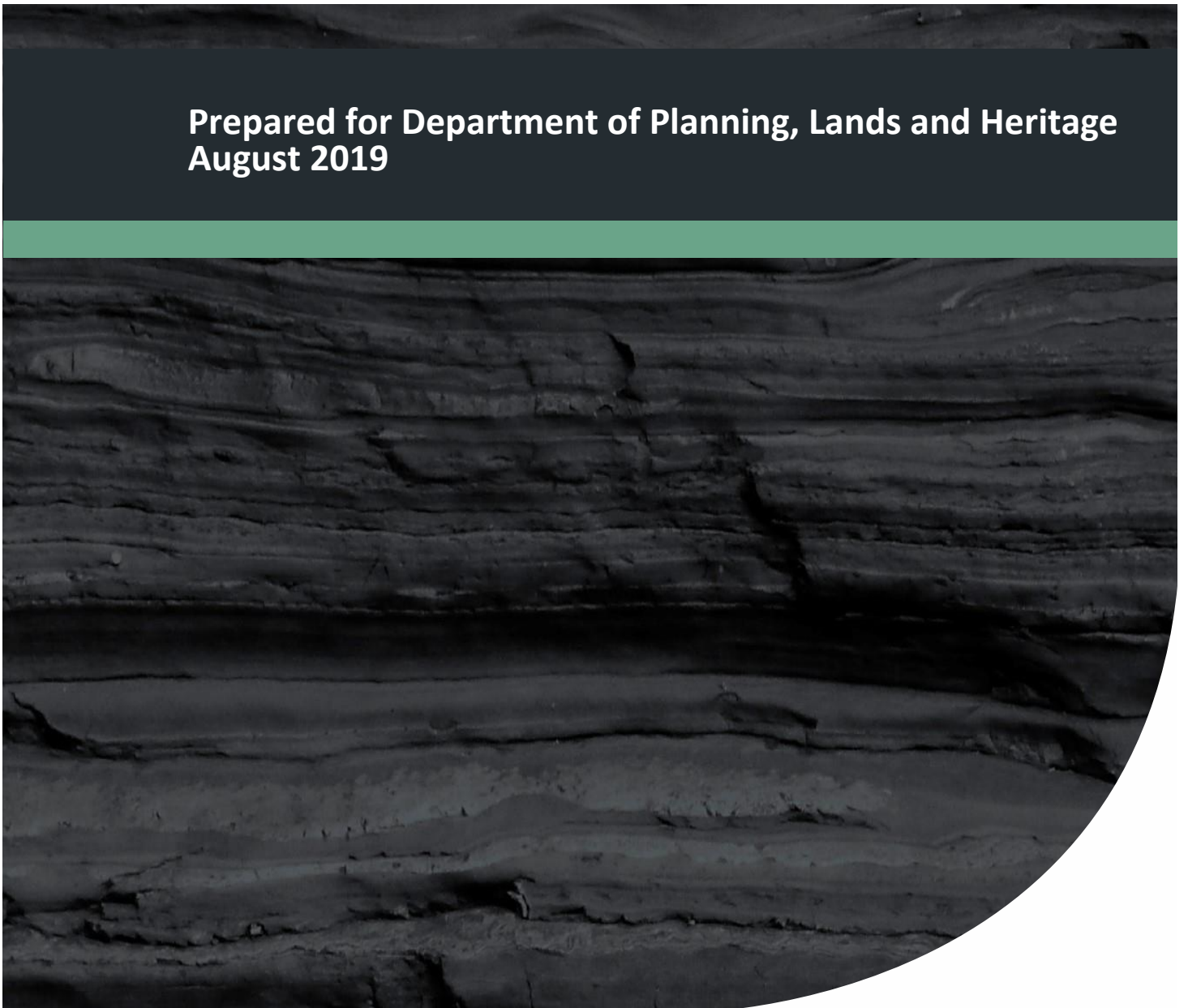


Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan

Project No: EP17-106(06)

**Prepared for Department of Planning, Lands and Heritage
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Assessment of Proposed Environmental Outcomes

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Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Executive Summary

The Department of Planning, Lands and Heritage (DPLH) has prepared the Draft East Wanneroo District Structure Plan (EWDSP), which will provide the basis for future planning and urban development of the East Wanneroo area.

This report provides a quantitative and qualitative assessment and audit of the environmental components of the Draft EWDSP and its proposed environmental outcomes. It has been prepared in the context of the current state and local planning policy framework, and also considers the recommendations provided in the Environmental Assessment Study (EAS), which was previously prepared by Emerge Associates (2018) to assist DPLH in preparing the Draft EWDSP, and therefore should be read in conjunction with this report.

The key environmental provisions proposed in the Draft EWDSP which have been considered in this assessment include:

- Provision of a district level 'Parklands' network, which affords protection for regionally significant environmental values. This network has been defined based on existing environmental protection mechanisms (such as Metropolitan Region Scheme (MRS) 'Parks and Recreation' reserves, Bush Forever sites and Conservation Category Wetlands), in addition to 'high priority areas for further investigation' identified in the EAS (which have been defined based on the potential occurrences of the SCP 20a threatened ecological community).
- Opportunities for additional conservation outcomes to be achieved at the local structure planning stage, through the provision of local public open space (POS) and specifically local conservation POS.
- Proposed future rehabilitation of wetland foreshore areas adjacent to future urban development, with a focus on rehabilitating 'Pinjar' complex vegetation.
- Proposed stormwater management strategy for future urban land uses which accommodates wetlands as part of the overall water balance planning in managing stormwater from major rainfall events.

A spatial analysis of the proposed 'Parklands' network has been undertaken to quantify the environmental outcomes that would be achieved through implementation of the Draft EWDSP. Based on this analysis and in comparison to the initial advice and recommendations of the EAS, implementation of the Draft EWDSP is considered likely to provide a sound basis for achieving biodiversity conservation outcomes for the key environmental values within the site. In this regard, it is important to note that the Draft EWDSP targets protection of regionally significant environmental values at a district level, given future stages of the land use planning process will provide opportunities for additional conservation outcomes to be achieved at a local level.

Specifically, state planning policies require that 10% of the gross-subdivisional area is to be provided as local POS. In addition, City of Wanneroo local planning policies allow conservation POS to be provided at a typical rate of 3% of the gross sub-subdivisional area, where applicable conservation significant environmental values occur. As such, there are opportunities for the proposed environmental outcomes of the Draft EWDSP to be expanded upon through future stages of the planning process required to facilitate the end use land uses proposed in the Draft EWDSP.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Based on a quantitative analysis, the proposed outcomes of the Draft EWDSP for key environmental values across the site are generally consistent with the recommendations presented in the EAS. Both the EAS and the Draft EWDSP are based on the underlying assumption that existing environmental protection mechanisms (such as MRS 'Parks and Recreation' reserves, local conservation reserves, Bush Forever sites (subject to the outcomes of future negotiated planning solution processes, where applicable) and conservation categories wetlands) will be protected. The Draft EWDSP 'Parklands' network also accommodates 'high priority areas for further investigation' identified in the EAS.

'High priority areas for further investigation' (and Bush Forever sites which are subject to negotiated planning solutions) will require further detailed investigation at future planning stages to confirm their environmental values and validate whether vegetation is representative of the SCP 20a TEC. If these areas are confirmed to contain the SCP 20a TEC, then retention of these areas would be expected and the Draft EWDSP outlines that these areas should be reserved for 'Parks and Recreation' under the MRS. However, if these areas are determined not to contain the SCP 20a TEC, expectation for their retention would no longer apply, given the potential occurrence of SCP 20a TEC was the primary factor in their original recommendation for protection, as presented in the EAS.

In absence of these further investigations and for the purpose of this report, it has been assumed that 'high priority areas for further investigation' are representative of the SCP 20a TEC and will ultimately be protected, in order to quantify the potential environmental outcomes of the Draft EWDSP. If further investigations result in a different outcome (i.e. the actual extent of the SCP 20a TEC within the site is less than that identified as potentially occurring in the EAS), then the environmental outcomes of the Draft EWDSP presented in this report would likely represent an overestimation, particularly in regard to protection outcomes for Carnaby's black cockatoo habitat, Banksia Woodlands of the SCP TEC and the Karrakatta central and south vegetation complex.

Based on a qualitative assessment of the proposed rehabilitation of foreshore areas outlined in the Draft EWDSP, the proposed rehabilitation strategy, if appropriately implemented, could improve the condition of existing Pinjar complex vegetation as well as potentially expand its current extent within foreshore reserve areas. Further consideration and confirmation of rehabilitation objectives, funding arrangements and long-term management authorities for proposed rehabilitated areas will need to be addressed during future planning stages, to ensure the proposed environmental outcomes of the proposed rehabilitation strategy are realised.

Based on a qualitative assessment of the proposed stormwater management strategy, the proposed accommodation of existing wetlands as part of the overall water balance planning is considered to be consistent with overarching stormwater management principles. Wetlands within the site generally have been subject to extensive historical disturbance and historical reduction in their wetland water levels (as a result of factors such as reduced rainfall, increased groundwater abstraction and pine plantations groundwater demand) and as such, their proposed accommodation in the stormwater management strategy is likely to assist in restoring long-term hydrological regimes and therefore enhancement of wetland features. Further technical work and consultation with relevant local and state government agencies will be required to inform the detailed design of the proposed stormwater management strategy, to ensure it is environmentally acceptable and consistent with policy requirements, which can be addressed at future stages of the planning process.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Overall, in the context of the recommendations of the EAS, the Draft EWDSP provides a sound basis for achieving biodiversity conservation outcomes for key environmental values across the site. This includes protection of regionally significant environmental values at a district-level through the proposed 'Parklands' network, in addition to proposing high-level environmental management strategies to rehabilitate 'Pinjar complex' vegetation within future foreshore areas and to restore long-term hydrological regimes of wetlands through the proposed stormwater management strategy.

Importantly, future stages of the land use planning process will also provide further opportunities to realise additional environmental outcomes at a local level, which will build on the proposed environmental outcomes of the Draft EWDSP.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Previous studies	1
1.3	Purpose of this report	1
2	Summary of EAS Outcomes	2
2.1	Key environmental values	2
2.2	Key conclusions and recommendations	3
2.3	Environmental legislation changes since EAS	4
2.3.1	Proclamation of <i>Biodiversity Conservation Act 2016</i>	4
2.3.2	EPBC Act listing of <i>Tuart Woodlands and Forests of the Swan Coastal Plain</i>	4
3	Draft East Wanneroo District Structure Plan	5
3.1	Proposed land uses	5
3.2	Precincts	5
3.3	Environmental provisions	6
3.3.1	'Parklands' network	6
3.3.1.1	MRS P&R reserves	6
3.3.1.2	Bush Forever sites	7
3.3.1.3	Conservation category wetlands	8
3.3.1.4	Parkland links	8
3.3.2	Future local structure planning conservation outcomes	8
3.3.3	Proposed foreshore rehabilitation	8
3.3.4	Proposed accommodation and enhancement of wetlands in drainage strategy	8
4	Quantitative Assessment of Draft EWDSP 'Parklands' Network	9
4.1	Accommodation of key environmental values	9
4.2	Accommodation of EAS 'Priority Areas for Further Investigation'	12
5	Qualitative Assessment of Draft EWDSP Environmental Provisions	14
5.1	Future local structure planning conservation outcomes	14
5.2	Proposed foreshore rehabilitation	16
5.2.1	Summary of proposed foreshore rehabilitation	16
5.2.2	Discussion of proposed foreshore rehabilitation	17
5.3	Proposed use and enhancement of wetlands in drainage strategy	19
5.3.1	Summary of proposed drainage strategy	19
5.3.2	Discussion of proposed drainage strategy	20
6	References	22

List of Tables

Table 1: Summary of proposed new MRS P&R reserves (adapted from Draft EWDSP Section 5.4.1)	6
Table 2: Summary of Draft EWDSP environmental outcomes – key environmental values	10
Table 3: Summary of Draft EWDSP environmental outcomes – 'Priority Areas for Further Investigation'	12

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Figures

Figure 1: Site Location

Figure 2: Known and Potential Occurrences of Threatened Ecological Communities

Figure 3: Existing Protection Mechanisms

Figure 4: EAS Priority Areas for Further Investigation

Figure 5: Draft EWDSP Parklands Network

Figure 6: Draft EWDSP Precinct Boundaries

Appendices

Appendix A

Draft East Wanneroo District Structure Plan (DPLH 2019)

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Abbreviation Tables

Table A1: Abbreviations – organisations

Organisations	
CoW	City of Wanneroo
DBCA	Department of Biodiversity, Conservation and Attractions
DPLH	Department of Planning, Lands and Heritage
EPA	Environmental Protection Authority
WAPC	Western Australian Planning Commission

Table A2: Abbreviations – general terms

General terms	
CBC	Carnaby's black cockatoo
CCW	Conservation category wetland
EAS	Environmental Assessment Strategy
EWDSP	East Wanneroo District Structure Plan
MUW	Multiple use wetland
POS	Public open space
P&R	Parks and recreation
SCP	Swan Coastal Plain
TEC	Threatened ecological community
UFI	Unique feature identifier

Table A3: Abbreviations – legislation

Legislation	
BC Act	<i>Biodiversity Conservation Act 2016</i>
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
LPP	Local Planning Policy
MRS	Metropolitan Region Scheme

Table A4: Abbreviations – units of measurement

Units of measurement	
ha	Hectare

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



1 Introduction

1.1 Background

The Department of Planning, Lands and Heritage (DPLH) has prepared the Draft East Wanneroo District Structure Plan (EWDSP), which, following its approval, will provide the basis for future planning and urban development of the East Wanneroo area. The EWDSP area (the site) extends across approximately 80 km² of land within the localities of Gnangara, Jandabup, Mariginiup and Wanneroo, as shown in **Figure 1**. The Draft EWDSP layout plan is provided in **Appendix A**.

1.2 Previous studies

Emerge Associates previously prepared the Environmental Assessment Study (EAS), on behalf of DPLH. The EAS involved an assessment of environmental values across the site and provided a range of environmental recommendations for consideration by DPLH during preparation of the EWDSP.

1.3 Purpose of this report

DPLH has since prepared the Draft EWDSP and has commissioned Emerge Associates to complete this report. The purpose of this report is to complete a quantitative and qualitative assessment and audit of the environmental components of the Draft EWDSP and its proposed environmental outcomes. This assessment has been completed in the context of the recommendations provided in the EAS and the current state and local planning policy framework.

This report includes the following:

- A summary of the key findings and recommendations of the EAS (**Section 2**)
- A description of the Draft EWDSP and proposed environmental outcomes (**Section 3**)
- A quantitative assessment of the Draft EWDSP 'Parklands' network (**Section 4**)
- A qualitative assessment of the Draft EWDSP environmental provisions (**Section 5**).

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



2 Summary of EAS Outcomes

A summary of the key results, recommendations and outcomes of the EAS is provided below. The EAS (Emerge Associates 2018) should be referred to for further detail.

2.1 Key environmental values

The EAS identified the following key environmental values as occurring within the site:

- Known occurrences of threatened ecological communities (TECs), including the State listed SCP 20a '*Banksia attenuata* woodland over species rich dense shrublands' and the Commonwealth listed 'Banksia Woodlands of the Swan Coastal Plain'.
- Additional areas of vegetation potentially representative of the SCP 20a TEC, but which are not currently identified in the State TEC database maintained by the Department of Biodiversity, Conservation and Attractions (DBCA). Detailed flora and vegetation surveys would be required to confirm whether these patches of vegetation are representative of the SCP 20a TEC. These areas are shown in **Figure 2**.
- Known occurrences of threatened and priority flora. In addition, there is the potential for further occurrences of threatened and priority flora species to occur within the site.
- Vegetation representative of the 'Karrakatta – Central and South', 'Bassendean – Central and South', 'Pinjar' and 'Herdsman' regional vegetation complexes.
- Threatened and priority fauna habitat, including potential foraging habitat for Carnaby's black cockatoo.
- Groundwater dependent ecosystems associated with the Gnangara Mound (superficial aquifer) of the Gnangara groundwater system, which underlies the site.
- Conservation category wetlands (CCWs), which represent the majority of surface water features and lakes within the site.

In addition, a number of existing Metropolitan Region Scheme (MRS) 'Parks and Recreation' (P&R) reserves, Bush Forever sites, City of Wanneroo (CoW) local 'Conservation' reserves, mapped regional ecological linkages and Public Drinking Water Sources Areas, occur across the site.

The extensive areas of vegetation potentially representative of the SCP 20a TEC (but which are not currently identified in the DBCA TEC database) were identified in the EAS as being a critical environmental consideration in preparing the EWDSP, given that:

- Across the Swan Coastal Plain, only 585 ha of the SCP 20a TEC is currently known to occur.
- Within the site, 324 ha of vegetation potentially representative of the SCP 20a TEC has been identified (only 7.5 ha of which is accounted for in the 585 ha in DBCA TEC mapping).

In this context, if all 324 ha of vegetation is confirmed to be representative of the SCP 20a TEC through future detailed flora and vegetation surveys, then the total distribution of the TEC across the SCP could increase to a total of up to 901 ha, of which up to 36% could occur within the site. As such, the site would be of high regional significance for this TEC and thus the EAS recommended precautionary responses for incorporation into the EWDSP, but also allows for flexibility to resolve uncertainty as the planning process progresses.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



2.2 Key conclusions and recommendations

The key conclusions and recommendations presented in the EAS are summarised as follows:

- Large areas of vegetation within the site, containing a range of environmental values, are afforded some level of protection through existing land use planning mechanisms. It is expected that these existing protection mechanisms will continue to be accommodated in the EWDSP and through the future planning process, such that these values are ultimately protected for conservation. Existing protection mechanisms are shown in **Figure 3** and include:
 - Areas regionally reserved for P&R under the MRS
 - Areas locally reserved for conservation under the CoW District Planning Scheme No. 2
 - Areas within Bush Forever sites (subject to resolution of any negotiated planning solutions)
 - Areas within mapped CCWs or their nominal 50 m buffer.
- In addition to the above, a number of areas of vegetation have been identified as potentially supporting significant environmental values. These areas have been identified as 'priority areas for further investigation'. These areas require detailed site specific investigations to confirm their environmental values. If confirmed, these values are recommended to be prioritised for protection as part of the future planning process. Priority areas for further investigation identified in the EAS are shown in **Figure 4** and were primarily identified based on their likelihood of being representative of the SCP 20a TEC. Consideration was also given to minimum patch size thresholds and patch ecological viability relating to shape and geometry.
- Of the identified 'priority areas for further investigation', a number of these were determined to be of highest priority due to range of factors, namely composition, size and connectivity of patches, consolidated land ownership, contribution to regional ecological linkages and alignment with identified 'priority local natural areas' (DoP 2011) and 'local natural areas' (CoW 2018). These areas were identified as 'high priority areas for further investigation'.

Other conclusions and recommendations of the EAS include:

- Site specific flora and vegetation surveys will be required to verify and confirm the extent of potential TEC occurrences. Potential TEC mapping presented in the EAS and shown in **Figure 2**, which informed its recommendations, was based on a high-level preliminary vegetation assessment only.
- Existing environmental approvals pursuant to the Commonwealth EPBC Act and/or the State EP Act should be considered when determining areas of environmental value to be protected, given specific approvals within the site could allow for impacts to existing environmental values.
- Based on a desktop assessment, a number of Bush Forever sites and mapped geomorphic wetlands within the site may require review. Some wetlands may require reclassification.
- Identified priority areas for further investigation commonly extend across multiple land parcels. As such, consideration should be given to the potential impacts of fragmented land ownership on achieving conservation outcomes.
- It is recommended that DPLH and DBCA maintain records of detailed flora and vegetation surveys as they are completed across the site during future planning stages, to allow tracking of confirmed SCP 20a TEC occurrences. This will enable the total known extent of the TEC to be updated, which may be relevant to future studies and/or any future processes around evaluation of the community's status.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



2.3 Environmental legislation changes since EAS

Since preparation of the EAS in October 2018, a number of changes to environmental legislation and TEC listings have occurred, which are relevant to the site and the EWDSP.

2.3.1 Proclamation of *Biodiversity Conservation Act 2016*

On 1 January 2019, the *Biodiversity Conservation Act 2016* (BC Act) and *Biodiversity Conservation Regulations 2018* replaced both the *Wildlife Conservation Act 1950* and its associated regulations. Part 2 of the BC Act allows the Minister for Environment to list ecological communities as TECs, which provides statutory protections under the BC Act for such values. A formal listing process for TECs was not previously provided for under the *Wildlife Conservation Act 1950* and instead, the Minister for Environment endorsed a list of TECs through a non-statutory process.

At the time of preparing this report, the Minister for Environment is yet to list any TECs pursuant to the BC Act. However, this is expected to occur in the near future and it is highly likely that the SCP 20a community will be listed as a TEC. If this occurs, any proposal to modify or impact a confirmed occurrence of the SCP 20a TEC would require approval pursuant to Part 4 of the BC Act.

Given the potential widespread occurrence of the SCP 20a TEC across the site, this will be a relevant consideration for future stages of the land use planning process across the EWDSP area. However, it is not anticipated that this will undermine the advice and recommendations of the EAS.

2.3.2 EPBC Act listing of *Tuart Woodlands and Forests of the Swan Coastal Plain*

The *Tuart Woodlands and Forests of the Swan Coastal Plain* (Tuart Woodlands) ecological community was listed as a 'Critically Endangered' TEC pursuant to the EPBC Act on 4 July 2019.

At the time of preparing the EAS in October 2018, the potential listing of the Tuart Woodlands TEC was still being considered by the Commonwealth Minister for Environment. Given the potential for the community to be listed as a TEC at the time, the EAS provided specific consideration for this environmental value. The preliminary vegetation assessment completed as part of the EAS identified potential occurrences of the community (the results of which are shown in **Figure 2**), but did not involve detailed assessment against the 'key diagnostic characteristics' of the community, which are provided in the TEC's Approved Conservation Advice.

Given the potential occurrence of the Tuart Woodlands TEC within the site, proponents of future development will need to consider their obligations under the EPBC Act if impacts to confirmed occurrences of the Tuarts Woodlands TEC are proposed. As such, this will be a relevant consideration for future stages of the land use planning process across the EWDSP area. However, it is not anticipated that listing of the Tuart Woodlands TEC under the EPBC Act will undermine the advice and recommendations of the EAS.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



3 Draft East Wanneroo District Structure Plan

The Draft EWDSP has been prepared by DPLH and is provided in **Appendix A**. DPLH describes the Draft EWDSP as a high-level statutory document that will guide future amendments to the MRS and will provide a framework for the future detailed planning of the East Wanneroo area. The results and recommendations of the EAS were considered by DPLH when preparing the Draft EWDSP.

3.1 Proposed land uses

The Draft EWDSP proposes a range of land uses across the site, including:

- Centre
- Urban neighbourhood
- Character areas
- Suburban neighbourhood
- Special residential areas
- Industrial
- Public purpose
- Parklands
- Parklands (subject to confirmation)
- Parkland link
- Regional sporting fields
- Rural
- Service commercial
- State forest
- Tourism opportunities
- High schools
- Movement network (roads, transit corridors, station locations).

Detailed descriptions of these land use categories are provided in the Draft EWDSP report.

In some portions of the site, the Draft EWDSP does not propose any change to existing land uses. For example, some areas of existing rural land uses are proposed to be maintained, in addition to existing conservation land uses associated with existing reserves.

3.2 Precincts

The Draft EWDSP identifies 28 precincts across the site, the boundaries of which are shown in **Appendix A** and **Figure 6**. The Draft EWDSP outlines that precinct boundaries represent future local structure plan (LSP) boundaries.

The Draft EWDSP outlines that opportunities to optimise self-contained drainage catchments within precincts have informed the delineation of precincts boundaries. This is discussed further in **Section 5.3**.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



3.3 Environmental provisions

A range of spatial responses and textual provisions have been provided in the Draft EWDSP to address the environmental values of the site. These are summarised below.

3.3.1 'Parklands' network

The primary response of the Draft EWDSP to the environmental values of the site is the provision of a network of 'Parklands' land uses. The Draft EWDSP Parklands network incorporates the following:

- land currently protected as P&R reserves in the MRS
- New areas to be reserved for P&R in the MRS
- Potentially new areas to be reserved for P&R, subject to confirmation
- Bush Forever sites subject to a negotiated planning solution
- A 50 ha Regional Sporting Facility
- Conservation category wetlands
- Existing local reserves
- Parkland Links.

The proposed 'Parklands' network identified in the Draft EWDSP is shown in **Figure 5** and its features are discussed below.

3.3.1.1 MRS P&R reserves

All existing MRS P&R reserves within the site are accommodated in Draft EWDSP Parklands network. In addition, the Draft EWDSP proposes that seven new MRS P&R reserves (or extensions to existing reserves) should be incorporated into the MRS, as summarised in **Table 1** and shown in **Appendix A**. The Draft EWDSP proposes that the WAPC will be the responsible authority for preparing and initiating the necessary MRS amendments to create these reserves.

Table 1: Summary of proposed new MRS P&R reserves (adapted from Draft EWDSP Section 5.4.1)

No.	Name	Description
1	Lake Adams	Eastern expansion of an existing MRS P&R reserve, to incorporate a mapped CCW (UFI 7959).
2	Coogee Park	New MRS P&R reserve over an existing CoW local reserve associated with Coogee Park (local reserve no. 38656), and incorporating the adjacent CCW (UFI 14241) and regionally mapped 'Pinjar' complex vegetation.
3	Regional sporting facility	Northern expansion of existing Lake Jandabup MRS P&R reserve, to provide 50 ha of land for a future regional sporting facility.
4	REW 15443	Northern expansion of existing Lake Jandabup MRS P&R reserve, to incorporate a mapped REW (UFI 15443) and associated native vegetation. North-west of the future regional sporting facility.
5	Townsend Road Bushland	Northern expansion of existing Lake Jandabup MRS P&R reserve, to incorporate the currently unreserved portion of Bush Forever Site 324 immediately north of Townsend Road.
6	Bush Forever site 471	Southern expansion of an existing MRS P&R reserve, comprising the unreserved portions of Bush Forever Site 471 on the northern side of Elliot Road.
7	Lake Badgerup	Southern expansion of existing Lake Badgerup MRS P&R reserve, comprising two unreserved portions of Bush Forever Site 327, adjacent to the intersection of Badgerup Road and Ocean Reef Road.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Further to these seven new P&R reserves, a number of additional potential MRS P&R reserves have been identified in the Draft EWDSP and shown as 'Parklands (subject to confirmation)'. These areas have been accommodated in the Draft EWDSP given they were identified as 'high priority areas for future investigation' in the EAS. The Draft EWDSP outlines that detailed flora and fauna surveys will be required to confirm the environmental values within these areas (primarily to determine whether vegetation is representative of the SCP 20a TEC) and thus determine their suitability as potential MRS P&R reserves.

The Draft EWDSP outlines that proponents will then be responsible for confirming *'the appropriate configuration of these new reserves in conjunction with the creation of coherent neighbourhoods'*. Based on discussions with DPLH, it is understood that this process is intended to involve consideration of a range of factors, including but not limited to environmental considerations, in determining the proposed form of urban development across a precinct. The outcomes of this will then form the basis of requests from proponent/s to the WAPC for the reservation of the determined P&R area. The Draft EWDSP outlines that this process *'must be completed prior to, or in parallel with the precinct being zoned Urban'*.

3.3.1.2 Bush Forever sites

The majority of existing Bush Forever sites which are mapped within the site are accommodated within the proposed Parklands network of the Draft EWDSP. These Bush Forever sites are located within existing MRS P&R reserves or within one of the seven proposed MRS P&R reserves.

In addition, three sub-areas of Bush Forever 327 (within EWDSP precincts 1 and 3) are identified within the Draft EWDSP as 'Parklands (subject to confirmation)'. The Draft EWDSP outlines that these Bush Forever sites can undertake the process for a negotiated planning solution to determine where bushland will be retained, in accordance with State Planning Policy 2.8 *Bushland Policy for the Perth Metropolitan Region* (SPP 2.8).

Some Bush Forever sites within the site do not align with the proposed Parklands network shown in the Draft EWDSP, including:

- Bush Forever Site 326 (within EWDSP Precinct 21), given no change to the existing rural land use is proposed in the Draft EWDSP.
- Bush Forever Site 463 (within EWDSP Precinct 17), given the area is subject to an approved local structure plan and an associated negotiated planning solution for Bush Forever site 463. The approved local structure plan and Bush Forever negotiated planning solution have been implemented and as such, no change to the existing land use is proposed in the Draft EWDSP.
- Bush Forever Site 471 (within EWDSP Precinct 5), given no change to the existing public purpose land use is proposed in the Draft EWDSP.
- Bush Forever Sites 104, 105, 106, 107, 108, 433 and 441 (within EWDSP Precincts 24 and 26), given these Bush Forever sites will be addressed through the future land use planning process associated with the proposed industrial land use.

DPLH has confirmed that whilst these specific Bush Forever sites do not align with proposed Parklands network of the Draft EWDSP (due to the reasons outlined above), there will remain a presumption against clearing of regionally significant bushland or other degrading activities within these Bush Forever sites, consistent with policy measures of SPP 2.8.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



3.3.1.3 Conservation category wetlands

The majority of CCWs mapped as occurring within the site align with the Parklands network proposed in the Draft EWDSP. DPLH have outlined that some CCWs are proposed to be included in new MRS P&R reserves where they are structurally or strategically important, whilst others will remain in private ownership and be addressed at future stages of the land use planning process. DPLH have confirmed that there is an expectation that all CCWs will ultimately be retained, subject to any future wetland reclassification proposals, consistent with the assumptions of the EAS.

3.3.1.4 Parkland links

The Draft EWDSP identifies a network of linear 'Parkland links'. The Draft EWDSP proposes integration of ecological and movement functions within these links, in the form of linear parklands or landscape boulevards. The Draft EWDSP outlines that the specific environmental features to be retained as part of 'Parkland links' will be confirmed at the future local structure planning stage.

3.3.2 Future local structure planning conservation outcomes

The Draft EWDSP outlines that the district level 'Parklands' network has been provided to accommodate environmental values of '*regional significance*'. The Draft EWDSP also outlines that future local structure plans will be required to achieve a 10% provision of public open space (POS), consistent with the requirements of *Liveable Neighbourhoods* (WAPC 2009) and that through this process, additional areas of native vegetation and environmental values are anticipated to be identified for conservation land uses. As such, there will be opportunities to add to the district-level conservation outcomes proposed in the EWDSP through future stages of the land use planning process. This is discussed further in **Section 5.1**.

3.3.3 Proposed foreshore rehabilitation

The Draft EWDSP outlines that one of the planning outcomes to be achieved in identified 'Parkland' areas is that '*regional vegetation complexes are rehabilitated and extended as part of the management of foreshore areas.*' The proposed rehabilitation of foreshore areas is intended to target 'Pinjar' complex vegetation, given only 40% of the original extent of this complex remains across the Swan Coastal Plain and 31% of its original extent occurs within the site. The proposed rehabilitation of foreshore areas is intended to be addressed through preparation and implementation of Foreshore Management Plan/s at future planning stages. This is discussed further in **Section 5.2**.

3.3.4 Proposed accommodation and enhancement of wetlands in drainage strategy

The Draft EWDSP and associated Draft District Water Management Strategy (DWMS) (RPS 2018) proposes to accommodate existing wetlands as part of the overall water balance planning in managing stormwater from major rainfall events. The Draft EWDSP outlines that '*this provides an opportunity to restore wetlands to provide ecological and amenity functions and enhance the overall wetland network across the EWDSP area.*' The accommodation of wetlands in the stormwater management strategy is intended to provide enhancement of environmental outcomes for wetlands across the site, given historical disturbances to hydrological regimes of the region. This is discussed further in **Section 5.3**.

Assessment of Proposed Environmental Outcomes East Wanneroo District Structure Plan



4 Quantitative Assessment of Draft EWDSP 'Parklands' Network

4.1 Accommodation of key environmental values

As part of this *Assessment of Proposed Environmental Outcomes*, a spatial analysis of the Draft EWDSP layout has been undertaken to quantify the environmental outcomes that would be achieved through its implementation, the results of which are presented in **Table 2**. The following assumptions have been used for the purpose of this spatial analysis:

- All 'Parklands' and 'Parklands (subject to confirmation)' land use areas shown on the Draft EWDSP will provide for retention of existing environmental values.
- At least 80% of remnant vegetation within the 'Regional sporting field' land use area will be retained, based on advice received from DPLH.
- Vegetation within all mapped Bush Forever sites will be retained, subject to the outcomes of future negotiated planning solution processes where applicable.
- Vegetation within all mapped CCWs or nominal 50 m buffer areas will be retained.

The above areas are shown in **Figure 5** and are herein collectively referred to as the 'Draft EWDSP protection areas', as they represent the areas of the site where the Draft EWDSP proposes retention of existing environmental values to occur, assuming that further investigations confirm the occurrence of the SCP 20a TEC in the areas of 'Parklands (subject to confirmation)'.

The proposed environmental outcomes of the Draft EWDSP can also be compared the recommendations of the EAS, which were primarily associated with prioritising retention of larger patches of potential SCP 20a TEC (subject to further investigations validating occurrence of the TEC), given the environmental significance of such values. The areas identified in the EAS recommendations are shown in **Figure 4** and include:

- Areas subject to existing environmental protection mechanisms, which includes all MRS P&R reserves, Bush Forever sites, local conservation reserves, CCWs and their nominal 50 m buffers.
- 'Priority areas for future investigation' (including 'high priority' areas), which are associated with patches of potential SCP 20a TEC greater than 4 ha.
- Other considerations which were not accounted for in the above areas, specifically:
 - Potential SCP 20a TEC patches between 3-4 ha
 - Potential Tuart Woodland TEC patches greater than 3 ha.

EAS Table 19 summarised the total extent of each key environmental value within the site which would be provided protection if the above areas were accommodated through the Draft EWDSP and/or future stages of the planning process. These results are also provided in **Table 2** to provide comparison to the proposed environmental outcomes of the Draft EWDSP.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Table 2: Summary of Draft EWDSP environmental outcomes – key environmental values

Environmental value	Area across Swan Coastal Plain (ha)	Area within site (ha)	Proportion of SCP extent within site	EAS potentially protected area ¹ (ha)	EAS potentially protected area (proportion across site)	EAS potentially protected area (proportion across SCP)	Area within Draft EWDSP protection areas ²	Proportion (across site) in Draft EWDSP protection areas ²	Proportion (across SCP) in Draft EWDSP protection areas ²
Native vegetation (DPIRD 2017a)	582,521	1,710	0.29%	1412	83%	0.24%	1385	81%	0.24%
Potential TEC - SCP 20a ³	585 (901)	324	35.91%	266	82%	29.52%	219	68%	24.30%
Potential TEC - Tuart Woodlands	25,410	53	0.21%	31	59%	0.12%	20	38%	0.08%
Potential TEC - Banksia Woodlands	336,490	1,167	0.35%	966	83%	0.29%	912	78%	0.27%
Fauna habitat - Potential CBC foraging habitat (Glossop <i>et al.</i> 2011)	43,964	1,309	2.98%	1060	81%	2.41%	1024	78%	2.33%
Vegetation complex - Bassendean Central and South (26.1% remaining)	22,846	185	0.81%	159	86%	0.70%	158	85%	0.69%
Vegetation complex - Bassendean North (71.8% remaining)	53,218	238	0.45%	219	92%	0.41%	219	92%	0.41%
Vegetation complex - Bassendean North Transition (91.1% remaining)	16,069	347	2.16%	301	87%	1.87%	301	87%	1.87%
Vegetation complex - Karrakatta Central and South (23.0% remaining)	11,518	314	2.73%	243	77%	2.11%	197	63%	1.71%
Vegetation complex - Herdsman (33.9% remaining)	2,821	33	1.17%	32	98%	1.13%	26	79%	0.92%
Vegetation complex - Pinjar (30.0% remaining)	1,467	588	40.08%	457	78%	31.15%	483	82%	32.92%
Conservation Category Wetlands ⁴	31,307	394	1.26%	394	100%	1.26%	394	100%	1.26%

¹ Assumes all native vegetation will be protected within the following areas: areas subject to existing protection mechanisms, priority areas for further investigation, other areas (3-4 ha patches of potential SCP 20a TEC, 3+ ha patches of potential Tuart Woodlands TEC)

² Draft EWDSP protection areas assumes all native vegetation will be protected within the following areas: 'Parklands' and 'Parklands (subject to confirmation)' land uses shown on the Draft EWDSP, 80% of remnant vegetation within Regional Sporting Fields land use shown on the Draft EWDSP, all Bush Forever sites, all CCWs or nominal 50m buffer zones.

³ Note that of the 585 ha of this TEC known to occur across the Swan Coastal Plain, only 7.5 ha of this area is currently mapped by DBCA as occurring within the site. The potential additional occurrences of this TEC within the site (totalling 316.5 ha), as identified in the EAS, are not accounted for in the 585 ha of the known total occurrence across the Swan Coastal Plain. As such, the potential total occurrence of the SCP is assumed to be up to 901 ha.

⁴ Where these values intersect existing native vegetation.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Based on the results of the spatial analysis presented in **Table 2** and in comparison to the initial advice and recommendations of the EAS, implementation of the Draft EWDSP is considered likely to provide a sound basis for achieving biodiversity conservation outcomes for the key environmental values within the site. In this regard, it is important to note that the Draft EWDSP 'Parklands' network targets accommodation of regionally significant environmental values at the district level, given future stages of the land use planning process will provide further opportunities for conservation outcomes to be achieved at a local level. As such, there are opportunities for the proposed environmental outcomes of the Draft EWDSP to be expanded upon through future stages of the planning process required to facilitate the end use land uses proposed in the Draft EWDSP. This is discussed further in **Section 5.1**.

In addition to the above, the following observation and conclusions can be made when comparing the proposed environmental outcomes of the Draft EWDSP to the EAS recommendations:

- The quantitative protection outcomes for environmental values in the Draft EWDSP, as outlined in **Table 2**, are generally consistent with the recommendations presented in the EAS. The consistency in the results is attributed to both approaches being based on the same underlying assumption; that existing environmental protection mechanisms (MRS P&R reserves, Bush Forever sites, CoW local reserves and CCWs – which provide for the majority of protection outcomes across the site) will continue to be maintained and protected. However, it should be noted that the Draft EWDSP outlines that some Bush Forever sites will be subject to future negotiated planning solutions, which will determine vegetation retention outcomes in these areas, as discussed in **Section 3.3.1.2**.
- Where differences in protection outcomes for environmental values occur, they are attributed to the following considerations:
 - The EAS recommends that all 'priority areas for further investigation' should be prioritised for retention, subject to confirm of their environmental values (potential occurrence of SCP 20a TEC). Whilst the Draft EWDSP 'Parklands' network incorporates 'high priority areas for further investigation', it does not account for all 'priority areas for further investigation'. Based on discussions with DPLH, it is expected that further investigation and potential retention of these remaining areas will be addressed through the local structure planning process, as discussed further in **Section 4.2** and **Section 5.1**.
 - The EAS recommendations identified a range of other vegetation patches for potential protection, including 3-4 ha patches of potential SCP 20a TEC and 3+ ha patches of potential Tuart Woodlands TEC. The Draft EWDSP 'Parklands' network does not incorporate these areas and DPLH expect that potential retention of these areas will be considered at the local structure planning stage.
- Notable differences in quantitative protection outcomes between the EAS and the Draft EWDSP include:
 - **Potential SCP 20a TEC** – Lower area protected in the Draft EWDSP compared to areas identified in the EAS Table 19, given not all 'priority areas for further investigation' (which are largely based on patches of potential SCP 20a TEC occurrence) are accounted for in the Draft EWDSP 'Parklands' network. As outlined above, whilst all these areas are not accommodated in the Draft EWDSP, it is expected further investigation and potential retention of these will be addressed at the local structure planning stage.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



- **Potential Tuart Woodland TEC** – Lower area protected in the Draft EWDSP compared to areas identified in EAS Table 19, given '3+ ha patches of potential Tuart Woodlands TEC' are not accounted for in the Draft EWDSP 'Parklands' network. As outlined above, whilst all these areas are not accommodated in the Draft EWDSP, it is expected further investigation and potential retention of these will be addressed at the local structure planning stage.
- **Karrakatta central and south complex** – Lower area protected in the Draft EWDSP compared to areas identified in EAS Table 19. This is attributed to the correlation between the Karrakatta central and south vegetation complex and occurrences of potential SCP 20a TEC. As such, the comparative reduction is attributed to not all 'priority areas for further investigation' being accounted for in the Draft EWDSP 'Parklands' network, as discussed above.
- **Pinjar complex** – greater area protected in the Draft EWDSP compared to areas identified in EAS Table 19. Based on discussions with DPLH, preparation of the Draft EWDSP and layout of the 'Parklands' network targeted provision of district level protection for mapped areas of Pinjar complex vegetation. As such, the Draft EWDSP provides additional protection for regionally mapped occurrences of Pinjar complex vegetation, which are additional to areas identified in EAS Table 19.

Overall, the differences in the protection outcomes proposed in the Draft EWDSP compared to the EAS recommendations are primarily attributed to the Draft EWDSP 'Parklands' network being designed to target 'high priority areas for further investigation', with other areas (including remaining 'priority areas for further investigation', potential SCP 20a TEC patches between 3-4 ha, and 3+ ha patches of potential Tuart Woodlands TEC) not being targeted for accommodation in the 'Parklands' network. Based on discussions with DPLH and as outlined above, retention opportunities for these areas will be further considered at future stages of the land use planning process for the site, specifically at local structure planning. As such, this will provide additional opportunities to build on the conservation outcomes of the Draft EWDSP, discussed further in **Section 5.1**.

4.2 Accommodation of EAS 'Priority Areas for Further Investigation'

A spatial analysis of the Draft EWDSP layout has also been undertaken to determine what extent of 'priority areas for further investigation' and 'high priority areas for further investigation' identified in the EAS have been accommodated within the Draft EWDSP 'protection areas'. The results of this analysis are provided in **Table 3**.

The EAS 'Priority areas for further investigation' and 'high priority areas for further investigation' are discussed in **Section 2.2** and shown in **Figure 4**.

Table 3: Summary of Draft EWDSP environmental outcomes – 'Priority Areas for Further Investigation'

	Area identified in EAS	Area within Draft EWDSP 'protection areas'	Proportion within Draft EWDSP 'protection areas'
Priority area for further investigation*	117 ha	80 ha	68%
High priority area for further investigation*	83 ha	80 ha	96%

*Note: areas are not mutually exclusive, all 'high priority areas for further investigation' are also 'priority areas for further investigation'.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



Based on the results of the spatial analysis, the Draft EWDSP accommodates 96% of 'high priority areas for further protection' within the 'Parklands (subject to confirmation)' land use, the exception being a 3 ha patch located on Coogee Road in the north of the site. Accommodation of 'high priority areas for further investigations' in the Draft EWDSP is consistent with the recommendations of the EAS.

The 3 ha patch of vegetation located on Coogee Road is subject to an existing determination under the EPBC Act, which proposes removal of vegetation for residential purposes. Based on discussions with DPLH, this existing EPBC Act determination was considered during preparation of the Draft EWDSP and design of the proposed 'Parklands' network. This EPBC Act determination was issued following completion of the EAS. No state environmental approvals were known to apply to site at the time of preparing the EAS.

The Draft EWDSP 'Parklands' network does not account for the remaining 'priority areas for further investigation' (i.e. those not identified as 'high priority' in the EAS). As such, 68% of 'priority areas for further investigation' are accommodated within the proposed 'Parklands' network of the Draft EWDSP. Whilst the Draft EWDSP does not accommodate all 'priority areas for further investigation' at a district planning level, opportunities to accommodate these areas and their environmental values can be further explored at the local structure planning stage, as discussed in **Section 5.1**.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



5 Qualitative Assessment of Draft EWDSP Environmental Provisions

5.1 Future local structure planning conservation outcomes

As outlined in **Section 3.3.2**, the Draft EWDSP identifies a district level reserve network, comprising the 'Parklands' areas shown in the Draft EWDSP layout plan. Additional areas of 'Parkland (subject to confirmation)' will require detailed flora and vegetation surveys to be undertaken in order to confirm their environmental values, consistent with the recommendations of the EAS. If such surveys confirm these areas support conservation significant values (primarily the SCP 20a TEC), then the Draft EWDSP outlines that these areas require reservation for P&R under the MRS. The Draft EWDSP outlines that these detailed flora and vegetation surveys are to be completed early in the local structure planning process. If these areas are determined not to contain the SCP 20a TEC, expectation for their retention would no longer apply, given the potential occurrence of SCP 20a TEC was the primary factor in their original recommendation for protection, as presented in the EAS.

In addition to the district-level conservation outcomes proposed in the Draft EWDSP outlined above, areas of future urban development within the site will be required to accommodate additional areas of local public open space, consistent with state planning policy requirements. *Development control policy 2.3 - Public open space in residential areas* outlines that where urban development is proposed, 10% of the gross sub-divisible area is to be provided as POS. Furthermore, *CoW Local Planning Policy 4.3 – Public open space* (LPP 4.3) outlines that where significant natural assets occur (including but not limited to TECs, wetlands, threatened flora, conservation significant fauna species and vegetation complexes with less than 30% of their original extent remaining), a minimum of 3% of gross sub-divisible area can be provided as POS for the purpose of conservation.

Provision of local conservation POS areas across the site, consistent with LPP 4.3 where applicable, would provide for further protection and retention of existing environmental values, additional to that proposed at a district-level through the Draft EWDSP 'Parklands' network. As such, this would provide opportunities for the conservation outcomes of the Draft EWDSP for key environmental values (as presented in **Table 2**) to be expanded at future stages of the land use planning process.

Based on the Draft EWDSP layout plan and associated land uses, the site contains approximately 3000 ha of land identified for urban development (areas identified for 'centre', 'urban neighbourhood', 'character areas', 'suburban neighborhood' and 'special residential area' land uses). Based on a generic application of state and local policy measures, 10% of this area represents approximately 300 ha of potential local POS, with 3% of this area representing approximately 90 ha of potential local conservation POS. These figures represent a high-level indication of the potential extent of future local POS which could be implemented across the site. However, the actual extent and location of local POS areas will be determined through future local structure planning process and specific application of state and local POS policies. Most importantly, potential conservation POS areas would only be feasible where significant environmental values were confirmed to occur, based on the results of site specific environmental surveys and investigations.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



In consideration of the outcomes and recommendations of the EAS, future areas of local conservation POS could potentially be located to align with the following areas, which are not identified in the Draft EWDSP district-level 'Parklands' network:

- 'Priority areas for further investigation' (where these have not been identified in the Draft EWDSP 'Parklands' network), subject to the outcomes of further investigations confirming their environmental values. These areas align with vegetation currently identified as being potentially representative of the SCP 20a TEC.
- Potential SCP 20a TEC patches between 3-4 ha and potential Tuart Woodland TEC patches greater than 3 ha identified in the EAS, subject to the outcomes of further investigations confirming their environmental values.
- Areas of native vegetation within 'Parkland Links' shown in the Draft EWDSP, or within mapped regional ecological linkages (as documented in the EAS).
- 'Priority local natural areas' identified in the 2011 *East Wanneroo Structure Plan*.

As outlined above, the identification of any conservation POS areas should be informed by the results of future detailed environmental (such as flora, vegetation and fauna) surveys and assessments.

Overall, areas of local POS will be provided through the future local structure planning process as a requirement of state policy requirements. This may include areas of local conservation POS targeting confirmed conservation significant environmental values. As such, this will provide opportunities for the proposed district-level conservation outcomes of the Draft EWDSP 'Parklands' network to be expanded and added to through the future local structure planning process.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



5.2 Proposed foreshore rehabilitation

5.2.1 Summary of proposed foreshore rehabilitation

Based on the results of the EAS, the Draft EWDSP notes that the site contains a number of regional vegetation complexes with less than 30% of their original pre-European extent remaining across the Swan Coastal Plain, including the Karrakatta Central and South, Bassendean Central and South and the Pinjar complexes. The Draft EWDSP also notes that approximately 40% of the total remaining extent of Pinjar complex vegetation across the Swan Coastal Plain occurs within the site.

In responding to these environmental values, the proposed 'Parklands' network of the Draft EWDSP accommodates areas of remnant vegetation of various vegetation complexes across the site, as shown in **Table 2**. In addition to the proposed spatial protection outcomes provided by the 'Parklands' network, the Draft EWDSP also proposes a vegetation rehabilitation strategy targeting 'Pinjar' complex vegetation, given the regional significance of the site for this vegetation complex in the context of its reduced extent remaining across the Swan Coastal Plain. The Draft EWDSP outlines the following in this regard:

'Opportunities for rehabilitation and increasing the extent of remnant vegetation are available through the Foreshore Management Plans prepared for wetlands. Local Structure Plan proponents should liaise with the WAPC on how this can be comprehensively achieved where residential areas abut Parks and Recreation Reserves, in particular this will benefit the Pinjar vegetation complex which is locally significant and is represented at less than 30% of its pre-European settlement extent.'

The Draft EWDSP further outlines that one of the 'planning outcomes' to be achieved in identified Parkland areas is that *'regional vegetation complexes are rehabilitated and extended as part of the management of foreshore areas.'*

Based on these provisions of the Draft EWDSP and further discussions with DPLH, DPLH's expectations around vegetation rehabilitation within the site are summarised as follows:

- Where future development is proposed adjacent to retained wetlands, proponents of urban development will be required to prepare a Foreshore Management Plan which will need to address rehabilitation of vegetation within foreshore areas, with particular focus on rehabilitating vegetation representative of the Pinjar complex.
- The mechanism to require preparation of Foreshore Management Plan/s (where applicable) is expected to be through imposition of an associated condition on future subdivision approvals.
- Where proposed development abuts publicly owned land supporting a foreshore area, liaison between applicable landowners should occur when preparing the Foreshore Management Plan in order to determine the rehabilitation outcomes to be achieved and associated funding arrangements. DPLH has outlined that the WAPC has expressed in-principle support for contributing to future rehabilitation costs, where rehabilitation works are proposed within land managed by WAPC (for example, MRS P&R reserves managed by WAPC).

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



5.2.2 Discussion of proposed foreshore rehabilitation

Where urban development proposals involve environmental impacts, the environmental impact mitigation hierarchy outlines that, where possible, any impacts should first be avoided (for example, through the retention of environmental values in conservation areas). Where impacts are unavoidable, measures to mitigate such impacts should then be implemented (for example, through the implementation of environmental management plans or the undertaking of revegetation). Any significant residual impacts should then be managed through appropriate offsets.

In the context of the environmental impact mitigation hierarchy, the proposed 'Parklands' network identified in the Draft EWDSP provides for future impact avoidance outcomes across the site, whilst the proposed foreshore rehabilitation requirements will provide for additional mitigation of impacts associated with future urban development of the site.

The foreshore area rehabilitation strategy proposed in the Draft EWDSP is considered suitable for the site given the following factors:

- The site contains approximately 40% of all remaining Pinjar complex vegetation across the Swan Coastal Plain, indicating the site's significance for this vegetation complex.
- The site contains a number of large wetlands which support Pinjar complex vegetation within their foreshore areas, which collectively have an extensive interface with proposed future development areas within the site. As such, these foreshore areas would be largely accessible for future rehabilitation works proposed as part of adjacent development proposals.

The proposed rehabilitation of foreshore areas is also generally consistent with, and responds to, the EPA's advice provided on MRS Amendment 1308/41 (which established the current 'urban deferred' zoning across the majority of the site). The advice identified regional vegetation complexes with less than 30% of their pre-European extent remaining as relevant environmental considerations, which would need to be addressed as part of future planning stages. As such, the proposed rehabilitation of foreshore areas to target enhancement of 'Pinjar' complex vegetation is consistent with this advice.

If appropriately implemented, the proposed rehabilitation of foreshore areas would be expected to improve the condition of existing Pinjar complex vegetation retained through the land use planning process, as well as potentially expand its current extent within foreshore reserve areas.

However, to result in effective environmental outcomes and provide certainty to relevant stakeholders, the proposed rehabilitation of foreshore areas will need to be further considered and detailed through future planning stages. Amongst others, the following key considerations will need to be addressed in this regard:

- **Confirmation of rehabilitation objectives for foreshore areas.** This will provide increased certainty to stakeholders around rehabilitation expectations and will inform the preparation and specification of future rehabilitation strategies for foreshore reserves, which are expected to be documented in future Foreshore Management Plans.
- **Confirmation of funding arrangements for rehabilitation works.** Rehabilitation works have the potential to be costly, particularly in highly disturbed environments, such as wetlands in peri-urban areas. As such it is important to explore and confirm funding arrangements early in the

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



planning process. Rehabilitation costs will be largely dependent on the objectives and proposed intensity of rehabilitation works.

- **Confirmation of long-term land management authorities for rehabilitated areas.** The long-term viability of rehabilitation areas can be highly dependent on effective and ongoing land management. As such, it will be important to confirm land management responsibilities early in the planning process, which would likely involve liaison between proponents of development, WAPC, CoW and DBCA.

It is expected that these considerations could be addressed through the local structure planning process and also during preparation of future Foreshore Management Plans, in consultation with relevant stakeholders.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



5.3 Proposed use and enhancement of wetlands in drainage strategy

5.3.1 Summary of proposed drainage strategy

An Integrated Water Management Framework (IWMF) (RPS 2019) has been prepared for the site to support the Draft EWDSP, which describes the existing hydrology of the site and the proposed water management strategy for future development. A Draft DWMS has been prepared and will be finalised to support the final EWDSP.

The IWMF and Draft DWMS outline that existing groundwater levels across the site are expected to rise as a result of pine plantation harvesting, groundwater recharge operations and urbanisation. Regional modelling indicates groundwater levels will rise by 3-4 m by 2030 across the site, however more detailed groundwater level modelling is currently being completed as part of finalising the Draft DWMS to confirm and refine these estimates. Future groundwater rise may result in substantial fill requirements across the site to enable urban development, particularly in the eastern portions of the site. As such, the Draft EWDSP and Draft DWMS outline that a critical principle for future urban development will be to establish a controlled ground water level across the site in order to:

- Optimise the environmental and amenity values of existing wetlands
- Ensure the activation of acid sulphate soils is avoided
- Minimise the need for earthworking and the importation of fill material.

The Draft EWDSP proposes the controlled groundwater level to be defined based on the outcomes of the detailed groundwater modelling currently being completed as part of the Draft DWMS.

With regard to surface water considerations, the IWMF and Draft DWMS outline that no streams, creeks or major drains currently exist across the site, with stormwater runoff currently flowing via undefined overland flow paths towards low-lying wetland areas, or until infiltration to the underlying groundwater occurs. The site currently supports 94 separate surface water catchments, of which 41 currently drain internally to wetland features.

The Draft EWDSP proposes a stormwater management strategy for future urban development incorporating the principles of water sensitive urban design, which generally aims to maintain the existing drainage regime of the site where possible and provide protection and potential enhancement of existing wetlands and groundwater resources.

The Draft DWMS outlines that wetlands across the site have been subject to historical reductions in their water level over time, due a range of factors including a long-term decrease in average annual rainfall, increased groundwater abstraction across the Gngangara Mound and groundwater demand from pine plantations. A number of existing wetlands within the site also occur within publically or privately owned land which supports rural land uses, which can results in wetland areas being relatively inaccessible and potentially prone to undesirable land uses and activities (such as illegal dumping), in addition to a lack of effective environmental wetland management being undertaken.

The *Draft Gngangara Sustainability Study* (Government of WA 2009) outlines that ongoing reduction in groundwater levels would result in the loss of significant wetlands across the Gngangara wetland system, which incorporate the wetlands within the site. The study also outlines that harvesting of pine plantations and urbanisation of the East Wanneroo would result in rises to groundwater levels.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



The Draft EWDSP identifies the proposed urbanisation of the site as an opportunity to assist in restoring wetland values across the site, primarily through the implementation of a stormwater management strategy which will result in increased water levels for wetlands across the site, as well as through formalisation of ongoing management for wetland areas.

In this context, the Draft EWDSP proposes stormwater runoff from minor rainfall events to be managed through at-source treatment and infiltration, either within future residential lots or within the future road network and associated stormwater management infrastructure (such as rain gardens, tree pits and roadside swales planted with appropriate nutrient up-taking species). For stormwater runoff from major rainfall events, the Draft EWDSP proposes the following stormwater strategy:

- Stormwater runoff which does not infiltrate at-source is proposed to be conveyed and treated via an arterial drainage network to be constructed as part of urban development, including roadside swales and living streams, which will flow toward low-lying wetland areas. The Draft EWDSP outlines that this is based on the principle that existing topography will be retained across the site to minimise fill requirements for urban development and to enable direction of stormwater runoff to existing wetland features.
- All categories of wetlands (multiple use, resource enhancement and conservation category) are proposed to be accommodated as part of the stormwater management strategy for the site, specifically in managing stormwater from major rainfall events. The Draft EWDSP identifies this an opportunity to '*result in the enhancement or reinstatement of wetlands*' across the site, given the historical changes to the regional hydrological regime which has affected wetland values. The Draft EWDSP also outlines that consultation with DBCA will be required to ensure these stormwater management systems which accommodate wetlands are appropriately designed.
- The Draft EWDSP outlines that stormwater runoff will be required to be managed entirely within its originating precinct, except for circumstances where an existing wetland occurs on a precinct boundary, whereby stormwater runoff will be directed to that wetland feature. Proposed precinct boundaries identified in the Draft EWDSP in relation to DBCA mapped wetlands boundaries are shown in **Figure 6**.
- Where existing wetlands do not occur within catchments, drainage basins will be constructed and provided for in local public open space. The Draft EWDSP outlines that this is likely to apply to at least 15 existing catchments across the site which do not support wetland features.

5.3.2 Discussion of proposed drainage strategy

The accommodation of wetlands in managing urban stormwater runoff from major rainfall events is considered to be a logical approach in minimising earthworks and fill requirements of urban development through utilisation of existing topography. This approach is also consistent with overarching stormwater management principles for urban development, as outlined in DWER's guidance document *Decision process for stormwater management in Western Australia* (DWER 2017), which outlines that a key principle of urban stormwater management is to '*mimic natural hydrological processes*'.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



DWER (2017) outlines that stormwater management approaches for urban development should *'retain, protect and, where possible, restore high conservation significance water bodies within the development area'*. DWER (2017) notes that this should be generally achieved through the principles of maintaining pre-development conditions of receiving water bodies and wetlands.

The Draft DWMS outlines that the proposed drainage management strategy is likely to increase wetland water levels across the site. Whilst this will alter the current (pre-development) conditions of wetlands, this is not considered to be inconsistent with overarching stormwater management principles in the context of the site, given this strategy is likely to assist in restoring long-term hydrological regimes and wetland water levels across the site, which have been historically impacted by changing rainfall patterns and anthropogenic impacts (groundwater demand of pine plantations and groundwater abstraction activities for public drinking water). This provides an opportunity for the enhancement of wetland features across the site.

The past reduction of wetland water levels across the region has been identified as a key issue which requires management. In this regard and as discussed in the EAS, Ministerial Statement (MS) 819 *Gnangara Mound groundwater resources* sets out a range of conditions to ensure wetland water levels are appropriately managed during abstraction of groundwater resources from the Gnangara Mound. This includes specification in MS 819 of minimum allowable wetland water levels across the region (with a number of wetlands listed in MS 819 occurring within the site). As such, the proposed stormwater management strategy and resultant expected increase in wetland water levels are consistent with the water management principles that MS 819 aims to address.

Overall, the proposed stormwater management strategy and associated accommodation of existing wetlands as part of the overall water balance of the site is considered to be consistent with overarching stormwater management principles. Notwithstanding, the Draft EWDSP and Draft DWMS acknowledge that it will be important for additional detailed planning of the proposed drainage strategy to occur through subsequent stages of the planning process, most likely through preparation of Local Water Management Strategy/s. The Draft DWMS also outlines that further technical work and consultation with DBCA will be required prior to designing stormwater systems accommodate wetlands, which will enable further consideration of the potential environmental outcomes of the strategy and can be addressed at future stages of the planning process.

Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



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Assessment of Proposed Environmental Outcomes

East Wanneroo District Structure Plan



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Figures



Figure 1: Site Location

Figure 2: Known and Potential Occurrences of Threatened Ecological Communities

Figure 3: Existing Protection Mechanisms

Figure 4: EAS Priority Areas for Further Investigation

Figure 5: Draft EWDSP Parklands Network

Figure 6: Draft EWDSP Precinct Boundaries

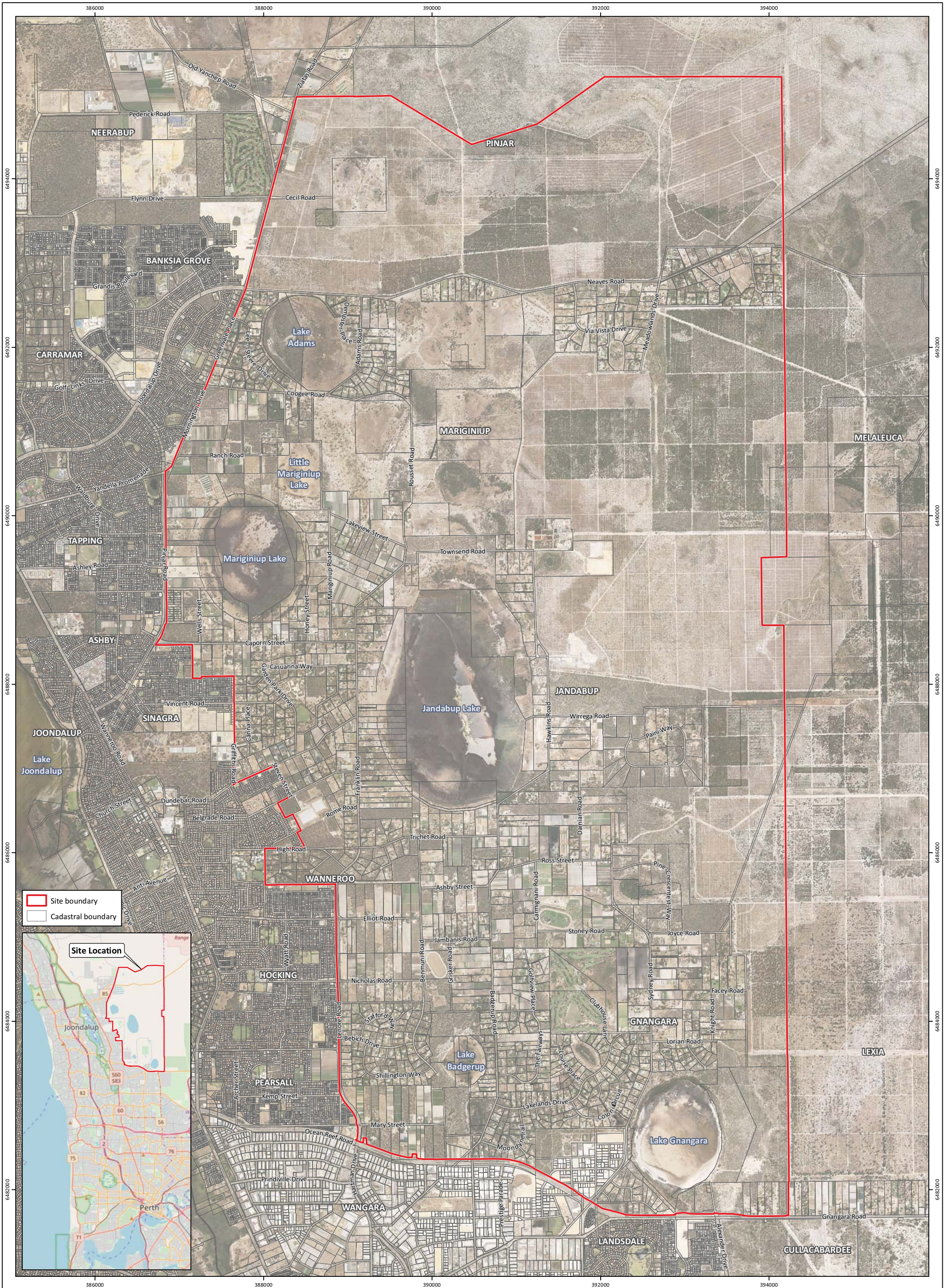


Figure 1: Site Location

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Drawn: ADB
Date: 29/07/2019
Checked: ADB
Approved: ALB
Date: 09/08/2019



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GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used

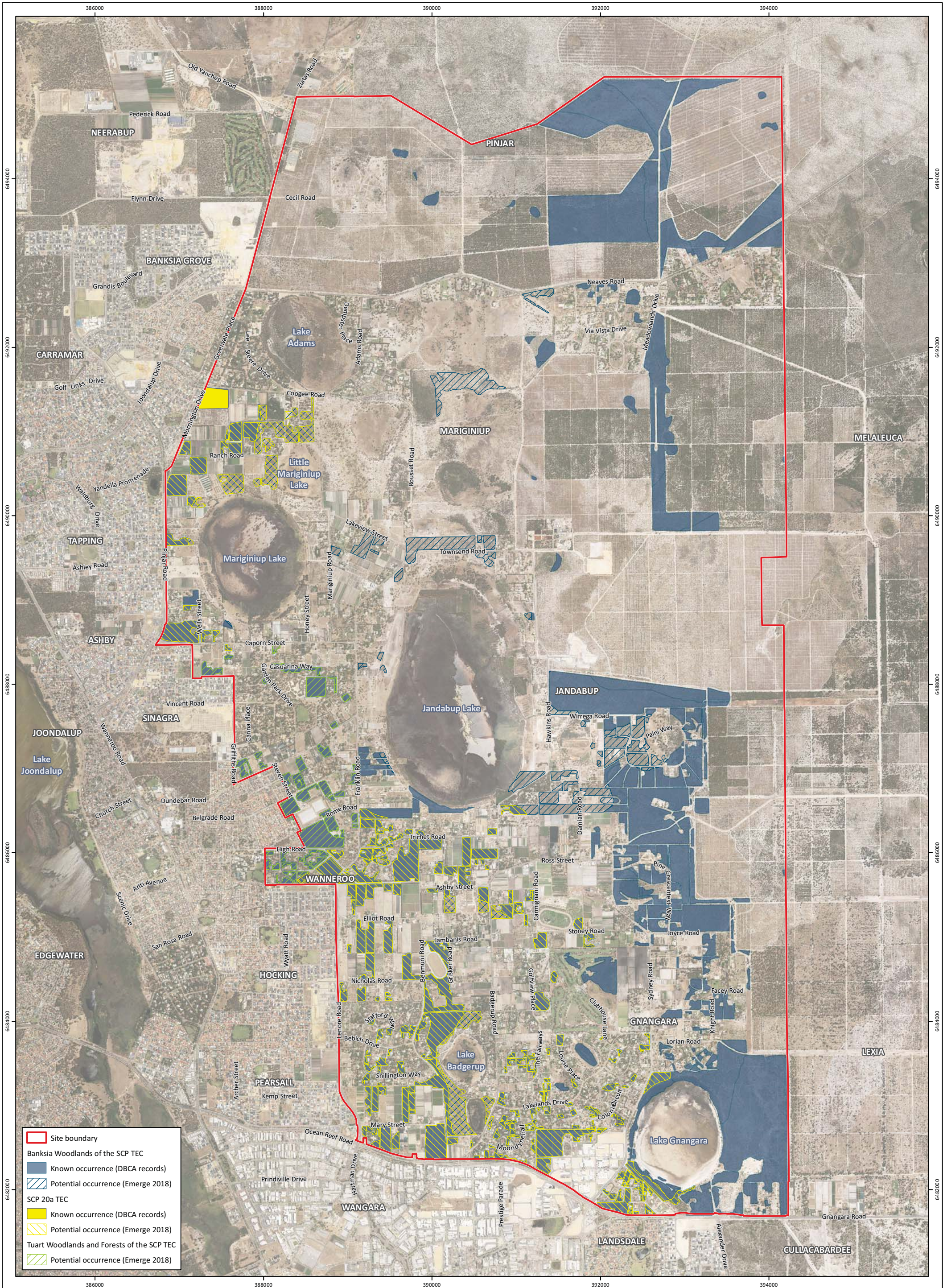


Figure 2: Known and Potential Occurrences of Threatened Ecological Communities

Project: Assessment of Proposed Environmental Outcomes
East Wanneroo District Structure Plan
Client: Department of Planning, Lands and Heritage

Plan Number:
EP17-106(06)-F78
Drawn: KNM
Date: 02/08/2019
Checked: ADB
Approved: ALB
Date: 09/08/2019



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Scale: 1:40,000@A3
GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used

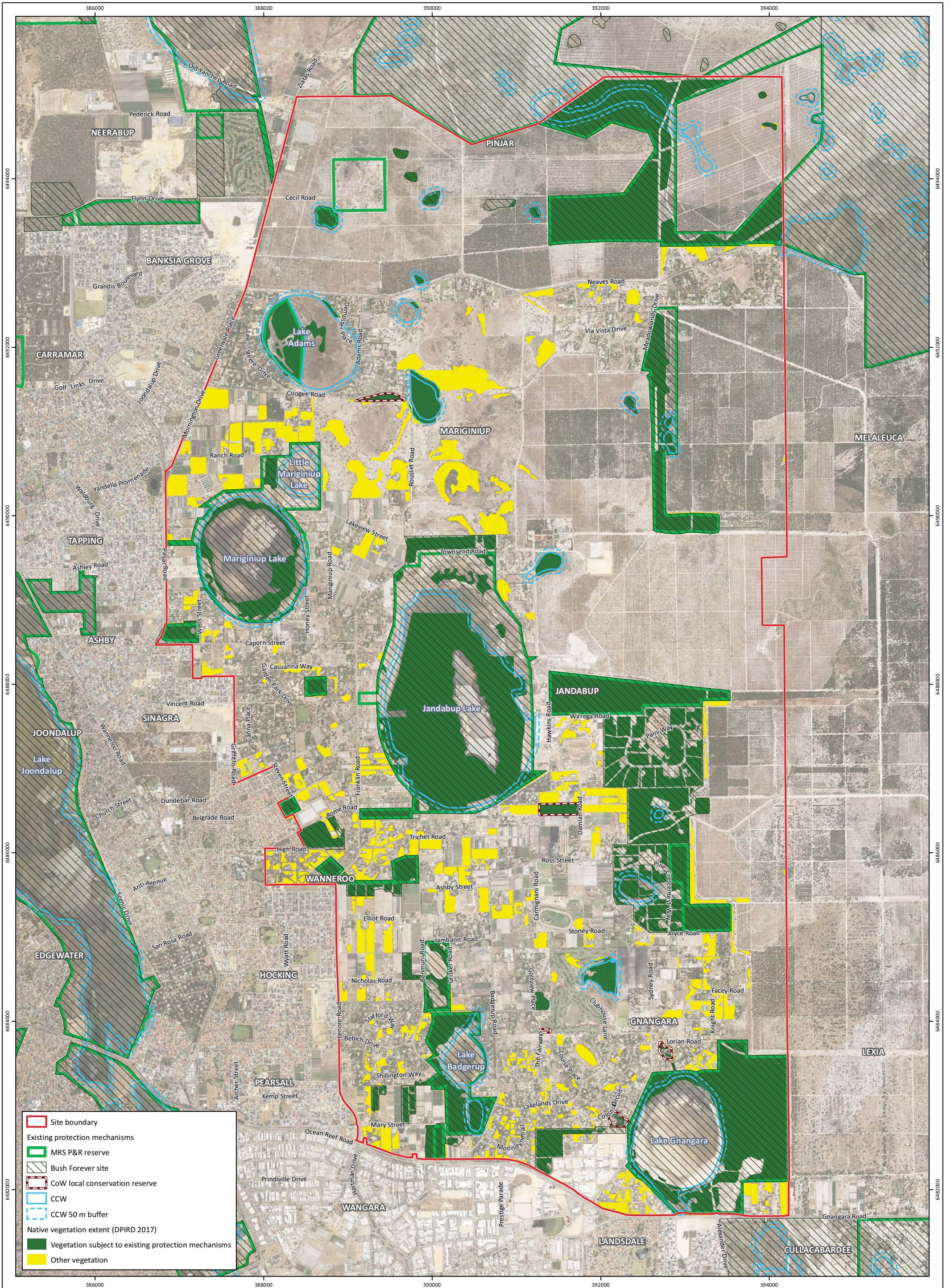


Figure 3: Existing Protection Mechanisms

Project: Assessment of Proposed Environmental Outcomes
East Wanneroo District Structure Plan

Client: Department of Planning, Lands and Heritage

Plan Number:
EP17-106(06)-F79

Drawn: KNM

Date: 02/08/2019

Checked: ADB

Approved: ALB

Date: 09/08/2019



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GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used

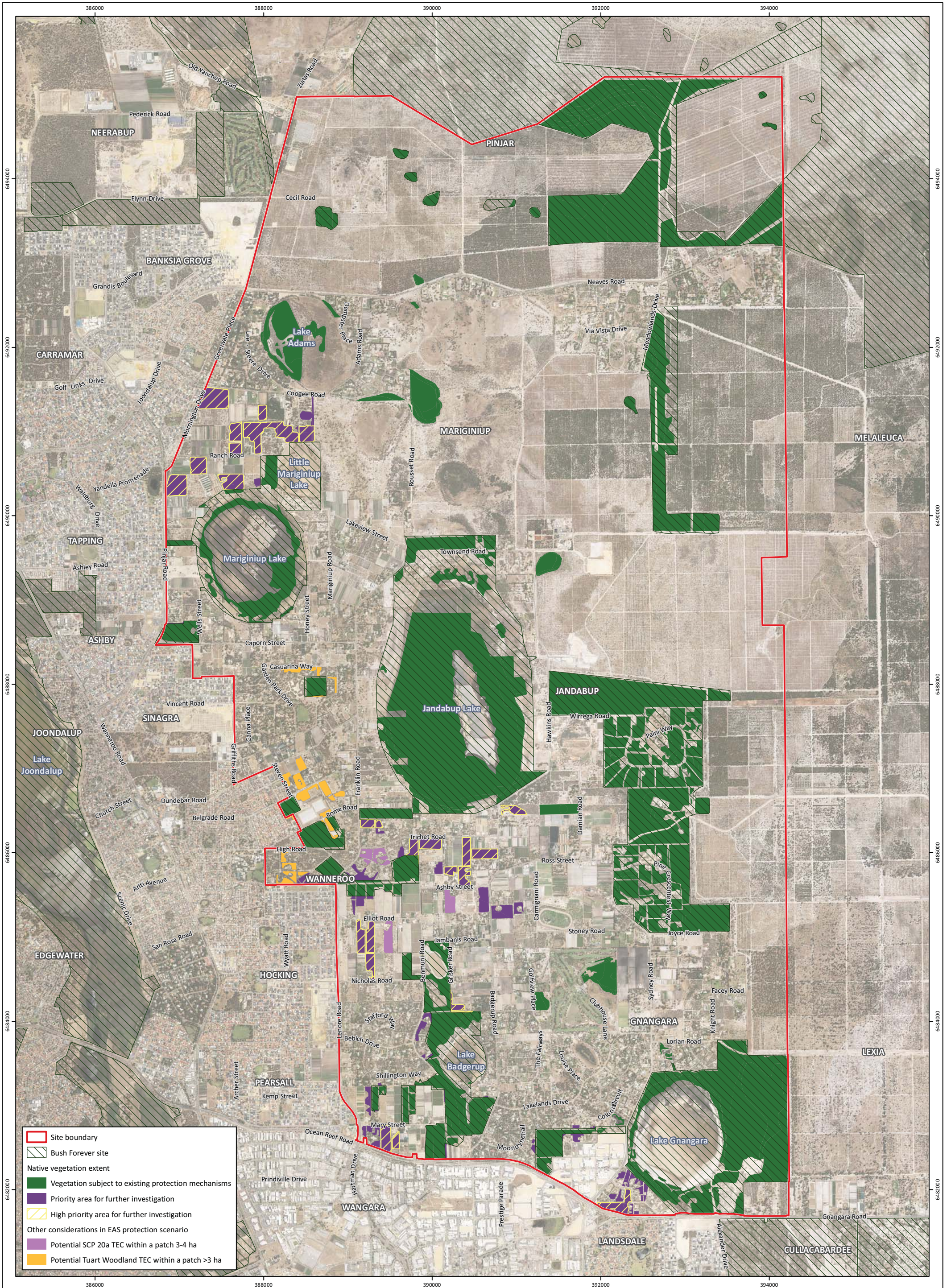


Figure 4: EAS Priority Areas for Further Investigation

Project: Assessment of Proposed Environmental Outcomes
East Wanneroo District Structure Plan

Client: Department of Planning, Lands and Heritage

Plan Number: EP17-106(06)-F80
Drawn: KNM
Date: 02/08/2019
Checked: ADB
Approved: ALB
Date: 09/08/2019



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Scale: 1:40,000@A3
GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used

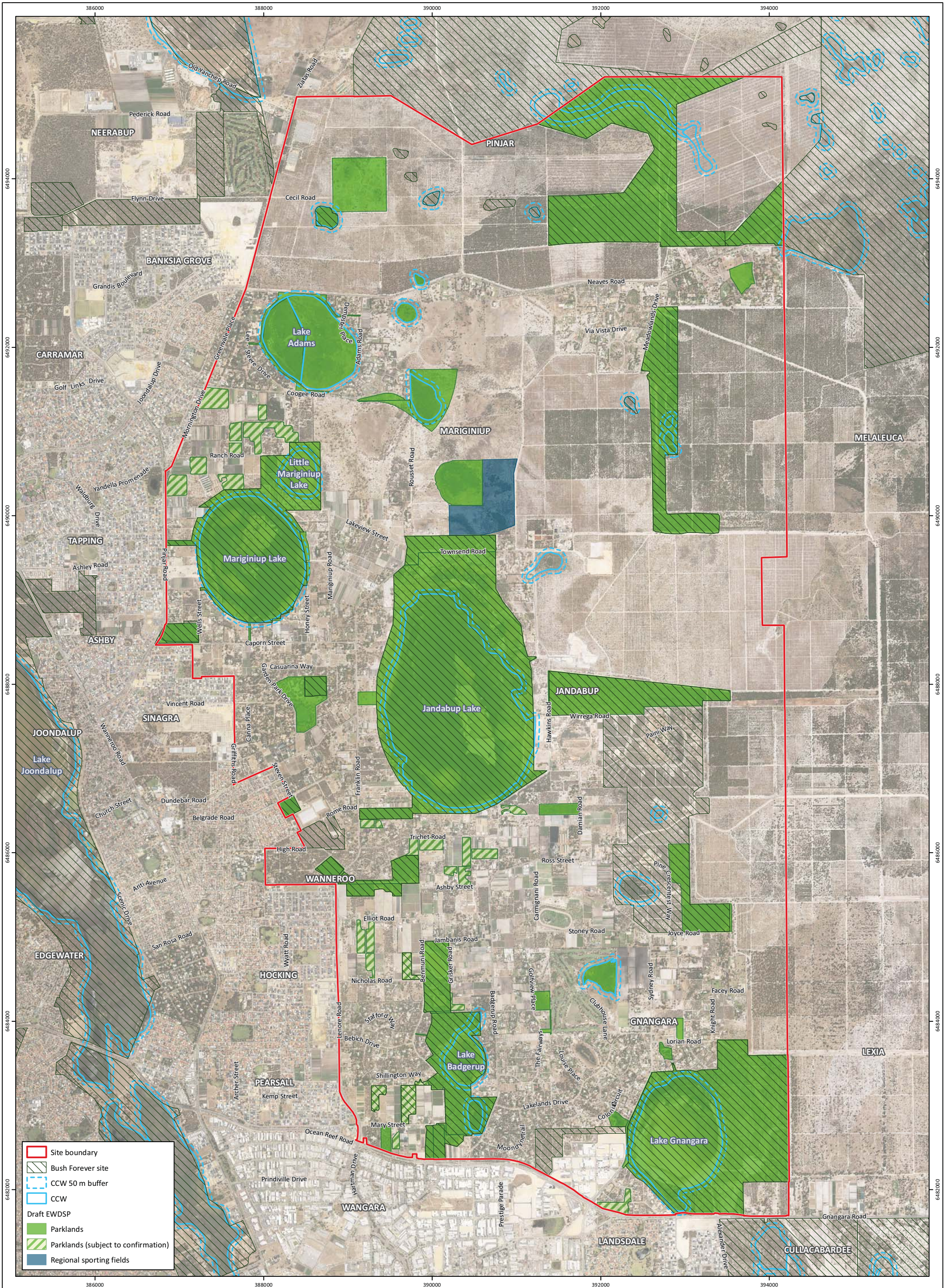


Figure 5: Draft District Structure Plan Parklands Network

Project: Assessment of Proposed Environmental Outcomes
East Wanneroo District Structure Plan
Client: Department of Planning, Lands and Heritage

Plan Number: EP17-106(06)-F81
Drawn: KNM
Date: 02/08/2019
Checked: ADB
Approved: ALB
Date: 09/08/2019



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Scale: 1:40,000@A3
GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used

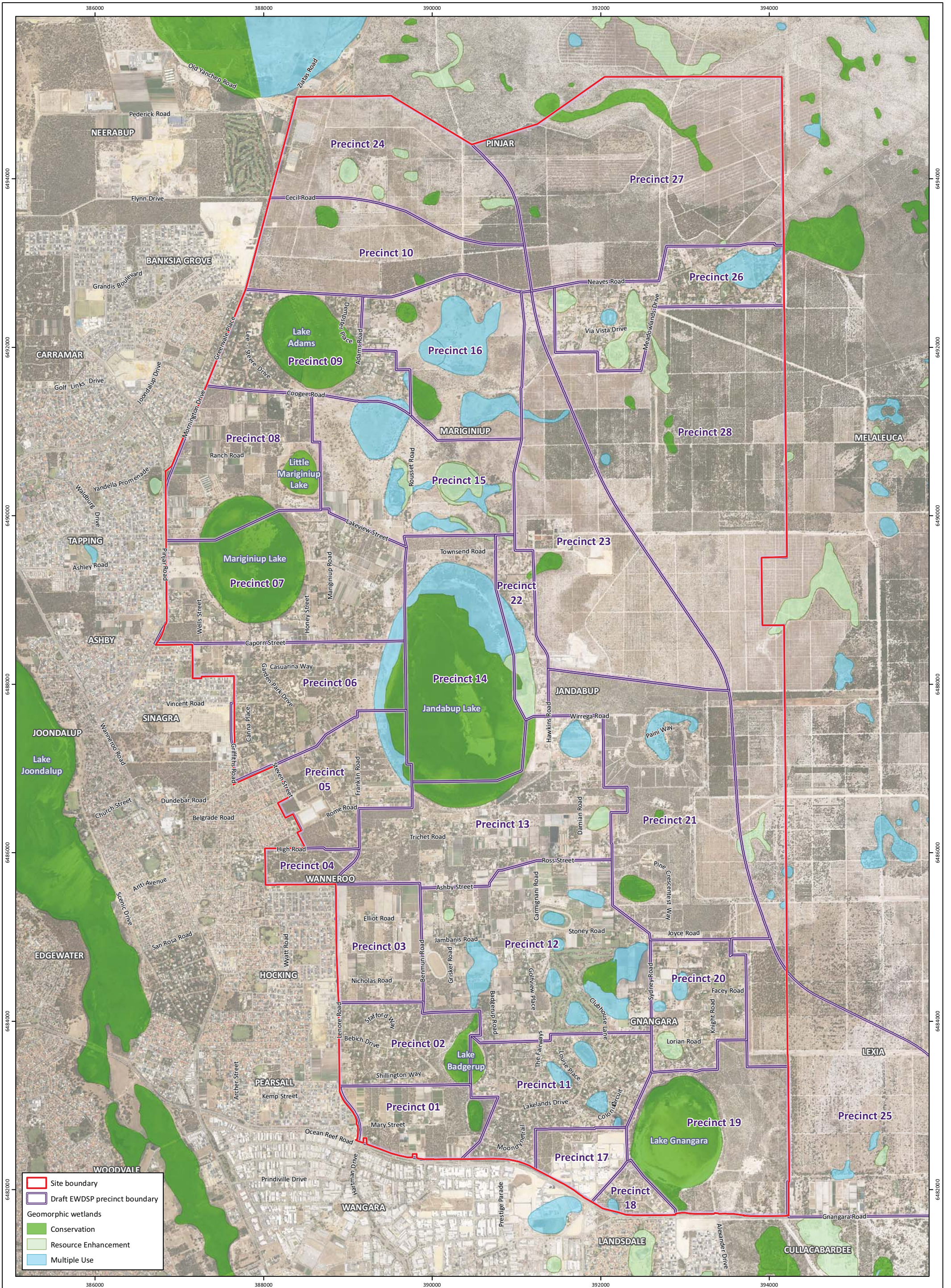


Figure 6: Draft EWDSP Precinct Boundaries

Project: Assessment of Proposed Environmental Outcomes
East Wanneroo District Structure Plan
Client: Department of Planning, Lands and Heritage

Plan Number:
EP17-106(06)-F82a
Drawn: KNM
Date: 15/08/2019
Checked: ADB
Approved: ALB
Date: 15/08/2019



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Metres
Scale: 1:40,000@A3
GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used

Appendix A

Draft East Wanneroo District Structure Plan (DPLH 2019)



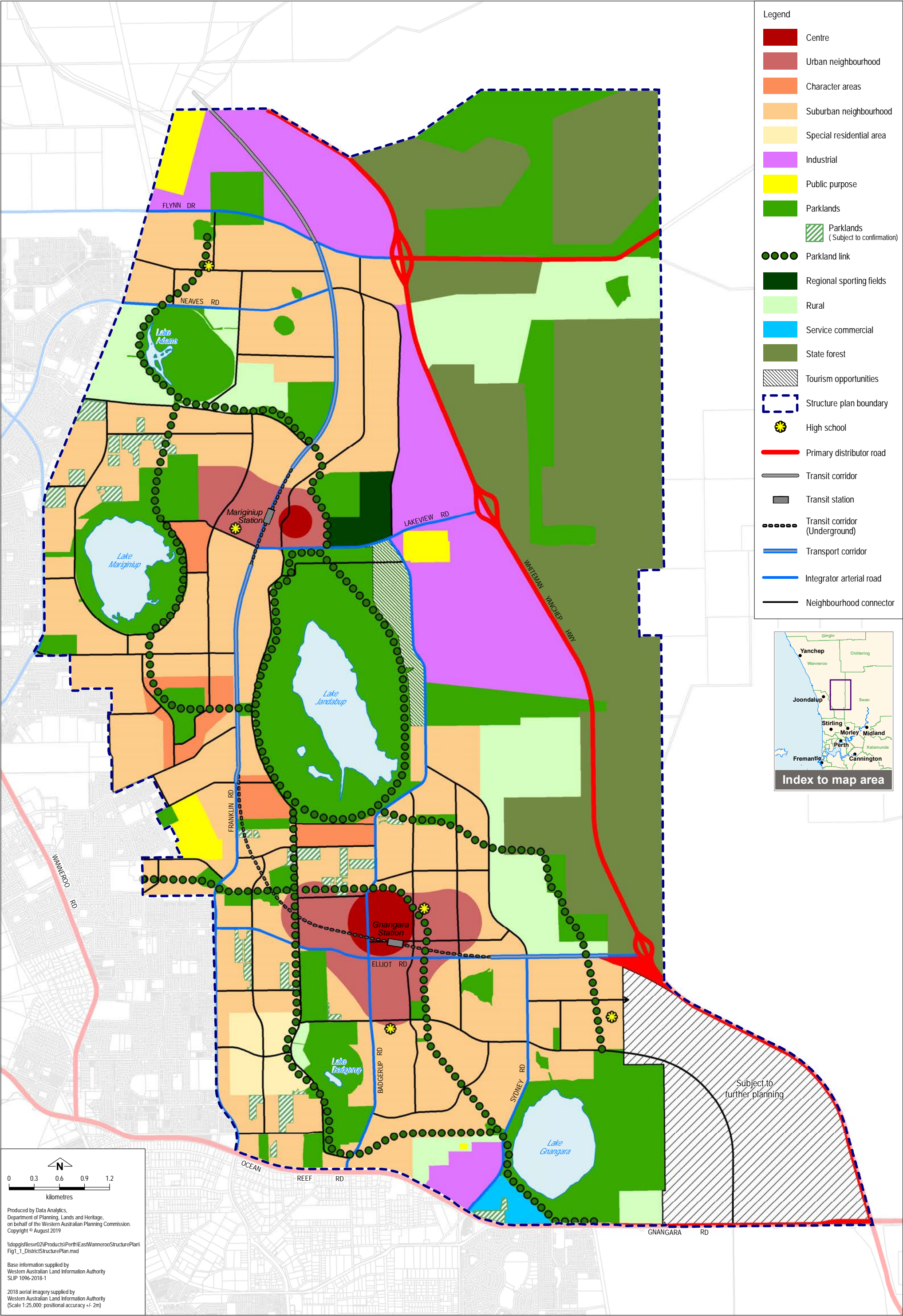
Draft District Structure Plan

Precinct Plan

Proposed New Regional Parks and Recreation Reserves

Parkland Network and Bush Forever Areas

Figure 1.1 Draft District Structure Plan



East Wanneroo District Structure Plan

Figure 1.11 Precinct Plan

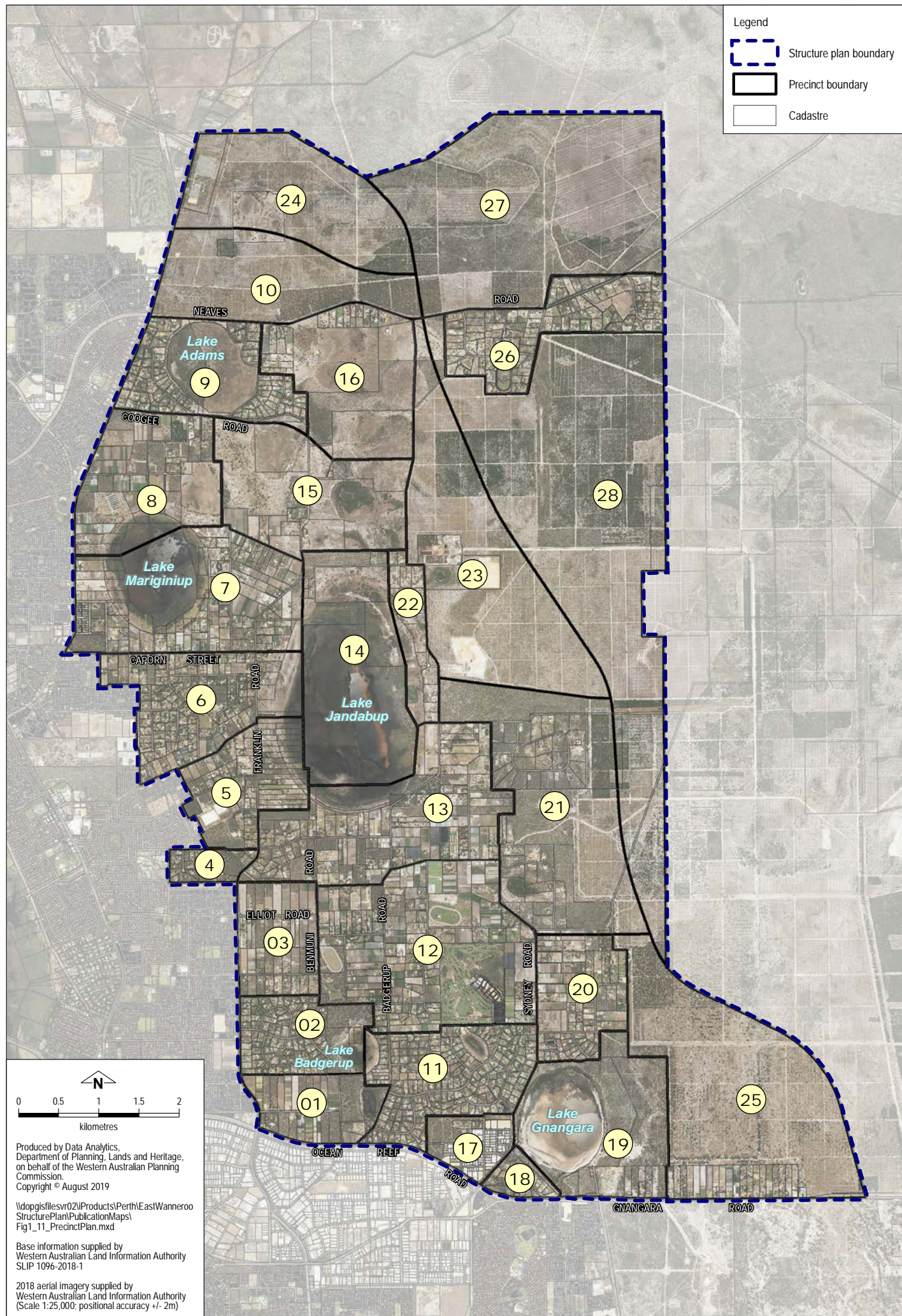


Figure 1.2 Proposed new regional Parks and Recreation reserves

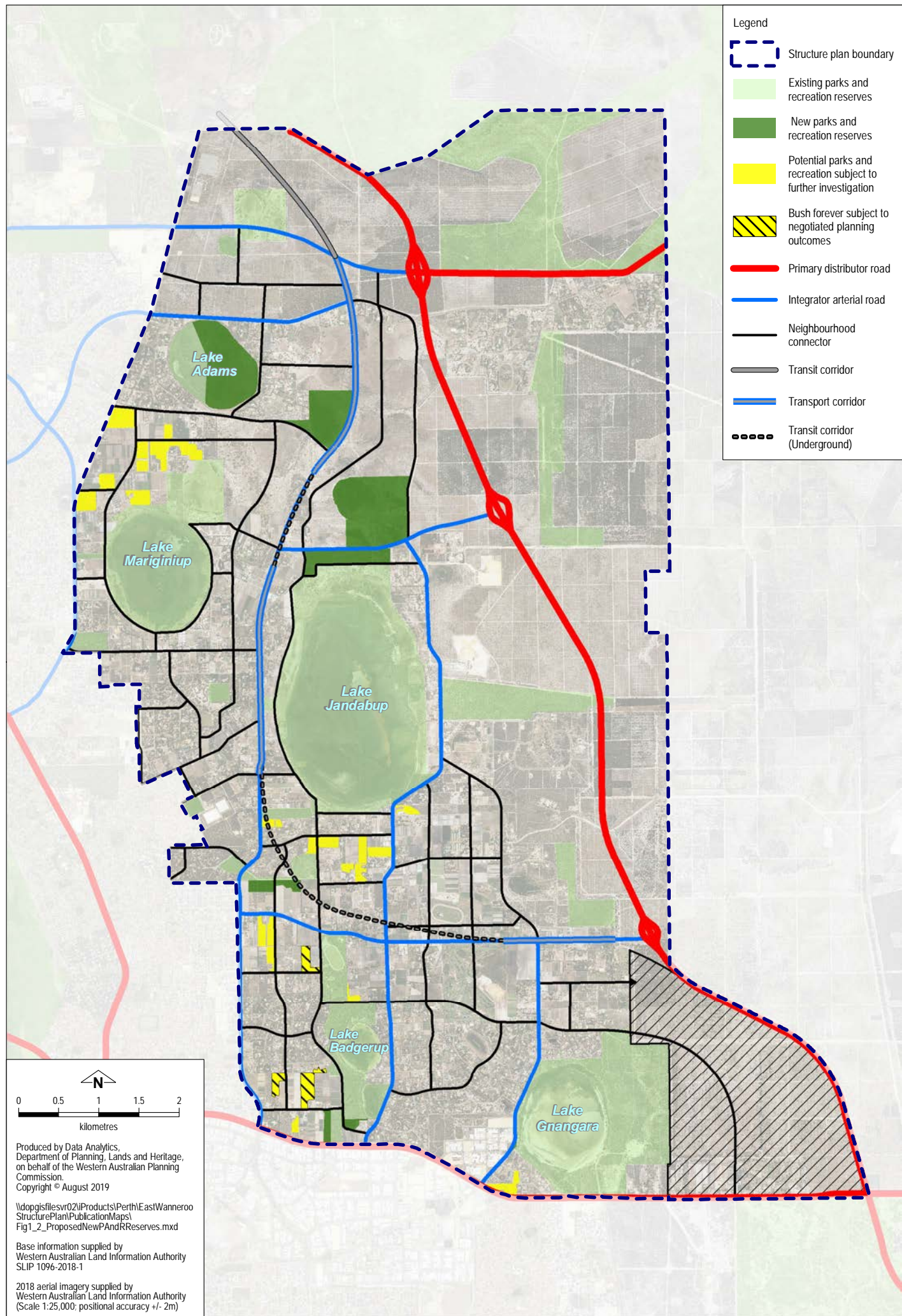


Figure 2.12 Parklands

