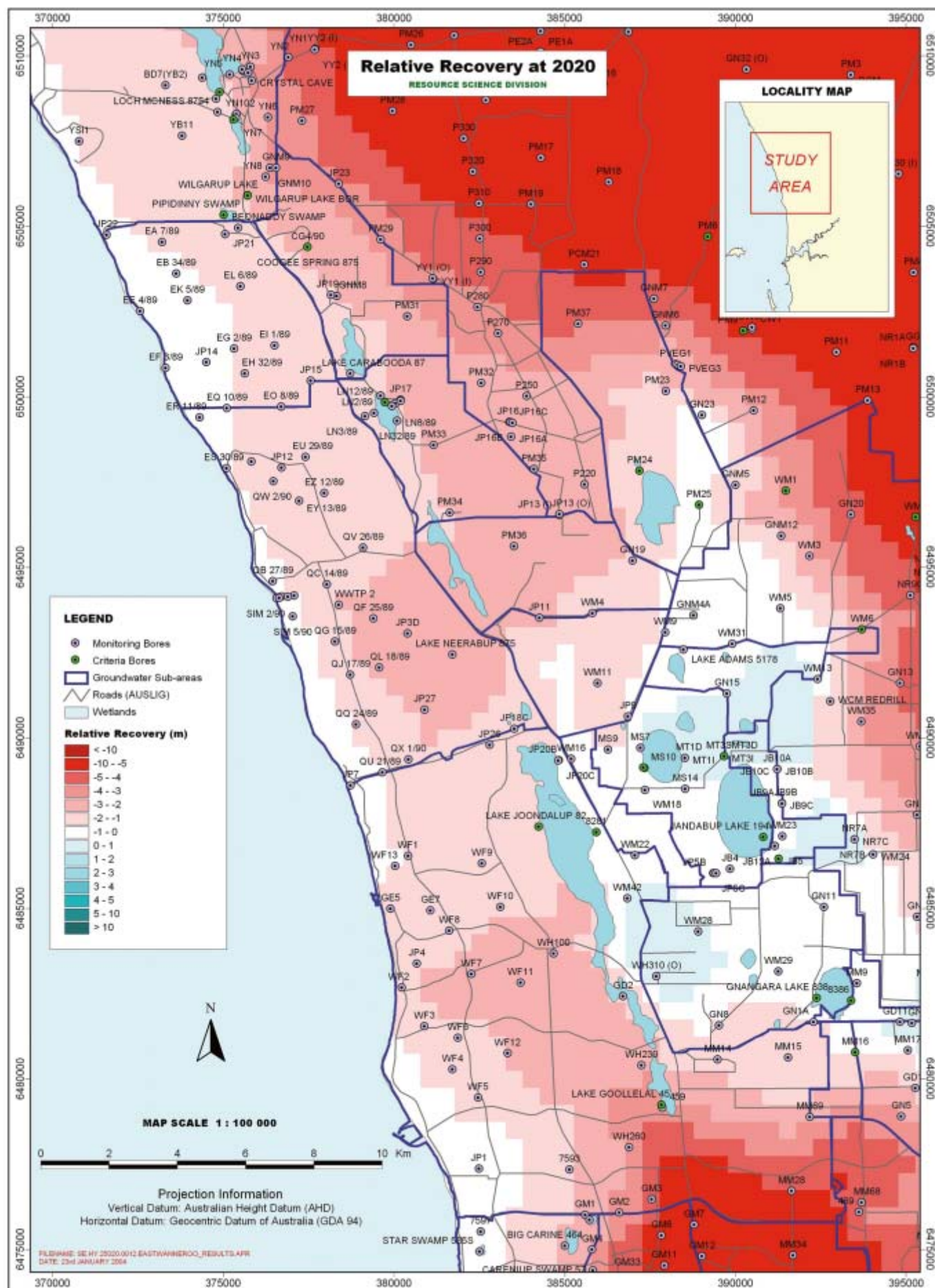
Integrated total urban water management for south-east Wanneroo

The Department of Water, DEC and the Water Corporation consider that urban land uses have fewer adverse impacts on groundwater quality and quantity than the widespread abstraction of groundwater and use of fertilisers and chemicals by the existing horticultural activities in the area.

New urban areas would need to be designed using best integrated urban water management principles and best practice water-sensitive urban design to ensure stormwater run-off meets required water quality standards and minimises the risk of nutrients and contamination entering wetlands and groundwater systems.

Innovative total urban water management using road and roof run-off and water-sensitive urban design best management practices, need to be incorporated throughout the planning and environmental approval processes, to ensure these design elements are followed through to the subdivision engineering design and approval stages by the WAPC, and in local government approvals for new houses in the area.

Figure **6** Land use groundwater modelling



It is unlikely that individual domestic garden bores will be permitted in new residential areas in close proximity to wetlands.

Innovative grey water re-use for domestic gardens, shared neighbourhood bores for households and public open space, may be a consideration in the structure planning and design of new urban areas.

Creating new urban areas and phasing out the high water horticultural uses on land surrounding Lakes Mariginiup and Jandabup, will increase run-off and the recharge to the groundwater system and wetlands. Additionally, the hydraulic flow between the southern end of Lake Jandabup and northern end of Lake Mariginiup will be increased by the creation of a water mound through limiting private groundwater uptake through urbanisation. A feedback of water flow into Lake Jandabup may also occur.

5.2

New areas for small rural lots and the retention of existing special rural zones

The land use concept retains the existing special rural zones and proposes only limited areas for new rural small lot subdivision. It is envisaged that these new areas would comprise various lot sizes and could form rural buffers between some new urban areas and wetlands and help to conserve remnant native vegetation and rural landscape values.

New rural subdivision areas could use a range of existing local planning scheme zones, such as special residential (especially as a transition zone from urban to rural), or special rural (lot sizes from 1-4 ha), and rural community (lot sizes from 2000 m² in the case of cluster-style subdivision to 4 ha for conventional subdivision) to provide more innovative rural subdivision solutions and a range of lot sizes.

New rural subdivision areas are proposed south of Neaves Road between Lake Adams and the existing Meadowlands special rural zone, east and south of Lake Jandabup and along portions of Grisker/Badgerup roads (figure 5).

Potential new rural subdivision/landscape protection areas are also proposed in the areas of remnant tuart and karst landforms in Carabooda/Nowergup, just east of Wanneroo Road. Although currently zoned rural, these areas are generally not suitable for intensive horticulture because of surface limestone, the presence of a number of resource enhancement and conservation category wetlands and remnant native vegetation. A notional line is shown in figure 5 to give an indication of the potential of the area for further rural small lot subdivision, and therefore, only gives a general indication and not a precise definition of existing lots that are suitable or not suitable for future small lot rural subdivision¹.

Compared with traditional 2 ha special rural subdivision, rural subdivision areas using the city's rural community zone provisions may allow for more environmentally sensitive rural living subdivision by retaining the natural topography, wetlands and remnant native vegetation, taking account of karst formations and rehabilitating and enhancing degraded rural areas.

The exact extent of new rural small lot subdivision would be subject to further local area structure planning and local planning scheme amendments, to be undertaken by the City of Wanneroo.

5.2.1

Allow for a broader range of complementary land uses in the rural areas

The western portion of Carabooda/Nowergup has been identified as a potential rural subdivision/landscape protection area. Well-designed rural subdivision and additional rural uses are to be encouraged as long as they are not wholly groundwater-dependent, retain heritage, protect landscape, wetlands and remnant vegetation values or promote tourism opportunities and small rural enterprises.

These complementary uses would need to be compatible with surrounding agricultural/horticultural uses and not result in unacceptable conflict. This area will need to be subject to more detailed local area structure planning to provide a basis for future development.

¹ NEW AREAS IDENTIFIED FOR SMALL RURAL LOT SUBDIVISION THAT FALL IN THE UNDERGROUND WATER POLLUTION CONTROL AREAS AND THE PUBLIC DRINKING WATER SUPPLY BOUNDARY NEED TO CONFORM WITH METROPOLITAN WATER SUPPLY, SEWAGE AND DRAINAGE ACT BY LAWS, STATE PLANNING POLICY 2.7 PUBLIC DRINKING WATER SOURCE POLICY, STATE PLANNING POLICY 2.2 GNANGARA GROUNDWATER PROTECTION AND OTHER DEPARTMENT OF WATER POLICIES IN RELATION TO RURAL SUBDIVISION IN PUBLIC DRINKING WATER SUPPLY AREAS PRIORITY SOURCE CLASSIFICATION AREAS. THE DEPARTMENT OF WATER HAS PRODUCED A NUMBER OF DOCUMENTS, IN THE FORM OF INDUSTRY CODES OF PRACTICE, ENVIRONMENTAL GUIDELINES OR WATER QUALITY PROTECTION NOTES, WHICH PROVIDE ADVICE ON BEST MANAGEMENT PRACTICES FOR LAND USES WITHIN PUBLIC DRINKING WATER SUPPLY AREAS. GUIDANCE ON APPROPRIATE LAND USES IN PRIORITY 1, 2 AND 3 AREAS IS GIVEN IN THE STATE PLANNING POLICY 2.2 GNANGARA GROUNDWATER PROTECTION (WAPC, 2005).

5.2.2

Special use/rural subdivision areas along Wanneroo Road

The area along Wanneroo Road, between Flynn Drive and Wattle Avenue, which is currently zoned rural, has been identified for special uses to take advantage of the Wanneroo Road frontage and high volume of passing traffic. Special uses, such as ancillary tourism-related uses, retail outlets for arts and craft, local produce, special attractions and private recreational uses, would provide for diversity, create a local activity node and add to the area's tourism capability.

Areas behind the Wanneroo Road frontage may support innovative styles of rural living subdivision that can demonstrate retention of landform, remnant vegetation and landscape values, and encouragement of uses to complement the special use area along Wanneroo Road.

The exact extent of areas and lots suitable for special uses and rural subdivision needs to be investigated and subject to the preparation of a local structure plan to accompany any future zoning changes to the city's District Planning Scheme 2. It must demonstrate planning and environmental objectives and strategies to minimise impacts on Lake Neerabup and to promote the types of land use, activities and business development that will support a local mixed use activity node.

5.3

Protect Bush Forever areas, wetlands and environmental values

Bush Forever areas, wetlands and other areas of local, regional and national environmental significance, can be identified and protected by several mechanisms. Bush Forever MRS amendment 1082/33, currently being finalised by the WAPC, proposes to reserve many of these areas as parks and recreation in the MRS.

Negotiated planning solutions as part of the formulation of local structure and subdivision plans for future urban and rural subdivision areas, can also achieve protection of Bush Forever areas and locally significant vegetation.

The City of Wanneroo is preparing a local biodiversity strategy that will consider methods for conserving biodiversity and remnant native vegetation, particularly under reserved complexes, on private and public lands.

The protection and management of east Wanneroo's wetlands is important. Many wetlands in east Wanneroo are identified as a priority for protection (defined as conservation, resource enhancement or multiple-use wetland management categories), and are reserved as parks and recreation in the MRS (figure 3).

Existing parks and recreation reservations occur around most of these wetlands and where future urban or rural subdivision is proposed adjacent to wetlands, these reservations will need to be reviewed and possibly extended to ensure adequate buffers are set aside. Other wetlands, lakes and

remnant native vegetation may also be considered for inclusion in open space corridors to provide linkages between areas of environmental value. This will be undertaken during the local structure planning and subdivision processes. Specific environmental management plans would need to be prepared for significant wetlands, lakes and remnant native vegetation proposed to be protected as part of the structure planning, rezoning and subdivision approval process.

An establishment plan to create the East Wanneroo lakes regional park is being prepared by the WAPC in conjunction with DEC. This plan will make recommendations on the parks and recreation reservation boundaries for the wetlands systems, park management boundaries and future management options.

Declining watertable levels over the Gnangara Mound are having an adverse impact on the mound's groundwater dependent and terrestrial ecosystems. Breaches in the conditions set by the Minister for the Environment have occurred, with minimum summer and winter water level criteria not being met for a number of years for most criteria wetlands. Lower wetland water levels increase the risk of acid sulfates being released from the peaty wetland soils resulting in further ecosystem degradation and water quality problems for wetland systems in east Wanneroo.

Stormwater run-off from future urban areas could be managed to recharge groundwater to the benefit of dependent wetlands. The quality of stormwater run-off from new urban areas would need to be managed to minimise the risk of adding nutrients and pollution.

Planning Bulletin 64 Acid Sulfate Soils contains planning advice for disturbing acid sulfate soils in the high risk areas as depicted in the risk maps developed by the DEC. To ensure subdivision and development of land containing acid sulfate soils is planned and managed to avoid potential and adverse effects on the natural and built environment, the planning bulletin requires that a site assessment be undertaken to determine the presence or absence of these soils and how they are to be managed, before zoning changes are approved.

Where acid sulfate soils are found, a detailed site investigation and a soil and groundwater management plan must be prepared and approved by the responsible authorities, to determine the capacity of land to support the proposed land use. If the soils can be managed, conditions will be imposed on subsequent subdivision or development.

5.3.1 **Landscape protection**

The East Wanneroo Landscape Character Assessment Study identified the area's major landscape character types and key features, gave a relative scenic value to each character type, and made recommendations for managing those landscape values and types.

It noted that alterations to groundwater levels over time may also have an adverse impact on the landscape character of the wetlands and associated native vegetation communities, in particular the remnant tuart and karst landform system in Carabooda/Nowergup.

Using information from the study, the land use concept (figure 5) protects the major wetlands in east Wanneroo and identifies the north-west portion of Carabooda/Nowergup for rural small lot subdivision/landscape protection.

An area along the east side of Wanneroo Road has also been suggested as high value landscape areas to take into account the protection of the western linear wetland system, tuart and karst systems and hazards. As previously stated the identification of areas suitable for smaller lot rural subdivision would be subject to more detailed local area structure planning by the city.

5.4 **Retain rural zoning in Carabooda/Nowergup and protect significant areas of basic raw materials**

The land use concept proposes that the northern area (north of Wattle Avenue) be retained in the rural zone and be subject to further local area planning.

The north-west portion along Wanneroo Road, as described in section 5.2 and 5.3, should be further considered for small rural lot subdivision and landscape protection as part of a local structure planning process.

The north-east portion of Carabooda/Nowergup will remain zoned rural and be available for agricultural/horticultural production and the protection of the significant deposits of sand and limestone in the area.

The objectives for the planning and use of the sand and limestone resources in the study area are outlined in State Planning Policy 2.4 Basic Raw Materials.

State Planning Policy 2.4 aims to identify and protect basic raw material resource locations, key extraction areas and future extraction areas from being developed for incompatible land uses which could limit future exploitation, and ensure that the extraction of basic raw materials does not have an adverse effect on the environment or amenity in the locality of the operation during or after extraction.

Limestone extraction is located mostly in Neerabup and Carabooda/Nowergup and sand mining is concentrated in Gngara and Landsdale in the south of the study area. Sand and limestone mining can occur in the Wanneroo groundwater area, subject to stringent conditions.

The large areas identified as basic raw materials areas are mostly not suitable for broadscale horticultural use because of the presence of shallow limestone. Limestone extraction is a long-term proposal in many of the resource areas and in others, the quality of the limestone is low (cap rock) and may not be suitable for extraction. The suitability of the identified resource areas may require closer examination and review.

Submissions from some landowners in these areas have expressed concerns about the limited land use options available to them.

Many interim rural/tourism uses (eg chalets, kennels, horse riding/agistment) or other appropriate uses that may be complementary to the objectives of protecting basic raw material resource areas, may be able to occur until the limestone and sand is required for extraction.

Extraction of basic raw materials resources in this area may be a threat to the long-term landscape and scenic values of the area. Site-specific landscape management measures need to be put in place where there is a conflict between preserving landscape and scenic amenity and proposals for future extraction of limestone or sand.

Future extraction of basic raw materials means that the environmental and social impacts need to be managed by industry and state and local governments to address visual impact, noise, transport and buffering issues and to accommodate appropriate sequential land uses, that could include innovative rural living subdivision, and in the longer term, possible future urban.

5.5

Establish a new Gnangara agricultural/horticultural precinct in north-east Wanneroo

The land use concept is predicated on the establishment of a secure agricultural/horticultural precinct in north Wanneroo consisting of the existing rural area (private land) in north east Carabooda and a new

area to the east of the existing Carabooda/Nowergup rural areas on land currently under pines in State Forest 65. There is also potential for other areas to the north and/or south of Neaves Road (Crown land) to be included (figure 5).

A new agricultural/horticultural area for fruit and vegetable production and other rural uses such as poultry (egg and meat), nurseries and horse industries, using best management practice and based on the use of recycled waste water for irrigation, may have multiple benefits. These include replacing existing rural land uses and agricultural/horticultural production displaced by proposed future new urban development in the southern areas of east Wanneroo.

A coordinated whole-of-government approach to management of the land and water resources of the Gnangara Mound is needed to deliver a sustainable solution to the competing demands on the groundwater resource to all sectors of the community.

This is an opportunity to investigate the feasibility of a recycled water scheme to provide for the growth of the agricultural/horticultural industry in north-east Wanneroo with security of water supply and land tenure. It is also an opportunity for the Government to put into action some of the principles of sustainable environmental management of land, water, wetlands and agricultural resources promoted in the state sustainability strategy, state water strategy and state planning strategy and to invest.

There are many complex issues that need to be investigated fully by the DAFWA in collaboration with Department of Water, DEC, DPI, and the Water Corporation. These issues need to be resolved before a new agricultural/horticultural area based on the use of recycled water can be adopted by the government. These include:

- the value of food production in close proximity to the Perth metropolitan area and the economic and market issues of the agricultural/horticultural sector;
- the completion of the feasibility study into the most suitable location for a proposed new agriculture precinct and the coordinated clearing of pine plantation areas;
- infrastructure capital costs and how these may be funded, including methods of capital recovery, cost of water to irrigators and timing of a recycled water scheme;
- comparison of social, environmental and financial costs and benefits of the horticulture option with other options for use of the recycled water, such as to assist in securing future public drinking water supply benefits;
- environmental issues and public health considerations from potential downstream contamination to public water sources from nutrients and chemicals; and

- investigation into broader public perception, education and acceptance of the use of recycled water for growing edible products.

DAFWA released a report in October 2006, Proposal for Agriculture/Horticulture Precinct at Wanneroo/Gnangara Mound, which undertook preliminary investigations into two potential sites located in State Forest 65 pine plantation areas at Neerabup in the general vicinity north and south of Neaves Road, and State Forest 65 pine plantation areas and private land at Carabooda/Pinjar, for establishing a large scale horticulture/agriculture precinct in north Wanneroo.

The report outlines broad issues in relation to implementing a horticulture precinct, including the option of using recycled water, proximity to the underground pollution control areas and priority 1 source protection area, existing pine plantations and nutrient leaching. In addition, it identifies further investigation required and site-specific issues to determine:

- land capability;
- suitable cropping areas;
- transport links;
- buffer areas and setbacks from wetlands;
- bushland and nearby residential areas;
- the likely changes in the groundwater hydrology;
- indigenous values cultural heritage and management responsibilities.

The Carabooda/Pinjar site is the preferred and the most suitable location due to the majority of the nominated land having a high to fair capability for horticulture. All potential areas will be investigated.

The proposed Gnangara sustainability strategy will provide a coordinated inter-agency management strategy for the sustainable use of land and water resources of the Gnangara Mound, including a detailed feasibility study (involving water supply options and infrastructure) into the establishment of a new horticultural precinct in State Forest 65/Carabooda/Pinjar area, and other areas identified by DAFWA, to support the existing areas in north east Carabooda.



6 Recommended actions

1

That the land use concept (figure 5) be used as the broad framework for future land use planning by local and state government agencies for the east Wanneroo area.

2

That the Gngangara sustainability strategy, (particularly components affecting the east Wanneroo area), be prepared by the Department of Water as a matter of urgency during 2007, to provide a coordinated, inter-agency management strategy for the sustainable use of Gngangara Mound land and water resources. The strategy should include the following components.

- a** Undertake an investigation into the feasibility of establishing a new secure agricultural/horticultural precinct and water supply options, including a recycled water scheme, to be completed as a matter of urgency by 2007 (DAFWA, DEC, Department of Water, DPI, Water Corporation).
- b** Undertake an investigation and cost /benefit analysis of possible changes in the underground water pollution control area boundary and priority 1 classification of the area in State Forest 65. This will border on the proposed future urban areas and investigation of future alternative land use,

including the option of a regional transport corridor (DPI, Department of Water, DEC, Water Corporation).

- c** Investigate pine plantation management and harvesting, natural vegetation and fire management, and implications to regional water balance and groundwater dependent ecosystems (Forest Products Commission, Department of Water, DEC, Water Corporation).
- d** Investigate the management of the Gngangara Mound biodiversity resources and future boundary for the Gngangara park (DEC, Department of Water).

3

That DPI undertake the following work as a priority.

- a** Define a sustainable future urban structure and form for east Wanneroo, together with future road and public transport networks and strategies, activity centres and corridors, population targets and the nature of employment opportunities.
- b** Integrate the east Wanneroo area in the context of broader strategic planning for the north-west corridor

particularly in relation to transport planning, infrastructure and commercial/employment centres.

- d** Integrate the broader strategic planning for east Wanneroo with the context of the Gngangara sustainability strategy and the strategic considerations for regional transport corridors and future land use options for abutting portions of State Forest 65.
- e** Provide an implementation process and outline further studies required to support a future MRS amendment from rural to urban deferred for identified areas.

4

That the City of Wanneroo initiate further detailed local planning for a special use/small lot rural subdivision area along Wanneroo Road and a small lot rural subdivision/landscape protection area as shown on figure 5 in the north-west of east Wanneroo (Nowergup and Carabooda areas) (City of Wanneroo, DPI, landowners).

7

Implementation of the land use concept

The land use concept provides a broad planning framework for future land use changes.

Development is dependent on a coordinated approach between state, local government and landowners to prepare more detailed development concept plans, MRS and local planning scheme amendments, and district and detailed local area structure plans.

A proposed MRS amendment(s) will also be referred to the EPA for determination of the level of environmental assessment required.

A fundamental prerequisite to the future development is the need to coordinate and consolidate the fragmented land ownership in south-east Wanneroo and to agree on the arrangements between landowners and, state and local government for the provision of the social infrastructure (ie schools, shops, health care, open space) and physical infrastructure (ie roads, sewer, water, power) to support residential development.

As there are no MRS amendments required for the proposed rural small lot subdivision areas shown on figure 5, recommendations for these areas may be initiated by the city via local area structure planning and local planning scheme amendments. These amendments will also need to be referred to the EPA for determination of the level of environmental assessment.

Consultation with the community needs to be a continuing process and additional opportunities are provided for public comment and submissions at each of the steps in the strategic planning, local planning scheme amendment, and structure planning and development process.

The following steps illustrate the matters to be addressed and the broad actions necessary for the future rezoning, subdivision and development of land in accordance with the current planning and environmental approval practices.

- Commence and complete the draft Gnangara sustainability strategy (in particular the feasibility study into establishing a new agricultural/ horticultural precinct) as a matter of urgency by 2007;
- Prepare further detailed studies, structure plans and other information necessary to support an MRS amendment(s) by 2008;
- MRS rural to urban deferred amendment initiated by the WAPC in 2008;
- WAPC refers MRS amendment to the EPA;
- Level of environmental assessment determined and if necessary

environmental assessment reporting undertaken, approved and setting of environmental conditions by EPA for the MRS amendment;

- MRS rural to urban deferred amendment advertised and finalised incorporating EPA environmental approval conditions;
- City of Wanneroo district planning scheme amendment initiated and district/local structure plans prepared incorporating any EPA environmental conditions and infrastructure agreements;
- Local scheme amendment and district/local structure plan finalised;
- Land transferred from urban deferred to urban zone in MRS;
- Subdivision application and approval process.

A partnership between the city and landowners may need to be formed to facilitate and coordinate the preparation and approval of district and or local area structure plans (time line subject to City of Wanneroo and landowners).

A ppendices

Appendix one

Western Australian Planning Commission criteria and information requirements for lifting urban deferment

Criteria

1

The land is capable of being provided with essential services.

2

Agreement has been reached between developers and service providers with regard to staging and financing of services.

3

Planning is sufficiently advanced to depict an acceptable overall design to guide future development.

4

The proposed urban development represents a logical progression of development.

5

Regional requirement (eg regional roads, open space and public purposes) have been satisfied or provision made for them.

6

Any constraints to urban development can be satisfactorily addressed.

Information requirements

1

Justification:

- clear description, explanation and justification for the proposed change;

- evidence that the change is a logical extension of urban development (in terms of development of nearby properties and provision of existing infrastructure services); and
- details of the characteristics of the land and its proposed use.

2

Land and ownership:

- land to which the amendment applies, ownership details, plans of the subject land and other features as appropriate; and
- extent of agreement of landowners.

3

Natural environment:

- accurate description of the land, including the natural environment;
- description of physical conditions of the land;
- identification of means by which natural features will be protected; and
- identification of environmental issues that may impact on future development (eg noise, water catchment, contaminated land and air pollution).

4

Services:

- information regarding how water, drainage, sewer, power and other optional services will service the land;
- information regarding the servicing of the area by road, including information regarding how the development will be accommodated in the regional road system; and
- information regarding the planned availability of public transport.

5

Employment:

- where the land is remote from a developed urban front, an employment strategy.

6

Public uses:

Details regarding the areas required for schools, public utilities and community facilities.

7

Consultation:

Details regarding any consultations undertaken with relevant service providers and agreement reached.

Appendix two Abbreviations

CALM	Department of Conservation and Land Management (now DEC)
DPC	Department of the Premier and Cabinet
DEC	Department of Environment and Conservation
DoE	Department of Environment (now DEC)
DPI	Department for Planning and Infrastructure
DAFWA	Department of Agriculture and Food Western Australia
EPA	Environmental Protection Authority
GL	gigalitre (one million kilolitres)
ha	hectare
ML	megalitre (one thousand kilolitres)
MRS	Metropolitan Region Scheme
WAPC	Western Australian Planning Commission

Appendix three Glossary

abstraction

pumping from an aquifer

aquifer

a geological formation or group of formations able to receive, store and transmit significant quantities of water

best management practice

the highest level of management able to be undertaken in a particular industry

Environmental Protection Policy

policies prepared under the *Environmental Protection Act, 1986* relating to the protection of environmental assets

groundwater dependent ecosystems

ecosystems (plants, animals and processes) that depend on groundwater for survival

groundwater resource

a defined area of groundwater that has beneficial uses

hectare

unit of land area equal to 10 000 m² or approximately 2.47 acres

hydrogeology

the study of groundwater, groundwater flows, quality and the distribution of aquifers

hydrology

the study of water, its properties, distribution and usage on and below the earth's surface

land capability

measure of the inherent ability of land to support particular land uses

permeable

the ability of rock or soil to permit the passage of water

production well

a well or bore that draws groundwater to the ground's surface

recharge

the process of renewing underground water by infiltration of rainfall

remnant vegetation

remaining areas of natural vegetation

run-off

that part of rainfall which flows off the land's surface towards drainage lines

sequential land use

a land use which occurs after the completion of a prior land use

sewage

the mixture of waste fluids and solids flowing in sewers from houses, factories, etc

state planning policy

a policy prepared by the WAPC under the *Planning and Development Act 2005*

public drinking water source area

catchment area of a surface water source (reservoir) or recharge area of a groundwater source (borefield)

supply well

well or bore that draws water to the ground's surface

System 6

an area of land defined by the Environmental Protection Authority comprising the Swan coastal plain

unconfined aquifer

an aquifer which has its upper boundary at the earth's surface (the upper surface of the groundwater in the aquifer is called the watertable)

urbanisation

the process whereby land is developed for urban land uses

underground water pollution control area

an area of land proclaimed under the *Metropolitan Water Supply Sewerage and Drainage Act 1909* for the purpose of protecting groundwater used for public drinking water supplies

watertable

the level to which water rises in a well tapping an unconfined aquifer

Appendix four

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Appendix five

Involved stakeholders

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